EDITORIAL

An increase in caries rate or an increase in access to care: data show mixed results

For the better half of a decade, dental public health advocates have interpreted data from the US Centers for Disease Control and Prevention (CDC) to show that there is an increase in caries experience among children (1-3). Subsequently, these interpretations have been used to support the development of new mid-level dental providers, expansion of new pediatric dentistry residency programs and the call for additional dental schools around the nation. However, it appears that these data may have been misinterpreted to some degree, and that the remedies recommended may actually result in a greater escalation of children ages 2-5 with reported "caries experience."

These data from the CDC are from the National Health and Nutrition Examination Survey (NHANES), which collects data from a representative sampling of children starting at age 2. The dental component of the survey involves a visual and tactile examination that looks for both caries and restorations. The interpretation of the trends from NHANES 1988-94 and NHANES 1999-2000 showed that "caries experience" had increased significantly among all 2-4-year-olds in the Midcourse review of Healthy People 2010, raising alarms, and urgent calls for improved "access" to care (2,4). (see Figure 1).

Clearly, such a rise in caries experience should, without question, raise serious concerns. Previously, these data had generally been presented without distinguishing between those with untreated and those with treated caries. However, upon identifying surfaces that were either filled or decayed establishes a much different picture of the true nature of caries experience (5,6).

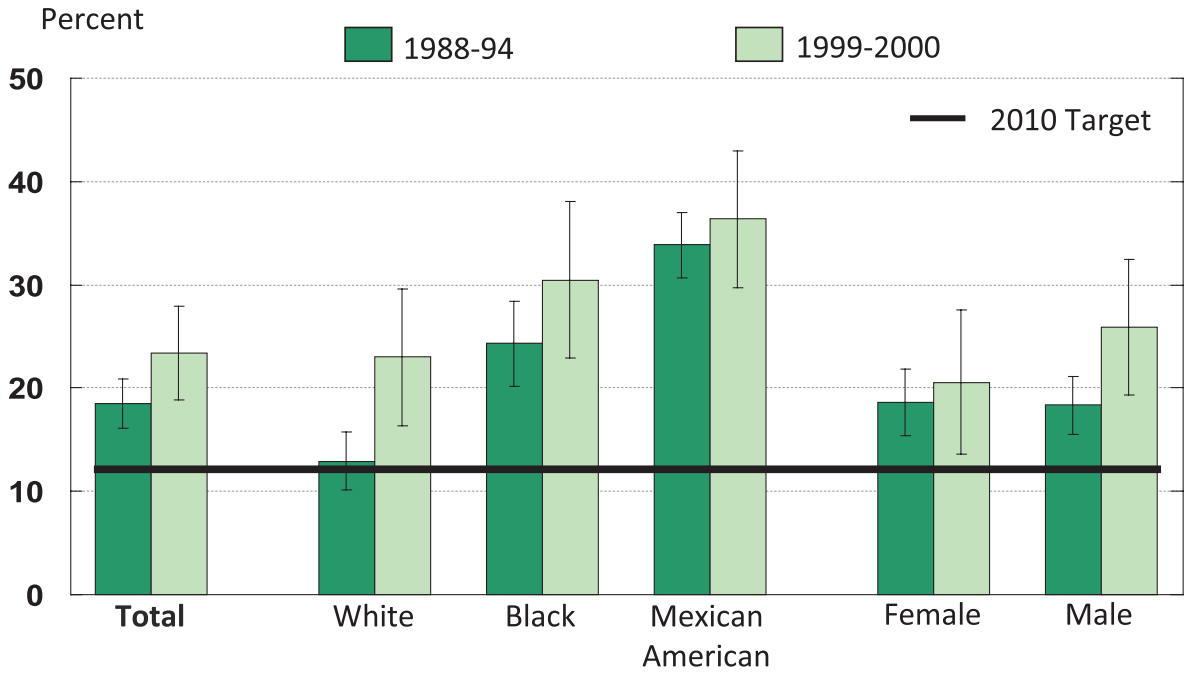
Contrary to previous assertions, CDC data (Figure 2) appears to show that access to dental care may be on the rise, and not that decay rates have dramatically escalated. These data show that for children ages 2-5 and <100 Federal Poverty Level (FPL), filled surfaces increased by more than 2.5-fold, while decayed surfaces remained constant. These same data also show that utilization of dental services for children under 6 has risen by 20%, and that the number of low-income children ages 6-8 receiving a dental sealant has more than doubled (Figure 3) (5).

This evidently indicates a trend of increased access to dental care for children, and begs the question of why would the number of filled teeth rise to the extent it has if untreated decay rates haven't risen?

It should be noted that the release of the Surgeon General's Report on Oral Health preceded most of NHANES 1999-2004. The report highlighted the importance of oral health access for children, and signaled the beginning of an era calling for increased access to dental care for children. The initial expansion of services included a federal requirement that all new Community Health Centers add a dental component, and a large increase in training programs for pediatric dentistry, which began during this stage of NHANES 1999-2004, as well as expanding numbers of for-profit dental clinics that cater to children with Medicaid. This increase in possible avenues of care, along with a more pronounced national awareness regarding the importance of children's oral health, may be the reason for the dramatic rise in treated caries in children ages 2-5.

If in fact access to traditional dental settings has increased, for high-risk children, there would naturally be an increase in dental radiographs made in most traditional dental settings. Lack of radiographs has been cited previously by Edelstein and Douglass as a criticism for underreporting caries in the National Institute of Dental Research 1986-87 official report on caries prevalence of primary teeth (7). An increase in dental radiographs improves diagnostic ability, which in turn may also increase the number of early lesions diagnosed when compared with those children who had only a visual/tactile exam in the NHANES studies. If earlier access to dental radiographs were to identify more interproximal lesions which then resulted in treatment, this would generally result in an increase of two surfaces of filled surfaces for a single interproximal lesion. Additionally, if there is an increase in care provided by pediatric dentists during the NHANES 1999-2004 period, more children would likely receive stainless steel crowns which would result in five filled surfaces being recorded for a single tooth (8).

One would not expect filled "caries experience" levels to be stable in an era of increased access. It has been well documented by both Friedman and Bader that dentists tend to overtreat, which results in more restored surfaces than necessary (9,10). Additionally, iatrogenic issues, primarily damaging enamel of adjacent teeth likely arise during treatment that would also require non-decayed teeth to be restored either at the time of treatment or at a later date (11). These components, along with more dentists providing more diagnostic and subsequently more restorative services for children may be enough to add to the increased level of filled surfaces we witness in the NHANES 1988-94 and NHANES 1999-2004 studies.



Note: Black and white exclude persons of Hispanic origin. Persons of Mexican-American origin may be any race.
Source: National Health and Nutrition Examination Survey, NCHS, CDC.

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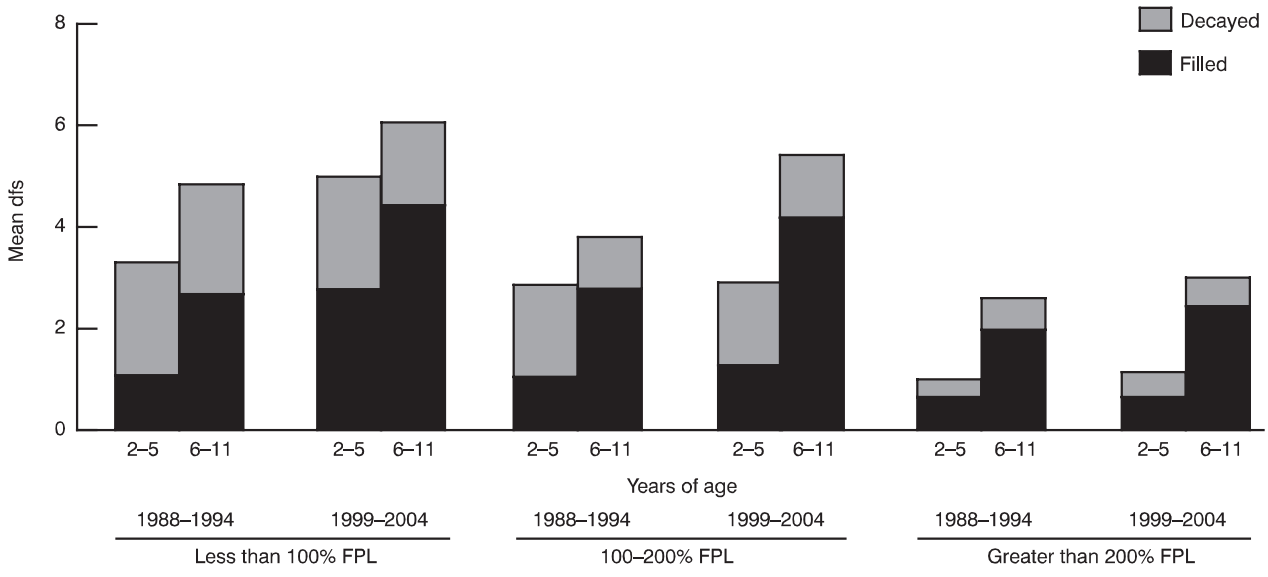
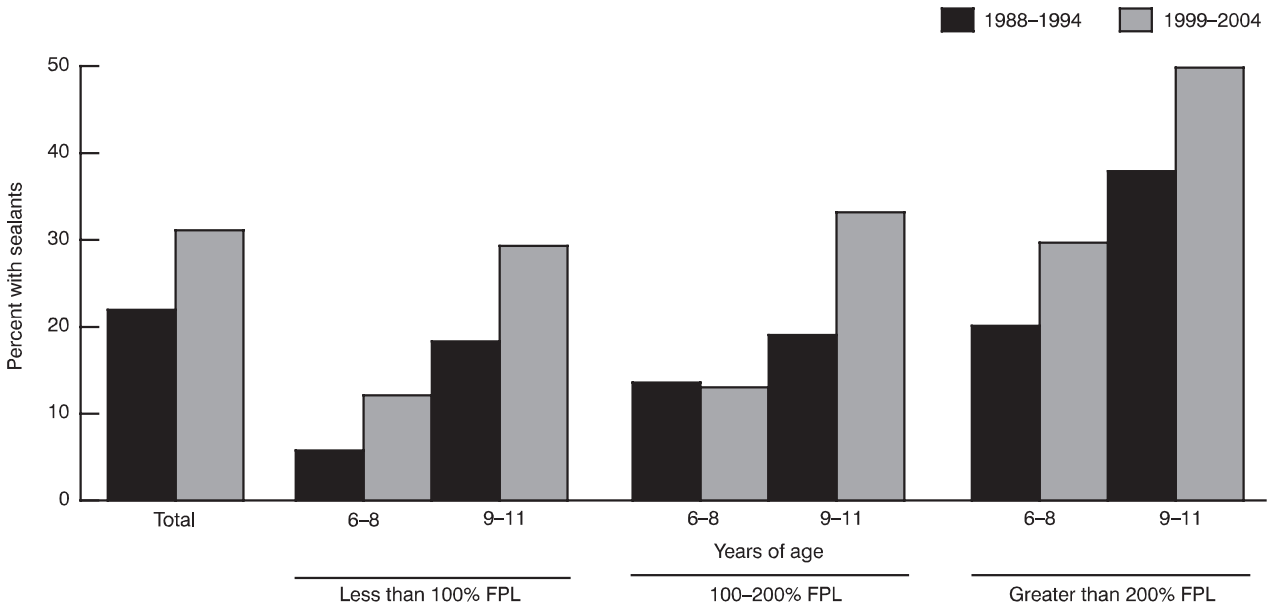
Figure 1 US Department of Health and Human Services, Healthy People 2010 Midcourse Review. Children 2-4 years who have ever had caries in primary teeth, 1988-94, 1999-2000.



NOTES: dfs is the number of decayed, and filled surfaces in primary teeth. FPL is federal poverty threshold or level.

Figure 2 Dye 2007. Decayed and filled primary dental surfaces (dfs) for youths 2-11 years of age by age group and federal poverty level status: United States, 1988-94 and 1999-2004. *Note*: dfs is the number of decayed and filled surfaces in primary teeth. FPL, federal poverty threshold or level.



NOTE: FPL is federal poverty threshold or level.

Figure 3 Dye 2007. Prevalence of dental sealants on permanent teeth for youths 6-11 years of age by age groups and federal poverty status levels: United States, 1988-94 and 1999-2004. FPL, federal poverty threshold or level.

Economic models of health-care provider behavior have been well studied in medicine. The behavior of surgical providers has been well documented by Wennberg and colleagues, utilizing Small Area Analysis (12). Wennberg has consistently shown that the likelihood of diagnosis of disease and subsequent treatment of disease increases for an individual as they move from an area of low to high intensity of practice areas. Hypothetically, expanding the number of pediatric dentists or general dentists interested in providing dental care to low-income children would likely increase the amount of diagnosis and subsequent treatment of dental caries.

If in fact this data signals an increase of access to dental care, we may also witness an increased demand for dental services in coming years by these same children, which public and private payers are not prepared to finance. An increase in the use of composite restorations in primary teeth has occurred during this same period, and studies indicate that there is a much higher failure rate for composite restorations as compared with amalgam, which would greatly increase costs, and demand for dental services for filled teeth (13). This increased provision of dental care may also be greater in populations who are covered by Medicaid, since reimbursement rates are so much lower, a greater number of procedures may be necessary for dentists, private companies that cater to Medicaid children and community health centers to cover costs if they are reimbursed by procedure. If in fact Friedman and Bader are correct in that dentists provide more care than necessary when treating, we are then creating an increased caries risk for this populations future. Future caries risk has traditionally been its highest for those with a past "caries experience." Treated or nontreated caries increases the risk for future decay (14). Tooth preparation for dental restorations more often than not, results in unintentional trauma to the teeth adjacent to those being restored (11). Additionally, future caries risk is more strongly associated with previous caries history than levels of *Streptococcus mutans,* so restoring more surfaces may result in greater risk (15). If this holds true, improved access to restorative care for young children may increase their need for future restorative care to maintain existing restorations and to treat future lesions that were a result of treating adjacent lesions.

An intriguing corollary, is that children living in Baltimore, Maryland had lower numbers of decayed, missing or filled (DMF) teeth than those living in New Zealand, a country with universal access to restorative care for children. Since New Zealand school children have universal access to care via dental therapists, this translates into <4% having decayed teeth, but still high DMF teeth, and subsequent disease risk (16). The CDC data may be establishing a similar trend for those with improved access, and may signal even greater escalation of "caries experience" among low-income children if there are further increases in access to dental care. Understanding how and why we may increase "caries experience" by increasing access is an essential question we must ask before promoting this policy further. More so, there is some question as to

whether restoring primary teeth actually improves the basic quality of life issues related to dental disease in children, specifically risk of pain and or requiring an extraction (17).

Other factors may be associated with the overall increase in caries experience among young children. An increase in poor nutrition among young children in the high–risk population may explain some of the increased need for restorative care. During this same period, obesity levels increased among children, also a disease of poor nutrition, which lends credence to this argument (18). Though no association has been made between caries and obesity, assessing common determinants of these diseases of poor nutrition may assist in public health efforts to reduce disease incidence. As well, while focusing great attention on improving surgical services for children, dental public health has not focused an equal level of attention to expanding primary prevention opportunities for children under the age of 3, which would attenuate much of the caries levels for high-risk children (19). Some basic changes that should be made for younger children include: expanding access to early preventive care starting at age 1, improved establishment and retention of dental homes for high-risk populations, incorporation of motivational interviewing into dental settings, population-based and patient-based nutrition policy that addresses dental health, and establishing evidence-based treatment modalities for high-disease populations.

Though the above explanations may be a simplified view of why we are witnessing an increase in caries experience among children ages 2-5, it should be alarming that an increase in access may result in increased treatment of non-carious teeth, an increase in caries risk because of more restorations placed, inappropriate dental material choice, and possibly an increase in future dental needs that could be averted through more intense and earlier primary prevention. Increasing dental services through the addition of more pediatric dentists, the creation and expansion of mid-level dental providers and the addition of new dentists may only result in increased long-term harm to the well-being of children rather than the improvement in their quality of life. If the disparity is associated with poorer nutrition among this cohort, dental public health has failed at intervening on a population and individual basis to improve the nutritional environment for children. It appears that the critical next step is in reducing overall caries experience for these children, which requires less surgical care and more early primary prevention. Otherwise, it's possible that the proposed workforce expansions may result in greater caries experience for young children, and subsequently throughout their life.

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