Affirmatively Furthering Fair Housing Data and Mapping Tool (AFFH-T) Data Documentation

---

[1] *Prepared by Cloud Nine Technologies and Brent Mast, HUD Office of Policy Development and Research*

Table of Contents

List of Tables

Document Revision History

Date	Change Description / Purpose
August 23rd, 2024	Original document provided with release of Data Version AFFHT0007

I.   Overview

The Affirmatively Furthering Fair Housing (AFFH) rule created a standardized process for fair housing planning that program participants use to help meet their longstanding requirement to affirmatively further fair housing. As part of this process, program participants analyze data and other information to assess fair housing issues in their jurisdictions and regions. Program participants use HUD-provided data, as well as local data and local knowledge, to conduct their assessment of fair housing.

This document outlines the data, methods, and sources behind the data and mapping tool that HUD provides. It describes demographic, socioeconomic, and housing characteristics, as well as access to opportunity areas through a series of Opportunity Indices.

This data package is not exhaustive and should not supplant local data or local knowledge that is more robust, timely, or accurate. It represents a baseline effort to assemble consistent, nationally available data from a variety of sources compiled into one location.

II.   Data Updates, Additions and Revisions

HUD-provided data are periodically updated. Versions of HUD-provided data are labeled with the letters 'AFFHT' followed by four digits (e.g. AFFHT0001). The labels progress in chronological order, meaning that the greater the number, the more recent the version of HUD-provided data. More information on earlier data versions is provided on HUD Exchange.

On August 23rd, 2024, AFFH-T provided maps and tables using data version AFFHT0007. The following additions, revisions and corrections are now included in the AFFHT0007 maps and tables.

- Maps and tables using AFFHT0007 are based on the FY2023 list of program participants.

- Maps and tables using AFFHT0007 are based on Census2020 Geo Codes.

- No 1990 Maps or 1990 attributes in the downloadable tables are populated with data. The current maps and current attributes in the downloadable tables are populated with latest data, including Census2020 and ACS1620.

Table 1. Data Sources by Data Version Number

AFFH-T data version Number	AFFHT0007	AFFHT0006	AFFHT0005	AFFHT0004	AFFHT0003	AFFHT0002	AFFHT0001
Boundaries for Jurisdictions	Program Participant list for FY2023	Program Participant list for FY2019	Program Participant list for FY2018	Program Participant list for FY2017	Program Participant list for FY2016	Program Participant list for FY2016	Program Participant list for FY2013
R/ECAPs	ACS 2016-20 with CBSA delineations released in March 2020	ACS 2011-15 with CBSA delineations released in July 2017	ACS 2011-15 with CBSA delineations released in July 2017	ACS 2009-13 with CBSA delineations released in July 2015	ACS 2009-13 with CBSA delineations released in July 2015	ACS 2009-13 with CBSA delineations released in July 2015	ACS 2009-13 with CBSA delineations released in February 2013
Brown Longitudinal Tract Database (LTDB)	Replaced by Decennial Census 2000, 2010 and 2020 Data	1990, 2000 and 2010	1990, 2000 and 2010	1990, 2000 and 2010	1990, 2000 and 2010	1990, 2000 and 2010	1990 and 2000
Inventory Management System (IMS)/PIH Information Center (PIC)	2023	2019	2018	2016	2016	2016	2013
Tenant Rental Assistance Certification System (TRACS)	2023	2019	2018	2016	2016	2016	2013
Comprehensive Housing Affordability Strategy (CHAS)	2016-20	2012-16	2011-15	2009-13	2009-13	2009-13	2008-12
Longitudinal Employer-Household Dynamics (LEHD)	2023	2017	2015*	2014	2014	2014	2013
Great Schools	2019, 2021-2022***	2016-17	2015-16**	2013-14	2013-14	2012	2012

Common Core of Data	2022***	2016-17	2015-16**	2013-14	2013-14	2012	2012
School attendance boundaries	Precisely School Attendance Zone Database 2023	Maponics School Attendance Zone Database 2018	Maponics School Attendance Zone Database 2016**	Maponics School Attendance Zone Database 2016	Maponics School Attendance Zone Database 2016	School Attendance Boundary Information System (SABINS) 2012	School Attendance Boundary Information System (SABINS) 2012
National Air Toxics Assessment (NATA)	Replaced by 2019 EPA data with 2020 GEO Codes	2014	2014	2011	2011	2011	2005
Location Affordability Index (LAI)	N/A	2012-2016	2008-2012	2008-2012	2008-2012	2008-2012	2008-2012

*Information of Massachusetts is temporarily missing from AFFHT0005, which will be fixed in later versions.

**Please note that there is no updated school proficiency data for participants of Alaska (02), Delaware (10), Kansas (20), Maine (23) in AFFHT0006 because no data was reported for them in the Great Schools 2016-2017 dataset. In the AFFH-T, the school proficiency index for these participants will continue to display the data from AFFHT0005 when AFFHT0006 is selected. Participants in all other states have new, updated data for school proficiency as noted in the AFFHT0006 details above. Please also refer to the section below on the School Proficiency Index for more information. Similarly, there is no updated school proficiency data for North Dakota in AFFHT0005, and for Kansas, West Virginia and Puerto Rico in AFFHT0004 and AFFHT0003. In the AFFH-T, the school proficiency index for these participants will continue to display the data from previous release.

***Please note that there is no updated school proficiency data for participants of Iowa (19), North Dakota (38), Vermont (50) and Puerto Rico (72) in AFFHT0007 because no data was reported for them in the Great Schools 2019, 2021-2022 dataset. In the AFFH-T, the school proficiency index for these participants will continue to display the data from AFFHT0006 when AFFHT0007 is selected. Participants in all other states have new, updated data for school proficiency as noted in the AFFHT0007 details above. Please also refer to the section below on the School Proficiency Index for more information.

III.   Data Sources

Table 2 lists data sources, years, and the spatial scale used to populate the tables and maps in the AFFH-T.

Table 2: Data Sources (AFFHT0007)

Data Category	Variables	Geographic level or Primary Sampling Unit	Tables	Maps	Sources and years
Demographics	Race/Ethnicity population in 2020	Block group	1, 4	1, 5-13	Decennial Census, 2020
Demographics	Race/Ethnicity population in 2020, 2010 & 2000	Tract	2	2	Decennial Census, 2020; Decennial Census, 2010; Decennial Census, 2000
Demographics	Limited English Proficiency (LEP) population; LEP languages; Foreign-born population; Foreign-born population place of birth (national origin)	Tract	1, 2, 4	3, 4, 6-13	American Community Survey (ACS), 2016-2020; Decennial Census, 2010; Decennial Census, 2000[a]
Demographics	Disability Type population; Disabled population by Age	Tract	1, 13, 14	14, 15	American Community Survey (ACS), 2016-2020[b]
Demographics	Population by Age, Sex, Family Type	Tract	1, 2, 4	7-13	Decennial Census, 2020; Decennial Census, 2010; Decennial Census, 2000
Socioeconomic	Racially/Ethnically-Concentrated Areas of Poverty (R/ECAP)	Tract	4, 7	1-17	American Community Survey (ACS), 2016-2020; Decennial Census, 2020; Decennial Census, 2010; Decennial Census, 2000
Housing	Population, housing units, occupied housing units, race/ethnicity, age, disability status, household type, and household size by Housing Type	Development; Tract	5-8, 11, 15	5	Inventory Management System (IMS)/ PIH Information Center (PIC), 2023; Tenant Rental Assistance Certification System (TRACS), 2023; Low Income Housing Tax Credit (LIHTC) database, 2022[c]
Housing	Households with Housing Problems; Households with Severe Housing Problems; Households with Income Less than 31% of Area Median Income (AMI); Households with Severe Housing Cost Burden; Households with Housing Problems by Race, Household Type, Household Size; Housing Tenure	Tract	9, 10, 16	6, 16, 17	Comprehensive Housing Affordability Strategy (CHAS), 2016-2020

Data Category	Variables	Geographic level or Primary Sampling Unit	Tables	Maps	Sources and years
Opportunity Indices	Dissimilarity Index	Community Development Block Grant (CDBG); HOME Investment Partnerships Program (HOME), Core Based Statistical Area (CBSA)	3	N/A	Decennial Census, 2020; Decennial Census, 2010; Decennial Census, 2000
Opportunity Indices	Low Poverty Index, Labor Market Engagement Index	Tract	12	9, 12	American Community Survey (ACS), 2016-2020
Opportunity Indices	School Proficiency Index	Block group	12	7	Great Schools (proficiency data), 2019, 2021-2022; Precisely School Attendance Zone database, 2023
Opportunity Indices	Low Transportation Cost Index; Transit Trips Index	Tract	12	10, 11	N/A
Opportunity Indices	Jobs Proximity Index	Block group	12	8	Longitudinal Employer-Household Dynamics (LEHD), 2023
Opportunity Indices	Environmental Health Index	Tract	12	13	EPA 2019 with 2020 GEO Codes

[a] For variables on limited English proficiency, foreign born, and foreign born by national origin, percentages using data from the American Community Survey (ACS), 2016-2020 are calculated using total population from the 2020 decennial census. Percentages using 2010 and 2000 decennial census data are also calculated using total population.

[b] For variables on disability, percentages are calculated based on the total population age 5 years and older.

[c] Because of incorrect or missing address information, which prevents 100 percent success rate in geocoding, some properties in IMS/PIC as well as TRACS may not be included in the calculation (which may impact housing data).

IV.   Levels of Geography and Weights

The AFFH-T includes data for all U.S. states, the District of Columbia, and Puerto Rico. Users may access data through the AFFH-T at various spatial scales, including geo-boundaries of Census tracts, the Community Development Block Grant (CDBG), the HOME Investment Partnerships Program (HOME)[2], the Core-based Statistical Area (CBSA), County, Public Housing Agency (PHA) Service Area, State entitlement and non-entitlement areas, and State. As shown in Table 2, most data in the AFFH-T are at the Census tract or block group levels. The selection of a spatial scale to use as the initial basis for each data element is primarily based on the lowest level in which HUD has faith in its accuracy. For example, data elements constructed from the American Community Survey (ACS) data are based on Census tract estimates rather than block group estimates due to concerns about sampling errors.

Data displayed in the AFFH-T map views are at the Census tract level for Local Governments and for PHAs, and at the county level for States. Data displayed in the report tables are aggregated from smaller geographic units (i.e. either the Census tract or block group level) to the CDBG[3] and CBSA, PHA Service Area, county, State entitlement and non-entitlement areas, and State levels. As shown in Table 1, the AFFH data are from multiple sources in various years. In order to compile them into one mapping tool database, data issued or released at different years need to be adjusted to the same year. The Census tract and block group boundaries in the AFFH-T are based on those released by Census in 2020. The CDBG and HOME jurisdiction, as well as State entitlement and non-entitlement boundaries are based on political jurisdiction boundaries for fiscal year 2023. The CBSA boundaries are based on OMB 2020 definitions. The PHA boundaries are based on public housing agency boundary for fiscal year 2023.

The CDBG level, the HOME level and the State entitlement and non-entitlement reflect the geographic boundaries for grantees that receive direct allocations of CDBG and HOME funds from HUD. CDBG and HOME jurisdictions as well as State entitlement and non-entitlement level are not census-designated areas, which means that these jurisdictional boundaries do not fall consistently along Census tracts or block groups. A series of technical procedures were necessary to construct a crosswalk between census-designated areas and CDBG, HOME jurisdictions and State entitlement and non-entitlement level Census geographic identifiers at the summary level 070 (state-county-county subdivision-place/remainder), summary level 080 (state-county-county subdivision-place/remainder-census tract) and summary level 091 (state-county-county subdivision-place/remainder-census tract-block group). Similarly, although county, county subdivision, place, Census tract and block group are all census-designated areas, there is necessarily no direct mapping of a Census tract or block group to a summary level 160 (state-place) area or a summary level 060 (state-county-county subdivision) area. A series of technical procedures were necessary to construct a crosswalk between the Census tract/block group and place as well as county subdivision.

Weights

---

[2]   HOME Jurisdictions with slightly different boundaries have been removed since AFFHT0005.

[3]   CDBG jurisdictions in the AFFH-T exclude non-entitlement jurisdictions.

At the boundaries of local government, PHA and State jurisdictions and their respective regions, some Census tracts/block groups fall partially within the boundaries and partially outside of the boundaries. Data from these tracts or block groups are weighted by the share of the population within the boundaries to approximate including only the portion of those tracts/block groups within the jurisdictions and regions in estimates reported for these levels.

V.   Race/Ethnicity

Among other protected characteristics, the Fair Housing Act prohibits housing discrimination based on race. HUD offers data on both race and ethnicity. HUD provides data for non-Hispanic Whites, considering Hispanics of any race as a separate race/ethnic category that can experience housing discrimination differently than other groups. Similarly, the data provided for the other race groups – Black, Asian and Pacific Islander, Native American, and other – also exclude information for people who identify their ethnicity as Hispanic. Other race/ethnicity data are discussed in sections IX and XI.

To make the racial categories in the demographic trend data more comparable between the historic data and the 2020 data, HUD has produced two sets of 2020 race data, provided in Table 2. One is based on 2020 Census race/ethnicity categories and the other is based on the categories provided in the Decennial Census 2010 and 2000 and Time Series tables. The data for R/ECAPs in Map 2 are based on Decennial Census 2020, and Decennial Census 2010 and 2000 that have been normalized in 2020. For all maps, the CBSA definitions remain the same, using the Census Bureau's March 2020 CBSA delineation.

Data Source: American Community Survey (ACS) 2016-2020; Decennial Census, 2020; Decennial Census, 2010; Decennial Census, 2000

Related AFFH-T Local Government, PHA and State Tables/Maps: Tables 1, 2, 4, 12; Maps 1, 2, 5-13.

VI.   National Origin and Limited English Proficiency (LEP)

The Fair Housing Act also prohibits housing discrimination based on national origin. The AFFH-T provides data for four indicators of national origin. The first two are the ten most common places of birth of the foreign-born population by jurisdiction and region and the number and percentage of the population that is foreign-born. The second two indicators are the ten most common languages spoken at home (for the population age 5 years and over) for those who speak English "less than 'very well,'" and the number and percentage of the population who speak English "less than 'very well.'"[4] In AFFHT0006, to increase the consistency of definition of boundaries between data sources and HUD-designated areas, summary level 070 (State-County-County Subdivision-Place) data of ACS2016-2020 have been used for some attributes in this category. However, to protect the privacy of survey units and to ensure the precision of the tabulated data, Census provided collapsed tables (C05006 and C16001) for sum070 this time, instead of full tables (B05006 and B16001) for other relevant Census-designated levels including for census tract, county, state-place, and state.

---

[4]   Percentages using data from the American Community Survey (ACS), 2016-2020 are calculated using total population from the 2020 decennial census. Percentages using decennial census data from 2010 and 2000 are also calculated using total population.

Information from these full tables have been converted to match the structure of C-tables. In AFFHT0007, no summary level 070 data are provided by Census.

Data on national origin and LEP originate from the 2016-2020 American Community Survey and from 2010 and 2000 Decennial Census data. Counts of each place of birth by tract were aggregated to the jurisdiction and regional level separately. Within these geographies, the counts for places of birth were ranked and the ten most populous groups were determined and are presented.

The ten most common places of birth and LEP languages are displayed in the AFFH-T Tables, while the top five are displayed in the AFFH-T Maps. HUD limits the number of categories for the maps to enable users to better visualize the most populous groups. The data does not contain National origin and LEP for Puerto Rico.

Data Source: American Community Survey (ACS) 2016-2020; Decennial Census, 2010; Decennial Census 2020.

Related AFFH-T Local Government and PHA Tables/Maps: Tables 1, 2, 4; Maps 3, 4, 6-13.

Related AFFH-T State Tables/Maps: Tables 1, 2, 4; Maps 3, 4.

VII.   Disability Status and Type

The Fair Housing Act prohibits housing discrimination against any person based on disability. The AFFH-T provides information on disability type, disability status by age group, and disability status by housing type. The disability type and disability status by age group measures are from the ACS, while the measure of persons with disabilities by housing type is from the PIC/TRACS data (see section IX). The definition of "disability" used by the Census Bureau may not be comparable to reporting requirements under certain HUD programs, which sometimes use different definitions of disability for purposes of determining eligibility.

The disability type categories are: hearing difficulty, vision difficulty, cognitive difficulty, ambulatory difficulty, self-care difficulty, and independent living difficulty. These categories are based on a new set of disability questions introduced into the ACS in 2008 and are not comparable to disability type figures in prior years.[5]

Data Source: American Community Survey (ACS), 2016-2020; Inventory Management System (IMS)/ PIH Information Center (PIC), 2023; Tenant Rental Assistance Certification System (TRACS), 2023
Related AFFH-T Local Government, PHA and State Tables/Maps: Tables 1, 13, 14, 15; Maps 14, 15.

VIII.   Sex

The Fair Housing Act prohibits housing discrimination against any person based on sex. The AFFH-T provides information on male/female status.

Data Source: Decennial Census, 2020; Decennial Census, 2010; Decennial Census, 2000

---

[5]   For variables on disability, percentages are calculated based on the total population age 5 years and older.

Related AFFH-T Local Government, PHA and State Tables/Maps: Tables 1, 2.

IX.   Families with Children and Age

The Fair Housing Act prohibits housing discrimination against any person based on familial status. For purposes of the Fair Housing Act, familial status includes one or more individuals under the age of 18 being domiciled with a parent or other person with legal custody of such individuals. The AFFH-T provides information on families with children. Specifically, familial status is measured as the number and percentage of all families (with two or more related people in the household) that are families with children under the age of 18. The AFFH-T also provides data on age group (under 18, 18-64, and 65+).Data Source: Decennial Census, 2020; Decennial Census, 2010; Decennial Census 2020

Related AFFH-T Local Government and PHA Tables/Maps: Tables 1, 2, 4; Maps 7-13.

Related AFFH-T State Tables/Maps: Tables 1, 2, 4.

X.   Households in Publicly Supported Housing

The AFFH-T provides data on households within the following housing categories: Public Housing, Section 8 Project-based Rental Assistance (PBRA), other assisted housing multifamily properties, and Section 8 tenant-based Housing Choice Voucher (HCV) Program. The "Other Multifamily" category includes properties funded through the Section 202 Supportive Housing for the Elderly Program (with both capital advance grants and Project Rental Assistance Contracts) and the Section 811 Supportive Housing for Persons with Disabilities Program.

The AFFH-T also provides locational information for Low-Income Housing Tax Credit properties.

The sources for data on these housing types are:

- HCV: census tract-level data extract from the Family Report Form HUD-50058 (PIC)
- Public Housing: development-level data extract from the Family Report Form HUD-50058 (PIC)
- PBRA and other multifamily properties: development-level data extract from HUD-50059 (TRACS)
- LIHTC: National Low-Income Housing Tax Credit (LIHTC) Database

The AFFH-T reports data by housing category differently depending on the report table. These details are outlined below:

Tables 5, 6, 11, and 15 present data on households in Public Housing, PBRA, other publicly supported housing multifamily properties, and HCV. Data on developments with fewer than 11 households reported or with fewer than 50 percent of occupied units reported at the CDBG, HOME, and CBSA aggregations were omitted to ensure confidentiality.

Table 5 presents the total number of units in publicly supported housing programs[6] and their share of the total number of housing units within CDBG or HOME jurisdictions. The denominator used in Table 5 is the total number of housing units in the 2010 census block group aggregated at the CDBG or HOME level.

Table 6 presents data on the race and ethnicity of households in publicly supported housing programs. The race/ethnicity categories are non-Hispanic White, non-Hispanic Black, Hispanic, and non-Hispanic Asian or Pacific Islander. Information on the race and ethnicity of households with incomes at or below 30 percent, 50 percent, and 80 percent of the area median income (AMI) is from the Comprehensive Housing Affordability Strategy (CHAS) database.

Table 7 reports the following data on households in publicly supported housing programs within the CDBG or HOME jurisdiction: race/ethnicity (percent non-Hispanic White, non-Hispanic Black, Hispanic, and non-Hispanic Asian or Pacific Islander), percent of households with at least one member with a disability, and percent of households where the head or spouse is age 62 or older. The data in this table are presented separately for properties/households located within and outside of racially or ethnically concentrated areas of poverty (R/ECAPs) (detailed below in section X) within the CDBG or HOME jurisdiction.

Table 8 presents data on the composition of households assisted through Public Housing, PBRA, and other multifamily properties. Population characteristics include race/ethnicity (White, Black, Hispanic, Asian), and households with children. Data on properties with fewer than 11 households reported or with fewer than 50 percent of occupied units reported at the development and at the Census tract aggregation were omitted to ensure confidentiality.

Tables 7 and 8 include only developments with spatial information that is precise enough to accurately determine their location within a Census tract, such as a rooftop location or the ZIP+4 centroid associated with the address. Developments with less precise spatial information are omitted because they cannot reliably be located to the correct street block or the correct side of the street block.

In conjunction with Tables 7 and 8, Map 5 also includes only developments with spatial information that is precise enough to accurately determine their location within a Census tract. Over 94 percent of Public Housing, PBRA, and other multifamily have sufficient geographical information to be included in the tables and maps.

Tables 11 and 15 present data on unit size (households in 0-1bedroom units, 2-bedroom units, and 3 or more-bedroom units), households with children, and households where at least one member has a disability.

Data Source: Inventory Management System (IMS)/PIH Information Center (PIC), 2023; Tenant Rental Assistance Certification System (TRACS), 2023; Low Income Housing Tax Credit (LIHTC)

---

[6] Publicly Supported Housing Programs include Public Housing, HCV, PBRA, and other multifamily programs. Since HCV units can be in LIHTC, LIHTC is excluded as counting both would be double counting some units.

database, 2022; Decennial Census, 2020; Comprehensive Housing Affordability Strategy (CHAS), 2016-2020

Related AFFH-T Local Government and PHA Tables/Maps: Tables 5-8, 11, 15; Map 5.

Related AFFH-T State Tables/Maps: Tables 5-8, 15; Map 5.

XI.   Racially or Ethnically Concentrated Areas of Poverty (R/ECAPs)

To assist communities in identifying racially or ethnically concentrated areas of poverty (R/ECAPs), HUD has developed a census tract-based definition of R/ECAPs. The definition involves a racial/ethnic group concentration threshold and a poverty test. The racial/ethnic group concentration threshold is straightforward: R/ECAPs must have a non-White population of 50 percent or more. Regarding the poverty threshold, Wilson (1980) defines neighborhoods of "extreme poverty" as census tracts with 40 percent or more of individuals living at or below the poverty line. Because overall poverty levels are substantially lower in many parts of the country, HUD supplements this with an alternate criterion. Thus, a neighborhood can be a R/ECAP if it has a poverty rate that exceeds 40% or is three or more times the average tract poverty rate for the metropolitan/micropolitan area, whichever threshold is lower. Census tracts with this extreme poverty that satisfy the racial/ethnic concentration threshold are deemed R/ECAPs. This translates into the following equation:

$$\frac{R}{ECAP_i} = yes \ldots if \ldots \begin{cases} PovRate_i \geq \left[3 * \mu_{PovRate}^{cbsa}\right] \\ or \\ PovRate_i \geq 0.4 \end{cases} \cap \left[\frac{(Pop_i - NHW_i)}{Pop_i}\right] \geq 0.50$$

Where i represents census tracts, $(\mu_{PovRate}^{cbsa})$ is the metropolitan/micropolitan (CBSA) mean tract poverty rate, PovRate is the ith tract poverty rate, (NHW_i) is the non-Hispanic White population in tract i, and Pop is the population in tract i.

While this definition of R/ECAP works well for tracts in CBSAs, places outside of these geographies are unlikely to have racial or ethnic group concentrations as high as 50 percent. In these areas, the racial/ethnic group concentration threshold is set at 20 percent.

Since the R/ECAPs information is based on CBSAs, in the AFFHT0005 data version, there is no R/ECAPs information for counties in the map tool. At the State level, the current and historical R/ECAPs flags are replaced by the following attributes: County Population in R/ECAPs, Percentage of County Population living in R/ECAPs, Number of R/ECAPs County Tracts, and Percentage of County Tracts that are R/ECAPs.

Data Source: American Community Survey (ACS), 2016-2020; Decennial Census, 2020; Decennial Census, 2010; Decennial Census, 2000

Related AFFH-T Local Government and PHA Tables/Maps: Tables 4, 7; Maps 1-17.

Related AFFH-T State Tables/Maps: Tables 4, 7; Maps 1-15, 18.

References:
Wilson, William J. (1980). The Declining Significance of Race: Blacks and Changing American Institutions. Chicago: University of Chicago Press.

XII.   Housing Problems and Disproportionate Housing Needs

To assist communities in describing and identifying disproportionate housing needs in their jurisdictions and regions, the AFFH-T provides data identifying instances where housing problems or severe housing problems exist. The AFFH-T presents housing problems overall, as well as variations by race/ethnicity, household type and household size. The race/ethnicity categories presented are non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic Asian or Pacific Islander, non-Hispanic Native American, and non-Hispanic other. The household type and size categories presented are family households of less than five people, family households of five or more people, and non-family households of any size.

Information on housing problems is drawn from CHAS, which demonstrates the extent of housing problems and housing needs, particularly for low-income households. The CHAS data are produced via custom tabulations of ACS data by the U.S. Census Bureau.

The AFFH-T provides data on the number and share of households with one of the following four housing problems:

1.   Lacks complete kitchen facilities
2.   Lacks complete plumbing facilities
3.   More than one person per room
4.   Cost Burden - monthly housing costs (including utilities) exceed 30% of monthly income

Additionally, the AFFH-T provides data on the number and share of households with one or more of the following "severe" housing problems, defined as:

1.   Lacks complete kitchen facilities
2.   Lacks complete plumbing facilities
3.   More than one person per room
4.   Severe Cost Burden - monthly housing costs (including utilities) exceed 50% of monthly income

Program participants should review these data to determine where disproportionate housing needs may be found in their jurisdictions and regions. For example, a sub-group, such as households of a particular racial/ethnic group or household size, may experience housing problems more frequently than the overall population as a whole or than another sub-group.

Data Source: Comprehensive Housing Affordability Strategy (CHAS), 2016-2020

Related AFFH-T Local Government, PHA and State Tables/Maps: Tables 9, 10; Map 6.

XIII.   Housing Tenure

To assist in understanding the entire housing stock in a jurisdiction and region, the AFFH-T provides information on housing tenure. The number and percentage of housing units occupied by renters and

homeowners are available for households overall and by the race of the head of household. Additionally, the AFFH-T contains a map showing the percentage of rental units that are affordable, defined as renting at or less than 30 percent of household income for a household whose income is at 50 percent of area median income.

Data Source: Comprehensive Housing Affordability Strategy (CHAS), 2016-2020

Related AFFH-T Local Government and PHA Tables/Maps: Table 16; Maps 16, 17.

Related AFFH-T State Tables/Maps: none.

XIV.   Indices

HUD has developed a series of indices to help inform communities about segregation and disparities in access to opportunity in their jurisdiction and region. A description of the methodology for each of the following indices may be found below:

1.   Dissimilarity Index
2.   Low Poverty Index
3.   School Proficiency Index
4.   Jobs Proximity Index
5.   Labor Market Engagement Index
6.   Low Transportation Cost Index
7.   Transit Trips Index
8.   Environmental Health Index

Table 3 of the AFFH-T tables provides values for the dissimilarity index. Table 12 of the AFFH-T tables provides values for all the remaining indices, which relate to disparities in access to opportunity.

To generate Table 12, index values were calculated for each census tract. These tract values were averaged and then weighted based on the distribution of people of different racial and ethnic groups within the CDBG jurisdiction, HOME jurisdiction, CBSA, PHA Service Areas, State entitlement/non-entitlement areas, or State to generate composite index values for each race and ethnicity. A similar process was applied to weight the data based on the distribution of people of different racial and ethnic groups who are living below the federal poverty line within the CDBG, HOME, or State Entitlement jurisdiction, CBSA, PHA Service Area, and State. The population estimates are based on the 2020 Decennial Census at the census tract or block group level, depending on the geographic level at which the index was originally calculated.

The indices from Table 12 are also used to populate maps generated by the AFFH-T, showing the overall index values of census tracts juxtaposed against data on race/ethnicity, national origin, and family type.

The following details each of the eight indices used in the AFFH-T.

A. Analyzing Segregation

1. Dissimilarity Index

Summary

The dissimilarity index (or the index of dissimilarity) is a commonly used measure of community-level segregation. The dissimilarity index represents the extent to which the distribution of any two groups (frequently racial or ethnic groups) differs across census tracts or block groups. It is calculated as:

$$D_j^{WB} = 100 * \frac{1}{2} \sum_{i=1}^{N} \left| \frac{W_i}{W_j} - \frac{B_i}{B_j} \right|$$

Where *i* indexes census block groups or tracts, *j* is the jth jurisdiction, *W* is group one and *B* is group two, and *N* is the number of block groups or tracts *i* in jurisdiction j.

Interpretation

The values of the dissimilarity index range from 0 to 100, with a value of zero representing perfect integration between the racial groups in question, and a value of 100 representing perfect segregation between the racial groups. The following is one way to understand these values:

Measure	Values	Description
Dissimilarity Index	<40	Low Segregation
[range 0-100]	40-54	Moderate Segregation
	>55	High Segregation

In Table 3, the current dissimilarity indices for 2020 exclude multiracial individuals, and the 2000, 2010, and 2020 trend racial data from the Census Decennial data also exclude multiracial individuals in the racial categories.

Data Source: Decennial Census, 2020; Decennial Census, 2010; Decennial Census, 2000. 2020 Decennial Census data are Block-group level and Census-tract level, and 2010 & 2000 Decennial Census data are Census-tract level.

Related AFFH-T Local Government and PHA Tables/Maps: Table 3.

Related AFFH-T State Tables/Maps: Table 3; Map 18.

References:
Massey, Douglas S. and Nancy A. Denton. 1988. The Dimensions of Residential Segregation. Social Forces, 67(2): 281-315.

B. Analyzing Disparities in Access to Opportunity

HUD used a two-stage process for developing the data needed to analyze disparities in access to opportunity. The first stage involves quantifying the degree to which a neighborhood offers features commonly viewed as important opportunity indicators. In the second stage, HUD compares these rankings across people in particular racial and economic subgroups to characterize disparities in access to opportunities. The index scores in the table (by race/ethnicity) roll up all of the block/tract scores and weighted by where the population (for each R/E group) actually lives. Please refer to

section C for more details of the aggregation/calculation. To focus the analysis, HUD developed methods to quantify a selected number of the important opportunity indicators in every neighborhood. These dimensions were selected because existing research suggests they have a bearing on a range of individual outcomes. HUD has selected five dimensions upon which to focus: poverty, education, employment, transportation, and health.

Invariably, these opportunity indicators do not capture all that is encompassed in an individual's or a family's access to opportunity. In quantifying opportunity indicators, HUD is quantifying features of neighborhoods for the purpose of assessing whether significant disparities exist in the access or exposure of particular groups to these quality-of-life factors. While these important dimensions are identified by research as important to quality of life, the measures are not without limitations. HUD constrained the scope of HUD-provided data to those that are closely linked to neighborhood geographies and could be measured consistently at small area levels across the country. For example, HUD's measure of school performance only reflects elementary school proficiency. It does not capture academic achievement for higher grades of schooling, which is important to a community's well-being, but may not be as geographically tied to individual neighborhoods as elementary schools. Similarly, the health hazard measure only captures outdoor toxins, missing indoor exposures. The national-availability restriction is a necessity given that all HUD program participants must complete an Assessment of Fair Housing. HUD realizes that there are other opportunity indicators that may be relevant, such as neighborhood crime or housing unit lead and radon levels. However, these lack consistent neighborhood-level data across all program participant geographies. HUD encourages program participants to supplement the HUD-provided data with local data and local knowledge on these other opportunity indicators so that the analysis is as thorough as possible. The five opportunity indicators are operationalized by seven indices, described below.

2. Low Poverty Index

Summary
The low poverty index captures poverty in a given neighborhood. The index is based on the poverty rate (*pv*).

$$Pov_i = \left[\left(\frac{pv_i - \mu_{pv}}{\sigma_{pv}} \right) * -1 \right]$$

The mean (μ_{pv}) and standard error (σ_{pv}) are estimated over the national distribution.

The poverty rate is determined at the census tract level.

Interpretation
Values are inverted and percentile ranked nationally. The resulting values range from 0 to 100. The higher the score, the less exposure to poverty in a neighborhood.

Data Source: American Community Survey, 2016-2020

Related AFFH-T Local Government, PHA and State Tables/Maps: Table 12; Map 12. School Proficiency Index

3. School Proficiency Index

Summary
The school proficiency index uses school-level data on the performance of 4th grade students on state exams to describe which neighborhoods have high-performing elementary schools nearby and which are near lower performing elementary schools. The school proficiency index is a function of the percent of 4th grade students proficient in reading (r) and math (m) on state test scores for up to three schools (i=1,2,3) within 3 miles of the block group centroid. S denotes 4th grade school enrollment:

$$School_i = \sum_{n=i}^{3} \left(\frac{s_i}{\sum^n s_i} \right) * \left[\frac{1}{2} * r_i + \frac{1}{2} * m_i \right]$$

Elementary schools are linked with block groups based on a geographic mapping of attendance area zones from Pitney Bowes[7], where available. Block groups are matched with up the three schools (closest in distance in the same school district) within 4 miles of the block group centroid. In cases with multiple school matches, an enrollment-weighted score is calculated following the equation above. About 14 percent of block groups have no schools within 4 miles. In such cases, the index is based on the single closest school.

In the AFFHT0004 data version, there is no school proficiency data for jurisdictions in Kansas, West Virginia, and Puerto Rico because no data was reported for jurisdictions in these states in the Great Schools 2013-14 dataset. For the jurisdictions in these states, the block group and county level school proficiency index in Map 7 revert to using AFFHT0002, instead of the data in AFFHT0004. In Table 12 for these jurisdictions, the school proficiency index also reverts to AFFHT0002, as well as for regions that do not cross state boundaries. However, please note if region crosses state boundaries, Table 12 region-level school proficiency index reflects AFFHT0004 data. The same algorithm is applied to AFFHT0005, AFFHT006 and AFFHT0007 for those states without the latest school proficiency index.

The raw data contains an adjusted school proficiency index that is adjusted for the percentage of students that are economically disadvantaged. Please note that the use of this adjusted school proficiency index is optional; program participants are not required to include the adjusted school proficiency index in their analysis. The adjusted school proficiency index is not included in the AFFH-T online maps and tables, but is only provided in the raw data provided on HUD Exchange.

The adjusted school proficiency index is a function of the percent of 4th grade students, economically disadvantaged and not economically disadvantaged, that are proficient in reading and math on state test scores for up to three schools (i=1,2,3) within 4 miles of the block group centroid. In the formula below, j=1 denotes economically disadvantaged students, and j=2 denotes students that are not economically disadvantaged. $S_{i,j}$ denotes the count of group j students in school i, and s_i denotes total 4th grade enrollment in school i.

---

[7] All references to Maponics school boundaries should be updated to Pitney Bowes which acquired Maponics for previous releases. In AFFHT0007, the Precisely school boundaries are used.

$$School_i = \sum_{i=1}^{3} \frac{s_i}{S} * \sum_{j=1}^{2} \frac{s_{i,j}}{s_i} \theta_{i,j}$$

Where $\Theta_{i,j}$ is an index, percentile ranked by state, for group j in school i:

$$\theta_{i,j} = \left[\frac{1}{2} * r_{i,j} + \frac{1}{2} * m_{i,j}\right]$$

$m_{i,j}$ denotes math scores for group j in school i, and $r_{i,j}$ denotes reading scores for group j in school i.

Interpretation
Values are percentile ranked at the state level and range from 0 to 100. The higher the score, the higher the quality of the school system in a neighborhood.

Data Source: Great Schools (proficiency data, 2019, 2021-22); Precisely (attendance boundaries, 2023).

Related AFFH-T Local Government, PHA and State Tables/Maps: Table 12; Map 7.

4. Jobs Proximity Index

Summary
The jobs proximity index quantifies the accessibility of a given residential neighborhood as a function of its distance to all job locations within a CBSA, with larger employment centers weighted more heavily. Specifically, a gravity model is used, where the accessibility (*Ai*) of a given residential block group is a summary description of the distance to all job locations, with the distance from any single job location positively weighted by the size of employment (job opportunities) at that location and inversely weighted by the labor supply (competition) to that location. More formally, the model has the following specification:

$$A_i = \frac{\sum_{j=1}^{n} \frac{E_j}{d_{i,j}^2}}{\sum_{j=1}^{n} \frac{L_j}{d_{i,j}^2}}$$

Where *i* indexes a given residential block group, and *j* indexes all *n* block groups within a CBSA. Distance, *d*, is measured as "as the crow flies" between block groups *i* and *j,* with distances less than 1 mile set equal to 1. *E* represents the number of jobs in block group *j,* and *L* is the number of workers in block group *j.*

The Longitudinal Employer-Household Dynamics (LEHD) database has no data for Puerto Rico and has a concentration of missing records for Massachusetts.

The downloadable raw data contain an alternative jobs proximity index. Please note that the use of this alternative jobs proximity index is optional; program participants are not required to include the alternative jobs proximity index in their analysis. The alternative jobs proximity index is not included

in the AFFH-T online maps and tables, but is only provided in the raw data provided on HUD Exchange.

The alternative index is computed with the following formula, weighting the numerator and denominator by the inverse of distance instead of distance squared:

$$A_i = \frac{\sum_{j=1}^{n} \frac{E_j}{d_{i,j}}}{\sum_{j=1}^{n} \frac{L_j}{d_{i,j}}}$$

Interpretation
Values are percentile ranked at the CBSA level with values ranging from 0 to 100. The higher the index value, the better the access to employment opportunities for residents in a neighborhood.

Data Source: Longitudinal Employer-Household Dynamics (LEHD) data, 2023

Related AFFH-T Local Government, PHA and State Tables/Maps: Table 12; Map 8.

5. Labor Market Engagement Index

Summary
The labor market engagement index provides a summary description of the relative intensity of labor market engagement and human capital in a neighborhood. This is based upon the level of employment, labor force participation, and educational attainment in a census tract (*i*). Formally, the labor market index is a linear combination of three standardized vectors: unemployment rate (*u*), labor-force participation rate (*l*), and percent with a bachelor's degree or higher (*b*), using the following formula:

$$LBM_i = \left[\left(\frac{u_i - \mu_u}{\sigma_u} \right) * -1 \right] + \left(\frac{l_i - \mu_l}{\sigma_l} \right) + \left(\frac{b_i - \mu_b}{\sigma_b} \right)$$

Where the means (μ_u, μ_l, μ_b) and standard errors ($\sigma_u, \sigma_l, \sigma_b$) are estimated over the national distribution. Also, the value for the standardized unemployment rate is multiplied by -1.

Interpretation
Values are percentile ranked nationally and range from 0 to 100. The higher the score, the higher the labor force participation and human capital in a neighborhood.

Data Source: American Community Survey, 2016-2020

Related AFFH-T Local Government, PHA and State Tables/Maps: Table 12; Map 9.

6. Low Transportation Cost Index

Summary
This index is based on estimates of transportation costs for a family that meets the following description: a 3-person single-parent family with income at 50% of the median income for renters for

the region (i.e., CBSA). The estimates come from the Location Affordability Index (LAI). The data used in the AFFH-T correspond to those for household type 6 (hh_type6_) as noted in the LAI data dictionary. More specifically, among this household type, the AFFH-T models transportation costs as a percent of income for renters (t_rent). Neighborhoods are defined as census tracts. The LAI data does not contain transportation cost information for Puerto Rico.

In AFFHT0007, due to lack of reliable source data, no Low Transportation Cost Index is provided.

Interpretation
Values are inverted and percentile ranked nationally, with values ranging from 0 to 100. The higher the value, the lower the cost of transportation in that neighborhood. Transportation costs may be low for a variety of reasons, including greater access to public transportation and the density of homes, services, and jobs in the neighborhood and surrounding community.

Data Source: N/A

Related AFFH-T Local Government, PHA and State Tables/Maps: Table 12; Map 11.

References:
www.locationaffordability.info
http://lai.locationaffordability.info//lai_data_dictionary.pdf

7. Transit Trips Index

Summary
This index is based on estimates of transit trips taken by a family that meets the following description: a 3-person single-parent family with income at 50% of the median income for renters for the region (i.e., CBSA). The estimates come from the Location Affordability Index (LAI). The data used in the AFFH-T correspond to those for household type 6 (hh_type6_) as noted in the LAI data dictionary. More specifically, among this household type, the AFFH-T models annual transit trips for renters (transit_trips_rent). Neighborhoods are defined as census tracts. The LAI does not contain transit trip information for Puerto Rico.

In AFFHT0007, due to lack of reliable source data, no Transit Trips Index is provided.

Interpretation
Values are percentile ranked nationally, with values ranging from 0 to 100. The higher the value, the more likely residents in that neighborhood utilize public transit. The index controls for income such that a higher index value will often reflect better access to public transit.

Data Source: N/A

Related AFFH-T Local Government, PHA and State Tables/Maps: Table 12; Map 10.

References:
www.locationaffordability.info
http://lai.locationaffordability.info//lai_data_dictionary.pdf

8. Environmental Health Index

Summary

The environmental health index summarizes potential exposure to harmful toxins at a neighborhood level. The index is a linear combination of standardized EPA estimates of air quality carcinogenic (*c*), respiratory (*r*) and neurological (*n*) hazards with *i* indexing census tracts.

$$EnvHealth_i = \left[\left(\frac{c_i - \mu_c}{\sigma_c}\right) + \left(\frac{r_i - \mu_r}{\sigma_r}\right) + \left(\frac{n_i - \mu_n}{\sigma_n}\right)\right] * -1$$

Where means (μ_c, μ_r, μ_n) and standard errors ($\sigma_c, \sigma_r, \sigma_n$) are estimated over the national distribution.

Interpretation
Values are inverted and then percentile ranked nationally. Values range from 0 to 100. The higher the index value, the less exposure to toxins harmful to human health. Therefore, the higher the value, the better the environmental quality of a neighborhood, where a neighborhood is a census tract.

Data Source: EPA 2019 with 2020 GEO Codes

Related AFFH-T Local Government, PHA and State Tables/Maps: Table 12; Map 13.

References:
http://www.epa.gov/ttn/atw/natamain/

C. Computing Indices by Protected Class

The AFFH-T provides index values documenting the extent to which members of different racial or ethnic groups have access to or exposure to particular opportunity indicators. The AFFH-T provides a weighted average for a given protected characteristic. The generic access for subgroup *M* to asset dimension *R* in jurisdiction *j* is calculated as:

$$Index_M^R = \sum_i^N \frac{M_i}{M_j} * R_i$$

Where *i* indicates Census tracts in jurisdiction *j* for subgroup *M* to dimension *R*. *N* is the total number of Census tracts in jurisdiction j.

It is useful to provide an example of this in practice (Table 2). Consider Jurisdiction X with a total of three neighborhoods (A, B, and C). Each neighborhood has an index score representing the prevalence of poverty within that neighborhood (Column 1), with higher values representing lower levels of poverty. To compute the index value for a particular protected class, such as White or Black individuals, the values are weighted based on the distribution of that subpopulation across the three neighborhoods. For example, 40% of the jurisdiction's White population lives in neighborhood A, so the index value for neighborhood A represents 40% of the composite index value for the White population in the jurisdiction. The values for neighborhoods B and C are weighted at 40% and 20% respectively, based on the share of White individuals living in those neighborhoods, leading to a final weighted low poverty index for the White population in the jurisdiction of 56.

Table 3. Example of Weighting of Low Poverty Index by Race in a Hypothetical Jurisdiction

	Dimension	White			Black		
Neighborhood	Low Poverty Index	white pop	%white of total pop	Index for whites [(1)*(3)]	black pop	%black of total pop	Index for blacks [(1)*(6)]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A	80	400	40%	32	100	20%	16
B	50	400	40%	20	150	30%	15
C	20	200	20%	4	250	50%	10
Total		1000	100%	**56**	500	100%	**41**

This exercise can be repeated for each racial or ethnic group. For example, the low poverty index among the Black population in Jurisdiction X is 41. Using these indices, it is possible to identify disparities in access to opportunity across protected classes.

To account for differences in household income across groups, the AFFH-T also provides separate index values for persons below the federal poverty line, again breaking out values by racial or ethnic group. This will aid program participants in understanding whether there are disparities in access to opportunity indicators across protected class groups that cannot be explained by differences in income. These index values by protected class among the total and populations below the federal poverty line are available in Table 12.