

COMMUNITY CAPACITY FOR CANCER PREVENTION

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ABSTRACT

We pilot-tested a street-level study of availability of physical resources to assess ethnic disparities in community capacity for cancer prevention in forty Brooklyn, NY, census tracts with high proportions of White, African American, or Jamaican immigrant populations. Interns with GIS maps made street-level inventories of food retailers, fast-food restaurants, and commercial exercise facilities. Availability was quantified as resources per capita or square mile. Median income-adjusted number of supermarkets, greengrocers and fast-food restaurants per square mile was significantly higher in Jamaican than in African American or White tracts. Bodegas per capita was greatest in African American tracts, with no significant differences among the population groups in availability of health food stores, or commercial exercise venues.

INTRODUCTION

Community capacity is the ability of a community to respond to needs of its residents. Strategic thinking about a neighborhood involves identifying characteristics of communities that affect the ability to address important social and public health problems (Goodman et al., 1998; A. J. Schulz et al., 2005). Capacity building is a process which enables proactive planning and implementation tailored to specialized neighborhood conditions (Cottrell, 1977; Fawcett et al., 1996; Poole, 1997). These concepts are frequently applied to health and health promotion

generally, but they also can be important in thinking about prevention of specific diseases including cancer, diabetes and cardiovascular disease (Carlaw, Mittlemark, Bracht, and Luepker, 1984; Farquhar et al., 1985; Steckler, Orville, Eng, and Dawson, 1992; Stunkard, Feliz, Yopp, and Cohen, 1985).

Several researchers have developed models exploring the dynamic relationship between the spatial array of resources in the physical environment of communities, characteristics of area population (including race and socioeconomic status) and health outcomes (House, 2002; Link and Phelan, 1995; A. Schulz and Northridge, 2004; A. J. Schulz et al., 2005; A. J. Schulz, Williams, Israel, and Lempert, 2002; Williams and Collins, 2001). In many communities, racial, ethnic and economic enclaves are still sharply defined. It has been argued that inequities in resource distribution in the “built environment” that mirror these patterns of population distribution help to explain health disparities because of the impact on individual choices and decision-making about lifestyle and behavior (Sallis and Glanz, 2006).

Assessment of the Nutritional Environment

Several recent studies have focused on the importance of the food resource or nutritional environment of neighborhoods and examined differences in availability of the array and type of food. Morland and colleagues linked the local food environment (proximity to supermarkets, fast-food restaurants, other types of food sources) to adherence to dietary guidelines such as intake of fruits and vegetables (Morland, Wing, and Diez Roux, 2002). Whites had access to five times more supermarkets and among African Americans, they observed a 32% increase in guideline adherence associated with presence of at least one supermarket in the census tract compared to only 11% for Whites. Residential proximity to supermarkets has also

been found to influence the quality of diets of pregnant women (Laraia, Siega-Riz, Kaufman, and Jones, 2004).

Powell et al.'s assessment of density of four types of food retail stores found substantially more small grocery and convenience stores than supermarkets in urban zip codes, that high-income zip codes had more chain but fewer non-chain supermarkets, and that low-income areas had more grocery and convenience stores. Zip codes with higher proportions of African Americans had fewer than half the average number of chain supermarkets and 23% fewer convenience stores, but more than twice the number of non-chain supermarkets and 1.9 times as many grocery stores compared to predominantly white zip codes (Powell, Slater, Mirtcheva, Bao, and Chaloupka, 2007).

A 2006 study by Moore and Diez-Roux of low and high income neighborhoods in three communities across the country (including New York City, the city where our research takes place) found higher numbers of grocery stores, but fewer fruit and vegetable markets and health food stores in low income and minority communities. These areas also had as few as half the number of supermarkets (Moore and Diez Roux, 2006). Bodegas (small family-run food stores, usually with a limited inventory of food staples) have been linked to lower availability of healthy foods, particularly in minority areas (Horowitz, Colson, Hebert, and Lancaster, 2004; Moore and Diez Roux, 2006).

Some studies have also examined demographic differences in patronizing fast-food restaurants (Jeffery and French, 1998). It has been suggested that frequency of eating at fast-food restaurants differs significantly with sex and education. Disproportionate numbers of these establishments have been found in neighborhoods with large numbers of African Americans. These facilities have also been associated with higher fat and lower vegetable intake in this population (Block, Scribner, and DeSalvo,

2004; Lewis et al., 2005; Satia, Galanko, and Siega-Riz, 2004). Regular consumption of fast-food has also been related to increased obesity and overweight (Bowman and Vinyard, 2004; Jeffery and French, 1998; Thompson et al., 2004).

The Environment for Physical Activity

Other spatial availability studies have linked physical activity levels to increased density and convenience of facilities (Diez Roux et al., 2007; Giles-Corti and Donovan, 2002; Gordon-Larsen, Nelson, Page, and Popkin, 2006; McCormack et al., 2004). Other studies indicate that exercise facilities are less available in low income and minority neighborhoods although variations exist by facility type (Estabrooks, Lee, and Gyurcsik, 2003; Gordon-Larsen et al., 2006; Yen and Kaplan, 1998). While proximity to outlets for physical activity (fitness centers, parks, pools etc.) increases exercise frequency, this relationship has not been consistently observed in African American communities (Gordon-Larsen et al., 2006; Rohm Young and Voorhees, 2003; Sallis et al., 1990; Sanderson et al., 2003).

Minority and low income populations sometimes perceive lower availability of facilities in their neighborhoods compared to other income and ethnic groups, even when actual differences do not exist (Boslaugh, Luke, Brownson, Naleid, and Kreuter, 2004; Brownson, Baker, Housemann, Brennan, and Bacak, 2001; Wilson, Kirtland, Ainsworth, and Addy, 2004).

Cancer Prevention in Diverse Ethnic Populations

Comprehensive strategies for planning community approaches to cancer prevention must be sensitive to diverse populations and take into account key issues. These key issues include effective educational outreach through institutions in the target area, health promotion messages

that reflect the unique makeup and cultural orientation of a neighborhood and accurate, culturally sensitive information about differing risks and available resources (Blumenthal et al., 2005; Hardy, Wynn, Huckaby, Lisovicz, and White-Johnson, 2005; Hinton, Downey, Lisovicz, Mayfield-Johnson, and White-Johnson, 2005; Ransom and Shelley, 2006).

These issues are important in thinking about cancer prevention for African Americans who are well known to have higher death rates from cancer compared to other racial and ethnic groups in the United States (Ries et al., 2002). African American males, have mortality rates 40% and incidence rates 20% higher than whites (American Cancer Society, 2003). Some of the differential burden has been linked to factors such as late stage diagnosis due to lack of health insurance (Haynes and Smedley, 1999). Other lifestyle factors at play include lower fruit and vegetable intake, (Crump et al., 2006; Kann et al., 2000) and inactivity rates of 33.2% compared to 22.9% in whites. Overweight is also an increasing problem affecting 77% of African American women and 59% of men (American Cancer Society, 2003).

Most studies treat African American populations as homogeneous communities, without reference to large immigrant populations subsumed within this grouping with distinctive cultures and behavior patterns. During the past two decades, densely populated urban areas such as New York City have experienced substantial immigration from the Caribbean, particularly from Jamaica, the Dominican Republic, and Haiti (New York City Dept. of City Planning, 2004). Caribbean immigrant groups have settled in large tracts of Brooklyn, New York City's most populous borough (2.465 million in the 2000 Census). In particular, the 2000 Census counted 83,713 persons of "Jamaican ancestry" (3.4% of the total population) in Brooklyn.

Despite past research on spatial equity, there are still important unmet research needs and barriers to analysis. Studies are costly, training and involvement of community members is important and available data is often based on administrative databases from state and local governments which may be out of date or not sufficiently detailed to answer specific questions. This is particularly problematic in neighborhoods with high turnover of retail outlets. In addition, closer examination of residential clusters of diverse subpopulations generally classified as African American and spatial analysis of resource availability for neighborhoods they inhabit is only feasible in a select number of specific densely populated urban communities.

It is clear that a tailored research program is needed in order to explore the spatial dimensions of disparities in the environment that facilitate cancer prevention in densely populated communities such as Brooklyn, New York. The goals of such a program should include examining resource availability, categorizing resources for food and exercise in the environment, and comparing differences in availability by race, ethnicity and income through comparison of areas with high concentrations of African American and whites, as well as those with high levels of Caribbean immigrants. We undertook a pilot study to explore and better understand how the distribution of relevant resources varies with the concentration of different demographic groups, believing that improved analysis of the distribution of these resources can be a useful tool for communities in development of strategies and proactive policies for resource distribution.

METHODS

During 2005-06 we conducted a pilot project to develop and test methods for assessing spatial analysis of community capacity for cancer prevention in several Brooklyn neighborhoods. We focused on two primary categories of resources associated with cancer prevention--nutrition and physical activity. We also gathered data on facilities that influence substance abuse (which we limited to alcohol consumption) and weight loss although that data is not reported here (U.S. Dept. of Health and Human Services, 2000). We developed prototype databases for assessment of resources related to each broad indicator area and methods for analysis within the framework of a geographic information system using the census tract as the unit of analysis.

We created a detailed typology of resources which facilitated assessment of the food and exercise environment. Table 1 shows the resources included in the study. Our nutritional resource classification included food retailers grouped into three broad types: supermarkets (including both chain and non-chain), greengrocers (smaller stores specializing in fruits and vegetables which are usually prominently displayed on the street), and bodegas. We catalogued health food stores and vitamin retail specialty shops separately. Fast-food outlets included chain (McDonald's, Burger King, etc.) and non-chain (donuts, ice cream, pizza, BBQ-ribs, Caribbean, etc.). Non-fast-food outlets were not included. We also sought to create a detailed classification system for exercise resources and included a comprehensive array of facilities. Table 1 shows the array of exercise facilities inventoried including community and recreational centers, YMCA's, YWCA's, commercial fitness centers, pools, karate and martial arts centers, and dance studios.

Table 1.
Food and Exercise Resources Utilized in Inventory

<i>FOOD RESOURCES</i>	EXERCISE RESOURCES
Supermarkets – chain Supermarkets – non-chain Health food stores Greenmarkets Greengrocers Bodegas (convenience stores) Fast-food restaurants – chain Fast-food restaurants – non-chain	Community and recreational centers including YM/YWCAs Swimming pools Martial arts schools including self-defense, karate, kung fu, tae kwan do Yoga centers and instruction Private health and fitness centers/gyms Parks and playgrounds Sports fields Dance studios and/or schools Public beaches Horse riding schools Golf courses and driving ranges Baseball batting cages

Census Tract Selection by Income and Ethnicity

We selected forty census tracts on the basis of data from the 2000 US Census. Population data by ethnicity and income for each of Brooklyn's 783 census tracts were provided by the Columbia University Electronic Data Service. We ranked the census tracts three separate ways: by percent White, percent African American, and number of persons of Jamaican ancestry. We identified the 78 census tracts (i.e., the top decile) with the highest percent African Americans and then ranked those by median income, selecting the five highest, five lowest, and five middle income tracts. We identified fifteen high, middle, and low income White tracts in a similar fashion. All thirty census tracts selected this way thus had populations at least 85% African American or White. No census tracts had comparable concentrations of persons of Jamaican ancestry. We therefore identified the ten census tracts with the largest numbers of such individuals. These tracts were highly homogeneous with respect to income (median

income ranged from \$23,000 to \$32,000). We used two density metrics to represent availability of each type of resource: number per square mile and number per capita, using the area and population as the respective denominators.

Student trainees were selected from a minority serving institution in the Brooklyn area, with the specific goal of training early career African American and Caribbean researchers in improved use of Geographic Information Systems(GIS), community assessment, data gathering and statistical analysis. The team inventoried resources in the selected census tracts using a combination of field trips conducted by driving to target areas and doing block-by-block analysis on foot and keyword searches based on the resource code classifications in the telephone directory, and internet sites such as Google maps. This resulted in a master database of 1,028 stores, gyms, and weight loss centers. The field inventories were facilitated by a set of detailed area street maps with census tract boundaries that were prepared beforehand using GIS software. The harvested addresses were geocoded to be compatible with the mapping system.

Statistical Methods

Due to the sparseness of the data and wide variability of our availability measures from one census tract to another, as well as lack of normality, we used the Kruskal-Wallis test as an indication of whether the ranks of availability measures differed by ethnic group. For similar reasons, the accessibility measures were modeled via median regression (Koenker and Hallock, 2001). Models included ethnic group as a main effect plus an income-ethnic-group interaction.

RESULTS

Table 2 compares two measures of availability of resources, number per unit population and number per unit area, by ethnic group but without adjustment for income. The number of resources per unit area for each of the three major types of retail food stores differed significantly among the three ethnic groups. These differences were also reflected in the per capita availability, but only the greengrocer differences were statistically significant. The highest concentrations of supermarkets, bodegas, and greengrocers per square mile were observed in Jamaican areas. The lowest concentration of greengrocers was in African American areas, irrespective of which measure was used. The availability of fast-food restaurants per unit area differed significantly by ethnic area, with Jamaican census tracts having the highest density and White tracts the lowest. There were no significant differences in the availability of health food and vitamin stores or commercial exercise facilities by ethnic area.

Table 2.

Availability of Resources by Ethnic Group

	Availability measure	Jamaican	African American	White	Test of differences (a)
Supermarkets	Per capita	1.68	1.25	1.64	N
	Per mi ²	17.20	5.43	5.90	Y
Bodegas	Per capita	5.25	10.74	1.96	N
	Per mi ²	53.89	46.74	7.07	Y
Greengrocers	Per capita	2.34	0.25	1.96	Y
	Per mi ²	24.06	1.08	7.07	Y
Health foods and vitamins	Per capita	0.34	0.45	0.33	N
	Per mi ²	3.44	2.17	1.18	N
Fast-food	Per capita	9.04	7.24	1.96	N
	Per mi ²	92.89	31.52	7.07	Y
Exercise facilities	Per capita	0.45	1.24	3.27	N
	Per mi ²	4.58	5.43	11.79	N

(a) Kruskal-Wallis test for equality of medians; N = medians are not significantly different from each other, Y = at least one median differs from others, $p < 0.05$

A more nuanced picture is obtained in Table 3, which shows the availability measures by ethnicity, stratified by income. The final column of Table 3 shows the order of median resource availability by ethnic group, after adjustment for income, for those comparisons in which the median regressions were statistically significant. Thus, for example, the median income-adjusted number of supermarkets per square mile was significantly higher in Jamaican tracts than in African American or White tracts. The order was similar for greengrocers (both per capita and per square mile).

The number of bodegas per capita was greater in African American tracts than in Jamaican tracts, and these in turn were greater than in White tracts. The number of bodegas per square mile was similar in Jamaican and African American tracts, and both were significantly greater than in White tracts. Fast-food restaurants were significantly more abundant in Jamaican tracts than in African American or White tracts. There were no significant income-adjusted differences by ethnicity for the other resources.

The two measures of availability of commercial exercise facilities were highest in White neighborhoods and lowest in Jamaican neighborhoods, with African American neighborhoods intermediate (Table 1). Per capita availability in White neighborhoods was about seven times that in Jamaican areas, and availability per square mile was about 2.5 times as high. Density of exercise facilities did not differ significantly with income.

Table 3.
Availability of Resources by Income and Ethnicity

	Meas.	Jamaican	African American			White			Order of medians, adjusted for income (a)
			Income			Income			
		(b)	L	M	H	L	M	H	
Supermarkets	Per cap Per mi ²	1.68	1.89	0.89	0.00	1.67	3.35	0.00	J > AA, W
		17.20	10.7	3.65	0.00	10.6	11.6	0.00	
Bodegas	Per cap Per mi ²	5.25	9.00	13.4	11.7	1.67	3.35	1.49	AA > J > W J, AA > W
		53.89	50.9	54.7	33.0	10.6	11.6	2.54	
Green-grocers	Per cap Per mi ²	2.34	0.00	0.00	1.30	2.23	3.35	0.00	J > AA, W J > AA, W
		24.06	0.00	0.00	3.66	14.2	11.6	0.00	
Health foods and vitamins	Per cap Per mi ²	0.34	0.00	0.89	1.30	0.56	0.00	0.00	
		3.44	0.00	3.65	3.66	3.55	0.00	0.00	
Fast-food	Per cap Per mi ²	9.04	4.26	10.7	10.4	1.11	5.03	1.49	J > AA W
		92.89	24.13	43.8	29.0	7.09	17.3	2.54	
Exercise facilities	Per cap Per mi ²	0.45	0.00	2.7	2.6	2.8	1.7	5.99	
		4.58	0.00	11.0	7.33	17.7	5.78	10.18	

L = Low, M = Middle, H = High

(a) Based on median regression results. Order of medians is shown only if regression coefficient is significantly different from zero (p<0.05).

(b) All Jamaican census tracts were middle income.

DISCUSSION

Our study demonstrates the feasibility of combining census data with information collected in the field within a GIS framework to assess community resources. Disparities in availability of resources within a community affect an individual's ability to adhere to guidelines for cancer prevention. While most cancer prevention advice focuses on individual actions (e.g., choosing particular types of food, engaging in physical activity, avoiding environmental hazards), this assumes that resources that promote health (gyms, supermarkets, health food stores, and health facilities) are readily available and that negative influences do not proliferate in one's local neighborhood (e.g., fast-food outlets, and bodegas offering few fruit and vegetable choices). In reality, resources are not uniformly distributed geographically but are affected by social, economic, or political forces. Such barriers must be addressed at a policy level.

We observed fewer supermarkets in more affluent neighborhoods. This finding contrasts with that of the Atherosclerosis Risk in Communities (ARIC) study, in which supermarkets tended to be situated in wealthier neighborhoods (Morland et al., 2002). Morland et al. reported four times as many supermarkets in white as in African American census tracts. In our study we found an unexpectedly high concentration of supermarkets and greengrocers in census tracts with large Jamaican immigrant populations relative to both white and African American areas.

While some of these differences may be due to the pilot nature of our study, which did not survey the entire borough, they may also be partly due to the way food retailing is organized in highly urbanized areas such as Brooklyn, where the population density is up to 100 times that of the rural and suburban census tracts of the ARIC

study. In census tracts where car ownership is low, most food shopping is done on foot, and supermarkets tend to be of small or medium size and exist side by side with even smaller grocery and specialty food stores. Several of the study tracts include stretches of Flatbush Avenue, a major commercial and shopping street characterized by numerous small stores, specializing in tropical food products, clearly catering to the demands of the local immigrant population.

Although we did not survey food consumption patterns, the higher concentration of supermarkets in Jamaican relative to African American neighborhoods in Brooklyn suggests access to a wide variety of food types and nutrients. In the ARIC study fruit and vegetable intake among African Americans increased in proportion to the availability of supermarkets (Morland et al., 2002). A more recent analysis of the ARIC data also show a lower prevalence of overweight and obesity in neighborhoods with supermarkets (Morland, Diez Roux, and Wing, 2006). On the other hand, the concentration of fast-food establishments in Jamaican census tracts was also higher than in other areas. The Caribbean popular press has suggested that fast-food restaurants have a special appeal for new immigrants because of their association with the lifestyle of the United States and their relative scarcity in the home countries (Caribbean Net News, April 12, 2006), but data on actual food and restaurant preferences among Caribbean immigrants to Brooklyn are so far lacking.

Although White neighborhoods had the greatest numbers of exercise facilities, and Jamaican areas the fewest, the differences in availability of exercise facility availability were not statistically significant. The number of facilities in our selected census tracts is small, however, and the statistical comparisons have low power. Neither measure exhibited a clear pattern when stratified by income (Table 2). We did not include some types of free

recreational programs such as those offered through school programs.

Limitations

As a pilot project our data were necessarily limited to a small number (40) of census tracts with an average population of 4,449 and average area of 0.073 sq mi. in a borough of nearly 2.5 million persons and area of 70.6 sq mi. We deliberately focused on census tracts with highly homogeneous ethnic populations. In the US 2000 Census, 37.8% of the Brooklyn population was foreign-born, and of these, Jamaican-born residents comprised 7.9%, second only to residents born in China (9.2%). We chose to focus on Jamaican-dominated census tracts. By contrast, the next three Caribbean countries of origin were Haiti (6.6%), the Dominican Republic (6.4%), and Trinidad and Tobago (5.6%)(New York City Dept. of City Planning, 2004). It is not necessarily the case that our results can be generalized to these populations, for whom broader studies must be undertaken.

Our study underscores the need to evaluate a broad range of different types of environmental influences that shape population behavior and health impacts in specific urban subpopulations. This should include examination of a broader array of community resources and a closer look at other aspects of Caribbean immigrant and African American populations, with special attention to socioeconomic factors such as income, in order to develop cancer prevention strategies that have a practical relationship to each community's unique needs. Assessment of resource usage by ethnic group will require population surveys, such as studies of recreational facilities by children recently reported by Roemmich and colleagues (Roemmich et al., 2006). Such studies should take into account the constraints on availability due to transportation options which may be sparse in low-income areas.

This study offers a method of providing objective measurements of disparities in availability of neighborhood resources given that knowledge, utilization and perception of resources can vary by ethnicity and socio-economic position. These findings have important implications for communities across the country as they experiment with policy initiatives to address inequities in resource distribution of relevance to cancer prevention. Efforts such as financial and tax incentives for stores to offer healthy foods, for underserved neighborhoods to attract supermarkets, or to increase availability of exercise facilities are important, but should be developed in a targeted way, based on need and neighborhood analysis (Tulane University School of Public Health, Undated). It is encouraging to note that in 2006, the New York City Department of Health launched an initiative in Central Brooklyn to reach out to bodegas to encourage them to offer low-fat products and provide health information to consumers (New York City Department of Health and Mental Hygiene, 2006). Policies based upon assessment of community capacity should take note of behavioral issues that go well beyond simple inventories.

ACKNOWLEDGMENTS

This research was supported by US Public Health Service grant U54 CA 101598. We are grateful to Dr. Carol Magai and Dr. Alfred I. Neugut for advice and encouragement, and to Ms. Jane Weintrop of the Columbia University Electronic Data Service for providing US Census data files. Special thanks are due to Ms. Delores Owens, Ms. Shatese Valentine, Ms. Merlyn Grant for field work, and Mr. Eric Blackwell for field supervision.

REFERENCES

- American Cancer Society. (2003). *Cancer Facts and Figures for African Americans, 2003-2004*. Atlanta: American Cancer Society.
- Block, J. P., Scribner, R. A., and DeSalvo, K. B. (2004). Fast-food, race/ethnicity, and income: a geographic analysis. *Am J Prev Med*, 27(3), 211-217.
- Blumenthal, D. S., Fort, J. G., Ahmed, N. U., Semanya, K. A., Schreiber, G. B., Perry, S., et al. (2005). Impact of a two-city community cancer prevention intervention on African Americans. *J Natl Med Assoc*, 97(11), 1479-1488.
- Boslaugh, S. E., Luke, D. A., Brownson, R. C., Naleid, K. S., and Kreuter, M. W. (2004). Perceptions of neighborhood environment for physical activity: is it "who you are" or "where you live"? *J Urban Health*, 81(4), 671-681.
- Bowman, S. A., and Vinyard, B. T. (2004). Fast-food consumption of U.S. adults: impact on energy and nutrient intakes and overweight status. *J Am Coll Nutr*, 23(2), 163-168.
- Brownson, R. C., Baker, E. A., Housemann, R. A., Brennan, L. K., and Bacak, S. J. (2001). Environmental and policy determinants of physical activity in the United States. *Am J Public Health*, 91(12), 1995-2003.

- Carlaw, R. W., Mittlemark, M. B., Bracht, N., and Luepker, R. (1984). Organization for a community cardiovascular health program: experiences from the Minnesota Heart Health Program. *Health Educ Q*, 11(3), 243-252.
- Cottrell, L. (1977). The competent community. In R. Warren (Ed.), *New Perspectives on the American Community* (pp. 535-545). Chicago: Rand-McNally.
- Crump, S. R., Taylor, B. D., Sung, J. F., Burley, L., Sheats, J., Murphy, F. G., et al. (2006). Dietary intake to reduce cancer risk among African American women in public housing: do sociodemographic factors make a difference? *Ethn Dis*, 16(4), 963-970.
- Diez Roux, A. V., Evenson, K. R., McGinn, A. P., Brown, D. G., Moore, L., Brines, S., et al. (2007). Availability of recreational resources and physical activity in adults. *Am J Public Health*, 97(3), 493-499.
- Estabrooks, P. A., Lee, R. E., and Gyuresik, N. C. (2003). Resources for physical activity participation: does availability and accessibility differ by neighborhood socioeconomic status? *Ann Behav Med*, 25(2), 100-104.
- Farquhar, J. W., Fortmann, S. P., Maccoby, N., Haskell, W. L., Williams, P. T., Flora, J. A., et al. (1985). The Stanford Five-City Project: design and methods. *Am J Epidemiol*, 122(2), 323-334.

- Fawcett, S., Paine-Andrews, A., Francisco, V., Schultz, J., Richter, K., Lewis, R., et al. (1996). Empowering community health initiatives through evaluation. In D. Fetterman, S. Kaftarian and A. Wandersman (Eds.), *Empowerment evaluation: Knowledge tools for self-assessment and accountability* (pp. 161-187). Thousand Oaks, CA: Sage Publications.
- Giles-Corti, B., and Donovan, R. J. (2002). The relative influence of individual, social and physical environment determinants of physical activity. *Soc Sci Med*, 54(12), 1793-1812.
- Goodman, R. M., Speers, M. A., McLeroy, K., Fawcett, S., Kegler, M., Parker, E., et al. (1998). Identifying and defining the dimensions of community capacity to provide a basis for measurement. *Health Educ Behav*, 25(3), 258-278.
- Gordon-Larsen, P., Nelson, M. C., Page, P., and Popkin, B. M. (2006). Inequality in the built environment underlies key health disparities in physical activity and obesity. *Pediatrics*, 117(2), 417-424.
- Hardy, C. M., Wynn, T. A., Huckaby, F., Lisovicz, N., and White-Johnson, F. (2005). African American community health advisors trained as research partners: recruitment and training. *Fam Community Health*, 28(1), 28-40.
- Haynes, M. A., and Smedley, B. D. (Eds.). (1999). *The Unequal Burden of Cancer: An Assessment of NIH Research and Programs for Ethnic Minorities and the Medically Underserved*. Washington, DC: National Academy Press.

- Hinton, A., Downey, J., Lisovicz, N., Mayfield-Johnson, S., and White-Johnson, F. (2005). The community health advisor program and the deep South network for cancer control: health promotion programs for volunteer community health advisors. *Fam Community Health*, 28(1), 20-27.
- Horowitz, C. R., Colson, K. A., Hebert, P. L., and Lancaster, K. (2004). Barriers to buying healthy foods for people with diabetes: evidence of environmental disparities. *Am J Public Health*, 94(9), 1549-1554.
- House, J. S. (2002). Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. *J Health Soc Behav*, 43(2), 125-142.
- Jeffery, R. W., and French, S. A. (1998). Epidemic obesity in the United States: are fast-foods and television viewing contributing? *Am J Public Health*, 88(2), 277-280.
- Kann, L., Kinchen, S. A., Williams, B. I., Ross, J. G., Lowry, R., Grunbaum, J. A., et al. (2000). Youth risk behavior surveillance--United States, 1999. *MMWR CDC Surveill Summ*, 49(5), 1-32.
- Koenker, R., and Hallock, K. F. (2001). Quantile regression. *J. Econ. Persp.*, 15, 143-156.
- Laraia, B. A., Siega-Riz, A. M., Kaufman, J. S., and Jones, S. J. (2004). Proximity of supermarkets is positively associated with diet quality index for pregnancy. *Prev Med*, 39(5), 869-875.

- Lewis, L. B., Sloane, D. C., Nascimento, L. M., Diamant, A. L., Guinyard, J. J., Yancey, A. K., et al. (2005). African Americans' access to healthy food options in South Los Angeles restaurants. *Am J Public Health*, 95(4), 668-673.
- Link, B. G., and Phelan, J. (1995). Social conditions as fundamental causes of disease. *J Health Soc Behav, Spec No*, 80-94.
- McCormack, G., Giles-Corti, B., Lange, A., Smith, T., Martin, K., and Pikora, T. J. (2004). An update of recent evidence of the relationship between objective and self-report measures of the physical environment and physical activity behaviours. *J Sci Med Sport*, 7(1 Suppl), 81-92.
- Moore, L. V., and Diez Roux, A. V. (2006). Associations of neighborhood characteristics with the location and type of food stores. *Am J Public Health*, 96(2), 325-331.
- Morland, K., Diez Roux, A. V., and Wing, S. (2006). Supermarkets, other food stores, and obesity: the atherosclerosis risk in communities study. *Am J Prev Med*, 30(4), 333-339.
- Morland, K., Wing, S., and Diez Roux, A. (2002). The contextual effect of the local food environment on residents' diets: the atherosclerosis risk in communities study. *Am J Public Health*, 92(11), 1761-1767.

- New York City Department of Health and Mental Hygiene. (2006). Press Release: City Health Department Begins 1% Milk Initiative in Central Brooklyn, South Bronx, and Harlem Bodegas (Jan. 19, 2006). In Dept. of Health and Mental Hygiene (Ed.). New York, NY.
- New York City Dept. of City Planning. (2004). The Newest New Yorkers, 2000. New York City.
- Poole, D. L. (1997). Building community capacity to promote social and public health: challenges for universities. *Health Soc Work*, 22(3), 163-170.
- Powell, L. M., Slater, S., Mirtcheva, D., Bao, Y., and Chaloupka, F. J. (2007). Food store availability and neighborhood characteristics in the United States. *Prev Med*, 44(3), 189-195.
- Ransom, P., and Shelley, D. (2006). What can community organizations do for tobacco control? *J Health Hum Serv Adm*, 29(1), 51-82.
- Ries, L. A. G., Eisner, M. P., Kosary, C. L., Hankey, B. F., Miller, B. A., Clegg, L., et al. (Eds.). (2002). *SEER Cancer Statistics Review, 1973-1999*. Bethesda, MD: National Cancer Institute.
- Roemmich, J. N., Epstein, L. H., Raja, S., Yin, L., Robinson, J., and Winiewicz, D. (2006). Association of access to parks and recreational facilities with the physical activity of young children. *Prev Med*, 43(6), 437-441.

- Rohm Young, D., and Voorhees, C. C. (2003). Personal, social, and environmental correlates of physical activity in urban African-American women. *Am J Prev Med*, 25(3 Suppl 1), 38-44.
- Sallis, J. F., and Glanz, K. (2006). The role of built environments in physical activity, eating, and obesity in childhood. *Future Child*, 16(1), 89-108.
- Sallis, J. F., Hovell, M. F., Hofstetter, C. R., Elder, J. P., Hackley, M., Caspersen, C. J., et al. (1990). Distance between homes and exercise facilities related to frequency of exercise among San Diego residents. *Public Health Rep*, 105(2), 179-185.
- Sanderson, B. K., Foushee, H. R., Bittner, V., Cornell, C. E., Stalker, V., Shelton, S., et al. (2003). Personal, social, and physical environmental correlates of physical activity in rural African-American women in Alabama. *Am J Prev Med*, 25(3 Suppl 1), 30-37.
- Satia, J. A., Galanko, J. A., and Siega-Riz, A. M. (2004). Eating at fast-food restaurants is associated with dietary intake, demographic, psychosocial and behavioural factors among African Americans in North Carolina. *Public Health Nutr*, 7(8), 1089-1096.
- Schulz, A., and Northridge, M. E. (2004). Social determinants of health: implications for environmental health promotion. *Health Educ Behav*, 31(4), 455-471.

- Schulz, A. J., Kannan, S., Dvonch, J. T., Israel, B. A., Allen, A., 3rd, James, S. A., et al. (2005). Social and physical environments and disparities in risk for cardiovascular disease: the healthy environments partnership conceptual model. *Environ Health Perspect*, 113(12), 1817-1825.
- Schulz, A. J., Williams, D. R., Israel, B. A., and Lempert, L. B. (2002). Racial and spatial relations as fundamental determinants of health in Detroit. *Milbank Q*, 80(4), 677-707, iv.
- Steckler, A., Orville, K., Eng, E., and Dawson, L. (1992). Summary of a formative evaluation of PATCH. *J Health Educ.*, 23, 174-178.
- Stunkard, D., Feliz, M., Yopp, P., and Cohen, R. (1985). Mobilizing a community to promote health for the Pennsylvania County Health Improvement Program. In J. Rosen and L. Solomon (Eds.), *Prevention in Health Psychology* (pp. 143-190). Hanover, NH: University of New England Press.
- Thompson, O. M., Ballew, C., Resnicow, K., Must, A., Bandini, L. G., Cyr, H., et al. (2004). Food purchased away from home as a predictor of change in BMI z-score among girls. *Int J Obes Relat Metab Disord*, 28(2), 282-289.
- Tulane University School of Public Health. (Undated). Food: A Question of Access - Addressing Poor Nutrition, Food Availability, and Policy. Retrieved November 23, 2007, from <http://www.sph.tulane.edu/PRC/Files/Food%20Policy%20Brief.pdf>

- U.S. Dept. of Health and Human Services. (2000, November, 2000). Healthy People 2010, 2nd Edition. Retrieved January 1, 2007, from <http://www.healthypeople.gov>
- Williams, D. R., and Collins, C. (2001). Racial residential segregation: a fundamental cause of racial disparities in health. *Public Health Rep*, 116(5), 404-416.
- Wilson, D. K., Kirtland, K. A., Ainsworth, B. E., and Addy, C. L. (2004). Socioeconomic status and perceptions of access and safety for physical activity. *Ann Behav Med*, 28(1), 20-28.
- Yen, I. H., and Kaplan, G. A. (1998). Poverty area residence and changes in physical activity level: evidence from the Alameda County Study. *Am J Public Health*, 88(11), 1709-1712.

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