

URBAN POVERTY AND INFANT-HEALTH DISPARITIES AMONG AFRICAN AMERICANS AND WHITES IN MILWAUKEE

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This study examined neighborhood and infant health disparities between African-American and white mothers in Milwaukee, Wisconsin. Census-block data were used for 1990 and Vital Statistics data were used for 1992 through 1994. African-American mothers lived in less desirable, more segregated neighborhoods than white mothers did in 1990. African-American infant and neonatal mortality rates were twice those of whites (2.3 and 2.0, respectively), while African-American postneonatal mortality rates were three times that of whites (3.0). African-American low and very low birth weight rates were more than twice those of whites (2.5 and 2.6, respectively). All African-American mothers were nearly eight times as likely as all white mothers to have inadequate prenatal care, whereas poor African-American mothers were three times as likely to have inadequate prenatal care as were poor white mothers. Public health experts and practitioners may want to consider the communities of minority patients to devise interventions suitable for addressing health disparities. (*J Natl Med Assoc.* 2002;94: 472-479.)

Key words: concentrated poverty ♦
residential segregation ♦ infant
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maternal risk factor

Infant mortality is a worldwide indicator of health status. In 1997, African-American infant mortality was 2.4 times that of white infant mortality in the U.S. Factors associated with infant mortality disparities include biomedical (low

birth weight), individual-level (teen births), and geographic (residential segregation) factors.¹⁻³ This study examines neighborhood and infant health disparities by race in Milwaukee.

Milwaukee experienced several economic changes during the 1980s, including a growth in unemployment and poverty.⁴ Such changes meant that African Americans became more residentially surrounded by other African Americans in low-status neighborhoods, which resulted in a growth of concentrated urban poverty.⁴⁻⁶ Residence in poor areas means that minority groups have little to no resources to afford quality health care and have access to inadequate health facilities in their communities. This indirectly contributes to a greater exposure to illness and disease relative to whites who live in more affluent areas.

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Neighborhood location is associated with health disparities by race.⁷ Studies have found that adult mortality is positively associated with African American-white segregation⁸ and African-American social isolation.⁹ Others have found that residence in low-income neighborhoods is a risk factor for African-American infant mortality,^{8,10} African-American neonatal mortality,¹¹ and African-American low-birth weight.¹²

Because Milwaukee has high levels of racial segregation and neighborhood poverty relative to other large cities, we hypothesize that neighborhood and health outcomes will be more pronounced among African Americans than whites. This paper addresses: (1) the extent of neighborhood inequality between African Americans and whites; (2) the extent poor and nonpoor African-American and white mothers live in high-poverty areas; and (3) the extent of infant health disparities between poor and nonpoor African-American and white mothers in Milwaukee.

MATERIALS AND METHODS

Data were drawn from two sources. Neighborhood variables were taken from the 1990 U.S. Census data for the Milwaukee metropolitan area.¹³ The units of analysis were census block groups that represent neighborhoods. Poverty was defined as African-American or white mothers with incomes below the federally-defined poverty threshold. Infant health data were drawn from the 1992, 1993, and 1994 Vital Statistics data files for Milwaukee.^{14,15} In these data, "poor" status was defined as those with less than a high school education (<HS 12) or high school drop outs.

Infant health indicators included: infant mortality rates (IMR)—deaths before the infant's first birthday per 1000 live births; neonatal mortality rates (NMR)—deaths under 28 days per 1000 live births; and postneonatal mortality rates (PNMR)—deaths between 28 and 365 days per 1000 live births. Other indicators included low birth weight (LBW) rates—births less than 2500 g or 5.5 pounds per 100

live births, and very low birth weight (VLBW) rates—births less than 1500 g or 3.3 pounds per 100 live births.

Three indicators of neighborhood risk were analyzed. The first indicator measured economic, demographic, health and physical conditions of African-American and white neighborhoods, designated as block groups with 50% or more of either non-Hispanic African-American or non-Hispanic white persons. Economic conditions of blocks included: percent of families who lived below the poverty line and who received public assistance; percent of unemployed persons; percent of high school dropouts; percent of persons in professional occupations; and percent of households with wealth.

The demographic measure was percent of females age 15 to 19 years. Health conditions included percent of persons age 16 to 64 years with a mobility limitation or a physical or mental condition for six or more months, which made it difficult to go outside the home alone. The second health condition was percent of persons 16 to 64 years with self-care limitation or a health condition for six or more months, which made it difficult to take care of personal needs or get around inside the home. Physical features of neighborhoods were median age of housing and percent of housing units that were vacant, without heating, and lacked complete plumbing facilities.

The second neighborhood risk factor was concentrated poverty, or the extent to which poor mothers lived in high-poverty areas with other poor families. Concentrated poverty was computed by dividing number of poor African-American (white) mothers in high poverty blocks (those with 40% or more poverty) by all poor African Americans (whites).⁴ Because families with a female as head of household are poorer than other families, this isolation will most negatively affect their chances for favorable economic and health outcomes than other segments of the population.^{7,16}

The third neighborhood factor measured the level of residential segregation between

poor African-American/white mothers and affluent families (incomes \$75,000 or more in 1989 dollars). This indicates the extent to which they lived apart from families with economic resources that would otherwise narrow the gulf (via a tax base generated by high incomes) in economic and health disparities.

We also analyzed the maternal risk factors related to infant health disparities: inadequate prenatal care (not initiated in first trimester), teen birth rate, short gestation (<37 weeks), congenital anomalies (anemia, birth injury, hyaline membrane disease, seizures, assisted ventilation, fetal alcohol syndrome, and other abnormal conditions), and tobacco and alcohol use by pregnant mothers.

STATISTICAL ANALYSIS

The following analyses present the percentages of economic and health conditions of African-American and white neighborhoods, using the Student's *t*-test statistic to assess disparities between these neighborhoods. We also examine differences in high-poverty concentration between African-American and white mothers by comparing their respective percentages. We also examine the extent of residential segregation between poor African-American mothers and affluent families and between poor white mothers and affluent families by noting the different dissimilarity (D) index scores for each pairing. This index measures the percent either poor African-American female-headed families or all affluent families would have to exchange blocks to eliminate the segregation between them.⁵ Finally, we analyze the racial disparities in infant and maternal health outcomes by computing the rate ratios between African-American and white mothers on each outcome.

RESULTS

The Milwaukee metropolitan area was composed of 366 neighborhoods. There were 119 "African-American" and 247 "white" neighborhoods. The 1990 census sample included poor African-American mothers ($n = 9,916$) and

poor white mothers ($n = 2,555$). The 1992–1994 Vital Statistics sample included poor African-American ($n = 1,296$) and poor white ($n = 337$) mothers who experienced infant deaths and low weight births.

African-American neighborhoods were more unequal than white neighborhoods (Table 1). African Americans lived in areas with significantly higher percentages of poverty (39%), unemployment (20%), high school drop outs (24%), persons with mobility limitations (3%), and self-care limitations (5%) than did whites. They also lived in areas with lower percentages of professionals (23%) and household wealth (17%) than did whites.

The disparity in poverty noted in Table 1 is disaggregated in Table 2 which examines the extent African Americans and whites lived in nonpoverty (0% to 19% poverty), poverty (20% to 39.9% poverty), and high-poverty (40% or higher poverty) neighborhoods. Poor African-American families and poor African-American females lived in high-poverty neighborhoods (59.4% and 60.1%, respectively) more so than did their white counterparts (24.5% and 29.0%, respectively).

Poor African-American mothers were also more segregated from affluent families (85%) than were poor white mothers. This means that either 85% of poor African-American mothers or all affluent families would have to exchange blocks to eliminate their segregation.

Tables 3 through 5 present infant health disparities for African Americans and whites in Milwaukee between 1992 and 1994. The average African-American IMR and NMR were twice those of whites (2.3 and 2.0, respectively; column 3), while the average African-American PNMR was three times that of white PNMR (2.9) between 1992 and 1994 (table 3). On average, 16.3 African-American infant deaths occurred per 1,000 live births between 1992 and 1994, whereas 7.3 white infant deaths occurred per 1,000 live births during the same period.

A well-documented risk factor for infant mortality is low birth weight.¹⁷ Table 4 reveals

Table 1. Black and White Neighborhood Characteristics: Milwaukee Metropolitan Area, 1990 (U.S. Census)

Neighborhood characteristic	African American neighborhoods ¹ (%)	White neighborhoods ¹ (%)
Poverty rate	39.3** ²	9.4
Public assistance ³	66.5**	10.4
Unemployment	20.0**	5.7
Less than high school	24.1**	16.2
Females age 15 to 19	8.9**	5.7
Professional occupations	23.0**	40.4
Household wealth ⁴	17.3**	49.3
Persons w/mobility limitation ⁵	3.0**	1.2
Persons w/self-care limitation ⁵	5.3**	1.9
Vacant housing	41.0**	32.3
Housing without heating	0.34*	0.28
Housing without plumbing	1.10**	0.51
Housing age (median)	1943	1950

¹African-American neighborhoods equal block groups that have 50% or more non-Hispanics African Americans, and White neighborhoods equal block groups with 50% or more non-Hispanic Whites.

²Asterisks refer to difference in *t*-tests comparing African American and White neighborhoods: **p* < .001; ***p* < .0001. For example, a *t*-test indicates that the difference between 39.3% for African Americans in African American neighborhoods, and 9.4% for Whites in White neighborhoods is statistically significant at the .0001-level.

³Public assistance income includes (in 1989 dollars) supplemental security income payments made by welfare agencies to low-income persons 65 years old or over; aid to families with dependent children; and general assistance.

⁴Household wealth includes (in 1989 dollars) interest on savings or bonds, dividends from stocks-holdings, net income from rental of property to others and receipts from borders or lodgers, net royalties, and periodic payments from an estate or trust fund.

⁵Mobility limitation includes persons with a health condition (physical or mental) that lasted for six or more months and which made it difficult to go outside the home alone. Self-care limitation includes persons with a health condition that lasted for six or more months and which made it difficult to take care of their own personal needs, such as dressing, bathing, or getting around inside the home.

the 1992–1994 average African-American LBW and VLBW rates were more than twice those of white LBW and VLBW rates (2.5 and 2.6, respectively; column 5). The average LBW rate for poor African-American mothers was twice that for poor white mothers. LBW for poor African-American mothers was slightly higher than that for total African-American mothers, while LBW for poor white mothers was 3 percentage points greater than that for total white mothers.

Other risk factors for infant mortality reveal that African-American mothers were eight times as likely as white mothers to receive inadequate prenatal care; African-American teens were five times as likely as white teens to give birth; and African-American mothers were

two times as likely as white mothers to have a premature birth (Table 5). The most pronounced disparity between poor African-American and poor white mothers was in the level of inadequate prenatal care ($23.1/8.5 = 2.7$).

Within-race disparities show that teen birth rate increased 19 percentage points between poor and total African-American mothers. Between poor white and total white mothers, teen birth rate increased 32 percentage points and tobacco use increased 34 percentage points. Although poor status worsened certain risk factors within each race group, disparities *between* racial groups have more harmful consequences for African-American mothers, as evidenced by higher African-American inadequate prenatal care, IMR and LBW rates.

Table 2. Neighborhood Typology by Poverty Status: Milwaukee Metropolitan Area 1990 (U.S. Census)

Population	Neighborhood poverty status	Group (sample size)		
		Total (%)	African American (%)	White (%)
Total	non-poverty	66.5 (n = 282,468)	34.5 (n = 43,040)	84.9 (n = 227,754)
	poverty	15.6 (n = 66,255)	24.6 (n = 30,763)	9.6 (n = 25,731)
	high-poverty	17.9 (n = 75,851)	40.9 (n = 51,125)	5.5 (n = 14,738)
	Total	100	100	100
Poor families	non-poverty	24.2 (n = 4,179)	16.4 (n = 1,882)	50.1 (n = 2,088)
	poverty	25.3 (n = 4,378)	24.2 (n = 2,785)	25.4 (n = 1,060)
	high-poverty	50.4 (n = 8,723)	59.4 (n = 6,841)	24.5 (n = 1,020)
	Total	100	100	100
Poor Female Headed Families	non-poverty	20.5 (n = 2,724)	15.2 (n = 1,505)	44.3 (n = 1,131)
	poverty	26.2 (n = 3,490)	24.7 (n = 2,454)	26.7 (n = 682)
	high-poverty	53.3 (n = 7,089)	60.1 (n = 5,957)	29.0 (n = 742)
	Total	100	100	100

Note: nonpoverty area = block group with between 0 and 19% poverty; poverty area = block group with between 20% and 39.9% poverty; high-poverty area = block group with 40% or higher poverty. Shaded area ■ indicates the concentrated poverty disparity by race.

DISCUSSION

We found support for our hypothesis in that neighborhood and health outcomes were more pronounced among African Americans than whites. Total and poor African-American moth-

ers lived in less desirable areas that were concentrated with poverty. They have to cope not only with their own poverty but that of those around them,⁴ a condition which makes it even harder to escape such distressed areas. In ad-

Table 3. Infant, Neonatal and Postneonatal Mortality Rates (per 1000 live births) for African American and Whites in the Milwaukee Metropolitan Area, 1992-1994 (Vital Statistics)

Year & mortality	African American (deaths)	White (deaths)	Rate ratio (b/w)
Infant mortality rate (IMR)			
1992	12.7 (n = 76)	6.6 (n = 102)	2.0
1993	16.5 (n = 99)	7.3 (n = 114)	2.3
1994	19.7 (n = 113)	7.9 (n = 112)	2.5
Average	16.3	7.3	2.3
Neonatal mortality rate (NMR)			
1992	6.7 (n = 41)	4.2 (n = 68)	1.6
1993	8.2 (n = 49)	3.9 (n = 62)	2.1
1994	9.3 (n = 53)	4.6 (n = 66)	2.0
Average	8.1	4.2	1.9
Postneonatal mortality rate (PNMR)			
1992	6.0 (n = 37)	2.4 (n = 39)	2.5
1993	8.3 (n = 50)	2.9 (n = 46)	2.9
1994	8.9 (n = 51)	2.8 (n = 40)	3.2
Average	7.7	2.7	2.9

Note: IMR = infant mortality rate equals deaths to infants under the age of 1 year old per 1000 live births; NMR = neonatal mortality rate includes deaths to infants within 28 days of life per 1000 live births; PNMR = postneonatal mortality rate equals infant deaths between 28 and 365 days per 1000 live births.

Table 4. Low and Very Low Birth Weight Rates (per 100 live births) for African Americans and Whites in the Milwaukee Metropolitan Area, 1992-1994 (Vital Statistics)

Year	African American		White		Rate Ratio total B/W
	total	<HS	total	<HS	
Low birthweight					
1992	13.8 (n = 838)	15.9 (n = 455)	5.9 (n = 887)	8.4 (n = 114)	2.3
1993	14.5 (n = 861)	15.2 (n = 423)	5.4 (n = 781)	8.8 (n = 116)	2.7
1994	14.4 (n = 823)	15.7 (n = 418)	5.6 (n = 865)	8.6 (n = 107)	2.6
Average	14.2	15.6	5.6	8.6	2.5
Very low birthweight					
1992	3.4 (n = 204)	3.1 (n = 91)	1.2 (n = 180)	1.7 (n = 23)	2.8
1993	3.0 (n = 181)	2.8 (n = 78)	1.2 (n = 169)	1.4 (n = 18)	2.5
1994	2.7 (n = 153)	3.0 (n = 76)	1.1 (n = 163)	1.7 (n = 21)	2.5
Average	3.0	3.0	1.2	1.6	2.6

Note: <HS indicates African American and White mothers with less than a high school education. Low birth weight or LBW = <2500 grams or 5.5 pounds; Very low birth weight or VLBW = <1500 grams or 3.3 pounds.

dition, they lived apart from affluent families, whose resources could provide a buffer against growing economic and health disparities. For poor white mothers, on the other hand, living in more affluent neighborhoods with higher percentages of wealth and professionals ensures them of a protective “buffer” against the negative consequences of residence in poorer, highly segregated neighborhoods.

Economic conditions of poor neighborhoods, as well as lack of prenatal care for African-American mothers, may impact infant

health disparities. Because one in five persons in African-American neighborhoods were employed in professional occupations and one in four persons were without a high school degree, African Americans were less likely to work in jobs that ensured access to health insurance and hence quality health care. In addition, older housing stock may contribute to the low birth weight and mortality of their infants, through unsanitary living conditions and substandard plumbing facilities.¹⁸

The interaction of neighborhood risk and

Table 5. Maternal Risk Factors for Infant Mortality and Low Birth Weight By Racial and Class Status: Milwaukee Metropolitan Area 1992-1994 (Vital Statistics)

Risk Factor	African American (%)		White (%)		Ratio total B/W
	total (n = 17,741)	<HS (n = 8,313)	total (n = 43,647)	<HS (n = 3,890)	
Inadequate prenatal care	17.2	23.1	2.2	8.5	7.8
Teen birth rate	28.2	47.0	5.6	37.2	5.0
Short gestation	18.7	20.5	8.7	11.7	2.1
Congenital anomalies	9.4	8.3	10.2	10.0	0.9
Tobacco use	26.1	31.5	18.1	52.2	1.4
Alcohol use	5.3	6.3	5.6	5.2	0.9

Note: <HS indicates African American and White mothers with less than a high school education. Inadequate prenatal care-care not initiated in the first trimester. Teen birth rate equals the number of births to African American and White mothers age 15 to 19 years old per 100 live births. Short gestation indicates less than 37 weeks of pregnancy. Congenital anomalies include such abnormal conditions of the newborn as anemia, birth injury, fetal alcohol syndrome, hyaline membrane disease, meconium aspiration syndrome, assisted ventilation (less than 30 minutes), assisted ventilation (30 minutes or more), seizures, and other abnormal conditions. Tobacco use denotes the use of tobacco by pregnant African American and White women. Alcohol use indicates the use of alcohol by pregnant African American and White women.

inadequate prenatal care may also impact infant health disparities in that (poor) expectant African-American mothers may be given limited information about the importance of prenatal care from available health care providers. Other factors might include economically weaker friendship and family networks that would otherwise provide sufficient information about prenatal care or transportation to doctor's appointments.

As a consequence of living in disadvantaged areas that result in stressful lifestyles, African-American mothers might cope with their conditions by engaging in risk behaviors such as tobacco and alcohol use during pregnancy. This may be manifested in the slight disparity in alcohol use between poor African-American and white mothers, and may also affect the disparity in short gestation among poor African Americans and whites. This underscores the cumulative impact urban poverty has on health disparities.

Health practitioners may want to consider more closely how the community affects their poor and nonpoor minority patients, to help narrow the gulf in health disparities. Medical education could also implement cultural competence into its curriculum so future physicians may receive proper training in the treatment of poor, ethnic populations. This will foster a more trustworthy relationship between minority patients and their doctors.¹⁹

This research is unique in that no study in social epidemiology has considered a full array of neighborhood risk factors in the context of examining health outcomes of racial groups as this study did. We believe that the neighborhood environment is appropriately represented with block-group data and a multiplicity of factors that are realistically found in urban neighborhoods.

This analysis is not without limitations. To begin, it is a case study that is not generalizable to other metropolitan areas. However, Milwaukee is similar to other metropolitan areas in the Midwest (i.e., Chicago, Gary, Indiana, and Cleveland, Ohio) in how it has been impacted

by changes in the postindustrial economy. A second limitation is that associations between neighborhood risk factors and infant health outcomes are not placed in a multivariate context. Instead, this research describes infant and maternal health in the context of neighborhood inequality. A third limitation addresses the shortcomings of the data. Although poor economic and health outcomes may result as a consequence of one's neighborhood location, these outcomes are moderated by discriminatory practices in the housing market and health care industry. The data, however, precludes the authors from analyzing the impact of discrimination on neighborhood and health outcomes.

CONCLUSION

We have shown that one's race and place of residence are crucial antecedents to economic and health inequality. Two approaches should be taken. First, public health experts may want to explore potential pathways to narrowing health inequalities by considering the geographic inequalities that confront disadvantaged segments in society. Such pathways should focus on historical and contemporary discriminatory practices of racial residential segregation and how it leads to a concentration of poverty and poor health outcomes. The second approach could include clinical interventions that address the early initiation of prenatal care for poor women in poor areas that would reduce adverse infant health outcomes. The two approaches must work together because patients cannot be healed without their communities being healed as well.

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