

Neighborhood Disparities in Access to Healthy Foods and Their Effects on Environmental Justice

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Environmental justice is concerned with an equitable distribution of environmental burdens. These burdens comprise immediate health hazards as well as subtle inequities, such as limited access to healthy foods.

We reviewed the literature on neighborhood disparities in access to fast-food outlets and convenience stores. Low-income neighborhoods offered greater access to food sources that promote unhealthy eating. The distribution of fast-food outlets and convenience stores differed by the racial/ethnic characteristics of the neighborhood.

Further research is needed to address the limitations of current studies, identify effective policy actions to achieve environmental justice, and evaluate intervention strategies to promote lifelong healthy eating habits, optimum health, and vibrant communities. (*Am J Public Health*. 2012;102:1644–1654. doi:10.2105/AJPH.2012.300865)

ENVIRONMENTAL JUSTICE HAS been defined as

fair treatment and meaningful involvement of all people regardless of race, ethnicity, income, national origin, or educational level in the development, implementation, and enforcement of

environmental laws, regulations, and policies.^{1(p1)}

Fair treatment signifies that “no population, due to policy or economic disempowerment, is forced to bear a disproportionate exposure to and burden of harmful environmental conditions.”^{1(p1)}

The concept of environmental justice, which has its roots in the fight against toxic landfills in economically distressed areas, can be similarly applied to the inequitable distribution of unhealthy food sources across socioeconomic and ethnic strata.¹ The neighborhood environment can help promote and sustain beneficial lifestyle patterns or can contribute to the development of unhealthy behaviors, resulting in chronic health problems among residents.^{2–4} The higher prevalence of obesity among low-income and minority populations has been related to their limited access to healthy foods^{5–18} and to a higher density of fast-food outlets and convenience stores where they live.^{9,19–21} These environmental barriers to healthy living represent a significant challenge to ethnic minorities and underserved populations and violate the principle of fair treatment.

Several studies have investigated disparities in the distribution of neighborhood vegetation,^{22,23} the proximity of residences to playgrounds,²⁴ and the

accessibility of supermarkets and grocery stores,^{25,26} but fewer have examined access to fast-food outlets and convenience stores as a function of neighborhood racial and socioeconomic demographics. To our knowledge, our review is the first to expand the focus of environmental justice from environmental hazards and toxic exposures to issues of the food environment by examining research on socioeconomic, ethnic, and racial disparities in neighborhood access to fast-food outlets and convenience stores.

METHODS

We reviewed studies of differences in accessibility of fast-food outlets and convenience stores by the socioeconomic and racial/ethnic characteristics of neighborhoods. With the assistance of an experienced health science librarian, we conducted searches in the MEDLINE, PubMed, PsycINFO, EBSCO Academic Search Premier, and Scopus databases. Key words were “neighborhood deprivation,” “food environment,” “food sources,” “fast-food restaurants,” “convenience stores,” “bodegas,” “disparity,” “inequality,” “minorities,” “racial/ethnic segregation,” and “socioeconomic segregation.” We included only original, peer-reviewed studies published in English

between 2000 and 2011. Comments, editorials, dissertations, conference proceedings, newsletters, and policy statements were excluded. We also excluded studies that focused on methods and measurements, did not examine socioeconomic or racial/ethnic characteristics of the neighborhood, or used schools as a proxy for neighborhood environment.

Our search identified 501 unique citations; after detailed inspection, we selected 24. The primary reasons for exclusion were irrelevant outcomes or comparisons ($n = 316$), focus on dietary behavior ($n = 96$), and methodology studies ($n = 65$). We defined fast-food outlets as

take-away or take-out providers, often with a ‘drive-thru’ service which allows customers to order and pick up food from their cars; but most also have a seating area in which customers can eat the food on the premises (<http://www.merriam-webster.com>).

Examples of fast-food outlets were fast-food restaurant chains, take-away or carry-out establishments, and small local fast-food businesses. We defined convenience stores as

retail stores that sell a combination of gasoline, fast foods, soft drinks, dairy products, beer, cigarettes, publications, grocery items, snacks, and nonfood items

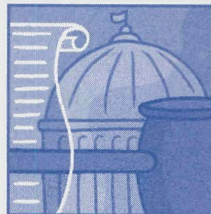


TABLE 1—Studies of Neighborhood Disparities in Accessibility of Fast Food Outlets and Convenience Stores

Study	Neighborhood Food Environment			Neighborhood Characteristics	Data Sources	Results
	Location	Definition	Main predictor(s)			
Cross-sectional studies Gordon et al. ²⁸	North and central Brooklyn; east and central Harlem, NY	Census block groups (n = 448), 400-m radius around each block group	Fast-food outlets, supermarkets, bodegas	Income, race/ethnicity	2000 Census, walking survey	Low-income African American block groups had significantly lower proportion of healthy bodegas ($r = -0.49$; $P = .001$) and greater accessibility of fast-food outlets ($r = -0.39$; $P = .001$).
		MO: neighborhoods (n = 17) and 800-m-radius buffer around a centroid structure; HI: census tract (n = 64)	Convenience stores, groceries/retail stores, public markets	Income, race/ethnicity, population density	2000 Census, online yellow pages, walking survey	Convenience stores were more prevalent in the most deprived areas of Kansas and Honolulu. ^a
Lee et al. ²⁹	Urban areas of Kansas City, MO, and Honolulu, HI					
Lisabeth et al. ³⁰	Nueces County, TX	Census tract (n = 64), 1-mile buffer around each census tract	Grocery stores; supermarkets; meat, seafood, and produce stores; convenience stores with and without gas stations	Income, race/ethnicity, commercialization	Reference USA, US Business Database; 2000 census	Hispanic neighborhoods (> 80%) were more likely to have convenience stores without gas stations (RR = 3.94; 95% CI = 2.21, 7.02; $P < .05$). Increasing income was associated with fewer convenience stores with gas stations (RR = 0.79; 95% CI = 0.66, 0.95; $P < .05$).
						Density of fast-food outlets was not associated with the proportion of non-White residents ($z = -1.98$; $P = .04$). Fast-food outlets density was linked to lower median household income ($z = -10.45$; $P < .001$).
Hurvitz et al. ³¹	King County, WA	Census tract (n = 373)	Large national and local fast-food chains, individual outlets	Income, race/ethnicity, arterial road density	Local public health agency, 2000 census, King County >GIS street line data	

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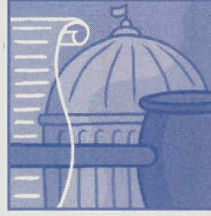


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Sharkey et al. ³²	Hidalgo County, Rio Grande Valley, TX	Census block groups (n = 197) 1-, 3-, and 5-mile radius	Convenience stores, fast-food outlets, supermarkets, grocery stores, mass merchandisers	Income, car ownership	2000 Census, 2002 NAICS	Increased neighborhood deprivation was associated with greater accessibility of convenience stores ($r = -0.245$; $P < .001$).
Sharkey and Horel ³³	Central Texas, 6 rural counties	Census block groups (n = 101)	Convenience stores, grocery stores, supermarkets, discount stores, specialty food stores, drug stores, beverage stores	Income, race/ethnicity, unemployment rate, education	2000 Census, Brazos Valley Food Environment Project, telephone directories, direct observation	Poorer neighborhoods with the greatest minority composition had better access to convenience stores (median = 0.6 km) than wealthier neighborhoods with low minority composition (median = 4.8 km).
Galvez et al. ³⁴	East Harlem, NY	Census block group (n = 165)	Supermarkets, grocery stores, specialty stores, food stores, full-service and fast-food outlets	Income, race/ethnicity	2000 Census, walking survey by a single surveyor in 2004	Hispanic (> 75%) census blocks had higher density of convenience stores (PR = 1.80; 95% CI = 1.20, 2.70) and fast-food outlets (PR = 2.14; 95% CI = 1.33, 3.44) than racially mixed census blocks.
Kwate et al. ³⁵	Manhattan, Brooklyn, Queens, Bronx, Staten Island, NY	Census block group (n = 5730), 300-m radius around each block group	National and local fast-food outlets	Income, race/ethnicity	NYC Department of Health and Mental Hygiene's online directory, 2000 census	Percentage of African Americans in block groups was positively associated with fast-food outlet density. ^a
Powell et al. ³⁶	United States	Zip codes (n = 21 976)	Full-service and fast-food outlets	Income, race/ethnicity, population density, urbanization	Dun and Bradstreet National Business List, 2000 census	Higher density of fast-food outlets in zip codes falling into lower-income quintiles (IR = 1.235; 95% CI = 1.175, 1.297; $P < .001$) and African American neighborhoods (IR = 0.593; 95% CI = 0.541, 0.650; $P < .001$).
Moore and Diez Roux ³⁷	Forsyth County, NC; Baltimore County, MD; Manhattan and Bronx, NY	Census tracts (n = 638)	Convenience stores, supermarkets, grocery stores, liquor stores, natural food stores, bakeries, meat and fish markets, specialty food stores	Income, race/ethnicity, education	Multietnic Study of Atherosclerosis, InfoUSA, 2000 Census	Convenience stores were more common in African American (PR = 4.4; 95% CI = 2.0, 10.1) and Hispanic (PR = 5.5; 95% CI = 2.8, 11.0) neighborhoods in the Bronx and in racially mixed neighborhoods overall (PR = 1.5; 95% CI = 1.1, 1.9).

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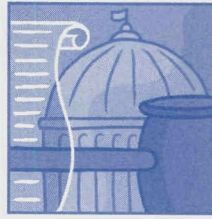


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Lewis et al. ³⁸	Los Angeles, CA	Zip codes target area (n = 13); comparison area (n = 6) ^d	Fast-food, fast casual, and sit-down restaurants	Income, race/ethnicity	City's Environmental Health Office database, walking survey by multiple surveyors	Poorer neighborhoods had a higher proportion of fast-food outlets than wealthier neighborhoods (25.6% vs 11.2%; $P < .001$). Neighborhoods with a higher percentage of African Americans had fewer healthy food options than neighborhoods with lower percentage of African Americans (33.4% vs 20.9%; $P < .001$). African American neighborhoods (> 80%) had 2.4 fast-food outlets/sq mile; White neighborhoods (> 80%) had 1.5. Fast-food outlet density was associated with neighborhood percentage of African Americans ($r = 0.160$; $P = .04$). 60% of African Americans lived in areas with ≥ 1 fast-food outlets compared to White (55%)
Block et al. ³⁹	New Orleans, LA	Census tract (n = 156), 0.5–1-mile buffer around each census tract	Fast-food chains	Income, race/ethnicity, alcohol outlet density, presence of interstate or major state highways	Orleans Parish Sanitation Department, local yellow pages, restaurant locator Web sites, 1990 census	
Morland et al. ⁴⁰	Maryland, North Carolina, Mississippi, Minnesota	Census tracts (n = 208)	Convenience stores, supermarkets, grocery stores, full-service and fast-food restaurants	Income, race/ethnicity, education	ARIC study database, local health department, state departments of agriculture	
Morland et al. ⁴¹	Mississippi, North Carolina, Maryland, Minnesota	Census tract (n = 216)	Supermarkets, grocery stores, convenience stores with gas stations, specialty food stores, full-service restaurants, fast-food outlets, carryout places, carryout specialty items, bars and taverns	Income, race/ethnicity, car ownership	Local departments of environmental health, state departments of agriculture, 1990 census	Fast-food outlets were more prevalent in neighborhoods with low (PR = 1.4; 95% CI = 1.0, 1.9) and medium (PR = 1.3; 95% CI = 0.9, 1.8) income. Carry-out and fast-food outlets were twice as common in White (PR = 2.0; 95% CI = 1.0, 4.0 and PR = 1.5; 95% CI = 1.0, 2.2, respectively) and racially mixed (PR = 2.7; 95% CI = 1.4, 5.4 and PR = 2.3; 95% CI = 1.5, 3.4, respectively) neighborhoods. Density of take-away was higher in the second most affluent quintile (mean = 1.61; $P = .04$).
Macintyre et al. ⁴²	Glasgow, UK	Data zones ^b (n = 377)	Restaurants, fast-food chains, cafes, take-away outlets	Income	2001 Census, Glasgow City Council Food Safety Unit 2003 database	

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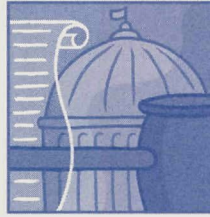


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MacDonald et al. ⁴³	Glasgow, UK	Data zones ^b (n = 694)	Convenience stores, supermarkets, delicatessens, bakers, butchers, fruit and vegetable sellers, fishmongers	Income	Public databases, 2001 census output areas	Poor neighborhoods had more convenience stores than wealthier neighborhoods (mean = 1.31; $P < .01$).
Jones et al. ⁴⁴	Nova Scotia, Canada	Communities (n = 266)	Fast-food chains	Income, educational level, marital status, employment status	Online store locators, public database	Community-level deprivation was associated with greater proportion of fast-food outlets (mean = 0.047; $P < .001$).
Pearce et al. ⁴⁵	New Zealand	Territorial authorities (n = 74)	Multinational and local fast-food outlets	Income	Online yellow pages, 2001 census	Access to fast-food outlets was higher in high-deprivation (median distance = 1870 m) than in low-deprivation (median distance = 714 m) neighborhoods ($P = .001$). No association was found between fast-food outlet density and neighborhood income. ^a
Daniel et al. ⁴⁶	Montreal, Quebec	Census tract (n = 862), 1-km buffer	Fast-food outlets, fruit and vegetable stores	Income, household structure, educational attainment, language, road network	2003 Commercial database, Montreal census metropolitan area	People living in low-income neighborhoods were 2.3 times as likely as residents of affluent neighborhoods to have fast-food outlets within 5–10 min walk (OR = 2.393; 95% CI = 1.081, 5.297; $P = .03$).
Smoyer-Tomic et al. ⁴⁷	Edmonton, Alberta	215 residential neighborhoods, radius of 500, 800, 1000, and 1500 m	Fast-food outlets	Income, race/ethnicity, immigration, age, family status, housing, urbanization	2001 Canadian census, health inspection database	Neighborhoods with a greater proportion of low-income persons (mean = 18.32, SD = 9.36; $P = .001$), renters (mean = 44.86; SD = 23.55; $P = .001$), and immigrants (mean = 23.00; SD = 6.62; $P = .028$) had increased fast-food access.
Hemphill et al. ⁴⁸	Edmonton, Alberta	Neighborhoods (n = 204)	Fast-food outlets	Income, educational attainment, unemployment rate, immigration	Edmonton Department of City Planning, Capital Health Region Department of Environmental Health, Statistics Canada 2001	Poorer neighborhoods had a greater density of fast-food outlets ($F = 58.339$, $P = .001$).
Ecological studies MacDonald et al. ⁴⁹	Scotland and England	England: super output area ^c (n = 32 482); Scotland: data zone ^b (n = 6505)	Fast-food multinational chains	Income	(1) Burger King Web site, online yellow pages	

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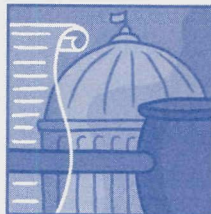


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Cummins et al. ⁵⁰	Scotland and England	England: super output area ^c (n = 32 482); Scotland: data zone ^b (n = 6505)	One international fast-food chain	Income	2001 Census, online yellow pages	Poor neighborhoods had an increased exposure to outlets from 1 global fast-food company (mean = 0028; P < .001). Residents of areas with an individual mean weekly income of \$179.50 had 2.5 times the exposure to fast-food outlets as residents of areas with an individual mean weekly income of \$649.50 ^a
Reidpath et al. ⁵¹	Melbourne, Australia	Postal district (n = 267)	Fast-food chains	Income	Online yellow pages, 1999 census	

Note. ARIC = Atherosclerosis Risk in Communities; CI = confidence interval; F = F test; GIS = geographic information systems; IR = incidence ratio; NAICS = North American Industry Classification System; OR = odds ratio; PR = prevalence ratio; RR = relative risk.

^aQuantitative data not provided in article.

^bMean population = 778; range = 500–1000.

^cMean population = 1500; range = 1000–6500.

^dPopulation target area = 531 141; population comparison area = 222 019.

and have a size less than 5000 square feet.^{27(p996)}

RESULTS

Of the 24 studies identified (Table 1), 14 were conducted in the United States^{28–41}; the remainder took place in Canada, England, Scotland, Australia, and New Zealand.^{42–51} Most studies were cross-sectional,^{28–48} and 3 had an ecological design.^{49–51} Two studies used nationally representative data.^{36,45} The small geographic areas chosen as the units of analysis were a census tract,^{29–31,37,39–41,46} a census block group,^{28,32–34} a zip code or postal district,^{36,38,51} a community or neighborhood,^{29,44,47,48} a territorial authority,⁴⁵ or a data zone.^{42,43,49,50} Factors that influenced the choice of units of analysis were the country or area where the study was conducted and the study design.

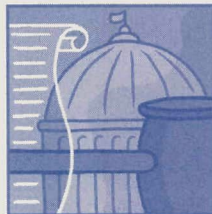
Techniques for identifying fast-food outlet and convenience store locations varied. Most studies used public health agency databases^{28,30,32,35–42,44,46–48} and area-based geocoding techniques.^{28–33,35,46,47} Five studies conducted walking surveys in a subsample of their units of analysis.^{28,29,33,34,38} Some studies used walking surveys to confirm locations, to assess the availability of healthy menu options,^{28,29,31} and to perform food inventories in selected fast-food outlets and convenience stores.^{34,38} Only 8 studies^{28–30,32,35,39,46,47} employed circular buffers,⁵² ranging from a 0.2- to a 5-mile radius from each unit of analysis to

define the residents' neighborhood food environment.

Among the neighborhood characteristics mentioned in the studies were race and ethnicity,^{28–41,47} income,^{28–51} educational level,^{33,37,40,44,46,48} employment status,^{33,48} commercialization,³⁰ alcohol outlet density,³⁹ presence of interstate or major state highways,^{31,39,46} urbanization,^{36,47} housing,^{46,47} and car ownership.^{32,40} Two studies assessed disparities among homogeneous demographic areas with predominantly African American³⁴ or Hispanic³⁰ communities.

Accessibility of Fast-Food Outlets

Eighteen studies investigated income disparities and exposure to fast-food outlets.^{28,31,32,34–36,38,39,41,42,44–51} Fourteen found a relationship between neighborhood deprivation and fast-food outlet density.^{28,31,32,36,38,41,42,44,45,47–51} Morland et al. examined 216 census tracts in Maryland, North Carolina, Mississippi, and Minnesota and reported a higher prevalence of fast-food restaurants among low-income neighborhoods.⁴¹ Hurvitz et al. examined 373 census tracts in King County, Washington, and found that the density of fast-food restaurants was inversely associated with the neighborhood household income.³¹ Poorer neighborhoods in South Los Angeles, California, had a greater proportion of fast-food restaurants than did neighborhoods in wealthier West Los Angeles.³⁸ At the national level,



a comprehensive study of 21 976 US zip codes with 259 182 full-service restaurants and 69 219 fast-food restaurants found that these establishments were more highly concentrated in low- and middle-income neighborhoods than in high-income neighborhoods.³⁶

In New Zealand, a national study of 74 territorial authorities, comprising 37 760 neighborhoods, found that access to multinational fast-food restaurants and small local fast-food businesses was greater in poor than in wealthier neighborhoods.⁴⁵ In Melbourne, the second largest city in Australia, people living in areas with the lowest weekly incomes (\$169–\$199) had 2.5 times the exposure to fast-food restaurants as residents of areas with the highest weekly incomes (\$400–\$899).⁵¹ Results from studies in the United Kingdom and Canada were mixed. Two studies in the United Kingdom found that poor neighborhoods were more likely than wealthier neighborhoods to have a high density of fast-food restaurants.^{49,50} However, a study in Glasgow found that fast-food restaurant chains were more likely to be concentrated in more affluent neighborhoods.⁴² In Canada, studies in Nova Scotia and Edmonton found a significant association between socioeconomic deprivation and higher prevalence and accessibility of fast-food restaurants,^{44,47,48} but a study of 862 census tracts in Montreal found no association between density of all types of fast-food outlets and neighborhood income level.⁴⁶

Nine studies in the United States (and none in other countries)

examined neighborhood racial/ethnic disparities and exposure to fast-food outlets.^{28,31,34–36,38–41}

Studies in Los Angeles,³⁸ New York City,³⁵ and New Orleans, Louisiana,³⁹ found that unhealthy foods were more heavily promoted in African American communities. In South Los Angeles, neighborhoods with a higher proportion of African American residents had fewer healthy food choices and more fast-food restaurants than did West Los Angeles, an area of the city with a lower percentage of African Americans.³⁸ A study of 5370 census blocks distributed across the 5 boroughs of New York City found a higher density of fast-food restaurant chains and independent local fast-food businesses in predominantly African American areas than in majority White locales.³⁵ In predominantly African American areas, exposure to fast food was similar in more and less affluent neighborhoods, suggesting that racial correlates of fast-food density were more significant than socioeconomic correlates.³⁵ Similar findings were reported in a study of 165 census tracts in New Orleans, where predominantly African American neighborhoods had 2.4 fast-food restaurants per square mile, and predominantly White neighborhoods had 1.5. In this study, the proportion of African American residents was also found to be a more powerful predictor of fast-food restaurant density than was median household income.³⁹

A study of 448 block groups in New York found that African American block groups had fewer

opportunities to obtain healthy foods and greater access to fast-food restaurants than did other ethnic block groups.²⁸ Inequities in the availability of national and local fast-food restaurants within a single-minority community were reported in a study of 165 census block groups in a low-income neighborhood of East Harlem, New York, where predominantly Hispanic census blocks had a higher proportion of fast-food restaurants than did racially mixed census blocks.³⁴ In a study of 216 census tracts in Mississippi, North Carolina, Maryland, and Minnesota, fast-food restaurants were twice as common in racially mixed neighborhoods as in predominantly African American neighborhoods.⁴¹

By contrast, a study in King County, Washington,³¹ and a national study³⁶ detected no associations between a greater prevalence of fast-food restaurants and the proportion of non-White residents. In King County, however, the census tracts examined had little ethnic variability: about 85% of the population was White.³¹

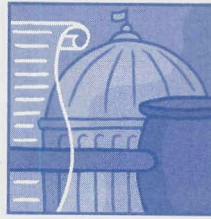
Accessibility of Convenience Stores

Eight studies investigated neighborhood disparities in the density of convenience stores.^{28–30,32–34,41,43} Differences by neighborhood income and race/ethnicity were found in urban and rural areas of the United States.^{29,33} A comparative study of the urban food environments of Kansas City, Missouri, and Honolulu, Hawaii, found that convenience stores were more prevalent

in the parts of these cities that were the most deprived and had the highest concentration of ethnic minorities.²⁹ A study of 6 rural counties in Texas found that poor neighborhoods with higher proportions of minorities had greater access to convenience stores.³³ Similar findings were reported in a study of 197 census blocks in Texas, where increased neighborhood deprivation was associated with greater access to convenience stores.³²

A study in New York City examined healthy and unhealthy food environments in ethnic neighborhoods to develop a food desert index. African American neighborhoods had more bodegas classified as less healthy because of their large stock of foods of low nutritional value than did Hispanic and White neighborhoods.²⁸ In East Harlem, African American neighborhoods were less likely to have convenience stores than were racially mixed neighborhoods, and predominately Hispanic neighborhoods were more likely to have convenience stores.³⁴

One group looked at Jackson City, Mississippi; Forsyth County, North Carolina; Washington County, Maryland; and 7 suburbs of Minneapolis, Minnesota, and found a higher proportion of convenience stores without gas stations in minority and racially mixed than in White neighborhoods.⁴¹ In addition, more convenience stores were located in poor than in wealthier neighborhoods.⁴¹ A study among Hispanic communities in Nueces County, Texas, reported a greater availability of convenience stores in



Hispanic than in non-Hispanic White neighborhoods. Comparisons between lower- and higher-income areas within the same Hispanic neighborhoods found no significant associations.³⁰ One international study found a greater prevalence of convenience stores in the most deprived neighborhoods of Glasgow than in the least deprived neighborhoods.⁴³

DISCUSSION

The principle of environmental justice charges society and government with the responsibility to provide equal access to healthy food options for all citizens. Our review found socioeconomic, ethnic, and racial disparities in neighborhood access to fast-food outlets and convenience stores and demonstrated that much remains to be done before environmental justice is achieved. Neighborhoods where economically disadvantaged and minority populations reside were more likely to have abundant sources of foods that promote unhealthy eating. Previous reviews have shown that limited access to supermarkets and grocery stores in low-income neighborhoods may represent a significant barrier to the consumption of healthy foods.⁵³ Excessive exposure to unhealthy food sources and limited access to healthier options may explain the high prevalence of obesity observed in these communities. Such associations have been described not only in the United States,^{54–56} but also in the United Kingdom,^{57–61} the Netherlands,^{62,63} Sweden,⁶⁴ Australia,^{65,66} and Canada,⁶⁷ where residing in a low-income or deprived area was independently

associated with prevalence of obesity and with poor-quality diets.

Accessibility is a key determinant of consumption^{68–71} and can act as a barrier to or a facilitator for healthy eating,⁷² as well as a component of environmental justice. Accessibility of healthful food sources may lower the risk of overweight and obesity by facilitating healthier diets,⁷³ and easy access to nutritionally inappropriate food sources may contribute to excessive and harmful weight gain.⁷² In general, fast-food outlets and convenience stores offer high-calorie foods,⁷⁴ leading to higher total caloric intakes for their customers.^{75,76} Fast-food outlets are known for their convenient and affordable energy-dense foods.⁷⁷ Convenience stores provide mostly prepared, high-calorie foods and a limited choice of fresh but expensive produce.^{9,72,78} Fast-food outlet patrons have been shown to consume large portion sizes and to significantly underestimate the caloric content of the foods they eat, particularly for calorie-rich foods.⁷⁹

Policy initiatives such as calorie labeling in fast-food restaurants are intended to help consumers make informed menu choices.⁸⁰ However, assessments of the effectiveness of these regulations have yielded inconsistent results. In New York City, a study comparing purchasing patterns before and after the regulation was implemented reported that fast-food consumers living in low-income neighborhoods were less likely to use the calorie information.⁸¹ Furthermore, the use of the calorie information by low-income customers was not associated

with the purchase of meals with lower caloric content.⁸¹ Another New York City study found no clear reduction in mean energy content of lunchtime purchases for all menu items in the full sample of fast-food chains examined. However, the regulation appeared to exert a positive effect on energy intake in 3 of the sample's 13 fast-food chains.⁸² In King County, Washington, a study of a Mexican fast-food chain found no change in mean calories purchased after calorie labeling was implemented.⁸³ A study in Pierce County, Washington, evaluating labeling in a small convenience sample of full-service restaurants showed that customers who used the calorie information reduced their orders by an average of 75 calories.⁸⁴

Despite these inconsistent results, calorie-labeling initiatives may encourage fast-food outlets to improve their menu offerings and promote lower-calorie items. More studies are needed to assess the potential impact of repeated exposure to such regulations on long-term consumer purchasing patterns and their impact on environmental justice.

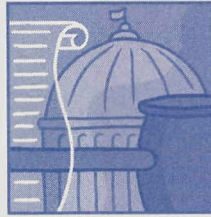
Other initiatives, such as public-private partnerships to introduce supermarkets to underserved areas, offer promise. For example, the Pennsylvania Fresh Food Financing Initiative found that adding a supermarket to an underserved area increased availability of healthy foods in the community.⁸⁵

The emergence of so-called urban food deserts—areas with limited access to healthful food sources and high levels of racial

segregation and income inequality—mandates public health intervention. Improved transportation in low-income neighborhoods, thus improving access to healthful foods; mobile markets to bring fresh produce into communities; and direct incentives for food retailers to locate near low-income communities, such as zoning allowances, tax holidays, or tax rebates, are among proposed strategies for a more equitable distribution of healthful food sources.⁸⁶ Increased access to supermarkets, increased availability of healthy food choices, policy initiatives to encourage healthier menu offerings in fast-food outlets, and nutrition education in the community may work synergistically to reduce the risk of obesity and improve dietary quality in these populations. However, the differences in results across racial/ethnic, socioeconomic, and national boundaries reported by the studies we reviewed demonstrate that no one-size-fits-all solution exists for the problem of environmental justice. Each situation has its own regional flavor and requires flexible strategies at the national and local level to effect positive change.

Limitations

Our database search did not include sociological abstracts or the science and social science citation indices of the Web of Science. Nevertheless, the multiple databases we used encompassed the sociological literature, making the likelihood of missed articles small. Our definition of environmental justice included “meaningful involvement of all people.”^{1(p1)}



Despite its importance, addressing this integral component of environmental justice was beyond the scope of this article. We strongly encourage further research into how community involvement may be strengthened.

Conclusions about cause and effect could not be established because most of the studies in our review were cross sectional. Therefore, other environmental and genetic causes of obesity and poor dietary quality in these populations cannot be ruled out as confounders. Not all studies employed buffering techniques, which are the most accurate methods available for defining impact areas.⁸⁷ This may explain the disparate results observed in some international studies that relied on secondary data to describe the food environment.

Description of the food environment involves the identification of specific types of outlets and their location; it has therefore been recommended that a field validation be conducted or that multiple data sources be used to increase the quality of the results.⁸⁸ No studies conducted outside the United States followed these recommendations. Some studies were limited to large fast-food chains. Other fast-food sources, such as small corner stores (e.g., bodegas and Asian food markets) were not considered in many of the studies, which could have caused underestimation of convenience stores, which are overrepresented in low-income and minority neighborhoods.⁸⁹

In some cases, the lack of standardized methodology hindered

direct comparison of results. For example, in 2 studies of the food environments in Hispanic and African American neighborhoods in New York City, use of buffering techniques in one but not the other may explain their differing findings.^{28,34} Fast-food or total dietary intake, and home availability of energy-dense foods, were not objectively assessed, limiting our ability to determine whether the physical presence of fast-food outlets and convenience stores could be translated into an increased consumption of energy-dense foods. Nevertheless, current evidence suggests that easily accessible fast-food outlets and convenience stores may result in greater consumption of unhealthy foods and higher energy intake.⁹⁰

Studies on store food quality have demonstrated the impact of in-store availability and price of energy-dense snack foods on purchase and consumption choices.⁹¹ Prospective studies that objectively measure the dietary intake of healthy foods in relationship to proximity to fast-food outlets and convenience stores; reliable, standardized methods for measuring density of and proximity to fast-food sources; and inclusion of small corner stores in similar studies are all needed.

Conclusions

The impact of neighborhood design on residents' health has become a focus of research interest.²⁶ Results from these studies have led the environmental justice movement to expand its concerns beyond the unequal distribution of environmental

hazards to issues of public health, such as obesity.⁹² Low-income and racial/ethnic minority populations have substantial environmental challenges to overcome to make healthy dietary choices and to maintain a healthy body weight.⁵³

The disproportionate distribution of food sources that contributes to the development of unhealthy behaviors among these communities and the consequent disease burden deeply affect not only individuals and families, but also society as a whole. Environmental justice will be achieved, says the Environmental Protection Agency,

when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.⁹³

This principle of fairness and equity needs to be reflected in neighborhood environments that facilitate healthy food choices for all societal strata. This should include public-private partnerships to increase access to healthy foods in underserved areas and the participation and accountability of the community in formulating public policy and environmental decisions. Nutrition education, including learning to understand food and menu labels, could help residents of low-income communities to make healthier choices. These innovations could help reduce neighborhood inequalities, enhance environmental justice, and promote lifelong healthy eating habits, optimum health, and vibrant communities. ■

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Contributors

A. Hilmers originated the study, drafted the first version of the article, and coordinated all revisions. All authors conceptualized ideas, interpreted findings, and critically reviewed and approved the final version of the article.

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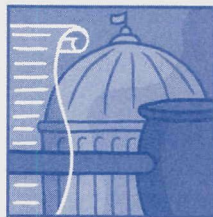
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Human Participant Protection

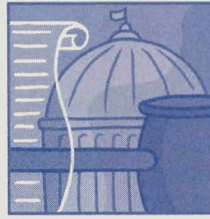
This study was a review of the literature, and institutional review board approval was not needed.

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