

4. DENTAL PAIN

The following section contains: a description of dental caries; their prevalence, with a focus on disparities; the unmet need for services; and the learning consequences of dental problems.



Definitions

The most common cause of toothache is dental decay, also known as dental caries.¹³⁶ Dental decay is caused by specific types of bacteria that produce acid that destroys the tooth's enamel and the layer under it, the dentin. As the dentin and enamel break down, a cavity is created. If the decay is not removed, bacteria will continue to grow and produce acid that eventually will get into the tooth's inner layer. This layer contains the soft pulp and sensitive nerve fibers.¹³⁷

Left untreated, tooth decay leads to pain and infection, which, in addition to other health effects, can result in problems with learning, eating and speaking.¹³⁸ Moreover, the incidence of sepsis ranges from 5% to 10% for children with untreated caries, which in rare instances, can lead to fatal systemic infections.¹³⁹

Prevalence

This section summarizes the prevalence of dental caries (treated and untreated) and untreated dental caries.

Dental caries

Dental caries is one of the most common chronic conditions in childhood. Recent national data from 2011-2012 shows that the prevalence of dental caries (treated and untreated) increases with age and is high in black children, Hispanic children and children in poverty.

In young children, about 37% of children aged 2–8 years have caries in primary teeth, with prevalence increasing with age from about 23% of 2 to 5 year olds to 56% of 6 to 8 year olds. Among younger children in the 2 to 8 age group, caries prevalence in primary teeth for Hispanic (46%) and black (44%) children was more than 1.4 times that of white children (31%).¹⁴⁰

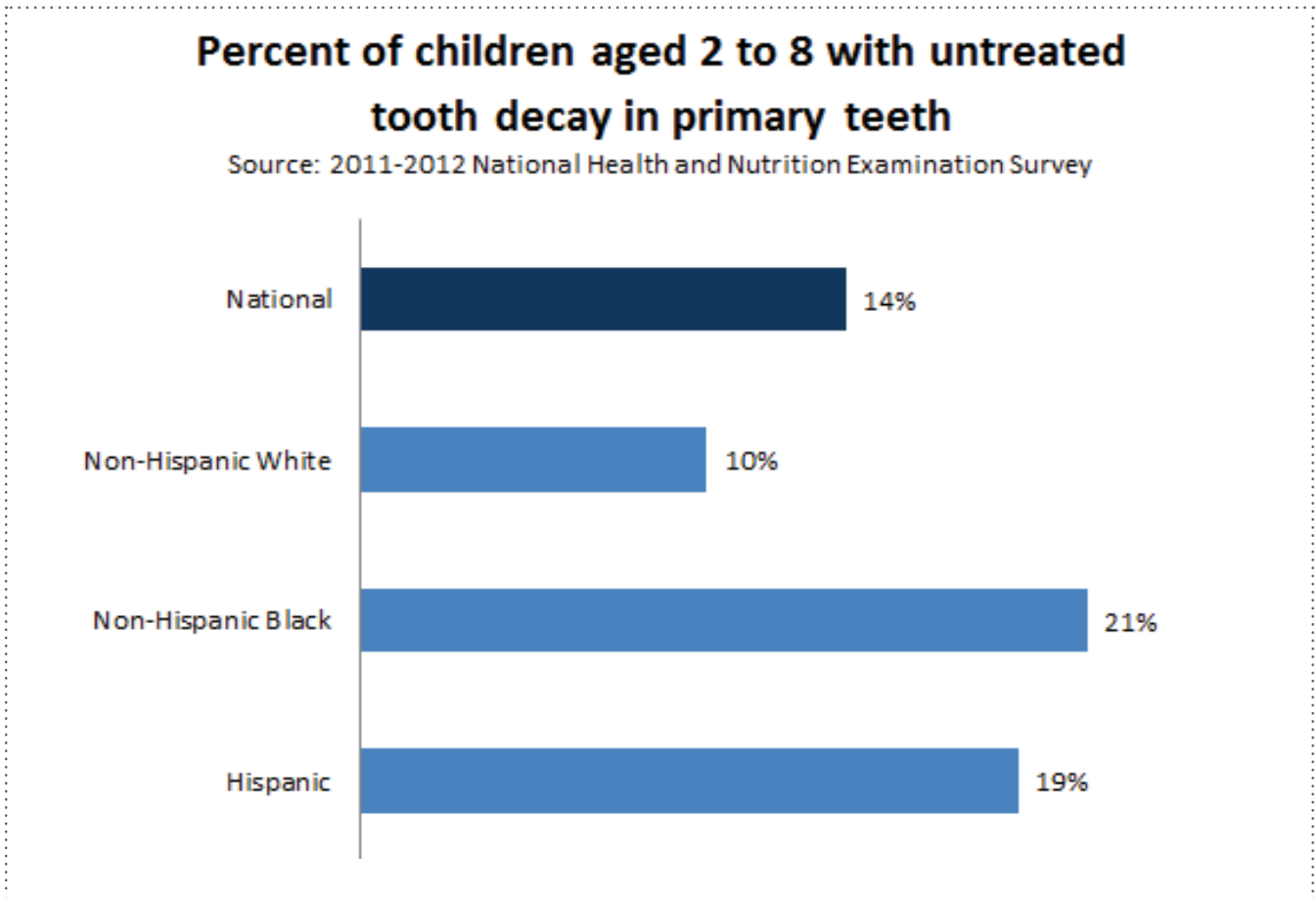
In older children, caries prevalence in permanent teeth increases from 21% in 6 to 11 year olds to 58% in 12 to 19 year olds. Hispanic children aged 6 to 11 (27%) had a higher caries prevalence, compared with white children (19%). Overall, the prevalence of caries did not significantly differ by race and Hispanic origin among adolescents.¹⁴¹

Disparities by poverty status are striking. About 69% of children aged 6 to 9 living in families below the poverty threshold have dental caries, which is almost twice the rate of caries prevalence (37%) in children who are better off (living at least 5 times above the poverty threshold).¹⁴²

Untreated dental caries

Not only do Hispanic children, black children and children in poverty have a greater prevalence of tooth decay, they also tend to have a higher prevalence of untreated tooth decay.

In young children aged 2 to 8, based on 2011-2012 national data, about 14% of children had untreated tooth decay in primary teeth. The rates for black children (21%) and Hispanic children (19%) is about double the rate of white children (10%).¹⁴³



In the 6 to 9 age group, about 22% of children had untreated caries in their permanent and primary teeth, with rates being particularly high in black children (32%), Mexican American children (29%) and children living below the poverty threshold (27%).¹⁴⁴

Overall, 15% of adolescents aged 12 to 19 have untreated caries. While prevalence of caries (treated or untreated) did not differ significantly by race and ethnicity among adolescents, prevalence of untreated caries was significantly higher for black adolescents (21%) compared with white adolescents (13%).¹⁴⁵

Some studies of disadvantaged communities in the US show even higher rates of untreated caries than the national rates, with the caveat that there may be differences in measurement methodology. In a study of under-privileged children in WIC centers (federally-funded Special Supplemental Nutrition Program for Women, Infants and Children), Head Start programs, and elementary and high schools serving high-poverty student populations in Los Angeles, 73% of 2 to 16 year olds had untreated dental caries.¹⁴⁶

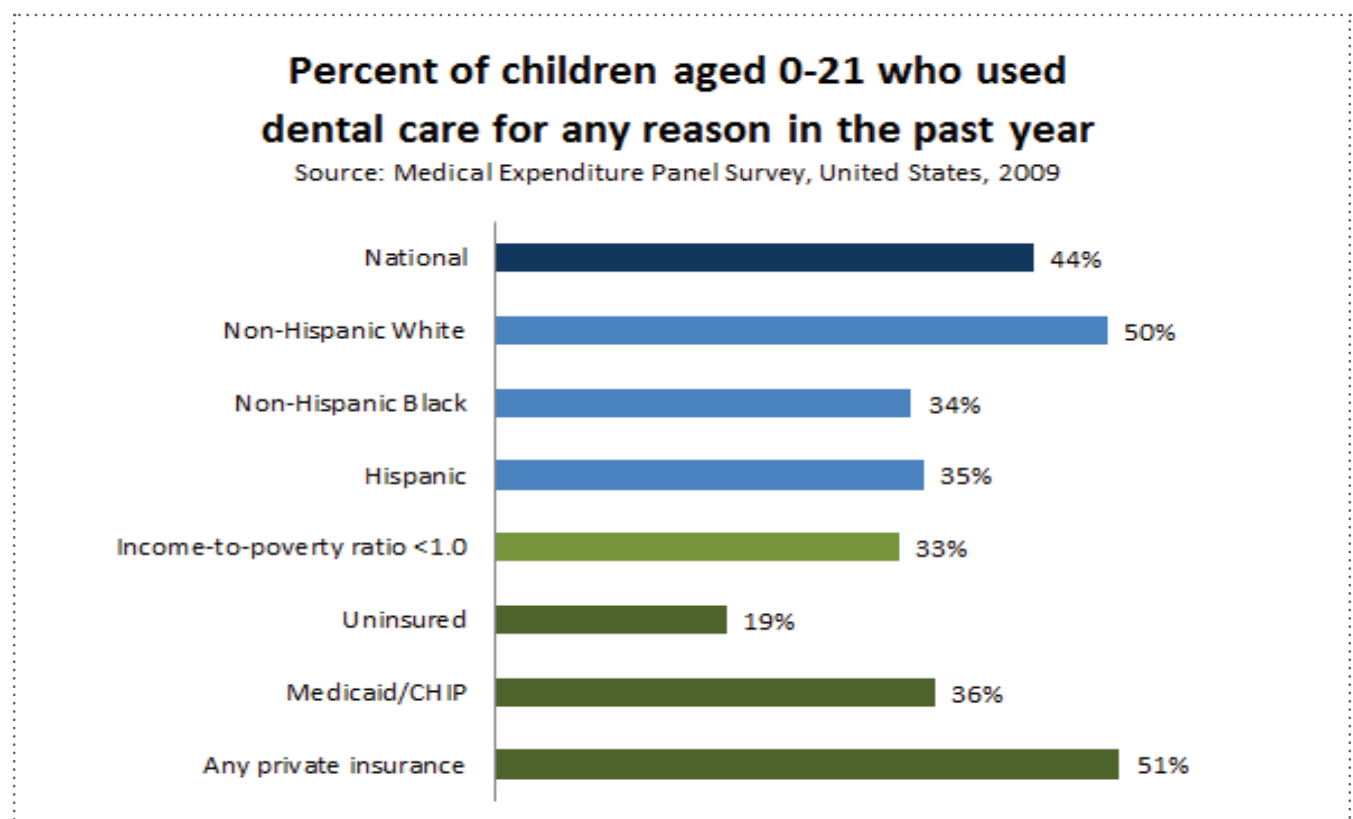
Unmet need for services

In general, the percentage of children with untreated caries has reduced over time,¹⁴⁷ suggesting that children are getting access to treatment or restorative care. However, the prevalence of caries (treated or untreated) remains high over time.¹⁴⁸ Therefore, there is a need to ensure that children receive regular,

preventive dental care, which is key to preventing and identifying dental decay, before it causes pain and infection and interferes with a child’s ability to function. Ideally, as recommended by American Academy of Pediatric Dentistry, families should have access to a dental home by the time their child is 1 year old and a child should be seen by a dentist every 6 months. Furthermore, dental sealants and fluoride are effective in preventing and controlling tooth decay, and these measures are recommended for children at risk of tooth decay.¹⁴⁹

To reduce children’s caries: (1) More than 13 U.S. national institutes, organizations and federal agencies recommend school-based caries prevention, including sealants and fluoride varnish.¹⁵⁰ (2) Healthy People 2010 and 2020 set goals for school-based oral health education and caries prevention.¹⁵¹ (3) Medicaid expenditures for children’s oral health care increased from \$7b to \$15b over the last 10 years.¹⁵² (4) The number of U.S. dentists and hygienists both increased by more than 10%.¹⁵³ As a national health issue, untreated caries is identified as #19 among the Institute of Medicine’s “100 Priority Topics for Comparative Effectiveness Research” and #17 on the Patient Centered Outcomes Research Institute.

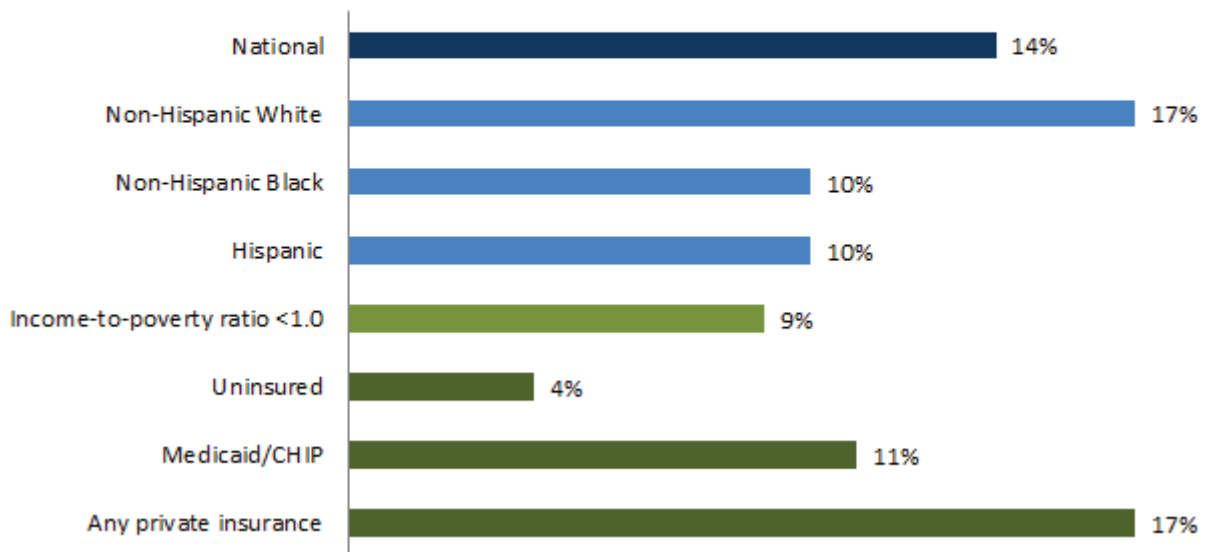
Paradoxically, however, less than 40% of U.S. dentists provide sealants.¹⁵⁴ National data shows that there is a considerable gap between best practice recommendations for dental care and the actual receipt of dental care. According to 2009 data, less than half of children aged 21 years and below (44%) used dental care (for any reason, not just preventive) and only 14% received a preventive dental service (i.e., topical fluoride, sealants, or both) in the past year. Children who were significantly less likely to use dental care and receive preventive services are black (34% for dental care, 10% for preventive services), Hispanic (35% for dental care, 10% for preventive services), and come from low-income families (33% for dental care, 9% for preventive services).¹⁵⁵



Percent of children aged 0-21 who received a preventive dental service* in the past year

Source: Medical Expenditure Panel Survey, United States, 2009

*Preventive dental service refers to topical fluoride, sealants, or both.



More recent 2011-2012 data also shows a shortfall in use of dental sealants. Among 6 to 11 year olds, 41% of children had at least one dental sealant on a permanent tooth, with black and Asian children (each about 31%) having a lower rate compared with white children (44%). Hispanic children (40%) had higher dental sealant prevalence compared with black children (31%).¹⁵⁶

Impact on learning

Research shows that dental problems undermine a child's ability to learn by causing missed school days, loss of sleep and inability to pay attention. Studies also find that dental problems are associated with poor school performance and adverse psychosocial outcomes. What follows is an overview of the evidence examining the link between dental problems and each of these learning consequences.

Missed school days/absenteeism

Findings from several studies quantify the magnitude of missing school specifically due to dental problems in various ways: percentage of children missing school specifically due to dental problems, the number of missed school days per 100 school children and the average number of missed school days per child.

Studies show that between 4% to 7% of students miss school due to dental problems. The percentage of children missing school specifically due to dental problems ranges from 4% missing school due to dental pain or infection in a North Carolina statewide study¹⁵⁷ to 6% missing school due to dental problems in a disadvantaged student population in LA¹⁵⁸ to 7% in a California statewide survey.¹⁵⁹ In a study based in Flint, MI, dental pain kept 13% of children home from school.¹⁶⁰ While there are differences in how dental problems and absences were defined and measured across each of these studies, these estimates suggest that at least 1 to 3 students out of a typical classroom of 20 students¹⁶¹ miss school specifically due to dental problems.

Rates of missing school are higher among children with toothaches, poor access to dental care and lower oral health status. The LA study of a disadvantaged population found that students with a toothache in the past 6 months were nearly 6 times more likely to miss school compared with students who did not. Further students who needed dental care but were unable to access it were 3 times more likely to miss school days because of dental problems than were those with access to dental care.¹⁶² The statewide North Carolina study similarly found a higher likelihood of absences caused by dental pain or infection among uninsured children and publicly insured children (versus privately insured) and children who had lower oral health status (versus those with very good or excellent oral health status).¹⁶³

In terms of number of school days missed, the statewide California study finds that for those who missed school due to a dental problem, 40% missed 2 or more days. Moreover, certain groups tend to miss 2 or more days: children who cannot afford needed dental care (73%) versus children who can afford needed dental care (36%); children without dental insurance (59%) versus children with private dental insurance (33%); children below the Federal Poverty Level (53%) versus children with family incomes at least 3 times the Federal Poverty Level (30%); and Limited English-proficient speakers (52%) versus Native or fluent English speakers (30%).¹⁶⁴ Another study provides a frequently quoted albeit more than 25 year old national statistic of 117 hours per 100 school children (also expressed as 51 million school hours missed).¹⁶⁵ A more reliable, conservative estimate from the recent 2011 study of a disadvantaged population in LA is 58 school hours missed each year per 100 elementary school-aged children and 80 school hours missed each year per 100 high school-aged children.¹⁶⁶ The key point here is that many hours lost due to dental problems can be prevented by routine, preventive dental care.

Poor school performance

Three large observational cross-sectional studies found a statistically significant association between poor dental health and poor school performance. While these studies cannot establish a cause and effect relationship, they provide strong evidence of a statistically significant association, and intuitively and quantitatively support the findings discussed in the previous section.¹⁶⁷

One of the more comprehensive studies, using data from the 2007 National Survey of Children's Health, applies models that adjust for demographic, socioeconomic, health variables that may be related to dental health and the study outcomes of school performance and psychosocial well-being.¹⁶⁸ This study also accounted for differences in dental care availability and quality and children's dental health between states. The study found that children with dental problems are significantly more likely to have problems at school and are less likely to do all the required homework.

The statewide North Carolina study controls for child's gender, race, Hispanic ethnicity, grade in school, highest level of education achieved in the household, and health insurance coverage.¹⁶⁹ The study finds that children with lower oral health status were more likely to perform poorly in school, and this association was independent of absence related to dental pain. The study also finds that school absences caused by dental pain or infection were significantly related to poor school performance whereas school absences for routine dental care were not. The authors state that their findings suggest that a child with poor oral health is more likely to have pain or infection that not only puts them at risk of missing school but also undermines their ability to perform while at school or at home.

The LA study of a disadvantaged student population, which adjusts for type of school, gender and race/ethnicity, finds that high school students with toothaches in the past 6 months were almost 4 times more likely to have a GPA lower than the median of 2.8 compared with students without it.¹⁷⁰

Loss of sleep and inability to pay attention in class

Dental problems can also result in loss of sleep and inability to pay attention in class. In a study of dental problems in kindergarten and elementary schools in Flint and Genesee County, 20% of the children said a toothache kept them up at night, and nearly 20% said a toothache made it difficult for them to pay attention in the classroom.¹⁷¹ In another study of a small outpatient clinic-based sample of children experiencing acute dental pain resulting from dental caries, 66% of children had pain which kept them from sleeping.¹⁷²

Psycho-social outcomes

The previously discussed national study using 2007 National Survey of Children's Health data finds statistically significant associations between dental problems and poor psychosocial outcomes.¹⁷³ Children with dental problems are more likely to feel worthless/inferior, shy, and unhappy/sad/depressed and are less likely to be friendly. The study finds that the link between dental problems and poor psychosocial outcomes is larger for adolescents. This finding underscores the value of intervening early to improve child dental health in order to prevent adverse effects on psychosocial well being later in life.

Conclusions

Key points:

- Black children, Hispanic children and children in poverty have significantly higher rates of dental decay, a higher likelihood that their dental decay is untreated and lower rates of receiving preventive services and dental care, compared with white children and children from higher-income families.
- These disadvantaged groups of children are therefore vulnerable to the learning consequences of dental problems which are missed school days, lost sleep and inability to pay attention. Dental problems are also strongly associated with poor school performance and adverse psychosocial outcomes, with the caveat that a cause-effect relationship cannot be proven by the cross-sectional observational studies that examined these associations.
- Collectively, these findings clearly show the need for disadvantaged children to receive regular preventive services and have access to dental care, so that dental problems don't impede their ability to learn. For at-risk populations, bringing care to kids—such as by bringing preventive services to schools—rather than kids to care reduces barriers to care and offers a greater economy of scale.¹⁷⁴