

Food Access and Health in Cook County, Illinois

TECHNICAL REPORT
Center on Human Needs
Virginia Commonwealth University
Richmond, Virginia

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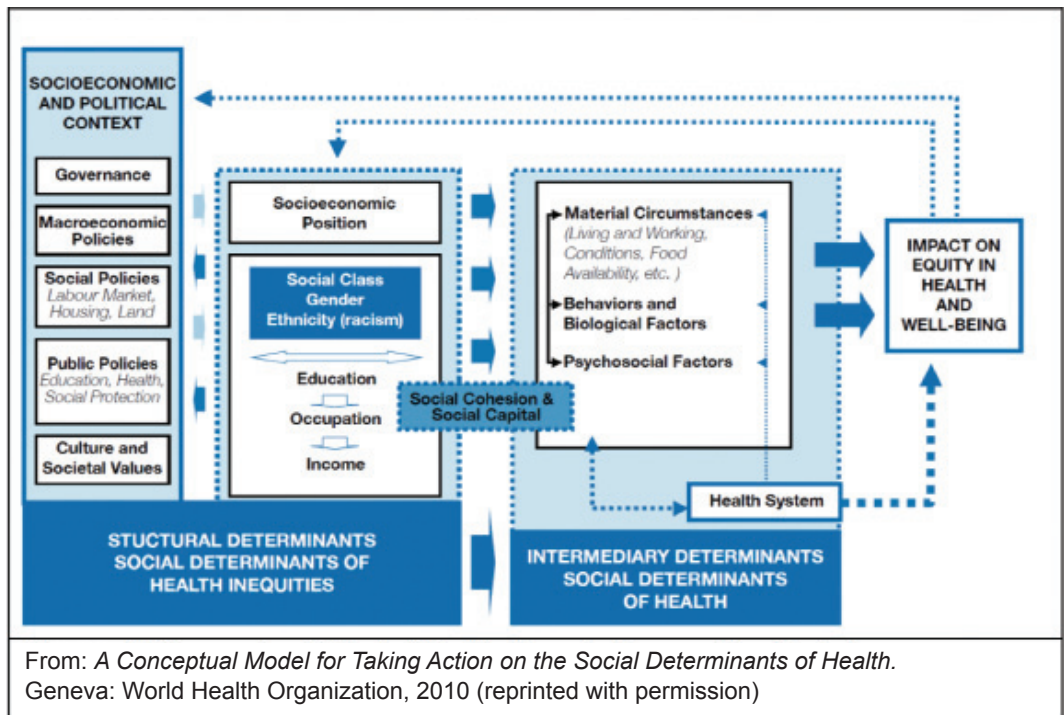
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Preface

Health is influenced by more than health care, and the same is true for health disparities.¹ Inequities in health exist for reasons that transcend access to health care or adequate health insurance coverage. Health is also heavily influenced by health behaviors (such as tobacco use), modifiable risk factors (such as obesity), and environmental conditions. These conditions are only partly a matter of personal choice. Adopting a healthier diet requires access to supermarkets or farmers' markets that sell fresh produce. Regular physical activity requires a conducive built environment and access to safe parks, pedestrian routes, and green space for residents to walk, bicycle, or play. Tobacco and alcohol use is influenced by enticing advertising and marketing practices. Exposure to environmental pollutants from unhealthy housing or from nearby factories and smokestacks are not choices made by residents but by society.

Figure 1:
World Health Organization
Conceptual Model for Social
Determinants of Health



In the language of social epidemiology, “downstream” determinants of health—ranging from unhealthy behaviors to living and working conditions—are the byproduct of “upstream” structural determinants (Figure 1) such as socioeconomic position, race-ethnicity, occupation, and social cohesion. These socioeconomic circumstances are themselves the result of upstream policies that create opportunities for education and employment, income and savings, social equality, and environmental stewardship. Macroeconomic policies create commercial incentives for industries to either promote unhealthy products or more healthful alternatives.²

Health also varies sharply by geography—across communities and neighborhoods—because unhealthful downstream conditions are often concentrated in disadvantaged areas. Areas populated by the poor or communities of color typically experience greater exposure to unhealthy conditions and material deprivation, a vicious cycle that is itself shaped by upstream factors. These upstream influences include historical antecedents, such as racial or ethnic discrimination and recurring cycles of poverty that inhibit economic growth and social mobility over generations, but also modern-day decisions about where to position highways and supermarkets and how much resource to invest in public transportation, housing, local development, crime prevention, public schools, job training, and social services. The recognition that “place matters” to health and the need to understand how unwise social policies foment health inequity comes at the recommendation of prestigious commissions sponsored by the World Health Organization,³ MacArthur Foundation,⁴ and Robert Wood Johnson Foundation.⁵

About the Place Matters Project

The Place Matters technical reports were produced by the Virginia Commonwealth University (VCU) Center on Human Needs (CHN) in collaboration with the Joint Center for Political and Economic Studies/Health Policy Institute (HPI) and the Virginia Network for Geospatial Health Research (VANGHR). All maps and geospatial analyses were produced by VANGHR.

The production of the Place Matters technical reports was funded by HPI under a subaward from a parent grant from the National Institutes of Health (grant 5RC2MD004795-02). The goal of the project was to prepare and disseminate a series of locally tailored Community Health Equity Reports (CHERs) to assess population health inequities and related social and economic conditions for the following eight communities:

- Alameda County, California
- Baltimore, Maryland
- Bernalillo County, New Mexico
- Orleans Parish, Louisiana
- Cook County, Illinois
- San Joaquin Valley, California
- Boston, Massachusetts
- South Delta, Mississippi

The VCU Center on Human Needs and VANGHR were contracted by HPI to develop technical reports on which the eight CHERs were based. What follows is the technical report for Cook County, Illinois. The focus of the report and the research questions it addresses were guided by extensive input from the Place Matters team in Cook County. See the Methods Appendix on the CHN website for more details on analytic methods.

The project was approved by the VCU Institutional Review Board.

For more information about the Place Matters technical reports or collaborating organizations visit the websites listed below:

Center on Human Needs: www.humanneeds.vcu.edu

Health Policy Institute: www.jointcenter.org/institutes/health-policy

Place Matters Initiative: www.jointcenter.org/hpi/pages/place-matters

Virginia Network for Geospatial Health Research: vnghr.org/

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Introduction

The health of Cook County residents is related to many factors.⁶ As is true elsewhere, disease rates vary dramatically by age, gender, race, and ethnicity as well as with the prevalence of risky health-related behaviors.^{3,7–12} Place matters in health because characteristics of the areas in which people live affect health choices, behaviors, environmental risks, and access to medical care.^{13–18} Local conditions that may affect health include levels of stress and environmental toxins, the social and economic characteristics of individuals and families (such as education and income), and the characteristics of the communities in which people live.

Countywide statistics oversimplify important geographic differences between different neighborhoods and communities within Cook County that contribute to large differences in the health of residents. Geographic disparities in health status within Cook County reflect, in part, geographic patterns in the population and living conditions. The health challenges faced by individuals and households are influenced by the neighborhood.^{19,20} Regardless of one's education, income, or motivation to make healthy choices, exposure to risks introduced by inadequate access to nutritious food, lack of places to exercise, crime, air pollution, poor schools, job scarcity, and stress related to these community challenges can significantly affect health.^{18,21–29} Furthermore, historical patterns contribute to long-term trends of placing vulnerable populations in stressed areas. This in turn reinforces cycles of hardship that entrench patterns of socioeconomic disadvantage.^{30–34}

This report focuses on the characteristics of Cook County, including Chicago and surrounding communities that may affect health outcomes for residents. We explored the relationship between health outcomes, community characteristics, and food access (proximity to various types of food sources). Health outcomes include life expectancy, premature death, heart disease mortality, and stroke mortality. Previous national and local studies have demonstrated that limited access to healthy foods and too much access to poor food sources (e.g., fast foods) are associated with adverse health outcomes such as obesity, cancer, and cardiovascular disease.^{35–38}

Part I of this report provides background information about Cook County, including population data, health outcomes, socioeconomic conditions, and community characteristics. Part II examines the relationship between various neighborhood characteristics and food access indicators and health outcomes, including premature mortality and mortality due to heart disease and stroke. Part III discusses possible implications for the observed relationships. Appendix A, on the CHN website, presents detail about the data and methods that were used in preparing this report.

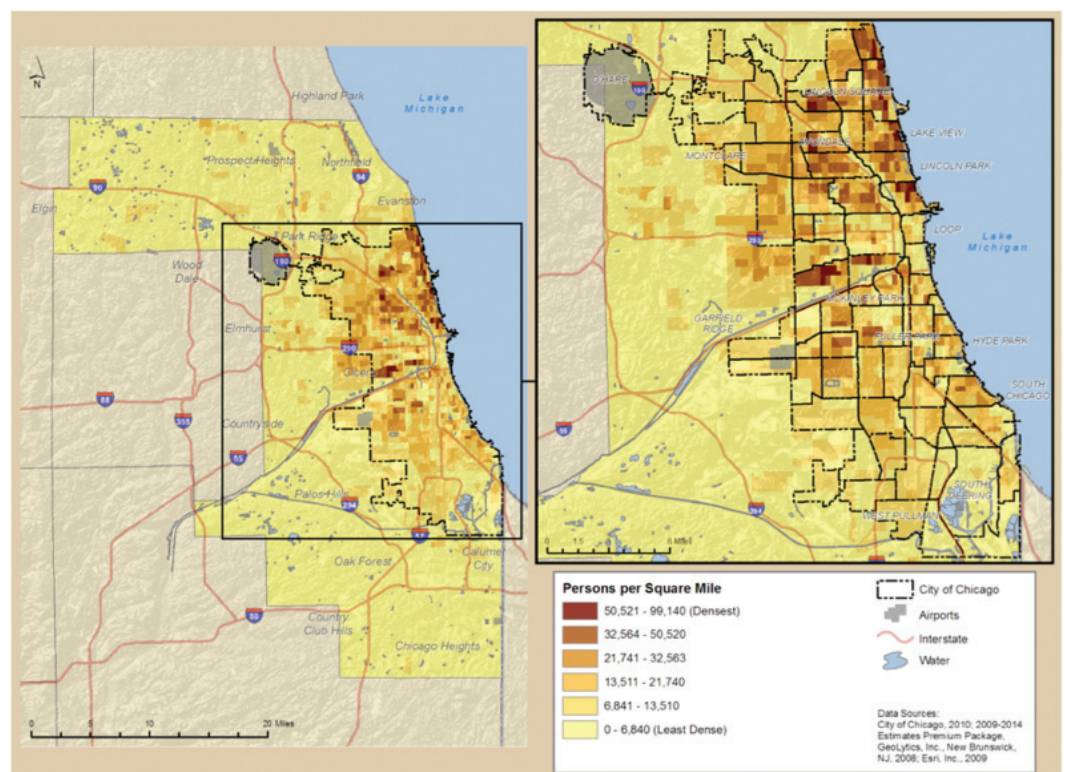


Part I. Background: Population, Community Characteristics, and Health in Cook County

Population

Cook County, home to Chicago, is located in the northeastern corner of Illinois and is bordered by Lake Michigan. It is the second largest county in the United States. In 2009, its population of 5,287,037 made up more than 40% of the total population of Illinois (12,910,409).³⁹ Cook County is characterized by dense population within the Chicago city limits, particularly in the northeast portion of the city along the shore of Lake Michigan (Map 1). The population becomes less dense in the suburban areas further away from the city. Over half of Cook County's population is located in the City of Chicago, which is also the county seat. The overall population density in Cook County was 5,598.3 persons per square mile in 2009 but ranged from 9.2 in the largely industrial South Deering area to 99,140 in the Uptown community.

Map1:
Population Density by
Census Tract, Cook County
and Chicago (2009)



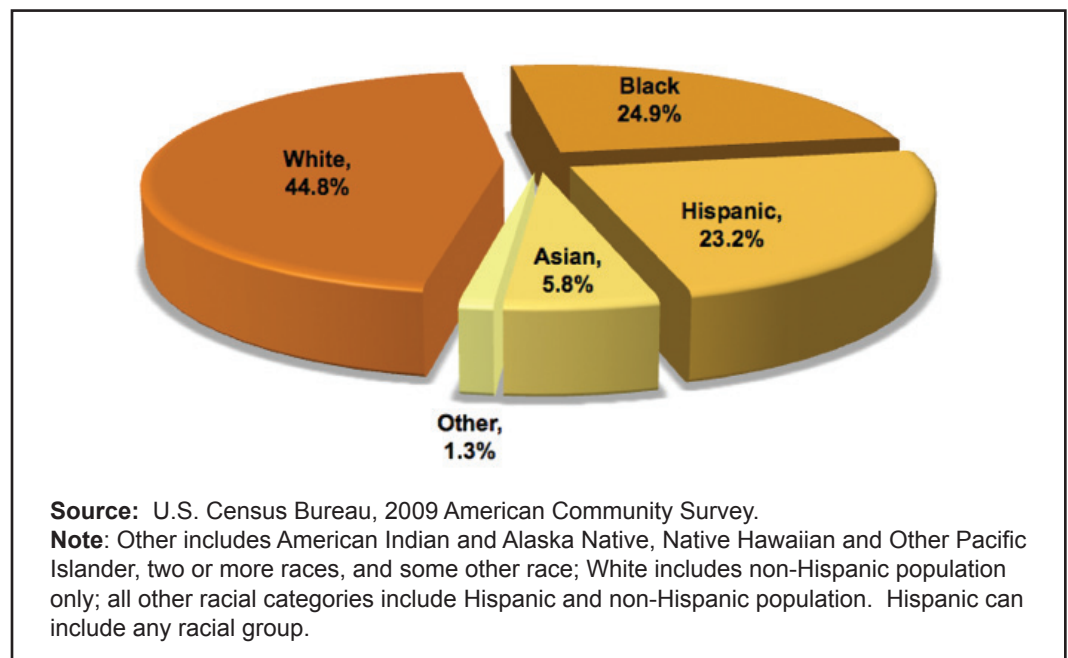
Cook County has a large minority population, with Black and Hispanic residents each comprising nearly one quarter of the total population (Figure 2). Asians comprise 5.8% of the total population. These proportions are larger than those seen in the state of Illinois as well as the nation, where only 12.1% of the population is Black, 15.8% are Hispanic, and 4.4% are Asian (Table 1).

Table 1:
Demographic Characteristics
of Cook County,
the State of Illinois,
and the United States

	Cook County	Illinois	United States
Population (2009)^(a)	5,287,037	12,910,409	307,006,556
Population density (2009)^(b)	5,598.3	232.7	86.7
Race/ethnicity (2009)^(a) (%)			
White	44.8	64.4	64.9
Black	24.9	14.4	12.1
Hispanic	23.2	15.3	15.8
Asian	5.8	4.3	4.4
Other	1.3	1.6	2.8
Foreign born (2009)^(a)	20.6	13.5	12.5

(a) Source: U.S. Census Bureau 2009, American Community Survey.
(b) Source: 2009 Geolytics Projection

Figure 2:
Race/Ethnicity
in Cook County (2009)

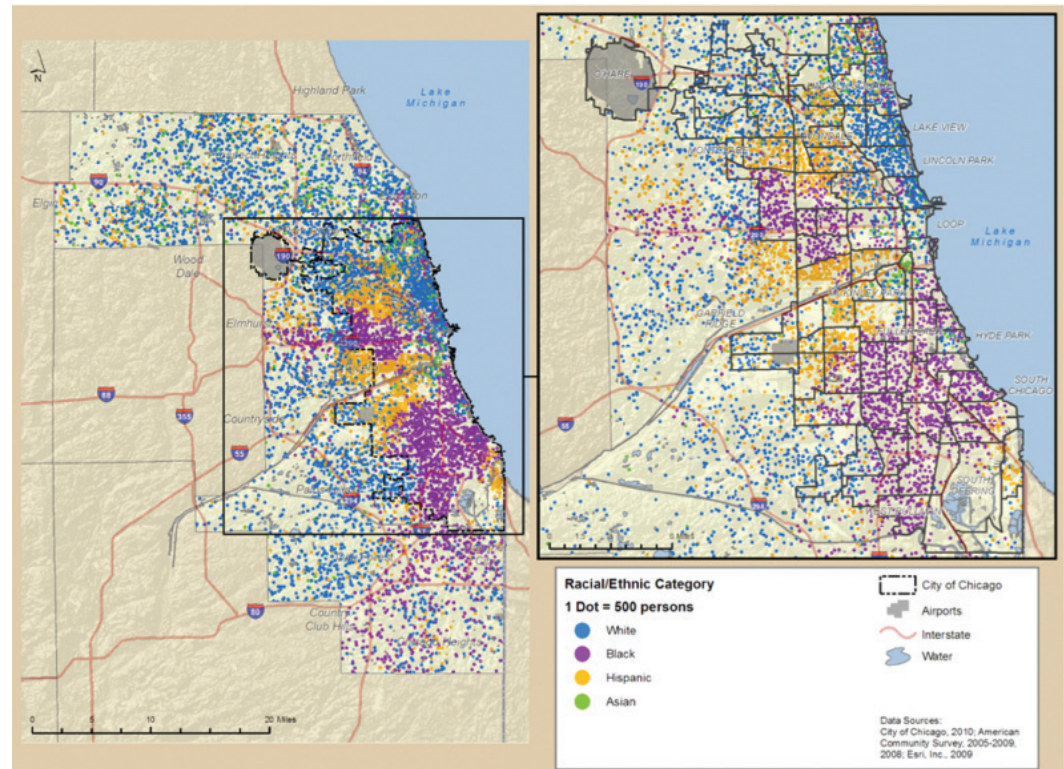


In part because of racial segregation, racial and ethnic population densities vary across Cook County.^{18,40, 41} The Index of Dissimilarity⁴² is a measure of residential segregation that explains the percentage of the population that would have to move in order to achieve a completely integrated community. The higher the value, the more segregated the area. Between 2005 and 2009, the Index of Dissimilarity for Cook County between the Black and White populations was 80.8% at the census-tract level,³⁹ a rate higher than

exists for the populations of all large U.S. metropolitan areas other than Milwaukee and Detroit.⁴³ By comparison, the state of Illinois had a value of 75.1%.⁴³ The Index of Dissimilarity between White and Hispanic populations in Cook County was 60.2%.³⁹

The diversity index is used to compare racial segregation at smaller geographic levels, such as the census tract. The diversity index is a measure of the likelihood that two people randomly chosen from an area will be of a different race or ethnicity. The higher the value, the less segregated the area. Although the diversity index for Cook County as a whole in 2009 was 69.8%, the value ranges from 0.3% (no diversity) in a single census tract in Englewood to 83.3% in a single census tract in Rogers Park (high diversity).

Map 2:
Racial and Ethnic
Distribution in Cook County
and Chicago (2005–2009)



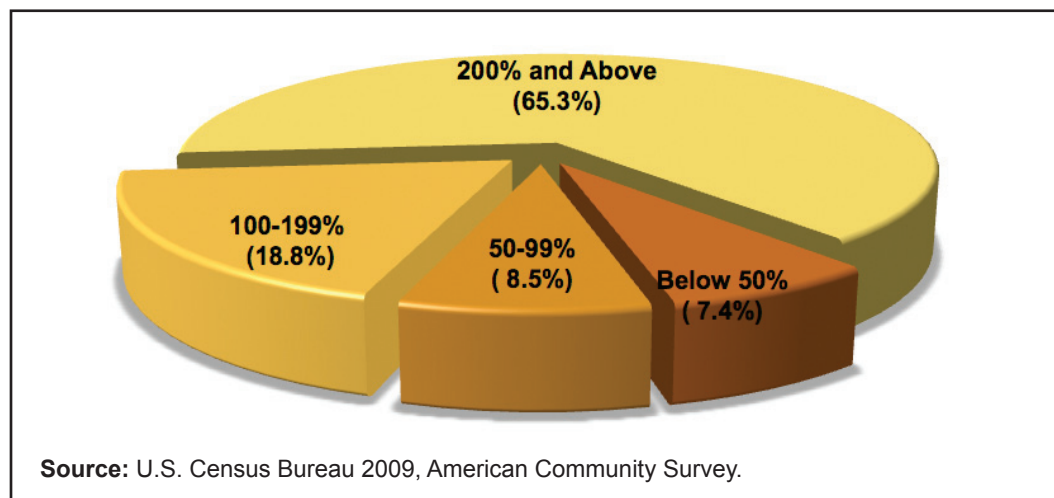
Map 2 illustrates the segregation of racial and ethnic groups in Cook County generally and in the City of Chicago. The northern suburban townships of Barrington, Hanover, Palatine, Schaumburg, Wheeling, Elk Grove, Northfield, Maine, New Trier, Niles, and Evanston are majority White. The southern townships of Orland and Bremen are also majority White, whereas Thornton is majority Black. Within Chicago, the community areas on the northern shore of Lake Michigan (Lakeview, Lincoln Park, and Near North Side) are majority White, whereas much of Washington Park, Englewood, Woodlawn, Greater Grand Crossing, South Shore, South Chicago, Avalon Park, and Chatham are majority Black. There are also predominantly Black communities on Chicago's West Side and near west suburbs. More than three quarters of the census tracts in South Lawndale, Brighton Park, and Gage Park have a Hispanic population that is greater than 70% of the total population. There are also large Hispanic populations on Chicago's Northwest Side.

Socioeconomic Characteristics

As is true nationally, socioeconomic conditions in Cook County exert an important—and often unrecognized—influence on health status. Nationally, families living below the federal poverty level (FPL) are 3.6 times more likely to report fair or poor health than are those with incomes of at least twice the FPL.⁴⁴ In 2009, 15.9% of households in Cook County had incomes below the FPL, compared with 13.3% of households in Illinois and 14.3% of households in the United States.³⁹

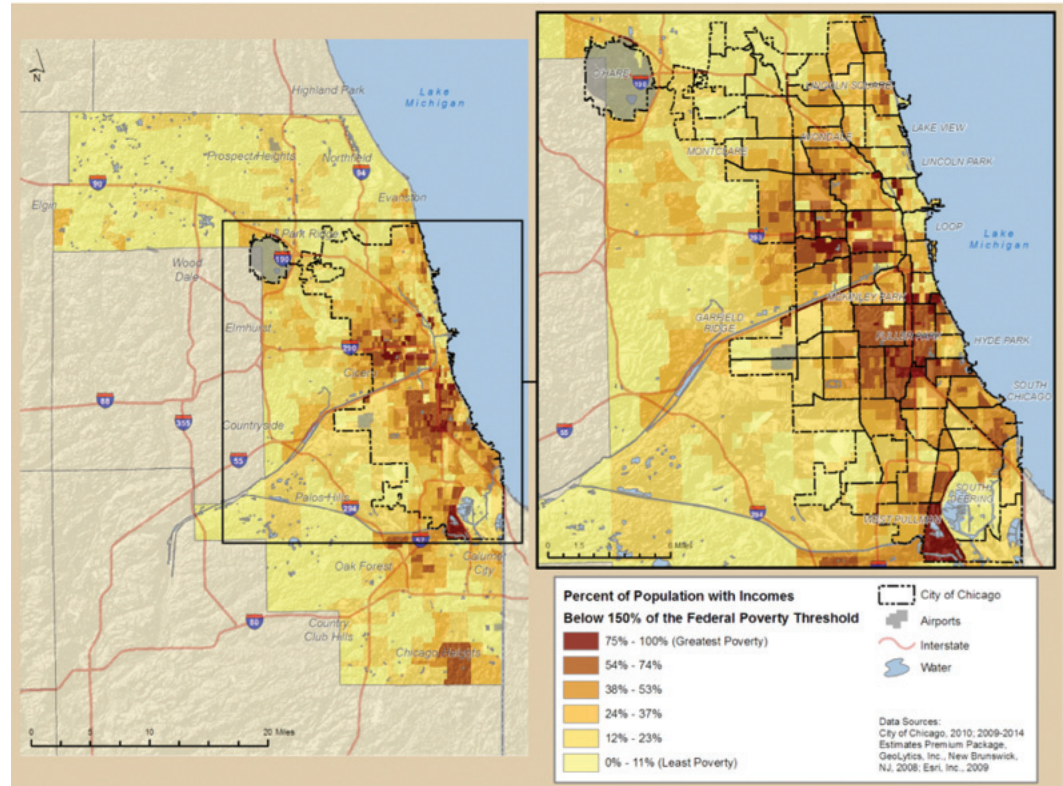
The income-to-poverty ratio expresses household income as a percentage of the FPL. Figure 3 shows that 7.4% of households in Cook County had incomes that were less than half of the FPL (an income-to-poverty ratio of 50%), and almost 35% earned less than twice the FPL. For a family of four, this was less than \$44,100 in 2009.

Figure 3:
Ratio of Income
to Poverty in
Cook County (2009)



The U.S. Census Bureau estimates that 23.6% of U.S. households had incomes below 150% of the FPL in 2009.³⁹ In Cook County, 25.9% of the population earned less than 150% of the FPL.³⁹ In 2009, half of households in census tracts in the neighborhoods of Armour Square, East Garfield, Englewood, Fuller Park, Grand Boulevard, Lower West Side, New City, North Lawndale, Oakland, Riverdale, South Chicago, South Lawndale, Washington Park, West Englewood, West Garfield Park, and Woodlawn had incomes below 150% of the FPL (Map 3).

Map 3:
Poverty by Census
Tract, Cook County and
Chicago (2009)



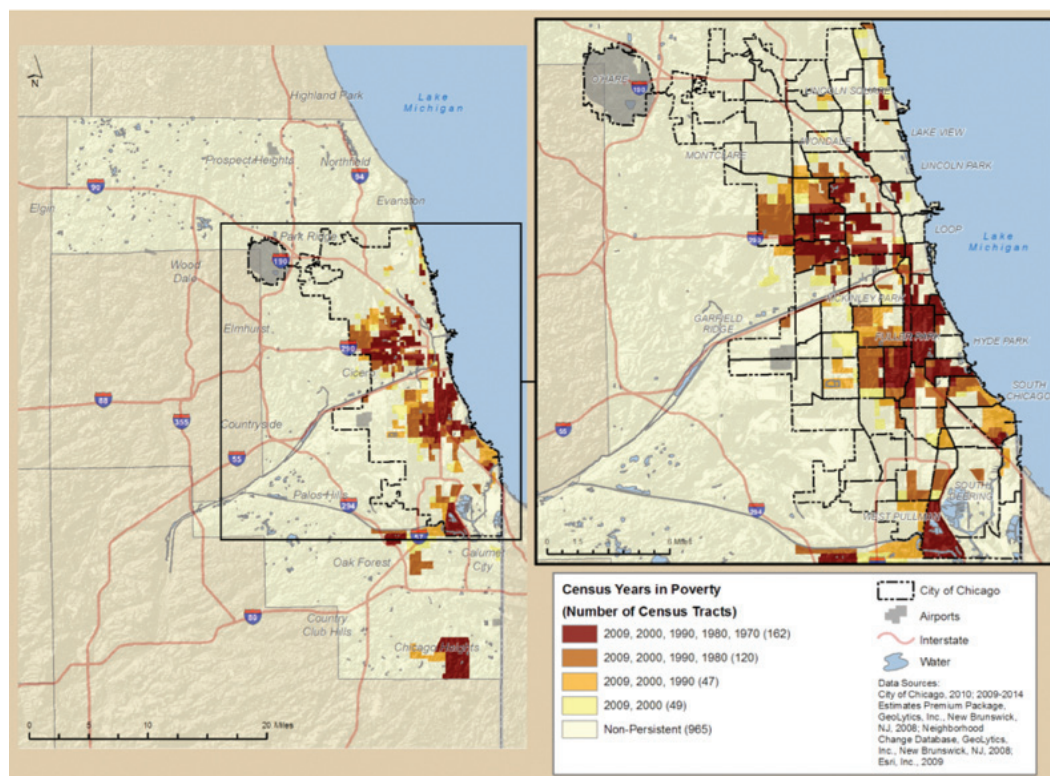
A persistent lack of economic resources during childhood can have consequences on cognitive, emotional, behavioral, and physical development.^{45,46} It may also diminish the likelihood of high school completion, thus perpetuating disadvantage and the multigenerational cycle of living in conditions that adversely affect health. Persistent poverty exists in census tracts in which at least 20% of households had incomes below 100% of the FPL for at least two consecutive census periods. Persistent poverty exists in more than a quarter of Cook County census tracts, including 162 tracts located in neighborhoods, listed in Table 2, where more than 20% of the population has had incomes below the FPL for five decades (Map 4) and an additional 216 census tracts that have experienced persistent poverty for two to four decades.

Table 2:
Cook County
Neighborhoods with
Persistent Poverty
for Five Decades

Uptown	North Center	Lincoln Park
Near North Side	Humboldt Park	West Town
Austin	West Garfield Park	East Garfield Park
Near West Side	North Lawndale	South Lawndale
Lower West Side	Near South Side	Armour Square
Douglas	Oakland	Fuller Park
Grand Boulevard	Kenwood	Washington Park
Woodlawn	South Shore	South Chicago
Riverdale	West Englewood	Englewood
Greater Grand Crossing	Auburn Gresham	<i>Robbins/Blue Island</i>
<i>Chicago Heights/Ford Heights</i>		

Source: Geolytics Neighborhood Change Database.
Communities in *italics* are suburbs. All others are Chicago Community Areas

Map 4:
Persistent Poverty by
Census Tract, Cook
County and Chicago
(1970–2009)



Race is strongly associated with poverty and wealth, both nationally and in Cook County. In 2009, the median income of Cook County families was \$63,612 overall, with sharp differences by race and ethnicity. The median income was \$87,918 among non-Hispanic Whites, \$77,096 among Asians, \$40,048 among Blacks, and \$44,012 among Hispanics.³⁹

Insufficient income to meet basic needs intensifies material hardship. In the United States, the risk of housing cost burden^a in 2009 was almost seven times greater for those earning less than \$20,000 per year than it was for those earning \$75,000 or more.³⁹ Households in Cook County were more likely to have had housing cost burden in 2009 as compared with households in Illinois and the United States. In Cook County, the housing cost burden in 2009 was moderate to severe (between 30% and 49.9% of income) for over one in five (21.7%) households, and was severe (more than 50% of income) in another 17.0% of households.³⁹ Cook County's housing cost burden exceeded that of Illinois (19.1% and 12.5% of households respectively experienced moderate or severe cost burden) and the United States (18.4% and 12.0% of households, respectively, experienced moderate or severe cost burden).³⁹ Severe overcrowding (an average of more than 1.5 persons per room) affected 4.2% of Cook County households, compared with 2.4% of Illinois households and 2.8% of U.S. households.⁴⁷ Only 54.9% of housing units in Cook County were occupied by those who owned and held financial stake in the property, compared with 63.9% in Illinois and 60.7% nationally.^{24,47}

^aDefined as paying greater than 30% of household income on housing costs.

Education

Education is a pathway to higher income and net worth, which also have strong influences on health status and access to health care. National statistics indicate that adults (age 25 years and older) who lack a high school education or equivalent are three times more likely to die before age 65 years as are those with a college education.⁴⁸ They are also more likely to engage in unhealthy behaviors such as cigarette smoking.⁴⁹

Table 3:
Socioeconomic
Characteristics of
Cook County,
The State of Illinois,
and the United States

	Cook County(%)	Illinois(%)	United States(%)
Educational attainment			
Less than high school	16.4	13.6	14.7
High school only	24.2	27.3	28.5
Some college	25.7	28.5	28.9
Bachelor's degree or higher	33.7	30.6	27.9
Poverty rate			
Below 50%	7.4	6.0	6.3
50–99%	8.5	7.3	8.1
100–199%	18.8	16.9	18.4
200% and above	65.3%	69.7%	67.3%
Source: U.S. Census Bureau 2009, American Community Survey.			

In Cook County, a larger percentage of adults (age 25 years and older) lacked a high school degree in 2009 (16.4%) than did those in either Illinois (13.6%) or the nation (14.7%) (Table 3).^{33,39} Educational attainment varies greatly by census tract in Cook County: 69.8% of census tracts—representing 929 tracts—had a higher percentage of adults without a high school education than was the overall percentage for Illinois.⁴⁷ The percentage without a high school diploma varies by census tract from 0.2% in New Trier Township in the northern suburb of Cook County to 76.6% in a census tract in Near West Side (Map 5). Cook County neighborhoods with the highest percentages of adults without a high school diploma are shown in Table 4.

Map 5:
Adults with a
Bachelor's Degree,
by Census Tract,
City of Baltimore (2009)

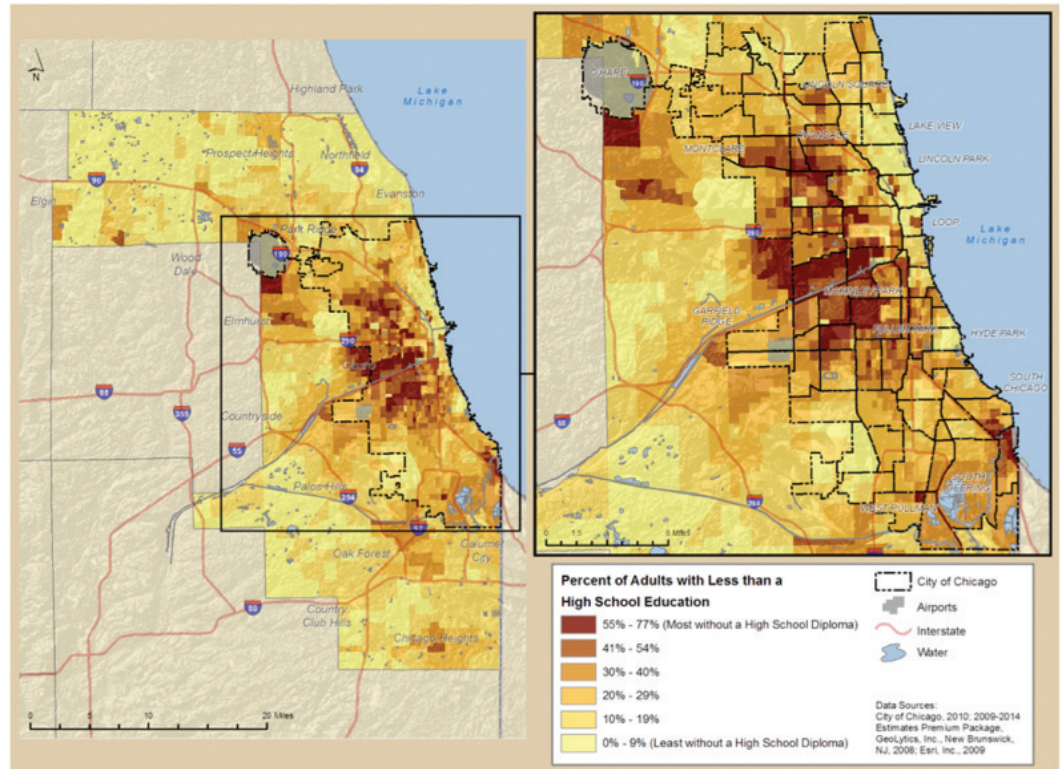


Table 4:
Cook County
Neighborhoods with
Low Educational
Attainment*

Near West Side	Grand Boulevard	New City
Logan Square	South Lawndale	Douglas
Humboldt Park	Grand Boulevard	Lower West Side
Brighton Park	North Lawndale	Hermosa
Cicero	Gage Park	West Englewood
Belmont Cragin	West Town	Austin
South Chicago	West Pullman	Near North Side
Near West Side	Englewood	McKinley Park
West Garfield Park	<i>Melrose Park</i>	<i>Franklin Park</i>
<i>Cicero</i>		

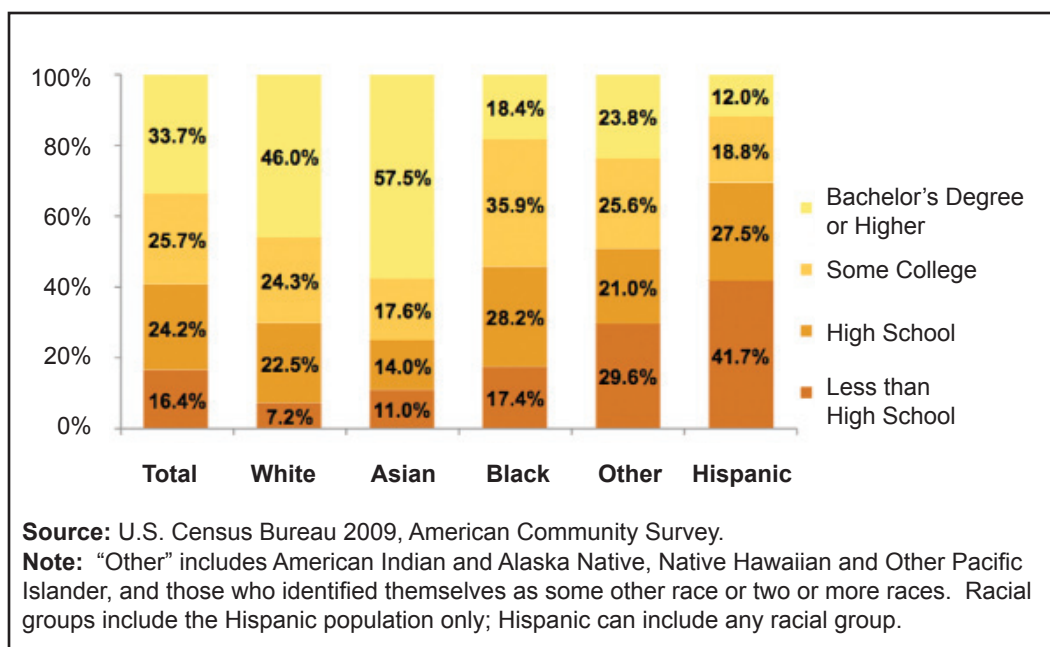
*Neighborhoods in which at least 50% of adults lacked a high school diploma in at least one census tract in 2009.

Source: Geolytics Neighborhood Change Database.

Communities in *italics* are suburbs. All others are Chicago Community Areas

Race and ethnicity are strongly related to educational attainment. Compared with non-Hispanic White adults (age 25 years and older) in the same time period, Black adults in Cook County were more than twice as likely to lack a high school diploma, and Hispanic adults were more than five and a half times as likely (Figure 4).

Figure 4:
Educational Attainment
by Race/Ethnicity,
Cook County (2009)



Besides educational attainment, measures of educational proficiency also vary by place. The National Assessment of Educational Progress (NAEP) evaluates samples of students in the 4th, 8th, and 12th grades to gauge levels of proficiency in various subjects. In 2009, Chicago 4th graders had a higher percentage of students scoring below basic proficiency in reading, math, and science than did either Illinois or the United States.⁵⁰ Among 8th grade students in Chicago, the risk of scoring below basic in all three subjects was nearly double that of students statewide.⁵⁰

Health Outcomes

Disparities in health outcomes on the basis of demographic factors are well established. In 2007, life expectancy at birth in the United States was 77.9 years but differed by 4.8 years for Blacks (73.6 years) and Whites (78.4 years).⁵¹ In 2007, Blacks experienced 157 more premature deaths (before the age of 65) per 100,000 persons than did Whites, a ratio of 1.7 premature deaths among Blacks for every premature death among Whites.⁵² The premature mortality rate for Whites in Cook County was less than that of Whites for the nation, but the rate for Black residents was higher in Cook County than in the rest of the nation, creating a larger racial disparity. Black Cook County residents suffered 266.4 more premature deaths than did White residents in 2007, a ratio of 2.5 premature Black deaths for every premature White death.

Nationally, Blacks had the highest overall age-adjusted mortality in 2007, with a rate difference of 208.6 more deaths per 100,000 persons than that of Whites.⁵³ That is a ratio of 1.3 deaths among Blacks for every death among Whites. Blacks also had the highest age-adjusted mortality rate from heart diseases.⁵³ In Cook County, Black residents suffered 355.8 more deaths per 100,000 from all causes as compared with Whites, a

disparity that is higher than in Illinois (296.2 excess deaths) or the United States (208.6 excess deaths). That is a ratio of 1.5 deaths among Blacks for every death among Whites in Cook County, compared with a ratio of 1.4 for Illinois and 1.3 for the United States. Disparities in heart disease mortality in Cook County are similar to those seen in Illinois and the United States (Table 5).

Table 5:
Health Outcomes in
Cook County, Illinois and
the United States

	Cook County	Illinois	United States
Life expectancy at birth (years)	79.1^(a)	78.6^(b)	77.9^(c)
Overall Premature mortality^(d)	239.6	219.0	231.1
White	179.5	191.4	216.7
Black	445.9	425.6	373.7
Hispanic	141.3	132.3	173.0
Overall All-cause mortality^(d)	759.2	760.3	760.2
White	687.1	732.5	749.4
Black	1042.9	1028.7	958.0
Hispanic	449.9	434.4	546.1
Overall Heart disease mortality^(d)	202.0	192.9	190.9
White	194.7	190.2	191.4
Black	261.8	257.0	251.9
Hispanic	110.9	104.4	136.0
Overall Infant mortality rate^(e)	7.5	7.4	6.7
White	4.3	6.0	5.6
Black	13.8	14.4	12.9
Hispanic	5.2	6.2	5.4
Overall Low birthweight rate (%)^(f)	8.9	8.4	8.2
White (%)	6.9	7.1	7.1
Black (%)	13.9	13.7	13.4
Hispanic (%)	6.6	6.6	7.0

Note 1: Premature, all-cause, and heart disease mortality rates are calculated per 100,000 persons and are age adjusted to the 2000 U.S. Census population.

Note 2: Infant Mortality Rates are calculated per 1,000 live births.

Note 3: Heart Disease is defined as the following ICD10 codes: I00–I09, I11, I13, I20–I51

(a) Calculations performed by the VCU Center on Human Needs from 2003–2007 mortality data provided by Chicago and Cook County Public Health Department and 2001–2008 Geolytics Premium Estimates.

(b) Calculations performed by the VCU Center on Human Needs from 2007 data provided by the Centers for Disease Control and Prevention CDC WONDER on-line tool.

(c) Health, United States 2010: With Special Features on Death and Dying. The Centers for Disease Control and Prevention; 2007.

(d) Centers for Disease Control and Prevention CDC WONDER on-line tool 2007.

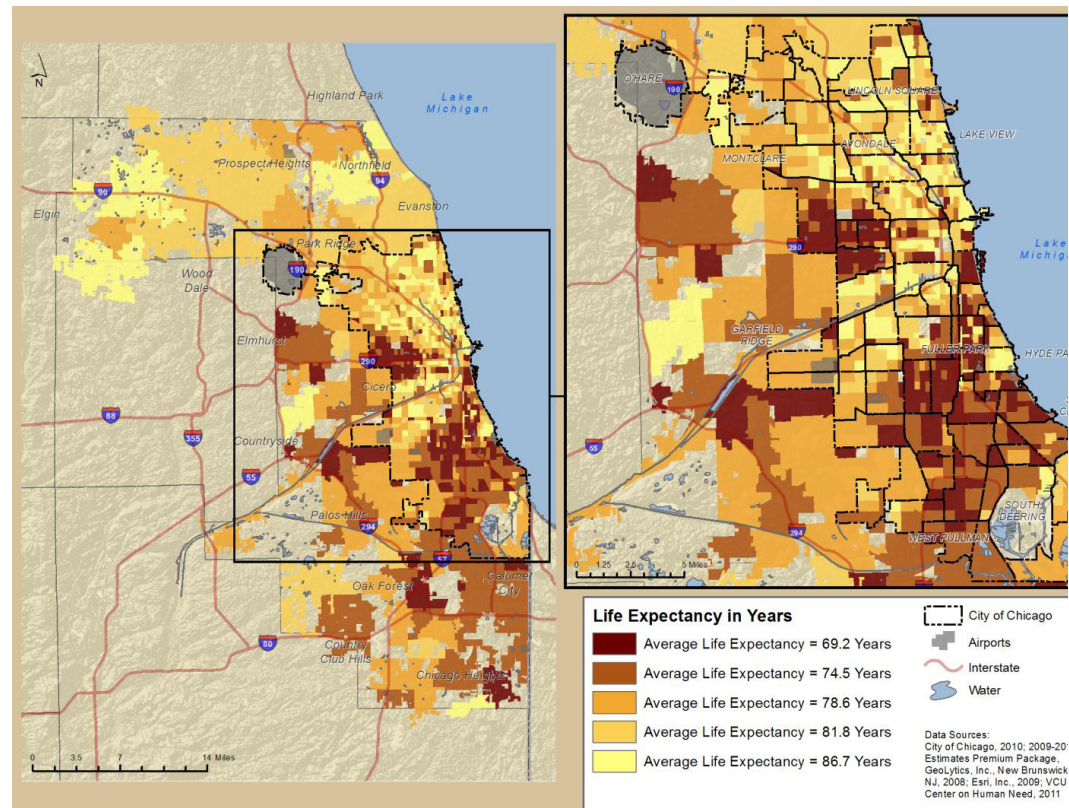
(e) National Center for Health Statistics, National Vital Statistics Report 2006;58(17).

(f) The Centers for Disease Control and Prevention National Vital Statistics System 2008.

Race is also strongly correlated with birth outcomes. The infant mortality rate in the United States was 5.6 per 1,000 for White mothers and 12.9 per 1,000 for Black mothers in 2006.⁵¹ Infant mortality is more than 24 times higher for infants with a birth weight of less than 2,500 grams than it is for infants at or above this weight.⁵¹ In the United States, Black mothers are 89% more likely to deliver a child of low birth weight than are White mothers (13.4% to 7.1%, respectively). In Cook County, Black mothers are more than twice as likely as White mothers to give birth to a child of low birth weight.

Given the geographic variation in socioeconomic and environmental factors that affect health in Cook County, it follows that health outcomes—including life expectancy—vary sharply by neighborhood as well. The average life expectancy of census tracts in Chicago and municipality in suburban Cook County are shown in Map 6. We separated the small areas into quintiles (5 equally sized groups) based on their life expectancy and calculated the average value for each quintile. The results suggest that life expectancy varied by as much as 17.5 years across small areas within the county. Life expectancy in the lowest quintile (69.2 years) was lower than in countries like the Dominican Republic and El Salvador.⁵⁴

Map 6:
Life Expectancy Quintiles
by Census Tract and
Municipality, Cook County
(2003–2007)



Other health outcomes—including premature mortality, heart disease mortality, and stroke mortality—vary sharply by place as well. Cardiovascular diseases such as heart disease and stroke are strongly related to diet.⁵⁵ Access to fresh fruit and vegetables and other heart-healthy food is important to reducing the risk of cardiovascular disease, cancer, and other chronic illnesses.⁵⁵

Part II. Neighborhood Characteristics, Food Access, and Health Outcomes

Socioeconomic Factors and Health

Socioeconomic factors affect the way people live and may affect the risk of illness and premature death.^{3,13} In 2007, members of families living in poverty nationwide were nearly twice as likely to have diabetes, 5.3 times more likely to report serious psychological distress, and 1.6 times as likely to have been hospitalized during the previous year as compared with families with incomes of at least 200% of the FPL.⁵⁶ In addition, access to health care services is more limited for families with low incomes. In 2007, impoverished families were two to four times more likely to lack health insurance or a usual source of care, or to defer health care because of cost, as compared with families that had incomes of at least 200% of the FPL.⁵⁶

In 2009, life expectancy in Cook County was significantly correlated with a number of key social, economic, and demographic indicators. A correlation coefficient (r) closer to 1.0 (or -1.0) indicates a very strong relationship, whereas a correlation coefficient close to 0 indicates a very weak relationship.

- Areas (census tracts and suburban municipalities) with a higher percentage of the population that was non-Hispanic White had significantly longer life expectancies ($r = 0.15$, $P < 0.0001$). Areas with a higher percentage of non-Hispanic Blacks had significantly shorter life expectancies ($r = -0.16$, $P < 0.0001$).
- Owner-occupied housing was associated with longer life expectancies ($r = 0.08$, $P < 0.0114$), whereas a high vacancy rate was associated with shorter life expectancies ($r = -0.06$, $P < 0.0427$).
- Areas with high concentrations of poverty ($r = -0.12$, $P < 0.0001$) and unemployment ($r = -0.09$, $P < 0.0029$) had significantly shorter life expectancies, whereas higher median income ($r = 0.18$, $P < 0.0001$) was associated with significantly longer life expectancies.
- Areas with lower educational attainment (less than high school) had shorter life expectancies ($r = -0.06$, $P < 0.0436$), whereas a high percentage of the population with at least a Bachelor's degree was associated with longer life expectancies ($r = 0.13$, $P < 0.0001$).

Figure 5:
Average Life Expectancy
(2003-2007) by Median
Income (2009) in
Cook County

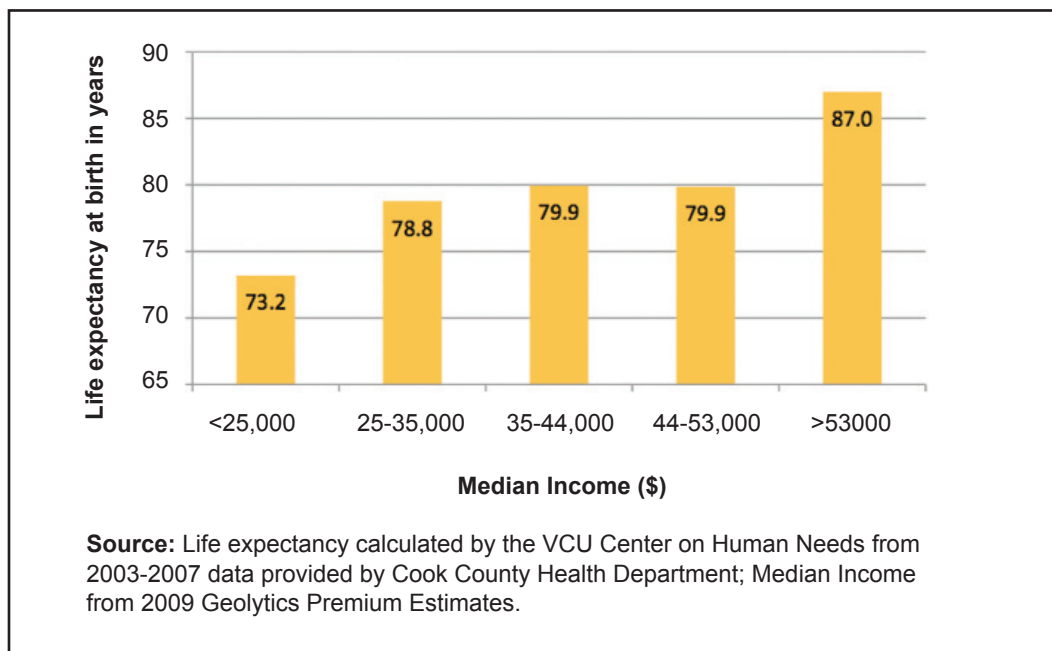


Figure 5 illustrates the relationship between life expectancy and income. We grouped Chicago census tracts and suburban Cook municipalities into quintiles (5 equal groups) according to median income and calculated the average life expectancy of each quintile. Areas with a median income greater than \$53,000 per year had a life expectancy that was almost 14 years longer than that of areas with a median income below \$25,000 per year.

Food Access in Cook County

Access to healthy, nutritious food is an important influence on community health. A diet deficient in fruits and vegetables and high in calories, sodium, and saturated fat is linked to numerous acute and chronic health problems such as diabetes, hypertension, obesity, heart disease, and stroke.⁵⁵ An important impediment to healthy diets is restricted access to supermarkets or other venues (such as farmers' markets or community gardens) to purchase affordable, nutritious foods. Previous national and local studies indicate that chain supermarkets (such as Jewel-Osco, Dominick's, and Food 4 Less) provide the greatest variety of healthy food options that combine quality and affordable price.^{57,58} Many neighborhoods are "food deserts" that lack such grocers but are instead dominated by convenience stores, bodegas, and fast food outlets that sell inexpensive, calorie-dense foods. In comparison with chain supermarkets, independent grocers and discount stores that sell food often offer less selection and poorer quality of food products at higher cost.⁵⁷

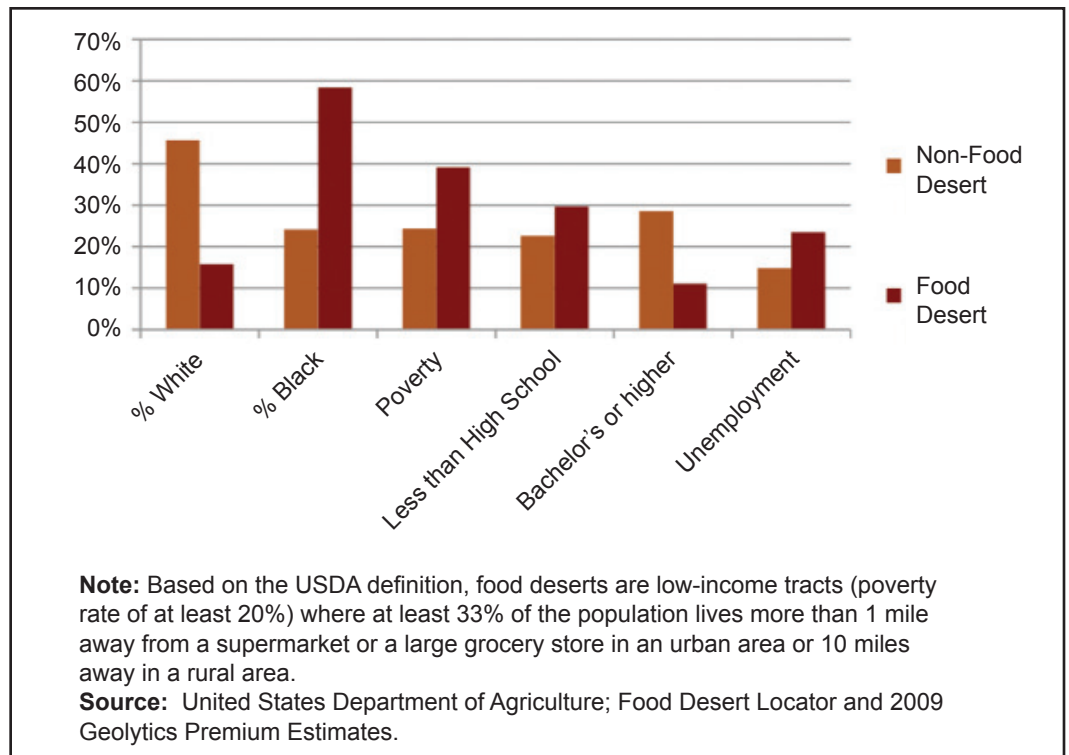
The distribution of food providers in a community is related to numerous factors, including the demographics and physical characteristics of the community. Previous studies have found that supermarkets in the United States are more numerous in higher-income communities and communities with higher percentages of non-Hispanic White residents.⁵⁹ Conversely, high-poverty and -minority communities tend to have greater access to liquor stores and fast food establishments.^{59–63} These communities may have high access to some types of grocery stores,⁶³ but in comparison with chain supermarkets, alternative grocery stores have been found to have higher prices, limited selection, and poorer quality of food items.⁵⁷

A report conducted by the Mari Gallagher Research and Consulting Group in 2006 investigated the determinants of food deserts in Chicago.³⁵ The study found that access to particular types of food providers was linked to community demographics. Looking at blocks within Chicago by their majority race/ethnicity (50% of the population or more), blocks that were majority Black or Hispanic had a higher average distance to all grocery stores.³⁵ This characteristic remained when looking at chain grocers or at smaller, independent grocers.

The United States Department of Agriculture (USDA) classified 39 census tracts in Cook County as food deserts in 2010. They defined food deserts as low-income tracts (poverty rate of at least 20%) where at least 33% of the population lives more than 1 mile away from a supermarket or a large grocery store in an urban area or 10 miles away in a rural area.⁶⁴ In Chicago, these census tracts are located mainly in South Deering, West Pullman, Pullman, and New City, but there are also food deserts in Woodlawn, Roseland, East Side, Riverdale, and Englewood.⁶⁴ More than 54% of the population in these tracts had low access to a supermarket or large grocery store, and close to 27% were low income and had poor access (as defined above).⁶⁵ Outside of Chicago, most of the tracts considered food deserts were in Thornton, Bloom, and Bremen, with a few tracts in Elk Grove, Niles, Leyden, Calumet, Worth, and Rich. In these census tracts, more than 56% of the population had low food access, and more than one in every five were low income and had poor access.⁶⁵

How the social, economic, and demographic characteristics of residents in these food deserts differ from residents of non-food deserts in Cook County is illustrated in Figure 6. Whereas the population in non-food desert tracts was less than one-quarter Black (24.2%), close to three of every five (58.5%) residents of food deserts were Black. Conversely, whereas whites made up close to half (45.7%) the population of non-food desert tracts, they made up less than one sixth (15.9%) of food desert tracts. Educational attainment was also significantly correlated with food desert status. The percentage of adults with a Bachelor's degree or higher in non-food desert census tracts was more than double that of adults in food desert tracts (28.6% versus 11.1%). Additionally, the average yearly household expenditure on fruits and vegetables was more than \$50 per year higher in non-food desert tracts. Lastly, the average life expectancy (among Chicago tracts alone) was 78.8 years in non-food desert tracts and 72.6 years in food desert tracts,

Figure 6:
Characteristics of Food
Deserts and Non-Food
Deserts in Cook County



and the risk of premature death (death before the age of 65) was more than double in food deserts as compared with non-food deserts.

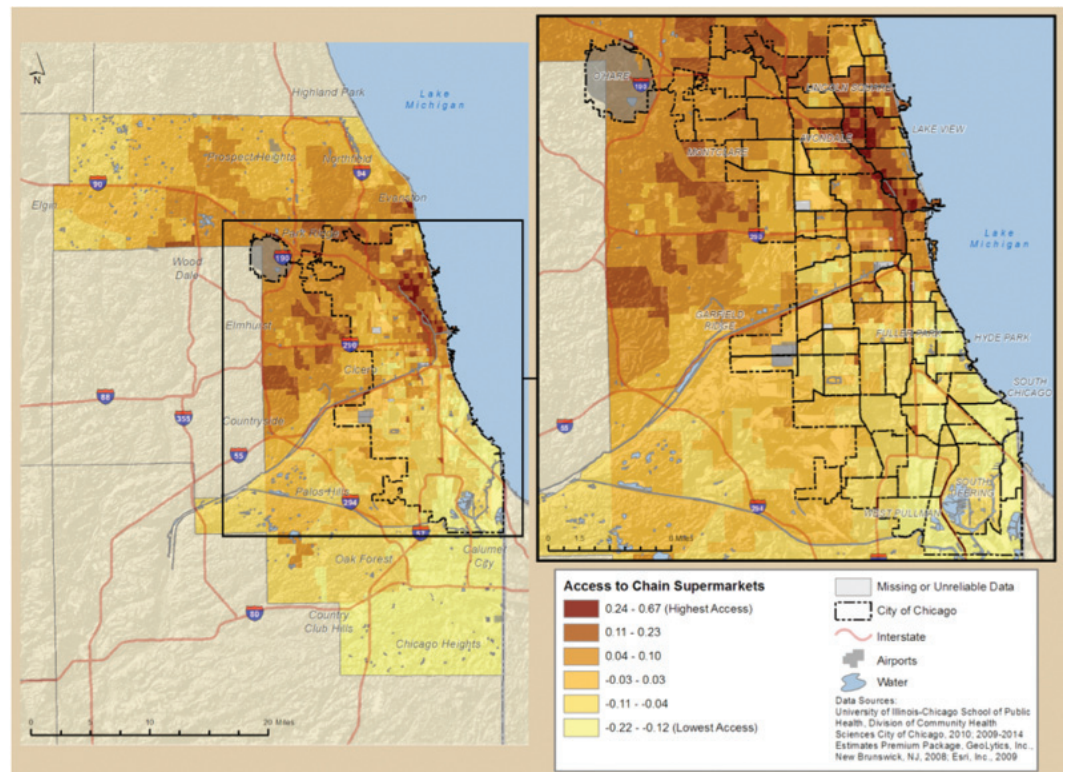
Access to food providers is highly contingent on the size of the population in the community. As with most other commercial industries, supermarkets, grocery stores, and restaurants are more clustered in areas of high population density. In order to investigate the degree to which community characteristics other than population density contribute to the type and quantity of food providers available in Cook County, we developed a food access index^b that accounts for population density in measuring food access at the census-tract level. A positive food index value indicates greater food access than would be predicted on the basis of population density, whereas a negative value indicates lower food access than would be predicted. Further explanation of the methodology behind the food access index can be found in Appendices A and B. We measured the food index for access to supermarkets, supermarkets plus large independent grocers, discount stores and small independent grocers, drug stores, and fast food establishments.

^bThe food access measure was calculated by measuring the distance from the centroid of each census tract to every location of food providers (such as chain supermarkets, independent supermarkets, drug stores, and fast food). The reciprocal of these values was summed and calculated as a percentage of the range of values for each type of provider (greatest access equals one; worst access equals zero). We then ran an ordinary least squares geospatial regression model with population density predicting food access. The residuals left from this model represent the food access index.

Access to supermarkets

The areas of Cook County in which the food access index is highest for chain supermarkets (with the exception of discount stores including Aldi's and Save-A-Lots) is illustrated in Map 7. Near North Side, Lake View, North Center, and a few tracts in Lincoln Park have the highest food access scores for chain supermarkets, indicating that those areas have more access to chain supermarkets than would be predicted on the basis of their population density. Areas with the greatest deficit in access to chain supermarkets are Thornton and Bloom. In Chicago, the largest deficits are in South Chicago.

Map 7:
Access to Chain
Supermarkets by Census
Tract, Cook County (2009)

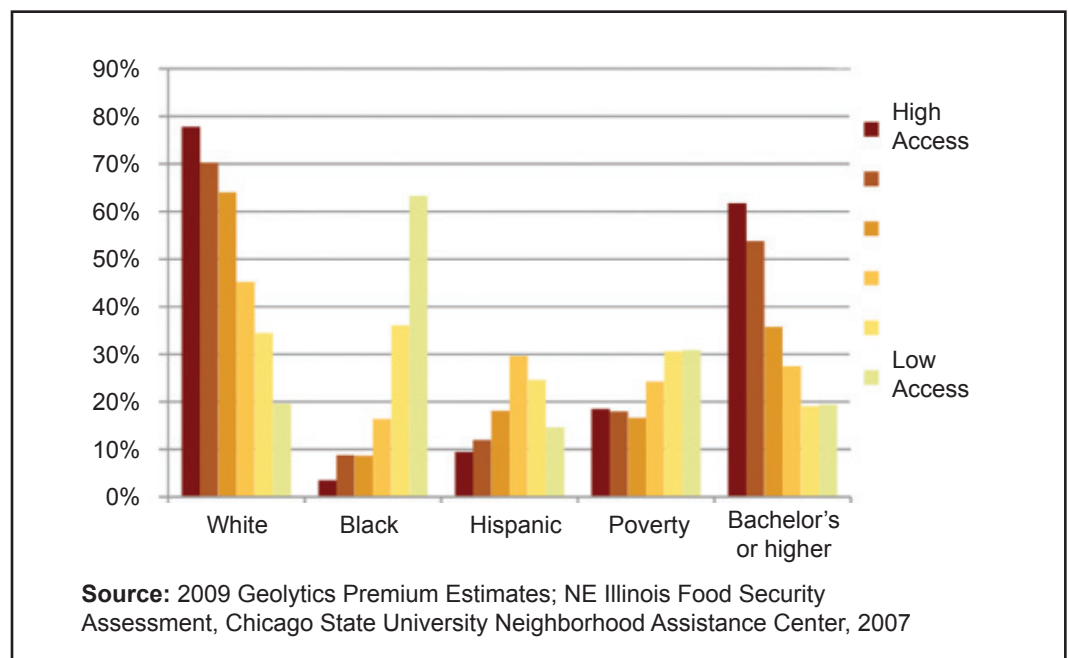


Social, economic, and demographic characteristics of the communities of Cook County are significantly associated with the level of access to chain supermarkets as measured by the food access index. The bivariate associations between the food access index and various social and economic measures, reported here and in the following sections, are correlation coefficients that show the strength and statistical significance of the relationship between two variables, without controlling for other factors. As noted earlier, a correlation coefficient (r) closer to 1.0 (or -1.0) indicates a very strong relationship, whereas a correlation coefficient close to 0 indicates a very weak relationship.

- Areas (census tracts and suburban municipalities) with larger White populations ($r = 0.45$, $P < 0.0001$) and, to a lesser degree, Asian populations ($r = 0.19$, $P < 0.0001$) had greater access to chain supermarkets. Black populations had diminished access ($r = -0.47$, $P < 0.0001$).
- Areas with high median income had increased access ($r = 0.27$, $P < 0.0001$), whereas areas of concentrated poverty had diminished access ($r = -0.23$, $P < 0.0001$).
- High concentrations of adults who lack a high school education had reduced access to chain supermarkets ($r = -0.21$, $P < 0.0001$), whereas areas with high concentrations of adults with a Bachelor's degree or higher education had increased access ($r = 0.43$, $P < 0.0001$).

The social, economic, and demographic disparities that exist in the access areas identified in Map 7 are illustrated in Figure 7. Whites comprise 77.8% of the population in the high-access group (those tracts in dark red on the map), whereas Blacks account for only 3.5%. By comparison, Whites comprise 19.7% of the population in the low-access group (those tracts in light yellow on the map), whereas Blacks account for 63.3%. The percentage of the adult population that holds a Bachelor's degree is more than three times higher in the dark red group as compared with the light yellow group (61.7% and 19.4%, respectively), and the percentage of the population below 150% of the FPL is also substantially lower in the dark red group as compared with the light yellow group (18.5% and 30.9%, respectively).

Figure 7:
Characteristics of Areas
by Access To Chain
Supermarkets



Although chain supermarkets are the food provider most likely to offer healthy foods such as fresh produce and low-fat milk,^{57,58} independent stores (particularly larger independent stores) also can provide healthy food products at competitive prices.⁵⁷ The food access index to chain supermarkets and large independent grocery stores in Cook County is plotted in Map 8. A large independent food store was defined as a store with five or more cash registers (such as Ultra Foods, Pete's Fresh Market, and Garden Fresh Market). Access, as defined by this measure, was again highest in Near North Side, North Center, and Lake View but also in Portage Park, West Town, Avondale, and Logan Square. Once again, Thornton and Bloom have less access to supermarkets and large independent grocers, as do more neighborhoods in Chicago (such as South Shore, South Chicago, and East Side). The social conditions that exist in areas with chain supermarkets and large independent grocers^c are similar to those observed for areas with chain supermarkets only, with a few important variations.

- Map 8:**
Access to Chain
Supermarkets or Large
Independent Groceries
by Census Tract,
Cook County (2009)



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percentages of Hispanic residents are associated with higher access to chain and large independent stores ($r = 0.15$, $P < 0.0001$), whereas percent Hispanic was unrelated to access to chain supermarkets alone.

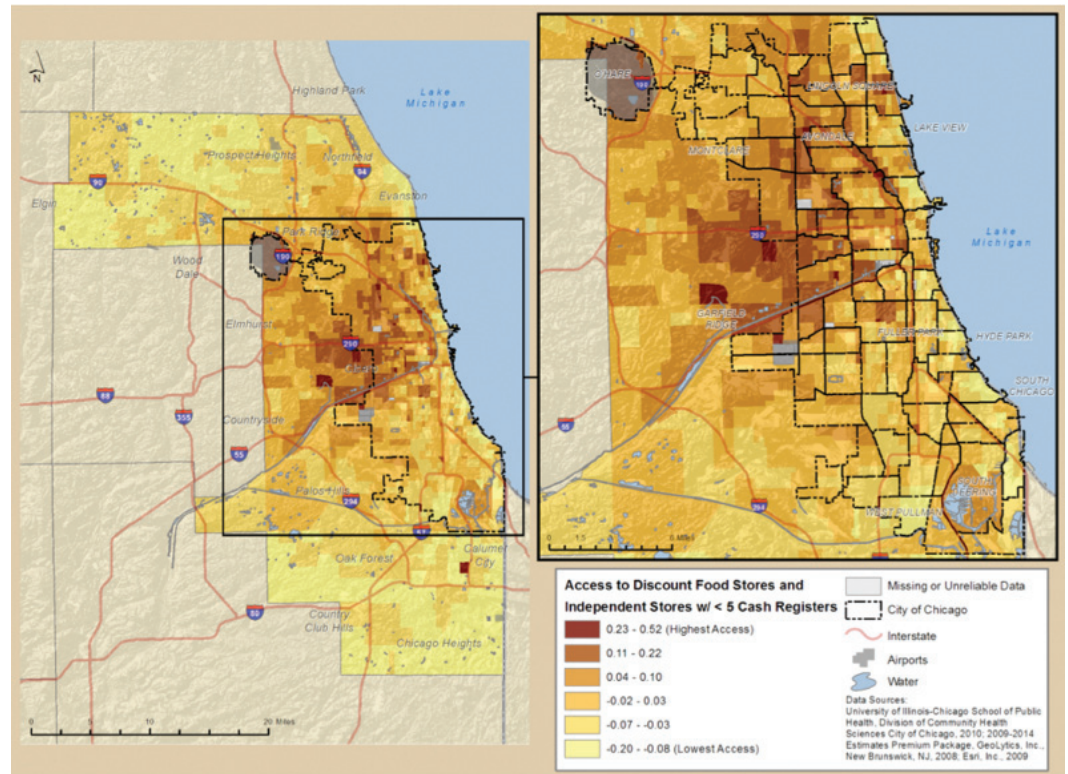
- The relationship between food access index scores and median income ($r = 0.13$, $P < 0.0001$) and poverty ($r = -0.08$, $P < 0.0029$) is of a lower magnitude when large independent stores are included in the measure. This suggests that large independent grocers may be more likely than chain supermarkets to locate in areas with poorer economic conditions.
- A high concentration of adults with a Bachelor's degree is still associated with increased access ($r = 0.25$, $P < 0.0001$), but a high concentration of adults without a high school education is no longer associated with decreased access.

Taken together, these findings suggest that although disadvantaged groups (such as the poor, uneducated, residentially segregated Black populations) lack the advantage of increased food access to chain supermarkets or large independent grocers, the latter appear to be more likely than are chain supermarkets to locate in struggling communities.

Access to discount grocers and small independent grocers

Discount grocers (such as Aldi's and Save-A-Lots) and smaller independent grocers (defined as having fewer than five cash registers) are more likely to locate in distressed areas but generally do not offer the diversity of products or competitive prices that supermarkets provide. Studies suggest that smaller independent grocers offer fewer healthy options such as fresh fruits and vegetables⁵⁷ but are still a potential food source for the community. The spatial distribution of the food access index for discount stores and smaller independent grocers is shown in Map 9. Whereas the areas of Cook County that had higher-than-expected access to chain supermarkets and large independent groceries were in northern Chicago (such as Near North Side, North Center, and Lake View), access to small independent grocers is higher to the south in the Near West Side, North and South Lawndale, West Town, Austin, East Garfield Park, Humboldt Park, and Hermosa. The suburban Cook communities of Berwyn, Cicero, and Oak Park also have greater access to these food providers. Areas with lower-than-expected access to discount stores and small independent grocers are once again in Bloom and Thornton, as well as the suburban areas of Evanston, Palatine, and Wheeling and the Chicago neighborhoods of Near North Side and South Shore.

Map 9:
Access to Discount Grocers
and Small Independent
Grocers by Census Tract,
Cook County (2009)



Note: Small Independent grocers have fewer than 5 cash registers.

The social, economic, and demographic conditions in areas with access to discount and small independent groceries are substantially different than those in the previous two subgroups.

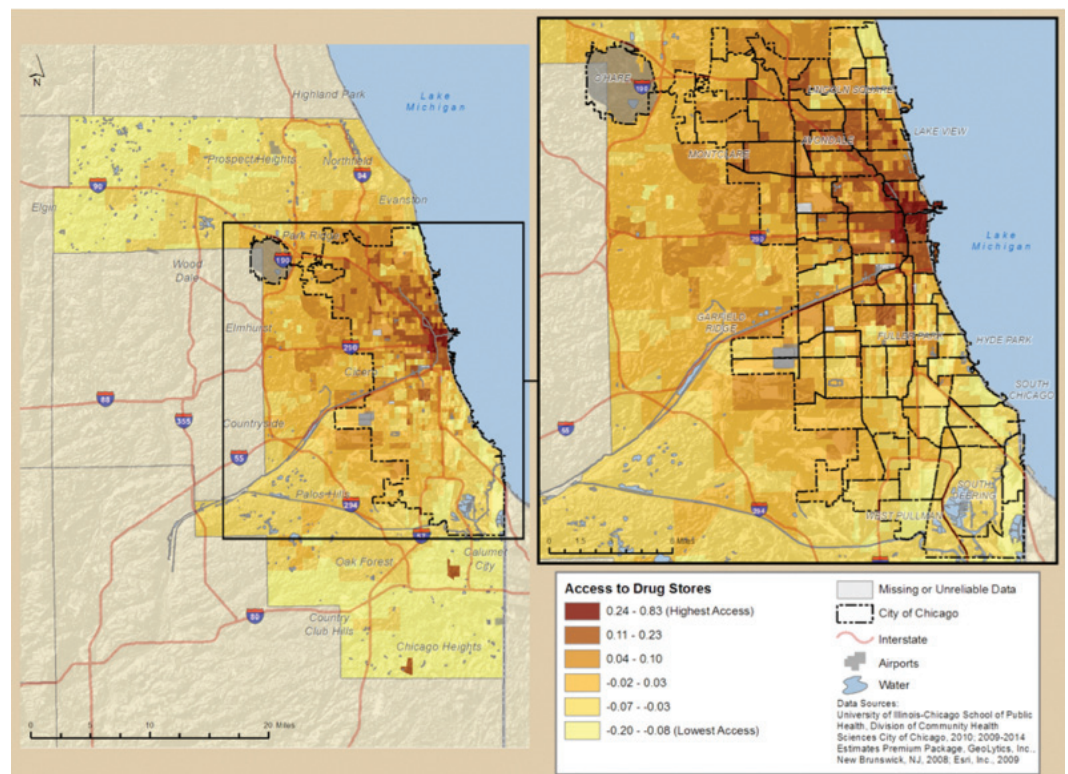
- Race of the population is not significantly related to access to discount and small independent grocers, but percent Hispanic is associated with higher access ($r = 0.30$, $P < 0.0001$).
- Median income is negatively associated with access to discount and small independent grocers ($r = -0.19$, $P < 0.0001$), and areas of poverty have greater access ($r = 0.21$, $P < 0.0001$). These associations indicate that discount and small independent grocers are more likely to locate in low-income and impoverished areas.
- Educational attainment (less than high school) is associated with greater access to discount and small independent groceries ($r = 0.36$, $P < 0.0001$), whereas a higher concentration of adults with a Bachelor's degree or higher is associated with less-than-expected access ($r = -0.18$, $P < 0.0001$).
- Access to discount and small independent grocers is associated with decreased household expenditures on fruits and vegetables ($r = -0.21$, $P < 0.0001$).

Access to large drug stores

Grocery stores are not always the only community food source. Large drug stores (including specifically Walgreens and CVS in Cook County) provide some food options, although they rarely provide access to fresh foods or produce. According to the food access index, the Chicago neighborhoods of The Loop, Near West Side, and the Near North Side have the greatest levels of access to large drug stores beyond what would be expected on the basis of population density (Map 10). The lowest access to these large drug stores is in Bloom and Thornton as well as Hanover and the Chicago neighborhoods of East Side, South Chicago, South Lawndale, and South Shore.

- Access to drug stores is higher in areas with larger percentages of White residents ($r = 0.12$, $P < 0.0001$) and Asian residents ($r = 0.08$, $P < 0.0026$) and lower in areas with higher percentages of Black residents ($r = -0.14$, $P < 0.0001$).
- Communities with higher percentages of adults with a Bachelor's degree had higher access as well ($r = 0.17$, $P < 0.0001$).

Map 10:
Access to Large Drug
Stores by Census Tract,
Cook County (2009)

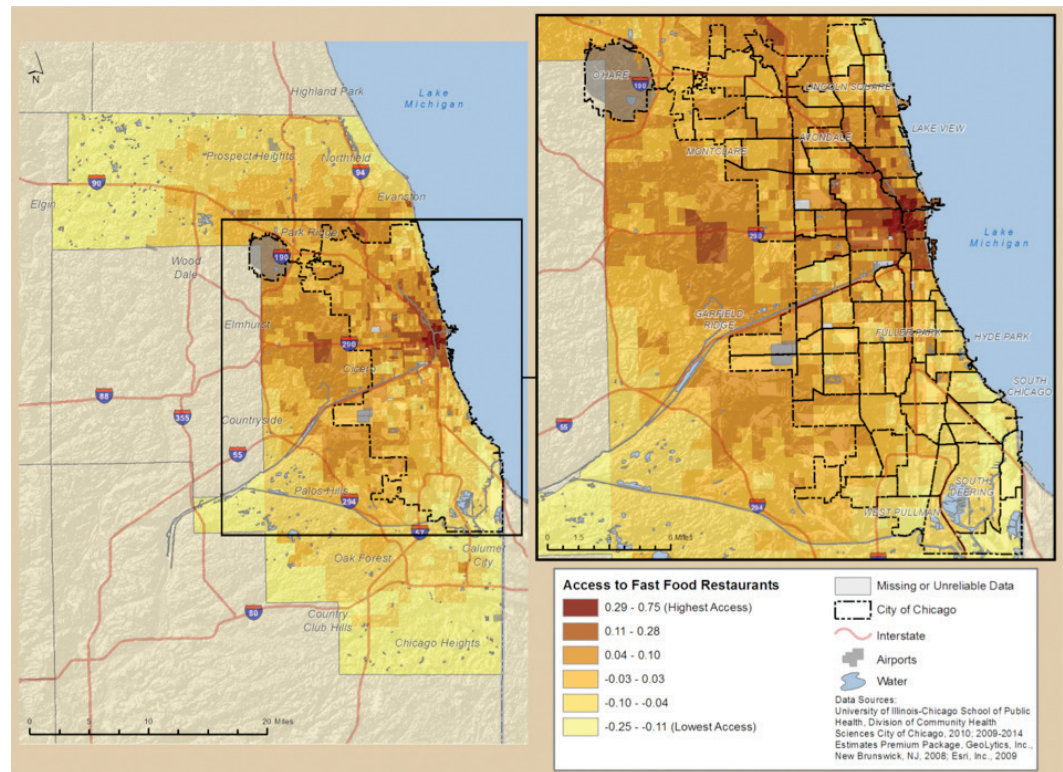


Access to fast food restaurants

The density of fast food establishments in Cook County is also relevant to health because of its association with obesity rates.^{66,67} The food access index for fast food establishments according to population density is plotted in Map 11. Fast food access is highest in the Chicago neighborhoods of the Loop, Near North Side, and Near West Side. The lowest access is in Bloom as well as in Elgin, Hanover, Palatine, and Rich and the Chicago neighborhoods of East Side and South Chicago.

- Fast food access is slightly increased in areas with more White ($r = 0.11$, $P < 0.0001$) and Asian residents ($r = 0.09$, $P < 0.0008$) and slightly decreased in areas with more Black residents ($r = -0.13$, $P < 0.0001$).
- Areas with higher median income tend to have less access to fast food restaurants ($r = -0.07$, $P < 0.0125$), and areas with a high concentration of poverty tend to have more access to fast food ($r = 0.09$, $P < 0.0017$). Although statistically significant, these associations are fairly weak suggesting that the prevalence of poverty is not a strong predictor of fast food access.

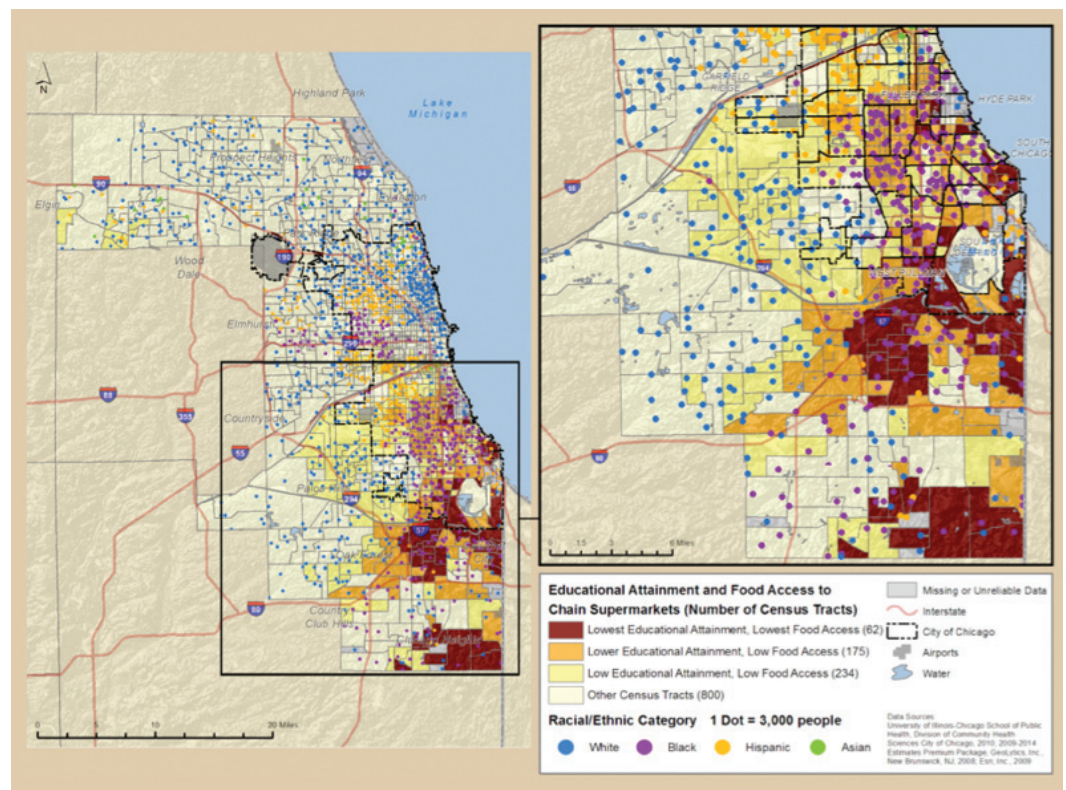
Map 11:
Access to Fast
Food Restaurants by
Census Tract,
Cook County (2009)



Food access is a community asset that enhances the quality of life of its residents: In Cook County, as in other areas, access to chain supermarkets has the highest correlation with healthy food purchases such as fruits and vegetables. The above analysis of access to various types of food providers illustrates how social, economic, and demographic characteristics help determine the distribution of food access throughout the county. Areas with a larger proportion of adults with a Bachelor's degree or higher have the greatest access to chain supermarkets ($r = 0.43$, $P < 0.0001$).

When the relationship between education and access to chain supermarkets is mapped by using spatial autocorrelation, the resulting Moran's I value of 0.46 indicates that communities in which educational attainment predicts food access have a moderately strong tendency to cluster together rather than disperse randomly. In Map 12, these areas are depicted in dark brown. Superimposed on this map are the racial and ethnic demographics of those tracts. The shaded census tracts indicate where low educational attainment and low access to chain supermarkets co-occur; the darker the color, the lower the level of either educational attainment or food access.

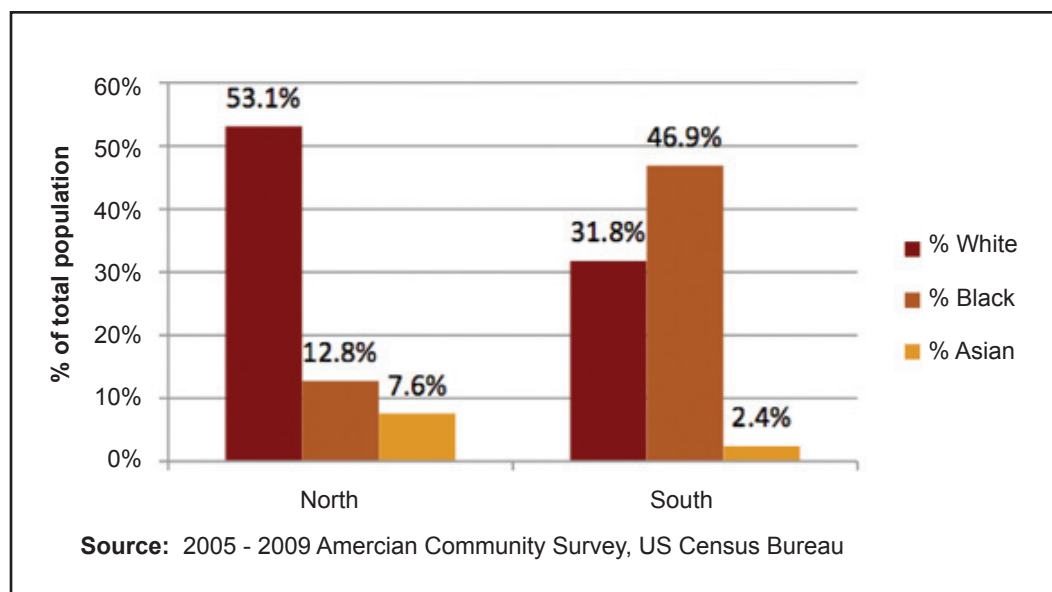
Map 12:
Demographic
Characteristics of Census
Tracts of Co-occurring Low
Educational Attainment
and Access to Chain
Supermarkets,
Cook County (2009)



Note: *Lowest* educational attainment = 0% to 15% with a Bachelor's degree; *Lower* educational attainment = 0% to 20% with a Bachelor's degree; *Low* educational attainment = 0% to 25% with a Bachelor's degree.

Lowest Food Access = -0.22 to 0.00 Food Access Index value; *Lower* Food Access = -0.22 to 0.003; *Low* Food Access = -0.22 to 0.07.

Figure 8:
Demographics of
Cook North and South
of the Stevenson
Expressway



Most of the distressed census tracts depicted in Map 12 are located in the southern portion of Cook County, which has a high concentration of minority communities. Using the Stevenson Expressway as a boundary, the demographic and socioeconomic disparity between north and south Cook County is highlighted in Figure 8. The area south of the expressway contains 86.2% of distressed tracts and a population that is majority Black (46.9%). North of the expressway—an area that contains only 13.8% of the distressed tracts—greater than half of the population is White, and slightly fewer than one of every eight residents is Black. The percentage of the population below 150% of the FPL is also greater south of the expressway as compared with the north (28.1% versus 22.6%, respectively).

Food Access and Health in Cook County

The relationship between food access and health has been demonstrated in a number of studies and geographic areas. In many settings, the presence of supermarkets has been shown to be associated with a lower prevalence of obesity, and the reverse has been shown in association with convenience stores.^{68,69} Access to lower-cost fruits and vegetables has also been associated with decreased obesity prevalence.³⁶ In Chicago, the Mari Gallagher study found access to grocery stores and fast food establishments to be related to years of potential life lost and death rates from cancer, cardiovascular disease, and diabetes.³⁵

The availability of food providers may affect purchasing and diet decisions. Residents of communities with no supermarkets have been found to be 25% to 46% less likely to have a healthy diet as compared with residents of communities with the greatest access to such stores, even after controlling for age, sex, race/ethnicity, and socioeconomic indicators.⁷⁰ The benefits of supermarket access on fruit and vegetable intake appears to be even

stronger in the Black population. In one study designed to be nationally representative, adding one supermarket to a census tract was associated with a 32% increase in fruit and vegetable consumption by Black families, compared with 11% in White families.⁷¹

At the county level, Cook County has better food access metrics than either the state of Illinois or the United States (Table 6). The USDA reports a rate of 0.27 grocery stores per 1,000 persons in Cook County⁷² and a higher density of grocery stores (including both chain and independent providers) in Cook County than in either Illinois or the United States. Cook County also has a lower density of fast food establishments. As demonstrated in Maps 7 and 8, however, this aggregate measure masks disparities between areas of Cook County north of the Stevenson Expressway, where access to chain supermarkets and large independent grocery stores is high, and south of the Expressway, where access is low.

Health measures for Cook County are mixed. Cook County has somewhat higher obesity and hypertension rates as compared with Illinois and the United States but has a lower percentage of the population that is overweight. Adults in Cook are more likely to consume five or more fruits and vegetables per day as compared with adults across Illinois and the United States but are less likely to be physically active (Table 6).

Table 6:
Food Access and Risk
Factors in Cook County,
the State of Illinois, and
the United States

	Cook County	Illinois	United States
Grocery stores per 1,000 population 2008^(a)	0.27	0.21	0.18
Convenience stores per 1,000 population 2008^(a)	0.08	0.06	0.05
Fast food restaurant per 1,000 population 2008^(a)	0.67	0.68	0.69
Percentage of population that is overweight^(b)	35.7	37.1	36.2
Percentage of population that is obese^(b)	28.4	27.4	27.2
Percentage of adults who have been told they have high blood pressure^(b)	29.7	28.9	28.7
Percentage of adults who exercise 30+ minutes for 5 or more days per week^(b)	48.8	51.8	50.6
Percentage of adults who have 5 or more fruits and vegetables per day^(b)	24.9	22.5	23.5
(a) 2008 United States Department of Agriculture; Food Environment Atlas. Available at http://www.ers.usda.gov/FoodAtlas/ .			
(b) 2009 Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System.			

In order to examine the relationship between food access and health measures within Cook County, we grouped Chicago census tracts and suburban Cook municipalities into quintiles on the basis of both their access to chain supermarkets only and access to chain supermarkets plus large independent groceries. The life expectancies within these quintiles are displayed in Figures 9 and 10. The lowest quintile (census tracts and municipalities with the least access to these food providers) has an average life expectancy that is greater than 12 years shorter than the quintile with the highest access. Furthermore,

the risk of premature mortality is greater than twice as high in the lowest quintile as compared with the highest quintile. When large independent groceries are included, the difference in average life expectancy between the highest and lowest quintile is almost 11 years. Factors that exist in areas with access to chain supermarkets may have an important independent effect on these observed associations that our analyses did not capture.

Figure 9:
Average Life Expectancy
by Access to Chain
Supermarkets, Cook County

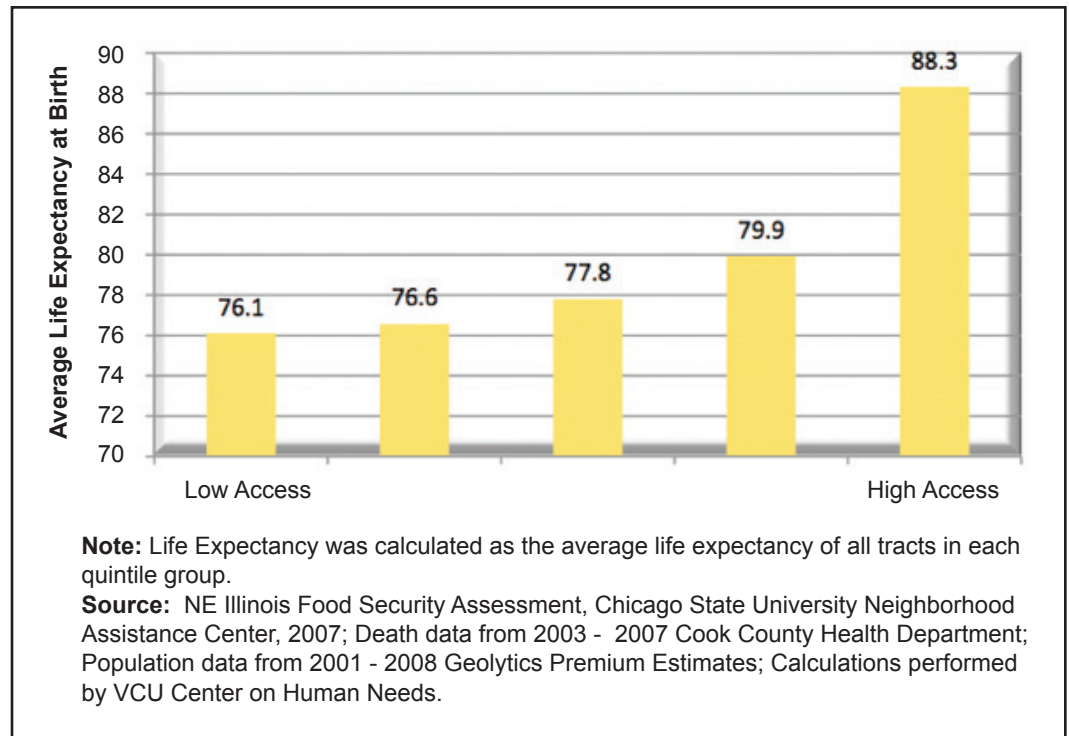
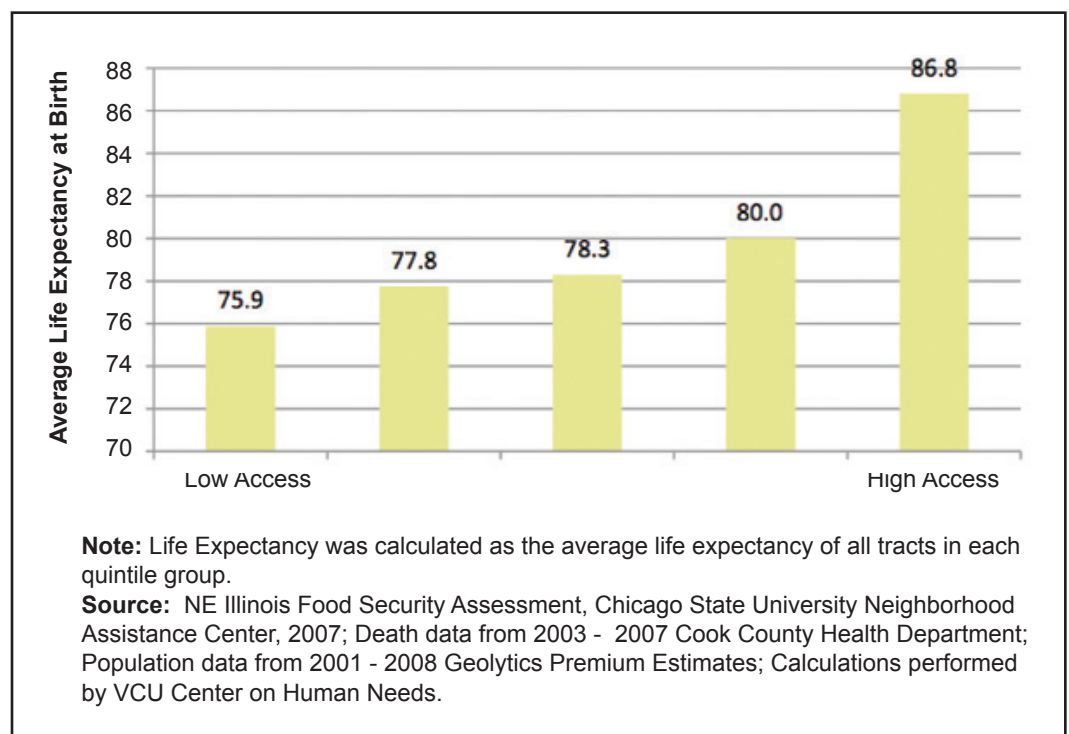


Figure 10:
Average Life Expectancy by
Access to Chain and Large
Independent Groceries,
Cook County



The relationships between various food access measures and health outcomes are mixed. The bivariate relationships shown below are presented as correlation coefficients, which indicate the strength of the relationship without controlling for other factors.

- Access to chain supermarkets is associated with higher life expectancy ($r = 0.14$, $P < 0.0001$) and lower premature mortality ($r = -0.26$, $P < 0.0001$) but is also associated with higher stroke mortality rates ($r = 0.08$, $P < 0.0095$).
- The outcomes associated with access to chain supermarkets and large independent stores are similar to those for access to chain stores alone; combined access is positively correlated with life expectancy ($r = 0.14$, $P < 0.0001$) and stroke mortality ($r = 0.12$, $P < 0.0003$) and negatively correlated with premature mortality ($r = -0.24$, $P < 0.0001$).
- Access to discount stores and small independent groceries is associated with both higher heart disease mortality ($r = 0.10$, $P < 0.0021$) and higher stroke mortality ($r = 0.12$, $P < 0.0002$).
- Access to drug stores is associated with lower premature mortality ($r = -0.15$, $P < 0.0001$) and higher stroke mortality ($r = 0.14$, $P < 0.0001$).
- The outcomes associated with access to fast food are similar to those for drug stores: Higher access is associated with lower premature mortality ($r = -0.13$, $P < 0.0001$) and higher stroke mortality ($r = 0.12$, $P < 0.0002$).

To sum up the bivariate relationships analyzed above, the data show that access to chain supermarkets and large independent groceries in Cook County is associated with life expectancy and premature mortality. These results corroborate the findings of previous studies: Higher access is associated with longer life expectancies and lower premature death rates. The positive association with stroke mortality, however, is unexpected (the higher the access measured, the higher the stroke mortality rates). In addition, that access to drug stores and fast food restaurants might be associated with lower premature death rates is also inconsistent with the literature.

In order to further investigate these findings, we conducted a number of multivariate linear regressions on the above health outcomes that controlled for known social determinants of health such as poverty, age, education, race, and unemployment. Once these factors were accounted for, the relationship between access to chain supermarkets and stroke mortality lost statistical significance, as did the relationship between stroke mortality and access to chain supermarkets and large independent groceries. The relationship persisted, however, for access to drug stores (adjusted $R^2 = 0.14$) and fast food restaurants (adjusted $R^2 = 0.14$), suggesting that high access to drug stores as well as access to fast food restaurants are associated with higher stroke mortality independent of community levels of poverty, education, race, and unemployment. Based on the magnitude of the coefficients, the models suggest that fast food access is associated with greater increases in stroke mortality than increases associated with drug store access. See Appendix for A for further description of the regression model.

Controlling for poverty, education, age, race, and unemployment, the relationship between premature mortality and drug store access or fast food access lost statistical significance. Access to chain supermarkets, however, remained significant. This suggests (with some limitations^d) that greater access to chain supermarkets in Cook County is associated with a decreased risk of premature mortality (adjusted $R^2 = 0.63$). Access to chain supermarkets or large independent grocery stores is also associated with a decrease in premature mortality, independent of other social factors (adjusted $R^2 = 0.64$).

Access to healthy food sources in Cook County has also demonstrated protective associations with heart disease mortality independent of poverty, education, race, or unemployment. Greater access to chain supermarkets was associated with lower heart disease mortality (adjusted $R^2 = 0.25$), as was access to chain supermarkets considered together with large independent groceries (adjusted $R^2 = 0.27$).

The results of the regression models show similar findings to those noted in the literature. Access to chain supermarkets and large independent grocery stores has protective associations with premature mortality and heart disease mortality independent of other confounding social, economic, and demographic factors. Access to these food providers does not, however, maintain a significant association with stroke mortality. Access to both drug stores and fast food restaurants (considered separately) is associated with an increased rate of stroke mortality.

^dResidual values of life expectancy models are not normally distributed, thus violating an assumption necessary to conduct reliable regression equations.

Part III. Conclusions

A report in May 2010 from the White House Task Force on Childhood Obesity set a goal of eliminating food deserts in America within a seven-year period.⁷³ It detailed four elements for “ensuring access to healthy, affordable food”: convenient physical access to grocery stores, affordable choices, availability of healthy products, and adequate resources for consumers to make healthy choices.⁷³ In Cook County, chain supermarkets and large independent grocery stores appear to be the food provider types most associated with healthy food choices. Access to these food providers is restricted in many areas, and not just in the 39 census tracts designated as food deserts by the USDA.

In addition to a lack of convenient physical access, the pockets of Cook County with low food access also tend to be distressed in other domains, such as poverty, educational attainment, and racial and ethnic isolation. Communities whose residents are already at risk for poor health outcomes endure compounded stressors from a disinvestment of community assets, a pattern that allows health disparities to grow wider. In Cook County, these areas appear to cluster south of the Stevenson Expressway. The suburban areas of Thornton and Bloom are particularly noteworthy as communities with the poorest access to all of the food providers we measured.

Access to healthy food sources such as chain supermarkets and/or large independent groceries in Cook County have protective associations with premature mortality and heart disease mortality independent of other known predictors. They also are associated with increased expenditures on healthy food options like fruits and vegetables. The health of the residents of Cook County would benefit from more equitable access to large food providers, especially in known food deserts, and an expansion in the diversity, quality, and affordability of the food products that smaller providers sell.

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