Disparities in Urban Neighborhood Conditions: Evidence from GIS Measures and Field Observation in New York City

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ABSTRACT

Although many low-income urban areas are highly walkable by conventional measures such as population density or land use mix, chronic diseases related to lack of physical activity are more common among residents of these areas. Disparities in neighborhood conditions may make poor areas less attractive environments for walking, offsetting the advantages of density and land use mix. This study compared poor and nonpoor neighborhoods in New York City, using geographic information systems measures constructed from public data for US census tracts within New York City ($N = 2{,}172$) as well as field observation of a matched-pair sample of 76 block faces on commercial streets in poor and nonpoor neighborhoods. Poor census tracts had significantly fewer street trees, landmarked buildings, clean streets, and sidewalk cafes, and higher rates of felony complaints, narcotics arrests, and vehicular crashes. The field observation showed similar results. Improving aesthetic and safety conditions in poor neighborhoods may help reduce disparities in physical activity among urban residents.

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INTRODUCTION

A growing number of studies find that people who live in densely populated areas, with mixed land use (e.g., homes, shops, schools, places of worship, parks), street connectivity (i.e., the directness and length of the street blocks and the density of connections within a street system) (1), and access to public transit (i.e., buses or trains) tend to walk more, be more physically active, and weigh less (2–4). These measures of walkability (i.e., ease of walking in an area) identify important city- and neighborhood-scale differences related to physical activity. They cannot, however, explain disparities in physical activity between poor and nonpoor neighborhoods *within* big-city environments (in "poor" neighborhoods, at least 20% of residents lived in poverty according to the 2000 US Census; in "nonpoor" neighborhoods, less than 20% of residents lived in poverty). Residents of low-income urban neighborhoods, despite living in what are, by conventional standards, highly walkable neighborhoods, have high rates of chronic disease related to lack of physical activity (5,6).

Disparities in aesthetic or safety-related characteristics may make poor neighborhoods less attractive environments for walking, offsetting the advantages of high population density and land use mix (2,7,8). Previous research has highlighted three types of aesthetic characteristics believed to influence walking: green space such as parks or natural areas (9–12), attractive architecture or urban design (13,14), and disagreeable features such as noise, air pollution, or physical disorder (10,15–17). In addition, some studies have found that crime risk (18–22) and traffic hazards (23,24) are associated with lower levels of physical activity and/or higher weight, although the evidence is mixed (16,24,25). Other neighborhood features may also promote such forms of active transportation as walking. Amenities (i.e., pleasant features) such as benches and sidewalk cafes may make an area more attractive to pedestrians (26). In addition, unlike motorists, who favor less-crowded roads, pedestrians prefer public places where other people are present (27).

Identifying the ways in which neighborhood conditions in low-income areas might discourage physical activity is consistent with an ecological approach that considers multiple levels of influence on behavior; it is also the first step toward effective intervention. This collaborative study asked how neighborhood characteristics such as aesthetics and safety differed between poor and nonpoor neighborhoods which are equally walkable by conventional measures. The first analysis used US census tract-level measures (census tracts are small, relatively permanent statistical subdivisions of a county) (28) to compare aesthetics, safety, and other conditions in poor and nonpoor neighborhoods, controlling for a walkability index that summarized population density, land use mix, street connectivity, and public transit. The second analysis used field observation conducted on commercial streets in high-walkability poor and nonpoor tracts, providing detailed measures of both physical conditions and social behavior. Both components of this research examined whether poor and nonpoor neighborhoods differ in ways that could help explain disparities in physical activity within a city.

METHODS

This study used data both from geographic information systems (GIS) measures and field observation in New York City. All analyses compared poor and nonpoor areas, with poor areas defined as census tracts with at least a 20% poverty rate in the 2000 US Census. We compared poor and nonpoor areas after controlling statistically for neighborhood walkability. Building on work by Frank *et al* (23,29), we constructed a walkability index for census tracts. Our index included five components, each receiving equal weight. These components were:

(1) Population density, that is, the ratio of population to land area.
(2) Unique intersection density, that is, the ratio of intersections to land area, excluding cul-de-sac or L-shaped intersections and consolidating intersections on divided streets.
(3) The minimum distance along the street network to the nearest subway stop; we assigned a value of 10 km (6.2 miles) to this

measure for three tracts located on small islands (the maximum for other tracts was 9.65 km (6.0 miles)).

(4) A measure of the balance among five types of land use – residential, office, retail, education, and entertainment – using data from a parcel-level database, the primary land use tax lot output (PLUTO) data, produced by the New York City Department of City Planning (30). (This land use mix measure equaled $A/\ln(N)$ where $A = -((b1/a) \times \ln(b1/a)) + (b2/a) \times \ln(b2/a) + \cdots$ over all five land uses, the variable a was the total floor area across the five land uses, $b1$ was the building floor area covered by the first land use, $b2$ was the building floor area covered by the second land use, and so on, N was the total number of land uses represented in the census tract, and zero values for $b1$ to $b5$ were set to 0.00001 to avoid zero or undefined terms.)

(5) The ratio of retail building floor area to retail land area, also using data from PLUTO. After calculating these measures at the census tract level, we standardized each to a z-score (or standard score) with a mean of zero and a standard deviation of 1, then summed the five z-score values to produce a walkability index that ranged from -11.47 to 14.36 for the city's inhabited tracts.

GIS Measures

The city-wide analysis using GIS data included measures of neighborhood aesthetics, safety, active transportation infrastructure (i.e., places for walking and/or bicycling, such as paths or trails where motorized vehicles are prohibited, as well as bus stops or subway/train stations), and sidewalk amenities constructed for all 2,172 census tracts with resident population in 2000. Source data available for this project ranged in spatial scale from point features (such as sidewalk cafes or vehicular crashes) to administrative units larger than census tracts. We aggregated point features up to the tract level. When using measures available only for larger geographies, such as police precincts, we intersected tract boundaries spatially with those larger geographic units and constructed area-weighted averages.

We used four measures of aesthetic features of each neighborhood. The New York City Department of Parks & Recreation (31) provided data from the 1995 Street Tree Census, which identifies the number of trees per street segment, and 2007 data on the locations of city parks and "greenstreets" (natural plantings on median strips and traffic islands). To indicate the presence of historically important architecture, we used the locations of buildings designated as historical landmarks by the New York City Landmarks Preservation Commission, available from the PLUTO database (30). Measures of street cleanliness came from "Project Scorecard," an annual assessment conducted by the New York City Mayor's Office of Operations (32). City evaluators rated the cleanliness of streets in a sample of blocks, with the ratings aggregated to one of 234 sanitation sections in the city. Our measure averaged the proportion of streets deemed acceptably clean in 2005–2007.

Our traffic safety indicators included a weighted average of speed limits within the tract, with the speed limits weighted by the length of the corresponding road segments; a proxy for street width, the total land area covered by the street network divided by the total length of roads, both within the tract; and the number of injuries from pedestrian–automobile collisions, averaged over the years 2003–2005, using data from the New York State Department of Transportation. For this study, crime data were available from the New York City Police Department at the precinct level. We calculated the average number of felony crimes and narcotics arrests per 100,000 residents for the years 2002–2004, the latest years available. We also examined the proportion of vacant housing units in the 2000 Census; this measure is often included in studies of neighborhood physical disorder and has been associated with crime and fear of crime (33–35).

Our measures of active transportation infrastructure included the presence of a bike lane or trail within the tract (according to the New York City Department of Transportation), as well as the presence of a subway stop within 0.8 km (0.5 miles) from the center of the tract and the density of bus stops per km^2, both using data from the Metropolitan Transit Authority. As a measure of sidewalk amenities, we used a 2006 geocoded list (in which geographic coordinates were determined from street addresses) of sidewalk cafes with outdoor seating, provided by the New York City Department of Consumer Affairs, which licenses sidewalk cafes.

Observer Ratings of Matched Street Segments

We selected commercial streets for observation because of their potential to serve as neighborhood gathering places that draw pedestrian traffic. We conducted field observation on one street segment in each of 38 tracts, taking separate measurements for each side of the street for a total of 76 block faces (a *block face* is one side of a city block). We used a two-step sampling process to select the street segments for observation. The first step was to select pairs of poor and nonpoor tracts matched on walkability. We began with census tracts in the top quartile of walkability (554 tracts), ranked the tracts by their walkability scores, and divided the ranked list into strata consisting of 20 tracts each. Within each stratum we identified a matched pair of poor and nonpoor census tracts, usually selecting tracts with the smallest difference between walkability scores. We reviewed these 28 matched pairs, excluding pairs in which a tract had little commercial activity or would have required excessively long travel, to generate a final sample of 20 pairs. Because of inclement weather during the field period, we audited only 19 pairs (38 tracts). Because of the matched pair selection, mean walkability scores were the same (3.64) for poor and nonpoor tracts. The distribution of tracts across the four boroughs (i.e., counties within New York City) in our study differed, however: among nonpoor tracts, 52.6% were in Manhattan and 31.6% in Brooklyn or the Bronx; among poor tracts, 26.3% were in Manhattan and 57.9% in Brooklyn or the Bronx. The remaining sampled tracts were in Queens.

For the second step, street segment selection, we used business location data from The Dun & Bradstreet Corporation to develop a detailed map for each sampled tract that displayed commercial land use, subway stops, and retail and service establishments. Based on these maps, we selected the street segment in each tract that maximized the proportion of commercially zoned land, proximity to subway stops, and density of retail and service establishments.

Observers spent approximately 75 min collecting data for each block face, using an audit tool developed by the authors based on an inventory of key constructs in research on urban design and neighborhood physical and social conditions. We included measures of the physical environment (i.e., the physical attributes of an area) such as aesthetics, traffic and crime safety, infrastructure for active travel (e.g., walking, bicycling, using public transit), and sidewalk amenities. We also included measures of social and commercial activity. In addition to the paper-and-pencil audit measures, observers took two 10-min pedestrian counts, used a radar gun to gauge traffic speed (taking measurements for 10 vehicles at mid-block), and, using a rolling tape measure, measured the total sidewalk width and the "unobstructed width" (taking into account obstructions such as vending carts or street furniture). The entire instrument, with item sources indicated where relevant, is available on the Internet (36), and the Appendix to this paper shows the subset of items used in this analysis.

Before the field period, we tested the audit tool in a few blocks, both to estimate the time required and to identify items that were ambiguous or difficult to measure and therefore needed revision. Observation took place on weekdays during July and August; no observation was conducted in rainy weather. To control for variation in traffic patterns due to morning and afternoon rush hour and the lunch hour, observers visited the blocks between 10:00 and 12:00 hours or between 13:30 and 15:30 hours. A core team of three student interns participated in developing the instrument and collected 75% of the data; seven other interns carried out observation on a rotating schedule, always working with one of the three core team members. All observers underwent a 3-hour training session at the Project for Public Spaces (a nonprofit organization dedicated to helping people create and sustain public places that build communities).

Statistical Analysis

In the city-wide analysis, we estimated median values (for continuous variables) or probabilities (for dichotomous variables) for the poor and nonpoor tracts, adjusting for walkability scores. We employed quantile regression to estimate adjusted median values and logistic regression to estimate the adjusted probabilities. We used adjusted medians rather than means both because of the skewness of several GIS variables and to reduce the influence of outliers. For the field observation measures, we assessed statistical significance of poor–nonpoor differences using *t*-tests without an equal variance assumption (for continuous variables) and χ^2-tests (for dichotomous variables).

RESULTS

In the first analysis, shown in Table 1, we compared poor and nonpoor tracts in New York City using GIS measures of aesthetics, safety, infrastructure for active transportation, and sidewalk amenities, with medians and proportions adjusted for an index of

Table 1: Census tract-level GIS measures of physical environment, adjusted for walkability, by poverty status

Measure	*Nonpoor*	*Poor*	*P-value*
Aesthetics			
Density of street trees per km^2	1005.9	507.6	$P<0.001$
Percent of tracts with any park or "greenstreet"	39.3	44.8	$P<0.05$
Percent of tracts with landmarked buildings	21.5	15.8	$P<0.01$
Percent of streets acceptably clean	93.4	89.5	$P<0.001$
Safety			
Weighted average speed limit in tract (mph)	26.9	27.2	$P<0.01$
Ratio of street area (km^2) to street length (km)	0.050	0.057	$P<0.001$
Density of pedestrian–vehicular collisions per km^2	17.8	24.1	$P<0.001$
Rate of felony complaints per 100,000 population	1530.6	1885.1	$P<0.001$
Rate of narcotics arrests per 100,000 population	221.7	929.6	$P<0.001$
Percent of vacant housing units	4.4	5.1	$P<0.001$
Infrastructure for active transportation			
Percent of tracts with bicycle lanes or greenways	27.6	35.7	$P<0.001$
Percent of tracts with subway stop within 0.8 km	49.5	72.4	$P<0.001$
Density of bus stops per km^2	0.540	0.538	
Sidewalk amenities			
Percent of tracts with any sidewalk cafe	9.1	1.9	$P<0.001$

walkability. Nonpoor tracts fared better than poor tracts on three aesthetics measures: more street trees, more landmarked buildings, and a higher proportion of clean streets. Poor neighborhoods were more likely to include parks or greenstreets. Nonpoor tracts also appeared safer than poor tracts, with slightly lower speed limits and narrower streets, lower vehicular crash rates, lower rates of felony complaints and narcotics arrests, and fewer vacant housing units. Poor census tracts had better access to bicycle lanes and paths and to subway stops, whereas density of bus stops did not differ significantly by neighborhood poverty level. Nonpoor tracts were more likely to have sidewalk cafes.

The second analysis used field observation measures of the physical environment collected on commercial streets in high-walkability tracts (Table 2). Most comparisons of aesthetic qualities favored the nonpoor block faces (hereafter, "blocks"), which had more natural features and fewer visible signs of trash or disrepair. Nonpoor blocks were also more likely to have ornate or decorative architecture and less likely to have excessive noise. The results for safety and active transportation infrastructure were mixed. Poor blocks tended to have narrower streets and slower traffic. This difference may be due to their concentration in the outer boroughs, whereas nonpoor blocks included more sites in the heavily traveled neighborhoods of Manhattan. Police presence was similar on poor and nonpoor blocks. Observers saw a few incidents of fighting or hostile behavior on poor blocks, but none on the nonpoor blocks. Public transit access was similar for poor and nonpoor blocks, but more nonpoor blocks had bicycle racks. Total width of sidewalks did not differ in poor and nonpoor neighborhoods, but the unobstructed walking area was narrower on sidewalks in nonpoor neighborhoods. Nonpoor blocks had more sidewalk cafes and pedestrian conveniences. Among both poor and nonpoor blocks, nearly half offered some kind of outdoor seating, including city- and business-provided benches, cafe chairs, and "substitute seating," such as stoops (i.e., small porches at building entrance) or large pots with plants. On poor blocks, only about 11% of seating was provided by businesses, whether sidewalk cafes or business-provided benches; on nonpoor blocks, the figure was significantly higher at 46% ($P = 0.02$). In poor neighborhoods, some chairs appeared to have been brought to the sidewalk from nearby apartments.

Table 2: Observational measures of physical environment, on high-walkability commercial streets, by poverty status

Measure	*Nonpoor*	*Poor*	*P-value*
Aesthetics			
Percent with natural features	68.4	52.6	
Count of natural features per block	5.8	2.9	$P < 0.05$
Percent with ornate or decorative architecture	39.5	18.4	$P < 0.05$
Percent with public art or banners	18.4	34.2	
Percent with excessive noise	39.0	62.9	$P < 0.05$
Percent with unpleasant odors	45.4	61.9	
Count of types of trash (six items)	1.8	2.7	$P < 0.001$
Count of signs of disrepair or abandonment (nine items)	0.4	1.2	$P < 0.001$
Safety			
Number of lanes to cross at intersection	5.6	4.4	$P < 0.01$
Average traffic speed (mph)	23.1	19.2	$P < 0.01$
Percent in which police were observed	57.9	52.6	
Percent in which fighting or hostile behavior was observed	0.0	10.5	$P < 0.05$
Infrastructure for active transportation			
Percent with bicycle rack(s)	23.7	2.6	$P < 0.01$
Percent with bus stop(s)	39.5	44.7	
Percent with subway stop(s)	29.0	26.3	
Sidewalk width (feet)	17.5	18.6	
Unobstructed sidewalk width (feet)	10.5	12.5	$P < 0.10$
Sidewalk amenities			
Percent with sidewalk cafes	15.8	2.6	$P < 0.05$
Percent with any seating	47.4	42.1	
Count of types of sidewalk conveniences (seven items)	5.4	3.8	$P < 0.05$

Table 3 compares measures of social and commercial activity. The most notable difference was in sidewalk commercial activity. Poor blocks had more street vendors, people distributing advertising flyers, and sidewalk shoppers. The street vendors ranged from newsstands and licensed food carts to informal vendors with items

Table 3: Observational measures of social/commercial activity and overall neighborhood ratings, on high-walkability commercial streets, by poverty status

Measure	*Nonpoor*	*Poor*	*P-value*
Percent with sidewalk vendor or display table	29.0	47.4	$P<0.10$
Percent with person distributing advertising flyers	2.6	18.4	$P<0.05$
Percent with person(s) shopping at sidewalk vendor	10.5	39.5	$P<0.01$
Percent with people standing in groups and talking	86.8	89.5	
Percent with people sitting alone	36.8	50.0	
Percent with people sitting in groups	21.1	39.5	$P<0.10$
Median pedestrians (average of two 5-min counts)	72	55.8	

arrayed on a card table. Poor blocks were also more likely to have people sitting in groups. Otherwise, few differences in the level or character of social activity were observed. Nonpoor blocks had higher median pedestrian counts, but the difference was not statistically significant.

DISCUSSION

Both GIS and field observation data indicated that neighborhood conditions differed significantly between poor and nonpoor neighborhoods that were equally walkable. Nonpoor neighborhoods had better scores on most indicators related to aesthetics, safety, and pedestrian conveniences. These findings are consistent with previous work on disparities in neighborhood conditions,(5,37) but to our knowledge this study is the first to demonstrate that these differences remained after controlling for the potentially confounding effect of neighborhood walkability. We also found differences between poor and nonpoor neighborhoods in features less commonly studied, such as pedestrian amenities and conveniences and sidewalk commercial activity. This study shows that low-income urban neighborhoods are less conducive to walking than they would appear to be if we considered only population density, land use mix, and other indicators of urban form. Taking account of neighborhood aesthetics and safety may help explain disparities in health between advantaged and disadvantaged populations.

This work suggests some questions for future research. First, if neighborhood conditions do influence physical activity, what is the relative importance of specific features such as crime, traffic safety, or physical disorder and how might these features interact (38)? Second, how do socioeconomic status or other individual characteristics shape the diverse ways in which people use streets and other public spaces (37)? Third, to what extent do public spaces serve as neighborhood destinations, thereby promoting physical activity and other healthy behaviors? Use of sidewalks as public spaces could attract pedestrian traffic by generating a lively street scene and providing additional shopping destinations; it could also deter walking by obstructing pedestrian traffic or generating physical disorder.

Strengths of this study include the variety of objective measures available for the city-wide analysis as well as inclusion of detailed field observation data. Although other studies have found similar differences by neighborhood poverty level (39), to our knowledge ours is the first to include controls for neighborhood walkability. Our findings are limited to one city, and future research should assess their generalizability to other places. Limitations of the GIS data also include the lack of validity and reliability information and the use of crime and street cleanliness measures available on only a coarse spatial scale. Limitations of the field observations include the limited size and scope of the sample, the lack of formal tests of intra- or inter-rater reliability, lack of data for evenings and weekends, lack of repeated measures for impermanent features such as social gatherings, and the use of neighborhood ratings by outside observers who may not represent the perceptions and priorities of local residents. Information on the quality or cost of neighborhood resources could modify our conclusions about disparities in neighborhood conditions. Lastly, we considered disparities by neighborhood poverty level only; study of disparities by race/ethnic composition or more differentiated measures of socioeconomic status would be a valuable addition to future research.

Policy measures to improve aesthetic and safety conditions in low-income neighborhoods may promote physical activity and thereby reduce increases in obesity and related health conditions among residents. Improving neighborhood conditions is an attractive approach for policy intervention because aesthetic and safety improvements can often be implemented more quickly and at more modest cost than more fundamental shifts in population density or land use patterns. In addition, community stakeholders often support neighborhood aesthetic and safety-related enhancements because such measures may improve quality of life and attract consumers to local businesses. Measures that could reduce the poor–nonpoor disparities identified in this study include planting trees along streets, increasing the frequency of trash pickup and other sanitation services, improving policing of the community, implementing traffic-calming measures, and promoting economic development in poor neighborhoods. Given the demands on limited city budgets, priorities should be informed by further research on the effects of specific neighborhood features on physical activity – either singly or in combination – relative to the cost of the improvement (40). In addition, given the diversity of ways in which residents use their streets and sidewalks, initiatives to improve neighborhood conditions should seek to include local residents in decision making.

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APPENDIX

Table A1: Field observation measures

Audit item in observation protocol	***Type or unit of measurement***	***Transformed measure used in analysis***
Natural features		Percent with any natural features
Planters (large pots)	Count	
Plantings (fenced in areas with flower beds, etc.)	Count	
Street trees (including fenced trees as long as tree dominates)	Count	
Window boxes (on buildings)	Count	
Flower pots on lampposts	Count	
Natural features: same as above		Sum of counts of natural features
Architecture		Percent with ornate or decorative architecture
Ornate/decorative or historical	Yes/no	
Banners on lampposts	Count	Percent with public art or banners
Public art	Count	
Unusual level of noise from …		Percent with any type of unusual level of noise
Trains, subways, buses	Yes/no	
Factories	Yes/no	

Table A1 *(Continued)*

Audit item in observation protocol	*Type or unit of measurement*	*Transformed measure used in analysis*
Construction	Yes/no	
Car, apartment, or portable stereos	Yes/no	
Truck-related noises	Yes/no	
Other (specify)	Yes/no	
Air pollution (buildings, vehicles, etc.)	Yes/no	Percent with either type of unpleasant odor
Other odor	Yes/no	
Type of trash		Count of types of trash present
Whole or broken beer, wine, or liquor bottles	Yes/no	
Discarded cigar/cigarette butts	Yes/no	
Food-related trash on sidewalk (e.g., chicken bones)	Yes/no	
Other garbage, litter, broken glass on sidewalks/in gutters	Yes/no	
Trash cans overflowing	Yes/no	
Household belongings on sidewalk or curb (discarded, not for sale)	Yes/no	
Types of disrepair of abandonment		Count of types of disrepair or abandonment
Abandoned cars (e.g., many tickets, partly disassembled)	Yes/no	
Graffiti	Yes/no	

Table A1 *(Continued)*

Audit item in observation protocol	*Type or unit of measurement*	*Transformed measure used in analysis*
Broken windows on buildings	Yes/no	
Other signs of abandoned buildings	Yes/no	
Stray animals	Yes/no	
Pools of standing water on sidewalk	Yes/no	
Building signage in disrepair (letters missing, paint faded, etc.)	Yes/no	
Awnings torn or tattered	Yes/no	
Buildings in serious disrepair	Yes/no	
Number of lanes to cross focal street (first intersection)	Count	Count of lanes to cross at intersection
Vehicle speed (measure with radar gun) Car 1…Car 10	mph	Average traffic speed: average of 10 measured speeds
Police on foot (not in vehicles)	Yes/no	Percent with police observed
People arguing or fight, acting hostile or threatening	Yes/no	Percent with fighting or hostile behavior observed
Bike racks	Count	Percent with bicycle rack
Bus shelter	Yes/no	Percent with bus shelter or bus stop
Bus stop (sign posted only)	Yes/no	
Subway entrance	Yes/no	Percent with subway stop
Total width of sidewalk (measured with rolling tape measure)	Feet	Sidewalk width

Table A1 (*Continued*)

Audit item in observation protocol	***Type or unit of measurement***	***Transformed measure used in analysis***
Width of walking lane (room to walk without obstructions)	Feet	Unobstructed sidewalk width
Sidewalk cafes	Count	Percent with sidewalk cafes
Seating		Percent with any type of seating
Municipal benches	Count	
Other benches	Count	
Chairs	Count	
In sidewalk cafes (estimate number of chairs)	Count	
Public steps, low walls, or other "substitute seating"	Count	
Stoops	Count	
Types of sidewalk conveniences		Count of types of sidewalk conveniences
Newspaper vending boxes	Count	
US Postal Service mailboxes	Count	
Information/emergency booths	Count	
ATMs (accessible from the street)	Count	
Garbage cans (public)	Count	
Pay telephone booths	Count	
Emergency phones	Count	

Table A1 *(Continued)*

Audit item in observation protocol	***Type or unit of measurement***	***Transformed measure used in analysis***
Type of sidewalk vendor/display		Percent with any type of sidewalk vendor or display table
Store-affiliated displays (sales stands or tables outside stores)	Yes/no	
Freestanding newsstand	Yes/no	
Fruit and vegetable stand	Yes/no	
Other food vendors (record types)	Yes/no	
Other vendors (record types)	Yes/no	
People distributing advertising flyers	Yes/no	Percent with person distributing advertising flyers
People shopping from street vendors	Yes/no	Percent with person(s) shopping at sidewalk vendor
People standing and talking to each other	Yes/no	Percent with people standing in groups and talking
People sitting (solo)	Yes/no	Percent with people sitting alone
People sitting in pairs or groups	Yes/no	Percent with people sitting in groups
Two pedestrian counts (number in 10 min)	Count	Median of average of two pedestrian counts

Source: Built Environment & Health (BEH) Project: www.beh.columbia.edu.