

## **Dental Disease:**

### **Education and Outreach Will Help to Eliminate Disease in Delaware and Beyond**

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## **INTRODUCTION**

The first-ever Surgeon General's Report on Oral Health released in 2000 stated unequivocally that "oral health is integral to general health."<sup>1</sup> The report revealed in persuasive detail how the mouth reflects well-being. Associations between chronic oral infections and prominent health problems – namely, cardiovascular disease, diabetes, stroke, certain cancers, Alzheimer's disease, rheumatoid arthritis, low birth weight, and failure to thrive in infants and young children – are well documented. In adults, the strong correlation between several oral diseases and noncommunicable chronic diseases is primarily a result of common risk factors related to lifestyle (e.g., dietary habits, tobacco and alcohol use, and lack of exercise).<sup>2</sup>

Major advances in preventive measures, such as the use of fluoride during the last half of the 20th century, and the treatment of dental disease have demonstrated that significant progress in oral health can be realized through a combination of individual, community and professional collaboration. Despite these achievements, the Surgeon General's report strongly warned that there was "still much work to be done," especially in addressing the disparities that affect those who are least able to access the available resources to achieve optimal oral health.<sup>1</sup>

Indeed, many Americans have not experienced improvement in oral health. This adverse situation is attributable to a multitude of factors including, but not limited to: knowledge deficits related to oral health maintenance and disease prevention, socioeconomic factors, and complex health problems. People who fall within these categories often experience a disproportionate level of oral health complications.

Furthermore, this issue has taken on increasing international significance. The two leading oral afflictions worldwide – dental caries (tooth decay) and periodontal (gum) disease – are still major oral health problems in most industrialized nations.

Seventeen years after the Surgeon General's report, the iconic label used to describe dental disease – "a silent epidemic" – is more real than ever. The United States continues to struggle with adequate access to and utilization of dental services.<sup>3</sup> These are profound and consequential concerns for the oral health of our nation. Given the extent of the problem, dental disease is a major public health issue.

This article outlines that challenge: the incidence – both nationally and statewide; the preventive measures that can be adopted by individuals and health care professionals; and, finally, an education campaign necessary to improve our oral health.

## **DENTAL CARIES: THE SILENT DISEASE**

Dental caries is a chronic, infectious, transmissible disease resulting from tooth-adherent bacteria, mainly *Mutans streptococci*, that metabolizes sugars to produce acids which, over time,

cause tooth decay. Beyond the obvious pain and loss of teeth, the devastating complications of this insidious disease include the financial and social costs, and a diminished quality of life for many Americans.

Ten years after the 2000 Surgeon General's report cited in the introduction, a National Healthy Policy Forum held in Washington, D.C. concluded that nationwide "dental disease remains the most common illness among children and affects about 40 percent of low-income adults."<sup>3</sup> Globally, dental caries affects 60-90% of schoolchildren and most adults.<sup>2</sup> This epidemic spares no one, including babies.

### **Early Childhood Caries (ECC)**

A severe form of caries associated with bottle usage (previously called baby bottle tooth decay) is highly prevalent and increasing in poor and near poor U.S. preschool children and is largely untreated in children under age three (see Figure 1).<sup>4</sup> The causes of ECC were originally attributed to bottle feeding habits and ad libitum breast feeding after the eruption of first teeth. Today, other causative factors have been found:

- Bacteria transmission through salivary contact with caregivers, family or other children (example, sharing of utensils)
- Over-consumption of sugar-containing snacks, such as juices, sodas and gummy snacks

In some severe cases, consequences of untreated ECC include hospitalizations and emergency room visits, failure to thrive, risk for delayed physical growth and development, and even life-threatening facial involvement.

Figure 1. Severe tooth decay in a 4-year-old boy

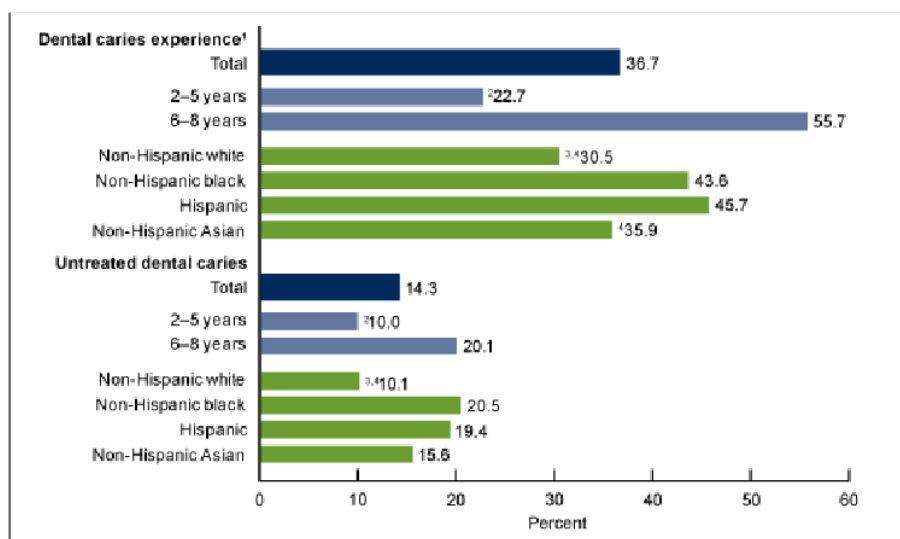


### Children Aged 2-19 (National)

Although dental caries has been declining in primary and permanent teeth for many children since the 1960s, there is still a high ongoing prevalence for some groups in the United States reaching epidemic levels.

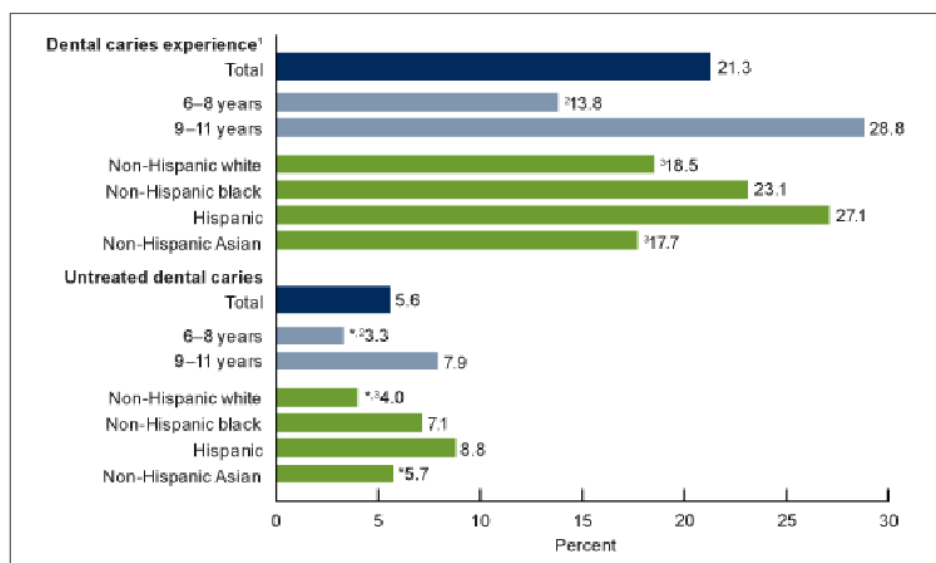
The following five tables are based on data compiled in 2011-2012 by the National Center for Health Statistics. Approximately 37% of children aged 2-8 had experienced dental caries in primary teeth (see Figure 2). Untreated tooth decay in primary teeth among children aged 2-8 was twice as high for Hispanic and non-Hispanic black children compared with non-Hispanic white children.<sup>5</sup>

Figure 2. Prevalence of dental caries in primary teeth, by age and race and Hispanic origin among children aged 2–8 years: United States, 2011–2012



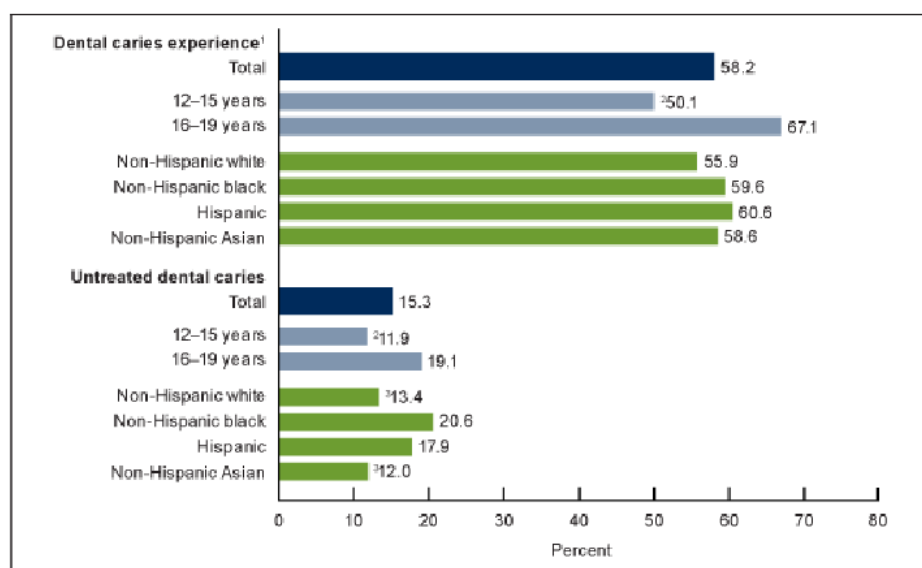
In 2011-2012, 21% of children aged 6-11 had experienced dental caries in permanent teeth (see Figure 3). In that same age bracket, 27% of Hispanic children had dental caries in permanent teeth compared with nearly 18% of non-Hispanic white and Asian children.<sup>5</sup>

Figure 3. Prevalence of dental caries in permanent teeth, by age and race and Hispanic origin among children aged 6–11 years: United States, 2011–2012



Among adolescents aged 12-19, about three in five had experienced dental caries in permanent teeth, and 15% had untreated tooth decay (see Figure 4). Of note, overall, the percentage with caries did not differ significantly by race and Hispanic origin in this age group.<sup>5</sup>

Figure 4. Prevalence of dental caries in permanent teeth, by age and race and Hispanic origin among adolescents aged 12–19 years: United States, 2011–2012



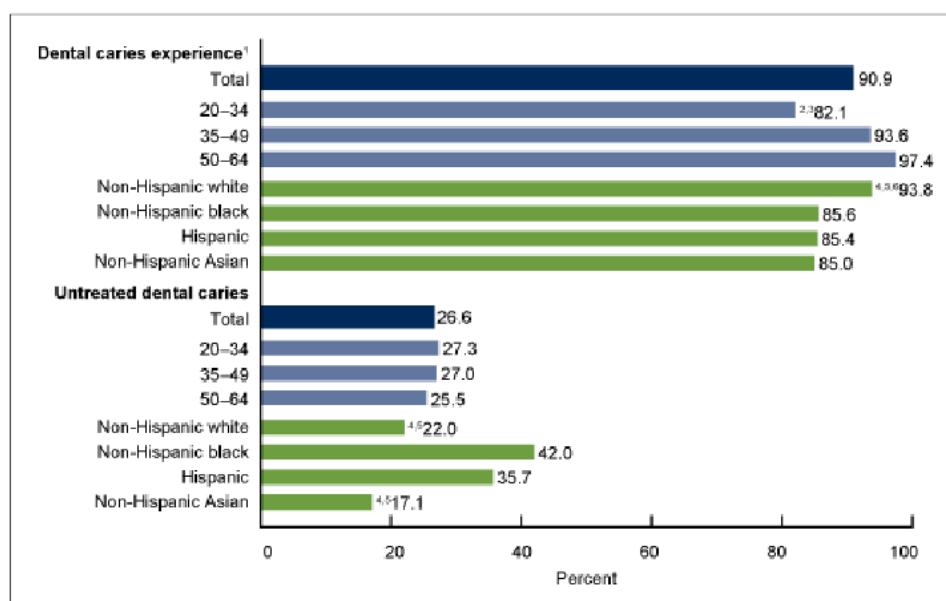
Delaware has not been spared the ravages of dental disease, especially among children. According to 2016 statistics compiled by the Division of Medicaid and Medical Assistance of the Delaware Department of Health and Social Services, 51,286 dental fillings and 9,537 tooth

extractions were performed on children aged 2 to 21 enrolled under Medicaid. Nearly \$60 million was billed for Medicaid dental services in 2016. Another statistic reveals that of the 135,984 children enrolled in Medicaid and CHIP (Children’s Health Insurance Program) less than 50% (62,955) had at least one dental visit that year. At the Roxana Cannon Arsht Surgicenter of Christiana Care Health System, 1,269 pediatric oral rehabilitation cases were performed under general anesthesia from 1/1/2015 to 9/15/2017 to treat dental caries in young children who are unable to cooperate in an office setting.

## Adults (National)

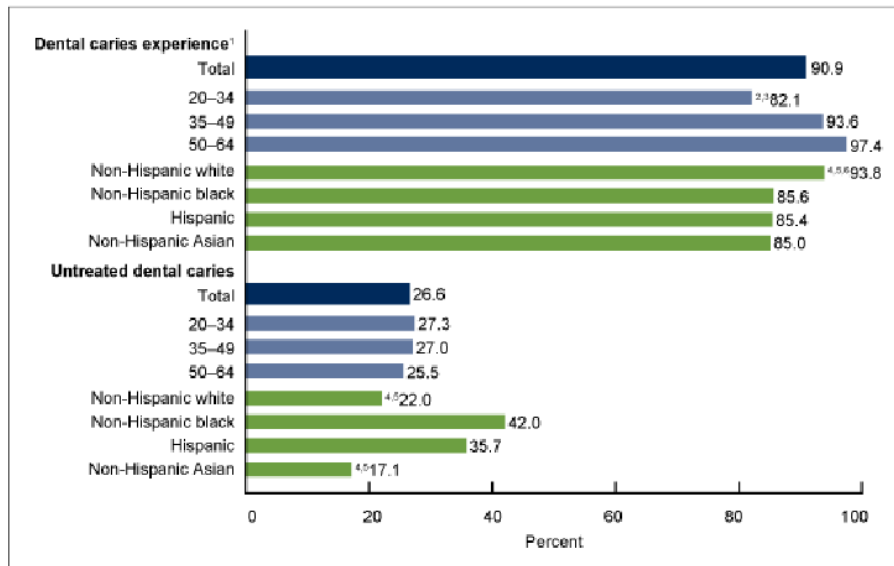
Among adults aged 20-64, nearly 91% had dental caries, and about 27% had untreated tooth decay (see Figure 5). Within this age group, non-Hispanic whites had the highest percentage (almost 94%) of dental caries. For untreated dental caries, however, non-Hispanic whites had the lowest percentage (22%), nearly half the percentage of non-Hispanic black adults (42%).<sup>5</sup>

Figure 5. Prevalence of dental caries in permanent teeth among adults aged 20–64, by age and race and Hispanic origin: United States, 2011–2012



In the final age group reviewed, nearly all U.S. adults aged 65 and over had dental caries – 96% (see Figure 6). The highest percentage of tooth decay was among non-Hispanic whites. Close to one in five Americans over the age of 65 experienced untreated dental caries in 2011-2012. No meaningful difference was manifest in untreated dental caries between those 65-74 and those aged 75 and over. Untreated tooth decay was significantly higher for non-Hispanic black adults (41%) than any other race group studied.<sup>5</sup>

Figure 6. Prevalence of dental caries in permanent teeth among adults aged 65 and over, by age and race and Hispanic origin: United States, 2011–2012



## PERIODONTAL DISEASE

The other major contributor to the epidemic of dental disease is periodontitis, also generally called gum disease or periodontal disease. It is caused by bacteria found in dental plaque that produces inflammation in the tissues of the gums and mouth. This inflammation can lead to destruction of the tissues, periodontal ligaments, and even bone. Gingivitis (gum inflammation, see Figure 7), which is reversible, usually precedes periodontitis. However, it is important to note that not all gingivitis progresses to periodontitis.

Figure 7. Gingivitis – gum inflammation and some bleeding



In the early stage of gingivitis, bacteria in plaque builds up, causing the gums to become inflamed and to easily bleed during tooth brushing. Although the gums may be irritated, the teeth are still firmly planted in their sockets. No irreversible bone or other tissue damage has occurred at this stage.

When gingivitis progresses to periodontitis, treatment becomes much more complicated, involving special dental procedures and even periodontal surgery. The early signs of periodontitis (see Figure 8) include receding gums and the formation of pockets between the gums and the teeth, which is diagnosed by a dental examination and dental radiographs (X-rays).

Figure 8. Early Periodontitis



Once the infection progresses, severe periodontitis (see Figure 9) can destroy tissues, ligaments, and bone in the mouth. It may also cause loss of teeth due to inadequate bone support.

Figure 9. Severe Periodontitis



The most recent published study from the Centers for Disease Control and Prevention estimates that 47.2%, or approximately 64.7 million American adults, have mild, moderate or severe

periodontitis. In adults 65 and older, prevalence rates increase to 70.1%. Periodontal disease is more common in men than women (65.4% to 38.4%).<sup>6</sup>

When the tissue of the gums separates from the teeth during periodontal disease, the harmful bacteria can enter the bloodstream and travel to major organs.<sup>7</sup> Mounting evidence suggests that an alarming number of systemic diseases are currently linked to periodontal disease. A partial list includes:

- Osteoporosis
- Cardiovascular disease
- Cancer
- Preeclampsia
- Preterm births
- Metabolic Syndrome
- Rheumatoid Arthritis
- Stroke
- Erectile dysfunction
- Bacterial pneumonia
- Diabetes

While one's oral health might contribute to various diseases and conditions, the reverse is also true – certain conditions might affect oral health. For instance, diabetes reduces the body's resistance to infection, thereby increasing the frequency of periodontal disease among those who have diabetes.<sup>8</sup> Other conditions having an adverse effect on the mouth and gums include HIV/AIDS, osteoporosis, Alzheimer's Disease, rheumatoid arthritis, and head and neck cancers.

## **TREATMENT & PREVENTION**

The good news is that both dental caries and periodontal disease are treatable and preventable. The epidemic levels now reached are reversible through education and collaboration. The first line of defense must begin with medical and public health professionals – including, but not limited to, OBGYNs, pediatricians, Family Medicine practitioners, and endocrinologists.

These specialists, and others, are particularly critical (and often unnoticed) in this battle.

### **OB-GYNs**

Prenatal health care should include an assessment of oral health. Only 22 to 34 percent of women in the United States consult a dentist during pregnancy.<sup>9</sup> To compound matters, myths about the effects of pregnancy on dental health and concerns for fetal safety during dental treatment can cause patients and physicians to avoid treatment of oral health issues during pregnancy.

Research shows that prenatal oral health conditions such as dental caries and periodontitis have adverse consequences for the child. One fourth of women of reproductive age have dental caries. Mothers who have high levels of untreated caries are more than three times as likely to have children who had an increased level of early childhood caries.<sup>10</sup> Thirty percent of women of



child-bearing age have periodontitis. This inflammatory disease is known to be associated with both preterm birth and low birth weight babies.<sup>9</sup>

Physicians, especially OB-GYNs, can address maternal oral issues, potentially reducing the risk of preterm birth and childhood caries through oral disease prevention, diagnosis, early management, and dental referral.

Moreover, findings from a 2008 study suggest that an oral health program based on providing proactive and repeated counseling begun during a woman's pregnancy was successful in reducing severe ECC.<sup>10</sup> Therefore, a mother's oral health status is a strong predictor of the oral health status of her children.

Some recommendations for OB-GYNs include:

- Every pregnant woman should be assessed for dental hygiene habits, access to fluoridated water, oral issues such as active caries and gingivitis, and access to dental care.
- Counseling regarding routine brushing and flossing; avoidance of sugary snacks and drinks; and to consult a dentist if necessary
- Use of oral topical antibacterial treatment (Xylitol and Chlorhexidine) of dental caries in mothers in late pregnancy and/or postpartum period can reduce oral bacteria levels and maternal transmission to infants.<sup>9</sup>

## **Pediatricians**

As discussed earlier, tooth decay, if left untreated even in the earliest stages of life, can have serious implications for a child's health. The Centers for Disease Control and Prevention reports that ECC is perhaps the most prevalent infectious disease of our nation's children. Dental caries is five times more common than asthma and seven times more common than hay fever in children.<sup>11</sup> Without preventive care, the impact of tooth decay on child development can be significant.

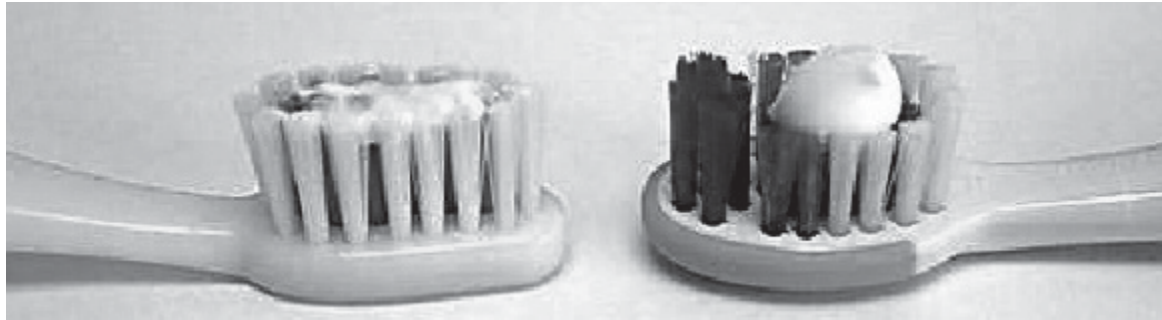
Because pediatricians and other pediatric health care professionals are far more likely to encounter new mothers and infants than are dentists, it is essential that they are (or become) aware of the associated risk factors of early childhood dental caries. The American Academy of Pediatrics recommends at least twelve check-ups for well-child care during the first three years, then yearly after age three on the following schedule: two-five days after birth, 1-, 2-, 4-, 6-, 9-, 12-, 15-, 18-months, 2 years, 2 ½ years, and 3 years.<sup>12</sup> This schedule gives pediatricians several opportunities to make timely referrals for a child's first dental visit. According to the American Academy of Pediatric Dentistry, a child's first dental visit should occur no later than six months after the eruption of the first tooth or by age one – whichever comes first.<sup>13</sup>

The American Academy of Pediatrics recommends that oral risk assessments should begin at six months of age. This tool allows pediatricians to identify parents and infants with a high predisposition to caries. The assessment starts by taking a simple dental history from the mother to determine dietary practices, fluoride exposure, oral hygiene, utilization of dental services, and the history of the mother's existing dental fillings or active dental caries.

Some recommendations for pediatricians to provide parents include:

- Minimize saliva-sharing activities (e.g., sharing utensils, cleaning a dropped pacifier with their saliva) to decrease transmission of cariogenic bacteria
- Implementing oral hygiene measures no later than the time of eruption of the first primary tooth. Brush the child's teeth twice daily with a "smear" amount of fluoridated toothpaste up to age three. From age three to six, a "pea" amount of toothpaste should be used (see figure 10).

Figure 10. Comparison of a 'smear' (left) with a 'pea-size' (right) amount of toothpaste.



- At-will nighttime breast-feeding should be avoided after the first primary teeth begin to erupt. Drinking juice from a bottle should be avoided, especially at bedtime. Teeth should be brushed after feedings.
- Encourage children to drink from a cup as they approach their first birthday. Infants should be weaned from the bottle after 12 months of age.
- Intake of juice should be limited to, at most, 4 ounces daily for toddlers age 1-3. For children age 4-6, fruit juice should be restricted to 4 to 6 ounces daily.
- Thumb sucking, while perfectly normal for infants, should stop between the ages of two and four.
- Children who drink primarily bottled water may not be getting the fluoride they need.
- Eliminate consumption of sugar-containing snacks or drinks.
- Encourage the establishment of a "dental home" for the child – finding a licensed dentist who will manage the child's oral health care in a comprehensive manner. This will insure the proper access to dental screenings, counseling and preventive measures.

## FLUORIDE: A PUBLIC HEALTH SUCCESS STORY

The addition of fluoride to public water supplies has played a major role in improving the public's dental health for 70 years and has been hailed as one of the great public health achievements of the 20th century.<sup>14</sup> Community water fluoridation now benefits more than 7 out of 10 Americans.

Fluoride, a naturally-occurring mineral, is found in most all water sources – rivers, lakes, wells and oceans. Adding fluoride to public water supplies brings the level up to the amount necessary to help prevent tooth decay by making the outer surface of teeth (enamel) more resistant to the acid attacks that cause caries. The recommended amount of fluoride is 0.7 milligrams per liter of

water. It goes without saying, of course, that water companies and public officials must be responsible to ensure safe addition and monitoring of fluoride levels in water supplied to the public.

The fluoride ingested from foods and beverages also provides a benefit because it becomes part of the saliva that bathes the teeth and helps remineralize weakened enamel. Toothpaste with fluoride has been responsible for a significant drop in cavities since 1960.

Before water fluoridation, children had about three times as many cavities.<sup>15</sup> Studies show that it continues to prevent tooth decay by 18 to 40 percent. The cost/ benefit ratios of community water fluoridation are astounding: 1) The average lifetime cost per person to fluoridate a water supply is less than the cost of one dental filling; 2) For most cities, every dollar invested in water fluoridation saves \$38 in dental treatment costs.<sup>14</sup>

## **SUMMARY & CONCLUSION**

Dr. David Satcher wrote in his Preface to the Surgeon General's landmark report, "Oral Health in America," that most Americans at the turn of the last century could expect to lose their teeth by middle age.

Thankfully, that is not the case today. However, dental disease is a silent, infectious and transmissible disease that has persisted and reached epidemic and pandemic levels, despite the continuing improvements in treatment and prevention.

The statistics are staggering but unrecognized by most: One-fourth of the U.S. population has untreated dental caries and nearly one out of every two American adults aged 30 and over is affected by periodontal disease.

As previously noted here, untreated dental disease can cause or exacerbate chronic medical conditions, lead to unnecessary pain and increased costs to the medical system – to say nothing of the social and economic impact brought on by millions of missed school and office hours lost each year to dental-related illness. One cannot be totally healthy without oral health.

Prevention starts with eliminating risk factors such as diets high in sugar, inappropriate bottle feeding of infants and low fluoride levels in a community's water supply. In addition, the practice of thorough oral hygiene every day and making regular routine dental visits to keep teeth healthy can prevent and mitigate existing dental disease.

But the steady progression of oral diseases has proved that more action is necessary – by individuals, communities and health professionals. This epidemic demands a higher level of awareness and an education campaign that starts in our local municipalities and builds at a state and national level. A blueprint for action includes the following four steps:

1. Dental and medical professionals must identify and acknowledge that dental disease is a silent epidemic.
2. We must utilize our medical and public health colleagues as the first line of defense in educating adults – including pregnant mothers to begin to slow down the transmission process.
3. We must rely on and utilize the published best practices, policies and standards for oral health care set forth by the American Dental Association, American

Academy of Pediatric Dentistry, American Academy of Pediatrics, American Academy of Periodontology, and the American Academy of Family Physicians.

4. We must enlist specific allies – medical professionals, daycare providers, teachers, school nurses, athletic coaches, ER doctors and staff, to name a few – to make timely dental referrals for infants, children, adolescents and adults to help stem dental disease.

Dentists themselves must be the trailblazers of this education campaign. When treating children, they should encourage their parents to receive dental care and educate them about healthy oral health practices for themselves and their children. Similarly, dentists treating adult patients should inquire about their children's oral health.

A rigorous and disciplined approach to this statewide education campaign can make giant strides in improving the oral health of all Delawareans and help to eliminate dental disease in the First State.

## References:

1. US Department of Health and Human Services. (2000). Oral health in America: A report of the Surgeon General– Executive Summary. Rockville, MD: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health.
2. The World Oral Health Report 2003. (2003). World Health Organization. Geneva, Switzerland.
3. National Health Policy Forum. (2011, Jan 21). Health update: Ten years after the Surgeon General's report. Forum Session of National Health Policy Forum. Washington, D.C.
4. American Academy of Pediatric Dentistry. (2014). Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies. Oral Health Policies.
5. Dye, B.A., Thornton-Evans, G., Li, X., Iafolla, T.J. (2015, Mar). Dental caries and sealant prevalence in children and adolescents in the United States, 2011-2012. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. NCHS Data Brief No. 191.
6. Centers for Disease Control and Prevention. (2017). Periodontal disease. Retrieved from: [https://www.cdc.gov/oralhealth/periodontal\\_disease/index.htm](https://www.cdc.gov/oralhealth/periodontal_disease/index.htm)
7. Ora, M. D. (2017). Diseases and conditions now linked to periodontal disease. Retrieved from: [www.oramd.com/DiseasesPeriodontalLinks.pdf](http://www.oramd.com/DiseasesPeriodontalLinks.pdf)
8. Mayo Clinic. (2017). Oral Health: A Window to Your Overall Health. Retrieved from: [www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/dental/art-20047475](http://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/dental/art-20047475)
9. Silk, H., Douglass, A. B., Douglass, J. M., & Silk, L. (2008, April 15). Oral health during pregnancy. *American Family Physician*, 77(8), 1139–1144. [PubMed](#)
10. Dye, B. A., Vargas, C. M., Lee, J. J., Magder, L., & Tinanoff, N. (2011, February). Assessing the relationship between children's oral health status and that of their mothers. *J Am Dent Assoc*, 142(2), 173–183. [PubMed https://doi.org/10.14219/jada.archive.2011.0061](https://doi.org/10.14219/jada.archive.2011.0061)

11. American Academy of Pediatrics. (2003, May). Oral health risk assessment timing and establishment of the dental home. Policy Statement. *Pediatrics*, 111(5).
12. American Academy of Pediatrics. (2017). AAP schedule of well-child care visits. Retrieved from: <https://www.healthychildren.org/English/family-life/health-management/Pages/Well-Child-Care-A-Check-Up-for-Success.aspx>
13. American Academy of Pediatric Dentistry. (2017). The dental home – It's never too early to start. Retrieved from: [www.aapd.org/assets/1/7/DentalHomeNeverTooEarly.pdf](http://www.aapd.org/assets/1/7/DentalHomeNeverTooEarly.pdf)
14. American Dental Association. (2017). Fluoridation. Retrieved from: [www.mouthhealthy.org/en/az-topics/f/fluoridation](http://www.mouthhealthy.org/en/az-topics/f/fluoridation)
15. American Dental Association. (2017). Fluoride. Retrieved from: [www.mouthhealthy.org/en/az-topics/f/fluoride](http://www.mouthhealthy.org/en/az-topics/f/fluoride)