National Neighborhood Data Archive (NaNDA): Broadband Internet Availability and Speed by ZIP Code Tabulation Area, United States, 2014-2020

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nanda_broadband_zcta_2014-2020_01P.dta
nanda_broadband_zcta_2014-2020_01P.csv
nanda_brdband1420Z_01P.sas7bdat

Overview and Data Dictionary

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Dataset Overview

Description

This dataset contains measures of broadband internet availability and speed per United States ZIP code tabulation area (ZCTA) in 2014 through 2020. The data is derived primarily from internet service providers' Form 477 reports to the Federal Communications Commission. Key variables include the average upload and download speed of fixed broadband connections and the number of high-speed internet service providers per ZCTA.

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Data Sources

Data on broadband connection speed is taken from the FCC's Broadband Deployment Data reports from December 2014-June 2020 (FCC 2014-2020a). See the FCC's Explanation of Broadband Deployment Data (FCC, 2020b) for a description of the source data fields, how the data are collected, and how the FCC has modified them.

We used the 2010 decennial census geographic header files (U.S. Census Bureau, 2010) to map blocks to ZCTAs.

Coverage

The dataset contains one observation per ZIP code tabulation area in the fifty United States, the District of Columbia, and the US island territories (e.g. Puerto Rico, U. S. Virgin Islands) and possessions (e.g. Mariana Islands).

Methodology

Prior research has demonstrated gaps in broadband availability and adoption between rural and urban areas (Prieger, 2013) and across age, education level, and socioeconomic status (Silva et al., 2018). Researchers have documented the effect of broadband access on community health (Whitacre & Brooks, 2013) and health information seeking behavior (Rains, 2008). Our data builds on this work by bringing together measures of broadband accessibility and speed across the United States for the period 2014-2020. (Similar measures for 2008-2012 are available at the census tract level only in Gomez-Lopez et al. [2017].)

Average per-ZCTA download and upload speeds (avg_download_speed, avg_upload_speed) are derived from the FCC broadband deployment data. We summarized the maximum committed information rates (Max CIR Downstream Speed and Max CIR Upstream Speed) of all providers in all block groups in the ZCTA, then divided by the total number of unique provider IDs in all block groups in the ZCTA, counting each provider once per block group. In other words, if one provider offers service in ten block groups within a ZCTA, the denominator is ten, not one. We dropped providers with a max CIR upload and/or download speed of zero, which the FCC uses to denote providers who offer broadband on a "best effort" basis instead of specifying a bandwidth.

We then calculated the total number of providers offering fixed high-speed connections in the ZCTA, as well as the number offering residential fixed high-speed connections. “High speed” is defined as having an average download and/or upload speed exceeding 200 kilobits per second (kbps). “Residential” providers are those with consumer=1 in the FCC broadband deployment data. We counted each provider once per ZCTA. If one provider offers service in ten block groups within a ZCTA, they are counted once, not ten times.

ZCTAs that were not served by any broadband providers in any year from 2014-2020 are missing from the data.

Usage Notes

Broadband Usage Data Excluded from This Dataset

Unlike previous versions of this dataset, we did not include data on households with broadband from the American Community Survey. Instead, this dataset is supplemented by National Neighborhood Data Archive (NaNDA): Internet Access by ZIP Code Tabulation Area, United States, 2015-2019, which contains data from the American Community Survey (ACS) about household internet access and computing devices by ZCTA.

There are two key differences between the two datasets. First, the FCC-derived data is longitudinal with different values for 2014-2020, whereas the ACS-derived data contains one measure for the entire period of 2015-2019. Second, the FCC data measures availability of broadband (e.g., providers offering high-speed internet access), whereas the ACS-derived data measures internet usage and access within households (e.g., percentages of households with an internet subscription or a computer that can be used to access the internet).

Users interested in the overall broadband internet environment (availability, access, and use) at a point between 2014-2020 can combine ACS-derived variables with observations from the year of interest within the FCC-derived data.

Note that within the FCC-derived data, the variables measuring number of high-speed internet providers and connection speed include both DSL/cable and satellite providers. For users looking to compare provider numbers and/or speed with adoption across these two datasets, the two most comparable variables within the ACS-derived data are n/p_broadband_dsl_cable_sub (households with DSL/cable broadband) and n/p_broadband_satellite_sub (households with satellite broadband).

ZIP Codes and ZIP Code Tabulation Areas

Users should be aware that ZCTAs are not equivalent to ZIP codes. ZIP codes are linear mail delivery routes created by the US Postal Service. ZIP code tabulation areas are spatial features consisting of census blocks grouped by the predominant ZIP code found on the block (United States Census Bureau, 2020).

In some cases, a location's address is not the same as its ZCTA. For example, some ZIP codes represent single-point addresses such as large post offices or office buildings. Also, the ZIP code for an address may not match its ZCTA if the ZIP code is not the most common ZIP code on the block. See the Census Bureau's ZCTA overview at https://www.census.gov/programs-surveys/geography/guidance/geo-areas/zctas.html (United States Census Bureau, 2020) for more information on how ZCTA boundaries are calculated.

Users wanting to combine this dataset with ZIP code geocoded data must use a ZIP code to ZCTA crosswalk. Such a crosswalk is available on the UDS Mapper website at https://www.udsmapper.org/zcta-crosswalk.cfm (John Snow Inc., 2018). Sample code for merging the UDS Mapper crosswalk with NaNDA datasets is available on the NaNDA repository at https://www.openicpsr.org/openicpsr/project/120088/ (Chenoweth & Khan, 2020).

Variables

Variable	Type	Obs	Unique	Mean	Min	Max	Label
zcta19	string	231847	33121	.	.	.	ZIP code tabulation area (2019 TIGER/Line shapefiles)
year	int	231847	7	2017	2014	2020	Year
avg_download_speed	float	231847	187105	98.05824	0	2156.498	Average download speed across all providers (kbps)
avg_upload_speed	float	231847	190094	64.24169	0	2047.745	Average upload speed across all providers (kbps)
tot_hs_providers	int	231847	27	1.287936	0	148	Total providers of high-speed fixed connections (200kbps+)
res_hs_providers	int	231847	18	0.7407428	0	148	Total residential providers of high-speed fixed connections (200kbps+)

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