

Variation in total and specific IgE: Effects of ethnicity and socioeconomic status

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Background: Asthma is common in minority and disadvantaged populations, whereas atopic disorders other than asthma appear to be less prevalent. It is unclear whether the same holds true for objective markers of sensitization. **Objective:** To determine the association of asthma, atopic disorders, and specific sensitization with race and socioeconomic factors.

Methods: We analyzed total and specific IgE among 882 women (577 white, 169 black, and 136 Hispanic) who delivered a child at a large tertiary hospital in Boston, Mass, and who were screened for participation in a family and birth cohort study. Race/ethnicity and other characteristics were obtained from screening questionnaires. Addresses were geocoded, and 3 census-based geographic area socioeconomic variables were derived from block group information from the 1990 US Census.

Results: Black and Hispanic women were more likely to come from areas with low socioeconomic indicators and were more likely to have asthma than white women. However, these women were less likely to have hay fever and eczema than their white counterparts. Compared with white women, black women had higher mean total IgE levels; had greater proportions of sensitization to indoor, outdoor, and fungal allergens; and were more than twice as likely to be sensitized to ≥ 3 aeroallergens.

Conclusion: The racial/ethnic disparities in atopic disorders may represent either underdiagnosis or underreporting and suggest that allergy testing may be underused in some populations. Differences in total IgE levels and specific allergen sensitization are likely a result of the complex interplay between exposures associated with socioeconomic disadvantage. (*J Allergy Clin Immunol* 2005;115:751-7.)

Key words: Immunologic sensitization, ethnic group, socioeconomic factors, asthma

Abbreviations used

OR: Odds ratio
 Ref: Reference group
 SES: Socioeconomic status

Asthma and other atopic conditions are reported to vary by socioeconomic status (SES) and race/ethnicity in the United States. Whereas asthma is documented to be more prevalent¹⁻³ and more severe^{4,5} in minority and disadvantaged populations, atopic disorders and atopic sensitization have been considered to be conditions of the relatively affluent.^{6,7} However, total serum IgE has been reported to be higher in black and Hispanic populations than in whites in the United States,^{8,9} and recent data have shown that sensitization to aeroallergens is greater among minority groups with asthma than among white groups.^{9,10} Because race and SES are tightly linked, it is assumed that exposures associated with low SES account for the observed increases in these atopic markers among minority populations; however, few analyses have attempted to disentangle the effects of low SES from those of race on atopic sensitization.

In children, in whom atopy is more closely linked with asthma than in adults, sensitization to aeroallergens is an important contributor to asthma morbidity.¹¹ We have recently shown that sensitization and exposure to both cat and cockroach allergens contribute to morbidity in adult women with asthma.¹² Thus, examining patterns of sensitization between ethnic groups may provide some clues to the disparities in asthma and allergy prevalence. We have previously demonstrated that markers of low SES were associated with increases in total serum IgE and the number and degree of sensitization to aeroallergens in mothers participating in the Boston Epidemiology of Home Allergens and Asthma study.¹³ However, there were too few women from minority groups to make any valid inferences about race/ethnicity in that study.

In this report, we describe the geographic variation of total serum IgE among women of various racial/ethnic groups in the greater Boston area and investigate the predictors of total and specific IgE in this cohort of women.

METHODS

This study involves women who delivered a child at a large tertiary hospital in Boston, Mass (Brigham and Women's Hospital).

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TABLE I. Characteristics of the 882 women

	White (n = 577)	Black (n = 169)	Hispanic (n = 136)	P value*
Age, y, mean $\pm$ SD	33.2 $\pm$ 4.5	27.6 $\pm$ 5.8	27.5 $\pm$ 5.9	<.0001
Asthma, n (%)	161 (27.9)	86 (50.9)	77 (56.6)	<.0001
Eczema, n (%)	130 (22.8)	30 (17.8)	9 (6.7)	<.0001
Hayfever, n (%)	250 (44.2)	46 (27.9)	22 (16.7)	<.0001
Residence within Boston City, n (%)	143 (24.8)	150 (88.8)	105 (77.2)	<.0001
Health insurance, n (%)				
Private/self-pay	550 (96.3)	125 (75.8)	82 (62.6)	<.0001
Medicaid	21 (3.7)	40 (24.2)	49 (37.4)	
Area (block group) SES indicators				
Poverty (% of the population living below poverty line), n (%)				
<5%	294 (51.0)	16 (9.5)	10 (7.4)	<.0001
5% to <20%	255 (44.3)	84 (49.7)	52 (38.2)	
$\geq$ 20%	27 (4.7)	69 (40.8)	74 (54.4)	
Education (% of the population who have completed a college education), n (%)				
>60%	212 (36.8)	12 (7.1)	17 (12.5)	<.0001
25% to 60%	288 (50.0)	61 (36.1)	51 (37.5)	
<25%	76 (13.2)	96 (56.8)	68 (50.0)	
Household income (% of the population with income $\geq$ \$50,000), n (%)				
>50%	228 (39.6)	7 (4.1)	8 (5.9)	<.0001
25% to 50%	268 (46.5)	54 (32.0)	40 (29.4)	
<25%	80 (13.9)	108 (63.9)	88 (64.7)	
Ever smoking, n (%)	197 (34.1)	52 (30.8)	44 (32.4)	.69
Current smoking, n (%)	22 (3.8)	17 (10.1)	9 (6.6)	.006
Spouse/partner ever smoking, n (%)	148 (25.7)	70 (41.9)	59 (44.4)	<.0001
Spouse/partner currently smokes, n (%)	24 (4.2)	21 (12.6)	14 (10.5)	.0001
Total IgE, IU/mL, geometric mean $\pm$ SD	35.6 $\pm$ 4.5	83.1 $\pm$ 4.3	61.0 $\pm$ 4.3	<.0001
Number of specific IgE $\geq$ CAP, class I, n (%)				
0	227 (41.0)	47 (28.3)	52 (39.1)	.0001
1 to 2	185 (33.5)	47 (28.3)	34 (25.6)	
$\geq$ 3	141 (25.5)	72 (43.4)	47 (35.3)	

*P values are from ANOVA or from χ^2 tests for differences among the 3 groups.

These women were screened for participation in the Epidemiology of Home Allergens and Asthma Study, which has previously been described.^{3,14,15} This analysis includes the 478 (95.8%) mothers enrolled in the study who had blood available for IgE measurements (377 white, 54 black, 26 Hispanic, 17 Asian, and 4 other). These subjects were the basis of previous reports.^{12,13} An additional 425 women (115 black mothers, 110 Hispanic mothers, and a random sample of 200 white mothers) who completed the detailed screening questionnaire and had blood available for IgE measurements but were not enrolled in the study are included in the current analysis. Of these 903 mothers, we excluded the 17 Asians and 4 of other race, for a final total of 882 women. A detailed description of screening and recruitment is presented in the Journal's Online Repository (www.mosby.com/jaci). The study was approved by the Human Research Committee of the Brigham and Women's Hospital.

The screening questionnaire contained 3 separate questions: "Has a doctor ever said that you have (1) asthma, (2) hay fever, or (3) eczema?" Positive responses were defined as doctor-diagnosed asthma, hay fever, and eczema. Race was determined by the woman's response to a question as described previously.³ Information on smoking and insurance status was obtained from the screening questionnaire. Subjects' addresses were obtained at the time of delivery and were sent to a commercial firm (Mapping Analytics, Rochester, NY) to be geocoded, whereby the address was used to assign block group number on the basis of the geographic areas defined in the 1990 US Census of Population and Housing.¹⁶ Three census-based geographic area SES variables were derived from block

group information and variables from the 1990 Census. A marker of poverty in the women's area of residence was established in terms of the proportion of the population in that block group living below the poverty level (composite variable based on family income and family size, according to 1990 US Census data) and categorized for analysis into 3 categories: <5%, 5% to 20%, and >20% of the population in the block group living below the poverty level. Area educational level was categorized into >60%, 25% to 60%, and <25% of the population in the block group having completed at least a college education. Area household income was categorized into >50%, 25% to 50%, and <25% of the population in the block group with a household income of >\$50,000.

A serum sample drawn at screening was analyzed for total IgE and for specific IgE antibodies to a panel of allergens, as measured with the UNICAP system (Pharmacia, Uppsala, Sweden). Specific IgE antibodies were assayed for dust mite, dog, cat, cockroach, *Alternaria* species, *Aspergillus* species, ryegrass, and ragweed, with each allergen attached to a cellulose sponge (ImmunoCAP), as previously described.^{12,13} In the CAP system, CAP classes correspond to the following units: 0 = 0 to <0.35 IU/mL, 1 = 0.35 to <0.7 IU/mL, 2 = 0.7 to <3.5 IU/mL, 3 = 3.5 to <17.5 IU/mL, 4 = 17.4 to <50 IU/mL, 5 = 50 to less than 100 IU/mL, and 6 = 100 IU/mL or greater. We defined sensitivity to each allergen as CAP class level 1 or above ($\geq$ 0.35 IU/mL).

Statistical analyses were performed by using SAS statistical software (SAS Institute, Inc, Cary, NC). Two sets of analyses were performed: total IgE was the outcome of interest in one set of

TABLE II. Predictors of total serum IgE levels: Linear regression models*

Variables	Univariate models		Multivariable model A		Multivariable model B	
	Geometric mean (SE)	P value	Geometric mean (SE)	P value	Geometric mean (SE)	P value
Race/ethnicity						
White	35.64 (1.06)	Ref	50.72 (1.07)	Ref	54.89 (1.11)	Ref
Black	83.08 (1.12)	<.0001	100.15 (1.13)	<.0001	106.65 (1.15)	<.0001
Hispanic	60.98 (1.14)	.0002	80.09 (1.15)	.003	81.16 (1.16)	.03
Asthma						
No	32.21 (1.06)	Ref	51.70 (1.10)	Ref	54.86 (1.11)	Ref
Yes	82.19 (1.08)	<.0001	106.19 (1.10)	<.0001	110.99 (1.11)	<.0001
Eczema						
No	42.13 (1.06)	Ref	62.80 (1.07)	Ref	65.59 (1.09)	Ref
Yes	65.87 (1.12)	.0006	87.42 (1.13)	.007	92.82 (1.14)	.005
Hay fever						
No	36.53 (1.07)	Ref	51.30 (1.09)	Ref	53.57 (1.10)	Ref
Yes	67.99 (1.09)	<.0001	107.03 (1.10)	<.0001	113.66 (1.12)	<.0001
Residence within Boston City						
No	36.51 (1.07)	Ref	—	—	76.34 (1.13)	Ref
Yes	59.70 (1.08)	<.0001	—	—	79.75 (1.11)	.7
Health insurance						
Private/self-pay	42.56 (1.06)	Ref	—	—	73.78 (1.09)	Ref
Medicaid	73.85 (1.16)	.0004	—	—	79.75 (1.11)	.5
Area (block group) SES indicators						
Poverty						
<5%	38.62 (1.09)	Ref	—	—	77.61 (1.14)	Ref
5% to <20%	43.51 (1.08)	.30			74.97 (1.12)	.8
≥20%	68.60 (1.12)	<.0001			81.65 (1.15)	.8
College education						
>60%	33.14 (1.10)	Ref	—	—	—	—
25% to 60%	44.93 (1.08)	.01				
<25%	63.90 (1.10)	<.0001				
Household income ≥\$50,000						
>50%	35.83 (1.10)	Ref	—	—	—	—
25% to 50%	42.55 (1.08)	.17				
<25%	61.18 (1.10)	<.0001				

*Results are reported as geometric means of serum IgE (SE) for each level of categorical variable in each of the univariate models. In the multivariable model, results are adjusted geometric means of serum IgE (SE) for each level of categorical variable. The multivariable model is adjusted for age in addition (continuous variable).

Ref is the reference group or category.

analyses, and the number of specific allergen sensitization results was the outcome in the other. The differences in characteristics between the racial/ethnic categories were tested by using χ^2 tests for categorical variables and by using t tests for the continuous variable (log-transformed serum total IgE). For the analysis investigating predictors of serum total IgE, univariate and multivariable linear regression models were constructed by using the REG procedure in SAS. A base multivariable model was created by using the non-SES variables that were significant in univariate analyses. These variables included age, asthma, hay fever, eczema, and race. Subsequent multivariable models were created by including the SES variables in the base model individually. Serum total IgE levels were log-transformed in the regression analyses to achieve residuals that were more closely normally distributed with a constant variance. For the analyses investigating predictors of the number of specific allergen sensitization results, we categorized the outcome into 3 groups: no sensitization to any of the allergens, sensitization to 1 to 2 allergens, and sensitization to 3 or more allergens. To assess the association of predictor variables on this 3-level outcome, we used polytomous regression, which is an extension of the logistic regression model for multilevel outcomes. Univariate and multivariate polytomous regression models were created for the 3-level outcome by using the CATMOD procedure in SAS. We also used geo-

statistical (kriging) approaches as implemented in the ArcGIS Geostatistical Analyst software (ESRI, Redlands, Calif) to verify and provide visual support to our regression models. The method and the maps (Fig E1) are presented in the Journal's Online Repository (www.mosby.com/jaci).

RESULTS

Characteristics

Table I shows the baseline characteristics of the 882 women in this analysis. White women tended to be slightly older than black or Hispanic women. Black and Hispanic women tended to come from areas within the Boston city limits and areas with low socioeconomic indices. A greater proportion of black and Hispanic women cited Medicaid as their health insurance coverage compared with white women. Although the proportion of ever smoking was similar among the 3 groups of women, there were more black and Hispanic women who reported current smoking at the time of delivery. Asthma was more common among black and Hispanic women, whereas

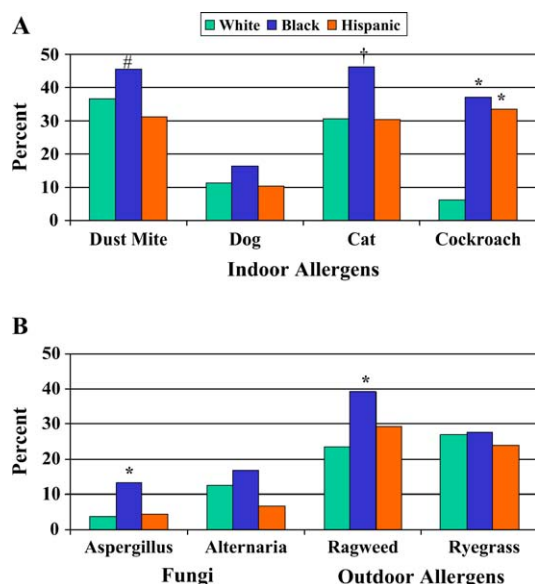


FIG 1. Proportion of women sensitized to 8 aeroallergens, stratified by race/ethnicity. **A**, Sensitization to indoor allergens. **B**, Sensitization to fungi and outdoor allergens. [#] $P = .04$; [†] $P = .0003$; ^{*} $P = .0001$.

eczema and hay fever were more common among white women. However, total serum IgE and the proportion of women with sensitization to 3 or more allergens were greater among black and Hispanic women.

Predictors of total serum IgE

Table II shows the association between the various characteristics and log-transformed total serum IgE. Age, asthma, eczema, hay fever, race, and the SES indicators were all significantly associated with IgE levels in univariate models. None of the smoking variables and season of delivery were associated with IgE levels. In a multivariable model adjusting for age, asthma, eczema, and hay fever, black and Hispanic women had higher total serum IgE levels than white women (Table II, *multivariable model A*). When each of the SES indicators was added to this multivariable model, none of them remained significant predictors of total serum IgE, whereas race/ethnicity remained strongly predictive of IgE (Table II, *multivariable model B*, and Table E1 in the Online Repository at www.mosby.com/jaci).

Specific allergic sensitization

Fig 1 shows the proportion of women in each ethnic group who are sensitized to each allergen. For most of the allergens, a significantly greater proportion of black women were sensitized than white women. The proportion of Hispanic women with sensitization to cockroach was greater than that for white women, but there were no differences in the proportions sensitized to the other allergens. We investigated the association between each specific allergen and asthma and hay fever in each group (see Table E2 in the Online Repository at www.mosby.com/jaci).

Among white women, specific sensitization to all of the allergens was significantly associated with asthma, and sensitization to all allergens except cockroach and *Aspergillus* was associated with hay fever. Among black women, sensitization to dog, cat, dust mite, cockroach, ragweed, and ryegrass was significantly associated with asthma, whereas only sensitization to cat, ragweed, and ryegrass was associated with hay fever. Among Hispanic women, only sensitization to cockroach achieved statistical significance for the association with asthma, whereas sensitization to cat and ragweed was associated with hay fever. In multivariable models adjusting for age and sensitization to all of the allergens, sensitization to dog, cat, cockroach, and ragweed remained significantly associated with asthma among whites; only sensitization to dog remained significantly associated with asthma among blacks; and sensitization to cockroach and ragweed remained significantly associated with asthma among Hispanics. In similar fashion, multivariable models adjusting for age and sensitization to all of the allergens showed that sensitization to dust mite, cat, *Aspergillus*, *Alternaria*, and ryegrass were significantly associated with hay fever among whites; only sensitization to cat remained significantly associated with hay fever among blacks; and only sensitization to cockroach remained significantly associated with hay fever among Hispanics.

We then investigated predictors of specific sensitization to increasing numbers of allergens. The outcome was categorized as 0 for no sensitization to the allergens tested, 1 to 2 for sensitization to 1 or 2 allergens, and ≥ 3 for sensitization to 3 or more allergens. Table III shows the results of polytomous regression models. Black women were about 2½ times more likely than white women to have specific sensitization to ≥ 3 allergens, and this relationship did not change appreciably when other covariates, including SES indicators, were entered into the model (Table III, *multivariable model B*, and Table E3 in the Online Repository at www.mosby.com/jaci). Both asthma and hay fever were strongly associated with increased risks for allergen sensitization to increasing number of allergens.

DISCUSSION

The main findings of our analysis are that black and Hispanic women have higher levels of total serum IgE and are more likely to be sensitized to a greater number of aeroallergens than white women. These findings remained significant after adjustment for area socioeconomic indicators. Our findings are supported by a geostatistical analysis (kriging) detailed in the Online Repository (www.mosby.com/jaci). Our kriging analysis showed that subjects living within the city limits of Boston had higher total serum IgE and that these levels decreased among the subjects living further away from the city (Fig E1, A). Race/ethnicity accounted for most of the gradient in serum IgE in our cohort (Fig E1, B), and further adjustment

TABLE III. Predictors of the number of positive specific allergen sensitization tests*

	Univariate model OR (95% CI)		Multivariate model A OR (95% CI)		Multivariate model B OR (95% CI)	
	1-2	≥3	1-2	≥3	1-2	≥3
Race/ethnicity						
White	1.00	1.00	1.00	1.00	1.00	1.00
Black	1.23 (0.78-1.92)	2.47 (1.62-3.77)	1.39 (0.84-2.33)	2.45 (1.46-4.11)	1.68 (0.92-3.05)	2.76 (1.51-5.05)
Hispanic	0.80 (0.50-1.29)	1.46 (0.93-2.27)	1.01 (0.59-1.75)	1.47 (0.84-2.58)	1.09 (0.58-2.05)	1.52 (0.79-2.92)
Age	0.99 (0.96-1.02)	0.94 (0.92-0.97)	0.97 (0.94-1.01)	0.95 (0.92-0.99)	0.97 (0.94-1.01)	0.95 (0.91-0.98)
Asthma	1.50 (1.05-2.14)	3.81 (2.69-5.41)	1.42 (0.96-2.10)	3.34 (2.25-4.95)	1.39 (0.93-2.07)	3.27 (2.19-4.88)
Eczema	1.96 (1.28-3.00)	1.79 (1.16-2.76)	1.64 (1.04-2.59)	1.42 (0.87-2.31)	1.67 (1.05-2.65)	1.47 (0.90-2.40)
Hay fever	3.54 (2.43-5.16)	4.72 (3.24-6.86)	3.83 (2.58-5.69)	6.90 (4.50-10.56)	4.00 (2.67-6.00)	7.12 (4.62-10.97)
Residence within Boston City	0.94 (0.68-1.31)	1.71 (1.23-2.37)	—	—	0.71 (0.45-1.13)	0.99 (0.61-1.61)
Area (block group) SES indicators						
Poverty						
<5%	1.00	1.00			1.00	1.00
5% to <20%	1.12 (0.78-1.60)	1.11 (0.76-1.61)	—	—	1.16 (0.77-1.75)	0.91 (0.57-1.44)
≥20%	0.87 (0.54-1.40)	1.53 (0.98-2.39)			0.80 (0.42-1.55)	0.80 (0.41-1.57)
College education						
>60%	1.00	1.00				
25% to 60%	1.07 (0.73-1.57)	1.27 (0.84-1.90)	—	—	—	—
<25%	1.18 (0.76-1.85)	2.06 (1.32-3.22)				
Household income						
≥\$50,000						
>50%	1.00	1.00				
25% to 50%	0.78 (0.53-1.15)	1.34 (0.88-2.04)	—	—	—	—
<25%	0.91 (0.60-1.38)	1.89 (1.22-2.93)				

*Results are reported as odds ratio (OR) (95% CI), obtained from polytomous regression models.

for SES did not change the association between race and total or specific IgE.

It is increasingly recognized that certain populations that are at greater risk for asthma and increased morbidity from asthma are more likely to be sensitized to aeroallergens. Studies in children with asthma have shown that cockroach allergen exposure and sensitization are more common among children with asthma living in the inner cities and contribute to the greater morbidity seen in these children.^{11,17} More recently, Celedon et al¹⁰ analyzed data from a cohort of children with asthma in Connecticut and showed that both Puerto Rican and African American children were more likely to be sensitized than white children to an array of indoor and outdoor aeroallergens other than cockroach allergen. Gelber et al¹⁸ showed that although sensitization to indoor allergens was a risk factor for asthma in adolescents and adults presenting to the hospital, this association was strongest among disadvantaged populations: the uninsured and African Americans. Minority populations without asthma in the United States are also at risk for sensitization to an array of aeroallergens. Gergen et al⁶ analyzed allergy skin test results to 8 allergens (house dust, cat, dog, *Alternaria*, ragweed, oak, perennial ryegrass, and Bermuda grass) from the National Health and Nutrition Examination Survey II. They found that black participants had a higher prevalence of reactivity than white participants, although this finding was not statistically significant. In that study, skin test re-

activity increased in both blacks and whites with higher income and education. A more recent analysis of allergy skin test data to four indoor allergens (cockroach, dust mite, cat, and *Alternaria alternata*) from children in the National Health and Nutrition Examination Survey III showed that both African American and Mexican American children were more likely to be sensitized to cockroach and dust mite than white children. In addition, the African American children were more likely to be sensitized to *A alternata*. These ethnic differences were more pronounced among the children living in central cities.

In line with these previous findings, we found that the prevalence of sensitization to cockroach in black and Hispanic women was greater than that of white women. This finding has generally been explained as reflecting the exposure patterns of different populations. Although we did not measure allergen levels in all of the homes of the women in this study, we had previously shown, in a subset of the households in the current study, that homes from low socioeconomic strata are more likely to have higher levels of cockroach allergens but lower levels of dust mite and cat, whereas the inverse holds for homes from higher socioeconomic strata.¹⁵ Similar patterns of exposure were shown in a study in Connecticut.¹⁹ However, the finding of greater prevalence of sensitization to dust mite and cat among black women in our cohort does not conform to these patterns of exposure. Although there is evidence to

suggest that genes (and the frequencies of the polymorphisms in these genes) that confer susceptibility to asthma and atopy differ between ethnic groups,²⁰ it is not likely that genetics alone can explain these disparities in sensitization. It is more likely that differences in housing and community environmental exposures²¹ that predispose to sensitization interact with these genes to explain these findings. For example, children from minority groups live in homes that are more likely to promote proliferation of certain indoor allergens, in particular cockroach, mouse, and molds,^{20,22,23} and are exposed to greater levels of these allergens at an early point in life, increasing their risk for sensitization to these allergens. However, although it has been shown that dominant patterns of exposure to allergens differ between communities,^{15,18} it appears that the overall burden of allergen exposure is similar, except for the most disadvantaged homes.¹⁵ Furthermore, exposure to a wide array of allergens also occurs outside the home; thus, differential exposure alone is not likely to explain our findings. Whether it is the specific type of allergen to which one is exposed or the degree of exposure that leads to sensitization remains unanswered. Alternatively, given exposure to aeroallergens, other exposures such as neighborhood stressors, pollution, and other cofactors associated with socioeconomic disadvantage may increase the risk of developing allergic sensitization.²⁴ Once sensitization has occurred, it may trigger a dynamic process in which sensitized individuals are more susceptible to further sensitization to other allergens they encounter throughout their lives.¹⁰

Because race/ethnicity and SES are very tightly linked in our cohort, we were unable to disentangle further the effects of each on serum IgE. Although race/ethnicity explained more of the variance in IgE than SES, it is likely that our current area SES variables do not capture the unmeasured and lifelong exposures that are linked with being from a minority group in this country. Our findings of higher levels of total IgE and greater prevalence of sensitization among minority and socioeconomically disadvantaged groups differ from findings from European countries, where atopy is associated with higher social class.^{25,26} It is possible that factors discussed here, such as the pattern of exposure to allergens and pollutants, and psychosocial stress²⁴ with the background of a different health care delivery system, may account for these disparate findings.

We have found that, although report of a doctor's diagnosis of asthma is more prevalent among black and Hispanic women than among white women in our cohort, diagnoses of hay fever and eczema are less prevalent. Because patterns of specific allergen sensitization vary in their importance to asthma and hay fever,^{27,28} the finding that black women had greater prevalence of sensitization to ragweed and dust mite suggests either underreporting or underdiagnosis of hay fever in these women because of various barriers to care.²⁹ Persons from minority populations may be less likely to be referred for or to present for consultation with an allergist or pulmonologist³⁰ and are

thus less likely to undergo allergy testing. Alternatively, these persons may also be less likely to report symptoms of allergic rhinitis than persons of higher SES.

The generalizability of our results may be limited by the fact that all of the women in this analysis were pregnant at the time of collection of specimens for IgE measurement. However, there are no data to suggest that pregnancy alters total or specific IgE levels. Our sample was not intended to be a representative sample of the general population, but rather a sample enriched for asthma or allergies in the woman or her child's father. Nevertheless, the racial/ethnic distribution of our study population reflects that of the metropolitan Boston communities from which participants were drawn.³¹

Because our cohort was enriched for asthma and allergies, and because there may be differential distribution of physician-diagnosed asthma and allergies between racial/ethnic groups, there was concern that this may confound our findings of higher levels of total serum IgE and greater rates of sensitization among the black and Hispanic women. To address this, we performed an analysis on the subset of 297 women who did not have any diagnosis of asthma, hay fever, or eczema. In this analysis, although total IgE levels were generally lower than in the whole cohort, we found similar results. Black and Hispanic women had higher total serum IgE levels (geometric means [SE] of 43.60 [1.22] and 36.63 [1.24], respectively) compared with white women (geometric mean [SE] of 17.47 [1.11]; *P* values for both comparisons were <.01). Black and Hispanic women were also more likely to be sensitized to 3 or more specific allergens. These results are detailed in Table E4 and Fig E2 in the Online Repository (www.mosby.com/jaci).

Although the cross-sectional nature of our study limits the amount of inference that can be made from our results, the relatively large number of participants from minority groups, the rich information on sensitization to both indoor and outdoor aeroallergens, and the geocoded information give us the opportunity to address the important issue of disparities in the prevalence of atopic disorders.

In summary, we have shown that women from minority groups in the metropolitan Boston area have higher total serum IgE and are more likely to be sensitized to more aeroallergens than their white counterparts. Race/ethnicity explained more of the variation in IgE than current SES indicators. Exposure patterns to aeroallergens alone are unlikely to explain our findings, and other exposures associated with living in urban US centers need to be examined more closely.

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