

*Excerpt from*

# *Neighborhoods and Health:*

## **Building Evidence for Local Policy**

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#### Section 4

### INDIANAPOLIS: ENVIRONMENTAL FACTORS AND THE RISK OF CHILDHOOD OBESITY

#### PURPOSE AND APPROACH

This section summarizes the site-specific analysis prepared by the Polis Center at Indiana University-Purdue University at Indianapolis (NNIP's local partner in Indianapolis) in conjunction with the Children's Health Services Research Program in the Department of Pediatrics at Indiana University.<sup>11</sup> It focuses on the relationship between neighborhood conditions and risk of childhood obesity.

#### *Purpose*

In the past two decades, the prevalence of obesity has risen dramatically (Anderson 2000). Concern about this rise centers on the link between obesity and increased health risks that translate into increased medical care and disability costs. In the United States, total costs attributable to obesity exceeded \$100 billion in 2000, or approximately 8 percent of the national health care budget (Wolf and Colditz 1998). Although the immediate health implications of obesity in childhood have not been examined extensively, obese children are likely to become obese adults, particularly if obesity is present during adolescence (Braddon et al. 1986; Serdula et al. 1993). However, adverse social and psychological effects of childhood obesity have been demonstrated (Stunkard and Burt 1967; Stunkard and Mendelson 1967). Furthermore, being overweight during adolescence has been shown to have deleterious effects on high school performance, educational attainment, psychosocial functioning, and socioeconomic attainment (Gortmaker et al. 1993).

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<sup>11</sup>The study is fully documented in an as yet unpublished report of the Polis Center at Indiana University-Purdue University at Indianapolis: *Indianapolis Site-Specific Neighborhood Health Analysis: Environmental Factors and Risk of Childhood Obesity*, 2002, by Sharon Kandris and Gilbert Liu, 2003.



The purposes of this research were to learn about and measure relationships between the prevalence of obesity and socioeconomic status, the presence of exercise opportunities, and exposure to social barriers at the neighborhood level during the late 1990s in Indianapolis (Marion County).

### ***Data sources and approach***

The researchers had access to a database for this work that is nationally known for its comprehensiveness: the Regenstrief Medical Records System (RMRS), which contains data on patient circumstances and care reported by a large number of care providers and other health entities in Indiana (now with data on 1.5 million patients since 1974).

The researchers recognized that the pediatric data in the RMRS reflected a population in which African Americans, Hispanics, and patients receiving Medicaid are overrepresented. While the selection bias affects the generalizability of the findings, it also works to the study's advantage given that several U.S. minority populations are disproportionately affected by obesity, particularly African Americans, Hispanics, and Native American women (Strauss 1999).

From the RMRS, the researchers obtained data on a random sample of children, ages 4 through 18, who had been seen by primary care clinics in the Indiana University Medical Group in Marion County from 1996 through 2000 and for whom simultaneous height and weight measurements were available. They classified all children in the sample according to body mass index (BMI) categories. Obese children were those with BMI above the 95<sup>th</sup> percentile according to a scale developed by the Centers for Disease Control and Prevention. They also had data on the children's addresses and other characteristics such as race. After excluding 17 percent of the initial group (because of unreasonable data or geo-coding difficulties), they were left with a sample of 17,871 children. The sample reflected the general age and gender distribution of the patient population.

Data were analyzed at the block group level. Block group characteristics included income and other socioeconomic variables from the 2000 census and information on physical activity opportunities (e.g., YMCAs, parks, after-school physical education programs) and crime rates from the Social Assets and Vulnerabilities Indicators database (SAVI), the neighborhood data system maintained by the Polis Center).

Patient characteristics and block group environmental data were first subjected to bivariate analysis. The researchers then conducted multivariate logistic regression analysis using only variables that evidenced significant associations in the bivariate analysis. They also prepared and examined maps of the key variables involved.



## FINDINGS AND IMPLICATIONS

### *Hypotheses and main findings*

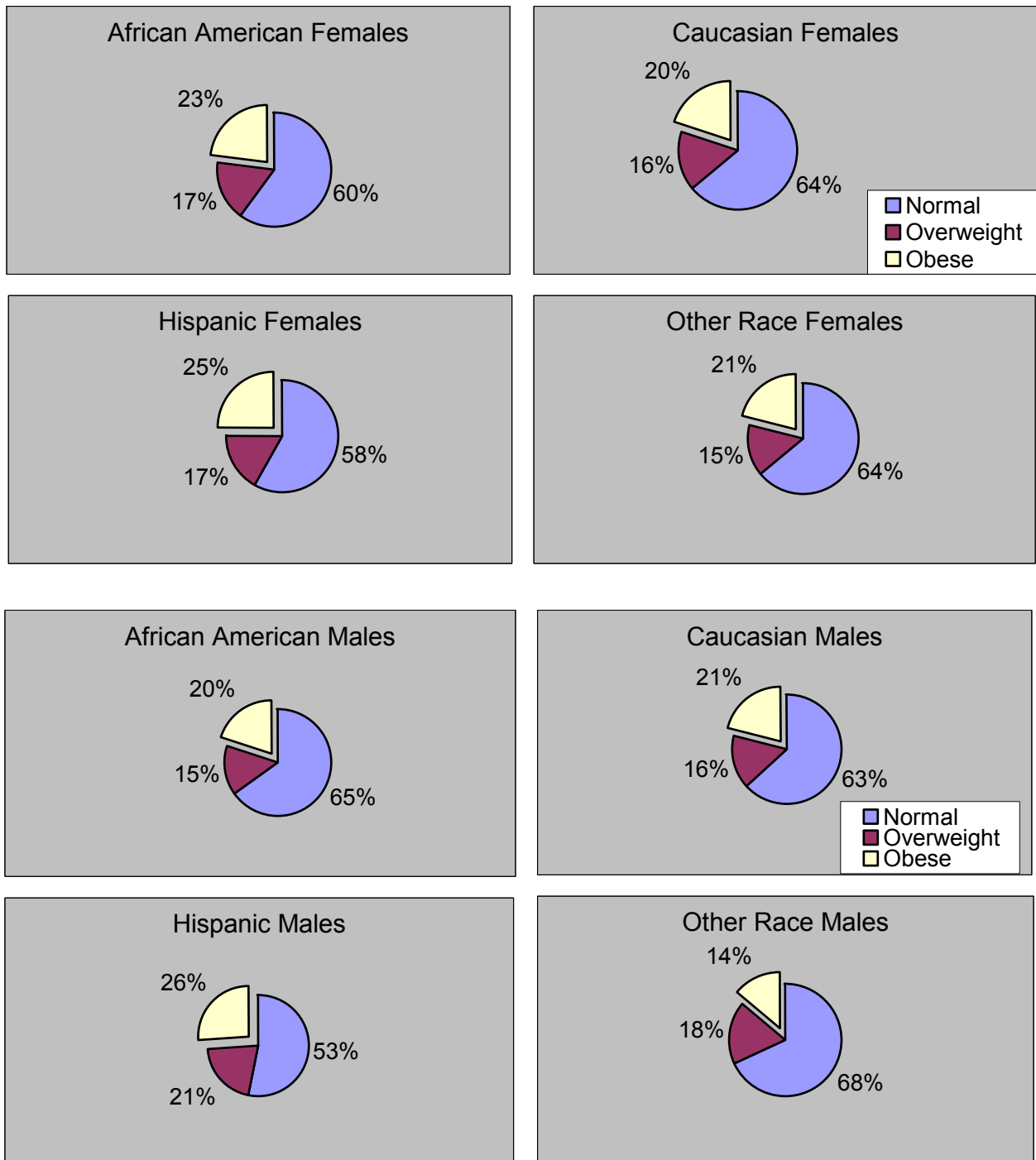
Figure 4.1 shows that there are important differences by race and gender. The prevalence of obesity is generally higher for females than males. Among females, 25 percent of Hispanics and 23 percent of African Americans were obese, compared with 20 to 21 percent for those of other races. Among males, 26 percent of Hispanics, 21 percent of whites, 20 percent of blacks, and only 14 percent of those of other races were obese. (It should be remembered that whites and African Americans are by far the dominant population groups in Indianapolis.) The researchers formulated the following hypotheses:

1. *That children living in areas of lower socioeconomic status (as measured by income and educational attainment) are more likely to be obese.* Results of the multivariate analysis related to age, gender, race, and socioeconomic status are shown in table 4.1. While education (share of adults 25 and over without a high school diploma) appeared important in bivariate analysis, its effects were eliminated in the multivariate logistic regression. That analysis, however, showed a significant negative relationship with income (as well as important relationships with gender, race, and age). Children from areas with very low median income are the most likely to be obese; the odds of obesity relative to children from areas with upper income are 1.55 (95 percent confidence interval: 1.27–1.90). The spatial pattern is shown in figure 4.2.

2. *That children living near opportunities for exercise (specifically parks, greenways, after-school programs, and YMCAs) are less likely to be obese than other children.* For this analysis, the researchers calculated the straight-line distance from the residence of each child in the sample to the nearest public play space. The mean was 567 meters for obese children and 571 meters for other children. In other words, there was no significant difference in the distances for obese and nonobese children. (Note that this analysis was performed only for a smaller sample of 2,496 children who had been seen at the clinics only in calendar year 2000.)



**Figure 4.1: Prevalence of Obesity by Race and Gender Among Children Ages 4-18  
Marion County, 1996-2000**



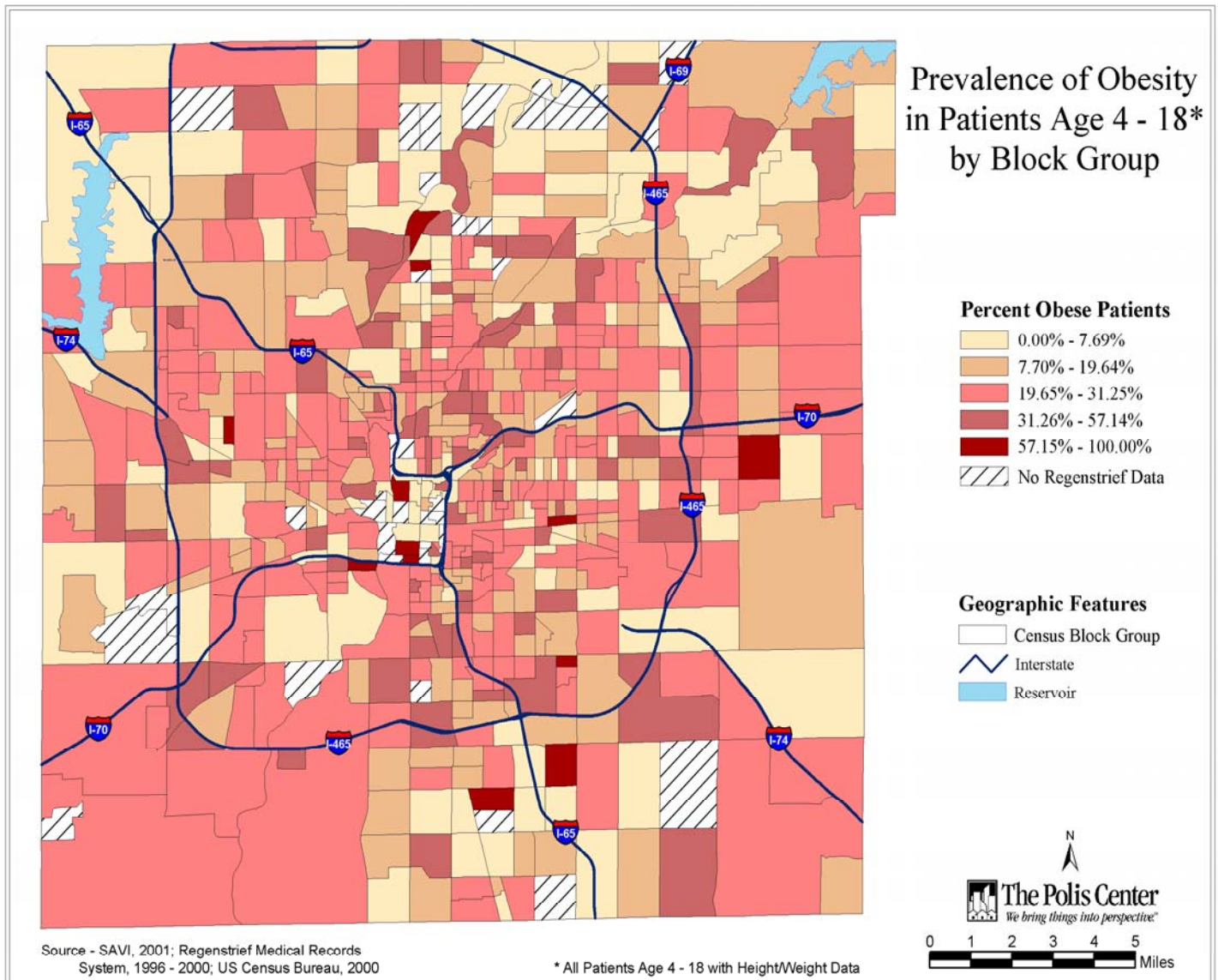


**Table 4.1**  
**Parameter Estimates, Standard Error of the Estimates and P-values from Multivariate Logistic Regression for Year 1996 – 2000 Study Cohort**

Parameter	Estimate	Standard error	P-value
Intercept (Obese)	-1.4933	0.1034	< 0.0001
Female	-0.0713	0.0636	0.2627
African American	-0.0464	0.0583	0.4261
Hispanic	0.3622	0.1297	0.0052
Other races	-0.4255	0.2105	0.0433
Female & African American	0.1752	0.0793	0.0271
Female & Hispanic	0.0269	0.1879	0.8863
Female & Other race	0.5892	0.2833	0.0375
Age	0.0746	0.0049	< 0.0001
Age & gender	-0.0109	0.0012	< 0.0001
Extremely low income	0.3654	0.1359	0.0072
Very low income	0.4380	0.1035	< 0.0001
Low income	0.3857	0.0988	< 0.0001
Moderate income	0.2960	0.1127	0.0086
Middle & upper income	0.2890	0.1123	0.0100



Figure 4.2: Prevalence of Obesity in Patients Age 4-18 by Block Group in Marion County





3. *That children living in areas with high exposure to social barriers (as measured by high crime rates, single-parent families, and those who are linguistically isolated) are more likely to be obese.* Working with the larger sample, with all measurements at the block group level, bivariate analysis showed that none of these factors was significantly predictive of obesity. The block group averages for crime densities (Part I crimes per square mile, 1996–2001) were 603 for normal children, 605 for overweight children, and 603 for obese children. Block group averages for single-parent families as a percentage of all households were the same (29 percent) for all three weight groups. Block group averages for linguistic isolation (percentage of families with English language difficulties according to the 2000 census) were also the same (2.2 percent) for all three groups.

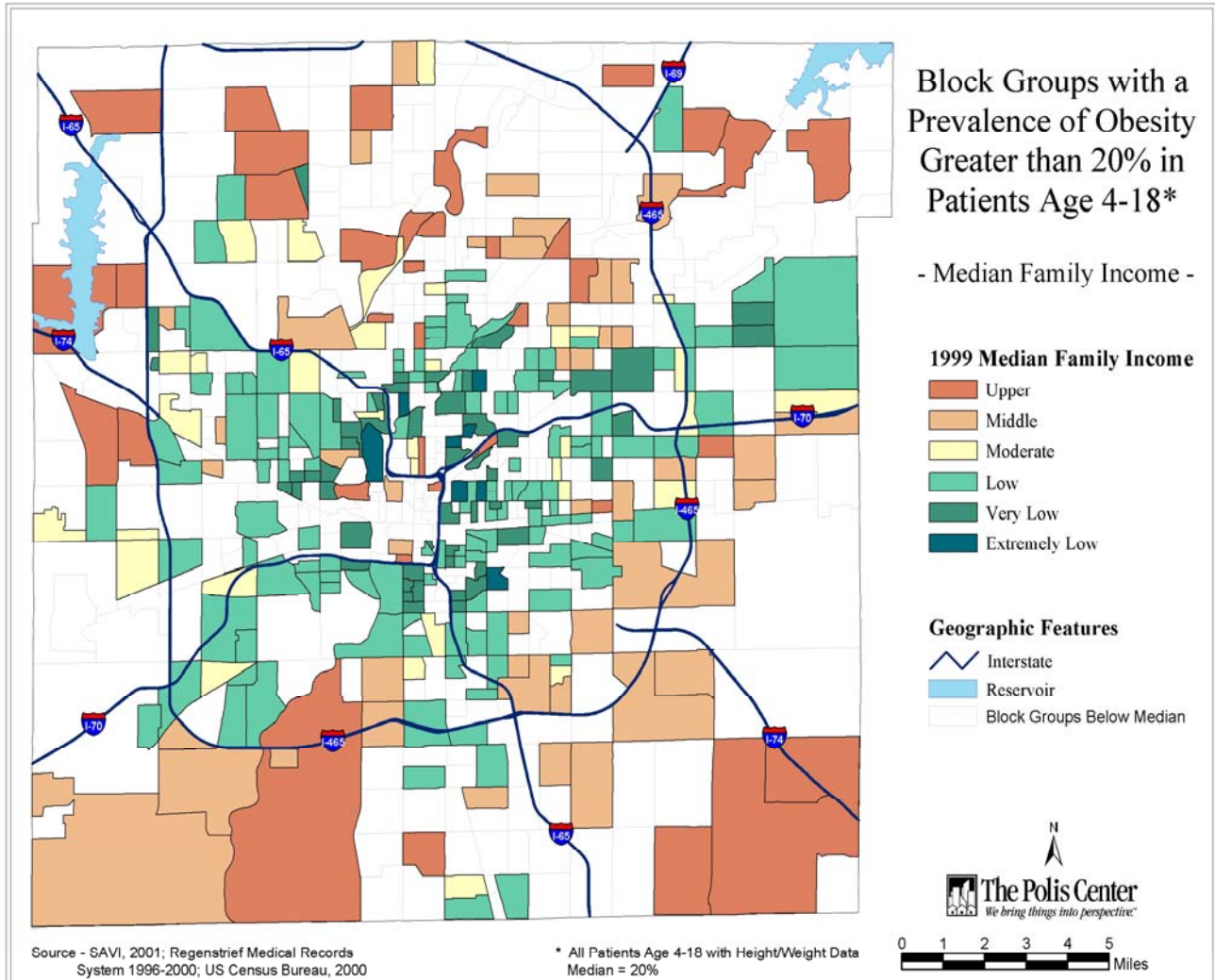
### ***Implications***

That obesity is strongly associated with SES (as measured by income) is noteworthy. To our knowledge, this is the first large population-based study to examine *environmental* (rather than individual) SES as a predictor of obesity in children. Characteristics of neighborhoods almost certainly have significant effects on the behavior of residents. Neighborhoods are where people make connections to others and become part of a social network. Therefore, neighborhoods can be seen as generating social and cultural capital that represents concrete targets for interventions aimed at improving self-management. If we can design strategies to combat the deleterious effects of low environmental SES, then we stand to empower vulnerable populations to make healthy choices.

The evidence did not support the other hypotheses, but that does not prove them incorrect. Other recent studies have found evidence to suggest that features of the physical environment (e.g., presence of sidewalks, enjoyable scenery) can be positive determinants of physical activity, and that other environmental factors (e.g., high rates of crime, the lack of a safe place to exercise) can be negative determinants (Brownson et al. 2001; King et al. 2000). It is likely that the measure used (linear distance) was too crude a measure/proxy for access to play space. Research using other, more sophisticated measures related to the other hypotheses seems warranted.



Figure 4.3: Highest Prevalence of Obesity and Median Family Income in Marion County





### ***Data potentials***

This study demonstrates that a large ongoing repository of data on patients and their care, supplied by a very large share of all local care providers (e.g., the Regenstrief System) can be used productively for policy analysis and, by logical extension, for helping to design and monitor program initiatives that may result from it. Few urban areas have mobilized and maintained the broad-scale agreement of providers to report in this way. The development of similar systems in other metropolitan areas is worth exploring.

### ***Community process***

This research has been timely for Indianapolis. The Alliance for Health Promotion there is forming a collaborative Strategic Thinking Coalition to address the issue of obesity. Stakeholders involved include the mayor's office, the United Way, health organizations, neighborhood organizations, educators, fitness and nutrition experts, members of the media, and local foundations. While the mission and goals of this new group are in the process of being defined, it is clear that it will become a strong forum for motivating action on the issue over the long term. The Coalition has decided to focus on both children and adults, recognizing the importance of affecting change through the family unit.

The Coalition is now reviewing the local report for this study. It expects to use it as a base for targeting resources to neighborhoods as well as understanding the issue and its determinants more broadly. The Coalition will also be involved in decisions on follow-up research to support the design of effective interventions.

The Polis Center has also met with the United Way of Central Indiana (its partner in SAVI) to discuss the implications of this analysis for local health initiatives. United Way plans to use the results to guide policy development in two of its impact councils: on Community Health and Well-Being and on Children and Youth. Plans are also being made to disseminate the report and its findings broadly within the local medical community.