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Chartbook: Trends in Rural Children's Oral Health and Access to Care

Key Findings

- Preventive dental service utilization increased from 71.8% of all children in 2003 to 78.5% in 2007, with similar values in 2011-2012 (77.2% for all children). Within rural children of White, Black and Other race/ethnicity, however, the 2007 peak was followed by subsequent decline in 2011-2012.
- Among White children, both reported condition of teeth and rates for receiving preventive dental visits remained lower among rural than among urban children across the period. For children in all other race/ethnicity groups, the gap between rural and urban children was smaller.
- The proportion of children with delayed dental care due to cost was relatively small (less than 3%). Race/ethnicity and residence were not associated with reported delays in dental care.
- The proportion of parents reporting their child had excellent or very good teeth increased slightly over the period, from 68.6% in 2003 to 70.9% in 2007 and 71.6% in 2011-2012 ($p < 0.001$). Urban children tended to have better teeth, as assessed by their parents.

Background

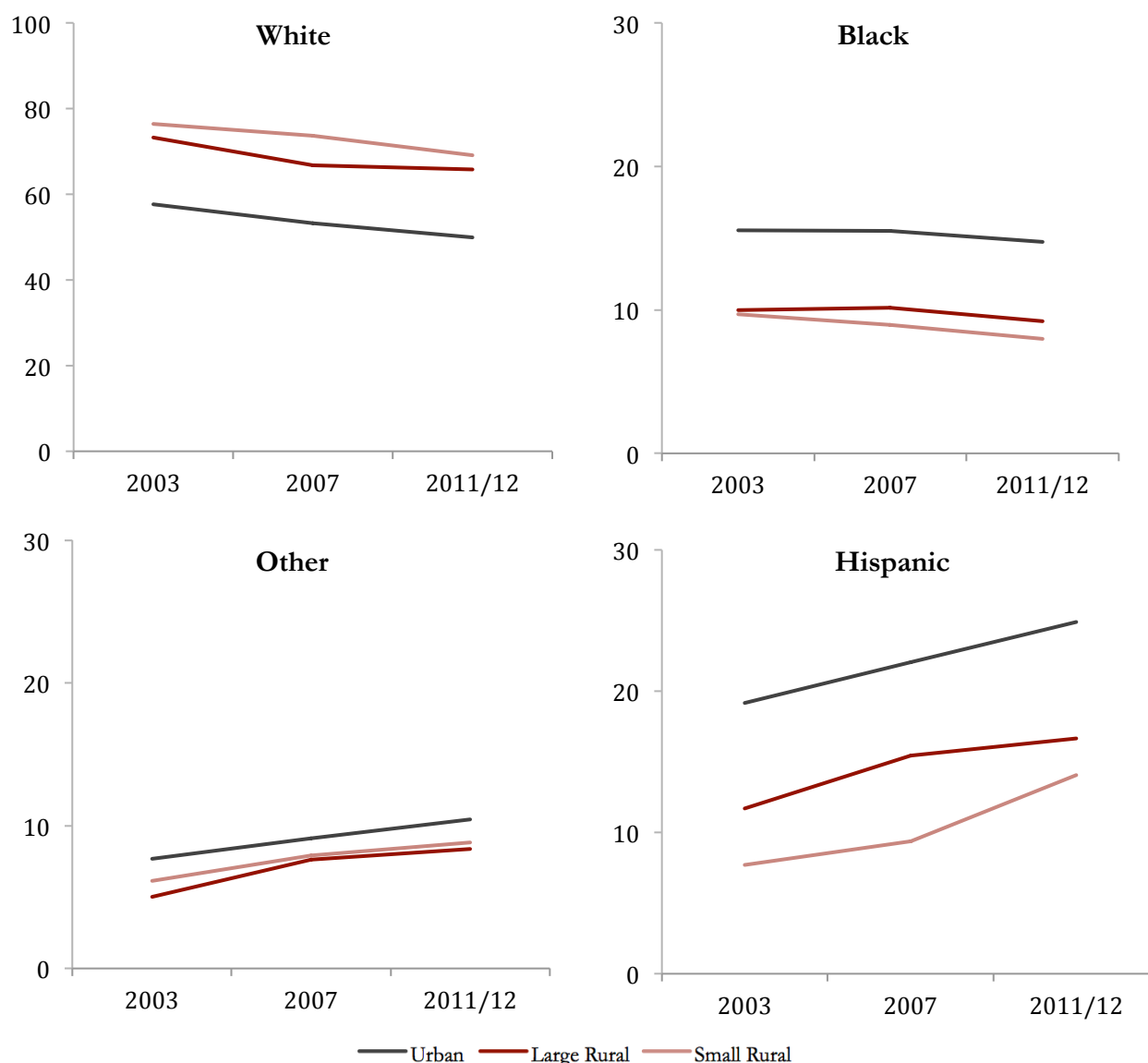
Oral health disparities among rural children have been well documented,¹ including a previous report by the South Carolina Rural Health Research Center, *Dental Health and Access to Care among Rural Children: A National and State Portrait*.² Addressing oral health disparities among children is important for developmental and cost reasons. Intervening early in the oral disease process yields cost efficiencies for payers such as Medicaid and desirable clinical outcomes for patients, as when dental sealants reduce subsequent tooth decay among children.³

Assessing progress at improving children's health requires examining trends over time, to see whether rural disparities, if present, are being reduced. The report that follows uses data from three administrations of the National Survey of Children's Health (2003, 2007, and 2011-2012) to assess progress in access to oral health care and perceived status of teeth among rural children. The National Survey of Children's Health is a nationally representative telephone survey of parents or guardians, sponsored by the Maternal and Child Health Bureau within the Health Resources and Services Administration. The definitions of rural used for the present report follow those used by the Maternal and Child Health Bureau, which classify children's residence as urban, large rural or small rural based on Rural Urban Commuting Area codes. Details are provided in the Technical Notes (Appendix A). In the body of the report, we provide graphs illustrating changes in oral health measures over time. A companion report, *Improving Rural Oral Health: Six States' Response to the United States Department of Health and Human Services Oral Health Strategic Framework*, provides examples of programs in six states aimed at improving oral health equity in rural populations.

Introduction: Children ages 1 to 17 years

Our examination of trends in rural children’s access to oral health care excludes children less than one year of age, as these very young children may not yet have teeth.* As shown below, racial/ethnic diversity among children increased between 2003 and 2011-2012, even in rural communities (For details, see Table B-1 in Appendix B). While rural children remain more likely to be non-Hispanic white than their urban peers, the proportion of Hispanic and non-Hispanic Other children in rural communities has increased.

Distribution of children ages 1 – 17 years, by race ethnicity and residence, 2003 – 2011-2012 National Survey of Children’s Health, in percent



*The population for this study is slightly smaller than that in the companion document examining trends in children’s general health over the decade: Probst JC, Jones KH. *Chartbook: Trends in Rural Children’s Health and Access to Care*. December, 2016.

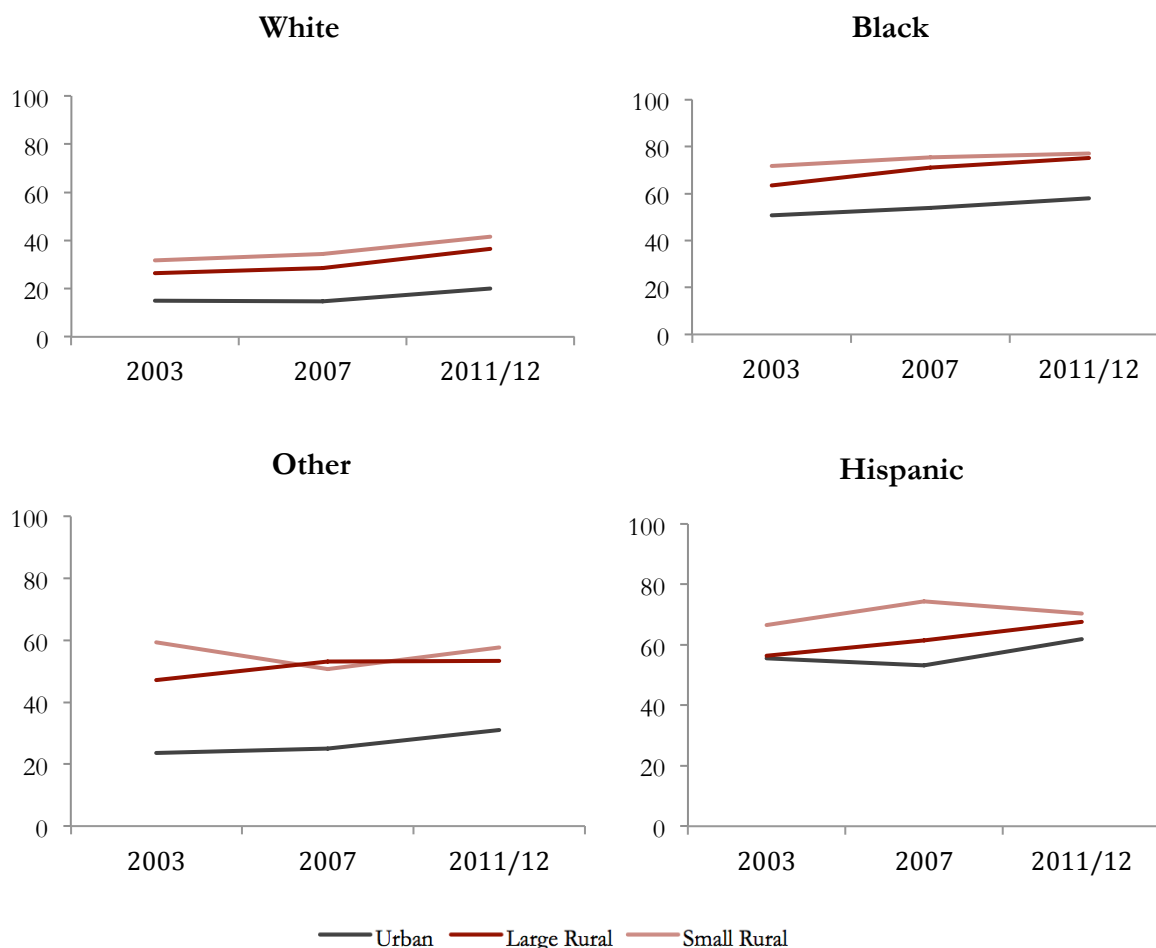
Rural children were consistently more likely to live in families at or below the Federal poverty level (FPL), as documented in Table 1, at right. Across the decade, poverty levels increased among both rural and urban children.

| | 2003 | 2007 | 2011/12 | P value, change over time |
|------------------|--------|--------|---------|---------------------------|
| N= | 93,717 | 84,799 | 86,763 | |
| Total, <100% FPL | 16.1 | 16.2 | 19.9 | 0.0000 |
| Urban | 15.2 | 15.0 | 19.0 | 0.0000 |
| Large Rural | 18.1 | 21.6 | 23.9 | 0.0000 |
| Small Rural | 20.8 | 21.0 | 24.5 | 0.0000 |

Reflecting increasing poverty documented in Table 1, the proportion of urban children insured by Medicaid or the State Children’s Health Insurance

Program increased over time (Chart, below). Among rural children, increases over time in the proportion of children insured through Medicaid were only significant among white rural children.

Proportion of children ages 1 – 17 years insured by Medicaid or SCHIP, by race ethnicity and residence, 2003 – 2011-2012 National Survey of Children’s Health, in percent



The absence of significant change over time among black and Hispanic rural children is attributable in part to higher levels of participation in Medicaid during 2003, which limited the amount of possible change. For example, the proportion of white children living in small rural areas who were covered by Medicaid grew by 31.2% across the decade, from 31.7% (2003) to 41.6% (2011-2012). Among black children in small rural areas, the increase was only 7.5%, from 71.7% (2003) to 77.1% (2011-2012; details in Table B-3 in Appendix).

Despite high levels of poverty, the proportion of children whose parents reported a *delay in dental care due to costs* has remained very low between 2007 and 2011-2012, as shown in Table 2, below. Nationally, the proportion of children with delayed care was relatively small and did not change statistically over time: 2.9% in 2007 and 2.8% in 2011/2012 ($p=0.5495$). There were no significant differences in delayed dental care due to costs over the study periods among any of the race/ethnicity and residence categories studied.

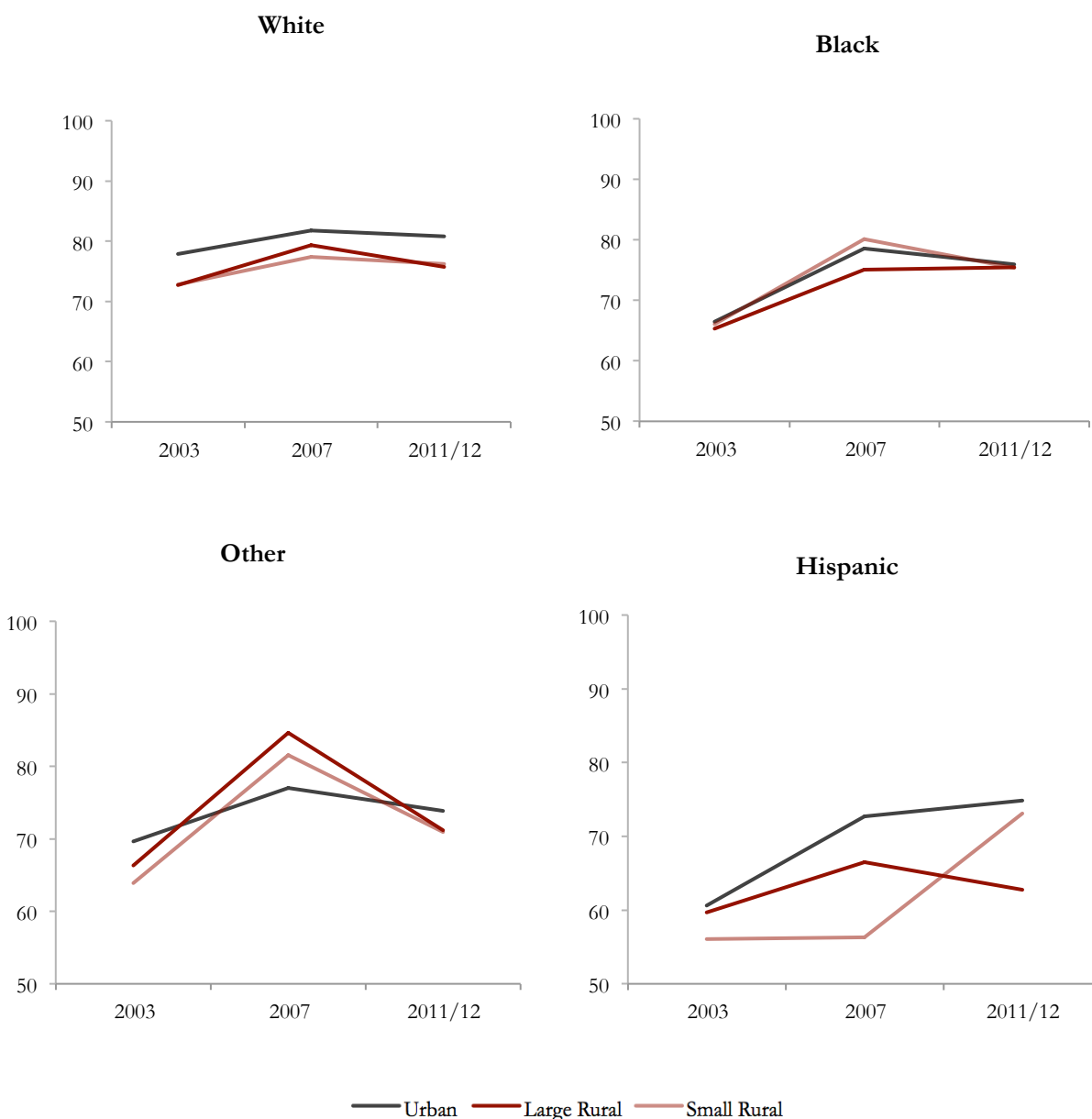
Table 2. Proportion of children ages 1-18 years with reported delay in dental care due to cost, by Race/ethnicity and Residence, 2003, 2007, 2011/2012 NSCH, n = 171,351

| Race/ethnicity | Residence | 2003 | 2007 | 2011-12 | P value, change over time |
|----------------|-------------|------|------|---------|------------------------------|
| NH White | Urban | . | 2.4 | 2.3 | 0.6539 |
| | Large Rural | . | 2.7 | 3.0 | 0.4861 |
| | Small Rural | . | 4.2 | 3.6 | 0.5387 |
| NH Black | Urban | . | 3.1 | 3.9 | 0.2735 |
| | Large Rural | . | 3.9 | 1.5 | 0.0721 |
| | Small Rural | . | 4.0 | 2.4 | 0.3616 |
| NH Other | Urban | . | 2.5 | 2.4 | 0.8279 |
| | Large Rural | . | 6.8 | 2.8 | 0.1619 |
| | Small Rural | . | 3.9 | 5.2 | 0.4620 |
| Hispanic | Urban | . | 3.5 | 3.1 | 0.5468 |
| | Large Rural | . | 3.7 | 1.4 | 0.2031 |
| | Small Rural | . | 1.8 | 3.0 | 0.4701 |

Oral Health Care Utilization

Preventive dental visits are important for professional assessment of a child’s oral health and development and for provision of guidance to the parents, such as when and how children should brush their teeth, the importance of fluoridated water, and what type of toothpaste is age-appropriate. Receipt of this important service increased from 71.8% of all children in 2003 to 78.5% in 2007, with similar values in 2011-2012 (77.2% for all children; Appendix B, Table 3). Within several rural populations, however, the 2007 peak was followed by subsequent decline in 2011-2012. The decreases occurred despite general increases in the proportion of children with health insurance.

**Percent of children with a preventive dental visit,
by race/ethnicity and residence, 2003, 2007 and 2011-2012 National Survey of Children’s Health**



The proportion of children reported to have had *any dental visit* during the past year was examined in the 2003 and 2011-2012 NSCH. Across that time period, the overall proportion of children with a visit was statistically unchanged (77.5% in 2003, 77.7% in 2011-2012). The proportion of parents reporting any dental visit, by race/ethnicity and residence, is shown in Table 3, below. The only significant change noted was an increase in “any dental visit” among urban Hispanic children.

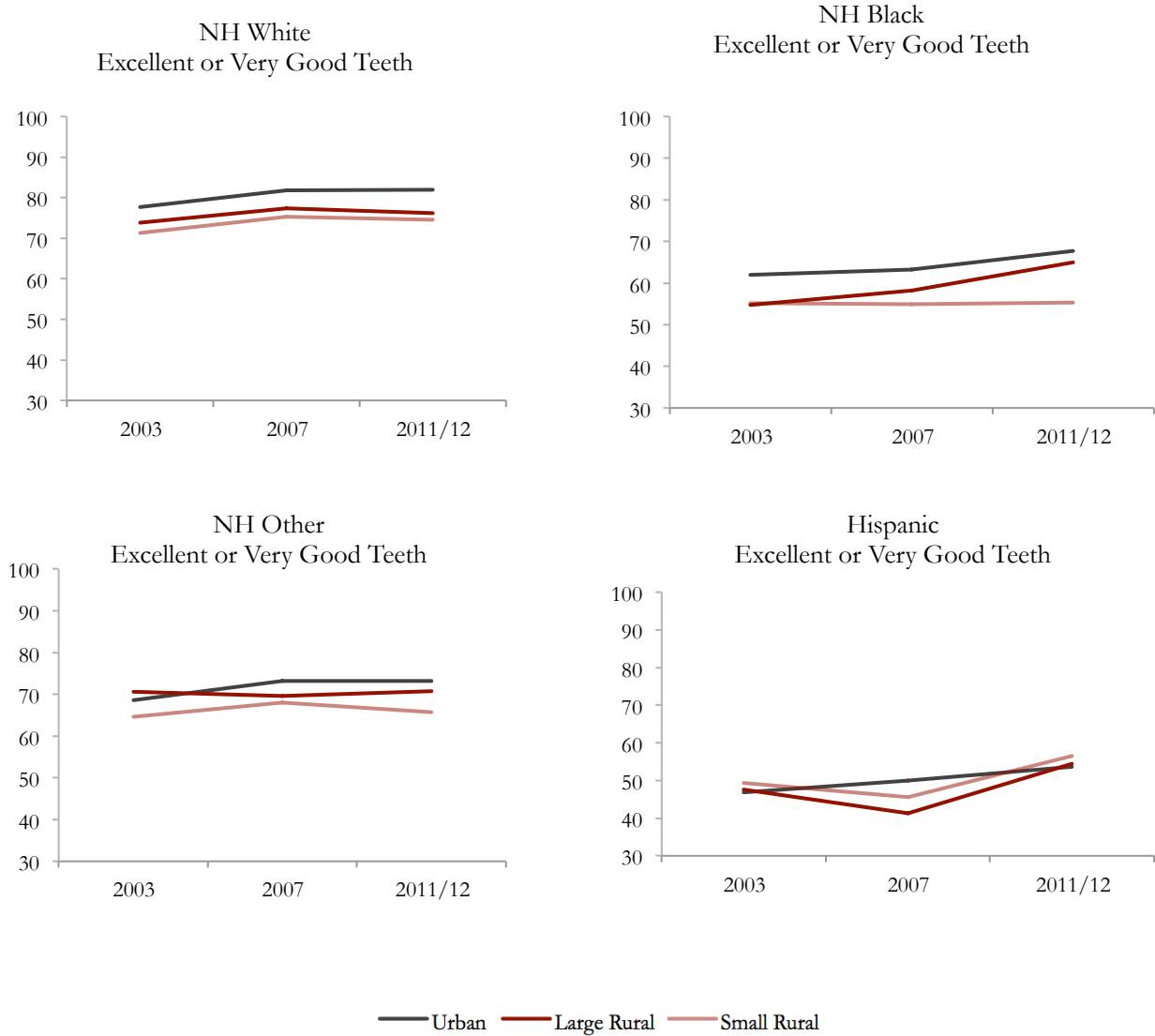
Table 3. Proportion of children ages 1 - 18 with any dental visit in the past year, by Race/ethnicity and Residence, 2003 and 2011/2012 NSCH, n = 190,644

| Race/ethnicity | Residence | 2003 | 2007 | 2011-12 | P value, change over time |
|----------------|-------------|------|------|---------|------------------------------|
| NH White | Urban | 81.4 | . | 81.2 | 0.7222 |
| | Large Rural | 77.8 | . | 76.2 | 0.2492 |
| | Small Rural | 78.5 | . | 76.8 | 0.1543 |
| NH Black | Urban | 75.1 | . | 76.4 | 0.1592 |
| | Large Rural | 74.1 | . | 75.9 | 0.6520 |
| | Small Rural | 76.3 | . | 75.5 | 0.8336 |
| NH Other | Urban | 75.1 | . | 74.3 | 0.6488 |
| | Large Rural | 78.5 | . | 71.8 | 0.0683 |
| | Small Rural | 74.0 | . | 71.7 | 0.5602 |
| Hispanic | Urban | 69.1 | . | 75.4 | 0.0000 |
| | Large Rural | 69.0 | . | 63.3 | 0.2435 |
| | Small Rural | 69.0 | . | 74.9 | 0.1852 |

Outcomes: Condition of Teeth

At the national level, the proportion of parents reporting their child had excellent or very good teeth increased slightly over the period, from 68.6% in 2003 to 70.9% in 2007 and 71.6% in 2011-2012 ($p < 0.001$; Appendix B, Table B-4). Looking within race/ethnicity and residence categories, two points emerge. First, within each race/ethnicity group, urban children tended to have better teeth, as assessed by their parents. Second, disparities experienced by minority children, particularly rural minority children, were persistent across the period. For example, 56.5% of Hispanic children living in small rural areas were described as having excellent or very good teeth in 2011-2012, versus 74.6% of non-Hispanic white children in those same areas.

Proportion of children with reported excellent or very good teeth, by race/ethnicity and residence, 2003 – 2011-1012 NSCH, in percent



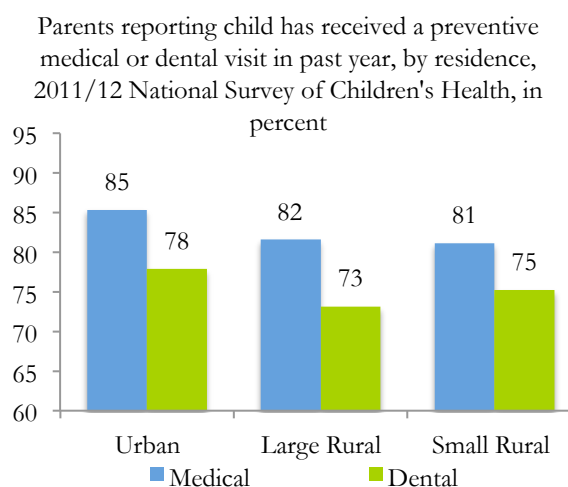
Conclusions: Rural, minority disparities persist over time

The trends in rural children’s use of oral health preventive services and oral health status suggest a mixed situation: progress with continuing disparities. The proportion of children reported to have received a preventive dental visit in the past year reached 78.5% nationally in 2011-2012, while the proportion having teeth described as “excellent” or “very good” teeth reached 71.6%. However, in most metrics rural children fared worse than urban children, and minority children lagged behind their white peers.

Can parents’ reports on children’s teeth be used for public health planning? While precise estimates of the proportion of children with a particular problem may be difficult to ascertain from parental report, disparities across groups of children based on parent responses echo professional judgment. For example, the racial/ethnic disparities in teeth status presented in this report show white children with the highest rates for very good or excellent teeth, followed by African American and Hispanic children. Parallel disparities are found in studies based on the National Health and Nutrition Examination Survey, which uses a professional examination of children’s teeth.^{4,5} Disparities in the use of preventive services such as sealants, which are more common among white children than among African American or Hispanic children,⁶ parallel disparities in preventive dental visits reported by parents. While there are few published studies on rural children, research examining disparities in the likelihood of any dental visit found that rural children are disadvantaged compared to urban children, paralleling findings reported here.⁷ In total, the evidence suggests that rural and racial/ethnic disparities detected through parent reporting are based on true problems.

Solutions to rural and racial/ethnic disparities will require a combination of improved access and improved parent education. As shown in the figure at right, parents are more likely to report obtaining a preventive medical visit for their child than a preventive dental visit. Medical and oral health professionals need to educate all parents, particularly those with low health literacy, about the importance of dental services for children.⁸

Patient education requires an adequate distribution of medical and dental health professionals, together with a commitment to oral health inter-professionalism. Addressing rural shortages of dental practitioners, The Institute of Medicine with the National Research Council has recommended increased recruitment of dental students from under-represented rural populations, together with increased funding for need-based scholarships.¹ Scope of practice laws that allow allied dental health practitioners to provide expanded services, such as placement of restorative materials, offer promise for highly rural states.⁹ Collaboration with local schools and other community based organizations will also be essential for parent education and improved child outcomes. Research suggests that programs which include oral health education, such as Early Head Start, can improve service use in low income children.¹⁰ Addressing rural children’s oral health will require mobilization across multiple community sectors to reduce disparities between urban and rural children, and to raise oral health services use to levels consistent with medical services use.



Appendix A. Technical Notes

Data Sources

The trend analysis was based on three waves of the National Survey of Children’s Health, 2003, 2007, and 2011/2012. This survey provides rich data regarding non-institutionalized children, including access to health care, utilization of health services, and physical health. The survey is sponsored by the Maternal and Child Health Bureau at the Health Resources and Services Administration, and the National Center for Health Statistics at the Centers for Disease Control conducts the survey. As described below, case data were obtained through telephone interviews with relevant personnel, supplemented by publicly available information.

Population Studied

Analyses were limited to children aged 1 – 17 for whom age, sex, race/ethnicity, residence, and response to health insurance coverage were available (N=265,279). Children younger than one year generally do not yet have many teeth. Additional restrictions were based on the availability of data for measures of interest when reported.

Geographic definitions

Definitions for residence parallel those used in *The Health and Well-Being of Children in Rural Areas: A Portrait of the Nation, 2011-2012*. Our work expands on that document and is predecessors by incorporating trends across multiple years. Rurality was measured at the Zip Code level and classified using the 2006 Rural-Urban Commuting Areas Codes (v2). The residence categories were:

- Urban-Focused areas (RUCA codes 1.0, 1.1, 2.0, 2.1, 3.0, 4.1, 5.1, 7.1, 8.1 and 10.1),
- Large rural areas (RUCA codes 4.0, 4.2, 5.0, 5.2, 6.0 and 6.1)
- Small or isolated rural areas (all remaining codes)

Race/Ethnicity

- Race/ethnicity was self-reported by the child’s parents. Following the National Center for Health Statistics forms, children were grouped as as Non-Hispanic (NH) White, NH Black, NH Other, and Hispanic.

Measures

This analysis examined four oral health outcome measures.

| Health care access | |
|---|--|
| Any dental visit? | About how long has it been since he/she last saw a dentist? Within the past 12 months? |
| Preventive dental visit? | During the past 12 months, did the child see a dentist for any routine preventive dental care, including checkups, screenings, and sealants? |
| Delay in dental care due to costs? | During the past 12 months, was there any time when the child needed health care but it was delayed or not received? What type of care was delayed – Dental? |
| Oral health | |
| Condition of teeth, excellent or very good? | How would you describe the condition of the child’s teeth? |

Statistical Analysis

The unit of analysis was the child. All analyses reflected the complex sampling design of the National Survey of Children’s Health. The analyses were adjusted to reflect the sampling of cell

phone respondents in 2007 and 2011/2012. To access geographic data, all analyses were carried out at the Research Data Center of the National Center for Health Statistics, located in Hyattsville, MD.

Measuring statistical significance

Because of the large number of observations (265,279) and the large number of comparisons made, the significance level is set at $p < 0.01$ or better. This conservative approach is used to avoid erroneously identifying small fluctuations as important.

Limitations to this report

This Chartbook describes children's access to health services at a very broad level: all children, sorted only by residence and race/ethnicity. For important subgroups, such as children with special health care needs, findings might be very different. In addition, all information is parent-reported and thus dependent on the parent's knowledge and memory.

Appendix B. Tables

Table B-1. Distribution of children by race/ethnicity and residence, 2003 – 2012 NSCH, n = 265,279

| Race/ethnicity | Residence | 2003 | 2007 | 2011-12 | P value for trend |
|----------------|-------------|------|------|---------|-------------------|
| NH White | Urban | 57.6 | 53.3 | 49.9 | 0.0000 |
| | Large Rural | 73.3 | 66.8 | 65.8 | 0.0000 |
| | Small Rural | 76.5 | 73.7 | 69.1 | 0.0000 |
| NH Black | Urban | 15.5 | 15.5 | 14.7 | 0.0000 |
| | Large Rural | 10.0 | 10.1 | 9.2 | 0.0000 |
| | Small Rural | 9.7 | 9.0 | 8.0 | 0.0000 |
| NH Other | Urban | 7.7 | 9.1 | 10.4 | 0.0000 |
| | Large Rural | 5.0 | 7.6 | 8.4 | 0.0000 |
| | Small Rural | 6.1 | 7.9 | 8.8 | 0.0000 |
| Hispanic | Urban | 19.2 | 22.1 | 24.9 | 0.0000 |
| | Large Rural | 11.7 | 15.4 | 16.6 | 0.0000 |
| | Small Rural | 7.7 | 9.4 | 14.1 | 0.0000 |

Table B-2. Proportion of children with health insurance coverage, by race/ethnicity and residence, 2003 – 2012 NSCH, n = 265,279

| Race/ethnicity | Residence | 2003 | 2007 | 2011-12 | P value for trend |
|----------------|-------------|------|------|---------|-------------------|
| NH White | Urban | 94.8 | 94.2 | 96.5 | 0.0000 |
| | Large Rural | 92.9 | 92.9 | 95.5 | 0.0000 |
| | Small Rural | 91.3 | 92.0 | 94.7 | 0.0000 |
| NH Black | Urban | 92.5 | 91.2 | 94.5 | 0.0019 |
| | Large Rural | 92.1 | 89.5 | 96.7 | 0.0066 |
| | Small Rural | 94.8 | 91.2 | 96.6 | 0.0230 |
| NH Other | Urban | 93.5 | 93.9 | 95.9 | 0.0058 |
| | Large Rural | 91.5 | 94.1 | 96.7 | 0.0013 |
| | Small Rural | 86.4 | 88.3 | 92.5 | 0.0247 |
| Hispanic | Urban | 78.5 | 81.4 | 90.2 | 0.0000 |
| | Large Rural | 82.6 | 71.8 | 87.2 | 0.0154 |
| | Small Rural | 76.7 | 77.7 | 88.3 | 0.0034 |

Table B-3. Proportion of insured children with Medicaid or SCHIP coverage, by race/ethnicity and residence, 2003 – 2012 NSCH, n = 245,513

| Race/ethnicity | Residence | 2003 | 2007 | 2011-12 | P value for trend |
|----------------|-------------|------|------|---------|-------------------|
| NH White | Urban | 15.0 | 14.6 | 20.0 | 0.0000 |
| | Large Rural | 26.3 | 28.6 | 36.5 | 0.0000 |
| | Small Rural | 31.7 | 34.3 | 41.6 | 0.0000 |
| NH Black | Urban | 50.7 | 53.8 | 57.9 | 0.0000 |
| | Large Rural | 63.4 | 71.0 | 75.1 | 0.0116 |
| | Small Rural | 71.7 | 75.5 | 77.1 | 0.3178 |
| NH Other | Urban | 23.6 | 25.1 | 31.0 | 0.0002 |
| | Large Rural | 47.1 | 53.1 | 53.4 | 0.3606 |
| | Small Rural | 59.4 | 50.7 | 57.8 | 0.2073 |
| Hispanic | Urban | 55.6 | 53.2 | 61.9 | 0.0000 |
| | Large Rural | 56.4 | 61.5 | 67.7 | 0.0744 |
| | Small Rural | 66.5 | 74.4 | 70.3 | 0.4355 |

Table B-4. Proportion of children ages 1 - 18 with a preventive dental visit in the past year, by Race/ethnicity and Residence, 2003 – 2012 NSCH, n = 264,559

| Race/ethnicity | Residence | 2003 | 2007 | 2011-12 | P value for trend |
|----------------|-------------|------|------|---------|-------------------|
| NH White | Urban | 77.9 | 81.8 | 80.8 | 0.0000 |
| | Large Rural | 72.7 | 79.4 | 75.7 | 0.0000 |
| | Small Rural | 72.8 | 77.4 | 76.2 | 0.0003 |
| NH Black | Urban | 66.5 | 78.5 | 76.0 | 0.0000 |
| | Large Rural | 65.3 | 75.0 | 75.5 | 0.0112 |
| | Small Rural | 66.1 | 80.2 | 75.3 | 0.0004 |
| NH Other | Urban | 69.6 | 77.0 | 73.9 | 0.0009 |
| | Large Rural | 66.3 | 84.6 | 71.2 | 0.0002 |
| | Small Rural | 63.9 | 81.5 | 70.9 | 0.0000 |
| Hispanic | Urban | 60.6 | 72.7 | 74.8 | 0.0000 |
| | Large Rural | 59.7 | 66.5 | 62.8 | 0.4643 |
| | Small Rural | 56.1 | 56.3 | 73.1 | 0.0010 |

Table B-5. Proportion of children ages 1 = 18 with reported excellent or very good condition of teeth, by Race/ethnicity and Residence, 2003 – 2012 NSCH, n = N=264,305

| Race/ethnicity | Residence | 2003 | 2007 | 2011-12 | P value for trend |
|----------------|-------------|-------|-------|---------|-------------------|
| NH White | Urban | 77.69 | 81.79 | 81.9 | 0.0000 |
| | Large Rural | 73.83 | 77.3 | 76.18 | 0.0208 |
| | Small Rural | 71.27 | 75.27 | 74.62 | 0.0028 |
| NH Black | Urban | 61.97 | 63.24 | 67.76 | 0.0001 |
| | Large Rural | 54.71 | 58.19 | 64.99 | 0.0547 |
| | Small Rural | 55.18 | 54.92 | 55.27 | 0.9975 |
| NH Other | Urban | 68.56 | 73.19 | 73.17 | 0.0344 |
| | Large Rural | 70.57 | 69.53 | 70.67 | 0.9733 |
| | Small Rural | 64.6 | 68.03 | 65.73 | 0.7293 |
| Hispanic | Urban | 46.85 | 50.04 | 53.68 | 0.0000 |
| | Large Rural | 47.56 | 41.29 | 54.44 | 0.0974 |
| | Small Rural | 49.26 | 45.58 | 56.47 | 0.2218 |

Appendix C. References

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