

# Family Income and the Impact of a Children's Health Insurance Program on Reported Need for Health Services and Unmet Health Need

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**ABSTRACT.** *Objective.* In an era when expanding publicly funded health insurance to children in higher income families has been the major strategy to increase access to health care for children, it is important to determine if the benefits to higher income children attributable to the receipt of health coverage are similar to those observed for lower income children. This study investigated how the likely impact of child health insurance expansions varies with family income.

*Methods.* We surveyed parents or guardians of children who were enrolled in a state-sponsored health insurance program (Massachusetts Children's Medical Security Plan [CMSP]) that, before the implementation of the State Children's Health Insurance Plan (SCHIP), was open to all children regardless of income. A stratified sample of children was drawn from administrative files. We grouped children by income category (low-income [LI]:  $\leq 133\%$  of the federal poverty limit [FPL], middle-income [MI]:  $134\%$ – $200\%$  of the FPL, high-income [HI]:  $>200\%$  of the FPL) that corresponded to eligibility for public health insurance programs in the state (Medicaid-eligible, SCHIP-eligible, and income that exceeded SCHIP eligibility). The majority of telephone interviews were conducted between November 1998 and March 1999. The overall response rate was  $61.8\%$ , yielding a sample of 996 children.

The CMSP benefit package included comprehensive coverage for preventive and specialty care and limited coverage for ancillary services. Children enrolled in CMSP were not covered for inpatient hospital stays but those whose family income was  $<400\%$  of the FPL were eligible to receive full or partial coverage for inpatient care through the state's free care pool. Although the CMSP benefit package did not meet the standards for a SCHIP, it is an approximate equivalent for children with incomes  $<200\%$  of the FPL, who have full coverage for hospitalization through the state's free care pool.

We used survey responses to develop 2 sets of indicators: the first for reported need for services and the second for unmet need or delays in care among children whose parents reported a need for the service. Within each set, we created indicators for 5 types of service (medical care, dental care, prescription drugs, vision services, and mental health care) and an additional composite indicator. The composite indicator aggregated all cat-

egories of services covered under CMSP in a single measure; it included all services except dental services, which, at the time of the study, were not covered by the program. The composite indicator served as the dependent variable in regression models.

We used weighted  $\chi^2$  tests to identify statistically significant differences in reported need and unmet need for the 5 types of medical services and the aggregate measure of all services covered by CMSP. We examined differences across income groups at 2 points in time: during the period children were uninsured before enrollment and while enrolled. We used weighted logistic regression to assess the independent association of family income with our dependent variables: reported need for health services and the presence of unmet need, controlling for other covariates. To evaluate the impact of participation in a child health insurance program, we examined unmet need before and after program enrollment, testing for statistical significance using McNemar's test for within-subject changes.

*Results.* During the period of uninsurance before enrollment, prescription drugs ( $70\%$ ) was the health service needed most frequently, followed by medical ( $65\%$ ) and dental ( $57\%$ ) care. For the composite measure of services covered by CMSP, reported need for services was not significantly different by income. Need for medical care, dental care, and prescription drugs were significantly greater among children who had been uninsured for  $>6$  months before enrollment. In addition, a significantly greater proportion of adolescent participants needed dental, vision, and mental health services than younger enrollees.

While enrolled, among recently enrolled children,  $77\%$  need medical services,  $68\%$  prescription drugs, and  $59\%$  dental. In unadjusted models MI and HI children were more than 2 times as likely to report need for covered services as LI children. After adjusting for possible confounders, the effect of income was no longer significant. Instead, nonadolescents (odds ratio [OR]: 2.44; 95% confidence interval [CI]: 1.25–4.76) and children with white ethnicity (OR: 3.03; 95% CI: 1.43–6.67) were significantly more likely to report need for services.

Before enrollment, unmet need among those who reported need for services was  $5\%$  for medical,  $4\%$  prescription drugs,  $31\%$  dental,  $30\%$  vision, and  $33\%$  mental health. For the composite measure of services covered by CMSP, LI children were significantly more likely to have had unmet need before enrollment than MI and HI children ( $20\%$ ,  $10\%$ ,  $7\%$  by income). As compared with younger children, adolescents also had significantly greater unmet need for the composite measure ( $19\%$  vs  $10\%$ ). In multivariate models, not having a usual site of care was a highly significant predictor of unmet need or delayed care (OR: 3.41; 95% CI: 1.28–9.11). Ninety-eight percent of parents cited cost as the reason they had difficulty obtaining needed care.

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After enrollment, the proportion of children who needed care and had difficulty obtaining it decreased for all categories of care. Less than 1% of enrollees reported unmet need or delays in care for medical services and 3% for prescription drugs. Children who needed vision and mental health services continued to experience difficulty obtaining these services (17% for each category of care), although they were covered as part of the benefit package. Unmet need or delays in care for dental services, which at the time of the study were not covered under CMSP, remained high (27%). We found a significant reduction in unmet need among children in all income groups and no significant differences in unmet need by income. Controlling for other covariates, adolescents (OR: 3.11; 95% CI: 1.58–6.12) and children with compromised health (OR: 3.20; 95% CI: 1.35–7.58) were more likely to have had difficulty obtaining needed services while enrolled in the program. Children in larger families (OR: 0.40; 95% CI: 0.17–0.96) and who were previously uninsured for >6 months (OR: 0.45; 95% CI: 0.22–7.58) were less likely to have difficulty obtaining care.

**Conclusion.** Our findings demonstrate the positive impact of providing health insurance coverage to children regardless of income. The HI children who enrolled in the program looked similar to children with incomes that meet current SCHIP eligibility guidelines, suggesting that expansions of SCHIPs to HI children should not qualitatively change the program dynamics. *Pediatrics* 2002;109(2). URL: <http://www.pediatrics.org/cgi/content/full/109/2/e29>; unmet health need, SCHIP, Medicaid, children's health services.

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ABBREVIATIONS. SCHIP, State Children's Health Insurance Program; FPL, Federal Poverty Limit; CMSP, Children's Medical Security Plan; LI, low-income; MI, middle-income; HI, high-income.

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Expanding publicly funded health insurance to children in higher income families has been the major strategy adopted by state and federal policymakers to increase access to health care for children. The passage of Title XXI of the Social Security Act that established the State Children's Health Insurance Program (SCHIP) in 1997 and recent policy discussions to offer publicly funded insurance options to higher income children are the most recent examples of this strategy. The rationale underlying expansions of child health insurance programs is that receipt of health insurance improves access to care, thereby decreasing unmet health need and delays in care.

An extensive literature documents the importance of insurance in increasing access to care among lower income children. These studies focus primarily on differences between lower income insured and uninsured children.<sup>1–7</sup> A few published studies have examined the effect of programs that extend health care coverage to uninsured children. One set of studies investigates the effect of Medicaid expansions on children's access to care, use of preventive services, and the substitution of public coverage for private insurance.<sup>8–13</sup> More recent studies examined similar issues in state programs designed to cover uninsured children,<sup>14–16</sup> precursors of SCHIPs. As public health insurance options are extended to higher income children, it becomes important to examine whether the benefits to higher income children attributable to

the receipt of health coverage are similar to those observed for lower income children. States considering expanding their SCHIPs children to children above 200% of the federal poverty limit (FPL) need to anticipate the increased level of services and cost associated with opening the program to children in these higher income families.

The purpose of this study is to examine how the likely impact of child health insurance expansions varies with family income. Specifically, we evaluate a state-financed program in Massachusetts, the Children's Medical Security Plan (CMSP) that provides coverage to children regardless of income. We used responses to a telephone survey to examine the program's effects on reported need for different types of health services and unmet need or delays in receiving needed services. We also determined if estimates of reported need for services and unmet need or delays in care vary among children in the state who were Medicaid-eligible, SCHIP eligible, and whose family income exceeds SCHIP eligibility guidelines.

## METHODS

### The Health Insurance Program: Massachusetts Children's Medical Security Plan (CMSP)

The CMSP, initiated in 1994, is a state-sponsored health insurance program that provides a limited benefit package for children regardless of income or immigration status. During the time period we consider in this study, July 1994 to April 1998, CMSP enrollees represented an economically diverse group of children. State policy did not prohibit Medicaid-eligible children from enrolling in CMSP, and the Massachusetts' SCHIP, which covers children between 133% and 200% FPL, had not yet been implemented. Based on data from the Urban Institute's 1997 National Survey of American Families<sup>17</sup> and 1997 CMSP enrollment files, we estimate is that, during the study period, CMSP enrolled more than a quarter of the state's uninsured Medicaid- and potential SCHIP-eligible children.

CMSP provided health insurance benefits on a sliding-fee basis. Families with incomes at or below 200% of the FPL received coverage free of charge. Families with incomes between 200 and 400% of the FPL were charged a reduced premium (\$10.50 per child per month, with a maximum of \$32.50 per family per month). Families whose incomes were >400% of the FPL paid the full premium per child (\$52.50 per child per month). The benefit package included 100% coverage with no copayments for routine well-child care and 100% coverage after copayment for sick visits, outpatient surgery, eye examinations, laboratory services, radiographs, and specialty consultations ordered by the primary care provider. Copayments were \$1.00, \$3.00, or \$5.00 based on the family income guidelines described above. Limited coverage was available for emergency care (\$1000 per benefit year), prescription drugs (\$100 per benefit year), durable medical equipment (\$200 per benefit year), and outpatient mental health services (13 visits per benefit year with copayment). Children enrolled in CMSP were not covered for inpatient hospital stays but those whose family income was <400% of the FPL were eligible to receive full or partial coverage for inpatient care through the state's free care pool. Although the CMSP benefit package did not meet the standards for a SCHIP, it is approximately equivalent for children with incomes <200% of the FPL, who have access to full coverage for hospitalization through the state free care pool.

The health insurance component of CMSP was contracted to a private insurer. The plan relied on a primary care physician, any willing provider model. Major hospitals, community health centers, and private physicians across the state willingly participated in the program; approximately 95% of CMSP enrollees lived within 5 miles of a participating provider. Since July 1996, the Massachusetts Department of Public Health's Bureau of Family and Community Health has been responsible for all other aspects of the CMSP. The Bureau worked closely with the state's Medicaid program to coordinate enrollment and benefits. It also worked

closely with advocacy groups, community organizations, school systems, and local health departments to maximize effective outreach.

## The Study Population

A list of CMSP enrollees was obtained from program administrative files. We identified as our target population 27 000 children, ages 6 months through 18 years, who were continuously enrolled in CMSP for a minimum of 6 months and were enrolled as of April 30, 1998. Information was gathered from a primary sample of 877 program participants and a Spanish oversample of 119 program participants. Data collection for the primary sample took place from November 1998 through March 1999, and for the Spanish oversample from August 28, 1999 through January 7, 2000.

In the primary sample, children were stratified by income and age for sampling purposes. This stratification was guided by health policy concerns. States are interested in the characteristics and responses of specific age and income groups not previously covered under publicly funded health insurance programs. Three family income categories were defined as: low-income (LI;  $\leq 133\%$  of the FPL), middle-income (MI;  $134\%–200\%$  of the FPL), and high-income (HI;  $>200\%$  of the FPL). LI children represent children who at the time of enrollment met state Medicaid income eligibility guidelines but, nevertheless, enrolled in CMSP. MI children are children who became eligible for expanded coverage under Massachusetts' SCHIP expansions. HI children are those children whose families have incomes  $>200\%$  of the FPL who continue to obtain coverage through CMSP. Age categories are younger children (ages 6 months to 12 years) and adolescents (ages 13–18 years).

We sampled equal numbers of children from each income stratum, an approach that gave both the optimal allocation for comparisons among strata and sufficient sample size in each stratum to obtain separate estimates of adequate precision.<sup>18</sup> Children were sampled using a plan that selected 1 child per family and equal numbers of adolescents and younger children from each income strata. We were particularly interested in adolescents, whose eligibility for insurance coverage under public programs has historically been more restrictive than that of younger children and whose unmet need may be different from that of younger children.<sup>19</sup> To increase the number of other-language speakers in our sample, we oversampled families who, in the administrative files, identified their children as Spanish-language speakers. In this second phase of sampling, additional Spanish-speaking children from families that were not previously sampled were selected using a scheme similar to that for the primary sample. Hence, the final sample was stratified by family income, age group, and language.

The survey was conducted by the Center for Survey Research, University of Massachusetts, Boston, Massachusetts, under the direction of the authors. The questionnaire was also translated into Spanish; interviews were conducted in either English or Spanish based on respondent preference. A parent or guardian of the sampled child was interviewed. The child was screened for eligibility at the beginning of the interview. The survey response rate was 61.8%. The major reason for nonresponse was inability to contact respondents (18.8% of non-Spanish-speaking and 62.4% of Spanish-speaking). There were few refusals (4.7% of non-Spanish speakers and 1.3% of Spanish speakers). Of the non-Spanish-speaking children sampled, the parents of 3.3% could not be interviewed because they spoke a language other than English or Spanish.

## Variables Measured

A 6-section telephone survey, which used primarily a fixed response format, was developed by the authors to measure the child's health experience before and subsequent to enrollment in CMSP, family insurance status, and selected demographic characteristics. Results from the sections on insurance status are reported in a different study.<sup>20</sup> Respondents were asked a similarly worded series of questions focusing on 5 different types of health services: medical care, dental care, prescription drugs, vision services, and mental health care. For all questions related to the period before enrollment, respondents were asked to focus on the period without insurance immediately preceding enrollment. For those chil-

dren who were uninsured for longer than a year, respondents were asked to focus on the 12-month period preceding enrollment.

We were able to use data from administrative files and responses to early sections of the computer assisted telephone interview to individualize questions and provide prompts to aid respondent recall, thereby diminishing the potential for recall bias. For example, the series of questions on medical care were worded as follows for a child who was uninsured for 8 months before enrollment: "During the 8-month period Daniel was uninsured before June 1997 (child's enrollment date), was there a time he needed any kind of medical care?" Those who indicated need for medical services were then asked, "Did Daniel get the medical care he needed at the time he needed it?" A final question was asked if the respondent reported delays in needed care: "Did Daniel eventually get the medical care he needed?" Our series of questions allowed us to more directly assess the impact of the program by distinguishing between those who did not need the service and those who needed it and received it without delays.

We used responses to these questions to develop 2 sets of indicators: the first for reported need for services and the second for unmet need or delays in care among children whose parents reported a need for the service. Within each set, we created indicators for each type of service and an additional composite indicator. The composite indicator aggregated all categories of services covered under CMSP in a single measure; it included all services except dental services, which, at the time of the study, were not covered by the program. The composite indicator served as the dependent variable in regression models.

We did not specifically ask respondents about their child's use of services. However, we believe that reported need for service is highly correlated with service use. We assume that children, whose parents reported that their children needed a service and received it either when needed or after a delay, used the service. The major difference between reported need and use is attributable to those children who never were able to obtain the care they needed.

## Analysis Plan

We calculated a set of weights that adjusted for differential response as well as the probability of selection. Data were weighted by strata, which were defined by family income, child age, and language spoken in the home, with an adjustment for nonresponse. The weighting strategy was designed to address potential nonresponse bias attributable to the lower response rate among Spanish-speaking respondents. Data analyses were conducted using STATA 6.0,<sup>21</sup> a statistical software program that allowed us to incorporate our complex sampling design and weights.

The children were grouped by income category. We used weighted  $\chi^2$  tests to identify statistically significant differences in reported need for services and unmet need or delays in care. We examined differences across income groups at 2 points in time: during the period children were uninsured before enrollment and while enrolled. We conducted additional analyses of need for services by length of enrollment ( $\leq 1$  year and  $>1$  year) to identify need for services among newly enrolled children.

We used weighted logistic regression analysis to assess the independent association of family income with our dependent variables: reported need for health services and the presence of unmet need/delays in care, controlling for other covariates. We used an adaptation of the health behavior model described by Newacheck et al<sup>22</sup> as the conceptual framework for these analyses. Factors thought to influence our dependent variables were grouped in 3 domains: 1) an individual's predisposition to use health services, 2) the individual's level of need for health services, and 3) the presence of enabling factors that permit an individual to secure services. Predisposing factors included child age, language spoken in the home, family structure, family size, education of family reference person, employment status of parents, and length of time without insurance before enrollment. Need factors were perceived health status and presence of a medical condition or disability that limits daily activity. From these 2 factors we created a single measure of compromised health that included fair or poor health status and/or the presence of a limiting condition. Enabling factors included place of residence (urban/rural), usual source of care, and length of enrollment in the program. Children were classified as having a usual source of care if the parent identified

a doctor's office, health center, or clinic as their child's site of care. Children whose parents reported the emergency department as their site of care were grouped with those who did not have a usual source of care.

We calculated estimates for the association between length of enrollment and study outcomes to evaluate potential recall bias. If systematic bias based on recall period existed, we would expect to find a significant relationship between length of enrollment and study outcomes. Unadjusted odds ratios were estimated for the dependent variables by family income, using family income  $\leq 133\%$  of the FPL as the reference group. Next, we estimated a set of models to test the stability of the association between the dependent variables and family income when controlling for predisposing factors, need factors, and enabling factors. Item nonresponse for each of the independent and dependent variables did not exceed 5%. Cases with missing data were excluded from our analyses.

To evaluate the impact of participation in the CMSP on unmet need or delayed care we examined changes in the weighted proportion of program participants who experienced unmet need or delayed care before and after program enrollment, testing for statistical significance using McNemar's test for within-subject changes.<sup>23</sup> We restricted this analysis to children whose parents reported that they needed services during both time periods.

## RESULTS

### Background Characteristics at Enrollment by Family Income

Information about program participants is presented in Table 1. Twenty-nine percent of children were LI children (family incomes  $\leq 133\%$  of the FPL, the Medicaid income eligibility standard at the time of the study). About half were MI children (family incomes between 134%–200% of the FPL, the income group targeted for the state's SCHIP expansion), and 22% were HI children (family incomes  $> 200\%$  of the FPL). Of the HI children, almost 80% had incomes between 200% and 300% of the FPL. Most program participants (84%) were children under 13. Almost equal proportions were preschool-aged ( $< 6$ ) and school-aged.<sup>6–12</sup> The parents of 70% of the children identified their child as white non-Hispanic. Among the remaining children, parents reported 38% as Hispanic or Latino, 16% American Indian, 16% black,

**TABLE 1.** Baseline Characteristics of CMSP Participants\* by Income

	By Income Group (% FPL)							
	$\leq 133$ <i>n</i> = 210		134–200 <i>n</i> = 397		134–200 <i>n</i> = 389		Total <i>n</i> = 996	
	Weighted %†	SE	Weighted %	SE	Weighted %	SE	Weighted %	SE
Predisposing factors								
Income	29	1.2	49	1.1	22	.7		
Age‖								
Younger child (6 mo–12 y)	78	2.7	86	1.4	88	1.3	84	1.1
Adolescent (ages 13–18 y)	22	2.7	14	1.4	12	1.3	16	1.1
Ethnicity‖								
Nonwhite	49	4.3	24	2.3	17	2.2	30	1.8
Primary language spoken in the home‖								
Non-English language	31	3.8	14	1.8	9	1.6	18	1.5
Number of children in the family								
Three or more children	32	4.1	35	2.8	25	2.6	32	1.9
Parent marital status at enrollment								
Married	60	3.1	65	2.0	72	1.8	65	1.4
Never married/divorced/ separated/widowed	40	3.1	35	2.0	28	1.8	35	1.4
Parental education‖								
High school graduate or below	64	4.2	51	2.9	45	2.9	53	2.0
Work status of parents‖								
Head of household and/or spouse employed	80	3.6	94	1.3	97	.9	91	1.3
Neither head of household nor spouse employed	20	3.6	6	1.3	3	.9	9	1.3
Need factors								
Compromised health (fair or poor and/or medical condition or disability that limits daily activity)	14	2.8	15	2.0	12	1.9	14	1.3
Enabling factors								
Place of residence								
Living in an urban area‡	38	4.2	29	2.5	25	2.5	31	1.8
Length of enrollment‡								
6–12 mo	31	3.9	24	2.4	19	2.3	25	1.7
>12 mo	69	3.9	76	2.4	81	2.3	75	1.7
Length of time without insurance before enrollment‖								
Uninsured $< 6$ mo	25	3.8	40	2.8	36	2.9	35	1.9
Uninsured $\geq 6$ mo	75	3.8	60	2.8	64	2.9	65	1.9
Usual source of care‡								
Has usual source	87	2.8	91	1.6	93	1.4	90	1.0
No usual source of care	13	2.8	9	1.6	7	1.4	10	1.0

SE indicates standard error.

\* Includes children who were continuously enrolled for  $\geq 6$  months and enrolled as of April 30, 1998.

† Sample estimates weighted on income, age group, language, and nonresponse.

‡ Difference by income group statistically significant at the  $P < .05$  level.

‖ Difference by income group statistically significant at the  $P < .01$  level.

and 30% as other. The majority of enrolled children (82%) spoke English in the home. Among the remaining 18%, Spanish was the most frequently identified language (9%). Most of the children (89%) lived in families with at least 1 working adult; half of the children had at least 1 parent who worked at least 35 hours a week for 1 employer. Almost a quarter (23%) had parents who were self-employed. Although about two thirds of the children had been without insurance for >6 months before enrollment, almost all (90%) had a usual source of care, which, most frequently, was a private doctor's office.

Background characteristics of program participants varied significantly by income group at the time of enrollment. Compared with MI and HI children, LI children were more likely to be older, non-white, speak a language other than English, live in an urban area, and not have a usual source of care. They were more likely to have enrolled in the program in the 6 to 12 months preceding the study start date and have been uninsured for >6 months before enrollment. Significantly more parents of poorer children were unemployed and worked <35 hours per week if employed. They also had fewer years of education.

Sociodemographic characteristics of respondents

and nonrespondents also differed significantly. Respondents were more likely to have incomes >133% of the FPL, have siblings in the household, speak English at home, live in nonurban areas, and have parents who were married. Our weighting strategy addressed potential nonresponse bias related to differences in income and language. Other differences between respondents and nonrespondents were controlled for in multivariate modeling. Nonrespondents and respondents did not differ with respect to length of enrollment, age, or employment status of parent(s). We found no differences between Spanish-speaking respondents and nonrespondents; all differences between respondents and nonrespondents, other than language, were attributable to those identified as non-Spanish-speaking. The similar demographic profile of Spanish-speaking respondents and nonrespondents suggests that, despite the lower response rate among this group, nonresponse bias may not be a major concern.

### Reported Need for Health Services During the Period of Uninsurance Before Enrollment

Estimates of reported need for health services are presented in Table 2. During the period program

**TABLE 2.** Reported Need for Services Before and After Enrollment

Type of Reported Need for Service	By Income Group (% FPL)			
	≤133 Weighted %	134–200 Weighted %	>200 Weighted %	Total Weighted %
<b>Medical</b>				
Before enrollment	58* (4.3)	69* (2.7)	68* (2.8)	65 (1.9)
While enrolled	71*‡ (3.8)	85*‡ (2.0)	87*‡ (2.0)	81‡ (1.5)
Enrolled 6–12 mo	69 (6.4)	83 (4.5)	78 (5.6)	77 (3.3)
Enrolled >12 mo	71 (4.7)	85 (2.2)	89   (2.0)	82¶ (1.7)
<b>Prescription drug</b>				
Before enrollment	64 (4.2)	73 (2.6)	70 (2.8)	70 (1.9)
While enrolled	74‡§ (3.5)	86† (1.9)	89† (1.8)	83§ (1.4)
Enrolled 6–12 mo	64 (6.8)	71 (5.4)	69 (6.3)	68 (3.7)
Enrolled >12 mo	79 (4.0)	90   (1.7)	94   (1.5)	88¶ (1.4)
<b>Dental</b>				
Before enrollment	58 (4.3)	57 (2.9)	53 (3.0)	57 (2.0)
While enrolled	72§ (4.0)	72§ (2.6)	72§ (2.7)	72§ (1.8)
Enrolled 6–12 mo	58 (7.6)	59 (5.8)	59 (6.7)	59 (4.0)
Enrolled >12 mo	78   (4.4)	76   (2.8)	75   (3.0)	76 (2.0)
<b>Vision</b>				
Before enrollment	14 (2.5)	11 (1.6)	9 (1.5)	12 (1.1)
While enrolled	17 (2.5)	15‡ (1.6)	16§ (1.5)	16§ (1.1)
Enrolled 6–12 mo	16 (5.1)	10 (3)	11 (3.8)	12 (2.4)
Enrolled >12 mo	18 (3.7)	16 (2.3)	18 (2.3)	17 (1.6)
<b>Mental health</b>				
Before enrollment	6 (1.8)	4 (1.0)	6 (1.2)	5 (0.7)
While enrolled	9 (1.8)	9§ (1.6)	11§ (1.7)	9§ (1.1)
Enrolled 6–12 mo	7 (3.6)	8 (2.4)	6 (2.5)	7 (1.8)
Enrolled >12 mo	9 (2.9)	10 (1.9)	12 (2.0)	10 (1.3)
<b>Any excluding dental#</b>				
Before enrollment	73 (3.9)	78 (2.3)	77 (2.5)	77 (1.7)
While enrolled	86* (2.7)	94* (1.3)	95* (1.7)	92 (1.1)
Enrolled 6–12 mo	86 (3.7)	88 (3.9)	86 (4.8)	87 (2.4)
Enrolled >12 mo	86* (3.5)	95*   (1.1)	97*   (1.1)	93   (1.1)

\* Difference by income group statistically significant at the  $P < .05$  level by weighted  $\chi^2$  test.

† Difference by income group statistically significant at the  $P < .01$  level by weighted  $\chi^2$  test.

‡ Difference between before and after enrollment statistically significant at the  $P < .05$  level.

§ Difference between before and after enrollment statistically significant at the  $P < .01$  level.

|| Difference between length of enrollment categories within same income group statistically significant at the  $P < .05$  level by weighted  $\chi^2$  test.

¶ Difference between income group within same enrollment category statistically significant at the  $P < .05$  level by weighted  $\chi^2$  test.

# Dental care was not covered by CMSP at the time of the study.

Note: Within-subject tests restricted children who needed service before and while enrolled.

participants were uninsured before enrollment, prescription drugs (70%) was the health service needed most frequently, followed by medical (65%) and dental care (57%). With the exception of medical care, there were no significant differences in need for services by income groups. Reported need for medical care was similar among the MI and HI children but lower among LI children. Additional bivariate analyses demonstrated that need for medical care, dental care, and prescription drugs was significantly greater among children who had been uninsured for >6 months before enrollment. In addition, a significantly greater proportion of adolescent participants needed dental, vision, and mental health services than younger enrollees.

### Unmet Health Need or Delays During the Period of Uninsurance Before Enrollment

Estimates of unmet health need or delayed care are presented in Table 3. Unmet need or delays in care among those who needed care before enrollment varied tremendously by type of service. For medical care and prescription drugs, unmet need or delays in care were low (5% and 4% respectively). In contrast, almost a third of children needing dental, vision, or mental health services had experienced difficulty obtaining needed care. Estimates of unmet need or delays in care were consistently higher among the LI children. However, differences by income were statistically significant only for dental and mental health need and the composite measure of services covered by CMSP. Additional bivariate analyses (not shown in tables) compared estimates of unmet need or delayed care among enrollees who had been uninsured more than versus <6 months. Children who had been uninsured >6 months before enrolling in

CMSP had consistently greater unmet need for all categories of care at the time of enrollment. Unmet need was significantly different for mental health services only (43% vs 4%;  $P < .001$ ), but differences could not be established for dental care (34% vs 23%;  $P = .07$ ) or the composite measure (14% vs 8%;  $P = .08$ ). Compared with younger children, adolescents had significantly greater unmet need for the composite measure of services covered by CMSP (19% vs 10%;  $P < .01$ ). Of the children who had difficulty obtaining needed services, 98% of parents cited cost as the reason.

### Reported Need for Health Services While Enrolled

We expected cumulative need for services to increase as a child remains in a health insurance program longer. Children who are enrolled in a program for longer periods are more likely to experience need for episodic care and routine age-related services at some point during their enrollment. To test this assumption, we analyzed reported need for services while enrolled by length of enrollment (Table 2). Among children who were enrolled between 6 and 12 months at the time of the study's start, 77% needed medical services, 59% dental, and 68% prescription drugs. As hypothesized, reported need for services increased as the length of enrollment increased, reaching significance for medical, dental, and prescription drug services. Among children who had been in the program for >1 year, 82% needed medical services, 76% dental, and 88% prescription drugs. In bivariate analyses, income differences were significant for medical care, prescription drugs, and the composite measure of any covered service. MI and HI children had significantly greater reported need for these services compared with LI children.

**TABLE 3.** Unmet Need or Delays in Care Before and After Enrollment Among Children Who Needed Care

Type of Unmet Need or Delay in Care	By Income Group (% FPL)			Total Weighted % (SE)
	≤133 Weighted % (SE)	134–200 Weighted % (SE)	>200 Weighted % (SE)	
Medical				
Before enrollment	9 (4)	4 (1)	4 (1)	5 (1)
While enrolled	.7‡ (.6)	.6‡ (.3)	.6 (.3)	.6§ (.2)
Prescription drug				
Before enrollment	6 (3)	4 (1)	3 (1)	4 (1)
While enrolled	3 (1)	4 (1)	1 (.7)	3‡ (.7)
Dental				
Before enrollment	40+ (6)	31+ (3)	18+ (3)	31 (2)
While enrolled	32 (5)	25‡ (3)	22 (3)	27‡ (2)
Vision				
Before enrollment	42 (9)	24 (7)	21 (7)	30 (5)
While enrolled	22 (6)	15 (5)	14 (5)	17 (3)
Mental health				
Before enrollment	58* (14)	22* (10)	15* (8)	33 (8)
While enrolled	32 (13)	10 (5)	15 (6)	17 (5)
Any excluding dental				
Before enrollment	20† (4)	10† (2)	7† (2)	12 (1)
While enrolled	10§ (2)	6‡ (1)	5§ (1)	7§ (1)

SE indicates standard error.

\* Difference by income group statistically significant at the  $P < .05$  level by weighted  $\chi^2$  test.

† Difference by income group statistically significant at the  $P < .01$  level by weighted  $\chi^2$  test.

‡ Difference between before and after enrollment statistically significant at the  $P < .05$  level.

§ Difference between before and after enrollment statistically significant at the  $P < .01$  level.

|| Dental care was not covered by CMSP at the time of the study.

Note: Within-subject tests restricted children who needed service before and while enrolled.

### Unmet Health Need or Delays in Care While Enrolled

The proportion of children who needed care and had difficulty obtaining it decreased after enrollment for all categories of care (Table 3). Less than 1% of enrollees reported unmet need or delays in care for medical services and 3% for prescription drugs. A sizeable proportion of children who needed vision and mental health services continued to experience difficulty obtaining these services (17% for each category of care), although they were covered as part of the benefit package. Unmet need or delays in care for dental services, which at the time of the study were not covered under CMSP, remained high (27%). Cost remained the major explanatory barrier to obtaining needed services for all categories of care except medical care but a variety of other reasons became more important after children received coverage. Although we found a tendency for the LI children to have a greater proportion of unmet need and delayed care, the difference was not statistically significant for any category of care. Adolescents had significantly more unmet need for services covered by the program than younger children (15% vs 5%;  $P < .001$ ). Neither length of time without insurance before enrollment nor length of enrollment had significant associations with unmet need/delayed care for any category of care.

### The Effect of Income on Need for Services Covered by CMSP

We estimated unadjusted and adjusted logistic regression models to further examine the relationship between family income and the probability of reporting need for any service covered under CMSP. The

adjusted models controlled for the need, predisposing, and enabling factors described in Table 1. We estimated 1 model for the period the child was uninsured before enrollment and a second for the enrollment period (Table 4). Because we asked respondents to think back to the period before enrollment, we also included a continuous variable for length of enrollment to control for the possibility of recall bias in models predicting need for services and unmet need before enrollment. In models that focused on the enrollment period, the length of enrollment variable controlled for the possibility of increased reported need for services and decreased unmet health need as children remained in the program longer.

During the period before enrollment when program participants were uninsured, parents of MI and HI children were no more likely than parents of LI children to have reported need for the range of services covered by CMSP in either adjusted or unadjusted models. Significant predictors of reported need for services in the adjusted model were longer period without insurance, compromised health status, and having a usual source of care.

During the period children were enrolled in the program, we found a strong association between reported need for services and family income in the unadjusted model. Parents of MI children were more than twice as likely and parents of HI children were more than 3 times as likely to report need covered services as compared with the Medicaid-eligible enrollees. This association persisted when we controlled for length of enrollment. However, once we controlled for the remaining need, predisposing, and enabling factors, the effect of income was no longer

**TABLE 4.** Unadjusted and Adjusted Models for the Effect of Income on Reported Need and Unmet Need or Delayed Care

	Reported Need for Services				Unmet Need or Delayed Care*			
	Before Enrollment		While Enrolled		Before Enrollment		While Enrolled	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Unadjusted model								
Income†								
FPL 134%–200%	1.38	0.86–2.21	2.31§	1.25–4.26	0.44§	0.23–0.80	0.62	0.32–1.22
FPL >200%	1.26	0.78–2.02	3.02‡	1.51–6.02	0.29‡	0.15–0.58	0.53	0.27–1.07
Adjusted model								
Income†								
FPL 134%–200%	1.52	0.87–2.67	1.76	0.79–3.91	0.63	0.32–1.23	0.56	0.24–1.32
FPL >200%	1.37	0.76–2.48	2.37	0.95–5.91	0.44‡	0.21–0.95	0.54	0.21–1.37
Adolescent	0.99	0.61–1.62	0.41§	0.21–0.80	1.23	0.60–2.52	3.11§	1.58–6.12
Primary language not English	0.61	0.32–1.16	0.92	0.35–2.40	1.75	0.66–4.67	2.20	0.83–5.83
Nonwhite	1.25	0.69–2.28	0.33§	0.15–0.70	1.53	0.65–3.60	0.93	0.36–2.41
Three or more children	0.89	0.54–1.46	0.79	0.40–1.57	0.75	0.37–1.51	0.40‡	0.17–0.96
Married	1.11	0.59–2.09	1.55	0.61–3.94	2.70	0.96–7.58	2.21	0.75–6.48
High school graduate or less	0.95	0.62–1.46	0.70	0.33–1.51	1.03	0.56–1.92	1.07	0.54–2.11
Head of household and/or spouse employed	1.25	0.57–2.73	0.90	0.35–2.31	0.70	0.25–1.97	0.87	0.28–2.75
Compromised health	2.66§	1.38–5.12	3.78	0.43–33.12	1.97	0.94–4.14	3.20§	1.35–7.58
Lives in urban area	1.13	0.70–1.83	0.71	0.34–1.50	1.38	0.72–2.65	1.65	0.75–3.63
Uninsured >6 mo	3.58§	2.33–5.52	1.31	0.62–2.79	1.29	0.64–2.59	0.45‡	0.22–0.90
No usual source of care	0.37§	0.20–0.68	2.10	0.51–8.59	3.41‡	1.28–9.11	0.88	0.24–3.27
Length of enrollment (6-mo intervals)	1.01	0.91–1.13	1.13	0.93–1.37	0.99	0.83–1.17	0.96	0.83–1.12

\* Unmet need or delayed care is among children whose parents reported a need for services covered by CMSP.

† Income reference group is  $\leq 133\%$  of the FPL.

‡  $P < .05$ .

§  $P \leq .01$ .

significant. Instead, we found that younger children (<13) and those who identified their ethnicity as white were significantly more likely to report need for services.

### **The Effect of Income on Unmet Need and Delayed Care for Services Covered by CMSP**

We used a similar methodology to predict unmet need or delayed care before and after enrollment, conditional on need for services. We found that, before enrollment, income was a significant predictor of unmet health need or delayed care in unadjusted and adjusted models. In the unadjusted model, MI and HI enrollees were significantly less likely than LI children to have unmet need or delays in care. In the adjusted model, HI children continued to have significantly less unmet need or delays in care than LI children. Although the difference between MI and LI children was no longer significant, the test for trend showed a significant association between income and unmet need or delayed care. Not having a usual site for care was a highly significant predictor of unmet need or delayed care, although the small number of children who did not have a usual source of care limited the precision of this estimate. There was evidence ( $P = .06$ ) that children whose parents were married and those who had compromised health were also more likely to have unmet need or delays in care.

Disparities in unmet need among income groups were smaller after enrollment. Income was not a significant predictor of unmet need or delayed care among children enrolled in the program. Adolescents, children with compromised health, children living in smaller families, and children who were previously uninsured for <6 months were more likely to have had difficulty obtaining needed services while enrolled in the program.

### **Assessing the Impact of Program Enrollment: Changes in Unmet Health Need and Delayed Care After Enrollment**

To assess the impact of program participation, we tested to see if there were significant reductions in unmet need associated with program enrollment. Using McNemar's test for within-subject changes as our test statistic and the aggregate measure of services covered by CMSP as our outcome, we found a significant reduction in unmet need. Among individual categories of care, unmet need or delayed care decreased significantly for medical care, prescription drugs, and dental care. Among children who reported need for vision and mental health services, the proportion that had difficulty obtaining these services decreased after enrollment but not significantly. We found no difference among income groups.

## **DISCUSSION**

As states consider expanding income eligibility for their SCHIPs, program planners need to anticipate the level of health services that will be needed by new enrollees, plan for increased capacity, and project program costs. Will the need for services among higher income children be different from that

of traditional Medicaid participants? Will it be different from that of children currently enrolled through SCHIP expansions? Our study begins to address the impact of program participation on children who are Medicaid-eligible, SCHIP-eligible, and whose family income exceeds SCHIP guidelines, using the experience of CMSP participants. Our findings indicate 2 distinct patterns related to income and reported need for services among program participants. In general, we found that greater reported need for services while enrolled was associated with higher income and greater unmet need or delayed care while enrolled was associated with lower income.

The relationship between income and unmet health need was expected and has been well-documented in national population-based surveys and local studies.<sup>2-4,22</sup> A relationship between unmet health need and insurance status has also been well-described.<sup>2-4,22</sup> Uninsured children consistently have greater unmet need than their insured counterparts, regardless of whether the source of insurance is public or private. Our study furthers the understanding of the interplay between income, insurance status, and unmet health need among children enrolling in publicly funded health insurance programs. Even after controlling for a number of factors thought to influence unmet need, before enrollment HI children had significantly less unmet need compared with Medicaid-eligible participants. We were surprised to find that unmet need at the time of enrollment was no different among program participants who had family incomes that exceeded the state's eligibility criteria and those who were targeted under SCHIP expansions. Service use to address previous unmet needs might be comparable among newly enrolled HI children and SCHIP enrollees and less than that of traditional Medicaid participants, based on the experience of CMSP participants before the implementation of Title XXI.

The relationship between income and reported need for services has different implications for health care expansions to HI children. During the time children were uninsured before program entry, reported need for services was not significantly different among income groups. Once enrolled, we again found that SCHIP-eligible and HI children looked quite similar, but different from traditional Medicaid participants. SCHIP-eligible and HI children were significantly more likely to report need for services than Medicaid-eligible children. This relationship remained stable controlling for length of enrollment and health status, but when we took into account a child's age and ethnicity, we no longer found significant differences in reported need for services by income. If we assume that reported need for services corresponds with utilization, our findings suggest that the age and ethnic composition of higher income enrollees may be important factors to consider when projecting their likelihood to use services.

The associations between reported need, income, ethnicity, and age identified in our study are consistent with the relationships between service utilization and these factors reported in other studies.<sup>2,3</sup> In

these studies, white, non-Hispanic, younger, and nonpoor children were more likely to use services measured by a variety of use indicators. Our findings suggest that being uninsured may dominate the effect of these demographic characteristics, which were not significant predictors of need for services before enrollment.

It is possible that differences in reported need for services while enrolled could be related to mover-stayer issues—eg, children with greater need remained in the program and children with little need dropped out. Several administrative policies that were in effect during the study period make this explanation less likely. First, there was little incentive for LI and MI children who did not need services to drop out of the program because they received coverage free of charge. In addition, the program did not have a yearly reenrollment or recertification process; only families who called the program administrator and requested to be disenrolled were removed from enrollment files. HI children, who were required to pay a premium quarterly to maintain enrollment, might be more likely to withdraw from the program if they did not need services. If this were so, then we might expect that HI children who remained in the program for longer periods would be more likely to have compromised health and greater reported need for services as compared with children who received coverage at no charge. When we compared health status and reported need for services among children who had been enrolled >2 years, we found no significant differences based on income.

The study has some limitations, some of which it shares with other evaluations of SCHIP precursors.<sup>14–16</sup> First, it focuses on children in a single state who voluntarily enrolled in the program. Massachusetts stands out among states as a leader in child health. It ranks highly on indicators of child health such as infant mortality and child death rates, childhood immunization, and the percent of uninsured children.<sup>24</sup> The state also has a well-developed public and private health care sector. Although the health care system in Massachusetts may differ from that in other states, the family structure, parents' employment status, and health status of children in our study are similar to those of the nation's SCHIP-eligible population,<sup>25</sup> and their age and ethnic make-up mirror that of uninsured children in the state.<sup>17</sup> Thus, because enrollment in SCHIP is voluntary, the children enrolled in CMSP are likely to be representative of the population most likely to enroll in SCHIP and other health programs that provide coverage for HI children.

A second limitation of the study is that the study design did not include a comparison group. It is possible that benefits we attributed to participation in the insurance program were the effects of a secular trend. For example, if the number of sites providing free care to uninsured children increased or the reimbursement for free care became more favorable, we might expect to see reductions in unmet need not associated with program participation. Massachusetts has a well-developed safety-net system comprised of a network of community health centers,

school-based health centers, and hospital-based ambulatory practices that provide partial and full free-care based on family income. Based on self-report and a review of claims data, we estimated that about a third of program participants received care at safety-net sites. Safety-net sites are reimbursed by the state's uncompensated care pool. In 1997, the legislation governing the uncompensated care was revised. The impact of new regulations, which were phased in gradually beginning in 1998, was minimal during our study period, decreasing the likelihood that our findings could be attributed to a secular trend.

Without a comparison group, it is also possible that we might be attributing to program participation decreases in unmet need that would have occurred regardless of whether or not the child had enrolled in CMSP. For example, a child enrolls in CMSP because she has an unmet need related to episodic illness. The child obtains medical services and the unmet need is resolved. This sequence of events that we attribute to program participation could happen even if the child had not enrolled in the program. The structure of the questions used to evaluate unmet need limits the possibility that we are incorrectly attributing reductions in unmet need to program participation. We asked parents of children who needed care if there was any time when the child needed care that she did not get it when she needed it. Parents answered the question for the period before enrollment and again for the time the child was enrolled. We did not ask if a child who had an unmet need before enrollment had this need met while enrolled. Because reported need for services increased after enrollment, largely attributable to length of time in the program, we would expect there would be more opportunity to have difficulty obtaining needed services if access did not improve with program participation.

A strength of our study is that we were able to directly assess the impact of the program on unmet health need by defining the proportion of children with unmet need or delayed care as a subset of those who needed the service. Population-based surveys, such as the National Health Interview Survey, whose purpose is to generate population estimates, answer a different question than the one that interests us. The National Health Interview Survey asks respondents, "During the past 12 months, was there any time someone in your family needed care and could not get it?" Affirmative responses constitute the numerator of the proportion. The denominator includes the entire population, which includes those who did not need the service, those who needed it and received it without delays, and those who needed it and did not receive it in a timely manner. To evaluate program impact, we are interested in the population who needed the service and the proportion that had difficulty obtaining it. We are not directly interested in the children who did not need the service.

The method we used to compute unmet need provides a very different estimate than that obtained from the traditional approach, particularly when the service is one that is not used by a large proportion

of enrollees. Consider the example of unmet need for mental health services. Calculating mental health unmet need using traditional approaches, we estimate that only 1.6% of program participants had unmet mental health needs. Restricting the estimate of unmet need to those who needed services, we found that during the time children were enrolled in CMSP almost 20% of those who needed mental health care had difficulty obtaining needed care. This is a concerning statistic, suggesting that attention needs to be directed toward improving access for mental health care.

To compare our estimates of unmet need to those of other studies, we recalculated our estimates using the full population, not just those who needed the service, as the denominator (unmet need/total population vs unmet need/those who needed services). Our estimates of unmet need for lower income children (<200% FPL) were 3.4% for medical care, 19.9% dental, 4.0% vision, and 3.1% prescription drugs. These estimates were consistent with state estimates from the 1997 round of the National Survey of American Families<sup>17</sup> but considerably lower than those reported by Lave et al<sup>15</sup> for a similar population of uninsured children who enrolled in SCHIP-like programs in western Pennsylvania. Their estimates of unmet need or delayed care at enrollment were 25.4%, 43.1%, 18.1%, and 10.5% for similar services. Although one might expect to find a positive impact of program participation among children with high levels of unmet need at enrollment, it is very encouraging to find significant reductions in unmet need or delayed care attributable to program participation even when the baseline levels of unmet need are low. Dental unmet need declined significantly after enrollment, although the program did not cover this service. We could not determine if this unanticipated benefit might be a result of increased access to low-cost dental providers or that parents were more willing to pay out-of-pocket for dental services, knowing that they had coverage for other services.

Our findings demonstrate the positive impact of providing health insurance coverage to children, even in a state with a well-developed safety-net system that enables most children, especially those without insurance to have an identified usual source of care. The benefits attributable to the receipt of health insurance were shared by all children in the program, regardless of income. The HI children who chose to enroll in the program looked quite similar to children with incomes that meet current SCHIP eligibility guidelines, suggesting that expansions of SCHIPs to HI children should not qualitatively change the program dynamics. In addition, the 2001 changes in the Health Care Financing Administration's rules regarding crowd-out prevention in SCHIPs<sup>26</sup> and findings from a Massachusetts study<sup>20</sup> suggest that when coverage is offered to HI children, the substitution of public coverage for private health insurance is not as much of a concern as once thought. Although additional research is needed to investigate whether the impact of expanding health coverage to HI children would be different in other states, it would seem that increasing the income eli-

gibility for SCHIPs would enroll children whose needs are no more burdensome to the program than those typically enrolled now.

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