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

Data Version AFFHT0004  
(Released November 17, 2017)

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**Document Revision History**

<b>Date</b>	<b>Change Description / Purpose</b>
November 30, 2017	Original document provided with Data Version AFFHT0004, released November 17, 2017.

## 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 are provided on [HUD Exchange](#).

On November 17, 2017, AFFH-T provided maps and tables using data version AFFHT0004. The following additions, revisions and corrections are now included in the AFFHT0004 maps and tables.

- Maps and tables using AFFHT0004 are based on the FY2017 list of program participants. All previous data versions are based on the FY2016 list.
- In AFFHT0004, improvements were made in the aggregation of Census data for tract and block group level data matched to PHA maps and entitlement/non-entitlement boundaries in the State (beta) maps. HUD has slightly adjusted the method in which weights have been applied to better estimate data for tracts and block groups that cross multiple jurisdictional boundaries. This did not affect Local Government maps and tables, only PHA and State maps and tables were affected.
- The following fixes were implemented, and have been noted in the list of [Known Issues](#):
  - State Map 5 pop-up contained the incorrect count for publicly supported housing. This has been fixed in data version AFFHT0004 and the pop-ups now display the correct count for publicly supported housing.
  - In Maps 7-13, opportunity indices in the pop-ups did not have correct formatting. This has been corrected in data version AFFHT0004. For Local Government and PHA maps, the indices are displayed as whole numbers. For States, the indices are calculated as average tract indices across counties, for which two decimal values are displayed.

- For previous data versions applied to Map 2, Racially or Ethnically Concentrated Areas of Poverty (R/ECAPs) for 1990 and 2000 trend data were incorrect. Map 2 in the AFFH-T incorrectly displayed the location of historical R/ECAPs for 1990 and 2000. This has been corrected in data version AFFHT0004. Map 2 in the AFFH-T now displays the correct location of historical R/ECAPs for 1990 and 2000. The public use file for AFFHT0004 has the correct R/ECAP data.
- For previous data versions, the Environmental Health Index was missing in some areas and required correction. (Map 14 and Table 12) There were errors in the coding and crosswalk used when Census tracts were matched to jurisdictions or regions. This resulted in some tracts being incorrectly matched to jurisdictions or regions when the index was calculated. This has been corrected in data version AFFHT0004.
- For previous data versions, the School Proficiency Index required some correction. (Map 7 and Table 12). There were errors in the coding and crosswalk used when Census tracts were matched to jurisdictions or regions. This resulted in some tracts being incorrectly matched to jurisdictions or regions when the index was calculated. This has been corrected in data version AFFHT0004.
- In AFFHT0003, the transit trips index and the low transportation cost index for PHAs and States was calculated with a vintage of the Location Affordability Index (LAI) data that was different than what was published in the data documentation and was not consistent with the data used for Local Governments. This did not affect Local Government maps and tables, only PHA and State maps and tables were corrected. This has been corrected in data version AFFHT0004 so that all transportation indices are calculated using LAI 2008-2012.

**Table 1. Data Sources by Data Version Number**

<b>AFFH-T data version Number</b>	<b>AFFHT0004</b>	<b>AFFHT0003</b>	<b>AFFHT0002</b>	<b>AFFHT0001</b>
Boundaries for Jurisdictions	Program Participant list for FY2017	Program Participant list for FY2016	Program Participant list for FY2016	Program Participant list for FY2013
R/ECAPs	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)	1990, 2000 and 2010	1990, 2000 and 2010	1990, 2000 and 2010	1990 and 2000
Inventory Management System (IMS)/PIH Information Center (PIC)	2016	2016	2016	2013
Tenant Rental Assistance Certification System (TRACS)	2016	2016	2016	2013
Comprehensive Housing Affordability Strategy (CHAS)	2009-13	2009-13	2009-13	2008-12
Longitudinal Employer-Household Dynamics (LEHD)	2014	2014	2014	2013
Great Schools	2013-14*	2013-14*	2012	2012
Common Core of Data	2013-14*	2013-14*	2012	2012
School attendance boundaries	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)	2011	2011	2011	2005

Location Affordability Index (LAI)	2008-2012	2008-2012	2008-2012	2008-2012
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\*Please note that school proficiency data for jurisdictions in Kansas, West Virginia, and Puerto Rico have not been updated because no data was reported for these jurisdictions in the Great Schools 2013-14 dataset. In the AFFH-T, the school proficiency index for these jurisdictions will continue to display the data from AFFHT0002 when AFFHT0004 is selected. Jurisdictions in all other states have new, updated data for school proficiency as noted in the AFFHT0004 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

Data Category	Variables	Geographic level or Primary Sampling Unit	Tables	Maps	Sources and years
<b>Demographics</b>	Race/Ethnicity population in 2010	Block group	1, 4	1, 5-13	Decennial Census, 2010
<b>Demographics</b>	Race/Ethnicity population in 2010, 2000 & 1990	Tract	2	2	Brown Longitudinal Tract Database (LTDB) based on decennial census data, 2010, 2000 & 1990
<b>Demographics</b>	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), 2009-2013; Decennial Census, 2000; Decennial Census, 1990 <sup>a</sup>
<b>Demographics</b>	Disability Type population; Disabled population by Age	Tract	1, 13, 14	14, 15	American Community Survey (ACS), 2009-2013 <sup>b</sup>
<b>Demographics</b>	Population by Age, Sex, Family Type	Tract	1, 2, 4	7-13	Decennial Census, 2010; Decennial Census, 2000; Decennial Census, 1990
<b>Socioeconomic</b>	Racially/Ethnically-Concentrated Areas of Poverty (R/ECAP)	Tract	4, 7	1-17	American Community Survey (ACS), 2009-2013; Decennial Census, 2010; Brown Longitudinal Tract Database (LTDB) based on decennial census data, 1990, 2000 & 2010
<b>Housing</b>	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), 2016; Tenant Rental Assistance Certification System (TRACS), 2016; Low Income Housing Tax Credit (LIHTC) database, 2014 <sup>c</sup>
<b>Housing</b>	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	Tract	9, 10, 16	6, 16, 17	Comprehensive Housing Affordability Strategy (CHAS), 2009-2013



Data Category	Variables	Geographic level or Primary Sampling Unit	Tables	Maps	Sources and years
	by Race, Household Type, Household Size; Housing Tenure				
<b>Opportunity Indices</b>	Dissimilarity Index	Community Development Block Grant (CDBG); HOME Investment Partnerships Program (HOME), Core Based Statistical Area (CBSA)	3	na	Decennial Census, 2010; Brown Longitudinal Tract Database (LTDB) based on decennial census data, 2010, 2000 & 1990
<b>Opportunity Indices</b>	Low Poverty Index, Labor Market Engagement Index	Tract	12	9, 12	American Community Survey (ACS), 2009-2013
<b>Opportunity Indices</b>	School Proficiency Index	Block group	12	7	Great Schools (proficiency data), 2013-14; Common Core of Data (4th grade enrollment and school addresses), 2013-14; Maponics School Attendance Zone database, 2016
<b>Opportunity Indices</b>	Low Transportation Cost Index; Transit Trips Index	Tract	12	10, 11	Location Affordability Index (LAI) data, 2008-2012
<b>Opportunity Indices</b>	Jobs Proximity Index	Block group	12	8	Longitudinal Employer-Household Dynamics (LEHD), 2014
<b>Opportunity Indices</b>	Environmental Health Index	Tract	12	13	National Air Toxics Assessment (NATA) data, 2011
<p><sup>a</sup> For variables on limited English proficiency, foreign born, and foreign born by national origin, percentages using data from the American Community Survey (ACS), 2009-2013 are calculated using total population from the 2010 decennial census. Percentages using 2000 and 1990 decennial census data are also calculated using total population.</p> <p><sup>b</sup> For variables on disability, percentages are calculated based on the total population age 5 years and older.</p> <p><sup>c</sup> 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).</p>					

#### 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), 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<sup>2</sup> 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 2010. The AFFH-T incorporates minor changes indicated in the ACS “Geography Release Notes” for 2011 and 2012 on the Census Bureau website<sup>3</sup>, resulting in boundaries and corresponding data adjusted to calendar year 2012. The CDBG and HOME jurisdiction, as well as State entitlement and non-entitlement boundaries are based on political jurisdiction boundaries for calendar year 2017. The CBSA boundaries are based on OMB 2015 definitions. The PHA boundaries are based either on summary level 050 (State-County) or on summary level 160 (State-Place).

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 mean 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, place, Census tract and block group are all census-designated areas, there is necessarily no direct mapping of a Census tract or

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<sup>2</sup> CDBG jurisdictions in the AFFH-T exclude non-entitlement jurisdictions.

<sup>3</sup> Tract changes between 2010 and 2011 are here: [http://www.census.gov/acs/www/data\\_documentation/2011\\_geography\\_release\\_notes/](http://www.census.gov/acs/www/data_documentation/2011_geography_release_notes/); Tract changes between 2011 and 2012 are here: [http://www.census.gov/acs/www/data\\_documentation/2012\\_geography\\_release\\_notes/](http://www.census.gov/acs/www/data_documentation/2012_geography_release_notes/)

block group to a State-Place (summary level 160). A series of technical procedures were necessary to construct a crosswalk between the Census tract/block group and place.

### ***Weights***

At the boundaries of local government, PHA and State jurisdictions and their respective regions, some Census tracts/block groups fell partially within the boundaries and partially outside of the boundaries. Data from these tracts were 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 2010 data, HUD has produced two sets of 2010 race data, provided in Table 2 and Map 2. One is based on 2010 Census race/ethnicity categories and the other is based on the categories provided in the Longitudinal Tract Database (LTDB) produced by Brown University. In Table 2 and Map 2, the 1990/2000/2010 “Trend” data uses LTDB, which does not have the Other category nor the Two or More Races category. The “Current” data in Table 2 is the same data in Table 1, but without the additional categories in Table 1, in order to align with the 1990/2000/2010 “Trend” data in Table 2.

The data for R/ECAPs in Map 2 are based on LTDB 2010 data that have been normalized to 2012 Census tract boundaries. For all maps, the CBSA definitions remain the same, using the Census Bureau’s July 2015 CBSA delineation.

Data Source: American Community Survey (ACS) 2009-2013; Decennial Census, 2010; Brown Longitudinal Tract Database (LTDB) based on decennial census data, 1990, 2000 & 2010

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.’”<sup>4</sup>

Data on national origin and LEP originate from the 2009-2013 American Community Survey and from 2000 and 1990 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) 2009-2013; Decennial Census, 2000; Decennial Census 1990.

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.<sup>5</sup>

Data Source: American Community Survey (ACS), 2009-2013; Inventory Management System (IMS)/ PIH Information Center (PIC), 2016; Tenant Rental Assistance Certification System (TRACS), 2016

Related AFFH-T Local Government, PHA and State Tables/Maps: Tables 1, 13, 14, 15; Maps 14, 15.

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<sup>4</sup> Percentages using data from the American Community Survey (ACS), 2009-2013 are calculated using total population from the 2010 decennial census. Percentages using decennial census data from 2000 and 1990 are also calculated using total population.

<sup>5</sup> For variables on disability, percentages are calculated based on the total population age 5 years and older.

## **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, 2010; Brown Longitudinal Tract Database (LTDB) based on decennial census data, 1990, 2000 & 2010

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 age 18. The AFFH-T also provides data on age group (under 18, 18-64, and 65+).

The 1990 data on families with children in Table 2 did not include information on families with a male householder, no wife present. The data have been corrected in the public use files and will be incorporated in a future update of the AFFH-T.

Data Source: Decennial Census, 2010; Decennial Census, 2000; Decennial Census 1990

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<sup>6</sup> 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

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<sup>6</sup> 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.

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 0-1 bedroom 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), 2016; Tenant Rental Assistance Certification System (TRACS), 2016; Low Income Housing Tax Credit (LIHTC) database, 2014; Decennial Census, 2010; Comprehensive Housing Affordability Strategy (CHAS), 2009-2013

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:

$$\frac{R}{ECAP}_i = \text{yes ... if ...} \left\{ \begin{array}{l} PovRate_i \geq [3 * \mu_{PovRate}^{cbsa}] \\ \text{or} \\ PovRate_i \geq 0.4 \end{array} \right. \cap \left[ \frac{(Pop_i - NHW_i)}{Pop_i} \right] \geq 0.50$$

Where  $i$  represents census tracts,  $(\mu_{PovRate}^{cbsa})$  is the metropolitan/micropolitan (CBSA) mean tract poverty rate,  $PovRate$  is the  $i$ th 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 AFFHT0004 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), 2009-2013; Decennial Census (2010); Brown Longitudinal Tract Database (LTDB) based on decennial census data, 1990, 2000 & 2010

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), 2009-2013

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), 2009-2013

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 2010 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  $j$ th 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 2010 exclude multiracial individuals, while the 1990, 2000, and 2010 trend racial data from the Brown Longitudinal Tract Database includes multiracial individuals in the racial categories.

Data Source: Decennial Census, 2010; Brown Longitudinal Tract Database (LTDB) based on decennial census data, 2010, 2000 & 1990. Decennial Census data are Block-group level, and LTDB 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. 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 ( $\mu_{pv}$ ) and standard error ( $\sigma_{pv}$ ) 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, 2009-2013

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 4<sup>th</sup> 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 4<sup>th</sup> 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 4<sup>th</sup> 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 School Attendance Boundary Information System (SABINS), where available, or within-district proximity matches of up to the three-closest schools within 1.5 miles. In cases with multiple school matches, an enrollment-weighted score is calculated following the equation above.

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 raw data contain an alternative school proficiency index that is adjusted for the percentage of students that are economically disadvantaged. Please note that the use of this alternative school proficiency index is optional; program participants are not required to include the alternative school proficiency index in their analysis. The alternative 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 4<sup>th</sup> 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 3 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*<sub>*i,j*</sub> denotes the count of group *j* students in school *i*, and *s*<sub>*i*</sub> denotes total 4<sup>th</sup> grade enrollment in school *i*.

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

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, 2013-14); Common Core of Data (4<sup>th</sup> grade school addresses and enrollment, 2013-14); Maponics (attendance boundaries, 2016).

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 ( $A_i$ ) 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, 2014

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 ( $\mu_u, \mu_l, \mu_b$ ) 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, 2006-2010

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 do not contain transportation cost information for Puerto Rico.

*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: Location Affordability Index (LAI) data, 2008-2012

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

References:

[www.locationaffordability.info](http://www.locationaffordability.info)

[http://lai.locationaffordability.info/lai\\_data\\_dictionary.pdf](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.

*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: Location Affordability Index (LAI) data, 2008-2012

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

References:

[www.locationaffordability.info](http://www.locationaffordability.info)

[http://lai.locationaffordability.info/lai\\_data\\_dictionary.pdf](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 ( $\mu_c, \mu_r, \mu_n$ ) 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: National Air Toxics Assessment (NATA) data, 2011

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 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)



	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)]
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%	<b>56</b>	500	100%	<b>41</b>

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.