

Effects of WIC Participation on Children's Use of Oral Health Services

Jessica Y. Lee DDS, PhD, MPH, R. Gary Rozier DDS, MPH, Edward C. Norton PhD, Jonathan B. Kotch MD, MPH, William F. Vann Jr, DMD, PhD

Dental disease and access to dental care are major public health problems for young low-income children living in the United States. This national dilemma has recently come under close scrutiny by policymakers, health care providers, and researchers.^{1,2} Because of frequent interactions with low-income children and their families, several public health programs can help alleviate dental problems and improve access to dental care. An example of such a program is the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). WIC is administered by the Food and Nutrition Services of the US Department of Agriculture and serves more than 7.4 million individuals.³ Over one third of infants born in the United States are enrolled in the WIC program. It is often the first contact with the health care system for many poor women and children. The primary goal of WIC is to "improve the health of women and children by providing nutritious foods, nutrition education and good health care during pregnancy, the postpartum period, infancy and early childhood."^{4(p391)} To achieve its goal, WIC agencies work to improve the linkage between clients and health care providers, including dentists, through referrals and networking.⁵

WIC and Medical Care

Several investigations have demonstrated the effectiveness of WIC in providing positive health outcomes. Among the benefits are a reduced frequency of low-birthweight deliveries,⁶⁻⁸ reduced Medicaid costs for newborns,⁹ reduced rates of anemia in children,⁶ and increased nutrient intake in children.¹⁰ The health effects of WIC participation are attributed to the direct nutrition-related benefits of the program rather than to the benefits of coordination of health and social services.¹¹ However, the beneficial effects of the coordination of health services cannot be dismissed

Objectives. We estimated the effects of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) on dental services use by Medicaid children in North Carolina.

Methods. We used linked Medicaid claims and enrollment files, WIC files, and the area resource file to compare dental services use for children enrolled in WIC with those not enrolled. We used multivariate models that controlled for child clustering and employed 2-step methodology to control for selection bias.

Results. Children who participated in WIC had an increased probability of having a dental visit, were more likely to use preventive and restorative services, and were less likely to use emergency services.

Conclusions. Children's WIC participation improved access to dental care services that should lead to improved oral health. (*Am J Public Health.* 2004;94:772-777)

readily.¹² Referral of children to health and social services is an important component of WIC programs. WIC counselors advise families about the location of clinics and programs, such as Medicaid and the State Children's Health Insurance Program, that help pay for health care.

Few studies have addressed the effects of WIC on the utilization of health care services.^{3,6,10} One investigation demonstrated that WIC participants used a children's clinic more frequently than did nonparticipants.¹² In a recently published study, Buescher et al. reported that "Medicaid-enrolled children participating in the WIC program use all types of health care services compared with Medicaid-enrolled children who were not WIC participants."^{13(p145)} They concluded that "the health care needs of low-income children who participate in WIC may be better met than those of low-income children who were not WIC participants."^{13(p145)}

WIC and Oral Health Care

Only 2 small, descriptive studies have investigated the relation between participation in WIC programs and referrals for oral health care. McCuniff et al.¹⁴ examined dental referral rates by WIC clinics in Missouri, reporting that of the 1850 participants seen during

a 2-month period at a clinic site, 27% of children and 17% of infants were referred for services outside the WIC clinic. Using self-reported information from caregivers, McCuniff et al.¹⁴ also reported a statistically significant bivariate relation between WIC referral and having a dental visit. Dental referrals constituted 10% of these referrals made for infants and children. Sargent et al.¹⁵ used a survey of WIC employees in an inner-city clinic to examine referral patterns. WIC nutritionists at this site offered a variety of referrals to their clients. One fifth of WIC participants were referred to health services, and referrals for dental care constituted the majority of these referrals. Results of these 2 studies suggest that dental referrals do take place within WIC clinics, but the proportion of all referrals due to a dental problem varied considerably. Furthermore, the outcome of these referrals is largely unknown.

Findings from previous WIC and health care utilization investigations are further limited because they do not control for the non-randomized nature of WIC participation.^{13,16} We build on these past studies in an investigation of WIC participation and use of dental services by using claims data rather than self-reports and by employing multistage modeling to control for selection bias. Using these

more sophisticated analytic techniques in our exploration of the effects of WIC on use of oral health services, we provide an estimate of the effectiveness of WIC programs in linking clients with dental providers. Specifically, we determined whether, compared with Medicaid children who did not participate in WIC, preschool-aged Medicaid children enrolled in WIC had an increased likelihood of having had a dental visit and whether it was of a certain type (preventive, restorative, or emergency).

METHODS

We tested the hypothesis that children enrolled in WIC have better access to dental care than children not enrolled in WIC. For purposes of this investigation, we defined *access* as use of services that was represented by Medicaid claims data. We measured the effects of children's WIC participation on the probability of a child's having had a dental visit and the different types of visits. Available sociodemographic variables were included as control variables in our analyses.

Data Sources and Study Cohort

We used the following linked North Carolina administrative data sets for our investigation: composite birth records, Medicaid eligibility enrollment files, Medicaid dental claims, WIC files, and the area resource file. The linkage process for these files has previously been reported, and a matching rate of 98.5% was established.¹³

All children born in North Carolina in calendar year 1992 who were enrolled in the Medicaid program were eligible for inclusion in the study. Children were excluded if they had more than 1 Medicaid identification in their records (759 children) or if they had recorded periods of Medicaid enrollment indicated before the date of birth (1371 children). A Medicaid enrollment history was created for each child in which enrollment status was indicated for each month of life from birth to the age of 5 years (months 1 through 60).

Analysis Strategy

Using various multiple regression analyses with control variables, we determined the re-

lation of children's WIC participation and the use of oral health services. Several analytic challenges had to be considered. Because our investigation followed children for 5 years, the data set contained multiple observations per child that can result in correlated error terms and bias results. To control for this problem, we used robust standard errors and controls for clustering around the child in the regression analysis. Panel data techniques using random effects models were used in each analysis.

Another important analysis consideration was the potential for selection bias. Because WIC participation was not randomly determined among Medicaid children, we anticipated that children who participated in WIC would more likely be users of health care services than other Medicaid children. This assumption suggests the potential for correlation between the WIC participation variable and the error term of our main analysis. Failure to account for this correlation could bias our results. To control for this potential bias, we incorporated a 2-stage multilevel model using instrumental variables as outlined by Bollen et al.¹⁷ We screened potential instrumental variables for their close association with WIC participation. Three instrumental variables (number of WIC clinics per county, number of full-time WIC workers per county, and WIC hours of operation per county) were correlated with WIC participation but not with dental utilization and were used in our analysis.

The primary measure of oral health utilization was a 3-level variable defined as no visits, 1 visit, or 2 or more visits per year as represented by dental claims. These categories were used because the recommended number of dental visits is 2 per year.¹⁸ We did not distinguish among the number of visits greater than 2 per year because those differences are likely to depend on the severity of dental disease rather than basic issues associated with access to care. Because the measure of this dependent variable was coded as 0, 1, and 2, we used an ordered probit analysis with controls for clustering to examine WIC and oral health services utilization for each observation year (1 through 4).

We used separate random effects logit analyses (logistic regression) for each type of

oral health services used. *Type of services received* was classified as (1) diagnostic/preventive services, (2) restorative services, and (3) emergency services. The American Dental Association procedure codes were used to classify service categories.¹⁸ Additionally, if a child had a hospital emergency room claim with a primary diagnosis of dental caries¹⁹ it was included as an emergency visit. These visit types were coded 0 or 1 to represent each type of visit per year as indicated by Medicaid claims.

Our major explanatory variable was children's WIC participation measured as the number of months when any WIC voucher was redeemed during each year of life. We also incorporated relevant available sociodemographic control variables into our analysis. These included maternal educational level (years of school completed), maternal age (years), household income (actual dollar amounts), marital status (unmarried vs married), and minority status (non-White vs White). Many of these variables have been reported as important determinants of access to oral health care.^{20–22} In addition, we used length of Medicaid enrollment (months) and dentists-to-population ratio in our analyses.

RESULTS

Descriptive Statistics

Summary statistics for the study cohort are presented in Table 1. Of the 81 518 live births in North Carolina in 1992, 53 591 children were enrolled in Medicaid and 49 795 met the study inclusion criteria at birth. Our cohort was reduced to 21 277 at 1 year of age because the eligibility for Medicaid changes from 185% of the federal poverty level during the first year of life to 133% of the federal poverty level thereafter. Approximately 18% of the children born with Medicaid benefits remained continuously enrolled. Approximately 12% stayed continuously enrolled in WIC for the entire 5-year study period. The average number of months per year enrolled in Medicaid was 7.6. More than 50% of the cohort was on WIC at any time during the study period. The average length of children's WIC participation was 4.4 months per year. The average maternal age was 21 years, with an average educational level of 11th grade.

TABLE 1—Characteristics of the Study Population: North Carolina, 1992–1997

| | Mean or Percentage | SD | Minimum | Maximum |
|--|--------------------|------|---------|---------|
| WIC variables | | | | |
| Time WIC vouchers were used, mo per year | 4.47 | 3.06 | 0 | 12 |
| Infant WIC participation | 51% | 0.33 | 0 | 1 |
| Outcome variables | | | | |
| Any dental visit in a year | 7.1% | 0.25 | 0 | 1 |
| Number of dental visits per year | 0.4 | 2.02 | 0 | 6 |
| Had a preventive visit in a year | 6.6% | 0.25 | 0 | 1 |
| Had a restorative visit in a year | 2.2% | 0.15 | 0 | 1 |
| Had an emergency visit in a year | 1.5% | 0.12 | 0 | 1 |
| Control variables | | | | |
| Maternal age, y | 21 | 5.51 | 13 | 39 |
| Maternal education | 11th grade | 4.39 | 9 | 18 |
| Medicaid enrollment, mo per year | 7.6 | 5.26 | 1 | 12 |
| Household income, \$ | 20 550 | 4140 | 12200 | 29130 |
| No. dentists/population | 6.820 | 3.81 | 0 | 17.6 |
| Unmarried | 54% | 0.48 | 0 | 1 |
| Non-White | 48% | 0.50 | 0 | 1 |

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

Forty-eight percent of the population was non-White. In each observation year, 7% of the sample had a dental visit of any type, 6% had a preventive visit, 2% had a restorative visit, and 1% had an emergency visit. Overall, 12.1% of the cohort used oral health services before the age of 5 years.

Analytic Results

The analytic file consisted of 4 observations per child (n=49 795) representing 1 for each year of life until the age of 5 years, for a total of 199 180 child-year observations. Because the first year of life represented the infant year and use of oral health services was extremely low, we omitted this year from our analysis, leaving 4 observation years for ages 1 through 4 years. Table 2 illustrates the model results of our analysis of children’s WIC participation and oral health services utilization (any visit, 1 visit, 2 or more visits per year). Children’s WIC participation was a significant ($P<.01$) factor with a positive effect on oral health services utilization. Also significant in the model were Medicaid enrollment ($P<.01$), household income ($P<.05$), dentist-to-population ratio ($P<.05$), and being non-White ($P<.05$).

Table 3 illustrates the likelihood of dental visits by level of WIC participation. These re-

TABLE 2—Ordered Probit Model Results for WIC and Use of Oral Health Services: North Carolina, 1992–1997

| Variables | Estimated Coefficient (SE) |
|--------------------------|----------------------------|
| WIC variables | |
| Child WIC participation | 0.043*** (0.013) |
| Infant WIC participation | 0.032*** (0.011) |
| Control variables | |
| Maternal age | 0.014* (0.00086) |
| Maternal education | -0.0017 (0.0016) |
| Medicaid enrollment | 0.101*** (0.006) |
| Household income | 0.060** (0.014) |
| Dentists/population | 0.015** (0.007) |
| Unmarried | -0.0013* (0.00078) |
| Non-White | -0.32** (0.014) |
| Constant 1 | 2.52 (0.030) |
| Constant 2 | 2.89 (0.030) |

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.
* $P<.10$; ** $P<.05$; *** $P<.01$.

sults were calculated using the base-case child (White, maternal age of 21 years, maternal educational level of grade 11, household income of \$20 550, and mother married and enrolled in Medicaid for 7.6 months). Children who participated in WIC

for a full year were about 1.7 times more likely to have 2 or more dental visits per year than those children who never participated in WIC (odds ratio [OR]=1.67; 95% confidence interval [CI]=1.45, 1.78). Children who participated in WIC for a full year were about 1.5 times more likely to have 1 dental visit than children not on WIC (OR=1.46; 95% CI=1.32, 1.56).

Table 4 presents results for the 3 logit models for children’s WIC participation and type of dental visit. Children’s WIC participation was significant ($P<.01$) and had a positive effect on the likelihood of a preventive or restorative visit and a negative and marginally significant effect ($P<.10$) on emergency visits. Table 3 presents the likelihood of type of dental visit by level of WIC participation. Children who participated in WIC for 12 months were more likely to have a preventive visit (OR=1.98; 95% CI=1.85, 2.02) and a restorative visit (OR=1.69; 95% CI=1.56, 1.87) but less likely to have an emergency visit (OR=0.68; 95% CI=0.56, 0.89) than children who did not receive WIC services.

DISCUSSION

This investigation represents the first detailed examination of children’s WIC participation and oral health care utilization. Previous studies have substantiated that WIC participation has an effect on the use of prenatal care and children’s medical care.^{3,6,10} Our findings indicate that children who participate in WIC are more likely to have a dental visit, thus increasing their access to oral health care. Because children on Medicaid are a high-risk population who often need more frequent and extensive dental services than other children, the association between WIC and greater use of services suggests that children on both Medicaid and WIC are more likely to receive the care they need.

Our results also showed that young children participating in the WIC program are more likely to use preventive and restorative services and are less likely to use emergency services than WIC nonparticipants. These findings suggest that children participating in WIC may have a better connection to the health care system that can lead to care that is more planned and less urgent. If further

TABLE 3—Odds Ratios for Dental Services Use, by Level of WIC Participation: North Carolina, 1992–1997

| | No WIC Participation (Reference Group) | 6-Month WIC Participation | 1-Year WIC Participation |
|----------------------------|---|------------------------------|-----------------------------|
| ≥ 2 Dental visits per year | 1.0 | 1.51*** | 1.67*** |
| 1 Dental visit per year | 1.0 | 1.26** | 1.46*** |
| No dental visits | 1.0 | 0.85* | 0.79** |
| Preventive care visit | 1.0 | 1.59*** | 1.98*** |
| Restorative care visit | 1.0 | 1.26*** | 1.69*** |
| Emergency care visit | 1.0 | 0.79* | 0.68* |

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children; OR = odds ratio.
* $P < .10$; ** $P < .05$; *** $P < .01$.

TABLE 4—Random Effects Logit Models for WIC and Type of Visit: North Carolina, 1992–1997

| | Preventive Visit (SE) | Restorative Visit (SE) | Emergency Visit (SE) |
|-------------------------|-----------------------|------------------------|----------------------|
| WIC variables | | | |
| Child WIC participation | 0.065 (0.026)*** | 0.047 (0.0035)*** | -0.036 (0.0021)* |
| Control variables | | | |
| Maternal age | 0.0048 (0.0011)*** | 0.037 (0.0014)*** | 0.00070 (0.0015) |
| Maternal education | -0.0050 (0.0015)*** | -0.0097 (0.0026)*** | -0.011 (0.0028)*** |
| Medicaid enrollment | 0.140 (0.0018)*** | 0.12 (0.0028)*** | 0.11 (0.0029)*** |
| Household income | -0.0030 (0.0015)** | -0.020 (0.0085)** | -0.015 (0.0045)*** |
| No. dentists/population | 0.023 (0.0096)** | 0.016 (0.0021)** | -0.020 (0.0024)*** |
| Unmarried | -0.0041 (0.0025)* | -0.002 (0.018) | -0.033 (0.019)* |
| Non-White | -0.038 (0.030)*** | -0.014 (0.0072)** | -0.047 (0.018)*** |
| Constant | -2.70 (0.58)*** | -3.13 (0.77)*** | -3.05 (0.87)*** |

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.
* $P < .10$; ** $P < .05$; *** $P < .01$.

studies can confirm a causal link between activities of a WIC nutritionist, dental referral, and use of dental services, it would appear that an important facet of the mission of WIC programs—appropriate referrals to health and social services—is being addressed. Our study contributes to the literature in 2 major ways: by broadening the understanding of the effects of WIC participation to oral health care and by making a methodological improvement on the way WIC effects are examined.

Methodological Contributions

Our study is the first to examine the WIC program and health services utilization with the 2-step statistical modeling approach. A strong criticism of previous WIC children's

health studies is their inability to control for the potential selection bias of enrollment in the WIC program.¹⁶ We conducted extensive tests for these sources of bias in the relation between WIC enrollment and use of oral health services and found that selection bias did exist. Random assignment of families to WIC participation would be a stronger design and would help overcome any selection bias. However, the practical problem of implementing this strategy in a community-based setting would be daunting, and such a design is not ethically defensible. To help control for selection bias, we used the 2-step methodology as described by Bollen et al.¹⁷ This approach makes a significant contribution to the literature about the WIC program because the majority of studies that examine the WIC pro-

gram have been unsuccessful in recognizing and correcting for selection bias (endogeneity).¹⁶ Our study also demonstrates the feasibility of using 2-step analysis to control for selection bias when examining the effects of WIC on oral health care use.

Sporadic and continuously enrolled Medicaid children differ demographically, socially, and economically,²³ so we did not limit the cohort to continuously enrolled children. Doing so would have biased the sample and threatened generalizability. Continuously enrolled children in our cohort had utilization rates for oral health services that were 3 times greater than those not enrolled continuously in Medicaid (30% vs 10%).²⁴ Instead, we controlled for Medicaid enrollment with a variable for duration of months per year enrolled in the program. However this approach can create another bias because low-income children qualifying for Medicaid may receive dental care under private insurance, with fee for service, or at no cost during periods in which they are not enrolled in Medicaid. Although low-income children are likely to use medical care when not enrolled in public insurance programs, it is unlikely that they receive dental care, particularly young children in North Carolina, where excess demand for services exists and dentists' participation in Medicaid is low.²⁵ Furthermore, dental care is the most prevalent unmet need in uninsured children who are eligible for Medicaid.²⁶ These findings underscore the difficulty young low-income children have in gaining access to oral health care regardless of insurance coverage.

Policy Contributions

In the policy area, we have several noteworthy findings. Our results indicate that children's WIC participation has a significant and positive effect on oral health services utilization during the first 5 years of life. This finding is important because inadequate access to dental care is commonplace among children of families living in poverty. This situation has been documented in numerous national and state reports including those from the Office of the Inspector General,²⁷ the American Dental Association,¹⁹ the General Accounting Office,²⁸ the surgeon general,² and the North Carolina Institute of Medicine.²⁹

In the North Carolina Institute of Medicine report on access to dental care, it was reported that fewer than 13% of children aged 1 to 5 years received any dental services. Our findings indicated that WIC participation could increase to 23% the use of dental services for children at this age. This is an increase of almost 50% compared with findings of the North Carolina Institute of Medicine. Even with this rather dramatic percentage increase in use, the absolute utilization of 23% is still relatively low; more work needs to be done to address the access to dental care crisis among low-income young children. Medicaid alone is not enough to provide sufficient access to oral health care for young children, but when available in combination with another public health program such as WIC, access to oral care health can be greatly improved.

Limitations

These results should be considered in light of the study's limitations. First, we have a short study duration of 4 years (ages 1 through 4). For this reason, we chose the random effects model and not the fixed effects as suggested by Judge.³⁰ The random effects model was able to control time-invariant variables as well as time-variant ones. We analyzed the child-level claims records and used panel data techniques that have not been applied in previous studies of WIC participation and use of services. Although we feel that we have made methodological improvements in the evaluation of WIC participation, future work should draw on additional years of panel data and address future questions such as the long-term oral health effects of the WIC program. In addition, because we examined the WIC program in only 1 state, this study needs to be replicated in other states. A single, expanded study with several states would involve considerable time and costs but could provide more generalizable and precise effects of the WIC program on access to oral health services.

We do not have information on children's oral health status in the study. It is well documented that Medicaid children and children living in poverty have disproportionately more dental disease.³¹ Thus, any dental visit is likely to be beneficial to this high-risk popu-

lation. The association of WIC with higher use of services may mean that oral health care needs of the children on Medicaid who participate in WIC are being better met. The findings for number of visits and type of use support this conclusion. Also, the adjusted odds of a child on Medicaid with WIC participation having 1 or more dental claims during the year was 1.3 to 1.5 times greater than that of a child with no WIC participation, across the 4 age groups. Studies have suggested that dental care is a serious unmet need among children in poverty, and our study suggests that use of dental care is enhanced among children participating in WIC services. ■

About the Authors

At the time of this investigation, Jessica Y. Lee was a PhD candidate in health policy and administration at the University of North Carolina, Chapel Hill, School of Public Health. R. Gary Rozier and Edward C. Norton are with the Department Health Policy Analysis and Administration, University of North Carolina, Chapel Hill. William F. Vann Jr is with the Department of Pediatric Dentistry, University of North Carolina, Chapel Hill. Jonathan B. Kotch is with the Department of Maternal and Child Health, University of North Carolina, Chapel Hill.

Requests for reprints should be sent to Jessica Y. Lee, DDS, MPH, PhD, Department of Pediatric Dentistry, CB 7450 Brauer Hall, Carolina Campus, Chapel Hill, NC 27599-7450 (e-mail: jessica_lee@dentistry.unc.edu).

Contributors

All authors participated in the conception, design, data analysis, and interpretation of the study. J.Y. Lee and R.G. Rozier wrote the first drafts of the article, and E.C. Norton, J.B. Kotch, and W.F. Vann contributed to subsequent versions.

Acknowledgments

This study was supported in part by the AAPD Foundation's Omnii Fellowship, MCH Grant 5 T17 MC 00015-11, AHRQ Grants T32-HS-00032 and 1-R03-HS11607-01, and NIDCR Grant 1K22DE14743-01.

The authors recognize Dr Paul Buescher, Stephanie Horton, and all the staff at the North Carolina State Center for Health Statistics for their help in obtaining the data and linkage. We also recognize Alice Lenihan and Sarah Roholt at the North Carolina WIC program for their assistance.

Human Participant Protection

No human subjects participated in this study. The protocol for this investigation was approved by the institutional review board at the University of North Carolina, Chapel Hill, School of Public Health.

References

1. Vargas CM, Crall JJ, Schneider DA. Sociodemographic distribution of pediatric dental caries:

- NHANES III, 1988-1994 [comments]. *J Am Dent Assoc.* 1998;129:1229-1238.
2. *Oral Health in America: A Report of the Surgeon General.* Rockville, Md: National Institute of Dental and Craniofacial Research; 2000.
3. *Early Intervention: Federal Investments Like WIC Can Produce Savings.* Washington, DC: US General Accounting Office; 1992. Document HRD 92-18.
4. Rush D, Horvitz DG, Seaver WB, et al. The National WIC Evaluation: evaluation of the Special Supplemental Food Program for Women, Infants, and Children, I: background and introduction. *Am J Clin Nutr.* 1988;48(suppl 2):389-393.
5. Jones CM, Tinanoff N, Edelstein BL, et al. Creating partnerships for improving oral health of low-income children. *J Public Health Dent.* 2000;60:193-196.
6. Kennedy ET, Gershoff S. Effect of WIC supplemental feeding on hemoglobin and hematocrit of prenatal patients. *J Am Diet Assoc.* 1982;80:227-230.
7. Kotelchuck M, Schwartz JB, Anderka MT, Finison KS. WIC participation and pregnancy outcomes: Massachusetts Statewide Evaluation Project. *Am J Public Health.* 1984;74:1086-1092.
8. Kennedy ET, Kotelchuck M. The effect of WIC supplemental feeding on birth weight: a case-control analysis. *Am J Clin Nutr.* 1984;40:579-585.
9. Schramm WF. WIC prenatal participation and its relationship to newborn Medicaid costs in Missouri: a cost/benefit analysis. *Am J Public Health.* 1985;75: 851-857.
10. Rush D, Alvir JM, Kenny DA, Johnson SS, Horvitz DG. The National WIC Evaluation: evaluation of the Special Supplemental Food Program for Women, Infants, and Children, III: Historical study of pregnancy outcomes. *Am J Clin Nutr.* 1988;48(suppl 2):412-428.
11. *An Evaluation of the WIC program.* Washington, DC: Institute of Medicine; 1990.
12. Kotch J. *Assessing the Impact of WIC Program on Infants and Children. Final Report to the United States Department of Agriculture.* Chapel Hill, NC: University of North Carolina at Chapel Hill; 1989.
13. Buescher PA, Horton SJ, Devaney BL, et al. Child participation in WIC: Medicaid costs and use of health care services. *Am J Public Health.* 2003;93:145-150.
14. McCuniff MD, Damiano PC, Kanellis MJ, Levy SM. The impact of WIC dental screenings and referrals on utilization of dental services among low-income children. *Pediatr Dent.* 1998;20:181-187.
15. Sargent JD, Attar-Abate L, Meyers A, Moore L, Kocher-Ahern E. Referrals of participants in an urban WIC program to health and welfare services. *Public Health Rep.* 1992;107:173-178.
16. Besharov DJ, Germanis P. *Rethinking WIC: An Evaluation of the Women, Infants and Children Program.* Washington, DC: AEI Press; 2001.
17. Bollen KA, Guilkey DK, Mroz TA. Binary outcomes and endogenous explanatory variables: tests and solutions with an application to the demand for contraceptive use in Tunisia. *Demography.* 1995;32:111-131.
18. American Dental Association Web site. 2002. Available at: <http://www.ada.org/prof/resources/pubs>. Accessed February 2002.
19. *International Classification of Diseases, 9th*

Revision. Geneva, Switzerland: World Health Organization; 1980.

20. Edelstein BL, Manski RJ, Moeller JF. Pediatric dental visits during 1996: an analysis of the federal Medical Expenditure Panel Survey. *Pediatr Dent*. 2000; 22(1):17–20.

21. Hayward RA, Meetz HK, Shapiro MF, Freeman HE. Utilization of dental services: 1986 patterns and trends. *J Public Health Dent*. 1989;49:147–152.

22. Manning WG, Bailit HL, Benjamin B, Newhouse JP. The demand for dental care: evidence from a randomized trial in health insurance. *J Am Dent Assoc*. 1985; 110:895–902.

23. Davidoff AJ, Garrett AB, Makuc DM, Schirmer M. Medicaid-eligible children who don't enroll: health status, access to care, and implications for Medicaid enrollment. *Inquiry*. 2000;37:203–218.

24. Lee JY, Kotch J, Rozier RG, Vann WF. Dental care utilization by Medicaid children before five. Paper presented at: Face of a Child: US Surgeon General's Conference on Oral Health; June 13–14, 2000; Washington, DC.

25. Mayer ML, Stearns SC, Norton EC, Rozier RG. The effects of Medicaid expansions and reimbursement increases on dentists' participation. *Inquiry*. 2000;37: 33–44.

26. Newacheck PW, Hughes DC, Hung YY, Wong S, Stoddard JJ. The unmet health needs of America's children. *Pediatrics*. 2000;105(4 pt 2):989–997.

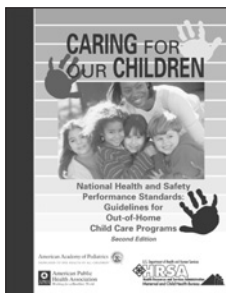
27. *Children's Dental Services Under Medicaid Program*. Washington, DC: Office of Technology Assessment; 1990.

28. *Children's Dental Services Under the Medicaid Program*. Washington, DC: US General Accounting Office; 2000.

29. North Carolina Institute of Medicine. *Task Force Report on Dental Access*. Raleigh, NC: North Carolina Institute of Medicine; 1999.

30. Judge C, Hill C, Griffith S, Lee T. *The Theory and Practice of Econometrics*. New York, NY: John Wiley and Sons; 1985.

31. Edelstein B. Policy issues in early childhood caries. *Community Dent Oral Epidemiol*. 1998;26(suppl 1): 96–103.



2nd Edition

ISBN 0-97156-820-0
2002 ■ 544 pages
Softcover

\$24.50 APHA Members
\$34.95 Nonmembers
plus shipping and handling

Caring For Our Children: National Health and Safety Performance Standards for Out-of-Home Child Care

Caring for Our Children is the most comprehensive source of information available on the development and evaluation of health and safety aspects of day care and child care centers. The guidelines address the health and safety needs of children ranging from infants to 12-year-olds. This field-reviewed book provides performance requirements for child care providers and parents, as well as for regulatory agencies seeking national guidelines to upgrade state and local child care licensing.

The second edition is extensively revised based on the consensus of ten technical panels each focused on a particular subject. The book includes eight chapters of 658 standards and a ninth chapter of 48 recommendations for licensing and community agencies and organizations.

American Public Health Association

Publication Sales

Web: www.apha.org

E-mail: APHA@TASCO1.com

Tel: (301) 893-1894

FAX: (301) 843-0159



CAR02J1