

A National and State Profile of Leading Health Problems and Health Care Quality for US Children: Key Insurance Disparities and Across-State Variations

Christina D. Bethell, PhD, MBA, MPH; Michael D. Kogan, PhD; Bonnie B. Strickland, PhD; Edward L. Schor, MD; Julie Robertson; Paul W. Newacheck, DrPH

From the Child and Adolescent Health Measurement Initiative, Department of Pediatrics, School of Medicine, Oregon Health & Science University, Portland, OR (Dr Bethell and Ms. Robertson); Maternal and Child Health Bureau, Health Resources and Services Administration, US Department of Health and Human Services, Rockville, Md (Dr Kogan and Dr Strickland); The Commonwealth Fund, New York, NY (Dr Schor); and Philip R. Lee Institute for Health Policy Studies, University of California San Francisco, CA (Dr Newacheck)

The views expressed in this report are those of the authors and do not necessarily represent those of the Department of Health and Human Services, the Agency for Healthcare Research and Quality, or the Centers for Medicare & Medicaid Services.

Please see Acknowledgments section for conflicts of interest information.

Publication of this article was supported by the US Department of Health and Human Services or the Agency for Healthcare Research and Quality. Address correspondence to Christina D. Bethell, PhD, MBA, MPH, Department of Pediatrics, School of Medicine, Oregon Health & Science University, 707 SW Gaines Street, Mailcode CDRCP, Portland, Oregon 97239 (e-mail: bethellc@ohsu.edu).

Received for publication March 1, 2010; accepted August 27, 2010.

ABSTRACT

BACKGROUND: Parent/consumer–reported data is valuable and necessary for population-based assessment of many key child health and health care quality measures relevant to both the Children’s Health Insurance Program Reauthorization Act (CHIPRA) of 2009 and the Patient Protection and Affordable Care Act of 2010 (ACA).

OBJECTIVES: The aim of this study was to evaluate national and state prevalence of health problems and special health care needs in US children; to estimate health care quality related to adequacy and consistency of insurance coverage, access to specialist, mental health and preventive medical and dental care, developmental screening, and whether children meet criteria for having a medical home, including care coordination and family centeredness; and to assess differences in health and health care quality for children by insurance type, special health care needs status, race/ethnicity, and/or state of residence.

METHODS: National and state level estimates were derived from the 2007 National Survey of Children’s Health (N = 91 642; children aged 0–17 years). Variations between children with public versus private sector health insurance, special health care needs, specific conditions, race/ethnicity, and across states were evaluated using multivariate logistic regression and/or standardized statistical tests.

RESULTS: An estimated 43% of US children (32 million) currently have at least 1 of 20 chronic health conditions assessed, increasing to 54.1% when overweight, obesity, or being at risk for developmental delays are included; 19.2% (14.2 million) have conditions resulting in a special health care need, a 1.6 point increase since 2003. Compared with privately insured children, the prevalence, complexity, and severity of health problems were systematically greater for the 29.1% of all children who are publicly insured children after adjusting

for variations in demographic and socioeconomic factors. Forty-five percent of all children in the United States scored positively on a minimal quality composite measure: 1) adequate insurance, 2) preventive care visit, and 3) medical home. A 22.2 point difference existed across states and there were wide variations by health condition (autism, 22.8, to asthma, 39.4). After adjustment for demographic and health status differences, quality of care varied between children with public versus private health insurance on all but the following 3 measures: not receiving needed mental health services, care coordination, and performance on the minimal quality composite. A 4.60 fold (gaps in insurance) to 1.27 fold (preventive dental and medical care visits) difference in quality scores was observed across states. Notable disparities were observed among publicly insured children according to race/ethnicity and across all children by special needs status and household income.

CONCLUSIONS: Findings emphasize the importance of health care insurance duration and adequacy, health care access, chronic condition management, and other quality of care goals reflected in the 2009 CHIPRA legislation and the ACA. Despite disparities, similarities for public and privately insured children speak to the pervasive nature of availability, coverage, and access issues for mental health services in the United States, as well as the system-wide problem of care coordination and accessing specialist care for all children. Variations across states in key areas amenable to state policy and program management support cross-state learning and improvement efforts.

KEYWORDS: children’s health insurance; children’s health services; chronic conditions in childhood; CSHCN medical home; national survey of children’s health (NSCH); quality of care

ACADEMIC PEDIATRICS 2011;11:S22–S33

THE CHILDREN'S HEALTH Insurance Program Reauthorization Act (CHIPRA) of 2009 (Public Law 111-3) seeks to improve access to and quality of care for children enrolled in the Children's Health Insurance Program (CHIP) and Medicaid.¹ The CHIPRA legislation mandates the implementation and evaluation of quality of care assessment efforts in CHIP and Medicaid programs. The more recent Patient Protection and Affordable Care Act of 2010 (ACA) further emphasizes CHIPRA insurance coverage and quality priorities and includes additional provisions related to ensuring coverage for children with special health care needs (CSHCN) and the provision of a full range of preventive services. Implementation of CHIPRA and ACA can benefit from a baseline, population-based assessment of the prevalence, severity, and complexity of health problems in US children, as well as a summary of what we currently know about health care quality and system performance through assessing the reported experiences of families. The 2007 National Survey of Children's Health (NSCH, released May 2009) is the most recent national and state-specific representative sample of children that allows identification of a range of health problems in children, as well as assessment of several quality of care indicators valid and meaningful to assess using parent-reported methods. NSCH allows for comparisons across children with public versus private sector insurance in addition to numerous demographic and socioeconomic factors. This paper summarizes findings from the 2007 NSCH beyond the high-level findings previously reported,² with a focus on comparing children with public versus private insurance as well as variations across states and for different racial, ethnic, and socioeconomic status groups.

Past studies have documented the most common health conditions for which children use health services and have delineated the availability of existing quality measures for these conditions.³⁻⁵ Prior studies have also examined selected health problems and specific insurance, access, and quality of care topics for children by using the earlier 2003 NSCH.⁶⁻²⁰ A recently published study used the 2007 NSCH to explore in more depth state variations and disparities in overweight and obesity in children²¹ and another used the 2007 NSCH to evaluate national findings on insurance adequacy, or underinsurance, in US children.²² Others have summarized evidence of quality based on documentation of the provision of indicated care for specific health care needs in children as recorded in medical charts.²³ These reports of children's health problems and health care quality vary in the extent to which they examine a range of topics at the child level and the degree to which they provide information by insurance, race, ethnicity, special health care need, and specific conditions. This study further leverages the 2007 NSCH data to provide a more recent and comprehensive national and across-states profile of health problems and quality of care for all children and separately for public and privately insured children, comparing across a range of child demographic and health characteristics using data collection methods that were standardized across all children and all states.

METHODS

DATA SOURCE AND KEY ANALYTIC VARIABLES

Data for this study were drawn from the 2007 NSCH public use data files prepared by the Data Resource Center for Child and Adolescent Health.^{24,25} NSCH data were collected between April 2007 and July 2008. The NSCH is directed and funded by the Maternal and Child Health Bureau of the Health Resources and Services Administration and is administered by the National Center for Health Statistics in conjunction with the National Immunization Survey using the State and Local Area Integrated Telephone Survey mechanism led by the National Center for Health Statistics.²⁴ The survey sample represented at least 1700 children from each state and the District of Columbia (1725–1932 cases across states). Respondents were a parent or other adult in the household who knew the child and the child's health and health history the best. All estimates from the NSCH data are adjusted for nonresponse bias and weighted to represent the noninstitutionalized population of children aged 0 to 17 years in each state, resulting in an estimated 73.76 million children in the United States. [Table 1](#) summarizes characteristics of children represented by the NSCH for all US children aged 0 to 17 years; separate data are provided for children with public or private sector health insurance, including their age, sex, race/ethnicity, household language, household income, and special health care needs status.

Measures of children's health conditions and problems derived from the 2007 NSCH are described in more detail in [Appendix A, Table A1](#), as well as in publicly available variable codebooks.²⁶ To summarize, those measures reported here include the following:

1. prevalence and service need complexity of CSHCN based on parent responses to the CSHCN Screener^{27,28}
2. prevalence, multiplicity, and parent-assessed severity of 20 chronic medical, mental, behavioral, or developmental health conditions or problems. Respondents were asked if a doctor ever (or in the last 12 months) told them their child had each condition or problem. If they said "yes," they were then asked if the child currently had this condition (some exceptions exist, see [Appendix A, Table A1](#)). Parents were also asked if their child's condition was "moderate or severe" (versus mild). This approach reflects studies showing a general positivity bias in parent reports of children's functioning, often resulting in "moderate" ratings for conditions with notable health impacts.²⁹
3. prevalence of 2 key risk factors: a) overweight or obesity for children aged 10 to 17 years, defined as $\geq 85\%$ of body-mass-index (BMI; population-based estimates using parent report reliable for older children³⁰) and b) moderate or high risk for developmental or behavioral problems based on responses to Parents Evaluation of Developmental Status items included in the NSCH.³¹

Several measures aligned with CHIPRA definitions of quality of care were derived from specific items in the 2007 NSCH ([Figure 2](#) and [Appendix A, Table A1](#)). To summarize, the following indicators are reported here:

Table 1. Characteristics of Children Represented in the 2007 National Survey of Children's Health*

Child Characteristic†	All Children Aged 0–17 Years, % (N = 91 642)	Publicly Insured Children (n = 19 748)	Privately Insured Children (n = 64 165)	Uninsured Children (n = 6808)
Percentage (estimated number of children aged 0–17 years)	100 (73.76 million)	29.1 (21.46 million)	61.8 (45.58 million)	9.2 (6.78 million)
Age ($P \leq .001$ for differences across types of insurance)‡				
0–5 years (n = 27 566)	33.2	39.8	30.9	28.6
6–11 years (n = 27 792)	32.4	31.7	32.5	33.9
12–17 years (n = 36 284)	34.4	28.6	36.6	37.5
Sex ($P = .564$ for differences across types of insurance)‡				
Female (n = 43 997)	48.9	49.4	48.8	47.6
Male (n = 47 535)	51.1	50.6	51.2	52.4
Race ($P \leq .001$ for differences across types of insurance)‡				
White NH§ (n = 61 377)	56.2	34.5	69.4	37.6
Black NH (n = 8873)	14.2	25.1	9.0	13.7
Asian NH (n = 2312)	3.6	2.0	4.4	1.8
Hispanic (n = 11 523)	20.5	31.7	12.0	42.4
Multi/other NH (n = 6011)	5.5	6.6	5.2	4.5
Ethnicity/language ($P \leq .001$ for differences across types of insurance)‡				
Hispanic, English household language (n = 6554)	9.8	11.0	9.2	10.2
Hispanic, Spanish (n = 4937)	10.6	20.7	2.7	32.2
Non-Hispanic (n = 78 558)	79.6	68.3	88.1	57.7
Household income ($P \leq .001$ for differences across types of insurance)‡				
0%–99% FPL (n = 10 971)	18.6	45.4	3.9	30.6
100%–199% FPL (n = 15 591)	21.0	34.4	13.0	32.1
200%–399% FPL (n = 30 792)	31.1	16.2	38.8	26.3
≥400% FPL (n = 34 288)	29.3	3.9	44.3	11.0
Geographic area ($P \leq .001$ for differences across types of insurance)‡				
Urban (n = 56 863)	71.5	68.5	73.0	69.9
Suburban (n = 9239)	10.2	8.1	11.3	9.5
Large town (n = 11 557)	9.1	11.2	7.9	10.6
Small town, rural (n = 13 551)	9.2	12.2	7.7	9.9
CSHCN¶ status ($P \leq .001$ for differences across types of insurance)‡				
Met CSHCN criteria (n = 18 352)	19.2	23.6	18.1	12.8
Non-CSHCN (n = 73 290)	80.8	76.4	81.9	87.2

*By insurance status and type. Weighted to represent the noninstitutionalized population of children aged 0–17 years in the United States.

†n = actual/raw number of children sampled. Numbers do not add to 100% of full sample size due to missing values on some variables and/or rounding. Insurance type was possible to calculate for 19 748 sampled children (98.9% of total sample).

‡Assessed using a chi-square test of differences across these three groups.

§NH = non-Hispanic.

¶CSHCN = children with special health care needs status.

||FPL = federal poverty level.

- gaps in health insurance for children with either public (Medicaid or CHIP) or private health insurance, based on responses to a series of questions: if there was a positive response to questions asking if the child had any kind of health insurance coverage they were further asked if the child was insured by/through Medicaid or CHIP (previous research has found that respondents find it difficult to distinguish between Medicaid and CHIP, so these categories were combined); finally, respondents were asked if during the past 12 months, or since the child's birth (if under 12 months of age), whether there was any time when the child was not covered by health insurance
- adequacy of insurance is evaluated based on parent responses to questions about the extent to which the child's health insurance offers benefits or covers services that usually or always meet the child's needs, usually or always allow him or her to see needed health care providers, and whether any costs paid by the family beyond health insurance premiums or costs covered by insurance are usually or always reasonable
- three preventive care measures included the following:
 - a) whether the child had a preventive medical care visit,
 - b) whether the child had a preventive dental care visit, or
 - c) whether the child had received a developmental screening using standardized parent-completed tools³² (at <6 years of age) during the past 12 months
- two specialized services measures asked parents: a) whether children who needed specialist care had problems getting specialist care and b) whether children reported to have a mental, emotional, or behavioral health problem requiring treatment or counseling received any needed mental health services in the past 12 months³³
- a multi-part medical home composite measure was used to assess medical home based on whether children: a) had a personal doctor or nurse and a usual source of care b) whether services received were family centered, and c) whether children had a problem accessing needed referrals and received needed care coordination³⁴
- a "minimal quality of care index" consists of a composite measure assessing whether a child experienced each of 3

positive systems-level quality of care attributes: adequate insurance, at least 1 preventive care visit in the past year, and receipt of care in a medical home (as defined above).

Each of the individual quality of care measures used in this study (not including the index of 3 measures) have been reviewed and endorsed for voluntary use by the National Quality Forum (NQF). Measures of Medical Home and Insurance Adequacy have proceeded to final ratification by the NQF Board. The remaining measures are endorsed pending public final comment and Board ratification in Summer 2011. For more information, contact lead paper author.

STATISTICAL ANALYSIS

National and state-by-state population prevalence for all health and quality of care variables were weighted to represent the population of noninstitutionalized children aged 0 to 17 years in the United States. The statistical significance of differences observed between children with public versus private sector health insurance in the prevalence, severity, and complexity of health problems and the key quality indicators were assessed in 2 ways. For bivariate (unadjusted) analyses, standard *t* tests or chi-square tests of statistical differences (as appropriate) were used, employing a $P < .05$ level of significance. Nested *t* tests were used to compare each state's prevalence to the nation. Adjustments to standard errors to account for weighting, clustering, stratification, and increased variability that result from the complex sampling design of the NSCH were made by using the SPSS Complex Sample Module (SPSS Inc, Chicago, Ill). Multivariate regression analyses included type of health insurance (public, private, uninsured) in a series of logistic regression analyses using "privately insured" as the reference variable and controlling for child's age, sex, race, ethnicity, primary household language, and household income. For quality of care variables, the special health care needs status of the child was also included in regression models. SPSS version 15.0 (SPSS Inc, Chicago, Ill) was used. Regression results for each variable included in these models is available, although not fully reported here due to space limitations.

Finally, a test for the presence of statistical outliers in state distributions of prevalence of health problems and quality of care scores was conducted to assess the degree to which national rates and ranges across states might be impacted by extreme values (Grubbs test). This test was run for each of the 28 health variables assessed (20 chronic conditions, 2 health risks, 6 health summary variables) and each quality of care variable, for all children and separately for children with public or private sector health insurance.

RESULTS

PREVALENCE OF HEALTH PROBLEMS

PREVALENCE AND COMPLEXITY OF SPECIAL HEALTH CARE NEEDS

Based on CSHCN screener results, 14.16 million (19.2%) of the estimated 73.76 million children in the

United States have 1 or more ongoing health condition that results in greater need for or use of health services of a type or amount than is required by children generally.²⁷ CSHCN prevalence ranges from 14.5% to 24.4% across the 50 states and the District of Columbia for all children and is significantly higher for children with public health insurance (5.06 million [23.6%]) compared with those with private health insurance (8.25 million [18.1%]; $P < .05$). This difference (Table 2) remained after adjustment for other factors (adjusted odds ratio [AOR] 1.72, 95% confidence interval [CI], 1.49–2.00). The prevalence of CSHCN increased from 17.6% in the 2003 NSCH.²⁵ This increase was observed for both publicly insured (21.8% to 23.6%) and privately insured (16.9% to 18.1%) children between 2003 and 2007 ($P < .05$).

Need for or use of prescription drugs for an ongoing health condition is one reason for categorization as a CSHCN. However, the majority (60.3%) of CSHCN have more complex needs that result in an above-routine number of health care encounters, multidisciplinary care teams, and/or specialized services (Table 2). Publicly insured CSHCN (73.4%) have higher adjusted odds of requiring services that go beyond routine need or use of prescription medications (AOR 2.27, 95% CI, 1.84–2.80) compared with privately insured CSHCN (52.2%, Table 2).

PREVALENCE OF SPECIFIC CHRONIC HEALTH CONDITIONS

Overall, 43% of all children were reported to currently have at least 1 of the 20 chronic health conditions assessed in the NSCH. Prevalence across all children aged 0 to 17 years ranged from a low of 0.1% for Tourette's syndrome to a high of 24.4% for environmental and skin allergies. Patterns in highest to lowest prevalence rates across health conditions was similar for children with either public or private health insurance (Figure 1). Publicly insured children had a 1.39 greater adjusted odds (Table 2) of experiencing 1 or more of the 20 chronic health conditions compared with privately insured children (47.4% vs 42.3%; 95% CI, 1.25–1.54). Publicly insured children are also significantly more likely than privately insured children to currently experience nearly each of the individual conditions assessed ($P < .05$; Figure 1 and Appendix B, Table B1).

THE PREVALENCE OF ALL CONDITIONS VARIED SUBSTANTIALLY ACROSS STATES

Prevalence rates varied from nearly 2 times to over 3 times across states for attention-deficit/hyperactivity disorder (3.4%–11.0%; $P < .001$), asthma (5.2%–14.4%; $P < .001$), chronic ear infections (4.1%–10.4%; $P < .001$), depression (1.2%–3.8%; $P < .05$), and overweight or obese (23.1%–44.4%; $P < .001$). In addition to the 20 chronic health conditions assessed, an even larger group of children aged 10 to 17 years were identified as being overweight or obese (31.6%), and 26.4% of children under age 6 years were estimated as having a moderate to high risk of chronic developmental, social and behavioral delays based on the Parents Evaluation of Developmental Status items included in the 2007 NSCH (26.4%). See

Table 2. Prevalence of Special Health Care Needs, Chronic Health Problems, and Key Health Risks for All Children Aged 0 to 17 Years, by Type of Health Insurance Coverage*

	All Children Aged 0–17 Years (N = 91 642) % (Quartiles)	Publicly Insured Children (n = 19 748) % (Quartiles)	Privately Insured Children (n = 64 165) % (Quartiles)	Adjusted OR (95% CI)†
CSHCN‡: has ongoing health conditions resulting in above routine and/or special health care need (CSHCN)	19.2 (14.5; 17.9; 22.7; 24.4)	23.6 (12.5; 22.9; 30.5; 37.1)	18.1 (13.2; 16.6; 19.8; 23.0)	1.72 (1.49–2.00)
Chronic condition: currently has ≥1 of 20 chronic conditions (see Appendix B for list of conditions; 90.2% of CSHCN had ≥1 from list)	43.0 (33.5; 41.2; 47.0; 53.3)	47.4 (28.4; 47.4; 55.8; 61.7)	42.3 (33.8; 39.6; 45.1; 49.5)	1.39 (1.25–1.54)
Multiple conditions: has ≥2 of 20 conditions assessed (among children with at least 1 condition) (See Appendix B for condition-specific results)	45.0 (37.1; 43.2; 48.7; 51.1)	52.7 (40.9; 49.7; 59.3; 72.3)	42.1 (35.5; 39.8; 44.1; 48.4)	1.44 (1.24–1.68)
Moderate or severe: parent-rated condition as greater than mild	49.9 (44.0; 47.8; 52.1; 55.3)	57.5 (45.6; 55.4; 62.3; 66.8)	45.6 (40.1; 43.6; 48.3; 52.1)	1.55 (1.35–1.78)
Service need complexity: CSHCN with ≥1 of 20 conditions assessed who require multiple types of special services, beyond primarily prescription medication management	60.3 (52.0; 57.9; 65.0; 77.2)	73.4 (58.1; 67.5; 80.1; 91.5)	52.2 (41.6; 49.2; 56.8; 67.7)	2.27 (1.84–2.80)
Health risks/BMI§: meets criteria for being overweight or obese (aged 10–17 years only)	31.6 (23.1; 28.4; 33.9; 44.4)	43.2 (27.2; 37.2; 45.3; 52.5)	27.3 (18.4; 23.9; 29.8; 37.8)	1.25 (1.03–1.52)
Health risks/development: meets criteria for being at risk for developmental, social or behavioral delays (aged <6 years)	26.4 (18.6; 22.7; 27.7; 35.2)	32.7 (16.8; 26.6; 36.7; 44.2)	22.1 (14.7; 19.5; 24.2; 26.3)	1.19 (0.96–1.48)

*State-specific findings can be found in Appendices C1, C2, and C3. Statistical analysis showed no significant outliers in the distribution across states (Grubbs test). State distribution quartiles are shown in parentheses (0% lowest across states, 25%, 75%, and 100% highest across states).

†Adjusted for child's age, sex, race/ethnicity, and household income using logistic regression analysis. OR = odds ratio; CI = confidence interval.

‡CSHCN = children with special health care needs.

§BMI = body mass index.

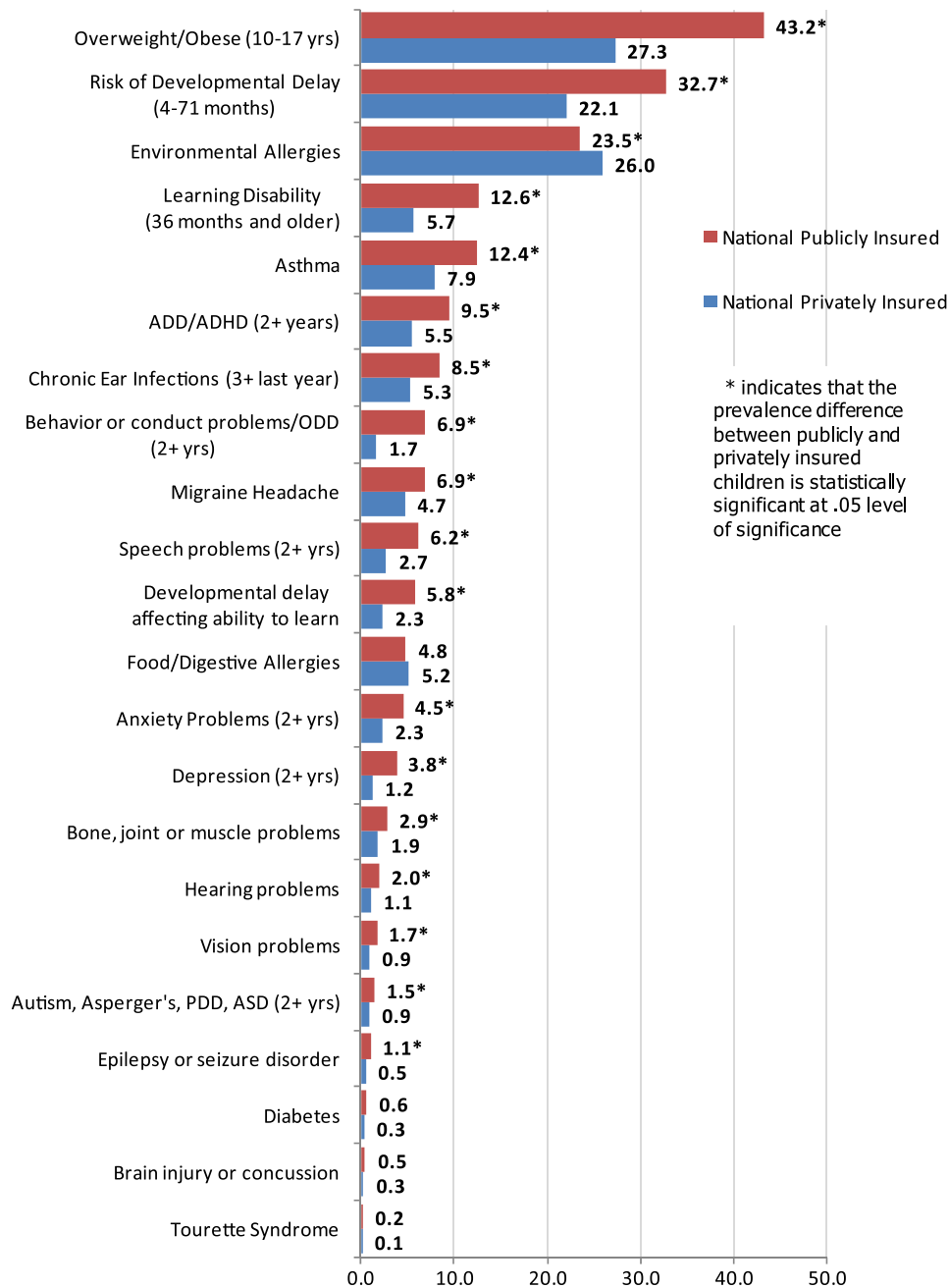


Figure 1. Prevalence of current chronic health problems and key health risks for children with public versus private sector health insurance (aged 0–17 years unless otherwise noted).

Appendix B, Table B1, for prevalence results for all 20 conditions.

SEVERITY OF HEALTH PROBLEMS

Half of all children (49.9%), 57.5% of publicly insured children, and 45.6% of privately insured children who experienced the health conditions evaluated had parents who described these conditions as being moderate or severe (vs mild, as is expected for many conditions, especially if appropriate health care is received). The adjusted odds that parents of publicly insured children would rate their children’s conditions as moderate or severe (vs mild) was 1.55 greater than for parents of privately insured children (95% CI, 1.35–1.78, Table 2). Appendix B, Table B1, includes data on the conditions most commonly rated as

moderate/severe by parents of publicly insured children and statistical difference from privately insured children. Children with conditions who also met criteria for having a special health care need were much more likely to have their conditions rated as moderate or severe versus mild (Appendix B, Table B1). For instance, 38.6% of children who currently have asthma had parents reporting their condition was moderate or severe, compared with 65.1% of children with asthma who also met criteria for having a special health care need.

PREVALENCE OF MULTIPLE CONDITIONS

Forty-five percent of children with any 1 of the 20 chronic health conditions assessed had more than 1 condition, meaning that nearly 1 in 5 (19.6%) of all children aged

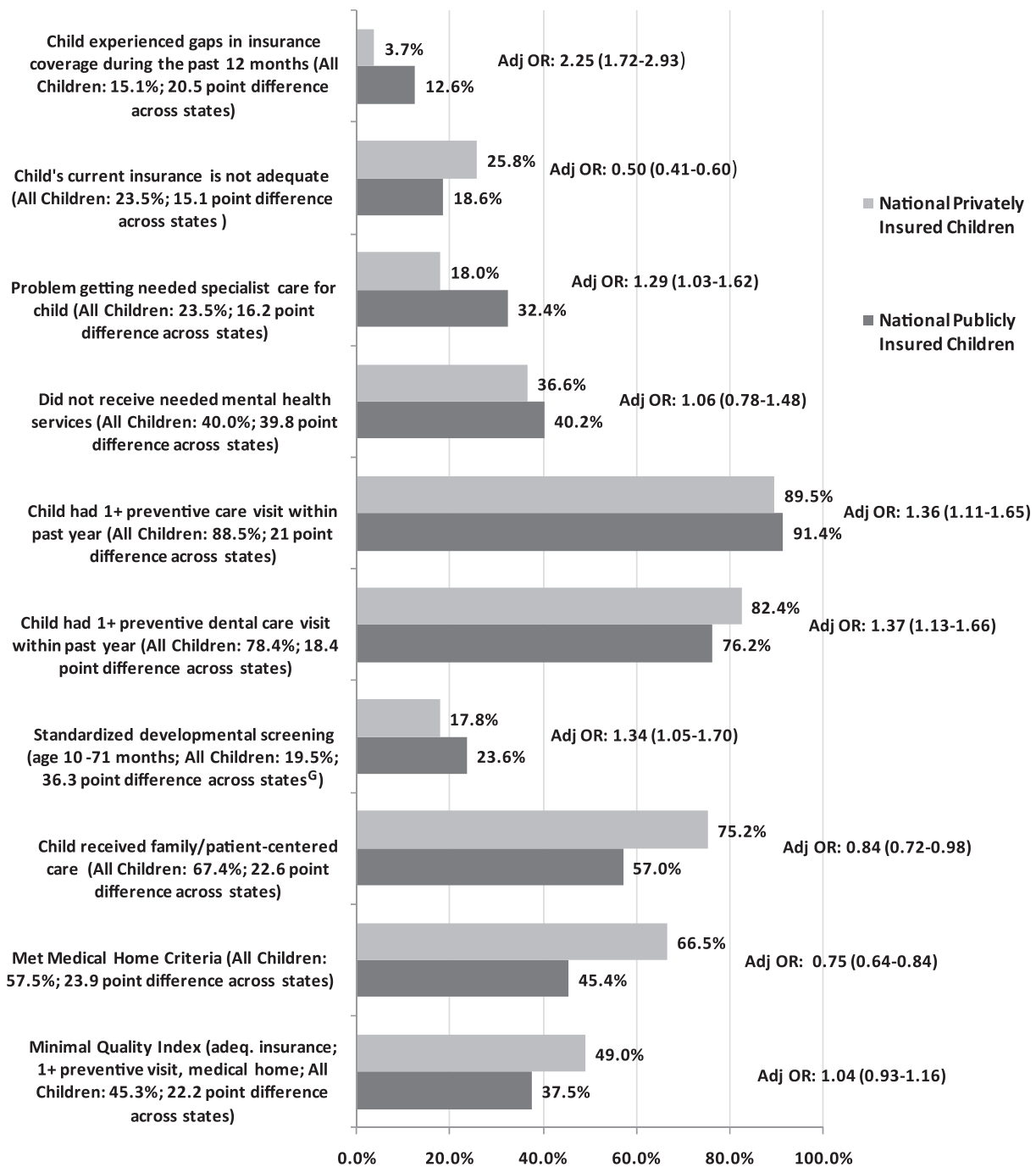


Figure 2. Healthcare quality and system performance measure scores comparing children with private and public sector health insurance. *Adjusted odds ratio compares public versus privately insured children, with adjustment for age, sex, race/ethnicity, income, and children with special health care needs status using logistic regression. ^(G) State distribution has outliers. State findings are in Appendix C, Tables C1 through C3. OR indicates odds ratio.

0 to 17 years currently experience at least 2 of the conditions assessed. More than half of all publicly insured children (52.7%) and over three fourths (78.6%) of these publicly insured who also qualified as having a special health care need (CSHCN) had 2 or more of the 20 health conditions assessed, rates substantially higher than for their privately insured counterparts. As shown in Table 2, publicly insured children had a 1.44 greater adjusted odds of having multiple conditions compared with privately insured children (95% CI, 1.24–1.68).

Although evaluated and available upon request, space limitations prevent an in-depth summary of variations observed in condition prevalence, severity, and complexity across states and according to a child's race/ethnicity, household income, or household primary language. To briefly summarize race/ethnicity and household income variations for publicly insured children, a consistent finding generally included a pattern of lower rates of prevalence of special needs and specific health conditions for Asian children and for Hispanic children living in households with Spanish

as their primary household language. This is a pattern consistent with prior research. White, black, and Hispanic children living in English-speaking households were more similar, although some variations were observed depending upon the health condition evaluated. Although prevalence rates varied by race/ethnicity, once identified as having a health condition or special health care need, groups were more similar. For example, although publicly insured Hispanic children were less likely to have parents who reported a current health condition among the 20 assessed (Hispanic, 30.6%; white, 50.4%; black, 51.3%), Hispanic children were similarly likely to have their conditions rated moderate or severe (vs mild; Hispanic, 46.4%; white, 49.7%; black, 43.9%). For publicly insured children, overall prevalence of having a health condition was generally similar across household income groups, although it was more variable on a condition by condition basis.

HEALTH CARE QUALITY AND SYSTEM PERFORMANCE

INSURANCE CONSISTENCY

Approximately 1 in 6 (15.1%), or 11.1 million children aged 0 to 17 years, experienced gaps in health insurance coverage during the past 12 months, including the 9.2% of children who were estimated to be uninsured. This varied nearly fivefold across states, from 5.7% in Massachusetts to 26.2% in Texas. Adjusted results revealed that publicly insured children had more than double the odds of experiencing a gap in coverage compared with privately insured children (AOR 2.25, 95% CI, 1.72–2.93; *Figure 2*). Among publicly insured children, gaps in insurance coverage were highest for Hispanic children (15.2%) and lowest for Asian children (6.7%; $P < .05$). Publicly insured children from poorer households (<200% federal poverty level) were more likely than publicly insured children from higher income households (>400% federal poverty level) to have gaps in insurance coverage (13% vs 6.0%; $P < .001$).

ADEQUACY OF INSURANCE

Among children with current health insurance, 15.7 million (23.5%) had parents who reported their coverage was never or only sometimes adequate in terms of coverage, access to, and costs of needed health care for their child. Reports of insurance inadequacy ranged from 16.2% in Hawaii to 31.3% in Minnesota. Publicly insured children had a lower reported frequency of inadequate insurance compared with privately insured children (18.6% vs 25.8%; *Figure 2*).

Among publicly insured children, whites had the lowest frequency of reported inadequate insurance (15%), a rate statistically different from that of Hispanics (20.6%), black children (20.3%), and Asian children (26.9%; $P < .05$). Notably, although the least likely to be uninsured or have gaps in health insurance, Asian children were most likely to be reported to have inadequate insurance (26.9%). Children with brain injury (40.4%), vision problems not corrected by glasses (37.2%), and migraine headaches (34.2%) were most likely to have parents who reported

that their insurance was not adequate. Children with diabetes (25.1%), asthma (26.5%), and environmental or skin allergies (26.2%) were least likely.

PREVENTIVE MEDICAL CARE VISITS

Most parents reported that their children had at least 1 preventive health care visit during the past 12 months (88.5%), although this was less commonly reported for older children (96.0% for children aged 0–5 years and 84.8% for children aged 6–17 years; $P < .05$). After accounting for variations in age distribution and other factors, overall, publicly insured children had 1.36 greater odds of having a preventive care visit in the last year compared with privately insured children (95% CI, 1.11–1.65); *Figure 2*). Prevalence of preventive visits was similar across race/ethnicity groups for children aged under 6 years and was higher for black children aged 6 to 17 years ($P < .05$). Only small differences were observed according to a child's household income. Prevalence differences across states were particularly large for children aged 6 to 17 years (69.1%–96.9%; $P < .05$). Children with diabetes (98.2%), those aged under 6 years at risk for developmental or behavioral problems (95.2%), and children aged 2 to 17 years with developmental delay (93.8%) were most likely to have at least 1 preventive care visit. Children aged 10 to 17 years who were overweight or obese (84.3%) or with migraine headaches (86.8%) were least likely. It is important to note that publicly insured CSHCN were more likely to have had at least 1 preventive visit in the past year compared with those who did not meet criteria for having a special health care need (AOR 1.65, 95% CI, 1.34–2.04).

DEVELOPMENTAL SCREENING FOR YOUNG CHILDREN

Nearly 20% of children aged 10 to 76 months were reported by their parents to have been screened for development, social or behavioral delays using standardized parent-completed tools, which is one primary assessment method recommended by the American Academy of Pediatrics.³² Publicly insured children had a higher frequency of parents reporting such screening compared with privately insured children (23.6% vs 17.8%; $P < .001$). Adjusted results revealed that publicly insured children had 1.34 greater odds of receiving a screening compared with privately insured children under age 6 (95% CI, 1.05–1.70; *Figure 2*). Among publicly insured children, screening rates were highest for black children (30.6%) and lowest for Asian children (20.2%). The range across states in the prevalence of screening was substantial (10.7%–47.0%).

PREVENTIVE DENTAL CARE VISITS

Results show that 78.4% of children had at least 1 preventive dental care visit in the past year. Prevalence was somewhat higher for children with private health insurance compared with publicly insured children (82.4% vs 76.2%). However, adjusted results revealed that publicly insured children had 1.37 greater odds of having parents report that their child had attended a preventive dental visit compared with parents of privately insured

children (95% CI, 1.13–1.66; **Figure 2**) Among publicly insured children, Asian children were least likely to have parents reporting a preventive dental visit (81.4%). Although less pronounced than for preventive medical care visits, substantial variation was observed across states (68.5%–86.9%; $P < .05$).

ACCESS TO SPECIALISTS AND MENTAL HEALTH SERVICES

Nearly one third of publicly insured children whose parents reported needed specialist care also had problems accessing this specialist care (32.4%). This is substantially higher than for privately insured children (18.0%; $P < .05$), with adjusted odds of 1.29 (95% CI, 1.03–1.62; **Figure 2**). Problems accessing needed specialist care were most likely for publicly insured Asian children (41.5%), followed by Hispanic and black children (36.9% and 36.3%, respectively). Specialist care access problems were equally likely for lower income children, regardless of their source of insurance.

Rates of not obtaining mental health services for conditions that required such treatment or counseling were similar for public (40.2%) and privately insured (36.6%) children after adjustment for other factors (AOR 1.06, 95% CI, 0.78–1.48; **Figure 2**). Wide ranges were observed across states for both publicly insured children (14.4%–66.3%; $P < .05$) and privately insured children (15.2%–58.5%; $P < .05$). Among publicly insured children, Hispanic, Asian, and black children more often experienced not receiving needed mental health services compared with white children (51.3%, 45.5%, 44.2%, and 34.9%, respectively). Publicly insured children living in households with incomes above 400% of the federal poverty level were significantly less likely (31.0%) to fail to receive needed mental health services compared with lower income publicly insured children ($P < .05$).

MEDICAL HOME

Fewer than half of publicly insured children (45.4%) and two thirds of privately insured children (66.5%) met the multipart medical home measurement criteria, with publicly insured children having 0.75 the odds after adjusting for other factors (95% CI, 0.64–0.86; **Figure 2**). The difference observed between children with public versus private health insurance was least notable in terms of differences in having a personal doctor or nurse (90.8% vs 95.4%) and usual source of care (90.5% vs 96.3%), and most notable for receipt of family-centered care (57.0% vs 75.2%). Although the likelihood of meeting the threshold measure of care coordination included in the medical home composite measure was lower for publicly insured children (62.7% vs 73.8%), the adjusted odds ratio comparing public to privately insured children was not significant (AOR 0.84, 95% CI, 0.71–1.00). Publicly insured Hispanic (32.9%) and Asian (33.3%) children were least likely to have a medical home, followed by publicly insured black children (40.3%). A 30-point range was observed across states in the proportion of publicly insured children meeting criteria for having a medical home (32.9%–62.6%; $P < .05$; **Figure 2**).

MINIMAL QUALITY OF CARE COMPOSITE INDEX

Fewer than half of all US children (45.3%) met criteria for the minimal quality indicator (insurance usually or always adequate, at least 1 preventive care visit, and meeting medical home criteria), with wide variations across states, ranging from 35.7% to 57.9% (**Figure 3**). Older children (40.9% for children aged 12–17 years), CSHCN (38.2%), and publicly insured children (37.5%) scored positively on this minimal quality of care composite measure less frequently than younger, healthy, and privately insured children. Among health conditions, children with autism were least likely (22.8%) to score positively on this minimal quality index, and children with chronic ear infections, asthma and either food, environmental, or skin allergies were most likely to score positively among all chronic conditions assessed in this study (39.9%, 39.4%, 40.6%, and 45.0%, respectively).

Additional variations on quality of care across subgroups of all children, and specifically for children with public sector health insurance, are available. For more information on these findings please contact the first author.

SUMMARY OF DIFFERENCES OBSERVED ACROSS US STATES

Highlights of differences across US states (including the District of Columbia) in the prevalence of health problems and scores on health care quality measures have been referenced throughout this paper, and more state-specific findings are available in **Appendix C, Tables C1 through C3**. In addition, state-specific profiles for most of the measures assessed in this study can be downloaded from <http://www.childhealthdata.org> or obtained from the first author.

As noted earlier, tests for statistical outliers in distributions across states were conducted for all of the 28 measures of health problems (20 conditions, 2 health risks, 6 summary measures) and each quality of care/system performance measure. These tests confirmed that neither the mean prevalence rates in health and quality of care measures across states (or national average) nor the often wide range in prevalence and performance between the states with the highest and lowest prevalence/scores were unduly impacted by or reflective of the presence of extreme values or outliers. This was true when assessed for all children, or separately for publicly insured and privately insured children. Among all measures assessed, there were 5 that did show the presence of extreme values/outliers for 1 more of these population groups: 1) prevalence of anxiety, 2) prevalence of Tourette's syndrome, 3) prevalence of overweight or obesity, 4) prevalence of children experiencing 1 or more of the 20 health conditions assessed (publicly insured children only), and 5) prevalence of developmental screening for young children (for all, public, and privately insured). **Appendix C, Tables C1 through C3** provide further details on results of tests for state outliers for key health and quality variables.

Among the health condition complexity, severity, and service needs measures summarized in **Table 2**, a 1.26 (condition severity) to 1.87 (multiple conditions) times

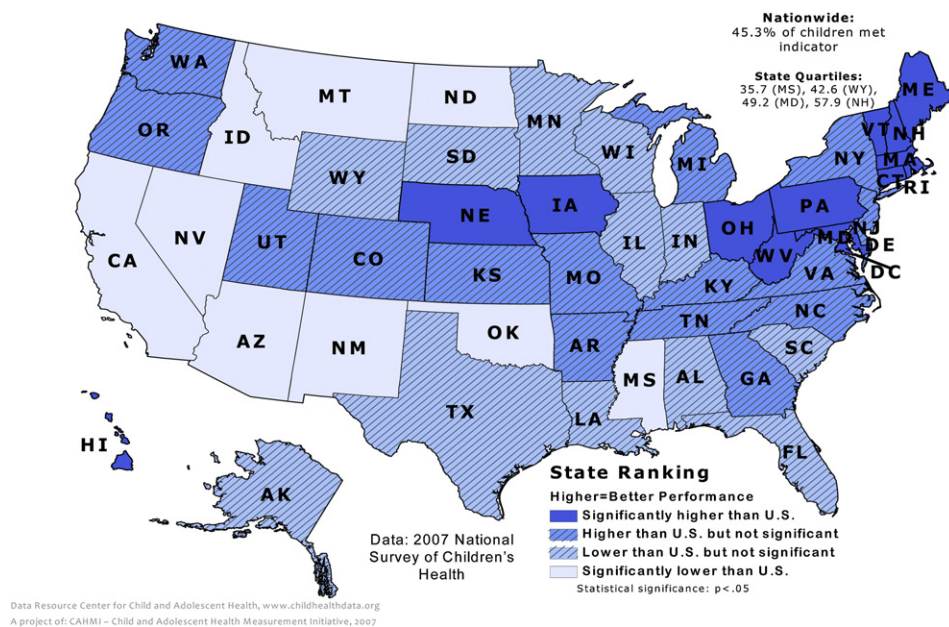


Figure 3. United States map comparing states to the national prevalence on a minimum quality index (assesses the percentage of children who met medical home criteria, had ≥ 1 preventive care visits, and adequate insurance coverage). State-specific prevalences are in Appendix C, Tables C1 through C3.

difference was observed between the state with the highest versus the lowest prevalence (privately insured across state ratios, 1.30 to 1.81; publicly insured across state ratios, 1.46 to 2.97). Excluding the developmental screening measure, which did include state outliers, a 4.60 fold (gaps in insurance) to 1.27 fold (preventive dental and medical care visits) difference was observed across states for quality of care measures (privately insured ratios, 6.92 for insurance gaps to 1.19 for preventive dental care; publicly insured ratios, 5.19 for gaps in insurance to 1.16 for preventive medical care). Overall, the 4-system performance measures with the greatest across-state variation were as follows: 1) gaps in health insurance coverage, 2) not receiving needed mental health care, 3) receipt of developmental screening using standardized parent-completed tools, and 4) problems with specialist care access. See Appendix C, Tables C1 through C3 for more details on state variations.

DISCUSSION AND CONCLUSIONS

This study supports CHIPRA and ACA emphasis on improving healthcare system performance in areas of insurance duration and adequacy, health care access, chronic condition management, and health promotion and disease prevention. Results are especially supportive of legislative goals focused on consistency of insurance, access to mental health and specialist care, preventive and developmental services, care coordination, family-centered care, and medical home and most integrated care setting. Study findings document the presence of a chronic health condition or substantial health risk for the majority of US children, highlighting the importance of the ACA provisions to eliminate preexisting condition exclusive practices and the emphasis in both CHIPRA and ACA on health

promotion and primary prevention services for all children with a focus on promoting healthy development and preventing chronic health problems later in life.

Although the prevalence and complexity of health conditions are systematically and notably greater among publicly insured children, the majority of children with chronic conditions in the US are nonetheless privately insured. This poses an important consideration in the design and implementation of efforts to improve health and health care quality for all children and suggests the need for public and private sector partnership and alignment in quality measurement and improvement efforts. Study findings are unique in identifying prevalence rates for specific conditions and CSHCN by source of insurance—information that can help target priorities for quality measurement development and enhancement, and quality improvement. The higher prevalence of chronic conditions highlights the importance of provisions to extend dependent coverage to young adults aged up to 26 years set forth in the ACA.

Examining condition-specific clinical quality of care was beyond the scope of the NSCH. However, the survey provides clinically relevant health care quality information pertaining to all conditions (eg, medical home) and to several CHIPRA-required measurement topics. For example, the inclusion of body mass index documentation as a preventive measure in the initial core set¹ is well supported by the finding that 43.2% of publicly insured children aged 10 to 17 years are overweight or obese. Similarly, the preventive measure of use of standardized screening tools for assessing developmental, social or behavioral delays as well as the adolescent well-visit measure will help reveal substantial additional numbers of children and youth in need. Future measures should address prevention and early and appropriate diagnosis and treatment of health risks and problems

essential to maximizing the lifecourse health trajectories of all children. Given the prevalence of specific chronic conditions in children, consideration of additional quality measures for asthma, attention-deficit/hyperactivity disorder, chronic ear infections, and those for learning disabilities is supportable. In addition, as put forth by the Subcommittee on Quality Measures for Children's Health-care in Medicaid and CHIP,¹ increased attention to measures of specialty care and care coordination are indicated. Data suggest that prime areas for quality measure development or enhancement include care for allergies, behavior and conduct problems, migraine headaches, speech problems, anxiety, and depression. All condition-specific quality measure development should keep in mind the high proportion of children with multiple conditions, the many common quality of care and system performance needs of children regardless of their conditions, and the wide variation in severity and health care needs among children with any single health condition.

Compared with privately insured children, those with public insurance experienced lower quality of care, including gaps in health insurance and problems accessing specialist care and on a multipart medical home composite measure. Exceptions include that publicly insured children scored better on "insurance adequacy," receipt of a standardized developmental screening, and having preventive care visits. After adjustment, these children were similar to privately insured children on rates of not receiving needed mental health services, the care coordination subdomain measure within the medical home measure, having problems accessing specialist care, and meeting a minimal quality of care index. Such similarities speak to the pervasive nature of availability, coverage, and access issues for mental health services in the United States, as well as the system-wide problem of care coordination and accessing specialist care for all children. Findings showing the substantially higher severity and complexity of conditions among children who also meet criteria for having a special health care need support stratifying CHIPRA's emphasis on quality measure scores for this important subgroup of children (CSHCN). Similarly, consistent race/ethnicity disparities in quality of care measures confirm consideration of quality of care separately for race/ethnicity subgroups.

This study documents the wide variation across states in the prevalence of health problems and in system performance and access to care. Consideration should be given to these findings in the implementation and evaluation of the CHIPRA legislation and in identifying promising practices and cross-state learning opportunities to improve system performance and quality of care for all US children. Given its broad scope and ability to reliably measure in a standardized manner a wide range of health problems and critical aspects of system performance at the child level, as well as by source of insurance, race, ethnicity, income, and CSHCN, the NSCH and similar national- and state-level surveys might be considered a platform for quality measurement from the family perspective.

Although national surveys have been a standard resource for estimating the prevalence of health conditions in the US population, there are, nonetheless, limitations to the use of surveys such as the NSCH. A comprehensive assessment of health needs and quality of care also requires the use of medical record and administrative data. One limitation of surveys such as the NSCH is the inability to ask about all possible health conditions in children or their detailed clinical presentation. Specific to the NSCH, with the exception of chronic ear infections, the NSCH does not ask about many common acute conditions in childhood that lead to use of health services (eg, upper respiratory infections, urinary tract infections) and for which quality measurement is also important. Another limitation of the NSCH is its general lack of condition-specific clinical quality measures. Despite these limitations and the distinct sources of quality information provided through other types of data (eg, medical charts, administrative data), overall conclusions on the leading health problems and quality of care set forth here are consistent with prior studies that used medical chart and clinical administrative data.^{3,23,35,36} This lends confidence to our conclusions that at least half of all children in the United States today currently experience 1 or more health conditions and/or have a substantial risk to their health, and that fewer than 50% of children receive health care that meets a basic level of quality of care.

ACKNOWLEDGMENTS

This paper is based on a report prepared for the Agency for Healthcare Research and Quality through purchase order HHSP233200900801P by the US Department of Health and Human Services (HHS), with funds provided by the HHS Centers for Medicare & Medicaid Services. This study was also supported by The Child and Adolescent Health Measurement Initiative's Data Resource Center for Child and Adolescent Health, which is funded by the Maternal and Child Health Bureau through Cooperative Agreement 1-U59-MC06980-01.

SUPPLEMENTARY DATA

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.acap.2010.08.011.

REFERENCES

- Centers for Medicare & Medicaid Services. Children's Health Insurance Program Reauthorization Act (CHIPRA) of 2009. Available at: <http://www.cms.hhs.gov/chipra>. Accessed January 28, 2010.
- US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. *The National Survey of Children's Health 2007*. Rockville, Md: US Department of Health and Human Services; 2009.
- Miller MR, Gergen P, Honour M, Zhan CL. Burden of illness for children and where we stand in measuring the quality of this health care. *Ambul Pediatr*. 2005;5:268-278.
- McDonald KM, Davies SM, Haberland CA, et al. Preliminary assessment of pediatric health care quality and patient safety in the united states using readily available administrative data. *Pediatrics*. 2008; 122:e416-e425.
- Simpson L, Dougherty D, Krause D, et al. Measuring children's health care quality. *Am J Med Qual*. 2007;22:80-84.

6. Victorino CC, Gauthier AH. The social determinants of child health: Variations across health outcomes—a population-based cross-sectional analysis. *BMC Pediatr*. 2009;9:53.
7. Flores G, Tomany-Korman SC. The language spoken at home and disparities in medical and dental health, access to care, and use of services in US children. *Pediatrics*. 2008;121:e1703–e1714.
8. Kogan MD, Newacheck PW, Honberg L, Strickland B. Association between underinsurance and access to care among children with special health care needs in the United States. *Pediatrics*. 2005;116:1162–1169.
9. Halterman JS, Montes G, Shone LP, Szilagyi PG. The impact of health insurance gaps on access to care among children with asthma in the United States. *Ambul Pediatr*. 2008;8:43–49.
10. Larson K, Halfon N. Family income gradients in the health and health care access of US children. *Matern Child Health J*. 2009;14:332–342.
11. Liu J, Probst JC, Martin AB, et al. Disparities in dental insurance coverage and dental care among US children: the national survey of children's health. *Pediatrics*. 2007;119(suppl 1):S12–S21.
12. Lykens KA, Fulda KG, Bae S, Singh KP. Differences in risk factors for children with special health care needs (CSHCN) receiving needed specialty care by socioeconomic status. *BMC Pediatr*. 2009;9:48.
13. Bethell CD, Read D, Goodman E, et al. Consistently inconsistent: a snapshot of across and within state disparities in the prevalence of childhood obesity and overweight. *Pediatrics*. 2009;123(Suppl 5): S277–S286.
14. Turchi R, Pomponio A, Bethell C, et al. Care coordination for CYSHCN: examining experiences from the National Survey of Children With Special Health Care Needs. *Pediatrics*. 2009; 124(suppl):S428–S434.
15. Okumura MJ, McPheeters ML, Davis MM. State and national estimates of insurance coverage and health care utilization for adolescents with chronic conditions from the national survey of children's health, 2003. *J Adolesc Health*. 2007;41:343–349.
16. Raphael JL, Guadagnolo BA, Beal AC, Giardino AP. Racial and ethnic disparities in indicators of a primary care medical home for children. *Acad Pediatr*. 2009;9:221–227.
17. Stevens GD, Pickering TA, Seid M, Tsai KY. Disparities in the national prevalence of a quality medical home for children with asthma. *Acad Pediatr*. 2009;9:234–241.
18. Szilagyi PG, Shone LP, Klein JD, et al. Improved health care among children with special health care needs after enrollment into the state children's health insurance program. *Ambul Pediatr*. 2007;7:10–17.
19. Toomey SL, Finkelstein J, Kuhlthau K. Does connection to primary care matter for children with attention-deficit/hyperactivity disorder? *Pediatrics*. 2008;122:368–374.
20. Van Cleave J, Davis MM. Preventive care utilization among children with and without special health care needs: Associations with unmet need. *Ambul Pediatr*. 2008;8:305–311.
21. Bethell CD, Simpson LA, Stumbo S, et al. National, state and local trends in childhood overweight and obesity. *Health Affairs*. 2010; 29:347–356.
22. Kogan MD, Newacheck P, Blumberg SJ, et al. Underinsurance among children in the United States. *New Eng J Med*. 2007;357:441–451.
23. Mangione-Smith R, DeCristofaro A, Setodji C, et al. The quality of ambulatory care delivered to children in the United States. *New Engl J Med*. 2007;357:1515–1523.
24. Blumberg SJ, Foster EB, Frasier AM, et al. *Design and operation of the National Survey of Children's Health, 2007*. Hyattsville, Md: National Center for Health Statistics; 2009.
25. National Survey of Children's Health. Data Resource Center. Available at: <http://www.nschdata.org>. Accessed January 28, 2010.
26. National Data Resource Center for Child and Adolescent Health. Child and Adolescent Health Measurement Initiative (CAHMI). 2007 *National Survey of Children's Health SPSS Codebook*. Available at: <http://nschdata.org/Viewdocument.aspx?item=519>. Accessed February 2, 2010.
27. Bethell CD, Read D, Stein R, et al. Identifying children with special health care needs: development and evaluation of a short screening instrument. *Ambul Pediatr*. 2002;2:38–48.
28. Bramlett MD, Read D, Bethell C, Blumberg SJ. Differentiating subgroups of children with special health care needs by health status and complexity of health care needs. *Matern Child Health J*. 2009;13: 151–163.
29. Simon AE, Chan KS, Forrest CB. Assessment of children's health-related quality of life in the United States with a multidimensional index. *Pediatrics*. 2008;121:e118–e126.
30. Blumberg SJ, Foster EB, Frasier AM, Satorius J, Skalland BJ, Nysse-Carris KL, et al. Design and operation of the National Survey of Children's Health, 2007. *Vital Health Stat*. 2009. May 21 [cited 2010 Feb 11]. Available at: http://ftp.cdc.gov/pub/Health_Statistics/NCHS/slats/nsch07/2_Methodology_Report/NSCH_Design_and_Operations_052109.pdf. Accessed January 28, 2010.
31. Glascoe FP, Robertshaw NS. Parents Evaluation of Developmental Status: Developmental Milestones (PEDS: DM). Available at: <http://www.pedstest.com/dm/>. Accessed January 27, 2010.
32. Child and Adolescent Health Measurement Initiative. Standardized developmental screening (SDBS)—measure of SDBS using surveys of parents. Available at: <http://cahmi.org/pages/Topics.aspx?section=12&topic=25>. Accessed January 28, 2010.
33. Blanchard LT, Gurka MJ, Blackman JA. Emotional, developmental, and behavioral health of American children and their families: a report from the 2003 national survey of children's health. *Pediatrics*. 2006; 117:e1202–e1212.
34. Bethell CD, Read D, Blumberg SJ. Health care and well being of children with chronic emotional, behavioral, or developmental problems. *MMWR Morb Mortal Wkly Rep*. 2005;54:985–989.
35. The Child and Adolescent Health Measurement Initiative. Measuring Medical Home: A Resource Manual for Researchers and Analysts. Sponsored by the National Center for Health Statistics, Centers for Disease Control and Prevention. *US Department of Health and Human Services*. 2008. Available at: <http://medicalhomedata.org/Viewdocument.aspx?item=521>.
36. Kohen DE, Brehaut JC, Garner RE, et al. Conceptualizing childhood health problems using survey data: a comparison of key indicators. *BMC Pediatr*. 2007;7:40.