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Pediatrics 2013;132;656; originally published online September 23, 2013;
DOI: 10.1542/peds.2013-1544

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A Longitudinal View of Child Enrollment in Medicaid



WHAT'S KNOWN ON THIS SUBJECT: Cross-sectional estimates suggest that one-third of children are enrolled in Medicaid or other public insurance programs. The percentage of children enrolled in Medicaid at any point during childhood, and which children use Medicaid as a longer-term insurance source, is unknown.



WHAT THIS STUDY ADDS: Over a 5-year period, 41% of children were enrolled in Medicaid at some point. Of those children, 51.5% were enrolled during all 5 years. Children with sociodemographic risk factors are more often enrolled for longer periods of childhood.

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KEY WORDS

Medicaid enrollment, children, insurance

ABBREVIATIONS

CHIP—Children's Health Insurance Program
CMS—Centers for Medicare & Medicaid Services
MAX—Medicaid Analytic eExtract
NCHS—National Center for Health Statistics
NHIS—National Health Interview Survey

Dr Simon carried out the initial analyses, and drafted the initial manuscript; Dr Driscoll carried out the initial analyses and reviewed and revised the manuscript; Ms Gorina and Dr Parker reviewed and revised the manuscript; Dr Schoendorf drafted the initial manuscript and reviewed and revised the manuscript; and all authors conceptualized and designed the study and approved the final manuscript as submitted.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

www.pediatrics.org/cgi/doi/10.1542/peds.2013-1544

doi:10.1542/peds.2013-1544

Accepted for publication Jul 5, 2013

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

COMPANION PAPER: A companion to this article can be found on page 763, and online at www.pediatrics.org/cgi/doi/10.1542/peds.2013-2529.

abstract

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BACKGROUND: Although national cross-sectional estimates of the percentage of children enrolled in Medicaid are available, the percentage of children enrolled in Medicaid over longer periods of time is unknown. Also, the percentage and characteristics of children who rely on Medicaid throughout childhood, rather than transiently, are unknown.

METHODS: We performed a longitudinal examination of Medicaid coverage among children across a 5-year period. Children 0 to 13 years of age in the 2004 National Health Interview Survey file were linked to Medicaid Analytic eExtract files from 2004 to 2008. The percentage of children enrolled in Medicaid at any time during the 5-year observation period and the number of years during which children were enrolled in Medicaid were calculated. Duration of Medicaid enrollment was compared across sociodemographic characteristics by using χ^2 tests.

RESULTS: Forty-one percent of all US children were enrolled in Medicaid at least some time during the 5-year period, compared with a single-year estimate of 32.8% in 2004 alone. Of enrolled children, 51.5% were enrolled during all 5 years. Children with lower parental education, with lower household income, of minority race or ethnicity, and in suboptimal health were more likely to be enrolled in Medicaid during all 5 years.

CONCLUSIONS: Longitudinal data reveal higher percentages of children with Medicaid insurance than shown by cross-sectional data. Half of children enrolled in Medicaid are enrolled during at least 5 consecutive years, and these children have higher risk sociodemographic profiles. *Pediatrics* 2013;132:656–662

Medicaid is an important source of health insurance for children in the United States. In 2010, approximately one-third of children less than 18 years of age were enrolled in Medicaid or other public health insurance programs, according to cross-sectional estimates from the National Health Interview Survey (NHIS).¹ However, because children enroll and disenroll across years,² cross-sectional estimates underestimate the percentage of children who rely on Medicaid during their childhood.

To fully understand the impact of Medicaid on child health, it is necessary to examine Medicaid enrollment for the same children over time. The Health Resources and Services Administration's Bureau of Maternal and Child Health³ and the Institute of Medicine⁴ advocate a life course model of health for children. In this regard, understanding the extent and depth of interaction with Medicaid across childhood may provide a clearer picture of the impact of Medicaid on child health than the more common snapshot descriptions of the pediatric Medicaid population.

Current national surveys used to estimate Medicaid enrollment either are cross-sectional¹ or follow people for short periods (up to 2 1/2 years) and are most often used to create cross-sectional estimates.⁵⁻⁸ As a result, longitudinal analyses of the Medicaid population on a large scale are rare.⁹⁻¹³ The large variations in enrollment patterns that exist between states^{2,14} suggest that nationally representative longitudinal data, rather than data from a subsample of states, are needed to fully reveal the scope of Medicaid. Specifically, the absence of national longitudinal data prevents accurate descriptions of the percentage of children in the United States who rely on Medicaid at any time in their childhood and of the percentage enrolled

in Medicaid chronically throughout childhood.

Additionally, the lack of longitudinal, nationally representative Medicaid data prevents full identification of children most likely to rely on Medicaid for a significant part of their childhood. Although characteristics of the Medicaid population have been described using cross-sectional data, these analyses consider all Medicaid enrollees as a homogeneous population, regardless of their enrollment duration.^{7,15-17} However, different populations of children may have varying risks of longer-term enrollment in Medicaid. Medicaid enrollees chronically on Medicaid and those for whom Medicaid enrollment is transient may differ in terms of socio-demographic characteristics, health status indicators, and other factors. Accurate characterization of the Medicaid population may allow for improved targeting of Medicaid enrollment initiatives for eligible but uninsured children and improve service to those groups.

A recently available data source, the NHIS/Medicaid Analytic eXtract (MAX) linked data files, allows national-level examination of the longitudinal patterns of pediatric Medicaid enrollment. This study uses those data to describe cumulative individual-level childhood Medicaid enrollment over a 5-year period rather than describe cross-sectional enrollment at a specific time. The duration of Medicaid enrollment over longer periods of childhood (the percentage of children enrolled in Medicaid during all 5 years, rather than only for a single year) was also calculated. We also examined whether children who differ in terms of socio-demographic profiles also have different Medicaid enrollment durations, to better understand the characteristics of children who are more likely to chronically rely on Medicaid.

METHODS

The 2004 NHIS was used to identify children 0 to 13 years of age. Children older than 13 years at their NHIS interview were excluded because these children would become older than 17 if observed for 5 years; the National Center for Health Statistics (NCHS) Ethics Review Board prohibits linkage of Medicaid records beyond 17 years of age for children sampled in the NHIS before their 18th birthday. Additionally, Medicaid enrollment criteria change greatly after 18 years of age.

The NHIS is a nationally representative, cross-sectional population health survey conducted annually by NCHS. It has a multistage sample design with primary sampling units of counties, secondary sampling units of clusters of houses, tertiary sampling units of households, and finally, persons within households.¹⁸ The response rate for the family interview, from which the person-file used in this analysis was derived, was 86.5%. In the family interview, information about children is provided by a knowledgeable adult family member (≥ 18 years of age) residing in the household.¹⁹

The 2004 NHIS person-file was linked to the MAX files for 2004 to 2008. The NHIS/MAX linked files, on which this study is based, were approved by the NCHS Ethics Review Board. No additional approval was required by our institution, NCHS, for this specific analysis. The MAX files are created by the Centers for Medicare & Medicaid Services (CMS). Medicaid eligibility and claim data are provided by each state to CMS through the Medical Statistical Information System. Analytic MAX files are extracted from the Medical Statistical Information System data. The MAX files and NHIS files were linked by using Social Security number, month and year of birth, and gender. Those elements had to match exactly for a respondent's NHIS and MAX data to be

linked.²⁰ In the 2004 NHIS, 51.9% of children 0 to 13 years of age were linkage eligible, meaning consent and sufficient information were provided to enable a linkage.

Enrollment in Medicaid during each year from 2004 to 2008 was defined as linkage to the MAX files during any month of a given year, coupled with MAX file indication that the child was enrolled in Medicaid rather than in the Children's Health Insurance Program (CHIP). CHIP participation was not considered for this analysis, because data from CHIP are inconsistently reported in the MAX files. Sociodemographic variables were obtained from the NHIS, including age at time of interview in 2004 (0–4, 5–9, 10–13 years), race and ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic all other races), highest level of parental education (less than high school, high school diploma, some college or associate degree, college degree or higher, missing), health status (excellent or very good; good, fair, or poor), family percentage of poverty level (<100%, 100% to <150%, 150% to <200%, 200% to <300%, and ≥300%), and family income-to-poverty level ratio. Because this is an individual-level longitudinal analysis, the children ages ranged from 0 to 13 years at baseline in 2004 to 4 to 17 years in 2008, the end of the 5-year observation period. Age groups reported throughout this article are at the time of interview in 2004. Additionally, we separately examined children <12 months in 2004, because newborns may be of particular interest. Highest level of parental education was missing for 3.3%, and health status was missing for 0.1% of linkage-eligible children 0 to 13 years of age. Race or ethnicity was missing for 9.2% of those children, but single imputation values provided by the NHIS were used. Income was missing for 16.8% of the study population, but multiply imputed

data for income-to-poverty ratio and family percentage of poverty level provided by NHIS were used for those missing observations. The final study population included 10 463 children for whom data were available for all variables described, although a “missing” category was included for parental education. Observations with missing parental education were retained because children missing those data were enrolled in Medicaid at a significantly higher rate (80.1%) than those without missing data (39.7%); excluding those observations would bias the overall estimates of Medicaid enrollment.

Analyses: Cumulative Medicaid Enrollment

Cumulative enrollment describes the percentage of children enrolled at any point during a stretch of time and was examined as follows. First, the percentage of children enrolled in Medicaid for any time during 2004 was calculated. Next, the period of observation was expanded sequentially to examine the percentage enrolled at any time during 2004 or 2005, 2004 to 2006, 2004 to 2007, and 2004 to 2008. Enrollment percentages were calculated for all children together and by the sociodemographic characteristics described above.

Analyses: Duration of Enrollment

Duration of enrollment was defined as the number of years the child was enrolled in Medicaid during the 5-year observation period (2004–2008). Children were categorized into those who were never enrolled in Medicaid during the 5 years and those enrolled during 1, 2, 3, 4, or all 5 of those years. For those enrolled during multiple years, whether the years were consecutive was not considered. Duration of enrollment was examined for all children and by the characteristics described earlier.

Statistical Analysis

The sample weights in the 2004 NHIS were adjusted to account for survey respondents who were not linkage eligible in the NHIS using model-based calibration (WTADJUST procedures) in SUDAAN.²¹ This approach reweights the data to preserve correct population totals within race and ethnicity, age, and gender cross-stratifications.²² Analyses were conducted using Stata 12.1 SE (Stata Corp, College Station, TX). The complex survey design of the NHIS was accounted for by using the survey data suite of commands. Multiply imputed data were analyzed using the multiple imputation suite of commands in Stata (StataCorp LP, College Station, TX).

χ^2 tests were used to determine variation in enrollment duration across categories of each sociodemographic factor. Analysis of variance was used to compare mean poverty level across Medicaid duration categories.

RESULTS

Cumulative Medicaid Enrollment

In 2004, 32.8% of children 0 to 13 years of age were enrolled in Medicaid (Table 1). When the observation period was expanded to 5 years, the percentage of children enrolled in Medicaid at any time from 2004 to 2008 was 41%, a 25% increase. Among children 0 to 4 years of age in 2004, 38.8% were enrolled in Medicaid during 2004, increasing to 47.3% when the observation period was expanded to 5 years. Over the 5-year observation period, 38.9% children 5 to 9 years and 35.5% of children 10 to 13 years were enrolled in Medicaid for any period of time. Among children 0 to 12 months old in 2004, 39.2% (SE 2.0%) were enrolled in Medicaid during 2004, increasing to 50.9% (SE 2.1%) across the 5-year observation period (data not shown).

Although non-Hispanic white children had the lowest Medicaid enrollment,

TABLE 1 Cumulative Percentage of Children Enrolled in Medicaid for Any Time During 2004–2008, by Demographic Characteristics (SE)

	Enrolled for Any Time During 2004	Enrolled for Any Time During 2004–2005	Enrolled for Any Time During 2004–2006	Enrolled for Any Time During 2004–2007	Enrolled for Any Time During 2004–2008
Percentage of all children (<i>n</i> = 10 463) enrolled in Medicaid	32.8 (0.7)	35.9 (0.7)	37.6 (0.7)	39.3 (0.7)	41.0 (0.8)
Age in 2004					
0–4 y (<i>n</i> = 3720)	38.8 (1.0)	42.5 (1.0)	44.1 (1.0)	45.9 (1.0)	47.3 (1.0)
5–9 y (<i>n</i> = 3738)	31.5 (1.0)	34.1 (1.0)	35.8 (1.0)	37.4 (1.0)	38.9 (1.0)
10–13 y (<i>n</i> = 3005)	27.0 (1.0)	29.9 (1.0)	31.5 (1.0)	33.5 (1.1)	35.5 (1.1)
Race or ethnicity					
Non-Hispanic white (<i>n</i> = 5500)	21.2 (0.8)	23.6 (0.9)	25.2 (0.9)	26.7 (0.9)	28.3 (0.9)
Non-Hispanic black (<i>n</i> = 1693)	57.6 (1.7)	61.3 (1.7)	63.0 (1.6)	65.2 (1.6)	67.4 (1.6)
Hispanic (<i>n</i> = 2920)	48.7 (1.4)	53.8 (1.4)	55.5 (1.4)	57.5 (1.4)	59.4 (1.4)
Non-Hispanic all other races (<i>n</i> = 350)	30.2 (3.3)	32.2 (3.4)	34.7 (3.5)	36.1 (3.5)	36.2 (3.5)
Highest level of parental education					
Less than high school (<i>n</i> = 1614)	68.0 (1.8)	72.7 (1.7)	74.4 (1.7)	76.1 (1.7)	78.0 (1.7)
High school (<i>n</i> = 2310)	48.5 (1.5)	51.7 (1.5)	54.2 (1.4)	57.1 (1.5)	59.0 (1.5)
Some college or associate degree (<i>n</i> = 3206)	31.2 (1.2)	35.2 (1.3)	37.2 (1.3)	39.2 (1.3)	41.6 (1.4)
College degree or higher (<i>n</i> = 2993)	7.5 (0.7)	8.9 (0.7)	9.7 (0.8)	10.4 (0.8)	11.0 (0.8)
Missing (<i>n</i> = 340)	69.0 (3.3)	73.2 (3.1)	75.3 (3.0)	77.0 (2.9)	80.1 (2.6)
Health status					
Excellent, very good (<i>n</i> = 8535)	28.6 (0.7)	31.5 (0.8)	33.3 (0.8)	34.9 (0.8)	36.5 (0.8)
Good, fair, or poor (<i>n</i> = 1928)	54.2 (1.6)	58.0 (1.6)	59.5 (1.5)	61.7 (1.5)	63.5 (1.5)
Family percentage of poverty level					
<100% (<i>n</i> = 2333) ^a	81.8 (1.2)	85.4 (1.1)	86.3 (1.1)	87.2 (1.0)	88.7 (1.0)
100 to <150% (<i>n</i> = 1418) ^a	55.5 (1.9)	61.3 (1.9)	63.4 (1.9)	66.9 (2.0)	68.8 (2.0)
150% to <200% (<i>n</i> = 1254) ^a	36.0 (2.1)	41.3 (2.2)	44.7 (2.2)	48.0 (2.2)	50.0 (2.1)
200% to <300% (<i>n</i> = 1861) ^a	21.6 (1.5)	25.3 (1.6)	27.8 (1.5)	30.2 (1.5)	32.9 (1.6)
≥300% (<i>n</i> = 3597) ^a	6.0 (0.5)	7.0 (0.5)	8.0 (0.6)	8.9 (0.6)	9.9 (0.6)

SOURCE: NHIS, 2004/MAX 2004–2008 linked data files.

^a Sample sizes for family income-to-poverty ratio categories are an average (rounded to the nearest whole number) of the sample sizes for each of the 5 imputed values.

21.2% in 2004, they had the largest percentage increase, a 33% rise to 28.3%, when the observation period was expanded to all 5 years. Two-thirds of non-Hispanic black children and 59% of Hispanic children were enrolled in Medicaid at some point from 2004 to 2008. Seventy-eight percent of children with highest level of parental education less than high school were enrolled for any time during the 5-year observation period, as were 59% of children with parents with a high school education. Among children whose parents had some college or an associate degree, Medicaid enrollment increased by one-third, to 42%, over the 5 years.

Among children in good, fair, or poor health in 2004, 54.2% were enrolled in Medicaid during 2004, and 63.5% were enrolled for any time during the 5-year observation period. Among children in

families at <100% of the poverty level in 2004, 81.8% had Medicaid during 2004, and 88.7% had Medicaid for any time during the 5-year period. Similar to parental education, children with higher incomes had lower overall Medicaid enrollment but had a greater increase over the observation period. For instance, 33% of children in families at 200% to <300% of the poverty level were enrolled in Medicaid at some time during the 5-year period, an increase of 52% from the cross-sectional 2004 estimate (21.6%).

Duration of Enrollment

Figure 1 shows the overall duration of Medicaid enrollment for the study population. Of the 41% of children who were 0 to 13 years of age in 2004 and enrolled in Medicaid for any time during 2004 to 2008, slightly more than

one-half, 51.5%, were enrolled during every year of the 5-year observation period, nearly 5 times as much as the percentage of children enrolled during only 1 year over that time (10.9%). Among the 50.9% of children 0 to 12 months in 2004 who were enrolled in Medicaid for any time during the 5-year observation period, 47.5% (SE 2.7%) were enrolled during every year of the 5-year observation period, but only 8.8% (SE 1.6%) were enrolled during only 1 year (data not shown).

Table 2 shows duration of Medicaid enrollment by sociodemographic characteristics. One-quarter of all children 0 to 4 years of age in 2004 were enrolled in Medicaid during all 5 years, from 2004 to 2008. Two-thirds of non-Hispanic black children were enrolled in Medicaid for some period of time over the 5-year period. Of those, 64%, or 43% of all

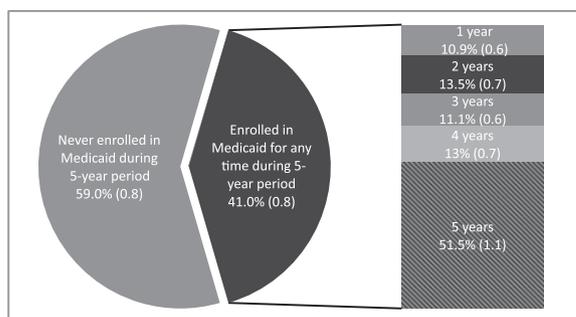


FIGURE 1

Percentage (SE) of children enrolled in Medicaid for any time during 2004–2008 (pie chart) and percentage (SE) of those enrolled for any time during 2004–2008 by duration of enrollment (bar chart). SOURCE: NHIS, 2004/MAX 2004–2008 linked data files.

non-Hispanic black children, were enrolled during all 5 years. Similarly, almost one-third of all Hispanic children had Medicaid each year from 2004 to 2008. More than one-half, 51.9%, of children whose parents had less than high school education had Medicaid all 5 years, as did 31.2% of children with high school as the highest level of parental education. Children with less than optimal health status were more likely to have long-term Medicaid than those with excellent or very good status: 39.3% compared with 17.5%. Of children with family income <100% of poverty in 2004, 62.3% had Medicaid during all 5 years. Even among children with family income 200% to <300% of poverty, long-term Medicaid enrollment was not uncommon; 11.1% of those children were enrolled during all 5 years.

DISCUSSION

This study used newly available longitudinal data to demonstrate that US children have substantially greater interaction with Medicaid than is indicated by traditional cross-sectional estimates. Forty-one percent of children 0 to 13 years of age were enrolled in Medicaid at some point over a 5-year period (2004–2008), ~25% higher than the estimate for a single year alone. Also, approximately one-half of children enrolled in Medicaid at any time during the 5-year study were enrolled

during all 5 years. Taken together, these data show that one-fifth of all US children 0 to 13 years of age in 2004 were enrolled in Medicaid during every year of the subsequent 5-year period. Finally, this analysis shows that traditionally high-risk subpopulations of US children have substantially more exposure to Medicaid than usual cross-sectional estimates suggest. For instance, more than three-quarters of children with parents having less than high school education were enrolled in Medicaid for some period of time during the 5-year study; more than one-half of all children with low parental education had Medicaid during all 5 years.

Estimated percentages of children enrolled in Medicaid from this longitudinal analysis are also higher than those from previously published cross-sectional studies. For example, unlinked data from the NHIS suggest that ~29% of children 0 to 17 years of age had public insurance (Medicaid or other state-sponsored health insurance, including CHIP) at the time of interview in 2004.¹ Data from the Medical Expenditure Panel Survey estimate that ~34% of children 0 to 17 years of age were enrolled in Medicaid at some point in 2004.⁷ The recognition that more children rely on Medicaid at some point in childhood than are indicated using cross-sectional estimates suggests that

Medicaid plays a greater role in covering child health care than previously described. This may be even more important given increases in Medicaid enrollment after the 2008 expansion.⁸

These data also provide an understanding of the Medicaid population at a more granular level rather than as a single entity. Longitudinal analysis of Medicaid enrollment shows differences in the characteristics of children enrolled in Medicaid chronically compared with those enrolled for only a short time. In general, children with traditionally high-risk sociodemographic characteristics are more likely to have long-term reliance on Medicaid. For instance, ~40% of US children in suboptimal health were on Medicaid during all 5 years of the study period, compared with <20% of children in excellent or very good health, suggesting that Medicaid is responsible for the ongoing care of much of the sick pediatric population. This has implications for planning of Medicaid services. An improved understanding of subpopulation characteristics may help as policymakers consider the best means of enrolling and retaining Medicaid-eligible children in Medicaid programs.

This study did not examine the amount of enrollment and disenrollment (so-called churning), or Medicaid coverage gaps, as other studies have.^{2,9,11,12} In this analysis, it is possible that children with Medicaid enrollment during a year disenrolled and reenrolled within that year. However, recent research shows that 72% of children less than 19 years old enrolled in Medicaid in 2007 were enrolled for the entire year, and 8% had 2 or more periods of enrollment in the year.²³ This suggests that most children in our analysis categorized as having Medicaid in a particular year had Medicaid for the entirety, or at least most, of that year. Even given some degree of undocumented lapses

TABLE 2 Duration of Medicaid Enrollment by Demographic Characteristics (SE)

	<i>n</i>	Never Enrolled	Enrolled During 1 y Only	Enrolled During 2 y	Enrolled During 3 y	Enrolled During 4 y	Enrolled During All 5 y	<i>P</i> Value
<i>n</i>	10 463	5733	489	587	515	614	2525	
Total		59.0 (0.8)	4.5 (0.3)	5.5 (0.3)	4.6 (0.3)	5.3 (0.3)	21.1 (0.6)	
Age at time of interview								
0–4 y	3720	52.7 (1.0)	4.4 (0.4)	6.1 (0.5)	5.1 (0.4)	6.4 (0.5)	25.4 (0.9)	<.001
5–9 y	3738	61.1 (1.0)	4.5 (0.4)	5.0 (0.4)	4.5 (0.4)	4.8 (0.4)	20.2 (0.8)	
10–13 y	3005	64.5 (1.1)	4.5 (0.4)	5.4 (0.5)	4.0 (0.4)	4.7 (0.5)	16.9 (0.8)	
Race or ethnicity								
Non-Hispanic white	5500	71.7 (0.9)	3.9 (0.3)	5.0 (0.4)	3.5 (0.3)	3.8 (0.4)	12.2 (0.7)	
Non-Hispanic black	1693	32.6 (1.6)	5.1 (0.6)	6.1 (0.8)	5.9 (0.8)	7.3 (0.8)	43.0 (1.7)	<.001
Hispanic	2920	40.1 (1.4)	6.1 (0.6)	6.5 (0.6)	7.2 (0.7)	8.5 (0.7)	31.3 (1.3)	
Non-Hispanic all other races	350	63.8 (3.5)	2.5 (0.9) ^a	6.7 (1.6) ^a	3.0 (1.0) ^a	4.9 (1.5) ^a	19.3 (3.0)	
Highest level of parental education ^b								
Less than high school	1614	22.0 (1.7)	4.4 (0.6)	5.2 (0.7)	6.0 (0.7)	10.6 (1.0)	51.9 (1.9)	<.001
High school	2310	41.0 (1.5)	6.4 (0.7)	7.2 (0.7)	6.9 (0.6)	7.4 (0.6)	31.2 (1.4)	
Some college or associate degree	3206	58.4 (1.4)	5.4 (0.5)	6.9 (0.6)	5.7 (0.6)	6.2 (0.6)	17.6 (0.9)	
College degree or higher	2993	89.0 (0.8)	2.2 (0.3)	3.0 (0.4)	1.3 (0.3)	1.1 (0.2)	3.4 (0.5)	
Health status								
Excellent, very good	8535	63.5 (0.8)	4.4 (0.3)	5.5 (0.3)	4.2 (0.3)	5.0 (0.3)	17.5 (0.6)	<.001
Good, fair, or poor	1928	36.5 (1.5)	4.9 (0.6)	5.6 (0.7)	6.6 (0.7)	7.2 (0.8)	39.3 (1.6)	
Mean family income-to-poverty ratio	10 463	4.2 (0.1)	2.3 (0.1)	2.1 (0.1)	1.7 (0.1)	1.5 (0.1)	1.2 (0.0)	<.001
<100%	2333 ^c	11.3 (1.0)	3.5 (0.6)	6.0 (0.6)	6.3 (0.7)	10.7 (0.9)	62.3 (1.5)	
100 to <150%	1418 ^c	31.2 (2.0)	6.8 (0.9)	9.4 (1.1)	10.2 (1.2)	10.3 (1.1)	32.1 (1.8)	<.001 ^d
150% to <200%	1254 ^c	50.0 (2.1)	6.9 (1.1)	10.0 (1.2)	7.1 (1.0)	7.1 (1.1)	18.9 (1.8)	
200% to <300%	1861 ^c	67.1 (1.6)	6.8 (0.9)	6.7 (0.8)	4.1 (0.6)	4.1 (0.6)	11.1 (1.1)	
≥300%	3597 ^c	90.1 (6.3)	2.4 (0.3)	2.2 (0.3)	1.3 (0.3)	1.2 (0.2)	2.8 (0.3)	

SOURCE: NHIS, 2004/MAX 2004–2008 linked data files.

^a Estimate not reliable because of <30 unweighted observations or relative SE >30%.^b Numbers of observations used for these estimates are lower than overall *n* because of missing data.^c Sample sizes for family income-to-poverty ratio categories are an average (rounded to the nearest whole number) of the sample sizes for each of the 5 imputed values.^d χ^2 value for multiply imputed poverty-to-income ratio was calculated using the method for combining χ^2 statistics of Little and Rubin.²⁵

in coverage, these results indicate that for most children enrolled in Medicaid, it is not a short-term event. These data may be useful for policymakers considering providing continuous eligibility or considering changing the duration of continuous eligibility in their state.

This study has several limitations. The population followed was from 2004, and the children could be followed only until 2008. More recent data may have changed our results, especially given increasing Medicaid enrollment since 2008.⁸ Second, only slightly more than one-half of the children in the 2004 NHIS were linkage eligible, which may introduce bias into our estimates. However, the data were reweighted to account for linkage eligibility. The distributions of the characteristics estimated (age, race and ethnicity, parental education, health status, and percentage

of poverty) using the full sample of children and the reweighted data were similar, with differences of 1.9 percentage points or less in all categories (data not shown). Also, whereas characteristics such as race or ethnicity and parental education are fairly stable across the study period, characteristics such as family income-to-poverty ratio may change over time, adding some uncertainty to the characterization of the children. Finally, the incompleteness of CHIP data in the MAX files prevents creation of estimates for all sources of public insurance rather than only Medicaid. Data from CMS suggest that at a single point in time in 2009, ~24.9 million children under age 19 were enrolled in Medicaid, and an additional 5.0 million were enrolled in CHIP programs.²⁴ Thus, the linked NHIS/MAX files cannot

be used to compare children in Medicaid with those in CHIP.

CONCLUSIONS

This longitudinal examination of Medicaid enrollment among children suggests that a greater portion of the US child population had Medicaid over time than indicated by traditional estimates based on cross-sectional data. For approximately one-half of children enrolled in Medicaid, Medicaid was a source of insurance during at least 5 years during childhood. In addition, children with traditional sociodemographic risk factors are at greater risk of relying on Medicaid for pediatric care across longer spans of childhood. Recognizing the true extent of US children's reliance on Medicaid may facilitate optimal planning and design of Medicaid services.

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