

The Relationship of Health Insurance to the Diagnosis and Management of Asthma and Respiratory Problems in Children in a Predominantly Hispanic Urban Community

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From 1998 through 2001, the Passaic Asthma Reduction Effort screened elementary school children for asthma and related respiratory problems. This program, funded by the Robert Wood Johnson Foundation and led by Passaic Beth Israel Hospital, was a communitywide activity involving all public, private, and religious schools in the city. This extensive screening program was prompted by increased school absenteeism owing to asthma and respiratory illnesses and asthma crises among children who had previously not been identified as having asthma.

Passaic is an older industrial community in northern New Jersey. The city is undergoing a transition in demographics with a substantial in-migration of a variety of Hispanic populations. The largest of these groups are made up of ethnic Dominicans, Puerto Ricans, and Mexicans, many of whom are poor but ineligible for Medicaid.

In the mid-1990s, concerns were raised about increasing numbers of children without health insurance. Identification of the number of children without health insurance and ineligible for Medicaid led to development of additional state-run children's health insurance programs.^{1,2} In New Jersey, NJ KidCare evolved in collaboration with state- and federally funded health maintenance organization (HMO) programs to target these populations. Coverage was signed into law in July 1999.³ As of December 30, 2001, evaluation of the HMO and NJ KidCare programs in Passaic County found that programs only reached 75% of eligible individuals.⁴

As part of the Passaic Asthma Reduction Effort, a questionnaire was distributed to the parents of children in grades 2 through 5. The questionnaire was written in both Spanish and English and covered respiratory symptoms, environmental health factors considered to be asthma triggers, asthma diagno-

Objectives. As part of an asthma screening study, we evaluated the relationship of health care insurance coverage to the diagnosis and treatment of elementary school children for asthma and related respiratory problems from 1998 through 2001.

Methods. A bilingual questionnaire assessing health care coverage, asthma diagnosis, respiratory symptoms, and use of medications was distributed to parents of 6235 public and private school children in grades 2 through 5 in Passaic, NJ.

Results. Responses for 4380 children (70%) revealed disparities in health care coverage and asthma diagnosis among racial and ethnic groups. Mexican and Dominican children had significant increases in health care coverage over the 4 years.

Conclusions. The percentage of children with health insurance grew from 67% in 1998 to 81% in 2001, and the increase was related to NJ KidCare. Diagnosis of asthma and treatment were related to health care coverage. (*Am J Public Health.* 2003;93:1316–1320)

sis, use of respiratory medications, and health insurance and sources of health care. The choice of symptoms and environmental factors used in the questionnaire was based on previous instruments.^{5–12}

METHODS

Participants were 6235 school-aged children within Passaic, NJ, in public and private school grades 2 through 5. The study was designed so that no child was screened more than once in the 4-year period from 1998 through 2001. Reports on the methodology of the screening program¹³ as well as the resultant rates and risk factors^{14,15} are available elsewhere.

Data analysis was carried out with SPSS¹⁶ and assessed the relationship of diagnosis and treatment for asthma and respiratory problems to insurance status. The format of most of the parental questionnaire data was nominal or ordinal, requiring analysis by Fisher exact and χ^2 tests. For some of the analyses, odds ratios and 95% confidence intervals (CIs) were computed. Data were analyzed by year (1–4) to assess how increased availability of state-sponsored insurance for children influenced asthma diagnosis and management in this community. Subset analyses were done

for 3 of the large Hispanic populations: Dominicans, Puerto Ricans, and Mexicans. Multiple regression analysis was conducted to assess the relative influences of various factors on diagnosis and management for the 4-year period.

RESULTS

Of the potential 6235 children to be screened, parental questionnaires were completed for 4380 (70%). The highest response rate was during the first year of the study (79%). The rate then declined and remained fairly consistent (67%–69%) for the following 3 years (Table 1). Parental reporting of health care insurance showed increases in the third and fourth years (2000 and 2001), a finding consistent with the timing of state implementation of the NJ KidCare program. However, it should be noted that even in 2001, nearly 20% of children were without health care insurance.

Insurance coverage was highly variable across ethnic subgroups (Table 1). Health coverage for Black and non-Hispanic White children was consistent across years, near or above 90%. In contrast, Mexican children had a low proportion of coverage (34% before the availability of NJ KidCare), increasing

TABLE 1—Demographics of Parents Responding to the Questionnaire Over the 4 Years of the Study: Passaic, NJ, 1998–2001

	Year 1	Year 2	Year 3	Year 4
Study Population	3rd grade	5th grade	3rd–4th grade	2nd–3rd grade
No. of students	1074	790	2087	2302
No. of questionnaires returned	844	53.2	1441	1573
Response rate, %	78.6	67.3	69.0	68.4
Asthma diagnosis, %	20.2	12.3	14.0	12.3
Medication use, %	11.0	7.0	7.3	7.7
Reported insurance, %	66.9	68.6	76.7	81.4
Mean age, y (SD)	8.7 (0.7)	10.9 (0.7)	8.9 (0.8)	8.1 (0.9)
Male/female ratio	45/56	48/52	45/55	46/54
Race/Ethnicity, No. (% insured)				
Hispanic (by country of origin)				
Dominican Republic*	177 (51)	129 (67)	332 (76)	310 (82)
Mexico*	139 (34)	90 (34)	339 (57)	428 (66)
Puerto Rico	138 (81)	82 (77)	260 (85)	289 (88)
Peru	24 (67)	19 (72)	57 (72)	64 (79)
Colombia	22 (77)	14 (79)	44 (82)	40 (85)
Other Hispanic*	31 (53)	54 (71)	59 (81)	83 (79)
Black	93 (90)	59 (90)	154 (89)	191 (93)
Non-Hispanic White	74 (94)	40 (96)	151 (92)	225 (95)
Asian	34 (91)	29 (83)	39 (80)	75 (81)

**P* < .05 (for increased proportion of insured).

to 66% by the fourth year of the study. Several groups showed significantly increased coverage over the 4 years. These included Mexicans (*df*=3, *F*=20.636, *P*<.001), Dominicans (*df*=3, *F*=20.823, *P*<.001), and those categorized as “other Hispanic,” a combination of Hispanic populations from Cuba and several Central and South American countries (*df*=3, *F*=3.79, *P*<.011).

To focus on the relationship between health care coverage and the diagnosis of asthma, data were subdivided by diagnosis and use of medications for asthma treatment. The data show that children who had health insurance were more likely than those who lacked health insurance to have been diagnosed with asthma (Table 2). In a multiple regression model in which the dependent vari-

able was diagnosis (yes, no), the primary contributor to diagnosis was number of symptoms reported by the parent ($\beta=.282, P<.001$), and secondary factors were year of the study ($\beta=.109, P<.001$) and whether a family member had asthma ($\beta=.041, P<.001$). However, although these variables were significant contributors to the model, the model *r*² was only 0.139, indicating that the model explained less than 15% of the diagnosis status, i.e., whether the child was diagnosed with asthma. In a regression model in which the dependent variable was diagnosis and treatment (no diagnosis, diagnosis but no medications, diagnosis with medications), the primary predictor was number of symptoms ($\beta=.657, P<.001$), and secondary predictors were having a family member with asthma ($\beta=.084, P<.001$) and having health insurance ($\beta=.027, P<.001$). The introduction of treatment status, i.e., use of medications, improved the predictive value of the model with an *r*² of 0.482 and showed that although asthma diagnosis is related to reported symptoms and family health, treatment is related to reported symptoms and the presence of health insurance. That is, management of respiratory problems with medication is more common among insured families than among uninsured families. Over the 4 years, insured children were 1.5 to 3 times more likely than uninsured children to use medications. It should be noted that the questionnaire ascertained only whether the child had been diagnosed with asthma and whether the child had health insurance, not when the diagnosis occurred or whether the child was insured during the time period of diagnosis.

During 1998, children with insurance were 2 to 3 times more likely than those without insurance to have been diagnosed with asthma. This finding was independent of country of origin. Differences in the percentage of children diagnosed with asthma were found across ethnic groups, with Puerto Ricans and Peruvians more likely to have been diagnosed with asthma (35% and 45%, respectively, with insurance; 12% and 20%, respectively, without insurance) compared with Mexicans and Dominicans (11% and 19%, respectively, with insurance; 6% and 11%, respectively, without insurance). During the last 3 years of the Passaic Asthma Reduc-

TABLE 2—Health Insurance Status, by Diagnosis and Use of Medications for Asthma, and Odds Ratios for Diagnosis and Medication Use as a Function of Health Insurance Status: Passaic, NJ, 1998–2001

Year	Health Insurance			No Health Insurance			Odds Ratio (95% CI)	
	No.	% Diagnosed	% on Medication	No.	% Diagnosed	% on Medication	Diagnosed ^a	Medications ^a
1	543	23.3	12.4	269	15.6	8.4	1.65 (1.11, 2.44)	1.55 (0.93, 2.57)*
2	353	18.8	12.7	159	16.7	5.8	1.16 (0.70, 1.93)*	2.23 (1.06, 4.70)
3	1057	15.6	8.5	321	8.7	2.9	1.96 (1.27, 3.00)	3.06 (1.52, 6.15)
4	1251	13.6	8.1	285	7.3	6.0	2.37 (1.51, 3.72)	1.56 (0.97, 2.49)

Note. CI = confidence interval.

^a χ^2 test, *P* < .05.

**P* < .10.

tion Effort program, the likelihood of diagnosis for children with insurance in most subgroups continued to be greater than that for children without insurance.

Not all medications were taken by children who had been diagnosed with asthma. Between 2% and 7% of undiagnosed Dominican children, 3% and 10% of undiagnosed Puerto Rican children, and 1% and 4% of undiagnosed Mexican children were reported to take medications “for breathing problems” over the 4-year study period. Because many of the families reported having other family members with asthma, there may have been sharing of prescribed or over-the-counter medications. This sharing appeared to be the case, because 14% of the children reported to use albuterol (Proventil, Ventolin, Volmax [albuterol sulfate]) were undiagnosed children from families with asthmatic members, whereas no undiagnosed children from homes without asthmatic members were reported to use albuterol (χ^2 test, $P<.001$, odds ratio [OR]=14.7, 95% CI=1.7, 125). In contrast, use of other prescription drugs (e.g., theophylline, loratadine [Claritin], azatadine maleate/pseudoephedrine sulfate [Rynatan], prednisolone [Prelone], and beclomethasone dipropionate [Vancenase]) that are used for a range of respiratory problems was not significantly associated with familial asthma (χ^2 test, $P=.073$).

Asthma is a family affair. Approximately one third of all responding families reported having at least 1 family member who had been diagnosed with asthma; this proportion ranged from 32% in 2001 to 38% in 1998.

In general, families whose target child had been diagnosed with asthma were more likely to have other members of the family diagnosed with asthma than were families whose target child had not been diagnosed with asthma (Table 3). Hispanics were twice as likely to have a child diagnosed with asthma if another member of the family also had asthma (OR=2.19, 95% CI=1.52, 3.14). Black children were 3 times as likely to be diagnosed with asthma if another member of the family had been diagnosed (OR=3.17, 95% CI=1.10, 9.17).

The data yielded striking differences in the proportion of families with asthma according to racial and ethnic subgroup. Between 8% and 17% of Mexicans and between 12% and 17% of Asians reported that they had at least 1 family member with asthma. Between 17% and 28% of non-Hispanic Whites reported familial asthma, and 23% to 36% of Dominican parents reported familial asthma. In contrast, between 56% and 71% of Puerto Ricans and Blacks reported that their families had at least 1 family member with asthma.

During the fourth year of the study, there was a marked decline in reported familial asthma for Dominican families (30%, χ^2 test, $P<.01$) compared with the previous 3 years. This change was not found for Asian or Black families, in which there was no change over the 4 years. Non-Hispanic White and Puerto Rican families showed modest declines in reported familial asthma during the fourth year compared with the previous 3 years (11% for Non-Hispanic Whites and 12% for Puerto Ricans, $P<.05$). In contrast, there was a signifi-

cant increase in reported familial asthma by Mexican parents (65%, χ^2 test, $P<.01$) in the fourth year of the study compared with the previous 3 years.

Within ethnic groups, the relation between familial diagnosis and health coverage was fairly consistent. Families with at least 1 member diagnosed with asthma were more likely to have health coverage than were those without family diagnosis ($P<.001$ for years 1, 3, and 4, $P=.013$ for year 2). However, the relation between having a family member with asthma and a child's having asthma was not influenced by whether the family had health insurance ($P>.10$ for all years). That is, familial asthma is independent of insurance status as a predictor of a child's asthma.

The impact of the NJ KidCare insurance program can be assessed not only by evaluating the increase in insurance coverage (Table 1) but also by looking at the distribution of health care providers between 1998 (year 1, before NJ KidCare) and 2001 (year 4, when the program was fully in place) (Table 4). Other than Puerto Ricans, most Hispanic subgroups showed a distinct increase in coverage after the institution of NJ KidCare, whereas changes in other forms of coverage were not statistically significant. There was little change in percentages of insurance coverage for Black, Non-Hispanic White, and Asian families.

DISCUSSION

For the study period, the Centers for Disease Control and Prevention reported that childhood asthma prevalence was 6.7% for New Jersey and 7.5% for the nation, far lower than the prevalence we found for this urban cohort.^{1,17,18} The data demonstrate that children with health care coverage were diagnosed with asthma more frequently and were more likely to have their asthma managed with medication than were children without insurance. However, asthma management with medications was reported for only approximately one third of the children with asthma and tended to include critical-care medications such as albuterol.

At the beginning of the study period, one third of the children of Passaic did not have

TABLE 3—Percentage of Families With a Child Diagnosed With Asthma and Odds Ratios for Relation Between Child Asthma Diagnosis and Presence of Familial Asthma: Passaic, NJ, 1998–2001

Year	Familial Diagnosis		No Familial Diagnosis		Odds Ratio*	95% CI
	No. of Families	% With Diagnosed Children	No. of Families	% With Diagnosed Children		
1998	313	37	552	10	5.13	3.54, 7.43
1999	181	33	336	11	3.97	2.48, 6.34
2000	463	28	946	7	5.36	3.87, 7.42
2001	492	34	1063	8	6.12	4.55, 8.24

Note. CI = confidence interval.

* $P<.001$; χ^2 test.

TABLE 4—Percentage of Families With Insurance Coverage, by Race/Ethnicity: Passaic, NJ, 1998–2001

Race/Ethnicity	Percentage by Reported Insurance Category									
	n		HMO/KidCare		Medicaid		Private Insurance		No Coverage	
	1998	2001	1998	2001	1998	2001	1998	2001	1998	2001
Hispanic (by country of origin)										
Dominican Republic	161	284	13	44	14	11	22	26	50	19
Mexico	123	404	7	44	10	9	14	11	70	35
Puerto Rico	133	274	34	34	22	15	28	39	15	12
Peru	18	56	11	45	28	5	17	29	44	21
Colombia	21	39	10	26	14	15	52	44	24	16
Other Hispanic	31	73	13	38	10	11	26	29	52	22
Black	83	169	35	40	18	17	35	36	11	7
Non-Hispanic White	66	186	48	12	5	5	39	77	6	5
Asian	34	62	35	23	6	10	50	52	9	16

access to health care coverage. As NJ KidCare became available, the number of children covered by insurance increased, as did the number of children diagnosed with asthma and placed on medical management. By the end of the study period, 20% of the children of Passaic still lacked health care coverage. This lack of coverage may indicate that a significant number of children with asthma and respiratory problems remain undiagnosed because they lack access to health care.

We found significant differences by ethnic group in the prevalence of both asthma and insurance coverage. It is unclear whether the disparities in asthma diagnosis and insurance represent differences in disease prevalence or whether they are economically driven. The lower rates of asthma among Mexican children compared with other Hispanic groups is consistent with the results of other studies.^{19–21} Mexican children had the lowest rates of health insurance, whereas Blacks and Puerto Ricans had higher rates (Table 1). Because health insurance provides easier access to health care, it may be that the differences in number of asthma cases reported by parents are associated with differences in access. The significant increase in familial asthma cases reported by Mexican parents during the fourth year of the study suggests that this association might be the case, because the Mexican families were the group that showed the greatest increase in coverage over that period.

Further data would be necessary to test this hypothesis.

Study limitations include at least 1 data flaw. In 1998, the term *health maintenance organization* (HMO) referred to both subsidized health care and private health insurance HMO programs. By 2001, many of the HMO offerings in Passaic were subsidized health care, including NJ KidCare. From the questionnaire, we are unable to distinguish which of the 1998 HMO responses referred to subsidized health care. A second limitation may be that because we do not know how many families had siblings in each grade, an overlap in responses by some families across years may have occurred.

Other issues include the fact that the diagnosis and treatment of asthma and respiratory symptoms may have changed over the time period as a result of changes in medical practice philosophy or of changes in regional environmental conditions. For example, in asthma management there has been a national move toward prevention and away from critical care alone.²² In addition, our findings may have been influenced by changes in environmental conditions in New Jersey. Specifically, 1998 was a wet year in New Jersey, followed by 3 years of increasing drought. This weather pattern may mean that asthma triggers such as mold and moist conditions that encourage dust mites would have been less toward the end of the study period than dur-

ing the first year. However, we do not expect that environmental factors affected racial and ethnic groups differentially.

Other studies have found high rates of asthma among urban Black and Hispanic families,^{9,19,20} but this study was able to further identify differences in asthma prevalence and access to health care management among Hispanic populations within the same community. We found that familial asthma was greatest among Puerto Rican and Black families (more than 60%) and that health care coverage for these groups was consistently high over the study period. In contrast, although other Hispanic groups also had relatively high proportions of familial asthma (20% to 35%), those groups had limited access to health care services before the introduction of NJ KidCare. The Passaic Asthma Reduction Effort was able to identify individuals and groups of individuals whose respiratory health may be compromised by lack of access to acute care and asthma management protocols. Identifying families without health coverage will allow the Passaic public agencies to be more effective in their community health outreach activities and, one hopes, to reduce school absenteeism due to asthma. Follow-up monitoring will help meet the health care needs of this diverse Hispanic community. ■

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Contributors

N. Freeman and D. Schneider were advisers to the Passaic Asthma Reduction Effort in its development and data analysis stages. P. McGarvey had oversight of the project. N. Freeman and D. Schneider analyzed data. All 3 authors contributed to writing of the article.

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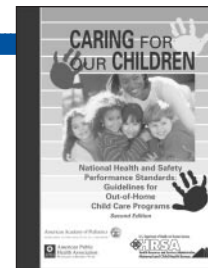
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Human Participant Protection

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