I. Data sources

**American Community Survey**

The American Community Survey (ACS) is a national survey conducted by the U.S. Census Bureau. Each year, the Census Bureau releases two types of ACS data tables: five-year estimates, which should be interpreted as five-year averages, and one-year estimates, which are available only for jurisdictions with a population of 65,000 or greater. We used five-year estimates because they are available for all jurisdictions and have the largest sample size, and thus are more reliable. We accessed the data through the Census Bureau’s [application programming interface (API)](https://www.census.gov/). As of August 2019, the most recent five-year ACS estimates are for 2013-2017.

More information:
- [American Community Survey Guidance for Data Users](https://www.census.gov/), U.S. Census Bureau.

**American Community Survey Public Use Microdata Sample (PUMS)**

A portion of the untabulated ACS records (with some modifications to ensure confidentiality) are made available to the public. This data is known as the public use microdata sample, or PUMS. PUMS data are used to create customized tabulations, such as tabulations of households by income as a percent of the area median (AMI).

The most detailed geographic area at which PUMS data is available is the Public Use Microdata Area (PUMA), which is an area of about 100,000 residents that often does not correspond with city or county boundaries. We use PUMS data for a jurisdiction only when it almost exactly corresponds with PUMA boundaries (see the [Geographic matching](https://www.census.gov/)) section for more details).

More information:
- [American Community Survey Public Use Microdata Sample (PUMS) Documentation](https://www.census.gov/), U.S. Census Bureau.

**Picture of Subsidized Households**

The Picture of Subsidized Households dataset is a tabulation of administrative records by the U.S. Department of Housing and Urban Development (HUD). Tabulations are available for the major HUD-administered housing subsidy programs at various geographic levels including cities and counties.

We calculated the number of households assisted by each program as the number of units available in a jurisdiction multiplied by the percent occupied. We assumed 100% occupancy if a program’s occupancy
data was missing. As of August 2019, the most recent Picture of Subsidized Households dataset is for 2018.

More information:
- Picture of Subsidized Households, U.S. Department of Housing and Urban Development.

**Low-Income Housing Tax Credit Database**

The Low-Income Housing Tax Credit (LIHTC) database is maintained by the U.S. Department of Housing and Urban Development. The 2018 LIHTC database used in the Housing Stability Profile includes project-level data on LIHTC buildings placed in service between 1987 through 2016, including the county and/or city in which the project is located and the number of low-income units. We calculated the number of LIHTC units using the database’s count of low-income units in service for LIHTC projects that are monitored for program compliance.

We excluded from our analyses projects that did not match with a county and/or city designation. We also did not investigate whether projects not matched to a jurisdiction were missing data or were simply not located within its boundaries.¹

More information:
- LIHTC Database, U.S. Department of Housing and Urban Development.

**Point-in-Time Count**

The Point-in-Time (PIT) count is a count of persons experiencing homelessness on a single night in January. PIT counts are conducted each year by Continuums of Care (CoCs), which are local or regional organizations responsible for coordinating HUD funding for housing and services for people experiencing homelessness. CoC areas can be a large city, county, or group of counties. PIT counts are reported for the CoC as a whole and not for each jurisdiction within the CoC. The Housing Stability Profile uses 2018 PIT data.

More information:
- Point-in-Time (PIT) and Housing Inventory Count (HIC) Guides, Tools, and Webinars, U.S. Department of Housing and Urban Development.
- What is a Continuum of Care? National Alliance to End Homelessness.

**Comprehensive Housing Affordability Strategy (CHAS) Data**

The Comprehensive Housing Affordability Strategy (CHAS) dataset is a custom tabulation of ACS data produced by the Census Bureau for HUD. Jurisdictions use CHAS data while planning how to spend HUD funds (ex. through the Consolidated Planning process). Unlike standard ACS tables, CHAS tabulates household income by the percent of the area median (AMI) and includes variables of particular relevance to housing affordability analyses.

We use CHAS data when PUMS data is not available for a given jurisdiction, either because it is too small or does not correspond closely with PUMA boundaries. As of August 2019, the most recent available CHAS dataset is for 2012-2016. Estimates should be interpreted as a five-year average.
More information:
• CHAS: Background, U.S. Department of Housing and Urban Development.

II. Housing cost burden

Housing costs include:
• Renters: Gross rent, which is contract (lease) rent, plus utilities paid by the renter.\(^2\)
• Homeowners: Sum of mortgage payments, real estate taxes, various insurances, utilities, fuels, mobile home costs, and condominium fees, as applicable.\(^3\)

We follow the American Community Survey subject definitions\(^4\) and do not compute housing cost burden for:
• Households with zero or negative income.
• Renters who do not pay cash rent (whether or not they pay utilities).
Such households are not included in the numerator or denominator of cost burden tabulations, but are included in other tabulations such as income by tenure.

III. Rental unit affordability

Utility cost imputation

Estimated utility costs for vacant-for-rent units are not included in the PUMS data. We impute those costs following a methodology like that used by in HUD’s Worst Case Housing Needs report\(^5\) and the American Housing Survey’s Housing Affordability Data System.\(^6\)

First, median utility costs were computed as the median difference between gross rent and contract rent, across the following dimensions:
• State
• Structure type (single-family or multi-family)
• Contract rent decile
Then, vacant-for-rent units were assigned the median utility value for the corresponding cell.

Unit size adjustment factors

Unit affordability was adjusted for unit size following the methodology used by HUD’s Comprehensive Housing Affordability Strategy (CHAS) dataset.\(^7\)

The adjustment factor for units with more than 4 bedrooms, up to 10 bedrooms, was computed as \(1.04 + (0.12 \times (n - 3))\) where \(n = \) number of bedrooms.

<table>
<thead>
<tr>
<th>Number of Bedrooms</th>
<th>Adjustment Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.70</td>
</tr>
<tr>
<td>1</td>
<td>0.75</td>
</tr>
<tr>
<td>2</td>
<td>0.90</td>
</tr>
<tr>
<td>3</td>
<td>1.04</td>
</tr>
<tr>
<td>4</td>
<td>1.16</td>
</tr>
</tbody>
</table>
IV. Income limits

Inflation adjustments

In analyses of American Community Survey public use microdata, income limits for 2013 through 2016 were adjusted for inflation to equal 2017 dollars, using the annual average of the not seasonally adjusted CPI-U for all items. We obtained Bureau of Labor Statistics (BLS) data series CUUR0000SA0 via the BLS Public Data Application Programming Interface (API).

Computation of non-HUD-published limits

The 100% AMI limits were computed as the median income for the Fair Market Rent area (FMR), times the household size adjustment factors used by HUD.\(^8\)

Income limits for households with more than 8 persons, up to 16 persons, were computed using the median income for the FMR area, times the formula used by HUD: \(1.32 + ((n - 4) \times 0.08)\) where \(n\) = household size.\(^9\)

No further adjustments were made, like rounding to the nearest $50 or capping the 30% AMI limit at the federal poverty limit but not over the 50% AMI limit.

V. Geographic matching

Continuum of Care areas

Jurisdictions were matched to a Continuum of Care (CoC) area if 98% of the jurisdiction’s land area was within the CoC. Jurisdictions that overlapped multiple CoCs or contained multiple CoCs were handled on a case-by-case basis in consultation with the client.

We created a crosswalk by using ArcGIS software to perform a spatial intersection between cities and counties and CoCs. The shapefile of 2018 CoC areas is produced by HUD,\(^10\) and the shapefiles of cities and counties are from the Census Bureau’s TIGER/Line product series.\(^11\) We made two manual changes to the CoC crosswalk to account for CoC name and boundary changes that occurred between the shapefile’s publication and the release of the PIT counts, so that those CoCs could be successfully matched to the PIT data.

Fair market rent areas

HUD defines area median income (AMI) for FMR areas, which are made up of one or more counties. A county-level FMR dataset is available from HUD.\(^12\) We used this dataset as a crosswalk between counties and FMR areas.

To match cities with FMR areas, we used the Missouri Census Data Center’s MABLE/Geocorr14 geographic correspondence engine\(^13\) to create a crosswalk between places and counties, with the U.S. Census Bureau’s 2010 decennial census count of housing units as the allocation weight. Cities were
assigned to counties if at least 95% of the jurisdiction’s housing units were within the county. If the city overlapped multiple counties in different FMR areas, those jurisdictions were handled on a case-by-case basis in consultation with the client.

**Public use microdata area**

One or more Public Use Microdata Areas (PUMAs) were matched to a jurisdiction if all the housing units within the PUMA were entirely within the jurisdiction. To make this determination, we used the Missouri Census Data Center’s MABLE/Geocorr14 geographic correspondence engine\(^{14}\) to create a crosswalk between PUMAs and cities and counties, respectively, with the U.S. Census Bureau’s 2010 decennial census count of housing units as the allocation weight. Marginal intersections were excluded from this measure. These were defined as intersections that contained less than 2.5% of the jurisdiction’s total housing units and not more than 500 housing units.

**VI. Change in median income and rent**

To chart the change in a jurisdiction’s median rent and median income since 2000, we obtained decennial census estimates and either one-year or five-year American Community Survey estimates. One-year ACS estimates are available only for jurisdictions with a population greater than 65,000. 2000 decennial census and 2011 through 2017 ACS estimates were accessed through the Census Bureau’s application programming interface (API). ACS estimates for 2005 through 2010 were obtained from the ACS Summary File.

We adjusted each of the included estimates for inflation to equal 2017 dollars:

- Estimates representing median household income were adjusted using the annual average, not seasonally adjusted, CPI-U.\(^{15}\)
- Median gross rent was adjusted with the annual average, not seasonally adjusted, CPI-U for all items less shelter.\(^{16}\)

We accessed data used for these adjustments through the Bureau of Labor Statistics application programming interface (API).

We used one-year ACS estimates as available for jurisdictions. One-year estimates can have statistically insignificant, but visually conspicuous, variation from year to year due to sampling error. To reduce the likelihood that statistical anomalies would overshadow the overall trend, we transformed one-year estimates into three-year rolling means. As an example, this means the “2007” point on the chart actually represents the 2005 through 2007 average and the “2008” point represents the 2006 through 2008 average.