

SPECIAL ARTICLE

Children in the United States with Discontinuous Health Insurance Coverage

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ABSTRACT

BACKGROUND

Estimates of the number of uninsured people in the United States usually exclude those with discontinuous coverage. The effects of gaps in insurance coverage for children on access to and use of ambulatory care are poorly understood.

METHODS

We analyzed a sample of 26,955 children under 18 years of age from the 2000 and 2001 National Health Interview Surveys. Children with discontinuous health insurance coverage were compared with those who were uninsured all year and with those who had public or private full-year coverage.

RESULTS

During the last 12 months before they were interviewed, 6.6 percent of children in the United States had no insurance and an additional 7.7 percent had gaps in insurance. Children who had full-year insurance coverage (private or public) had low rates of unmet health care needs and good access to care (delayed care, unmet medical care, and unfilled prescriptions were reported in <3 percent, and <5 percent had no usual place of care). Access to care was much worse for children who were uninsured for part of the year and for those who were uninsured for the full year (delayed care, 20.2 percent and 15.9 percent, respectively; unmet medical care, 13.4 percent and 12.6 percent, respectively; unfilled prescriptions, 9.9 percent and 10.0 percent, respectively; $P<0.01$ for all comparisons with children with full-year, private insurance coverage). In multivariate analyses adjusting for age, income, race or ethnic group, region, citizenship, family structure, parental employment, and health status, the differences in access to care persisted. As compared with the parents of children with full-year, private insurance, parents of children uninsured for the full year were far more likely to report delaying care (adjusted odds ratio, 12.65; 95 percent confidence interval, 9.45 to 16.94), as were parents of children uninsured for part of the year (adjusted odds ratio, 13.65; 95 percent confidence interval, 10.41 to 17.90).

CONCLUSIONS

Children with gaps in health insurance coverage commonly do not seek medical care, including preventive visits, and do not get prescriptions filled. These findings are important for both research and policy and point to the need for more encompassing and sensitive measures of the situation of being uninsured.

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IT HAS BEEN ESTIMATED THAT MORE THAN 40 million persons in the United States are uninsured,^{1,2} but this often-cited number presents a narrow and misleading snapshot of insurance problems. By counting only those without coverage at a single point in time, we exclude many of the “hidden uninsured” — adults and children with discontinuous coverage — from the debates about health insurance reforms.

The precise number of people in the United States with gaps in insurance coverage is little studied and difficult to discern.³⁻⁵ Indeed, most research about health services during the past 20 years has treated health insurance as a simple dichotomy — a person is either insured or uninsured. The limited evidence available suggests that many persons in the United States have discontinuities in coverage over time.⁶ An important issue for both research and policy is the way we should view persons with insurance discontinuities: Are they more like those who are fully insured or those who are fully uninsured?

We have focused on the extent of the discontinuity of health insurance coverage for children and its effect on access to and the use of ambulatory health care, defined as well-child visits (general checkups when the child is not sick or injured) and visits to doctors' offices. Few studies have examined these issues, especially among children.⁶⁻⁹ Moreover, the literature often focuses on selected subpopulations of children or involves data that do not fully reflect recent changes in the health care system or the full implementation of the State Children's Health Insurance Program.

We fill this gap with a new analysis that makes use of nationally representative data from the combined 2000 and 2001 National Health Interview Surveys, and we assess the following three aspects of access to health care: unaddressed health care needs due to cost, the existence of usual places for care, and ambulatory visits. Combining the data from two years provides a larger sample of children than the samples used in previous studies. In addition to permitting an analysis of the prevalence and effects of discontinuity of coverage, the National Health Interview Survey provides information needed to compare all children in the United States who are uninsured for part of the year with those who are uninsured for a full year and with those with public or private, full-year coverage. Our primary research questions are as follows. What characteristics do children with intermittent insurance

coverage have in terms of age, family income, race or ethnic group, region of residence, citizenship, family structure, parental employment, and health status that distinguish them from other children? How does access to ambulatory care vary among children who have insurance, children who have discontinuous insurance, and children who have no insurance at all?

METHODS

CHARACTERISTICS OF THE SURVEY COMPONENTS

We used the publicly available data from the 2000 and 2001 National Health Interview Surveys to conduct this study. The National Health Interview Survey is a collection of information about the demographic characteristics, health status, and health care usage of the U.S. civilian noninstitutionalized population. The basic survey has three components — the family component includes questions administered to all family members, and the sample-adult and sample-child components include more in-depth questions administered for one adult and one child selected randomly in each family. All 26,955 unweighted cases included in the sample-child component, representing 72.3 million children under 18 years of age in 2000 and 72.6 million in 2001, are included in this study. A knowledgeable adult, typically a parent, answered questions for children under 17 years of age; 17-year-olds answered for themselves. The response rates of the 2000 and 2001 sample-child components were 79.4 percent and 80.6 percent, respectively.^{10,11}

OUTCOME VARIABLES

We examined outcomes in the following areas: health care needs left unaddressed because of cost (delayed care, unmet medical care, and unfilled prescriptions), the existence of usual places for care, and ambulatory visits. Respondents were asked to consider activities during the past 12 months. Information about delayed care and unmet medical care was based on data from the family component of the survey. Other variables were constructed with data from the sample-child component. The existence of usual places for care was assessed according to whether respondents reported regular places where they sought sick care, preventive care, or both for their children.

The primary predictor variable was the child's health insurance coverage during the past 12 months. We determined the categories of insur-

ance coverage on the basis of whether the child had health insurance coverage at the time of the interview, the type of current coverage (Medicaid, State Children's Health Insurance Program, or employer-based or other private health insurance), and follow-up questions that depended on current insurance status.

If the child was currently covered, the respondent was asked whether the child had been uninsured at any time during the past 12 months. If the child was not currently covered, the respondent was asked how many months it had been since the child was last insured. On the basis of the responses, we constructed a variable encompassing the following four categories of insurance coverage: full-year uninsured (children with no coverage when interviewed and no coverage for at least 12 months before the interview); full-year insured, currently with public coverage (children with Medicaid or State Children's Health Insurance Program coverage when interviewed and no time without health insurance coverage during the past 12 months); full-year insured, currently with private coverage (children with employment-based or other private coverage when interviewed and no time without coverage during the past 12 months); and part-year uninsured (all children not falling into the other three categories).

Other predictor variables included the age of the child, family income, the child's race or ethnic group, geographic region of residence, the citizenship of the child, family structure, parental employment, and the health status of the child (i.e., global health status and activity limitations due to chronic conditions). Details of the survey and wording regarding race or ethnic group and all variables can be found at the Web site of the data-collection agency.¹²

DATA ANALYSIS

To derive estimates that represent the U.S. civilian, noninstitutionalized population, each record in the combined 2000 and 2001 National Health Interview Surveys was weighted according to person-level weights provided by the data-collection agency. We adjusted estimates for nonresponses and statistically weighted the results to reflect national population totals. Bivariate analyses were used to show the distribution of children in the four insurance groups according to age, family income, race or ethnic group, region of residence, citizenship, family structure, parental employment, and health status.

Bivariate analyses were also used to show the relationship between health insurance status and unaddressed health needs, the existence of usual places for care, and ambulatory visits.

We conducted multiple logistic-regression analyses to assess the effects of health insurance coverage after adjustment for age, family income, race or ethnic group, citizenship, region of residence, family structure, parental employment, and health status. These variables were selected on the basis of the conceptual model of Aday and Andersen for predicting access to care.¹³ Our use of that model incorporates age, race or ethnic group, region of residence, citizenship, family structure, and parental employment as predisposing variables; insurance status and family income as enabling variables; and health status as a need variable.

Data for the National Health Interview Survey were collected through a complex sample design incorporating stratification, clustering, and multistage sampling.¹⁴ Estimates, standard errors of bivariate statistics, P values of statistical significance testing, odds ratios, and 95 percent confidence intervals of estimated odds ratios for the logistic model were calculated with the use of SUDAAN software, which takes into account the complex sample design of the survey.¹⁵

RESULTS

RATES OF INSURANCE COVERAGE

On average, in 2000 and 2001 6.6 percent of children in the United States 17 years of age and under were reported to have had no health insurance coverage during the most recent 12-month period. When children with no insurance for part of the year were included, the proportion of uninsured children more than doubled, to an average of 14.3 percent each year for 2000 and 2001 (Table 1). The majority of children (66.8 percent) were covered for the entire most recent 12-month period and had private insurance coverage at the time of the interview for the survey; 18.9 percent were covered for the entire 12 months and had public insurance coverage at the time of the interview.

CHARACTERISTICS ACCORDING TO INSURANCE COVERAGE

Table 2 compares characteristics among children in the following four insurance groups: full-year uninsured, part-year uninsured, full-year insured with public coverage, and full-year insured with

private coverage. There was considerable variation across the insurance categories. The group that was fully insured with public coverage had the highest percentage of children in low-income families (families with incomes <200 percent of the federal poverty level, at 85.1 percent, followed by full-year uninsured children, at 74.6 percent, and part-year uninsured children, at 60.6 percent). Relatively few children (18.1 percent) who are fully insured with private coverage live in low-income households. Hispanic children account for almost half (46.4 percent) of the full-year-uninsured group but only 21.8 percent of the part-year-uninsured group ($P<0.01$). In contrast, non-Hispanic white children account for the majority (57.5 percent) of those uninsured for part of the year and only 36.9 percent of those uninsured for the full year ($P<0.01$).

Geographically, relatively few children from the Northeast were in either uninsured category, and relatively more children from the South were in these groups. Children uninsured for the full year were much more likely not to be U.S. citizens (20.8 percent, vs. <5 percent for each other insurance group; $P<0.01$). Children uninsured for the full year and those uninsured for part of the year were very similar in terms of parental employment. On the two measures of health status, the greatest percentage of problems was reported for children with full-year public coverage; for example, 12.3 percent of these children were reported to have activity limitations. Children who were uninsured for part of the year had more health problems than children uninsured for the full year. For example, 8.3 percent of those uninsured for part of the year had activity limitations, as compared with 4.9 percent of those uninsured for the full year ($P<0.05$).

INSURANCE COVERAGE AND UNMET NEEDS, USUAL PLACES FOR CARE, AND AMBULATORY VISITS

Bivariate Analyses

Parents of children who were fully insured with either private or public insurance reported very low rates of unaddressed health needs. In contrast, children who had part of a year or a full year without insurance were reported to have much higher rates of unaddressed health needs. For example, in the last 12 months before they were interviewed for the National Health Interview Surveys, parents of children in each fully insured group reported delayed care in less than 2.5 percent of children, as compared with 15.9 percent of children who were uninsured for the full year and 20.2 percent of those

Table 1. Health Insurance Coverage for Children in the United States under 18 Years of Age.

Coverage during the 12 Months before the Interview	Estimated Population*		Unweighted Count†
	no. (thousands)	%	
Full-year uninsured	4680±304	6.6±0.2	2,152
Part-year uninsured	5450±323	7.7±0.2	2,138
Full-year insured			
Public coverage	13,419±637	18.9±0.4	5,298
Private coverage	47,310±1153	66.8±0.5	16,724
Total	70,859	100.0	26,312

* The total does not include an estimated 1.6 million children whose health insurance coverage during the 12 months before the interview could not be ascertained. Data were obtained from the National Health Interview Surveys, 2000 and 2001.^{10,11} Plus-minus values are means ±SE.

† Unweighted counts represent the actual numbers of persons included in the survey sample.

uninsured for part of the year ($P<0.01$). Similar patterns were found for unmet medical care and unfilled prescriptions (Table 3).

On measures related to the existence of usual places for care and ambulatory visits, the problems for children without insurance for part of the year fell between those uninsured for the full year and those insured for the full year. For example, 38.0 percent of children uninsured for the full year had no regular places for sick and preventive care, as compared with 15.0 percent of children uninsured for part of the year ($P<0.01$). Significantly fewer (<4.5 percent) of those with public or private full-year coverage had this lack of continuity. As compared with either group of children who were insured for the full year, about a quarter of whom had no well-child visits, children without insurance all year were more likely to have had no well-child visits (58.7 percent, $P<0.01$), as were children who were uninsured for part of the year (37.2 percent, $P<0.01$).

Adjusted Analyses

In multiple logistic-regression analyses, the status of insurance coverage had a significant effect across all measures of unaddressed health needs, the existence of usual places for care, and ambulatory visits (Tables 4 and 5). Independent of age, family income, race or ethnic group, region of residence, citizenship, family structure, parental employment, and health status, being uninsured substantially increased the likelihood that children

Table 2. Characteristics of Children According to Health Insurance Coverage.*

Characteristic	Full-Year Uninsured	Part-Year Uninsured	Full-Year Insured, Public Coverage	Full-Year Insured, Private Coverage	All Children
	<i>percent</i>				
Age					
0 to 5 yr	27.4±1.3†	35.0±1.2†	41.2±0.9‡	31.0±0.5	33.0±0.4
6 to 11 yr	34.4±1.4	35.3±1.3	33.1±0.9	34.2±0.5	34.1±0.4
12 to 17 yr	38.2±1.3	29.7±1.1	25.8±0.9‡	34.8±0.5	32.9±0.4
Family income under 200% of the federal poverty level	74.6±1.5‡	60.6±1.3‡	85.1±0.7‡	18.1±0.5	37.3±0.5
Race or ethnic group§					
Hispanic	46.4±1.7‡	21.8±1.1‡	25.4±0.9‡	10.4±0.3	16.5±0.4
Non-Hispanic black	12.3±1.2	17.3±1.0‡	29.2±1.1‡	10.9±0.4	14.9±0.4
Non-Hispanic other	4.4±0.7	3.4±0.5†	5.0±0.5	4.8±0.2	4.7±0.2
Non-Hispanic white	36.9±1.6‡	57.5±1.5‡	40.4±1.2‡	74.0±0.5	63.9±0.5
Region					
West	31.5±1.5‡	23.3±1.4	22.2±1.0	20.5±0.5	21.8±0.5
Midwest	13.1±1.2‡	22.7±1.2†	20.7±1.0‡	26.4±0.6	24.2±0.5
South	47.4±1.6‡	41.0±1.4‡	38.8±1.1‡	32.6±0.6	35.4±0.5
Northeast	8.0±0.9‡	13.0±1.0‡	18.3±0.9	20.4±0.4	18.6±0.4
U.S. citizen	79.2±1.1‡	95.4±0.5‡	97.3±0.3†	98.1±0.1	96.5±0.2
Living with both parents	66.8±1.4‡	60.9±1.3‡	43.3±1.0‡	81.5±0.4	71.7±0.4
At least one parent who works	82.1±1.1‡	82.3±1.0‡	64.5±0.9‡	94.7±0.2	87.2±0.3
Health status					
Self-reported fair or poor health	2.2±0.4‡	2.6±0.4‡	4.6±0.4‡	0.9±0.1	1.8±0.1
Chronic condition limits activity	4.9±0.7	8.3±0.7‡	12.3±0.6‡	5.1±0.2	6.7±0.2

* Plus-minus values are means ±SE.

† P<0.05 for the comparison with children who had insurance for the full year, with private coverage at the time of the interview.

‡ P<0.01 for the comparison with children who had insurance for the full year, with private coverage at the time of the interview.

§ Race or ethnic group was assigned according to data from the data-collection agency.^{1,2}

would have problems with access to and the use of ambulatory health care. Moreover, on several measures, children who were uninsured for part of the year had problems at rates similar to those for children who were uninsured for the entire year, whereas children who had full public or private insurance coverage had much lower rates of problems.

For example, as compared with those who were privately insured all year, significantly more children who were uninsured for a full year had delayed care (odds ratio, 12.65; 95 percent confidence interval, 9.45 to 16.94), as did children who were uninsured for part of the year (odds ratio, 13.65; 95 percent confidence interval, 10.41 to 17.90). In contrast,

children who were insured all year through public insurance were no different on this measure from those who were insured with private coverage.

Similarly, as compared with children who were privately insured for the full year, significantly more children who were uninsured either for part of the year (odds ratio, 7.06; 95 percent confidence interval, 5.13 to 9.69) or for the full year (odds ratio, 7.11; 95 percent confidence interval, 5.01 to 10.10) had unfilled prescriptions, whereas only slightly more children who were covered by public insurance all year had unfilled prescriptions (odds ratio, 1.47; 95 percent confidence interval, 1.01 to 2.13). Smaller but still significant effects of gaps in insurance cov-

Table 3. Association between Health Insurance Coverage for Children in the United States and Unaddressed Health Care Needs, the Existence of Usual Places for Care, and Ambulatory Visits in the Last 12 Months before They Were Interviewed for the National Health Interview Survey.*

Variable	Full-Year Uninsured	Part-Year Uninsured	Full-Year Insured, Public Coverage	Full-Year Insured, Private Coverage
	<i>percent</i>			
Delayed care†	15.9±1.0‡	20.2±1.2‡	2.1±0.2§	1.5±0.1
Unmet medical care¶	12.6±0.9‡	13.4±0.9‡	1.4±0.2§	0.7±0.1
Unfilled prescriptions	10.0±0.8‡	9.9±0.8‡	2.8±0.3§	1.0±0.1
Lack of usual places for care**	38.0±1.5‡	15.0±0.9‡	4.3±0.4§	2.8±0.2
No well-child visits††	58.7±1.5‡	37.2±1.4‡	24.2±0.8	26.3±0.5
No visits to doctors' offices‡‡	39.0±1.5‡	17.2±1.0‡	11.4±0.6	11.1±0.3

* Plus-minus values are means ±SE.

† The respondent indicated that medical care was delayed for the child because of worry about the cost.

‡ P<0.01 for the comparison with children who had insurance for the full year, with private coverage, at the time of the interview.

§ P<0.05 for the comparison with children who had insurance for the full year, with private coverage, at the time of the interview.

¶ The respondent indicated that the child needed but did not receive medical care because the family could not afford it.

|| The respondent indicated that the child needed but did not get prescription medicines because the family could not afford it.

** The respondent indicated that the child did not have a usual place to go when sick or in need of advice about his or her health.

†† The respondent indicated that the child did not receive a well-child checkup (a general checkup when the child was not sick or injured).

‡‡ The respondent indicated that the child did not see a doctor or other medical health professional in an office, clinic, or other nonhospital or non-emergency-room setting.

erage were found for the categories of the existence of usual places for care, well-child visits, and visits to doctors' offices. Moreover, on the basis of these indicators, children with public health insurance tended to do somewhat better than those with private insurance. Many other factors in the models — income, race or ethnic group, region of residence, citizenship, family structure, and health status — were significantly related to most or all of the dependent variables, though the magnitude of these effects was notably less than the influence of insurance coverage.

DISCUSSION

According to the 2000 and 2001 National Health Interview Surveys, 6.6 percent of children in the United States were uninsured for the entire 12-month period, and an additional 7.7 percent were uninsured for part of the year. Who are the children with intermittent insurance coverage? Children uninsured for part of the year have some of the same characteristics as those uninsured for the

full year. For example, 82 percent of children uninsured for the full year or part of the year have working parents.

Previous research has shown that children in low-income families and those in minority racial or ethnic groups, especially those who are Hispanic, are more likely to be uninsured than white children and children in higher-income families¹⁶; the same factors are related to gaps in insurance, though Hispanic children are especially at risk for being uninsured all year. The children who are uninsured for part of the year or the full year are also similar on key measures of access to health care, and they have substantially greater barriers than those who are fully insured with either public or private coverage. Parents of children in both uninsured groups were far more likely than parents of children in the fully insured groups to report delayed care, unmet medical care needs, and unfilled prescriptions for their children.

On other measures of access to health care — existence of usual places for care, well-child visits, and visits to doctors' offices — children with gaps

Table 4. Predictors of Unaddressed Health Needs for Children in the United States in the Last 12 Months before They Were Interviewed for the National Health Interview Survey.*

Variable	Delayed Care	Unmet Medical Care	Unfilled Prescriptions
	<i>odds ratio (95% CI)</i>		
Health insurance coverage			
Full-year uninsured	12.65 (9.45–16.94)	18.50 (13.32–25.68)	7.11 (5.01–10.10)
Part-year uninsured	13.65 (10.41–17.90)	17.05 (12.49–23.26)	7.06 (5.13–9.69)
Full-year insured, public	0.97 (0.70–1.33)	1.28 (0.85–1.94)	1.47 (1.01–2.13)
Full-year insured, private†	1.00	1.00	1.00
Age			
0 to 5 yr	0.76 (0.60–0.97)	0.68 (0.53–0.89)	0.78 (0.59–1.04)
6 to 11 yr	0.87 (0.69–1.11)	0.88 (0.67–1.16)	0.76 (0.59–0.97)
12 to 17 yr†	1.00	1.00	1.00
Family income			
Under 200% of the federal poverty level	1.37 (1.07–1.76)	1.63 (1.25–2.13)	2.29 (1.67–3.14)
200% or more of the federal poverty level†	1.00	1.00	1.00
Race or ethnic group			
Hispanic	0.56 (0.44–0.73)	0.78 (0.57–1.05)	1.13 (0.88–1.45)
Non-Hispanic black	0.79 (0.60–1.04)	0.88 (0.65–1.20)	1.12 (0.85–1.47)
Non-Hispanic other	0.58 (0.35–0.96)	0.93 (0.52–1.65)	1.10 (0.63–1.91)
Non-Hispanic white†	1.00	1.00	1.00
Region			
West	1.11 (0.82–1.50)	1.07 (0.75–1.53)	1.31 (0.88–1.95)
Midwest	1.07 (0.80–1.41)	1.24 (0.87–1.77)	1.41 (0.89–2.25)
South	0.93 (0.70–1.23)	1.19 (0.85–1.66)	1.36 (0.93–1.99)
Northeast†	1.00	1.00	1.00
Citizenship of child			
U.S.	1.66 (1.14–2.41)	1.43 (0.95–2.15)	1.53 (0.93–2.51)
Non-U.S.†	1.00	1.00	1.00
Family structure			
Living with both parents	0.63 (0.51–0.78)	0.64 (0.50–0.82)	0.71 (0.55–0.91)
Living with single parent or nonparent others†	1.00	1.00	1.00
Parental employment			
Yes	1.01 (0.79–1.30)	1.05 (0.80–1.38)	0.86 (0.66–1.12)
No†	1.00	1.00	1.00
Proxy or self-reported health status of child			
Fair or poor	2.46 (1.61–3.78)	2.10 (1.29–3.44)	2.12 (1.36–3.32)
Excellent or good†	1.00	1.00	1.00
Limitation of activity			
Yes	1.87 (1.39–2.51)	2.26 (1.63–3.12)	1.90 (1.33–2.71)
No†	1.00	1.00	1.00

* Odds ratios are adjusted. For each outcome, the model includes all variables listed in the table. In the overall model, the Wald F value was 252.85 (18 df, $P < 0.005$) for the delayed-care group, 202.62 (18 df, $P < 0.005$) for the unmet-medical-care group, and 197.18 (18 df, $P < 0.005$) for the unfilled-prescriptions group. CI denotes confidence interval.

† This group served as the reference category.

Table 5. Predictors of the Lack of Usual Places for Care and Ambulatory Visits for Children in the United States in the Last 12 Months before They Were Interviewed for the National Health Interview Survey.*

Variable	Lacking Usual Places for Care	No Well-Child Visits	No Visits to Doctors' Offices
	<i>odds ratio (95% CI)</i>		
Health insurance coverage			
Full-year uninsured	9.82 (7.89–12.22)	3.24 (2.70–3.88)	2.92 (2.36–3.60)
Part-year uninsured	3.63 (2.93–4.49)	1.57 (1.35–1.83)	1.27 (1.06–1.52)
Full-year insured, public	0.95 (0.74–1.23)	0.85 (0.74–0.97)	0.70 (0.59–0.84)
Full-year insured, private†	1.00	1.00	1.00
Age			
0 to 5 yr	0.51 (0.42–0.61)	0.29 (0.26–0.32)	0.36 (0.31–0.42)
6 to 11 yr	0.66 (0.55–0.80)	0.95 (0.87–1.04)	0.97 (0.86–1.09)
12 to 17 yr†	1.00	1.00	1.00
Family income			
Under 200% of the federal poverty level	1.61 (1.34–1.94)	1.31 (1.17–1.47)	1.74 (1.50–2.01)
200% or more of the federal poverty level†	1.00	1.00	1.00
Race or ethnic group			
Hispanic	1.48 (1.20–1.83)	0.85 (0.76–0.95)	1.33 (1.15–1.54)
Non-Hispanic black	0.99 (0.78–1.26)	0.66 (0.57–0.75)	1.25 (1.07–1.46)
Non-Hispanic other	1.49 (1.08–2.08)	0.80 (0.65–0.99)	1.34 (1.01–1.78)
Non-Hispanic white†	1.00	1.00	1.00
Region			
West	3.50 (2.62–4.69)	3.42 (2.88–4.08)	2.44 (1.99–3.00)
Midwest	2.83 (2.08–3.85)	2.67 (2.24–3.18)	1.80 (1.49–2.18)
South	3.05 (2.33–3.99)	2.83 (2.40–3.34)	2.21 (1.84–2.64)
Northeast†	1.00	1.00	1.00
Citizenship of child			
U.S.	0.38 (0.29–0.50)	0.79 (0.64–0.98)	0.69 (0.55–0.87)
Non-U.S.†	1.00	1.00	1.00
Family structure			
Living with both parents	0.77 (0.65–0.91)	0.93 (0.84–1.03)	0.93 (0.82–1.07)
Living with single parent or nonparent others†	1.00	1.00	1.00
Parental employment			
Yes	0.99 (0.78–1.25)	1.01 (0.88–1.16)	1.01 (0.85–1.21)
No†	1.00	1.00	1.00
Proxy or self-reported health status of child			
Fair or poor	0.79 (0.49–1.29)	1.11 (0.84–1.48)	0.49 (0.31–0.79)
Excellent or good†	1.00	1.00	1.00
Limitation of activity			
Yes	1.02 (0.73–1.42)	0.77 (0.66–0.91)	0.60 (0.47–0.77)
No†	1.00	1.00	1.00

* Odds ratios are adjusted. For each outcome the model includes all variables listed in the table. In the overall model, the Wald F value was 278.14 (18 df, $P < 0.005$) for the group lacking usual places for care, 151.47 (18 df, $P < 0.005$) for the group with no well-child visits, and 296.91 (18 df, $P < 0.005$) for the group with no visits to doctors' offices. CI denotes confidence interval.

† This group served as the reference category.

in insurance coverage fell between those with full-year private insurance and those who were uninsured for the full year. Having a usual source of care is the foundation for the pediatric concept of a “medical home.”¹⁷ Therefore, the risk of going without a usual source of care, which is associated with decreased use of preventive care and increased use of emergency departments for nonemergency conditions, is of particular concern.¹⁸⁻²⁰

Children with year-long public insurance coverage had unaddressed health needs, lacked usual places for care, and used ambulatory health care services at rates that were nearly indistinguishable from the rates for children with year-long private insurance. Indeed, in the multivariate models, children with full-year public insurance coverage had a slightly better outcome for well-child care than did those with full-year private coverage. Hence, it seems that continuity is more important than the type of coverage in terms of access to care. Continuous coverage, whether public or private, conveys important protections and is superior to intermittent coverage or no coverage at all. Notably, in the multivariate analysis, although family income and race or ethnic group had independent effects on most measures, insurance status was a substantially more powerful predictor of access to and use of health care for children.

The limitations of this study should be noted. Our categorization of insurance coverage does not distinguish children who had mixed public and private insurance during the year; however, the four categories we use seem to represent distinct groups. The National Health Interview Survey also provides data on insurance coverage and access only during a 12-month span; this probably leads to an underestimation of the number of children having problems. On the basis of data from the 1990s, Short and Graefe found that during a four-year period, more than 40 percent of children had at least one gap in insurance coverage.⁶ Nevertheless, the effect of discontinuous insurance coverage on access to and the use of health care may be overstated in our correlational analysis to the extent that greater health care needs compel families to maintain insurance on a continuous basis.

Our findings raise questions that are beyond the scope of this article but suggest issues that should be further explored. Analyses incorporating multiple sets of data are needed to examine fully the causes and consequences of gaps in insurance coverage. For example, the findings that health insurance

coverage for Hispanic children differs substantially from that for children in other racial or ethnic groups and that coverage and access vary across geographic regions point to the need to study regional and state differences to explore the dynamics that lead to problems with health insurance coverage and access. The reasons that gaps in insurance coverage have greater effects on some measures than on others also needs further study. It may be that families who have insurance coverage for part of the year visit the doctor during periods of coverage, but they are as disadvantaged as those with no insurance coverage with respect to continuity of care.

A careful reading of most policy reports will show that when the number of persons in the United States without insurance is reported, the calculations used to produce that number are usually not articulated. However, estimates at a single point in time are typically presented.^{3-5,8} Such estimates exclude many persons with gaps in coverage and underestimate the number of uninsured persons in the United States. The problem of the “hidden uninsured” has clear implications for both policy and research. For researchers, the findings emphasize that categorizing insurance coverage as a dichotomy is overly simplistic. Given the complexity of the ways in which families gain and lose insurance coverage and the effects of those discontinuities, multidimensional definitions of coverage should be incorporated into analyses. In studies of the magnitude and the effects of health insurance problems, researchers should clearly explain how the uninsured are defined, consider the implications of the analyses, and discuss how limitations in the measures may affect the findings.

For policymakers, the findings point to the need for more encompassing measures of the situation of being uninsured. Gaps in insurance coverage have, to an extent, been viewed as a problem that corrects itself or is a minor issue relative to a long-term lack of insurance. However, we have found that on several indicators, children with intermittent insurance have notable problems. They do not get medical care, they do not get prescriptions filled, or they go without preventive care visits. Such issues need to be incorporated into policy discussions to estimate accurately the scope of insurance problems and to develop policy options that are sensitive to the ways children get and keep insurance coverage.

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REFERENCES

1. Current population reports: income, poverty, and health insurance coverage in the United States: 2003. Washington, D.C.: Government Printing Office, 2004. (Publication no. P60-226.) (Available at <http://www.census.gov/prod/2004pubs/p60-226.pdf>.)
2. Kaiser Commission on Medicaid and the Uninsured. Health insurance coverage in America: 2002 data update. (Accessed July 1, 2005, at <http://www.kff.org/uninsured/4154.cfm>.)
3. Lewis K, Ellwood M, Czajka JL. Counting the uninsured: a review of the literature. Washington, D.C.: Urban Institute, 1998. (Available at <http://www.urban.org/UploadedPDF/occ8.pdf>.)
4. Chollet DJ. A survey of surveys: what does it take to obtain accurate estimates of the uninsured? (Accessed July 1, 2005, at <http://statecoverage.net/pdf/scinews0300.pdf>.)
5. Bhandari S. People with health insurance: a comparison of estimates from two surveys. Washington, D.C.: Census Bureau, June 2004. (Accessed July 1, 2005, at <http://www.sipp.census.gov/sipp/workpapr/wp243.pdf>.)
6. Short PF, Graefe DR. Battery-powered health insurance? Stability in coverage of the uninsured. *Health Aff (Millwood)* 2003; 22(6):244-55.
7. Kogan MD, Alexander GR, Teitelbaum MA, Jack BW, Kotelchuck M, Pappas G. The effect of gaps in health insurance on continuity of a regular source of care among preschool-aged children in the United States. *JAMA* 1995;274:1429-35.
8. Tang SF, Olson LM, Yudkowsky BK. Uninsured children: how we count matters. *Pediatrics* 2003;112:e168-e173.
9. Aiken KD, Freed GL, Davis MM. When insurance status is not static: insurance transitions of low-income children and implications for health and health care. *Ambul Pediatr* 2004;4:237-43.
10. Division of Health Interview Statistics. 2000 NHIS survey description. Hyattsville, Md.: National Center for Health Statistics, March 2002. (Accessed July 1, 2005, at http://www.cdc.gov/nchs/about/major/nhis/quest_data_related_1997_forward.htm.)
11. *Idem*. 2001 NHIS survey description. Hyattsville, Md.: National Center for Health Statistics, January 2003. (Accessed July 1, 2005, at http://www.cdc.gov/nchs/about/major/nhis/quest_data_related_1997_forward.htm.)
12. National Center for Health Statistics. National Health Interview Survey (NHIS) Web site: questionnaires, datasets, and related documentation. (Accessed July 1, 2005, at http://www.cdc.gov/nchs/about/major/nhis/quest_data_related_doc.htm.)
13. Aday LA, Andersen R. A framework for the study of access to medical care. *Health Serv Res* 1974;9:208-20.
14. Botman SL, Moore TF, Moriarity CL, Parsons VL. Design and estimation for the National Health Interview Survey, 1995-2004. Washington, D.C.: Government Printing Office, 2000. (Available at http://www.cdc.gov/nchs/data/series/sr_02/sr02_130.pdf.)
15. Shah BV, Barnwell BG, Bieler GS. SUDAAN user's manual, release 7.0. Research Triangle Park, N.C.: Research Triangle Institute, 1996.
16. Dey AN, Schiller JS, Tai DA. Summary statistics for U.S. children: National Health Interview Survey, 2002. Washington, D.C.: Government Printing Office, 2004. (Available at http://www.cdc.gov/nchs/data/series/sr_10/sr10_221.pdf.)
17. Medical Home Initiatives for Children with Special Needs Project Advisory Committee, American Academy of Pediatrics. The medical home. *Pediatrics* 2002;110:184-6.
18. Starfield B, Shi L. The medical home, access to care, and insurance: a review of evidence. *Pediatrics* 2004;113:Suppl 5:1493-8.
19. Kempe A, Beaty B, Englund BP, Roark RJ, Hester N, Steiner JF. Quality of care and use of the medical home in a state-funded capitated primary care plan for low-income children. *Pediatrics* 2000;105:1020-8.
20. Starfield B. Primary care: balancing health needs, services, and technology. New York: Oxford University Press, 1998.

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