Graphic Detail

Geographic Information Systems (GIS) organize and clarify the patterns of human activities on the Earth's surface and their interaction with each other. GIS data, in the form of maps, can quickly and powerfully convey relationships to policymakers and the public. This department of Cityscape *includes maps that convey important housing or community development policy issues or solutions. If you have made such a map and are willing to share it in a future issue of* Cityscape*, please contact alexander.m.din@hud.gov.*

Visualizing Exposure of Children to Violent Crime in Washington, D.C.

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Introduction

Families with children consider crime, especially violent crime, an important factor in choosing where to live (Mast, 2009; Sanbonmatsu et al., 2011; Wilson and Mast, 2013). Several studies have found that violent crime exposure can have negative consequences across multiple dimensions, such as chronic physical conditions, developmental disorders, and mental health (American Public Health Association, 2018; Baryani et al., 2021; Jackson, Posick, and Vaughn, 2019; Lorenc et al., 2012). Other conditions include reduced child activity (Kneeshaw-Price et al., 2015), increased stress levels (Mayne et al., 2018), decreased academic achievement (Miliam, Furr-Holden, and Leaf, 2010), and increased probability of physical and mental health problems in adulthood (Mayne et al., 2018).

These studies show that families consider crime an important factor in neighborhood quality. Wilson and Mast (2013) found that perceived neighborhood safety was a strong motivator for households to use HUD (U.S. Department of Housing and Urban Development) vouchers to

change neighborhoods. Sanbonmatsu et al. (2011) reported that young females with Moving to Opportunity vouchers experienced increased feelings of safety and reduced exposure to unwanted sexual attention after their move. With broader research on crime, youth, and neighborhoods, this article provides a data visualization of the relationship between violent crime and where households with children live, using Washington, D.C., as a case study.

The Data

This article uses two measures to explore the spatial relationship between violent crime rates and where children reside in Washington, D.C. (D.C.). First, the authors analyze D.C. violent crime rates per 10,000 population and the percentage of the population aged birth to 17 at the Health Planning Neighborhood (HPN) level.[1] Open Data DC (n.d.) reports that 51 HPNs are used "by DC Health, partners, and researchers to facilitate analysis and statistical modeling on a variety of health, economic, social, and other topics." Because HPNs consist of aggregations of census tracts, the authors can compute violent crime rates and percentages of the population aged birth to 17 at the HPN level using tract-level data. Second, for the same age group, they used 2017–2021 American Community Survey data aggregated to the HPN level.

According to Open Data DC (n.d.), 2,072 violent crimes (for example, assault, homicide, robbery, and sexual abuse) were reported in D.C. in 2021. Exhibit 1 reports summary statistics for violent crime rates and percentages of the population aged birth to 17. Across 51 HPNs, the mean crime rate was 35.7 occurrences per 10,000 in the population, ranging from a minimum of 1 to a maximum of 227. The mean percentage of the population aged 17 or younger was 18.6 percent, ranging from a minimum of 9.2 percent to 38.7 percent.

Exhibit 1

Summary Statistics

Variable	N	Mean	StdDev	Min	Median	Max
Violent crime rate	51	35.677	37.359	1	21.832	227.273
Percentage of population aged 0–17	51	18.627	9.174	0	19.617	38.697

Max = maximum. Min = minimum. N = number of Health Planning Neighborhoods. StdDev = standard deviation.

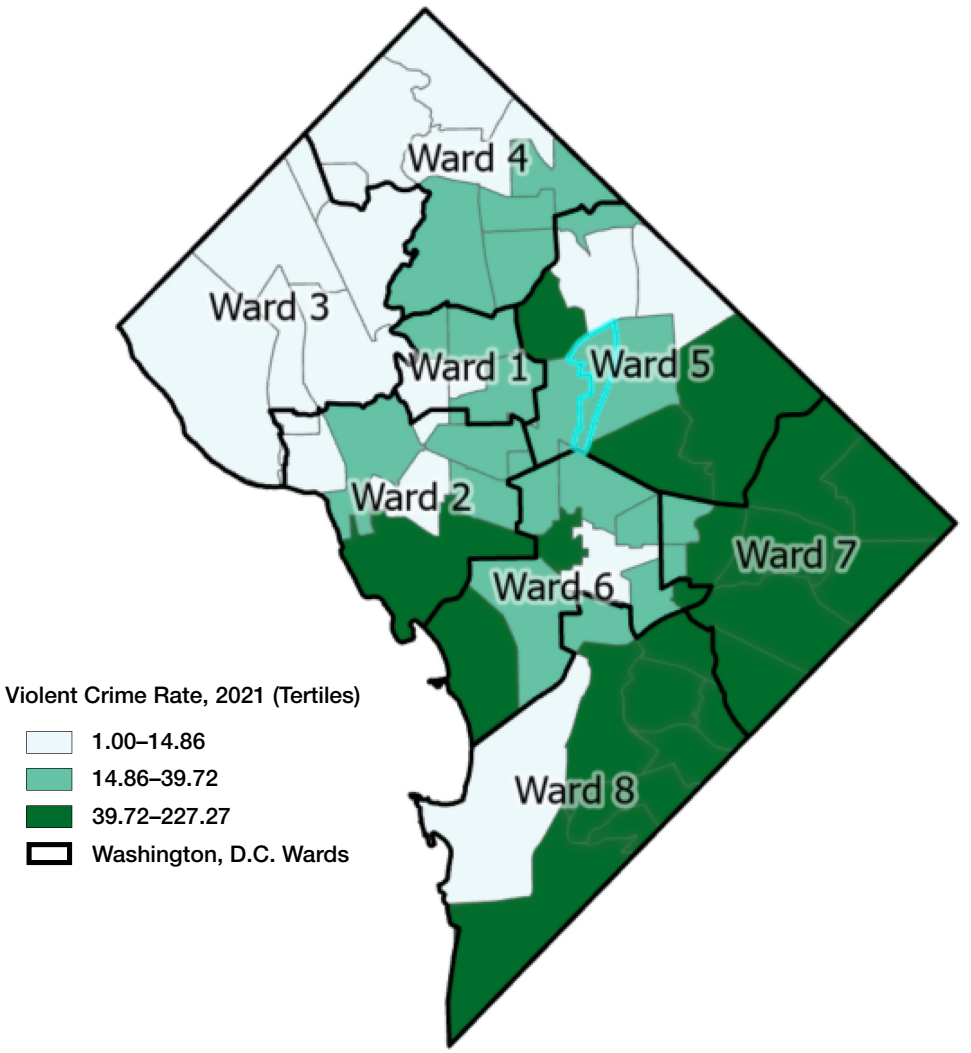
Data Visualizations

Exhibits 2–4 illustrate the same data in choropleth, or thematic, maps. Exhibit 2 provides a map of the violent crime rate at the HPN level. The class breaks on the map are based on the data and divided into tertiles; the class break in the lightest shade represents HPNs with a violent crime rate ranging from 1.00 to 14.86 and denoting the lowest third percentile within the data. Conversely, the darkest-shaded class break indicates HPNs with a violent crime rate in the highest third percentile, ranging between 39.72 and 227.27. This map shows that violent crime occurs at a high rate in the district's south-central, eastern, and southeastern sections. The moderate violent crime rates are represented by the middle tertile, ranging from 14.86 to 227.27 occurrences per 10,000 in the population.

[1] In similar work, Din (2022) specifically analyzed D.C. homicide data at the census tract level.

Exhibit 2

Map of Violent Crime Rate in Washington, D.C.

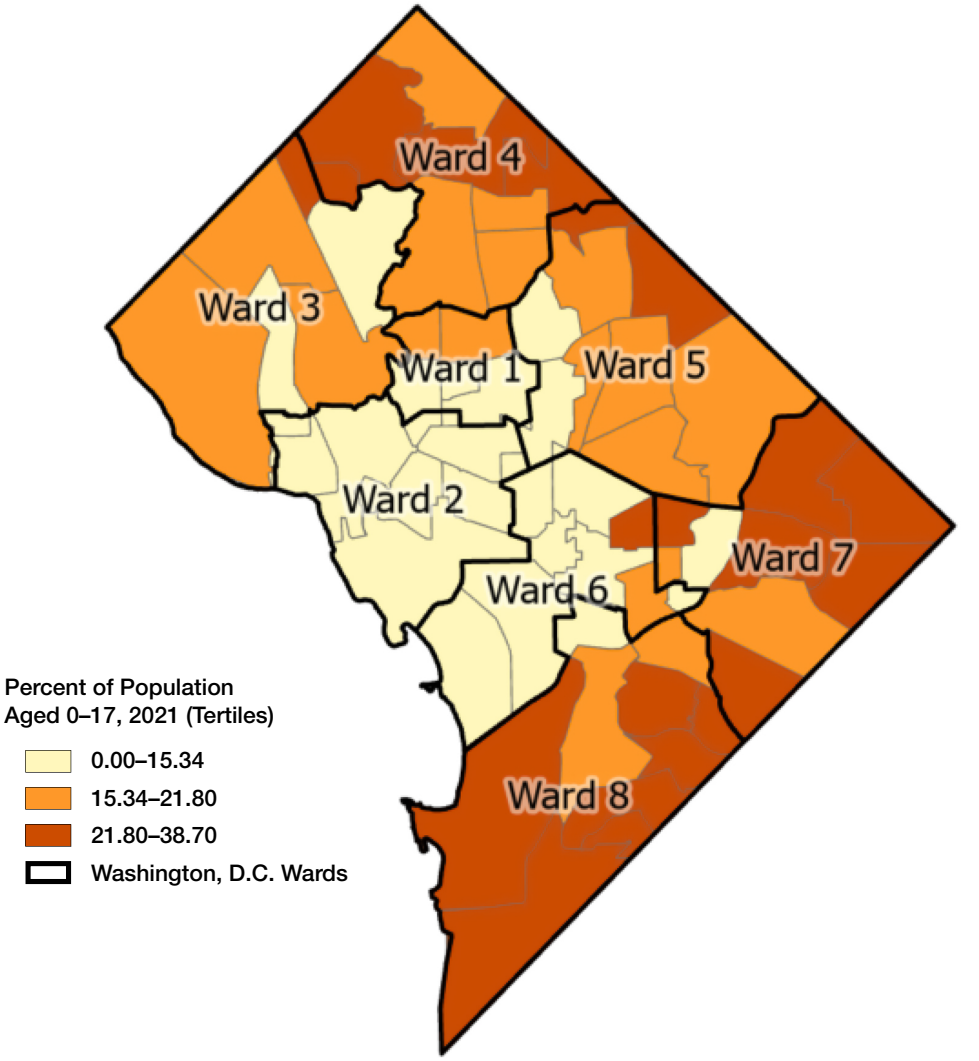


Sources: Authors' tabulations of Open Data DC for 2021 and American Community Survey 5-year data, 2017–2021; ward boundaries from Open Data DC

Exhibit 3 is a map of the percentage of the population of children younger than age 18. As in exhibit 2, the class breaks are coded into tertiles, in which the lightest-shaded areas show neighborhoods with fewer children as a percentage of the population, with the bottom third percentile ranging from 0.00 to 15.34 percent. The darkest-shaded areas indicate the HPNs where more children reside, which is the top third percentile, ranging from 21.80 to 38.70 percent of the population. This map shows that the largest concentrations of children reside in the north, east, and southeast parts of D.C., similar to the patterns seen in the previous map.

Exhibit 3

Map of Percentage of Population Aged 0–17 in Washington, D.C.

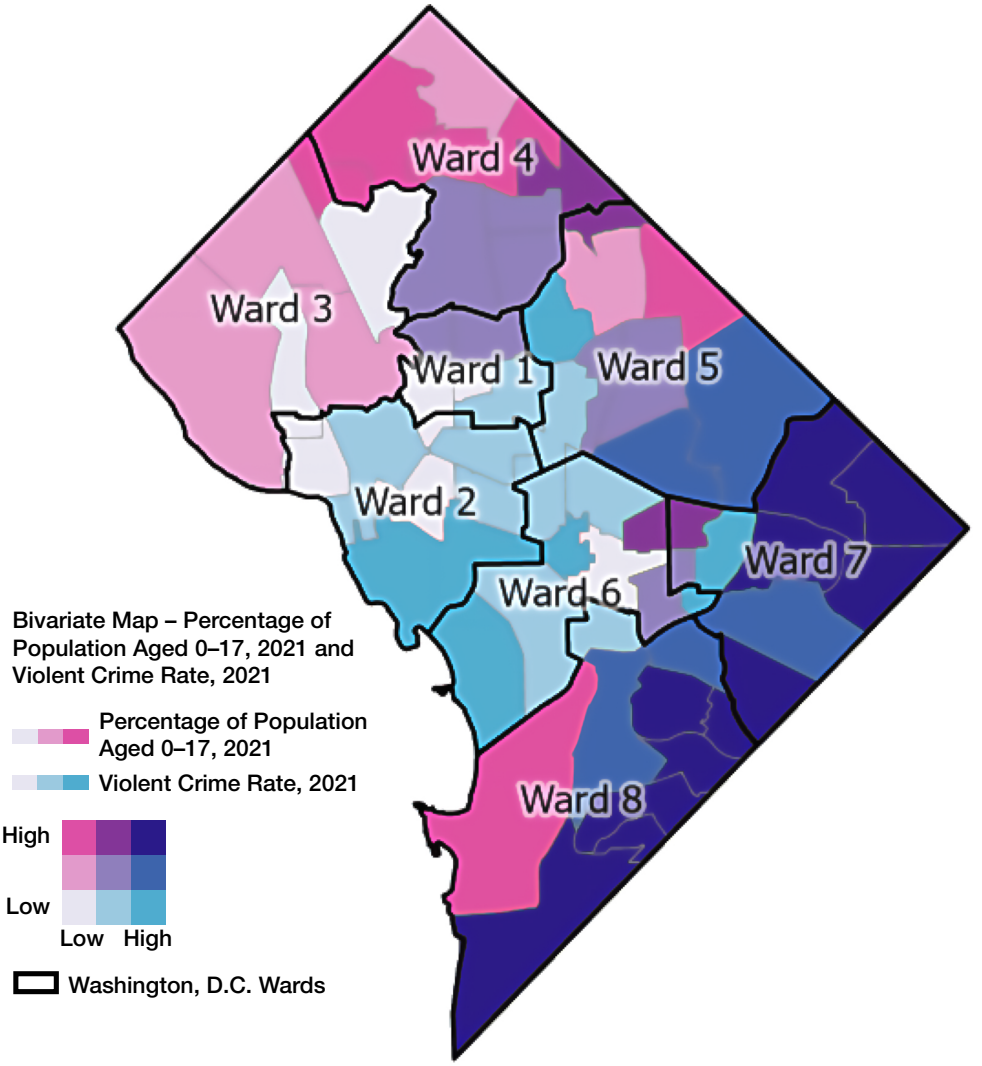


Sources: Authors' tabulations of Open Data DC for 2021 and American Community Survey 5-year data, 2017–2021; ward boundaries from Open Data DC

Exhibit 4 is a map of the two layers in exhibits 2 and 3 combined as a bivariate map. This type of thematic map shows areas where both measures are low, moderate, or high in combination with the other. Both variables have class breaks based on tertiles, such that the lightest shade denotes the lowest third and the darkest shade denotes the highest third values. In combining the two sets of tertiles, nine distinct typologies are indicated. Exhibit 5 provides a table with the number of HPNs in each category displayed in exhibit 4.

Exhibit 4

Bivariate Map of Violent Crime Rate and Percentage of Population Aged 0–17 in Washington, D.C.



Sources: Authors' tabulations of Open Data DC and American Community Survey 5-year data, 2017–2021; ward boundaries from Open Data DC

Exhibit 5

Table of HPNs by Violent Crime Rate and Percentage of Population Aged 0–17 in Washington, D.C.

HPNs by Violent Crime Rate and Percentage of Population Aged 0–17 in Washington, D.C.	Number of HPNs
Low Violent Crime Rate and Low Percentage of Population Aged 0–17	7
Low Violent Crime Rate and Moderate Percentage of Population Aged 0–17	5
Low Violent Crime Rate and High Percentage of Population Aged 0–17	5
Moderate Crime Rate and Low Percentage of Population Aged 0–17	7
Moderate Crime Rate and Moderate Percentage of Population Aged 0–17	8
Moderate Crime Rate and High Percentage of Population Aged 0–17	2
High Crime Rate and Low Percentage of Population Aged 0–17	3
High Crime Rate and Moderate Percentage of Population Aged 0–17	4
High Crime Rate and High Percentage of Population Aged 0–17	10
Grand Total	51

Sources: Authors' tabulations of Open Data DC and American Community Survey 5-year data, 2017–2021; ward boundaries from Open Data DC

In exhibits 2 and 3, the east and southeast have high values of both violent crime rates and the percentage of the population who were children. These values were reconfirmed in exhibit 4, where the darkest-shaded areas depict both variables at their highest levels. However, some places had high concentrations of children but low levels of violent crime, particularly in the north, as represented by the darker versions of the lightest shades. These data confirm what the *2020–21 State of D.C. Schools* (D.C. Policy Center, 2022) reports as two trends for Wards 7 and 8, areas along the southeast border of D.C. According to the annual overview, Wards 7 and 8 (1) had many of the school district's students (42 percent) and (2) had the most homicides that occurred in the 2020–21 academic year (64 percent).

Conclusion

Visualizing this disparate trend across the city can help advocacy groups, planners, and policymakers in housing, education, and law enforcement consider how data might help explore solutions and increase resources for families. This method of measuring and mapping crime rates and demographic composition at the neighborhood level can be useful for research and policy evaluation related to crime, youth, and neighborhood choice. Future work can also include analysis of other neighborhood quality measures, such as access to schools, childcare, jobs, transportation, and other indicators related to how families decide what neighborhoods would provide the most choices for safer housing and reduced exposure to violent crime, particularly for children.

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