Journal of Medical Systems, Vol. 28, No. 4, August 2004 (© 2004)

Diversity and Disparity: GIS and Small-Area Analysis in Six Chicago Neighborhoods

Steven Whitman,[1,2,3] Abigail Silva,[1] Ami Shah,[1] and David Ansell[1,2]

Small-area analysis in health is essential in uncovering local-level disparities often masked by health estimates for large areas (e.g., cities, counties, states). In this context, 14 health status indicators (HSIs) were examined for six Chicago community areas that reflect the substantial diversity of the city. HSIs were compared over time (from 1989–90 to 1999–2000) and across community areas. Important disparities among these community areas in mortality rates, birth outcomes, and infectious diseases were found. In many cases the disparities were in the expected direction with the richest and predominantly White community area experiencing the lowest rates. However, some surprises did manifest themselves. For example, only the poorest community area experienced a statistically significant decline in the infant mortality rate. Since so much of attention is now being paid to reducing and eliminating these disparities, it is important to examine their existence to better understand how to minimize them.

KEY WORDS: small-area analysis; mortality; morbidity; community health; health disparities.

INTRODUCTION

Geographic and small-area analysis is widespread now, having gained prominence in health research from some of the initial studies by John Wennberg and his colleagues about variations in surgical procedures[(1)] and other aspects of health care delivery,[(2)] some of which are still ongoing.[(3)] Such analyses have been used recently to combat the strategic placement of tobacco and alcohol advertising in certain neighborhoods,[(4)] to assess the relationship between income inequality and infant mortality in Brazil[(5)] and between neighborhood socioeconomic factors and birth weight in California,[(6)] to measure the prevalence of drug use in various school districts,[(7)] and to track the movement of the AIDS epidemic.[(8,9)] In addition, a new book addresses the relationship between geography (neighborhood) and health in great detail.[(10)]

[1]Sinai Urban Health Institute, Sinai Health System, Chicago, Illinois.
[2]The Chicago Medical School, North Chicago, Chicago, Illinois.
[3]To whom correspondence should be addressed; e-mail: whist@sinai.org.

0148-5598/04/0800-0397/0 © 2004 Plenum Publishing Corporation

In a large city like Chicago, small-area analysis is essential to understanding the dynamics involved at the community level. It can also help uncover the nature of health disparities that may exist among different groups of residents living in the same community. This is especially noteworthy since one of the overarching goals for Healthy People 2000 was to reduce health disparities among different groups[11] while Healthy People 2010 calls for the elimination of these disparities.[12]

Chicago is an excellent venue for a study of small areas in pursuit of these goals. In 2000 it was the third largest city in the United States, with a diverse population of almost 3,000,000, consisting of 36% non-Hispanic Black people, 31% non-Hispanic White people, and 26% Hispanic people. Chicago is also one of the most segregated cities in the United States, having been labeled "hypersegregated" by a seminal study.[13] Relevantly, the city is also divided into 77 officially designated community areas which often serve as loci for describing health in Chicago and for implementing community-based interventions as well. These community areas are also fully amenable to a geographical information systems (GIS) analysis.

Six community areas that reflect the racial and ethnic diversity of the city were selected for this analysis. The purpose of this report is to analyze health disparities that occur at the community level in one urban center in the United States, and to situate the findings in the context of the Healthy People 2010 goal so as to eliminate disparities in health.

METHODOLOGY

The Communities

Over 60 years ago sociologists at the University of Chicago divided the city into 75 community areas on the basis of social, cultural, and geographic factors (such as census tracts). These soon became officially designated and two more were added, producing a total of 77 community areas.[14] The following six community areas were selected for this analysis: North Lawndale, South Lawndale, Humboldt Park, West Town, Roseland, and Norwood Park. As Fig. 1 indicates, two communities are located slightly north and west of the downtown area, two are slightly south and west, one is on the far south side and another is on the far north side. Table I illustrates how different these community areas are. North Lawndale is almost entirely African American, South Lawndale is almost entirely Mexican, Humboldt Park is about half African American, a quarter Puerto Rican and a quarter Mexican, West Town is about half White, a quarter Puerto Rican and a quarter Mexican, Roseland is almost entirely African American, and Norwood Park is almost all White. The median household incomes for the six community areas, which range from $18,000 to $53,000, may be compared with about $42,000 for the United States and $39,000 for Chicago. As can be seen, the percent of the population that is Black in each community area is closely correlated with median household income, the poverty rate, and the unemployment rate.

Health Measures

The Centers for Disease Control and Prevention recently issued a report based upon 17 health status indicators (HSIs) that are to be used to monitor the nation's

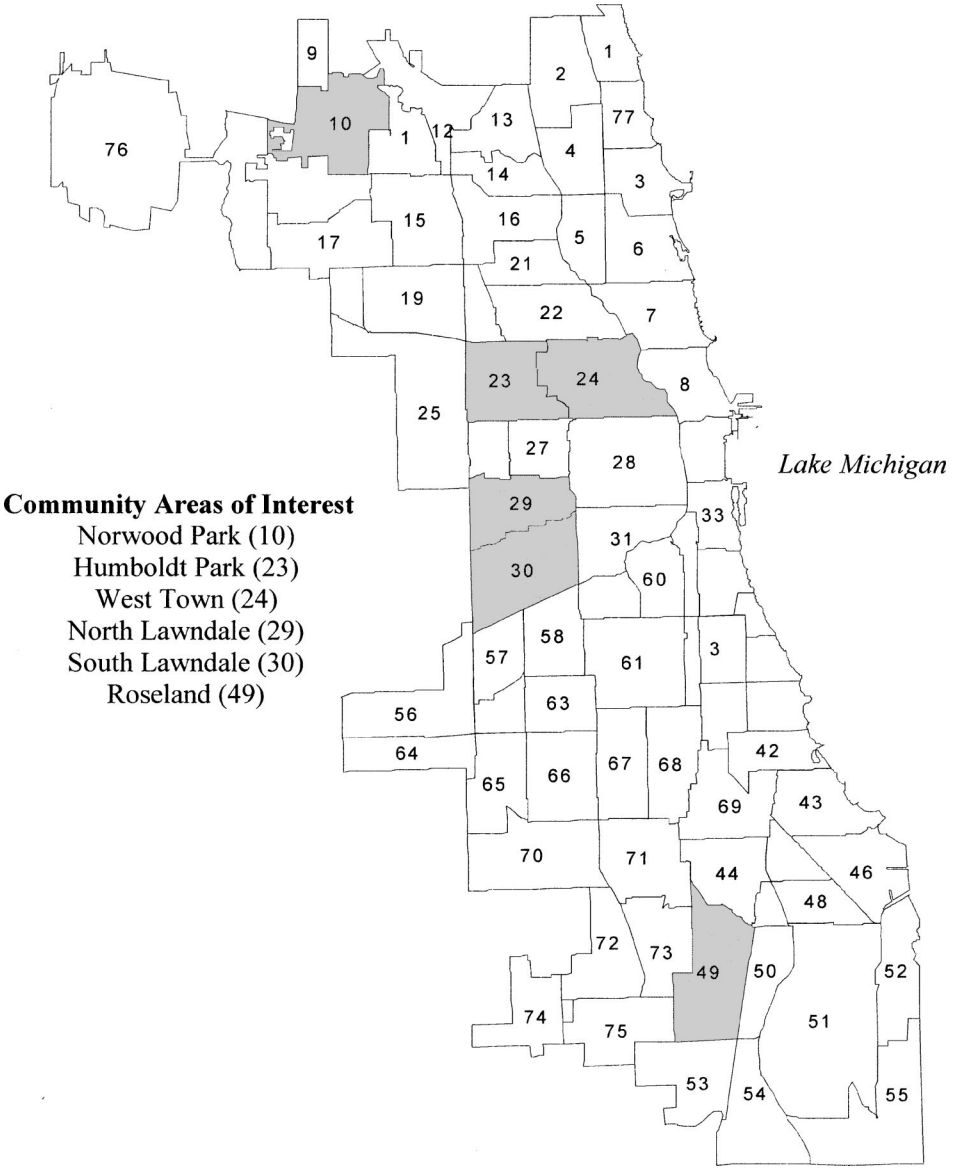

Fig. 1. Map of Chicago's community areas.

health as we pursue the Healthy People Goals for 2000 and 2010.[15] Fourteen of these 17 HSIs were used in a recent examination of Chicago's progress on reducing racial health disparities.[16] These 14 HSIs are listed in Table II and employed for this analysis as well.

All 14 HSIs were computed for the six community areas. Calculations combined 2 years of data to increase statistical stability. To allow examination of time trends, two intervals were selected: 1989–90 and 1999–2000.

Table I. Demographic and Social Characteristics of the Six Community Areas, 2000

Demographic measures[a]	Norwood Park[(10)]	Humboldt Park[(23)]	West Town[(24)]	North Lawndale[(29)]	South Lawndale[(30)]	Roseland[(49)]	Chicago
Total population	37,669	65,836	87,435	41,768	91,071	52,723	2,896,016
Total number of households	15,440	17,830	35,324	12,402	19,213	16,750	1,061,928
Average age	43	25	30	26	25	35	32
% Non-Hispanic Blacks	1	47	9	94	13	98	36
% Non-Hispanic Whites	88	3	39	1	4	1	31
% Hispanic	6	48	47	5	83	1	26
% High school graduates	83	50	70	60	37	77	72
% College degree or higher	25	5	35	7	5	14	6
Median household income ($)	53,402	28,728	38,915	18,342	32,320	38,237	38,625
Unemployment rate[b]	3	18	7	26	12	17	10
Individual poverty rate[c]	4.3	31.1	20.7	45.2	26.5	17.6	19.6

[a] Demographic measures are from the 2000 Census online.
[b] Unemployment rate is the percent of resident civilians over age 16 who are without work and actively seeking work.
[c] Individual poverty rate is the percent of residents with annual incomes below the federally defined poverty level in 1999.

Table II. The Fourteen Health Status Indicators (HSIs) Employed in This Study

Mortality rates	(ICD-9 codes)	(ICD-10 codes)
Total		
Heart disease	(390-398, 402, 404-429)	(100-109, 111, 113, 120-151)
Stroke	(430-434, 436-438)	(160-169)
Lung cancer	(162.0)	(C33-C34)
Female breast cancer	(174)	(C50)
Motor vehicle crash	(E810-E825)	(V02-V04, V09.0, V09.2, V12-V14, V19.0-V19.2, V19.4-V19.6, V20-V79, V80.3-V80.5, V81.0-V81.1, V82.0-V82.1, V83-V86, V87.0-V87.8, V88.0-V88.8, V89.0, V89.2)
Suicide	(E950-E959)	(X60-X84, Y87.0)
Homicide	(E960-E978)	(X85-Y09, Y87.1, Y35, Y89.0)
Birth-related outcomes		
Infant mortality rate		
Percent low birth weight		
Percent of women with no prenatal care in the first trimester		
Live birth rates for females age 15–17 years		
Communicable disease incidence		
Tuberculosis		
Primary and secondary syphilis		

Measures Employed

- The eight indicators of mortality are age-adjusted using the 2000 U.S. population as the standard and expressed per 100,000 population. Corresponding ICD-9 (for 1989–90 data) and ICD-10 codes (for 1999–2000 data) are listed in Table II. Comparability ratios were used to make the 1989–90 cause-specific mortality rates comparable to the 1999–2000 rates.[17]
- The infant mortality rate is expressed as the number of deaths among infants (in the 1st year of life) per 1000 live births.
- Low birth weight (<2500 g) and women with no prenatal care in the first trimester are expressed as percentages.
- Live birth rates for females aged 15–17 are expressed per 1000 women.
- The two communicable disease incidence rates (tuberculosis [TB] and primary and secondary [P&S] syphilis) are calculated per 100,000 population (unadjusted for age).

Communicable disease data were derived from their respective registries maintained by the Chicago Department of Public Health. All other numerators were abstracted from the vital records (birth and death) files maintained by the Illinois Department of Public Health and provided to us by the Chicago Department of Public Health. These files contained community area of residence data generated by GIS software. Denominators (population sizes) were obtained from the 1990 and 2000 Chicago censuses.

Statistical Analyses

To evaluate each community's change in the HSIs over time, data for 1989–90 and 1999–2000 were compared. A total of 95% confidence intervals were generated for each HSI. The difference between the two rates was regarded as being statistically significant if the respective confidence intervals did not overlap.

The extent of health disparities at the community level was also assessed. For each HSI, rate ratios (RRs) that compared the measures from the five community areas consisting predominately of people of color to Norwood Park, the predominately White and higher SES community area, were computed. A Taylor Series expansion was employed to generate 95% confidence intervals.[18] Statistical significance of a rate ratio was claimed if a confidence interval did not include the null value of 1. When two RRs were compared, their difference was considered statistically significant if their confidence intervals did not overlap.

RESULTS

Table III presents the 14 HSIs for the six community areas for 1989–90 and 1999–2000 and their respective 95% confidence intervals. Note that the vast majority of HSIs for each community area improved (i.e., the rates decreased) over this 10-year interval and a fair number of the changes (48 out of 84 or 57%) were statistically significant ($P < 0.05$). Note that for all six community areas only three HSIs worsened significantly (no prenatal care in the first trimester (twice) and suicide) while 45 improved significantly. Among these, mortality from all causes, heart disease, stroke, and breast cancer improved for all six community areas while lung cancer mortality, homicide, and birth rate among 15- to 17-year-old females improved for four of the community areas. The largest number of significantly improved HSIs occurred in North Lawndale[10] and Roseland[9] (predominantly Black community areas) while the fewest occurred in Norwood Park[5] (predominantly White community area).

Some of the improvements were quite substantial. For example, all-cause mortality (Table IV) decreased by 20% or more for North Lawndale, South Lawndale, and West Town. The community area with by far the lowest all-cause mortality rate in 1989–90 (Norwood Park at 877 per 100,000 population) showed the smallest decline (6%) over this 10-year period. This may be compared with a city-wide decrease of 14%.

Analogously the infant mortality rate declined for Chicago (by 32.5%) and for all community areas, although only the change for North Lawndale was statistically significant (Table V).

Table VI contains RRs for each of the 13 HSIs for 1999–200. (P&S syphilis is not included since these rates were 0 for Norwood Park.) Norwood Park is employed as the reference community area to which the other five are compared. Consider homicide rates as an example. The homicide rate in Humboldt Park was 10.2 times higher than the rate in Norwood Park. The remaining ratios were 2.7 for West Town, 8.8 for North Lawndale, 2.2 for South Lawndale, and 7.0 for Roseland. All of these RRs were statistically significant ($P < 0.05$). Of course, each HSI produced variable results for these comparisons. Not all RRs were this large. For example,

Table III. Fourteen Health Status Indicators (With 95% Confidence Intervals) for Each of the Six Community Areas, 1989–90 and 1999–2000

	1989–90	95% CI	1999–2000	95% CI	Sig. change
Mortality rates for each community area					
All cause					
Norwood Park	877.2	(863.4, 891.0)	821.0	(807.7, 834.2)	↓
Humboldlt Park	1259.2	(1240.7, 1277.8)	1089.3	(1072.1, 1106.6)	↓
West Town	1143.4	(1125.9, 1160.8)	888.6	(873.7, 903.5)	↓
North Lawndale	1622.3	(1600.0, 1644.6)	1300.9	(1281.2, 1320.6)	↓
South Lawndale	1143.4	(1127.4, 1159.3)	861.6	(847.6, 875.7)	↓
Roseland	1429.5	(1410.3, 1448.7)	1247.6	(1229.8, 1265.5)	↓
Heart disease					
Norwood Park	335.1	(327.5, 342.8)	284.3	(276.9, 291.7)	↓
Humboldlt Park	457.1	(447.0, 467.2)	340.9	(332.3, 349.4)	↓
West Town	387.4	(378.0, 396.7)	314.8	(306.3, 323.2)	↓
North Lawndale	462.6	(451.0, 474.2)	373.0	(362.8, 383.1)	↓
South Lawndale	385.9	(377.3, 394.5)	266.0	(258.9, 273.1)	↓
Roseland	454.8	(444.5, 465.2)	395.8	(386.6, 405.1)	↓
Stroke					
Norwood Park	61.5	(58.9, 64.1)	52.8	(50.0, 55.6)	↓
Humboldlt Park	77.6	(73.7, 81.5)	42.3	(38.8, 45.8)	↓
West Town	54.1	(50.7, 57.6)	45.3	(42.3, 48.3)	↓
North Lawndale	87.3	(82.7, 91.8)	76.3	(72.0, 80.5)	↓
South Lawndale	77.6	(73.8, 81.4)	44.6	(41.8, 47.5)	↓
Roseland	97.1	(92.4, 101.8)	72.4	(68.3, 76.5)	↓
Lung cancer					
Norwood Park	48.0	(44.4, 51.6)	48.9	(45.5, 52.3)	
Humboldlt Park	73.3	(68.5, 78.1)	59.1	(55.0, 63.3)	↓
West Town	61.3	(57.2, 65.4)	52.4	(48.9, 56.0)	↓
North Lawndale	83.6	(78.5, 88.7)	88.3	(83.2, 93.3)	
South Lawndale	56.4	(52.7, 60.0)	36.0	(32.9, 39.2)	↓
Roseland	86.9	(81.7, 92.1)	72.5	(68.0, 76.9)	↓
Breast cancer					
Norwood Park	37.6	(34.2, 41.0)	29.8	(26.9, 32.8)	↓
Humboldlt Park	59.4	(55.7, 63.0)	20.9	(18.1, 23.8)	↓
West Town	29.8	(26.9, 32.7)	22.5	(19.8, 25.3)	↓
North Lawndale	44.3	(40.3, 48.3)	34.6	(31.1, 38.0)	↓
South Lawndale	23.9	(21.0, 26.7)	16.0	(13.3, 18.6)	↓
Roseland	56.4	(52.1, 60.7)	34.0	(30.7, 37.2)	↓
Motor vehicle accident					
Norwood Park	10.6	(8.1, 13.1)	11.7	(9.3, 14.1)	
Humboldlt Park	15.3	(12.8, 17.9)	13.1	(10.5, 15.7)	
West Town	9.5	(7.3, 11.7)	10.8	(8.6, 13.0)	
North Lawndale	22.4	(18.9, 25.9)	7.8	(5.7, 9.8)	↓
South Lawndale	13.1	(10.5, 15.6)	13.2	(10.7, 15.6)	
Roseland	16.8	(13.8, 19.8)	18.3	(15.3, 21.3)	
Suicide					
Norwood Park	20.2	(17.1, 23.3)	10.4	(8.3, 12.6)	↓
Humboldlt Park	7.7	(5.6, 9.8)	10.7	(8.5, 13.0)	
West Town	12.7	(10.4, 15.1)	8.4	(6.4, 10.5)	
North Lawndale	4.8	(3.4, 6.3)	13.6	(11.0, 16.1)	↑
South Lawndale	7.0	(5.1, 8.9)	2.4	(1.2, 3.5)	↓
Roseland	6.6	(4.7, 8.5)	7.6	(5.9, 9.3)	
Homicide					
Norwood Park	5.0	(3.3, 6.7)	4.4	(2.9, 5.9)	
Humboldlt Park	51.0	(46.0, 56.1)	44.7	(39.8, 49.6)	
West Town	29.7	(25.9, 33.6)	11.6	(9.1, 14.2)	↓
North Lawndale	67.7	(61.8, 73.5)	38.5	(33.9, 43.1)	↓

Table III. Continued

	1989–90	95% CI	1999–2000	95% CI	Sig. change
South Lawndale	19.5	(16.5, 22.6)	9.6	(7.4, 11.8)	↓
Roseland	46.6	(41.6, 51.6)	30.5	(26.4, 34.6)	↓
Infant mortality					
Norwood Park	12.3	(4.7, 20.0)	3.5	(0.0, 7.5)	
Humboldlt Park	15.1	(11.3, 18.9)	13.2	(9.2, 17.3)	
West Town	15.9	(12.3, 19.6)	10.6	(6.9, 14.2)	
North Lawndale	26.9	(21.2, 32.7)	14.5	(9.3, 19.7)	↓
South Lawndale	12.0	(8.8, 15.2)	9.1	(6.2, 11.9)	
Roseland	23.7	(17.4, 30.1)	16.9	(10.7, 23.1)	
Other health measures					
Low birth weight					
Norwood Park	5.3	(3.8, 6.9)	6.7	(5.0, 8.4)	
Humboldlt Park	11.0	(10.0, 12.0)	11.1	(9.9, 12.2)	
West Town	9.1	(8.3, 9.9)	8.0	(7.0, 8.9)	
North Lawndale	16.8	(15.5, 18.2)	16.0	(14.4, 17.6)	
South Lawndale	5.5	(4.8, 6.1)	6.2	(5.5, 6.9)	
Roseland	15.8	(14.3, 17.4)	15.7	(13.9, 17.4)	
Tuberculosis					
Norwood Park	5.3	(0.1, 10.5)	5.3	(0.1, 10.6)	
Humboldlt Park	23.7	(15.5, 31.9)	17.5	(10.3, 24.6)	
West Town	25.1	(17.7, 32.5)	14.3	(8.7, 19.9)	
North Lawndale	55.0	(40.0, 69.9)	23.9	(13.5, 34.4)	↓
South Lawndale	10.5	(5.5, 15.5)	19.8	(13.3, 26.2)	
Roseland	37.2	(25.9, 48.4)	17.1	(9.2, 25.0)	↓
Primary and secondary syphilis					
Norwood Park	0.0	(0.0, 0.0)	0.0	(0.0, 0.0)	
Humboldlt Park	5.9	(1.8, 10.0)	1.5	(0.0, 3.6)	
West Town	0.6	(–0.5, 1.7)	1.7	(0.0, 3.7)	
North Lawndale	13.7	(6.3, 21.2)	12.0	(4.6, 19.4)	
South Lawndale	2.5	(0.0, 4.9)	1.1	(0.0, 2.6)	
Roseland	7.1	(2.2, 12.0)	11.4	(4.9, 17.8)	
Birth rate among females aged 15–17					
Norwood Park	6.1	(1.2, 10.9)	4.6	(0.6, 8.7)	
Humboldlt Park	111.8	(101.9, 121.7)	87.8	(78.7, 96.9)	↓
West Town	87.3	(78.9, 95.7)	55.3	(47.2, 63.5)	↓
North Lawndale	152.8	(139.3, 166.3)	104.7	(92.4, 116.9)	↓
South Lawndale	58.0	(50.9, 65.0)	66.6	(59.0, 74.2)	
Roseland	91.0	(80.5, 101.4)	56.8	(47.8, 65.9)	↓
No prenatal care in first trimester					
Norwood Park	7.5	(5.7, 9.3)	10.2	(8.1, 12.2)	
Humboldlt Park	27.6	(26.2, 29.0)	36.1	(34.4, 37.8)	↑
West Town	23.8	(22.6, 25.1)	27.6	(26.0, 29.3)	↑
North Lawndale	40.3	(38.6, 42.1)	33.1	(31.0, 35.2)	↓
South Lawndale	35.2	(33.8, 36.6)	20.3	(19.1, 21.6)	↓
Roseland	36.8	(34.7, 38.8)	27.6	(25.5, 29.8)	↓

Note. ↓ indicates the rates decreased (improved) significantly. ↑ indicates the rates increased (worsened) significantly.

all five RRs for all-cause mortality were less than 2 (although all were statistically significant). On the other hand, the findings for breast cancer were more mixed: in some cases rates were higher than Norwood Park and in some cases they were lower.

Of the 65 RRs, 49 (75%) were statistically significant. In 38 instances, the five community areas fared significantly worse than Norwood Park for selected HSI and

Table IV. All-Cause Mortality Rate for the Six Community Areas for 1989–90 and 1999–2000

Community area	1989–90	1999–2000	Change
Norwood Park	877.2	821.0	−6.4%
Humboldt Park	1259.2	1089.3	−13.5%
West Town	1143.4	888.6	−22.3%
N. Lawndale	1622.3	1300.9	−19.8%
S. Lawndale	1143.4	861.6	−24.6%
Roseland	1429.5	1247.6	−12.7%
Chicago	1167.9	1003.7	−14.1%

in 11 instances they fared significantly better. Several observations emerge from this array of RRs:

- despite the fact that Norwood Park showed the smallest decline in all-cause mortality between 1989–90 and 1999–2000 (Table V), its 1999–2000 all-cause mortality rate was still significantly lower than those of the other five community areas;
- in addition to all-cause mortality, Norwood Park had significantly better measures than the other five community areas for homicide, tuberculosis, and birth rate among 15- to 17-year-old females;
- there were not many statistically significant differences between Norwood Park and the other five community areas for motor vehicle injury mortality, suicide, infant mortality, and low birth rate;
- the other community areas generally fared better than Norwood Park on breast cancer mortality and stroke;
- of the 11 HSIs that were better for community areas other than Norwood Park, 5 of these were for South Lawndale, 3 more than for any other community area.

DISCUSSION

Six community areas in Chicago were selected because they represent the vast range of diversity within the community areas in Chicago and not because they were representative of all Black or White or Hispanic people in the city. To examine how the health of these communities has been faring, we performed two analyses. The first analysis examined how 14 Health Status Indicators for these six communities changed

Table V. Infant Mortality Rate for the Six Community Areas for 1989–90 and 1999–2000

Community area	1989–90	1999–2000	Change
Norwood Park	12.3	3.5	−71.5%
Humboldt Park	15.1	13.2	−12.6%
West Town	15.9	10.6	−33.3%
N. Lawndale	26.9	14.5	−46.0%
S. Lawndale	12.0	9.1	−24.2%
Roseland	23.7	16.9	−28.7%
Chicago	16.3	11.0	−32.5%

Table VI. Rate Ratios and 95% Confidence Intervals for Health Status Indicators for Five Community Areas Compared With Norwood Park, 1999–2000

	RR	95% CI
All-cause mortality		
Norwood Park	—	—
Humboldlt Park	1.33[a]	(1.30, 1.36)
West Town	1.08[a]	(1.06, 1.11)
North Lawndale	1.58[a]	(1.55, 1.62)
South Lawndale	1.05[a]	(1.03, 1.07)
Roseland	1.52[a]	(1.49, 1.55)
Heart disease		
Norwood Park	—	—
Humboldlt Park	1.20[a]	(1.16, 1.24)
West Town	1.11[a]	(1.07, 1.15)
North Lawndale	1.31[a]	(1.26, 1.36)
South Lawndale	0.94[a]	(0.90, 0.97)
Roseland	1.39[a]	(1.34, 1.44)
Stroke		
Norwood Park	—	—
Humboldlt Park	0.80[a]	(0.73, 0.88)
West Town	0.86[a]	(0.79, 0.93)
North Lawndale	1.44[a]	(1.34, 1.56)
South Lawndale	0.85[a]	(0.78, 0.92)
Roseland	1.37[a]	(1.27, 1.48)
Lung cancer		
Norwood Park	—	—
Humboldlt Park	1.21[a]	(1.10, 1.34)
West Town	1.07	(0.97, 1.18)
North Lawndale	1.81[a]	(1.65, 1.98)
South Lawndale	0.74[a]	(0.66, 0.82)
Roseland	1.48[a]	(1.35, 1.63)
Breast cancer		
Norwood Park	—	—
Humboldlt Park	0.70[a]	(0.59, 0.83)
West Town	0.76[a]	(0.64, 0.89)
North Lawndale	1.16[a]	(1.01, 1.33)
South Lawndale	0.54[a]	(0.44, 0.65)
Roseland	1.14	(0.99, 1.31)
Motor vehicle accident		
Norwood Park	—	—
Humboldlt Park	1.11	(0.84, 1.48)
West Town	0.92	(0.69, 1.23)
North Lawndale	0.66[a]	(0.48, 0.92)
South Lawndale	1.12	(0.85, 1.48)
Roseland	1.56[a]	(1.20, 2.03)
Suicide		
Norwood Park	—	—
Humboldlt Park	1.03	(0.77, 1.39)
West Town	0.81	(0.59, 1.11)
North Lawndale	1.30	(0.99, 1.72)
South Lawndale	0.23[a]	(0.13, 0.39)
Roseland	0.73[a]	(0.54, 0.99)
Homicide		
Norwood Park	—	—
Humboldlt Park	10.24[a]	(7.16, 14.65)
West Town	2.66[a]	(1.78, 3.99)
North Lawndale	8.83[a]	(6.15, 12.66)
South Lawndale	2.20[a]	(1.46, 3.32)
Roseland	6.99[a]	(4.84, 10.08)

Table VI. Continued

	RR	95% CI
Infant mortality		
Norwood Park	—	—
Humboldlt Park	3.74[a]	(1.16, 12.04)
West Town	2.98˘	(0.91, 9.72)
North Lawndale	4.10[a]	(1.25, 13.41)
South Lawndale	2.56˘	(0.79, 8.28)
Roseland	4.78[a]	(1.46, 15.68)
Low birth weight		
Norwood Park	—	—
Humboldlt Park	1.64˘	(0.68, 3.97)
West Town	1.18˘	(0.48, 2.95)
North Lawndale	2.38˘	(0.98, 5.78)
South Lawndale	0.92˘	(0.37, 2.26)
Roseland	2.33˘	(0.94, 5.74)
Tuberculosis		
Norwood Park	—	—
Humboldlt Park	3.27[a]	(2.94, 3.64)
West Town	2.68[a]	(2.41, 2.97)
North Lawndale	4.48[a]	(4.03, 4.99)
South Lawndale	3.70[a]	(3.34, 4.10)
Roseland	3.20[a]	(2.87, 3.56)
Primary and secondary syphilis		
Norwood Park	—	—
Humboldlt Park	NA	—
West Town	NA	—
North Lawndale	NA	—
South Lawndale	NA	—
Roseland	NA	—
Birth rate among females aged 15–17		
Norwood Park	—	—
Humboldlt Park	19.00[a]	(7.87, 45.83)
West Town	11.97[a]	(4.93, 29.07)
North Lawndale	22.65[a]	(9.37, 54.72)
South Lawndale	14.41[a]	(5.97, 34.81)
Roseland	12.30[a]	(5.06, 29.92)
Prenatal care		
Norwood Park	—	—
Humboldlt Park	3.56[a]	(1.78, 7.12)
West Town	2.72[a]	(1.34, 5.50)
North Lawndale	3.26[a]	(1.60, 6.63)
South Lawndale	2.00˘	(0.99, 4.04)
Roseland	2.72[a]	(1.31, 5.64)

[a] Significant HSI rate ratios are compared to Norwood Park (as reference).

over the decade between 1989–90 and 1999–2000. The second analysis compared five of these community areas against the sixth, the one that is predominately White and socioeconomically advantaged.

Changes Over the 10-Year Period

Despite the fact that some of the confidence intervals around the HSIs were quite wide (suggesting large variability), the community areas show many statistically significant improvements for HSIs over this 10-year interval (45/84 or 54%). For all the community areas there was significant improvement in several of HSIs

(mortality from all causes, heart disease, stroke, and breast cancer). Lung cancer mortality, homicide, and the birth rate for 15- to 17-year-old females improved for four of the communities. These improvements are generally consistent with national trends[19–21] and data for Chicago[16,22] as well.

On the other hand, the proportion of babies born at low birth weight and the incidence of primary and secondary syphilis did not improve significantly for any of the community areas. The lack of improvement in low birth weight proportions is consistent with other reports about Chicago[16,22] and the United States[23] while P&S syphilis has remained a very serious problem in Chicago.[24] Interestingly, the infant mortality rate decreased for all six community areas but only significantly for one (North Lawndale, from 26.9 to 14.5 or by 46%; Table V). The lack of significant findings is due at least in part to the small number of deaths and the conservative testing paradigm employed in this paper (see the Methodological Considerations section below).

The largest number of significantly improved HSIs occurred in North Lawndale and Roseland while the fewest occurred in Norwood Park. It is interesting to note that North Lawndale, which is all Black, is the poorest of these six community areas while Norwood Park, which is predominately White, is the richest.

Health Disparities Across Community Areas

We have previously examined both Black:White[16] as well as non-Hispanic Black:non-Hispanic White[22] health disparities in Chicago. Although these six community areas are not representative of any groups in the city, it is interesting to examine the nature of disparities in these different communities, some of which are contiguous (North Lawndale and South Lawndale; Humboldt Park and West Town).

We examined such community disparities by comparing Norwood Park with the other five community areas (Table VI). Although Norwood Park generally exhibited the smallest improvements over the 10-year interval under consideration, most of its HSIs remained better than those for most of the other five community areas. For example, the all-cause mortality rate remained significantly lower in Norwood Park than in all five of the other community areas, despite demonstrating the smallest decline between 1989–90 and 1999–2000 (Table V). Notably, the only HSI for which no difference was significant was the proportion of babies born at low birth weight.

Norwood Park, the richest community area among these six in both 1990 and 2000, had the best rates for 9 (of the 14) HSIs in 1989–90 and 7 in 1999–2000 (Table III). On the other side of the distribution, North Lawndale, the poorest community area among these six in both 1990 and 2000, had the worst rates for 10 of these HSIs in 1989–90 and 9 HSIs in 1999–2000. Thus, median family income was a good predictor of the relative health of these community areas and measures of relative income and health did not change much over this time period.

Methodological Considerations

These six community areas were selected for this study for certain policy development purposes and not because they are in any way representative of the city or

groups of people within the city. Thus, this analysis of changes in rates and the existence of disparities among these community areas cannot be generalized to groups of people in Chicago, to Chicago, or to the United States. To emphasize this, we refer the reader to other recent studies about Chicago which have shown increasing racial disparities in most of HSIs examined in this study.[16,22] The fact that such disparities are not increasing and in many cases seem to be decreasing when compared with Norwood Park, the richest community area included in this study, is notable. Whether this is due to rapid improvements in these five community areas or sluggish improvements in Norwood Park is a question left for future investigation. It is important to point out here that Norwood Park is not nearly the richest community area in Chicago. In fact, in 2000 it was nineth richest among the city's 77 community areas. In 2000, Norwood Park had a median household income of $53,000 while the richest community area had a median household income of $69,000.

The paradigm of significance testing employed in this study is also worth commenting upon. First, since these community areas are rather small, even when 2 years of data are combined, they often leave small numerators (number of deaths) that fail to locate differences as statistically significant. Second, since so many significance tests were performed, we would expect some of them (e.g., 5%) to be significant because of chance alone. The fact that so many differences were significant suggests that the observed trends were real and were not due to artifacts introduced by multiple significance tests. Finally, the paradigm of testing employed, based upon overlapping confidence intervals, is a conservative one. That is, if the confidence intervals do not overlap, then the two measures (e.g., all-cause mortality rates) are significantly different. Conversely, we also employed these confidence intervals to conclude that if two confidence intervals do overlap, that the differences are not significantly different. This is a common and often used procedure but it is necessarily conservative because it is readily possible for measures with overlapping confidence intervals to nonetheless be significantly different from each other.

CONCLUDING REMARKS

More and more researchers are coming to realize that health measures assessed for large geographical areas are not so useful and may best be seen as averages, often washing out important differences in smaller areas where differences may best be comprehended and interventions be most effectively mounted.[25–27] The data presented here for six communities in Chicago illustrate this observation. Among these six, statistically significant disparities exist among all areas of health considered: mortality, birth-outcome-related variables, and infectious diseases. At times these disparities, measured by their RRs, were quite large. To have used a city-wide measure to approximate community health would obviously be inappropriate.

This has additional relevance for health data collected by surveys (e.g., rates of smoking, cancer screening, asthma prevalence). Almost always these surveys are conducted at the national[28] or state level.[29] Rarely are they made available at the county or city level and very few surveys are available at the community level, requiring communities to employ higher level data. These data analyzed in this report

suggest that such higher level data may not be applicable to the local level. Only surveys of local communities would satisfy this demand.

In one city, albeit a large one, substantial disparities exist among six community areas, four of them consisting almost entirely of a single racial or ethnic group. If we are to find a way to indeed eliminate disparities in health, as called for by Healthy People 2010, there is a great deal of difficult work ahead of us. Whether the energy and resources needed for this task are assembled will say a lot about whom we are as public health workers and more generally as a people and a country.[30,31]

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