

# Prevalence of Obesity Among Children in Six Chicago Communities: Findings from a Health Survey

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## SYNOPSIS

**Objectives.** We analyzed data from a community health survey to assess levels of obesity and overweight among children in some Chicago communities compared with national U.S. estimates.

**Methods.** Data came from the Sinai Improving Community Health Survey, which was conducted via face-to-face interviews with people living in six racially and ethnically diverse Chicago communities during 2002 and 2003. A stratified, three-stage probability study design was employed to obtain a representative sample from each community. Height and weight data reported by the primary caretakers of 501 randomly selected children aged 2–12 years were used to determine age- and gender-specific body mass index (BMI), which was then used to classify weight status (obese  $\geq$ 95th percentile for age and gender).

**Results.** Compared with 16.8% for the U.S., the prevalence of obesity was 11.8% in a non-Hispanic white community on Chicago's north side, 34.0% in a Mexican American community on the west side, and 56.4% in a non-Hispanic black community on the south side.

**Conclusions.** Surveillance of the childhood obesity epidemic at the local level is limited. Findings describe the extent of disparities in childhood overweight and obesity within one city and how local-level data can shape new initiatives for improved health, one community at a time.

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The United States has recently experienced an unprecedented rise in childhood obesity. Since the 1970s, the prevalence of obesity has more than doubled for preschool-aged children and tripled for school-aged children.<sup>1</sup> The most recent national data show that approximately 19% of school-aged children are obese; i.e., they have a body mass index (BMI) for age and gender  $\geq 95$ th percentile. A disproportionate number of non-Hispanic black (22%) and Mexican American (23%) children are affected compared with non-Hispanic white children (18%). When children who are overweight (BMI for age and gender  $\geq 85$ th percentile and  $< 95$ th percentile) are included, the percentage of children at an unhealthy weight nearly doubles (37%).<sup>2</sup>

While a growing number of studies are documenting the magnitude of the childhood obesity epidemic at the state<sup>3-6</sup> and city level,<sup>7-11</sup> there is a paucity of such information for smaller geographic areas. Information at the community or neighborhood level may be more relevant for mobilizing individuals and more effectively targeting community-specific interventions. In an effort to document childhood overweight at the community level, we examined data from the Sinai Improving Community Health Survey, a door-to-door, population-based

health survey conducted in six Chicago communities. The purpose of this article is to describe the survey results pertaining to childhood obesity in these communities. More specifically, we present the prevalence of childhood obesity and overweight in these communities compared with the U.S. as a whole and the city of Chicago as a whole, and discuss the impact of individual, household, and community risk factors on these levels.

## METHODS

### Study population

The Sinai Improving Community Health Survey, conducted by the Sinai Health System in Chicago from September 2002 to April 2003, is a cross-sectional study of six of Chicago's 77 officially designated community areas.<sup>12</sup>

Table 1 presents the social and demographic characteristics of the six diverse communities surveyed. Humboldt Park and West Town are two ethnically mixed, contiguous communities on the city's west side. Together, they contain the largest population of Puerto Rican residents in Chicago. Humboldt Park is the more disadvantaged of the two, with a higher

**Table 1. Selected characteristics of six Chicago community areas, Chicago, and the U.S. 2000 Census<sup>a</sup>**

	Humboldt Park	North Lawndale	Norwood Park	Roseland	South Lawndale	West Town	Chicago	United States
Total population	65,836	41,768	37,669	52,723	91,071	87,435	2,896,016	281,421,906
Total households	19,834	14,620	15,712	17,968	20,991	39,251	1,152,868	273,637,396
Vacant lots (percent)	10	15	2	7	8	10	8	9
Occupied households with any child <18 years of age <sup>b</sup> (percent)	58	54	25	42	64	28	34	36
Non-Hispanic black (percent)	47	94	1	98	13	9	36	12
Non-Hispanic white (percent)	3	1	88	1	4	39	31	69
Hispanic (percent)	48	5	6	1	83	47	26	13
Mexican American	24	3	3	0	76	25	18	7
Puerto Rican	18	0	0	0	1	16	4	1
Household income	\$28,728	\$18,342	\$53,402	\$38,237	\$32,320	\$38,915	\$38,625	\$41,994
High school graduates <sup>c</sup> (percent)	50	60	83	77	37	70	72	80
Unemployment <sup>d</sup> (percent)	18	26	3	17	12	7	10	6
Childhood poverty <sup>e</sup> (percent)	39	59	3	25	33	31	28	17

<sup>a</sup>Data sources: 2000 U.S. Census and Community Area Health Inventory 1992–2002, Vol. 1. Chicago Department of Public Health, December 2004.

<sup>b</sup>Total households include the total noninstitutionalized population living in households.

<sup>c</sup>High school graduates are among those 25 years of age and older who received a high school diploma or its equivalent.

<sup>d</sup>Unemployment rate is the percent of resident civilians older than age 16 who are without work and actively seeking work.

<sup>e</sup>Childhood poverty rate is the percent of children younger than age 18 in families with annual incomes below the federally defined poverty level in 1999 (2000 data).

unemployment rate and lower median household income than West Town. North Lawndale, a predominantly African American community, had the lowest median household income (\$18,300) and highest childhood poverty rate of selected communities. Roseland, another predominantly African American community, is located on the south side of the city. It has a median household income and childhood poverty rate similar to that of Chicago as a whole. South Lawndale is a mostly Mexican immigrant community contiguous to North Lawndale. Its median household income is slightly lower than Chicago's average. Norwood Park, a predominantly non-Hispanic white community on the north side, has the highest median household income and lowest childhood poverty rate of the selected communities. The median household incomes for all six communities ranged from \$18,000 to \$53,000, which may be compared with \$42,000 for the U.S. and \$39,000 for Chicago.

### Sample design

To obtain a representative sample from each community area, we employed a stratified, three-stage probability sampling design. At the first stage, 15 census blocks were selected from each community area. The blocks were selected using probability proportionate to size (PPS) sampling, such that blocks with a higher proportion of adults (aged 18 years and older) had a higher probability for selection.<sup>13</sup> In the second stage, households were selected at random from these blocks. A letter of notification was mailed to selected addresses about the survey and the interviewer's expected visit. In the third stage of selection, interviewers administered a household screener to select a random adult (aged 18–75) and random child (aged 0–12) using the Trodahl-Carter-Bryant method of selection.<sup>14</sup> Once a child was selected, the primary caretaker of that child was then identified and interviewed about the child's health. This respondent may or may not have been the same adult who completed the screener or the adult portion of the survey.

More details about the overall survey methodology along with other survey findings have been published elsewhere.<sup>15–17</sup> The Survey Research Laboratory (SRL) of the University of Illinois at Chicago was subcontracted to implement the survey. The survey was administered from September 2002 to April 2003. The Institutional Review Boards (IRBs) of the Sinai Health System and the University of Illinois at Chicago approved this study.

### Measures employed

Data presented in this article come from the child portion of the survey administered to primary caretakers of selected children. Questions were asked about the child's height, weight, and daily activities, including hours of television viewing and eating habits. Demographic information on both the household and the child (including gender, age, date of birth, race/ethnicity, household income, and place of birth) was also gathered for analyses.

The weight status of each child was calculated according to the Centers for Disease Control and Prevention (CDC) age- and gender-specific growth charts (available at <http://www.cdc.gov/growthcharts/>). Obese was defined as age- and gender-specific BMI  $\geq$ 95th percentile and overweight as BMI  $\geq$ 85th percentile and  $<$ 95th percentile. Children younger than age 2 ( $n=130$ ) and those for whom height and weight data were unavailable ( $n=180$ ) were excluded. The final sample for these analyses consisted of 501 children 2–12 years of age.

### Response rate

Of the original 4,888 addresses selected for this study, 10% were nonresidential. Overall, 76% of residents at the selected addresses could be contacted. The lowest contact rates were in North Lawndale (71%) and Humboldt Park (73%); the highest contact rate was in Norwood Park (85%). Once contacted, 77% of households completed the screener, and 87% of those who screened as eligible completed the interview. Interviewers made an extra effort to reach individuals by interviewing during the evening and weekend hours, contacting neighbors and key informants, offering the survey in English and Spanish, and making up to 12 personal attempts at different times to contact each household before the household was declared a "nonrespondent."

Based on conservative American Association for Public Opinion Research calculations, the overall response rate for the survey was 43.2%.<sup>18,19</sup> Our survey's response rate reflects the increasing difficulty of conducting survey research in urban environments, as urbanicity is a well-documented correlate of survey nonresponse.<sup>20</sup> Physical barriers to participation, restricted-access apartment buildings in particular, and respondent concerns with crime and privacy, the latter of which is reflected in strong IRB assurances and protections, made the collection of survey data in this urban setting difficult.

### Statistical analysis

All observations were weighted to account for the probability of selection (at the block, household, and respondent levels) and to ensure that the sample accurately reflected the sociodemographic characteristics of the base populations per the 2000 Census. Data were analyzed using SAS.<sup>21</sup>

Ninety-five percent confidence intervals (CIs) were estimated for all analyses and point estimates using a Taylor expansion approximation that accounts for sample design features including unequal weighting, stratification, and clustering.<sup>22</sup> The Rao-Scott Chi-square test was used to assess the association between respondent characteristics and the prevalence of overweight. Multiple logistic regression (using the SAS procedure PROC SURVEYLOGISTIC) was used to assess independent predictors of childhood overweight.<sup>23</sup>

### RESULTS

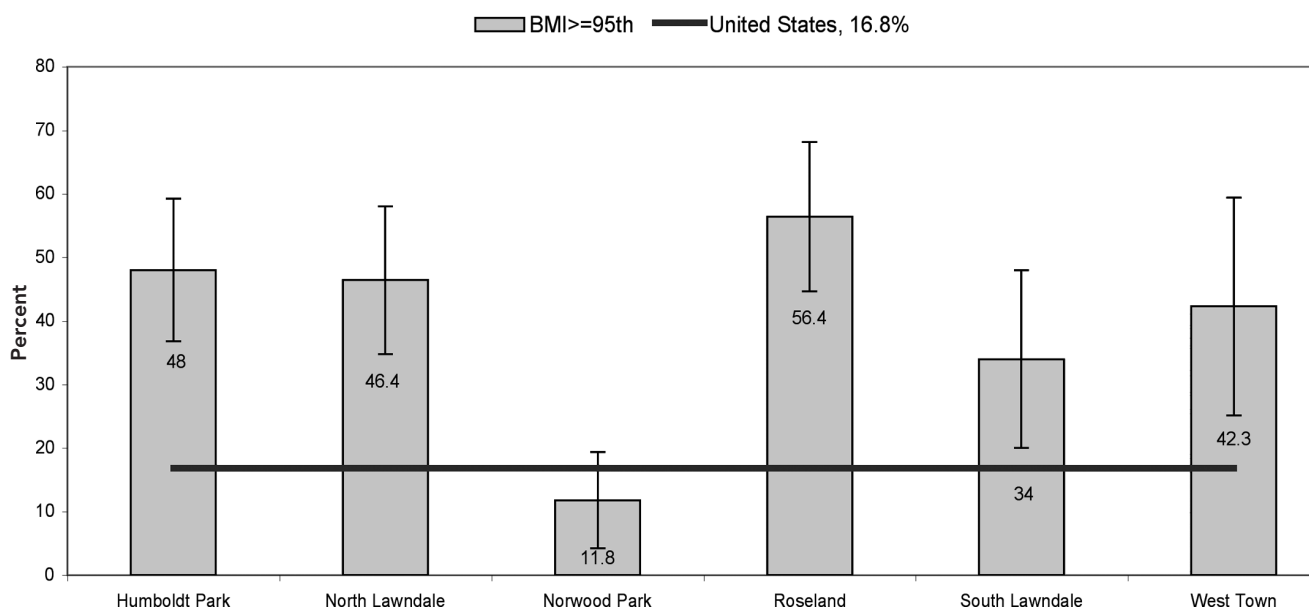
Of the 501 children, 52% were female and the mean age was 7.2 years, with no significant differences by community area. The sociodemographic characteristics of race and income reflect the 2000 Census estimates shown in Table 1.

Figure 1 presents the proportion of children aged

2–12 years who had a BMI for age  $\geq 95$ th percentile. The prevalence of obesity in the five predominantly minority communities was two to three times higher than the prevalence in the U.S. as a whole (16.8%, weighted mean for children aged 2–11 years), even when compared with non-Hispanic black (18.4%) or Mexican American (21.0%) children nationally. The proportion of obese children in the five minority communities was also significantly higher than that for the non-Hispanic white community of Norwood Park ( $p < 0.01$ ). For instance, children in South Lawndale (34.0%), a predominantly Mexican American community, were nearly three times as likely to be obese as children in Norwood Park (11.8%). Children in Roseland (56.4%), a predominantly African American community, were nearly five times as likely to be obese as children in Norwood Park.

The proportion of children who had a BMI for age  $\geq 85$ th percentile was also significantly higher in the five minority communities and lower in the non-Hispanic white community compared with the U.S. (Figure 2). For instance, the prevalence of overweight and obesity in West Town (68.7%) and Roseland (66.2%) was more than twice as high as the U.S. (32.8%) and more than three times as high as Norwood Park (19.2%,  $p < 0.001$ ).

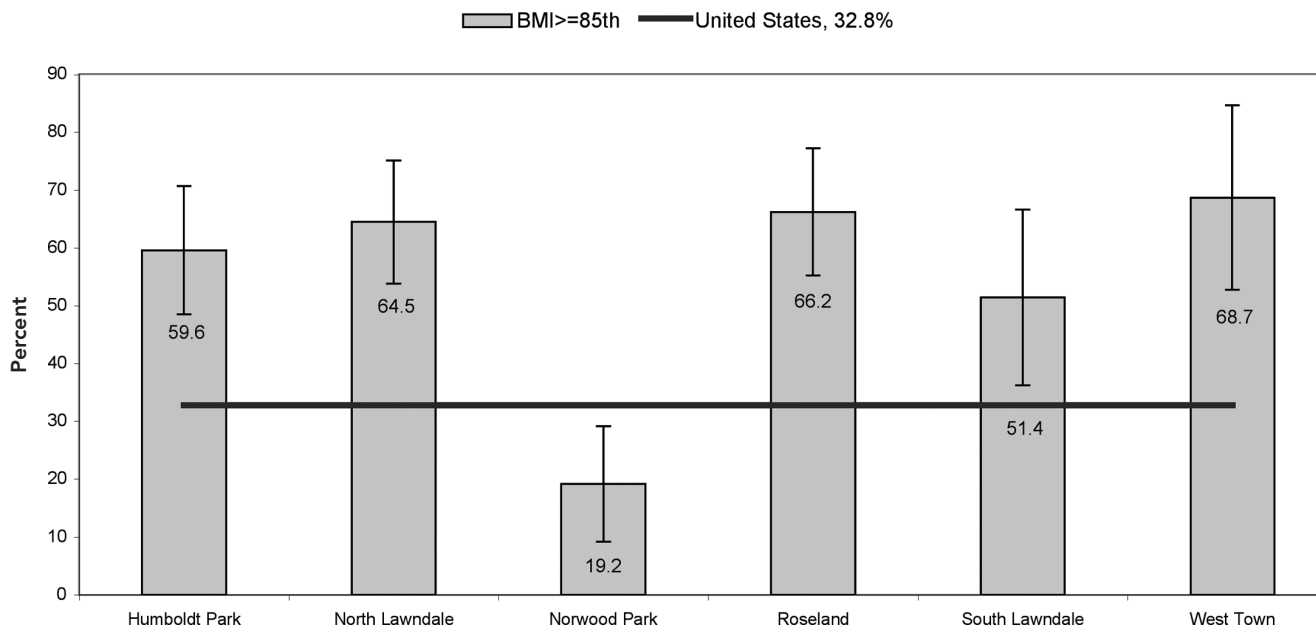
**Figure 1. Prevalence of obesity (BMI for age  $\geq 95$ th percentile) among children aged 2–12 years in six Chicago communities compared with the U.S.<sup>a</sup>**



<sup>a</sup>The U.S. prevalence is a weighted estimate from the National Health and Nutrition Examination Survey 2003–2004 obesity data for children aged 2–5 years (13.9%) and 6–11 years (18.9%).

BMI = body mass index

**Figure 2. Prevalence of overweight and obesity (BMI for age  $\geq$ 85th percentile) among children aged 2–12 years in six Chicago communities compared with the U.S.<sup>a</sup>**



<sup>a</sup>The U.S. prevalence is a weighted estimate from the National Health and Nutrition Examination Survey 2003–2004 for obese and overweight data for children aged 2–5 years (13.9%) and 6–11 years (18.9%).

BMI = body mass index

Table 2 presents the prevalence of obesity among children living in all six communities combined, stratified by eight demographic and behavioral risk factors that potentially influence weight status. No significant difference was observed in the proportion of obese children by gender, age, birthplace, or food consumption. However, when all of the factors significantly associated with an increased prevalence of obesity (i.e., community area, race/ethnicity, household income, and TV time) were entered into a logistic regression model, only race/ethnicity and household income remained significantly associated with obesity status (data not shown). Specifically, Mexican American (odds ratio [OR] = 5.34, CI 1.43, 19.90), Puerto Rican (OR = 4.88, CI 1.18, 20.16), and non-Hispanic black (OR = 4.64, CI 1.27, 17.03) children remained at significantly higher risk of being obese when compared with non-Hispanic white children. Children living in households with a household income of <\$50,000 a year were significantly more likely to be obese than children living in households with incomes of  $\geq$ \$50,000 a year (OR = 3.2, CI 1.4, 7.4). Other variables associated with activity and food consumption were almost all correlated in the expected direction, but not significantly so.

## DISCUSSION

Nearly half of the children (aged 2–12 years) in five of the six Chicago community areas were obese compared with 16.8% of children nationally.<sup>2</sup> To our knowledge, such elevated proportions of pediatric obesity have never before been documented. Moreover, when overweight children are considered, approximately two-thirds of surveyed children in the minority communities were at an unhealthy weight compared with one-third nationally.<sup>2</sup>

Interestingly, the prevalence of obesity far exceeded the prevalence of overweight by factors as high as four in Humboldt Park (48.0% obese vs. 11.6% overweight) and even five in Roseland (56.4% obese vs. 9.9% overweight). This is contrary to what would be expected given national survey estimates where the proportion of overweight is generally equal to or greater than the proportion of obese. In fact, the proportion of children classified only as overweight in these communities was not substantially higher than national estimates, despite the overall elevated obesity proportions. This shift in weight distribution suggests that the childhood obesity epidemic in five Chicago communities has escalated beyond the national epidemic.



**Table 2. Prevalence of childhood obesity (BMI for age  $\geq$ 95th percentile) in six Chicago community areas by selected demographic and behavioral risk factors, Sinai Improving Community Health Survey, 2002–2003**

All children 2–12 years	N=501	Percent obese	P-value <sup>a</sup>
Gender			
Male	248	41.4	0.517
Female	253	45.0	
Age			
2–5 years	171	48.9	0.164
6–12 years	330	40.5	
Race/ethnicity			
Non-Hispanic white (A) <sup>b</sup>	47	7.7	<0.0001
Non-Hispanic black (B) <sup>b</sup>	294	50.4	
Mexican American (B) <sup>b</sup>	68	46.3	
Puerto Rican (B) <sup>b</sup>	36	50.1	
Other (B) <sup>b</sup>	56	30.2	
Household income			
<\$30,000 (A) <sup>b</sup>	281	51.6	<0.0001
\$30,000–\$49,999 (A) <sup>b</sup>	107	37.6	
$\geq$ \$50,000 (B) <sup>b</sup>	92	17.0	
Missing income information (A) <sup>b</sup>	21	60.3	
Child born in the U.S.			
Yes	480	42.8	0.626
No	21	49.9	
Daily TV viewing hours			
$\leq$ 2	197	36.1	0.039
>2	304	48.7	
Fast food consumption			
At least once a week	324	46.6	0.192
Less than once a week	172	38.5	
Chip consumption			
At least four times a week	217	47.6	0.164
Less than four times a week	283	39.6	

<sup>a</sup>The *p*-values are based on the Rao-Scott Chi-square test. A *p*-value <0.05 is considered statistically significant.

<sup>b</sup>When more than two groups are being compared, those that differ significantly from one another are indicated by different letters (“A” and “B”). Determinations of statistical significance were made by examining 95% confidence intervals.

BMI = body mass index

TV = television

Only a few studies have estimated population-based childhood overweight/obesity prevalence at the local level (e.g., community, city, or county). For example, a 2001 survey of public school children in Los Angeles County found that 25% of children in the fifth grade were obese,<sup>8</sup> while a 2003 survey of 3,000 children in kindergarten through fifth grade in New York City Public Schools found that 24% of children were obese.<sup>9</sup> In addition, a school-based survey in Chicago found that 23% of 1,208 children (aged 3–7 years) were obese at school entry.<sup>11</sup> Though such estimates are high, no

study that we could find reported estimates of obesity as elevated as those reported in the five Chicago minority communities presented in this article.

Furthermore, the extent of such racial and ethnic disparities documented in our research is far more pronounced than previously reported in other geographies. For instance, the combined data for the six Chicago community areas indicate that Puerto Rican, Mexican American, and non-Hispanic black children in these communities are four to five times as likely to be obese as non-Hispanic white children. Existing data are unable to quantify the prevalence of obesity for local communities, let alone document the extent of racial and ethnic health disparities in these Chicago communities.

To date, there is inconsistent and limited evidence about the accuracy of proxy (caretaker or parental) reporting of height and weight for children.<sup>24–26</sup> Had we anticipated such extraordinary obesity estimates, we would have measured the height and weight of a subset of our sample for a more direct concordance with caretaker-reported data. However, given that this was not possible, we undertook two evaluation studies to examine the accuracy of survey estimates for subpopulations of the survey population.

The first study was conducted in an elementary school serving children from North Lawndale. A school nurse measured the height and weight of all 164 students aged 6–12 years in attendance on a given day. These measured estimates of obesity from this sample (60%) were actually higher than the prevalence for children aged 6–12 years in North Lawndale (46%) for our survey. The second study was administered in 2004 during a local Puerto Rican street festival. To gather data, tables were set up along the main avenue of this event, which runs through two of our surveyed communities, Humboldt Park and West Town. A convenience sample of 49 caretakers of children living in the Humboldt Park and West Town communities completed a brief health survey about a child who was in attendance at the festival. The child’s height and weight measurements were recorded as a part of the survey. The prevalence of obesity based on measured height and weight for children aged 2–12 years (*n*=38) from the street festival was 53%, which is similar to the 45% among children aged 2–12 years in Humboldt Park and West Town from our survey.<sup>27</sup> Results from both of these evaluation studies showed remarkable consistency with each other and with the community area estimates obtained from our survey.

### Methodological considerations

Some important methodological considerations must be taken into account when interpreting these findings. First, only six community areas could be surveyed with available resources for this study. The sampling plan was intended to represent each selected community area, and the survey findings are thus not representative of the city of Chicago or groups (e.g., non-Hispanic black or Mexican American) within it.

Second, national data on BMI came from measured heights and weights, whereas survey data were reported by caretakers. While self-reported heights and weights among adults consistently underestimate BMI when compared with measured data,<sup>28–30</sup> there is inconsistent and limited evidence about the accuracy of proxy (caretaker or parental) reporting of height and weight for children. One study found a tendency to underestimate height while accurately reporting weight, resulting in overestimates of BMI,<sup>24</sup> and another concluded that height and weight reported by parents provides a reliable assessment of childhood overweight/obesity.<sup>25</sup> Yet another found that parents accurately estimated height and underestimated weight, leading to underestimates of BMI.<sup>26</sup>

In the work reported herein, both evaluation studies were based on measured heights and weights, while the community survey was based on caretaker-reported heights and weights. Evaluation study participants were drawn from convenience samples of three of the six surveyed communities; they were not the same individuals who participated in the community survey. Nonetheless, the fact that both assessments produced obesity proportions similar to the survey findings for the same communities lends credibility to our survey findings, and suggests a relative level of accuracy when making comparisons with existing national data. Future studies should be undertaken to further examine the accuracy of caregiver-reported height and weight.

Third, because our survey data came from a larger, more comprehensive population-based survey to assess community health, the sample of children aged 2–12 years in some communities was smaller than in others (ranging from 51 children in West Town to 128 in North Lawndale). Sample size is associated with the power to detect a statistically significant difference and the precision of CIs. Despite variability in sample size, the differences among all of the five minority communities compared with Norwood Park were statistically significant. These highly significant comparisons speak to the very substantial proportions of childhood obesity in five of the surveyed communities that would not have been captured by city- or state-level means.

Lastly, in population-based surveys like this one,

nonresponse bias (i.e., the degree to which survey respondents and nonrespondents vary on the measures of interest) is an important challenge to the validity of the findings. For example, many studies that examine the impact of nonresponse bias on survey health findings suggest that respondents are often healthier than nonrespondents.<sup>31–33</sup> If similar patterns exist in this study, then morbid conditions such as obesity are likely to be underestimated.

### Implications

The community data presented here illustrate the limitations of existing data on childhood overweight/obesity. For example, all six of the surveyed communities reported proportions of obesity that were significantly different from the U.S. Even when examined by specific racial/ethnic group, the proportion of obese children in Roseland (56.4%) and North Lawndale (46.4%)—two non-Hispanic black but socioeconomically different communities—is more than twice the national estimate for non-Hispanic black children (18.4%). National data are unable to adequately detect the extent of such disparities. City-level means, which are often not even available, would likewise be inadequate in capturing the diversity in health of urban areas such as Chicago, as illustrated by the significant geographic variation in prevalence. Thus, the survey findings not only speak to the high proportions of obesity in some communities, but also call for local surveillance of overweight in children and for immediate targeted action.

The ultimate goal of conducting this survey was to develop targeted interventions. One example of how the availability of local-level data changed a community comes from Community Organizing for Obesity Prevention in Humboldt Park (CO-OP HP). Inspired by the alarmingly high prevalence of obesity among children revealed by the survey, local donors and community leaders have partnered with researchers from the Sinai Health System to address the obesity epidemic in the contiguous communities of Humboldt Park and West Town. CO-OP HP is addressing obesity-related concerns by raising awareness about weight status and healthy food choices, and collectively creating a healthier environment for families in Humboldt Park. More details about the CO-OP HP initiatives are described elsewhere.<sup>27</sup>

Obese children are more likely to become obese adults and are therefore at an increased risk of developing many life-debilitating conditions.<sup>34–38</sup> They are also more prone to psychosocial stressors such as low self-esteem and depression.<sup>39–42</sup> In fact, recent studies show that children are experiencing the medical and psychosocial consequences of their weight condition

even before reaching adulthood<sup>43-46</sup> and costing society more than \$127 million a year.<sup>47</sup> Because of these dramatic, long-term consequences, many studies suggest that the obesity epidemic may eventually reduce overall life expectancy.<sup>46,48</sup>

## CONCLUSION

The levels of obesity documented in this article are disproportionately high. It may be that these survey findings are unique to these communities or are comparable to what one might find in similar urban communities—or that they portend an obesity future even worse than the present. In any of these cases, it is evident that further investigation on how best to intervene and monitor the childhood obesity epidemic is necessary, and that both national and local efforts are needed to stem the tide.

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## REFERENCES

1. Strauss RS, Pollack HA. Epidemic increase in childhood overweight, 1986-1998. *JAMA* 2001;286:2845-8.
2. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA* 2006;295:1549-55.
3. Overweight among students in grades K-12—Arkansas, 2003-04 and 2004-05 school years. *MMWR Morb Mortal Wkly Rep* 2006; 55(1):5-8.
4. Hoelscher DM, Day RS, Lee ES, Frankowski RF, Kelder SH, Ward JL, et al. Measuring the prevalence of overweight in Texas school-children. *Am J Public Health* 2004;94:1002-8.
5. Kolbo JR, Penman AD, Meyer MK, Speed NM, Molaison EF, Zhang L. Prevalence of overweight among elementary and middle school students in Mississippi compared with prevalence data from the Youth Risk Behavior Surveillance System. *Prev Chronic Dis* 2006;3: A84.
6. Sherry B, Mei Z, Scanlon KS, Mokdad AH, Grummer-Strawn LM. Trends in state-specific prevalence of overweight and underweight in 2- through 4-year-old children from low-income families from 1989 through 2000. *Arch Pediatr Adolesc Med* 2004;158:1116-24.
7. Park MK, Menard SW, Schoolfield J. Prevalence of overweight in a triethnic pediatric population of San Antonio, Texas. *Int J Obes Relat Metab Disord* 2001;25:409-16.
8. Lee NE, De AK, Simon PA. School-based physical fitness testing identifies large disparities in childhood overweight in Los Angeles. *J Am Diet Assoc* 2006;106:118-21.
9. Thorpe LE, List DG, Marx T, May L, Helgeson SD, Frieden TR. Childhood obesity in New York City elementary school students. *Am J Public Health* 2004;94:1496-500.
10. Jehn ML, Gittelsohn J, Treuth MS, Caballero B. Prevalence of overweight among Baltimore city schoolchildren and its associations with nutrition and physical activity. *Obesity* 2006;14:989-93.
11. Mason M, Meleedy-Rey P, Christoffel KK, Longjohn M, Garcia MP, Ashlaw C. Prevalence of overweight and risk of overweight among 3- to 5-year-old Chicago children, 2002-2003. *J Sch Health* 2006;76:104-10.
12. Chicago Fact Book Consortium, editor. Local community fact book: Chicago metropolitan area, 1990. Chicago: Academy Chicago Publishers; 1995.
13. Kish L. Survey sampling. New York: John Wiley & Sons, Inc.; 1965.
14. Trolldahl VC, Carter RE. Random selection of respondents within households in phone surveys. *J Marketing Research* 1964;1:71-6.
15. Shah AM, Whitman S, Silva A. Variations in the health conditions of 6 Chicago community areas: a case for local-level data. *Am J Public Health* 2006;96:1485-91.
16. Dell JL, Whitman S, Shah AM, Silva A, Ansell D. Smoking in 6 diverse Chicago communities—a population study. *Am J Public Health* 2005;95:1036-42.
17. Shah AM, Williams C, Delgado J, Whitman S. A participatory approach to designing a community health survey: a report on the survey development process. Chicago: Sinai Health System; 2003. Also available from: URL: [http://www.suhichicago.org/files/publications/Methodology%20Paper-final%20report%20\(2\).pdf](http://www.suhichicago.org/files/publications/Methodology%20Paper-final%20report%20(2).pdf) [cited 2007 Nov 16].
18. Johnson TP, Owens L. Survey response rate reporting in the professional literature. In: Proceedings of the Section on Survey Research Methods, American Statistical Association (2003). Alexandria (VA): American Statistical Association; 2004. p. 127-33. Also available from: URL: [http://www.srl.uic.edu/publist/Conference/rr\\_reporting.pdf](http://www.srl.uic.edu/publist/Conference/rr_reporting.pdf) [cited 2007 Nov 16].
19. American Association for Public Opinion Research. Standard definitions: final dispositions of case codes and outcome rates for surveys. Ann Arbor (MI): AAPOR; 2000.
20. Groves RM, Couper MP. Nonresponse in household interview surveys. New York: John Wiley & Sons, Inc.; 1998.
21. SAS Institute Inc. SAS: version 9.1.3 for Windows®. Cary (NC): SAS Institute Inc.; 2002-2003.
22. Lee ES, Forthofer RN, Lorimor RJ. Analyzing complex survey data. Newbury Park (CA): Sage Publications, Inc.; 1989.
23. SAS Institute Inc. SAS/STAT® 9.1 user's guide. Cary (NC): SAS Institute Inc.; 2004.
24. Davis H, Gergen PJ. Mexican-American mothers' reports of the weights and heights of children 6 months through 11 years old. *J Am Diet Assoc* 1994;94:512-6.
25. Sekine M, Yamagami T, Hamanishi S, Kagamimori S. Accuracy of the estimated prevalence of childhood obesity from height and weight values reported by parents: results of the Toyama Birth Cohort study. *J Epidemiol* 2002;12:9-13.
26. Huybrechts I, De Bacquer D, Van Trimpont I, De Backer G, De Hanauw S. Validity of parentally reported weight and height for preschool-aged children in Belgium and its impact on classification into body mass index categories. *Pediatrics* 2006;118:2109-18.
27. Estarziou M, Morales M, Rico A, Margellos-Anast H, Whitman S, Christoffel KK. The community survey in Humboldt Park: preventing obesity and improving health. Chicago: Sinai Urban Health Institute; 2006.
28. Palta M, Prineas RJ, Berman R, Hannan P. Comparison of self-reported and measured height and weight. *Am J Epidemiol* 1982; 115:223-30.
29. Kuskowska-Wolk A, Karlsson P, Stolt M, Rossner S. The predictive validity of body mass index based on self-reported weight and height. *Int J Obes* 1989;13:441-53.
30. Kuczmarski MF, Kuczmarski RJ, Najjar M. Effects of age on validity of self-reported height, weight, and body mass index: findings from the Third National Health and Nutrition Examination Survey, 1988-1994. *J Am Diet Assoc* 2001;101:28-34.
31. Cohen G, Duffy JC. Are nonrespondents to health surveys less healthy than respondents? *Journal of Official Statistics* 2002;18:13-23.
32. Beard CM, Lane AW, O'Fallon WM, Riggs BL, Melton LJ 3rd. Comparison of respondents and nonrespondents in an osteoporosis study. *Ann Epidemiol* 1994;4:398-403.
33. Shahar E, Folsom AR, Jackson R. The effect of nonresponse on prevalence estimates for a referent population: insights from a population-based cohort study. *Atherosclerosis Risk in Communities (ARIC) Study Investigators. Ann Epidemiol* 1996;6:498-506.
34. Nesbitt SD, Ashaye MO, Stettler N, Sorof JM, Goran MI, Parekh R, et al. Overweight as a risk factor in children: a focus on ethnicity. *Ethn Dis* 2004;14:94-110.



35. Freedman DS, Dietz WH, Srinivasan SR, Berenson GS. The relation of overweight to cardiovascular risk factors among children and adolescents: the Bogalusa Heart Study. *Pediatrics* 1999;103(6 Pt 1):1175-82.
36. Kenchaiah S, Evans JC, Levy D, Wilson PW, Benjamin EJ, Larson MG, et al. Obesity and the risk of heart failure. *N Engl J Med* 2002;347:305-13.
37. Polednak AP. Trends in incidence rates for obesity-associated cancers in the US. *Cancer Detect Prev* 2003;27:415-21.
38. He XZ, Baker DW. Body mass index, physical activity, and the risk of decline in overall health and physical functioning in late middle age. *Am J Public Health* 2004;94:1567-73.
39. Strauss RS. Childhood obesity and self-esteem. *Pediatrics* 2000;105:e15.
40. Davison KK, Birch LL. Weight status, parent reaction, and self-concept in five-year-old girls. *Pediatrics* 2001;107:46-53.
41. Strauss RS, Pollack HA. Social marginalization of overweight children. *Arch Pediatr Adolesc Med* 2003;157:746-52.
42. Erickson SJ, Robinson TN, Haydel KF, Killen JD. Are overweight children unhappy?: body mass index, depressive symptoms, and overweight concerns in elementary school children. *Arch Pediatr Adolesc Med* 2000;154:931-5.
43. Pi-Sunyer FX. Medical hazards of obesity. *Ann Intern Med* 1993;119(7 Pt 2):655-60. Review.
44. Dietz WH. Health consequences of obesity in youth: childhood predictors of adult disease. *Pediatrics* 1998;101(3 Pt 2):518-25. Review.
45. Hannon TS, Rao G, Arslanian SA. Childhood obesity and type 2 diabetes mellitus. *Pediatrics* 2005;116:473-80.
46. Dietz WH. Childhood weight affects adult morbidity and mortality. *J Nutr* 1998;128(2 Suppl):411S-414S. Review.
47. Goran MI, Ball GD, Cruz ML. Obesity and risk of type 2 diabetes and cardiovascular disease in children and adolescents. *J Clin Endocrinol Metab* 2003;88:1417-27. Review.
48. Fontaine KR, Redden DT, Wang C, Westfall AO, Allison DB. Years of life lost due to obesity. *JAMA* 2003;289:187-93.