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The National Environmental Public Health Tracking Network Access to Parks Indicator: A National County-Level Measure of Park Proximity

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EXECUTIVE SUMMARY

Parks and recreation departments and public health organizations both work to improve the well-being of their communities. Measuring residential proximity to parks could be a specific area of shared interest, given that proximity to parks is needed for walking access, and the use of parks is, in turn, associated with many physical, social, and mental health benefits. The CDC's publicly available National Environmental Public Health Tracking Network (NEPHTN) Access to Parks Indicator (API) focuses on one major component of access, residential proximity to parks. The API uses a commercial parks database and U.S. Census data to estimate the number and percentage of individuals in the U.S. that live within a half-mile of a park boundary, a measure commonly used to represent park proximity. The API is calculated at the state and county levels and is available for all states and counties in the U.S. Using estimates from the API, we examined the distribution of residential proximity to parks by geography and race/ethnicity. Additionally, we evaluated differences in park proximity by rural/urban status of counties. In 2010, 39% of the total U.S. population lived within a half-mile of a park. This percentage varied widely between states, ranging from 9% in West Virginia to 67% in Hawaii and 88% in the District of Columbia (DC). Park proximity was lowest among non-Hispanic whites (34.2%) and highest among individuals belonging to the non-Hispanic other race category (52.0%). Metropolitan counties had the highest percentage of residents living within a half-mile of a park (43.3%); the percentage was lower in non-metropolitan counties adjacent to a metropolitan county (15.0%) and non-metropolitan

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counties not adjacent to a metropolitan county (18.5%). Park proximity was higher in metropolitan counties with a larger population size and in non-metropolitan counties with a higher degree of urbanization. The NEPHTN Access to Parks Indicator provides an opportunity to understand park proximity in counties and states throughout the U.S., including identifying disparities that may exist between population subgroups and comparing geographic areas. Parks and recreational professionals can use this information to compare their county or state to other geographic areas and, in combination with local data on parks within their jurisdiction, inform decisions to improve the distribution of parks and the well-being of their communities.

Keywords

Park access; park proximity; urbanization; urban planning; disparities; built environment; tracking network

Introduction

Parks are important features of communities that can positively influence physical, social, and mental health (Sallis et al., 2015). The use of parks has been linked specifically to increased physical activity, reduced obesity levels, stronger social integration, reduced stress and anxiety, and overall improvements in health (Bedimo-Rung, Mowen, & Cohen, 2005; Sallis et al., 2015). Parks can contribute to activity levels by serving both as a venue for physical activity and as a destination for walking and bicycle trips. Parks with shade trees also provide environmental benefits such as storing storm water, filtering water and air pollutants, and cooling urban heat islands, thereby reducing air pollution exposure and preventing heat-related illness among park users or nearby residents (Bedimo-Rung et al., 2005). Ensuring that residents have access to safe, high-quality parks in their community, conceivably enabling them to gain park-related social and health benefits, could be congruent with the goals of both parks and recreation and public health organizations.

Access to parks, defined as the ability of individuals to get to and navigate within a park, is a multi-dimensional construct (Bedimo-Rung et al., 2005). The quality, safety, and amenities of parks, as well as the quality of nearby pedestrian and bicycle infrastructure, are some factors that contribute to overall park access and usage (McCormack, Rock, Toohey, & Hignell, 2010; Blanck et al., 2012). However, a more fundamental aspect of park access is the existence of parks near residences, as a park must exist for it to have the potential to positively impact health. Studies have found that the likelihood of using parks for physical activity increases as residential proximity to parks increases (Cohen et al., 2007; Giles-Corti et al., 2005; McCormack, Giles-Corti, Bulsara, & Pikora, 2006; Mowen, Orsega-Smith, Payne, Ainsworth, & Godbey, 2007). There is also a positive association between walking and biking travel to parks and frequency of park use (Grow et al., 2008). The U.S. Surgeon General’s Call to Action to Promote Walking and Walkable Communities notes that, while public parks provide opportunities for people to walk, distance to destinations can be a barrier to walking (USDHHS, 2015).

The current understanding of residential proximity to parks is limited in scope. Most existing research relies on area-specific spatial databases constructed for designated study

areas to derive localized estimates of park proximity (e.g., Abercrombie et al., 2008). Studies vary in their geographic levels of analysis, definition of parks, and measurement of park proximity, factors which limit comparisons between studies and prohibit the assessment of potential regional variations in park proximity. This points to the need for the development of common definitions, measures, and methods to support the creation of generalizable data about park distribution and access. A standardized, objective measure of population proximity to parks that can be applied across the U.S. would enable the calculation of a national estimate and, subsequently, contribute to a broader understanding of park distribution in the U.S. Such a uniform measure would also facilitate the comparison of park proximity between similar geographic entities, such as counties and states. Additionally, differences in population park proximity by sociodemographic characteristics (e.g., race/ethnicity) or by geographic characteristics (e.g., degree of urbanization) could be evaluated on a national scale to identify underserved segments of the U.S. population that might warrant additional focus in park planning efforts. Urbanicity might be a particularly important correlate of park proximity, as rural residents may be less physically active and have access to fewer places for physical activity compared to their urban counterparts (Frost et al., 2010; Harris, Paul, Young, Zhang, & Fulton, 2015; Parks, Housemann, & Brownson, 2003). A national-level analysis of the relation between urbanicity and park proximity would broaden the existing literature base.

Planners and parks and recreation professionals who use GIS techniques might benefit from a readily available, online data source enumerating park proximity in their area that could supplement parks data collected at the local level. This information could assist parks and recreation departments and urban planners in their ongoing efforts to identify areas that would benefit from new parks. To address the need for a publicly available, standardized measure of park proximity across the U.S., the Centers for Disease Control and Prevention (CDC) developed the National Environmental Public Health Tracking Network (NEPHTN) Access to Parks Indicator (API). The NEPHTN is a national data system that tracks health outcomes, environmental exposures, and environmental hazards from a number of sources at the national, state, and city levels. The NEPHTN includes data on several objective indicators related to community design, including the API, which are readily available for use by public health practitioners (CDC, 2012). The API represents one dimension of park access, residential proximity to parks, measured as the number and percentage of residents in a county living within a half-mile radial buffer around a park boundary. The half mile distance was selected based on studies that have shown that most individuals are willing to regularly walk up to a half-mile to get to destinations like transit stops or recreational facilities (Weinstein Agrawal, Schlossberg, & Irvin, 2008; Guerra, Cervero, & Tischler, 2012). County-level estimates of park proximity from the NEPHTN can be aggregated to obtain state and national estimates. Park proximity should not be confused with travel route distance, which is the actual distance traveled to reach a park entrance (Nicholls, 2001; Thornton, Pearce, & Kavanagh, 2011). For example, an individual who lives within 200 feet of a park boundary might have to travel a longer distance to access the park due to the location of park entrances and surrounding street patterns, as depicted in Figure 1. Route distance to park entrances can be a barrier to walking and park use. Thus, while proximity is necessary, it is not the only factor required for parks to be accessible to nearby residents.

The objective of this study was to demonstrate the utility of the NEPHTN Access to Parks Indicator by 1) describing park proximity in the U.S. at the national, state, and county levels; 2) assessing whether park proximity in the U.S. varies by race/ethnicity; and 3) examining differences in park proximity by level of urbanization.

Methods

This study is a descriptive analysis of park proximity in the U.S. using publicly available data from NEPHTN (2010) and the United States Department of Agriculture Economic Research Service's 2013 Rural Urban Continuum Codes (RUCC).

The NEPHTN's API was calculated by overlaying a database of city, county, state, and national parks and beaches from a commercial data set provided by NAVTEQ, Inc. (Navteq 2010), Quarter 3, "LANDUSEA"), a provider of Geographic Information Systems data, with census block boundaries and population estimates from the 2010 U.S. Census (U.S. Census Bureau, 2010). These data were used to determine the number of people in each census block living within a half-mile buffer of a park boundary. Individual park buffers were merged to create a polygon encompassing all areas within a half-mile of a park. If only a portion of a census block was within the half-mile buffer of a park, proportional weighting was used to estimate the population living within the merged buffer, assuming an equal population distribution within the census block. The result was then divided by the total population in each county to arrive at the API percentage. Proximity to a park was not restricted by county boundaries. Individuals residing in one county but living within a half-mile of a park located in another county contributed to their county of residence's estimate of park proximity. A similar process was used for obtaining state- and national- level estimates. The 2010 API data were downloaded from the NEPHTN website at http://ephtracking.cdc.gov (CDC, 2012). Currently, only data from 2010 are available. The online tool allows the user to perform a data query by specifying the desired geographical unit of analysis (county, state, or national). Data can also be reported for specific age categories, racial groups (white, black, other, or multi-race) and/or ethnic groups (Hispanic or non-Hispanic). The system generates a downloadable dataset with estimates of park proximity for the requested geographical areas and population subgroups.

For this study, we reported the percentage of the population living within a half-mile of a park for each county and state and for the entire U.S. In addition, estimates were stratified by race/ethnicity (Hispanic, non-Hispanic white, non-Hispanic black, non- Hispanic multi-race, and non-Hispanic other race), using category-specific denominators from the 2010 Census. Because census data consists of complete population counts, there is no sampling error associated with the denominators used in this analysis. We did not calculate standard errors for the estimated number of people living within a half-mile buffer of a park due to the complex GIS-based methods used to determine these values. Therefore, this descriptive report did not include tests for statistically significant differences in park proximity between racial/ethnic groups or rural/urban categories.

Each county was assigned a rural/urban status code using the 2013 Rural Urban Continuum Codes (RUCC). The RUCC consists of nine codes assigned to each county based on

metropolitan status, population size in metro counties and degree of urbanization in non-metro counties (USDA, 2013). The three primary categories are metropolitan (metro), non-metro but adjacent to a metro county (non-metro adjacent), and non-metro and not adjacent to a metro county (non-metro non-adjacent). Non-metro adjacent counties are defined as those that share a boundary with a metro county and have at least 2% of their workforce commuting to the metro county. Metropolitan counties are further subdivided by population size, and non-metropolitan counties are further subdivided by degree of urbanization to arrive at nine categories along the rural urban continuum.

Results

In 2010, an estimated 39.2% of the overall U.S. population (or 121.0 million persons) lived within a half-mile of a park (Table 1). Park proximity is shown by state in Figure 2 and by county in Figure 3. State-level estimates of park proximity ranged from a low of 9% in West Virginia to a high of 67% in Hawaii and 88% in the District of Columbia (DC). Within states, counties had varying levels of park proximity (Figure 3). County-level estimates of park proximity ranged from a low of 0% in 352 counties (11% of all U.S. counties) to 100% in 3 counties (Essex and Hamilton Counties in New York and Kalawao County in Hawaii).

Nationally, park proximity was most common among individuals belonging to the non-Hispanic other race category (52.0%), followed by Hispanic (49.4%), non-Hispanic multi-race (45.3%), and non-Hispanic black (44.5%) categories (Table 1). Park proximity was the least common (34.2%) among the non-Hispanic white category.

In metro counties, 43.3% of the population lived within a half-mile of a park, compared to 15.0% in non-metro adjacent counties and 18.5% in non-metro, non-adjacent counties (Table 1). Within metro counties, park proximity was lower with smaller population size: 48.7% in large metro counties, 36.2% in medium metro counties, and 27.3% in small metro counties. Similarly, park proximity was lower with less urbanization in non-metro areas. In non-metro, adjacent counties, the percentage of the population living within a half-mile of a park was 18.1% in the most urbanized counties, 13.3% in moderately urbanized counties, and 7.8% in the least urbanized or rural counties. In non-metro, non-adjacent counties, park proximity was 24.4% in the most urbanized counties, 17.0% in moderately urbanized counties, and 11.7% in the least urbanized or rural counties. Within metro counties, park proximity was least common among the non-Hispanic white population; however, this was not true for most non-metro urbanization categories (Figure 4).

Discussion

These data provide a national picture of proximity to parks in the U.S. and highlight differences in park proximity by geographic level, race/ethnicity, and degree of urbanization. Overall, less than half (39%) of the total U.S. population lives within a half-mile of a park. Proximity is necessary but not sufficient for park access, and many other factors ranging from walk route distance to neighborhood safety to the quality of park amenities might act as additional barriers to park access (Blanck et al., 2012). Therefore, the proportion of the U.S. population with adequate overall park access is likely lower than this value.

We found that the percentage of residents living within close proximity to a park varied widely by state and county. High park proximity in Hawaii (67%) and District of Columbia (88%) likely results from a combination of small land areas, high population densities, and a large number of park sites, including beaches. Estimates at the county-level ranged from 0% to 100% of population living within a half mile of a park boundary. Of the 352 counties found to have 0% of their population living near a park, it is likely that some do have parks with people living near them; however, the inventory used to calculate the API may not have obtained data about parks in those counties.

We also found that park proximity in the U.S. differed among racial/ethnic groups, with non-Hispanic whites having the lowest park proximity compared to other racial/ ethnic groups within metropolitan counties. Prior findings on differences in park access by race or ethnicity have been inconsistent. Gordon-Larsen and colleagues (2006) found that census block groups characterized by a high percentage of minority residents in the U.S. were less likely to have any facilities for physical activity, including parks, compared to low-minority block groups, but they did not examine the presence of parks separately. Abercrombie and colleagues (2008) evaluated the distribution of recreation facilities and public parks in Maryland and concluded that mixed-race census block groups had the highest mean number of parks and the largest parks compared to mostly white and mostly minority block groups. Another study found that New York City census tracts with a higher proportion of black and Hispanic residents had significantly more parks compared to other areas (Weiss et al., 2011); however, the racial and ethnic differences in park access were reduced when they accounted for neighborhood-level “disamenities,” such as crime levels and pedestrian injuries, that are likely to be barriers to park usage. Similarly, Boone and colleagues (2009) found that a greater proportion of black residents lived within walking distance of parks compared to whites, but they had access to less park acreage, resulting in park congestion in predominantly black areas. Thus, factors beyond proximity that restrict park access, such as unsafe conditions within parks or along travel routes to parks, small park size, and poor maintenance of park facilities, may be more common in racially diverse communities, diminishing or negating the apparent proximity advantage among minority groups and reducing their overall access to parks (Blanck et al., 2012). Ensuring that park planning decisions at the local level are context-specific and consider all factors contributing to park access could help reduce observed racial and ethnic disparities so that the health benefits of parks are attainable for most people.

The data also demonstrate disparities in residential proximity to parks by degree of urbanization. The percentage of residents living within close proximity to a park in metropolitan counties was approximately 2.5 times that in non-metropolitan counties. Moreover, the most populous metro counties had almost twice the percentage of residents living within a half-mile of a park than the least populous metro counties, and the same was true for the most urbanized non-metro counties compared to the least urbanized/rural non-metro counties. These national-level findings align with the results of existing studies that suggest parks are more accessible to urban residents than rural residents (Harris, Paul, Young, Zhang, & Fulton, 2015; Parks et al., 2003). They also expand on previous knowledge by demonstrating that park proximity decreases gradually along a continuum of urbanicity from urban to rural. Individuals living in rural areas are more likely to be obese than urban

residents (Befort, Nazir, & Perri, 2012; Johnson & Johnson, 2015) and may also be less likely to meet physical activity recommendations (Davis et al., 2008; Martin et al., 2005; Parks et al., 2003). Thus, improving access to parks in rural areas as resources for physical activity could be an important area of focus for planning organizations.

The findings in this report are subject to several limitations. First, the commercially available parks database used to create the API might not include all public parks in the U.S., which would result in an underestimation of park proximity as operationalized in this study. Second, the API estimates the percentage of people living within a half-mile radial buffer, which is constructed using a Euclidean, straight-line distance from park boundaries. This measure of park proximity does not represent the actual travel distance to a park as accurately as network analysis, which calculates residential distance by following actual travel routes to the park and considers the street network and location of park entrances (Merriam & Giarrusso, 2009; Nicholls, 2001; Thornton, Pearce, & Kavanagh, 2011). Figure 1 illustrates a comparison of a half-mile radial buffer and a half-mile network buffer. In this scenario, a greater number of surrounding residences are included in the half-mile radial buffer than in the half-mile network buffer. The figure also depicts an example of a home that is located within the half-mile radial buffer, but whose residents have to travel much longer than a half-mile to access the park due to the surrounding street patterns and the location of the park entrance. Consequently, the measure of park proximity used in this analysis likely overestimates the number and percentage of people who can conveniently walk to access a nearby park. Finally, the API measure treats all parks as homogenous entities and does not account for characteristics of some parks that might hinder their ability to provide health benefits to surrounding residents (Cutts, Darby, Boone, & Brewis, 2009).

This report also has a number of strengths. To the authors' knowledge, this is the first published summary of the NEPHTN API. The use of this standardized measure allowed the authors to compare park proximity between states and counties at a national level, thereby demonstrating the utility of this freely-available public health and planning tool. In addition, the API is an objective indicator based on actual locations of parks. Thus, unlike measures that rely on personal recall, it is not subject to potential biases due to individual perceptions or knowledge of park location (Macintyre, Macdonald, & Ellaway, 2008).

Conclusions

Parks have been linked to multiple public health domains including environmental, mental, social, and physical well-being. While not the only benefit of park proximity, regular walks to nearby parks could help people achieve the recommended amount of physical activity. Encouraging people to walk to parks can be a response to the 2015 Surgeon General's Call to Action to Promote Walking and Walkable Communities (USDHHS, 2015). Because the distance people are willing to walk is constrained by time and physical ability, park proximity is particularly important for walking access. People who walk to parks engage in physical activity as an inherent part of their trip. Therefore, parks are not only a potential venue for physical activity, they can also serve as a motivating destination for taking regular walks. In addition, creating parks that are easily accessible by walking affords basic access

to those who do not drive, such as children. The NEPHTN API is a valuable resource for measuring the presence of nearby parks.

The NEPHTN API can be used in a number of ways by policy makers, planning departments, and researchers. First, the API can serve as a benchmarking tool for counties or states to see how they compare to other similar geographical areas in terms of residential park proximity. Second, park proximity data from the NEPHTN can be linked with other national data sources to assess the equitable distribution of park proximity between subgroups of the population (e.g., racial/ethnic groups, urban vs. rural) and the association with health outcomes. This information can supplement data generated by planning organizations at the local level to inform decisions related to park site selection and support comprehensive community planning strategies to make healthy destinations, such as parks, accessible by all residents. Finally, the NEPHTN is expected to be updated periodically, enabling stakeholders to monitor temporal trends in park proximity or examine the impact of policies or projects on changes in park proximity and distribution. Importantly, all NEPHTN data are readily available to the public and can be easily downloaded from the website via a user-friendly interface. An understanding of park proximity provides planners with an additional resource for identifying potential gaps in their park systems and researchers with a common foundation for analysis.

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Figure 1.
Illustration of half-mile radial buffer, half-mile network buffer, and travel route distance from a home to a park entrance

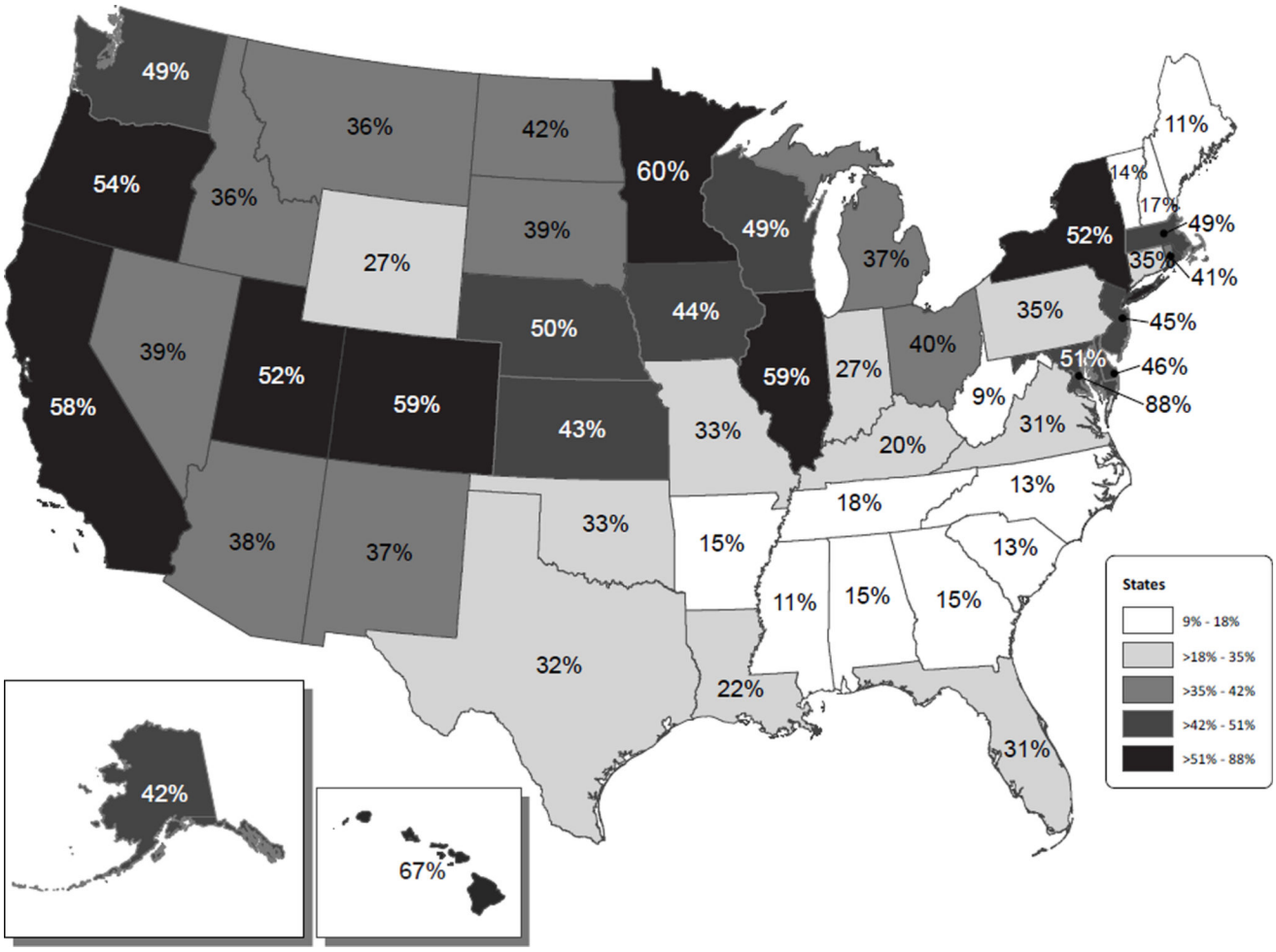

Figure 2.

Percentage of the population living within a half-mile of a park, by state; United States; 2010

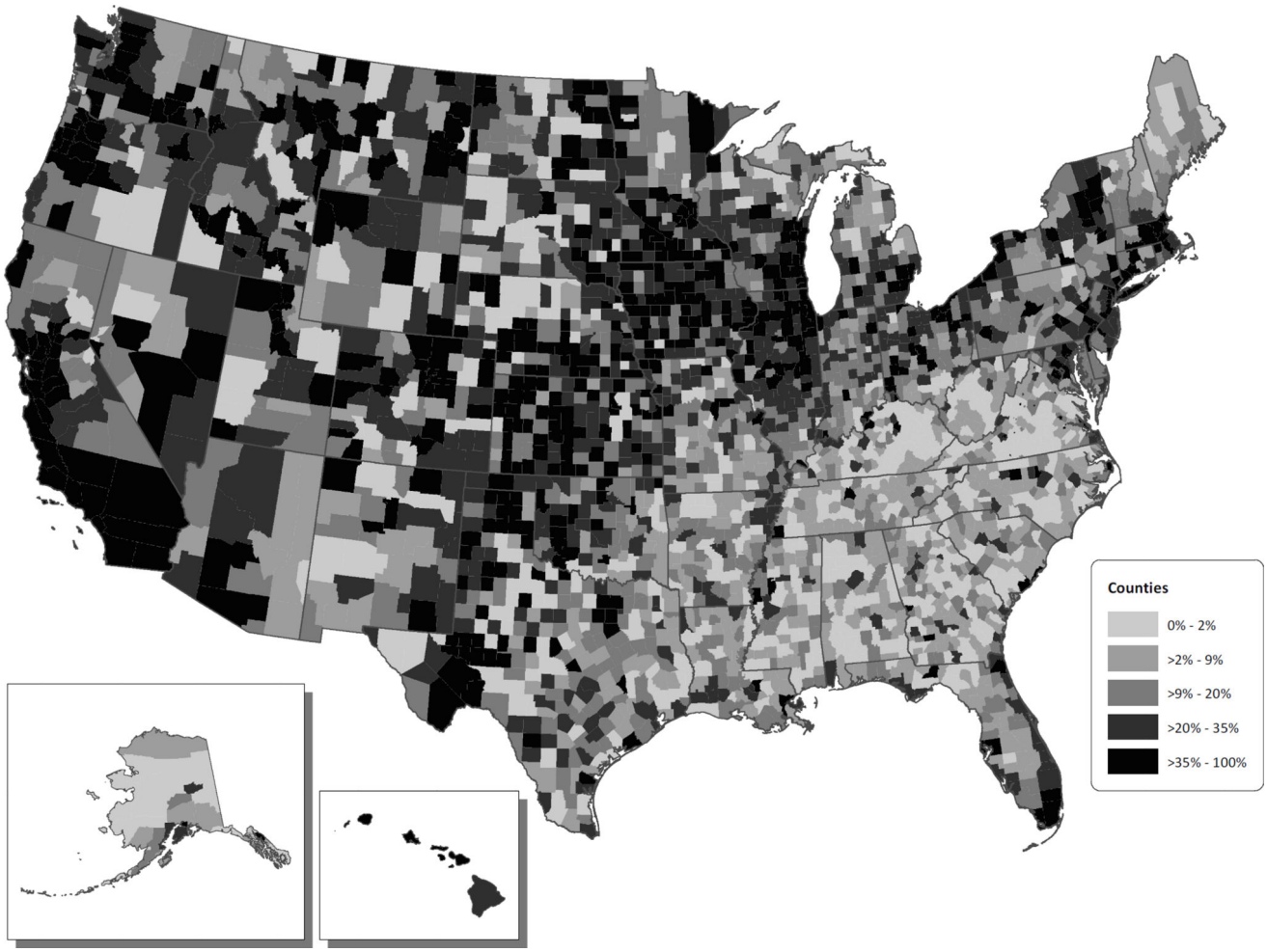

Figure 3.
Percentage of the population living within a half-mile of a park, by county; United States; 2010

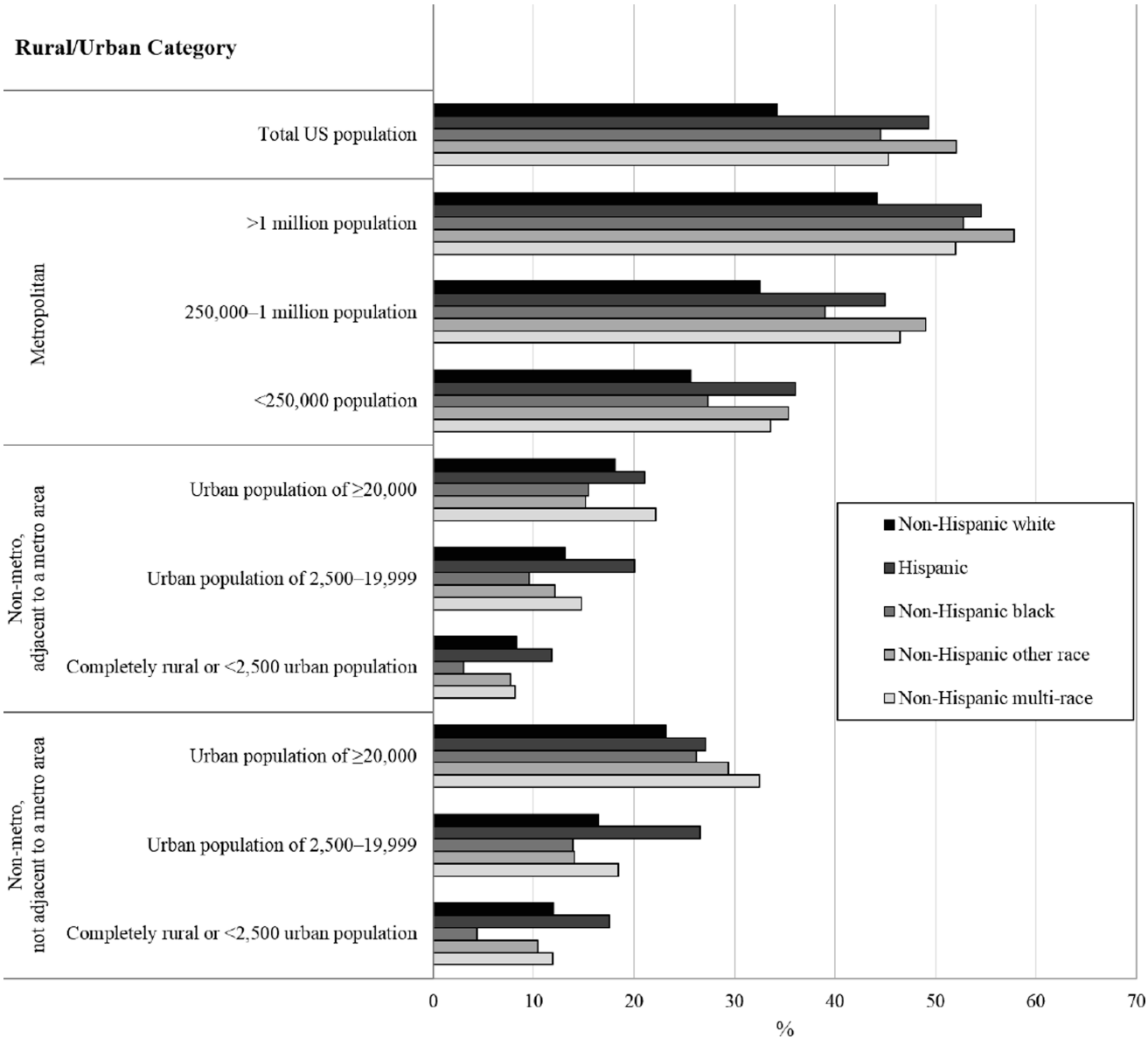

Figure 4.

Percentage of the population living within a half-mile of a park, by race/ethnicity within rural/urban categories, United States, 2010

Table 1

Number and Percentage of U.S. Population Living within a Half-Mile of a Park, by Race/Ethnicity and by Rural/Urban Status; United States; 2010

	Total population	Population within ½ mile of a park	
Description	**n**	**n**	**(% of total)**
All U.S.	308,745,538	121,040,232	(39.2)
Race/ethnicity			
Non-Hispanic white	196,817,552	67,402,895	(34.2)
Hispanic	50,477,594	24,910,986	(49.4)
Non-Hispanic black	37,685,848	16,763,242	(44.5)
Non-Hispanic other	17,798,063	9,260,163	(52.0)
Non-Hispanic multi-race	5,966,481	2,702,894	(45.3)
Rural/urban status			
Metro	262,452,132	113,542,501	(43.3)
>1 million population	168,523,961	82,089,439	(48.7)
250,000 to 1 million population	65,609,956	23,735,499	(36.2)
<250,000 population	28,318,215	7,717,563	(27.3)
Non-metro, adjacent to a metro area	30,480,746	4,581,088	(15.0)
Urban population of ≥20,000	13,538,322	2,450,403	(18.1)
Urban population of 2,500–19,999	14,784,976	1,962,354	(13.3)
Completely rural or <2,500 urban population	2,157,448	168,331	(7.8)
Non-metro, not adjacent to a metro area	15,784,767	2,915,463	(18.5)
Urban population of ≥20,000	4,953,810	1,210,694	(24.4)
Urban population of 2,500–19,999	8,245,352	1,401,079	(17.0)
Completely rural or <2,500 urban population	2,585,605	303,690	(11.7)