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Filled dietary fluoride supplement prescriptions for Medicaid-enrolled children living in states with high and low water fluoridation coverage

Susan O. Griffin, PhD [health economist],
Division of Oral Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA.

Chien-Hsun Li, MS [statistician],
CyberData Technologies, Herndon, VA.

Lorena Espinoza, DDS, MPH [associate director for science],
Division of Oral Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA.

Barbara F. Gooch, DMD, MPH [consultant]
DB Consulting, Silver Spring, MD,

Abstract

Background.—Although dietary fluoride (F) supplements (DFS) are recommended for children who use F-deficient drinking water, no studies have examined filled DFS prescriptions across multiple states to examine the dosage consistency with current recommendations or prescription length.

Methods.—This sequential cross-sectional analysis used Medicaid claims data for children aged 0.5 through 16 years who in 2011 lived in the 6 states with the lowest and the highest fluoridation coverage (≤ 34% and ≥ 95% of the public water system population fluoridated, respectively). For 2011, the authors calculated the mean percentage of children with filled DFS prescriptions and the change since 2000 across states with high and low fluoridation coverage, the percentage of children with filled DFS prescriptions containing F dosage consistent with current recommendations, and filled DFS prescription length and cost across states.

Results.—In states with high fluoridation coverage, the mean percentage of children with a filled prescription was < 1% in both years; in states with low fluoridation coverage, this value increased from 0.9% to 10.3%, the highest increase (16.4 percentage points) since 2000 among children aged 0.5 through 2 years. The average prescription length was 72 days. Across states, the mean costs per child prescribed supplements and per enrollee were $17.60 and $1.05, respectively.

Address correspondence to Dr. Griffin, Mail Stop S107-8, Centers for Disease Control and Prevention, 4770 Buford Hwy., Atlanta, GA 30341-3717, sig1@cdc.gov.

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Conclusions and Practical Implications.—Filled prescriptions largely followed current recommendations but reached only a small percentage of children in low-coverage states. The short prescription length indicated limited exposure for caries prevention. Results from these states suggest more children could have longer exposure to the caries-preventive benefits of F at a similar cost with water fluoridation as with DFS.

Keywords

Fluoride; caries; caries prevention products

For children who use fluoride (F)-deficient water (F content < 0.6 parts per million), the U.S. Preventive Services Task Force (USPSTF) recommends that primary care providers prescribe dietary F supplements to children aged 0.5 through 5 years.[1] Bright Futures[2] and the American Dental Association[3] also recommend dietary F supplements for children using F-deficient drinking water, but their recommendations extend into adolescence and are based on caries risk. Inappropriate use of supplements while the permanent teeth are developing can increase a child's risk of dental fluorosis, a visually detectible change in tooth enamel opacity.[4] As a result, the recommended F dosage in supplements, unchanged since 1994, depends on the child's age and the F content of their drinking water.[4] For children younger than 3 years, supplements containing 0.25 milligrams of F are recommended if F content of drinking water is less than 0.3 ppm; for children aged 3 through 5 years, supplements containing 0.50 or 0.25 mg F are recommended if F content of drinking water is less than 0.3 ppm or between 0.3 and 0.6 ppm, respectively; and for children aged 6 through 16 years, supplements containing 1.0 and 0.5 mg F are recommended if the F content of drinking water is less than 0.3 ppm or between 0.3 and 0.6 ppm, respectively.

Two concerns about the use of F supplementation are, first, that providers may be unaware of the fluoridation status of their patients' drinking water and thus inappropriately prescribe supplements, leading to increased fluorosis risk, and, second, parents' failure to adhere to the daily dosage regimen for as long as the F content of child's drinking water is deficient could reduce the preventive benefit of supplementation. Although both the 2004 and 2013 reviews for the USPSTF included the same 6 studies on F supplementation effectiveness, only the first review included the above concerns as key questions.[5,6] The 2004 review found that physician-reported data[6] suggested supplements were often prescribed without consideration of F content of drinking water. That review also only rated the evidence for effectiveness as "fair" owing to poor study design and the failure to account for nonadherence; children whose parents stopped giving them supplements were counted as dropouts, and dropout rates in two-thirds of the included studies were either not reported or were greater than 60%.

Recommendations for F supplement use among young children balance the caries-preventive benefit against the risk of fluorosis resulting from ingestion of F.[4] Therefore, it is important to know if the F content of the child's primary drinking water source is low. National studies on children's receipt of dietary F supplements are largely based on parental report,[7–9] and to the best of our knowledge, none have reported findings by public water system fluoridation status.

During the last decade, Medicaid claims data files for all states have become available to researchers. Medicaid-enrolled children predominantly represent low-income children. For example, from 2000 through 2011, the upper-income eligibility limits for families were between less than or equal to 200% and less than or equal to 241% of the federal poverty threshold,[10] and children in families with these levels of income are more likely than their higher-income counterparts to have untreated dental caries.[11] Over the past decade, for example, untreated caries in the permanent teeth has remained fairly stable—5.9% among children aged 6 through 11 years and 18.6% among children aged 12 to 19 years—with the prevalence almost twice as high among children living in poverty compared with children from higher-income families (income > 200% federal poverty threshold).[11] Although the prevalence of untreated caries in the primary teeth has decreased by almost 10 percentage points to 13.7%, it remains more than 2 times higher among poor children, 19.6%.[11]

F supplements are indicated only when the child's drinking water is deficient in F for caries prevention. Community water fluoridation (that is, the controlled addition of F to a community water system to ensure a concentration sufficient for caries prevention)[12] is safe, effective, and, at an annual cost of less than $2 per person,[13] is the least expensive mode of delivering F. Medicaid data files can support examination of prescription costs for F supplements and comparisons with published cost estimates for community water fluoridation.

To our knowledge, this is the first analysis of F prescriptions among children to use claims data across multiple states. Use of Medicaid claims data in this analysis allows comparison of filled prescriptions for dietary F supplements (hereafter referred to as F prescriptions) among Medicaid-enrolled children living in states where almost all people using public water systems received fluoridated water and in states where only approximately one-third or fewer people received fluoridated water. Furthermore, this analysis of claims data for 2000 and 2011 covers a period when recommendations for use of F supplements, supported by systematic reviews of the evidence, were released by major governmental and nongovernmental groups, such as the Centers for Disease Control and Prevention[4] in 2001, the USPSTF[6] in 2004, and the American Dental Association[3] in 2010. From 2000 through 2009 national initiatives aimed at increasing the use of preventive dental services in dental and primary care settings among young and poor children were also implemented. These include the American Academy of Pediatrics lowering the recommended age for first dental visit in 2003[14] and the USPSTF recommending the provision of preventive dental services by primary care providers in 2004.[15,16] The passage of the Children's Health Insurance Program (CHIP) Reauthorization Act in 2009 increased CHIP and Medicaid[17] enrollment and expanded access to comprehensive dental services among children enrolled in CHIP.[18,19]

We conducted this study to examine the changes in the percentage of children with F prescriptions over time, the consistency of prescribing and dosing with current recommendations, the average length of time that the prescriptions were filled (an upper bound on adherence), and prescription costs compared with published cost estimates for fluoridation of community water systems.

METHODS

Study population

We used Medicaid Analytic eXtract prescription drug use files for 2000 and 2011. In 2016 when we began the application process for data, 2011 was the most recent year for which data were available for all states. Data were obtained from the Centers for Medicare & Medicaid Services Virtual Research Data Center under Data Use Agreement 28045. Our research protocol was reviewed and approved by the Virtual Research Data Center Federal Agency Privacy Board.

We included children aged 0.5 through 16 years who were enrolled in Medicaid for at least 11 months. Children lived either in states with low water fluoridation coverage (354,288 children in 2000 and 769,147 children in 2011) or high water fluoridation coverage (971,353 children in 2000 and 1,919,531 children in 2011 [Table 1]). We stratified ages into 3 categories (0.5–2 years, 3–5 years, and 6–16 years) consistent with current F supplement dosing recommendations.[4] In 2000, children living in high-coverage states were more likely to be non-Hispanic white or black and less likely to be Hispanic or "other" race or ethnicity than were children in low-coverage states. By 2011, children in high-coverage states were less likely to be non-Hispanic white or other and more likely to be non-Hispanic black or Hispanic than children in low-coverage states (data not shown).

Treatment variable

Children who in 2011[20] lived in the 6 states (Hawaii, Idaho, Montana, New Jersey, Oregon, Utah) with the lowest water fluoridation coverage (≤ 34% of the population using public water systems received optimally fluoridated water) were considered to lack access to optimally fluoridated drinking water. Children who lived in the 6 states (Illinois, Kentucky, Maryland, Minnesota, North Dakota, Virginia) with the highest fluoridation coverage (≥ 95% of public water system population received fluoridated water) were considered to have access to optimally fluoridated drinking water (Table 2).[21]

Outcome measures

Children were classified as having an F prescription if they had a filled prescription with a National Drug Code indicating the product contained sodium F and was in the form of drops, lozenges, or tablets. From the National Drug Code, we could determine the F content of the dietary supplement—0.25 mg F, 0.5 mg F, or 1.0 mg F, and any (≥ 0.25 mg F). For each child with a F prescription, we calculated the sum of all payments paid by Medicaid and third parties with liability (for example, certain people, entities, insurers, or programs)[22] for F prescriptions, and the sum of days covered by all F prescriptions. For the latter sum, for example, if a child had 2 filled prescriptions, each for 30 days, the child was recorded as having a 60-day prescription. If the number of days for a prescription exceeded the number of days remaining in the year, the number of days was truncated to the number of days remaining in the year (for example, a 30-day prescription filled on December 20 would be assigned a length of 11 days). Finally, we originally planned to examine which providers (for example, dentists, primary care physicians) were prescribing F, but most taxonomy

codes in the prescription drug dataset were for pharmacists rather than the prescribing provider.

Statistical analysis

Only descriptive analyses were conducted. We calculated the mean (standard deviation) and median across the 6 high-coverage and 6 low-coverage states for the following variables:

- the percentage of Medicaid enrollees with an F prescription for all children and for each age group;
- mean prescription length in days (prescription length summed over enrollees divided by number of enrollees with a F prescription) for all children and each age group;
- F prescription cost per enrolled child (sum of costs divided by number of enrollees) and per enrollee with an F prescription (sum of costs divided by number of enrollees with F prescription). For all children with an F prescription, we also calculated the following:
- the percentage of children in each F dosage category stratified by age group;
- the mean, median, and mode prescription length in days.

Because these data were for all enrolled children, there was no sampling error; therefore, standard errors or confidence intervals for individual state outcomes were not estimated. We summarized findings across included states with high and low fluoridation coverage using means, standard deviations, medians, and ranges to examine the distribution of outcomes across low- and high-coverage states.

We used 2 criteria to examine provider compliance with F supplement recommendations: whether the prevalence of filled F prescriptions was higher in low-coverage than in high-coverage states, and whether F content of prescriptions was within dosage guidelines (that is, for 0.5–2 years, F content 0.25 mg F; for 2–5 years, F content 0.25 or 0.5 mg F; and for > 6 years, 0.5 or 1 mg F). To examine adherence to the daily F dosage regimen we examined the prescription length per child.

RESULTS

In 2000, the mean percentage of children aged 0.5 through 16 years with an F prescription was low; 0.1% for children living in high fluoridation coverage states and 0.8% for children in low fluoridation coverage states (Table 3). By 2011, the percentage of children with a filled prescription in high-coverage states remained low at 0.4%, with the highest percentage in any age group at 1.2%. In contrast, by 2011 the mean percentage with a filled prescription in low-coverage states was 10.3%. Increases were greater among younger children: 16.4 percentage points and 13.2 points for children aged 0.5 through 2 years and 3 through 5 years, respectively, compared with a change of 5.2 percentage points for children 6 through 16 years. Because the percentage of children with a filled prescription was so low in high-coverage states, we did not conduct additional analyses among these children.

Among children with an F prescription in low-coverage states, about 90% or more received a prescription with F content that could have been consistent with the recommended level for their age (Figure 1). In the 0.5 through 2 years group, 89.9% had prescriptions with 0.25 mg F; in the 3 through 5 years group, 15.4% with 0.25 mg F and 80.2% with 0.5 mg F; and in the 6 through 16 years group 12.9% with prescriptions with 0.5 mg F and 85.0% with 1 mg F. Among children with an F prescription, approximately 10% of children aged 0.5 through 2 years and 5% of children aged 3 through 5 years received dosages above the recommended level.

In 2011, the most frequently occurring prescription length (including refills) for all children in low-coverage states was 30 days (Table 4). The mean length was 72 days. Stratified by age (Figure 2), the mean length of prescriptions among low-coverage states in 2011 increased with child's age; 64.6, 76.5, and 85.1 days, respectively, for children 0.5 through 2 years, 3 through 5 years, and 6 through 16 years. The mean prescription length was higher for all age groups in 2011 than in 2000: by 7 days for children aged 0.5 through 2 years, by 18 days for children aged 3 through 5 years, and by 12 days for children aged 6 through 16 years.

In 2011, the mean annual cost per enrollee paid by Medicaid and third parties was $0.66 and $0.39, respectively, for a total mean cost per enrollee of $1.05. Among children with a filled F prescription, the mean (standard deviation) annual cost in low-coverage states ranged from $0.15 to $30.83 for all payers with a mean value of $17.60 ($13.77) (Table 5).

DISCUSSION

Consistent with efforts aimed at increasing access to effective preventive dental services, F prescriptions increased 10-fold between 2000 and 2011 among Medicaid-enrolled children living in low-coverage states. The prevalence of F prescriptions in these states in 2011, however, remained low at approximately 10%. There was no corresponding increase in high-coverage states, with a prevalence less than 1% in both 2000 and 2011. Furthermore, approximately 90% of children received dosages that were likely within the recommended levels for their age group. However, approximately 10% of children aged 0.5 through 2 years and 5% of children aged 3 through 5 years received dosages exceeding recommended levels, which could increase the risk for dental fluorosis. These findings indicate that providers were typically complying with current recommendations. The average length of an F prescription, however, suggests that for many children F exposure from prescribed supplements was limited. Over our study horizon of 1 year, most F prescriptions were only for 30 days.

Although we could not determine whether supplements were prescribed by dentists or primary care providers, it is likely that many F prescriptions for the 0.5 through 2 years age group were written by primary care providers; national data indicate that 90% of Medicaid enrollees age 0 through 2 years had a past-year primary care visit[23] compared with only 11% who had a past-year dental visit.[24]

F supplements are indicated only when drinking water is deficient in F. When technically feasible, water fluoridation could be an alternative intervention. Comparing the costs for these 2 interventions, we found that with the average filled prescription rate of 10% in the 6 low-coverage states, the cost of F supplements per enrollee in 2011 was $1.05 for all payers. This value, converted to $1.11 (2013 dollars), exceeds the 2013 per-person cost of water fluoridation in communities with more than 20,000 people: $0.89.[13] Furthermore, the cost of F supplements will increase as the filled prescription rate increases. For example, if all enrollees had filled prescriptions for 72 days (the mean prescription length in this study), the mean cost per enrollee would increase to $17.60 (2011 dollars). If prescriptions were filled for the entire year, the cost of F supplements would be even higher. Finally, studies on the cost-effectiveness of community water fluoridation among Medicaid-enrolled children[25,26] have underestimated the cost savings because they did not account for the cost of F supplements in nonfluoridated communities.

Our research had some limitations. First, we did not have information on the F content of a child's home drinking water, so we used state fluoridation coverage as a proxy for whether a child had optimally fluoridated water. This resulted in misclassification of some children's home fluoridation status. In addition, we could not determine exact compliance with recommendations because recommendations are based on both age and F content of drinking eater. For example, our finding that 90% of children age 0.5 through 2 years received F prescriptions with 0.25 mg F only suggests compliance as we did not know whether the F content of drinking water for these children was less than 0.3 ppm. Second, we used prescription length as a proxy for adherence. Prescription length is an upper bound for adherence, as availability does not guarantee children take the supplements. However, prescription length may have been underestimated if a prescription filled in 2010 extended into 2011. The most frequently filled prescription length was 30 days, suggesting that we could have underestimated prescription length from 1 day (prescription filled December 2, 2010) to 29 days (prescription filled December 31, 2010). Third, the methods to collect payments by third parties vary by state and the extent to which they accurately measure payments is unknown.[27] Finally, the findings of this study were obtained from 12 states and thus may not be generalizable to other states. A strength of this study is that it is the first to use Medicaid claims data across multiple states to examine filled F prescriptions in states with low and high water fluoridation coverage and their cost in low-coverage states. Claims data are less subject to recall bias than data obtained by parental report.

CONCLUSIONS

Our study provides new information suggesting that health care providers follow recommendations for prescribing F supplements. The short prescription length, however, suggests limited exposure for caries prevention. In addition, the cost of F supplements at current use levels per enrollee in the 6 low-fluoridation coverage states in this study were similar to the per-person water fluoridation costs in communities with more than 20,000 people.

ABBREVIATION KEY

CHIP	Children's Health Insurance Program
DFS	Dietary fluoride supplements
FW	Fluoridated water
PWS	Public water system
USPSTF	U.S. Preventive Services Task Force

References

1. Moyer VA; U.S. Preventive Services Task Force. Prevention of dental caries in children from birth through age 5 years: US Preventive Services Task Force recommendation statement. Pediatrics. 2014;133(6):1102–1111. [PubMed: 24799546]
2. Casamassimo P, Holt K, eds. Bright Futures: Oral Health—Pocket Guide. 3rd ed. Washington, DC: National Maternal and Child Oral Health Resource Center; 2006.
3. Rozier RG, Adair S, Graham F, et al. Evidence-based clinical recommendations on the prescription of dietary fluoride supplements for caries prevention: a report of the American Dental Association Council on Scientific Affairs. JADA. 2010;141(12):1480–1489. [PubMed: 21158195]
4. Centers for Disease Control and Prevention. Recommendations for using fluoride to prevent and control dental caries in the United States. MMWR Recomm Rep. 2001;50(RR-14):1–42.
5. Chou R, Cantor A, Zakher B, Mitchell JP, Pappas M. Preventing dental caries in children <5 years: systematic review updating USPSTF recommendation. Pediatrics. 2013;132(2):332–350. [PubMed: 23858419]
6. Bader JD, Rozier RG, Lohr KN, Frame PS. Physicians' roles in preventing dental caries in preschool children: a summary of the evidence for the U.S. Preventive Services Task Force. Am J Prev Med. 2004; 26(4):315–325. [PubMed: 15110059]
7. Vernacchio L, Kelly JP, Kaufman DW, Mitchell AA. Vitamin, fluoride, and iron use among US children younger than 12 years of age: results from the Slone Survey 1998–2007. J Am Diet Assoc. 2011;111(2):285–289. [PubMed: 21272704]
8. Ervin RB, Wright JD, Reed-Gillette D. Prevalence of leading types of dietary supplements used in the Third National Health and Nutrition Examination Survey, 1988–94. Adv Data. 2004;9(349):1–7.
9. Briefel R, Hanson C, Fox MK, Novak T, Ziegler P. Feeding Infants and Toddlers Study: do vitamin and mineral supplements contribute to nutrient adequacy or excess among US infants and toddlers? J Am Diet Assoc. 2006;106(1 suppl 1):S52–S65. [PubMed: 16376630]
10. Kaiser Family Foundation. State health facts: Medicaid/CHIP upper income eligibility limits for children, 2000–2018. Available at: https://www.kff.org/medicaid/state-indicator/medicaidchip-upper-income-eligibility-limits-for-children/?currentTimeframe=0&selectedDistributions=october-2000-january-2011&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Accessed August 19, 2019.
11. Dye BA, Mitnik GL, Iafolla TJ, Vargas CM. 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. JADA. 2017;148(8):550–565.e7. [PubMed: 28619207]
12. U.S. Department of Health and Human Services. Oral Health in America: a report of the surgeon general. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.
13. O'Connell J, Rockell J, Ouellet J, Tomar SL, Maas W. Costs and savings associated with community water fluoridation in the United States. Health Aff (Mill-wood). 2016;35(12):2224–2232.

14. Hale KJ; American Academy of Pediatrics Section on Pediatric Dentistry. Oral health risk assessment timing and establishment of the dental home. Pediatrics. 2003; 111(5 Pt 1):1113–1116. [PubMed: 12728101]
15. Calonge N; U.S. Preventive Services Task Force. Prevention of dental caries in preschool children: recommendations and rationale. Am J Prev Med. 2004;26(4): 326–329. [PubMed: 15110060]
16. Section on Pediatric Dentistry and Oral Health. Preventive oral health intervention for pediatricians. Pediatrics. 2008;122(6):1387–1394. [PubMed: 19015205]
17. Children's Health Insurance Program Reauthorization Act of 2009, Pub L No. 111–3, §501(d), 123 Stat 8 (2009).
18. Harrington M, Smith K, Trenholm C, et al. CHI-PRA Mandated Evaluation of the Children's Health Insurance Program: Final Findings. Ann Arbor, MI: Mathematica Policy Research. Available at: https://www.medicaid.gov/chip/downloads/chip-report-congress-2014.pdf. Accessed June 26, 2019.
19. Mann C Update on CMS Oral Health Initiative and Other Oral Health Related Items. Baltimore, MD: U.S. Department of Health and Human Services, Center for Medicaid and CHIP Services; 2014. Available at: https://www.medicaid.gov/Federal-Policy-Guidance/Downloads/CIB-07-10-2014.pdf. Accessed June 26, 2019.
20. Centers for Disease Control and Prevention. Community water fluoridation: state fluoridation percentage calculations and states ranked by fluoridation percentage. Available at: https://www.cdc.gov/fluoridation/statistics/2010stats.htm. Accessed June 26, 2019.
21. Centers for Disease Control and Prevention. Populations receiving optimally fluoridated public drinking water: United States, 1992–2006. MMWR Morb Mortal Wkly Rep. 2008;57(27):737–741. [PubMed: 18614991]
22. Centers for Medicare & Medicaid Services. Medicaid third party liability & coordination of benefits. Baltimore, MD: Centers for Medicare & Medicaid Services. Available at: https://www.medicaid.gov/medicaid/eligibility/tpl-cob/index.html. Accessed June 26, 2019.
23. Agency for Healthcare Research and Quality. Total health services: mean and median expenses per person with expense and distribution of expenses by source of payment: United States, 2011. Medical Expenditure Panel Survey Household Component Data. Available at: https://meps.ahrq.gov/survey_comp/household.jsp. Accessed March 2, 2017. (Data generated interactively; March 2, 2017.)
24. Agency for Healthcare Research and Quality. Medical Expenditure Panel Survey. Available at: https://meps.ahrq.gov/mepsweb/data_stats/tables_compendia_hh_interactive.jsp?_SERVICE=MEPSSocket0&_PROGRAM=MEPSPGM.TC.SAS&File=HCFY2011&Table=HCFY2011_PLEXP_B&VAR1=AGE&VAR2=SEX&VAR3=RACETH5C&VAR4=INSURCOV&VAR5=POVCAT11&VAR6=MSA&VAR7=REGION&VAR8=HEALTH&VARO1=2+17+44+64&VARO2=1&VARO3=1&VARO4=1&VARO5=1&VARO6=1&VARO7=1&VARO8=1&DD1=Health+insurance+statusstatus%3D%60%3C65%2C+Public+only%60&DD2=&DD3=&TCOPT1=&TCOPT2=&_Debug=&Action.x=107&Action.y=11. Accesse March 2, 2017. (Data generated interactively; March 2, 2017.)
25. Centers for Disease Control and Prevention. Water fluoridation and costs of Medicaid treatment for dental decay: Louisiana, 1995–1996. MMWR Morb Mortal Wkly Rep. 1999;48(34):753–757. [PubMed: 10499787]
26. Kumar JV, Adekugbe O, Melnik TA. Geographic variation in Medicaid claims for dental procedures in New York State: role of fluoridation under contemporary conditions. Public Health Rep. 2010;125(5):647–654. [PubMed: 20873280]
27. Research Data Assistance Center for Centers for Medicare & Medicaid Services. Third party payment amount. Minneapolos, MN: Research Data Assistance Center. Available at: https://www.resdac.org/cms-data/variables/third-party-payment-amount-unknown-0/. Accessed June 26, 2019.

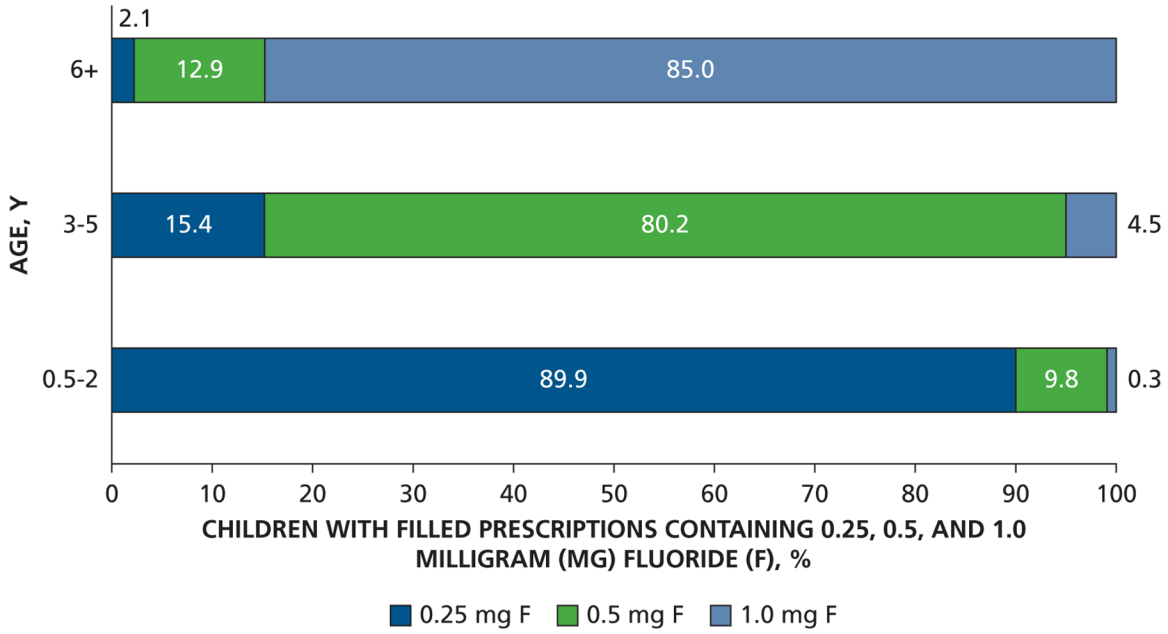

Figure 1.

Percentage of children with filled prescriptions containing 0.25, 0.5, and 1.0 milligrams (mg) fluoride (F) by age group in states with low fluoridation coverage (Hawaii, Idaho, Montana, New Jersey, Oregon, and Utah), 2011. Source: Centers for Medicare & Medicaid Services Medicaid Analytic eXtract file.

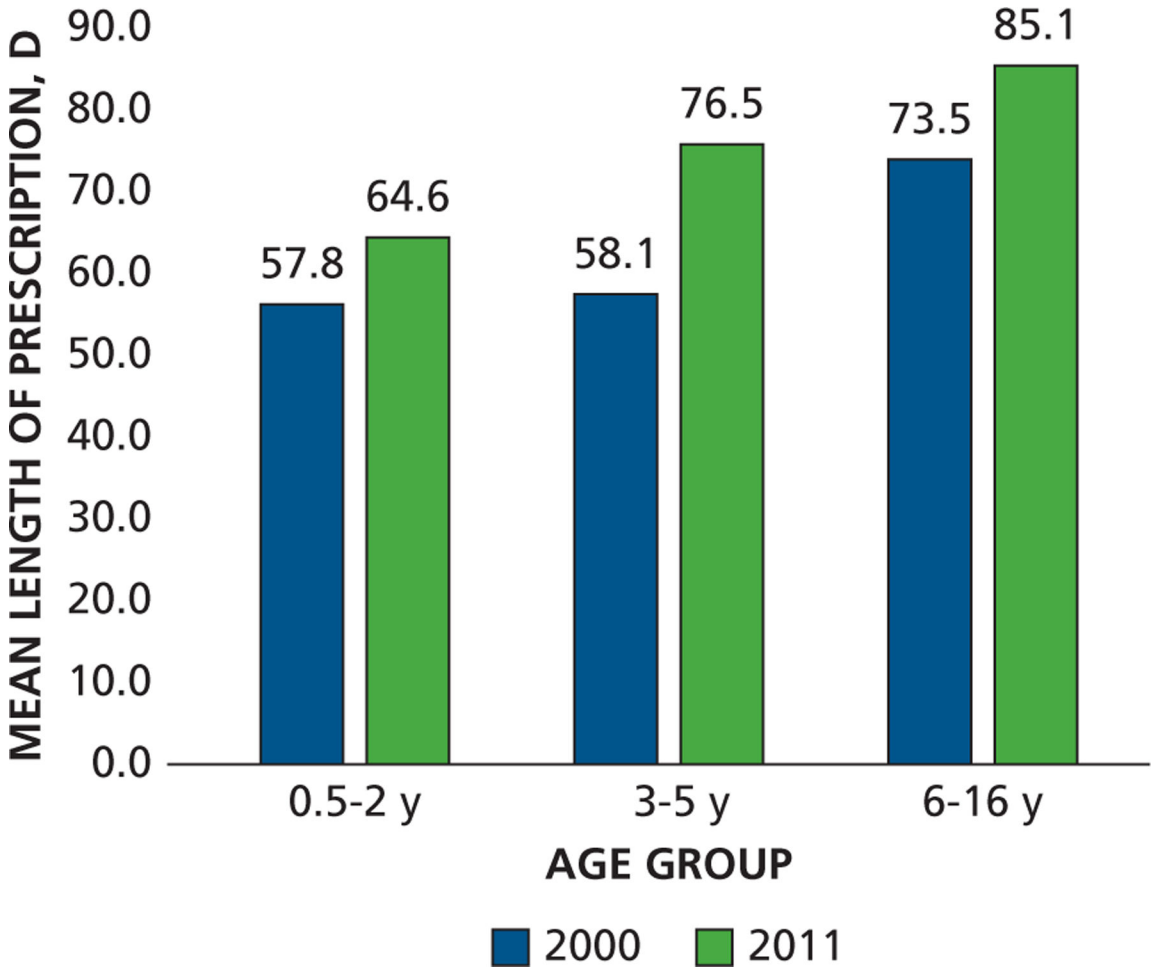

Figure 2.

Mean filled fluoride prescription length in states with low fluoridation coverage (Hawaii, Idaho, Montana, New Jersey, Oregon, and Utah), 2000 and 2011. Source: Centers for Medicare & Medicaid Services Medicaid Analytic eXtract file.

Table 1.

Number of enrolled children by age group in states with high and low fluoridation coverage: 2000 and 2011.*

STATES	2000				2011			
	Age, Y							
	0.5–2	3–5	6–16	0.5–16	0.5–2	3–5	6–16	0.5–16
High Fluoridation Coverage								
Illinois	106,585	93,095	232,450	432,130	162,015	190,770	486,948	839,733
Kentucky	31,696	31,315	104,328	167,339	52,272	59,901	179,257	291,430
Maryland	27,763	22,521	70,010	120,294	59,563	66,936	170,092	296,591
Minnesota	24,482	19,588	66,651	110,721	42,452	41,322	116,667	200,441
North Dakota	2,060	2,259	5,705	10,024	4,616	4,783	10,573	19,972
Virginia	29,425	26,459	74,961	130,845	56,672	63,479	151,213	271,364
All	222,011	195,237	554,105	971,353	377,590	427,191	1,114,750	1,919,531
Low Fluoridation Coverage								
Hawaii	7,134	8,179	20,532	35,845	15,361	17,585	41,811	74,757
Idaho	10,531	8,458	19,690	38,679	15,736	15,631	43,082	74,449
Montana	3,758	3,178	8,321	15,257	6,884	6,964	19,120	32,968
New Jersey	42,770	43,819	115,295	201,884	74,895	88,765	209,635	373,295
Oregon	5,445	4,646	15,016	25,107	31,856	31,618	68,497	131,971
Utah	12,027	8,503	16,986	37,516	22,455	21,693	37,559	81,707
All	81,665	76,783	195,840	354,288	167,187	182,256	419,704	769,147

*Data are for Medicaid Analytic Extract files from the Centers for Medicare & Medicaid Services prescription drug claim files, 2000 and 2011.

Source: Centers for Medicare & Medicaid Services Medicaid Analytic eXtract files.

Table 2.

Percentage of state population using fluoridated water in 2010 from public water system and percentage of state population using public water system for 12 states included in the analysis.

STATE	PEOPLE RECEIVING FW*	PEOPLE WITH PWS†	STATE POPULATION	STATE POPULATION WITH PWS (%)	PWS POPULATION RECEIVING FW (%)	STATE POPULATION FW (%)
High Community Water Fluoridation Coverage						
Kentucky	3,671,376	3,675,733§	4,339,367	84.71‡	99.88	84.61
Maryland	5,140,618	5,151,947	5,773,552	89.23	99.78	89.04
Illinois	11,325,132	11,403,176	12,830,632	88.87	99.32	88.27
North Dakota	559,246	577,325	672,591	85.84	96.87	83.15
Minnesota	4,117,266	4,166,424	5,303,925	78.55	98.82	77.63
Virginia	6,124,274	6,403,141	8,001,024	80.03	95.64	76.54
Low Community Water Fluoridation Coverage						
Utah	900,839	2,713,371†	2,763,885	98.17‡	33.20	33.59
Montana	233,221	788,805	989,415	79.70	29.60	23.57
Oregon	833,227	3,688,540	3,831,074	96.30	22.60	21.75
Idaho	335,127	1,099,561	1,567,582	70.10	30.50	21.38
New Jersey	1,111,624	8,221,293	8,791,894	93.50	13.50	12.64
Hawaii	139,598	1,290,549	1,360,301	94.90	10.80	10.26

*FW: Fluoridated water.

†PWS: Public water system.

‡This is a lower bound as it assumes that all well water did not contain optimal amounts of fluoride.

§The U.S. Geological Survey was used to estimate the number of people using public water systems because the state-reported value exceeded the U.S. Census state population estimate; the number of people using fluoridated water was revised downward by multiplying the state-reported value times the ratio of the U.S. Geological Survey estimate of public water system population to the state-reported state population using the water system.

Table 3.

Percentage of enrolled children with filled dietary fluoride supplement prescriptions by age group in states with high and low fluoridation coverage.*

STATE	FLUORIDATION COVERAGE (%)											
	2000				2011				Change			
	Age, Y											
	0.5–2	3–5	6–16	0.5–16	0.5–2	3–5	6–16	0.5–16	0.5–2	3–5	6–16	0.5–16
High Fluoridation Coverage												
Illinois	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kentucky	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.2	0.0	0.0	0.0
Maryland	0.4	0.1	0.0	0.1	2.7	0.9	0.4	0.9	2.3	0.9	0.3	0.8
Minnesota	0.5	0.1	0.0	0.1	1.8	0.8	0.3	0.7	1.3	0.7	0.3	0.6
North Dakota	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Virginia	0.5	0.1	0.0	0.1	2.1	0.6	0.2	0.7	1.6	0.5	0.2	0.5
Mean (SD†)	0.3 (0.2)	0.0 (0.0)	0.0 (0.0)	0.1 (0.1)	1.2 (1.1)	0.4 (0.4)	0.1 (0.1)	0.4 (0.4)	0.9 (1.0)	0.4 (0.4)	0.1 (0.1)	0.5 (0.3)
Median	0.3	0.0	0.0	0.1	1.0	0.3	0.1	0.4	0.7	0.3	0.1	0.4
Low Fluoridation Coverage												
Hawaii	0.4	0.1	0.0	0.1	16.1	18.2	7.5	11.8	15.8	18.1	7.5	11.7
Idaho	2.5	0.1	0.0	0.7	4.7	2.6	1.1	2.1	2.2	2.5	1.0	1.4
Montana	2.0	0.1	0.0	0.5	8.6	6.4	2.8	4.7	6.6	6.3	2.8	4.2
New Jersey	1.4	0.2	0.0	0.3	43.2	30.2	14.9	24.2	41.9	30.0	14.9	23.9
Oregon	3.1	0.3	0.0	0.7	30.9	15.7	4.8	13.7	27.7	15.5	4.8	12.9
Utah	7.5	0.7	0.0	2.6	11.7	7.3	0.1	5.2	4.2	6.6	0.1	2.6
Mean (SD)	2.8 (2.5)	0.2 (0.2)	0.0 (0.0)	0.8 (0.9)	19.2 (14.8)	13.4 (10.1)	5.2 (5.5)	10.3 (8.1)	16.4 (15.6)	13.2 (10.2)	5.2 (5.5)	9.0 (8.0)
Median	2.3	0.2	0.0	0.8	13.9	11.5	3.8	8.5	11.2	11.0	3.8	8.0

*Data are for Medicaid Analytic Extract files from the Centers for Medicare & Medicaid Services prescription drug claim files, 2000 and 2011.

†SD: Standard deviation.

Source: Centers for Medicare & Medicaid Services Medicaid Analytic eXtract files.

Table 4.

Length of dietary supplemental fluoride prescription among children aged 0.5 through 16 years in states with low fluoridation coverage.[*]

STATE	NO.	MEAN	MEDIAN	MODE	SD[†]
Hawaii	8,803	56	50	30	33
Idaho	1,605	69	50	30	60
Montana	1,572	72	50	30	69
New Jersey	90,689	85	60	30	68
Oregon	18,128	71	50	30	56
Utah	4,286	79	50	30	60
Mean	NA[‡]	72.1	NA	NA	NA

[*] Data are for Medicaid Analytic Extract files from the Centers for Medicare and Medicaid Services prescription drug claim files, 2011.

[†] SD: Standard deviation.

[‡] NA: Not applicable.

Source: Centers for Medicare & Medicaid Services Medicaid Analytic eXtract files.

Table 5.

Annual costs to Medicaid and third-party payers for dietary fluoride supplement prescriptions in states with low fluoridation coverage.*

STATE	MEDICAID COST ($)			THIRD-PARTY COST ($)			COST TO ALL PAYERS ($)		
	Total	Per Enrollee	Per Enrollee With Filled Prescription	Total	Per Enrollee	Per Enrollee With Filled Prescription	Total	Per Enrollee	Per Enrollee With Filled Prescription
Hawaii	1,081.00	0.01	0.12	243.00	0.00	0.03	1,324.00	0.02	0.15
Idaho	46,562.00	0.62	29.01	387.00	0.01	0.24	46,949.00	0.63	29.25
Montana	48,327.00	1.46	30.74	139.00	0.00	0.09	48,466.00	1.46	30.83
New Jersey	98,011.00	0.26	1.08	348.00	0.00	0.01	98,359.00	0.26	$1.09
Oregon	35,092.00	0.27	1.94	310,568.00	2.35	17.13	345,660.00	2.61	19.07
Utah	107,984.00	1.31	25.19	63.00	0.00	0.01	108,047.00	1.31	25.20
Mean (Standard Deviation)	NA	0.66 (0.60)	14.68 (15.05)	NA	0.39 (0.96)	2.92 (6.96)	NA	1.05 (0.95)	17.60 (13.77)
Median	NA	0.44	13.57	NA	0.00	0.06	NA	0.97	22.14

*Data are for Medicaid Analytic Extract files from the Centers for Medicare and Medicaid Services prescription drug claim files, 2011.

†NA: Not applicable.

Source: Centers for Medicare & Medicaid Services Medicaid Analytic eXtract files.