

# Trends in dental caries in children and adolescents according to poverty status in the United States from 1999 through 2004 and from 2011 through 2014

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The prevalence of dental caries in permanent teeth in children and adolescents has remained relatively stable since the 1980s.<sup>1</sup> From the 1960s through the early 1970s, approximately 1 in 2 children aged 6 to 11 years had dental caries in permanent teeth.<sup>2,3</sup> Since the late 1980s, approximately 1 in 4 children in the United States has had dental caries.<sup>1</sup>

There was a similar sharp decline between the 1970s and the 1980s related to untreated dental caries. Five decades ago, 1 in 4 children had untreated dental caries, and the prevalence declined to about 1 in 10 with untreated dental caries.<sup>1,2</sup> Among adolescents, a similar pattern of dental caries prevalence has occurred. Before the late 1970s, 9 in 10 adolescents had experienced dental caries, and one-half of adolescents had untreated dental caries.<sup>4</sup> After the mid-1980s, 3 in 5 adolescents had dental caries, and 1 in 5 had untreated dental caries, with the prevalence relatively unchanged since that time.<sup>1,5</sup>

In primary teeth, however, the prevalence of caries has developed differently. In the

## ABSTRACT

**Background.** Except for a small increase in caries prevalence in young children from 1999 through 2004, the prevalence of pediatric caries in the United States has remained consistent for the past 3 decades.

**Methods.** The authors used data from the National Health and Nutrition Examination Survey (NHANES) (from 1999 through 2004 and from 2011 through 2014) to ascertain changes in caries prevalence in youth aged 2 to 19 years. The authors evaluated changes in the prevalence of caries experience, untreated caries, and severe caries (3 or more teeth with untreated caries) in the primary, mixed, and permanent dentition according to poverty status.

**Results.** Untreated dental caries in the primary dentition decreased (24% versus 14%) for children aged 2 to 8 years regardless of poverty status from the period from 1999 through 2004 to the period from 2011 through 2014. Severe caries in primary teeth decreased between the period from 1999 through 2004 and the period from 2011 through 2014 for 2- to 8-year-olds (10% versus 6%). Among preschool-aged children in families with low incomes, caries experience decreased from nearly 42% to 35%, and untreated caries decreased from 31% to 18%.

Furthermore, there were significant reductions in the number of carious dental surfaces and significant increases in the number of restored dental surfaces. Overall, there was little change in the prevalence of caries in older children and adolescents.

**Conclusions.** The prevalence of caries in primary teeth in preschool-aged children has improved in the previous decade in the United States; however, the prevalence of having no caries experience in permanent teeth in children and adolescents remains unchanged.

**Practical Implications.** Although the oral health status of young children has improved in the previous decade, few changes have occurred for many older children and adolescents.

**Key Words.** Dental caries; oral health; poverty; epidemiology; dental public health; National Health and Nutrition Examination Survey; health disparities; children.

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United States, the prevalence of dental caries in the primary dentition of young children has remained relatively consistent since the 1970s. Except for a small increase from 1999 through 2004, approximately 23% to 24% of preschool-aged children from the 1970s through 2012 had dental caries.<sup>1,3,5</sup> The prevalence of untreated caries in primary teeth also has remained unchanged from the 1970s through the mid-2000s, during which time 1 in 5 preschoolers have had untreated caries in primary teeth.<sup>1,3</sup> But this “flat” trend appears to be improving. From 2011 through 2012, only 1 in 10 children aged 2 to 5 years had untreated dental caries.<sup>5</sup> It is not clear why the prevalence of untreated dental caries in permanent teeth declined substantially between the 1970s and 1980s, whereas it took 2 to 3 decades longer for untreated caries in primary teeth to decline as precipitously in young children. However, a plausible explanation can be attributed to dental care use patterns that were more typical during those earlier decades; dentists were not treating very young children routinely, and parents were not seeking dental care for their very young children routinely unless the child had a dental problem.

The World Health Organization defined chronic diseases as being noncommunicable, having a long duration, and generally having a slow progression.<sup>6</sup> Despite its bacterial component, dental caries is considered a chronic disease. Over the previous 2 decades, the prevalence of chronic illnesses such as asthma and allergies, obesity, and diabetes in children has been increasing and has increased disproportionately among children who are living in poverty.<sup>7-9</sup> However, changes in the prevalence of caries in permanent teeth during recent decades have not been similar to the patterns of other common chronic diseases that affect children in the United States. The prevalence of pediatric chronic illnesses has been increasing, whereas the prevalence of caries in permanent teeth generally has been flat or declining.

The effects of poverty on children’s oral health are well documented.<sup>10-15</sup> Given the reported increase in dental caries in early childhood from 1988 through 1994 and from 1999 through 2004,<sup>1</sup> understanding the trends in the prevalence of dental caries in children and adolescents according to key sociodemographic groups is an important step toward identifying the factors that affect childhood caries rates in the United States. The primary aim of this report was to describe changes in dental caries prevalence as they related to poverty status in children and adolescents between the period 1999 through 2004 and the period 2011 through 2014 in the United States.

## METHODS

**Data source.** For this study, we used data from the National Health and Nutrition Examination Survey (NHANES),<sup>16</sup> from the periods 1999 through 2004 and

2011 through 2014. NHANES is a cross-sectional survey that uses a stratified, multistage sampling design to obtain a representative probability sample of the civilian, noninstitutionalized population of the United States. Investigators can combine multiple 2-year periods to form a national probability sample that represents a longer period to improve the estimation, power, and reliability of the results. Relevant to our study, NHANES periodically oversample members of selected groups to improve statistical precision. For example, from 1999 through 2004, NHANES oversampled people aged 12 to 19 years, non-Hispanic blacks, and Mexican Americans. From 2000 through 2004, NHANES oversampled white people with low incomes. From 2011 through 2014, NHANES oversampled people who were Hispanic, non-Hispanic black, and Asian American.

NHANES interviewed participants in their homes, and participants received a health examination in mobile examination centers. Trained and calibrated dentists, who worked in mobile examination centers and used an artificial light with a nonmagnifying mirror and dental explorer, conducted the NHANES oral health examinations. Dentists dried teeth with compressed air as needed. Dentists assessed participants for the presence of dental caries and restorations at the tooth surface level, and they conformed their findings to Radike’s<sup>17</sup> criteria with minor modifications; they did not assess precavitated, incipient, or white-spot lesions. They used a consistent set of examination techniques and criteria throughout the entire study period. Overall, preliminary results related to data quality and examiner reliability analyses indicated that examiner performance was similar between the 2 survey periods being compared (1999-2004 and 2011-2014) and that examiners in both periods used the same examination methods to assess dental caries (B.A. Dye, DDS, MPH, unpublished data, 2017).<sup>18,19</sup> Additional information about NHANES<sup>16</sup> is available online.

**Study population.** For our study, we used data on 20,643 people aged 2 to 19 years who participated in NHANES either from 1999 through 2004 or from 2011 through 2014. We included in the analytical sample only the participants for whom we found information related

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**ABBREVIATION KEY.** **d:** Decayed (primary tooth or surface). **D:** Decayed (permanent tooth or surface). **dfs:** Decayed or filled surfaces in primary teeth. **DFS:** Decayed or filled surfaces in permanent teeth. **DMFS:** Decayed, missing, or filled surfaces in permanent teeth. **DMFT:** Decayed, missing, or filled permanent teeth. **ds:** Decayed surface (primary tooth). **DS:** Decayed surface (permanent tooth). **f:** Filled (primary tooth). **F:** Filled (permanent tooth). **FPG:** Federal poverty guidelines. **fs:** Filled surface (primary tooth). **FS:** Filled surface (permanent tooth). **M:** Missing (permanent tooth). **NHANES:** National Health and Nutrition Examination Survey. **S:** Surface. **t:** Tooth (primary). **T:** Tooth (permanent).

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