Geographic Variability in Childhood Asthma Prevalence in Chicago

Ruchi S Gupta MD MPH[1,2], Xingyou Zhang PhD[3], Lisa K Sharp PHD[4], John J Shannon MD[5], Jane L Holl, MD MPH[1,2], Kevin B Weiss MD MPH[1,6]
1. Institute for Healthcare Studies, Feinberg School of Medicine, Northwestern University; 2. Children's Memorial Hospital; 3. American Academy of Family Physicians; 4. University of Illinois at Chicago; 5. Cook County Hospital; 6 Hines VA
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Background

- Asthma affects 8.9 million children in the United States.
- Childhood asthma prevalence has been shown to be higher in urban communities overall without an understanding of differences by neighborhood.
- Chicago, an major urban community, has one of the highest asthma rates in the country and a marked socioeconomic/racial gradient with respect to asthma outcomes.
- No study has assessed whether the reported high asthma rates for "Chicago" remain consistent by neighborhood or by racial/ethnic group throughout the city.

Objective

- To determine the variability of childhood asthma prevalence and the role of race and demographic characteristics with respect to asthma prevalence in 287 Chicago neighborhoods.

Methods

- A cross sectional asthma screening survey was conducted as part of the Chicago Initiative to Raise Asthma Health Equity (CHIRAH).
- Children attending Chicago Public and Catholic elementary and middle schools during the 2003-2004 and 2004-2005 school years were surveyed.
- Screens were conducted in 105 schools. 48,917 surveys were completed resulting in a 78.9% response rate.
- Surveys were geocoded into neighborhood clusters.
- Neighborhood information on race, education and income were based on 2000 census data.
- Individual data from the surveys included child's age, gender, asthma status, and household members with asthma.
- Bivariate and multilevel analyses were performed.

Results

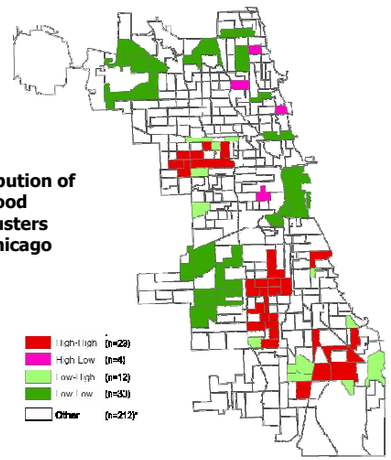
Overall 12.9%of children had been diagnosed with asthma.

Variables	Prevalence (%)	Asthma Prevalence (%)
White	30.0	9.4
Black non - Hispanic	28.7	19.4
Hispanic non - Black	40.5	10.7
Black Hispanic	0.8	21.4
Male	49.3	15.0
Female	50.7	10.9
Household member with asthma? Yes	8.7	37.8
Household member with asthma? No	91.3	9.6

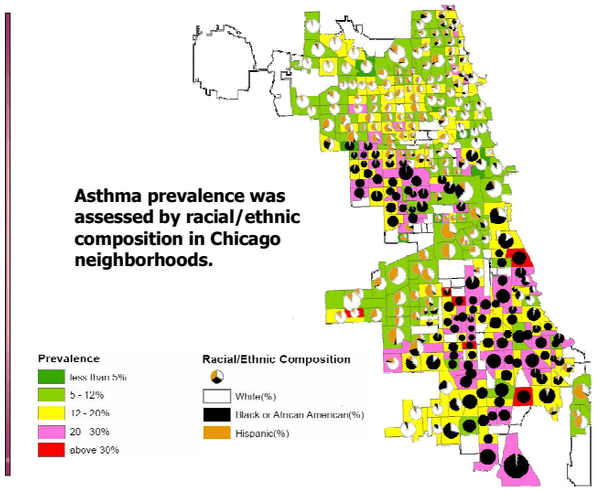
Neighborhood asthma prevalence was assessed using multivariate models of contributing individual and community factors.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
		OR (95% CI)		*OR (95% CI)*	*OR (95% CI)*	*OR (95% CI)*
6-8 years old vs 3-5 years old				1.05 (0.95, 1.16)	1.05 (0.95, 1.16)	1.05 (0.95, 1.16)
9-11 years old vs 3-5 years old				1.12 (1.01, 1.24)	1.11 (1.00, 1.22)	1.11 (1.00, 1.22)
12 and older vs 3-5 years old				1.14 (1.03, 1.27)	1.13 (1.02, 1.26)	1.13 (1.02, 1.26)
Gender (male vs female)				1.48 (1.40, 1.56)	1.48 (1.40, 1.57)	1.48 (1.40, 1.57)
Household Member with Asthma (yes vs no)				4.52 (4.21, 4.86)	4.35 (4.05, 4.68)	4.36 (4.06, 4.69)
Black (yes vs no)			2.1 (1.93, 2.21)		2.01 (1.86, 2.18)	2.05 (1.88, 2.24)
Hispanic (yes vs no)					1.16 (1.07, 1.25)	1.17 (1.08, 1.26)
Neighborhood income (low vs high)		1.32 (1.18, 1.47)				0.95 (0.87, 1.03)
Neighborhood level variance (SE)	0.140 (0.019)	0.122 (0.017)	0.028 (0.008)	0.101 (0.016)	0.024 (0.007)	0.023 (0.007)
MOR (95% CI)	1.43 (1.36, 1.49)	1.39 (1.33, 1.46)	1.11 (1.17, 1.22)	1.35 (1.29, 1.41)	1.16 (1.10, 1.20)	1.16 (1.10, 1.20)

Geographic distribution of significant childhood asthma spatial clusters was defined by Chicago neighborhoods.



Asthma prevalence was assessed by racial/ethnic composition in Chicago neighborhoods.



Asthma prevalence (mean, standard deviation, range) in predominantly Black neighborhoods (19.9, +/- 7, 4-44%) was higher than in predominantly White neighborhoods (11.4, +/- 4.7, 2-30%) and predominantly Hispanic neighborhoods (12.1, +/- 6.8, 0-29%).

Conclusions

- Childhood asthma prevalence varies widely by neighborhood within Chicago's urban environment.
- Adjacent areas in Chicago were identified with significantly different asthma prevalence.
- Significant disparities in overall asthma prevalence exist between Black and White children, with wide variation by neighborhood: some predominantly Black neighborhoods had lower asthma rates compared to some predominantly White neighborhoods.
- Race alone does not explain differences in asthma rates. Neighborhood factors in asthma rates needs to be further explored.
- A better understanding of the impact of neighborhood characteristics may lend insight into potential interventions to reduce childhood asthma.