

Tennessee Housing Indicators Data Sources & Methodology

DATA SOURCES

Page	Figure or Statistic	Source
1	Change in Population	ACS 5-year Estimates (2011-15 & 2016-20) Table DP05
1	Change in Housing Units	ACS 5-year Estimates (2011-15 & 2016-20) Table B2001
1	Change in Share of pre-80 Housing Units	ACS 5-year Estimates (2011-15 & 2016-20) Table B25034
1	Owners	ACS 5-year Estimates (2011-15 & 2016-20) Table B25034
1	Renters	ACS 5-year Estimates (2011-15 & 2016-20) Table B25034
1	Change in Homeownership Rate	ACS 5-year Estimates (2011-15 & 2016-20) Table S1101
2	Change in Cost Burden (Owners)	ACS 5-year Estimates (2011-15 & 2016-20) Table DP04
2	Change in Cost Burden (Renters)	ACS 5-year Estimates (2011-15 & 2016-20) Table DP04
2	Change in Cost Burden (Combined)	ACS 5-year Estimates (2011-15 & 2016-20) Table DP04
2	Percent of Homes Sold in 2021 that were Affordably Priced Based on Median family Income	Opportunity Index (2021) THDA
2	Rent Affordable at the Median Renter Household Income	National Low Income Housing Coalition
2	Change in Vacancy Rates	HUD Aggregated USPS Data from 2015 and 2020
2	Change in Median Rent	ACS 5-year Estimates (2011-15 & 2016-20) Table DP04
2	Change in Median Home Sale Price	TN Comptroller's Office (2016 and 2021)
3	Median Home Sale Price Trend	TN Comptroller (2021)
3	Age of Housing	ACS 5-year Estimates (2011-15 & 2016-20) Table B25107
4	Residential Building Permits by Year and Housing Type	Census Bureau Building Permits Survey (2010-2020)

5	2021 Median Home Sale Price Map	TN Comptroller's Office (2021)
5	Population by Year	ACS 5-year Estimates (2006-10; 2007-11; 2008-12; 2009-13; 2010-14; 2011-15; 2012-16; 2013-17; 2014-18; 2015-19; 2016-20) Table DP05
6	Tenure by Housing Type	ACS 5-year Estimates (2016-20) Table B25032
6	Tenure by Income	ACS 5-year Estimates (2016-20) Table S2503
6	Tenure by Race	ACS 5-year Estimates (2016-20) Table S2502
7	Share of Housing Units vacant for 2 or More Years in 2020	HUD Aggregated USPS Data (2020)
7	New Residential Units to Vacant Units	Census Bureau Building Permits Survey (2020) & HUD Aggregated USPS data (2020)
7	Share of Homes Sold Under \$100,000 in 2021	TN Comptroller's Office (2021)
8	Total Population by Race	ACS 5-year Estimates (2016-20) Table DP05
8	2021 Home Buyers by race	HMDA (2021)
8	Cost Burden by Race	CHAS (2014-18) Table 9
9	Distribution of Annual Income by Race or Ethnicity	ACS 5-year Estimates (2016-20) Tables B19001A, B, C, D, E, F, G, & I
10	Percent of Population with Limited English Proficiency (LEP)	ACS 5-year Estimates (2016-20) Table S1602
10	Percent of Foreign-Born Population that Speaks Only English or English Very Well	ACS 5-year Estimates (2016-20) Table S1602
10	Fair Housing Complaints from 2015-2019	HUD Office of Fair Housing and Equal Opportunity (2015-19)
10	First Language of Limited English Proficiency Population	ACS 5-year Estimates (2016-20) Table B06007
10	Share of Commuters Traveling Outside of their County of Residence	ACS 5-year Estimates (2016-20) Table S0801
10	Median Commute Time to Work in Minutes	ACS 5-year Estimates (2016-20) Table S0801

METHODOLOGY

SOFTWARE

Data for these indicators were cleaned using R, an open-source statistical and data analysis software. The visuals were created using PowerBI, which is a Microsoft product. Due to the software limitations of PowerBI, some visuals are missing small-number values. Furthermore, for some areas, some components within a graph or the entire graph may appear to be empty. This should be interpreted as the area having no members of that group, rather than as missing data. This is often the case with smaller counties across the state.

COVERAGE

Data are compiled for 108 geographies in Tennessee over five years. This includes all 95 counties, the three regions of the state (West, East, and Middle) as well as the 9 development districts. The Research and Planning division of THDA led analysis and development of this product. Although we aim to collect all available data for all the indicators, there will be instances of missing data. In particular, tax assessment value data are missing from the following counties: <><>. As such, the aggregates developed using these counties do not contain these data and should be interpreted as such. We aspire to offer increased coverage moving forward.

THDA CALCULATED INDICES

The housing opportunity index: The index, displayed on page 1, is based on the National Association of Home Builders (NAHB) / Wells Fargo Index.ⁱ The index measures the percent of homes sold in an area that are *affordable* to a family earning the local median income based on standard mortgage underwriting criteria. This criterion include but are not limited to a median priced home, the average interest rate, and a 10% down payment.

We utilize the median family income, an estimate from the U.S. Census Bureau’s ACS 5-year estimates, the median hourly wage by occupation, an estimate from <>, and sales price data from the Comptroller’s Office. Then, we assume that the homebuyer puts down a 10% down payment. Then, we use a financial formula to calculate the monthly payments on a fixed mortgage:ⁱⁱ

$$P= L[c (1 + c)n] / [(1+c)n - 1],$$

In which “L” represents the total amount of the mortgage, “c” equals the monthly mortgage calculate your monthly fixed-rate mortgage payments, and “n” equals the number of months of the loan. In this formula, “P” equals the monthly mortgage payment for a fixed-rate mortgage.

Median home sales price: These values are calculated using data acquired from the Tennessee Comptroller’s Office. This data comes in raw form and is filtered for single family residential properties sold at fair market value at a price no less than \$10,000 with a warranty deed.

Median aggregations for regions and development districts: To generate median estimates for regions and development districts, most data points were compiled by aggregating raw numbers from the original data source. Thus, the totals of the population and those within a certain category, e.g. the total number of renters who were cost-burdened as a percentage of all renters in that geography were calculated and then aggregated to the appropriate geography. For most of the data points, this simple aggregation of raw numbers allowed for precise estimates for regions and development districts.

For three indicators in particular (median sales price, median rent, and median commute time), aggregation via the summation of raw numbers was not possible. For these indicators, we utilize a weighted median calculation which assigns a weight to each county within a region and within a development district respectively using the appropriate denominator values. For example, the median sales price for Middle Tennessee was calculated by weighting the median sales price of each county in the region by the number of homes sold in that county as a proportion of all of the homes sold in the region. Similarly, for median rent, the proportion of renters in the county relative to the region or development district was used to construct the appropriate weights. These weights were then multiplied by the median values within each county and then summed up to the appropriate geographic aggregation to offer a more accurate weighted median value at the regional or development district level.

DATASET SOURCES

HUD Aggregated USPS Data:ⁱⁱⁱ These data are related to vacancies, which are collected and distributed quarterly. These restricted data are provided to government entities and non-profit organizations registered as users. The U.S. Department of Housing and Urban Development's (HUD) agreement with the United States Postal Service (USPS) allows for them to receive quarterly aggregate data on addresses that the USPS identified as being "vacant" or "No-Stat" in the previous quarter. These quarterly data represent seasonal trends. As such, data are averaged for the four quarters of each year to provide an annual estimate.

Tennessee Comptroller of the Treasury:^{iv} This office provides THDA with annual data for all 95 counties related to all home sales that occurred in each county, including those with and without mortgages. In addition, THDA receives parcel data for the majority of Tennessee counties which offer insights into tax assessment values among other pieces of information from these partners.

KGIS:^v The Knoxville GIS office, known as KGIS, provides THDA with parcel data from Knoxville, in particular. KGIS supports Knox County, the City of Knoxville and KUB, but also provides GIS services and data to the general public.

ACS 5-year estimates:^{vi} The American Community Survey (ACS) is a publicly available survey conducted of a representative sample of Americans each year. These data are provided as both 1-year and 5-year estimates. However, the 1-year estimates are only available for areas of more

than 65,000 people, which includes only 20 counties of the 95 in the state. As such, we use 5-year estimates to ensure that all counties are represented in the Housing Indicators.

The Building Permits Survey:^{vii} Provided by the U.S. Census, this publicly available survey utilizes a “cut-off” sample, which offers complete local and county data on new housing units authorized by permits. Enacted in January of 2022, this change from a representative sample allows for monthly releases of complete local and county data. We use the rate at which permits for new construction are issued as a means of representing the rate of new construction.

CHAS:^{viii} HUD’s Office of Policy Development and Research provides publicly available Comprehensive Housing Affordability Strategy (CHAS) data, which are tabulated by ACS. These data offer insights into the extent of housing problems and housing needs based on household income. The most recently available data use 5-year ACS estimates from 2014-18.

HMDA:^{ix} The Consumer Financial Protection Bureau (CFPB) provides publicly available data from the Home Mortgage Disclosure Act (HMDA). The CFPB requires these data of most financial institutions and includes comprehensive information about mortgage loans including certain borrower characteristics such as race, ethnicity, and income. We utilize HMDA data related to mortgages for first lien, owner-occupied, 1-4 family homes. This excludes second mortgages, mortgages on units in large buildings, and other types of loans unrelated to housing.

HUD FHEO Data:^x The Office of Fair Housing and Equal Opportunity (FHEO) provides publicly available data of all Title VIII fair housing cases filed by FHEO beginning January 1, 2007. We use these data to catalog the types of fair housing complaints made from 2015 to 2019, which offers a more comprehensive snapshot than just one-year data.

For comments or questions, please email Adeel Farooqi at AFarooqi@thda.org

ⁱ “NAHB/Wells Fargo Housing Opportunity Index.” *National Association of Home Builders*. Source: <https://www.nahb.org/news-and-economics/housing-economics/indices/housing-opportunity-index>

ⁱⁱ Burbeck, Lynn. “How to Calculate Your Payments on a Fixed Rate Mortgage.” *SFGate*. Source: <https://homeguides.sfgate.com/calculate-payments-fixed-rate-mortgage-2963.html>

ⁱⁱⁱ HUD Aggregated USPS Administrative Data on Address Vacancies. *U.S. Department of Housing and Urban Development*. Source: <https://www.huduser.gov/portal/datasets/usps.html>

^{iv} Tennessee Comptroller of the Treasury. Source: <https://comptroller.tn.gov/>

^v KGIS. Source: <https://www.kgis.org/portal/Home.aspx>

^{vi} United States Census Bureau. Source: <https://data.census.gov/cedsci/all>

^{vii} Building Permits Survey. *United States Census Bureau*. Source: <https://www.census.gov/construction/bps/>

^{viii} Consolidated Planning / CHAS Data. *U.S. Department of Housing and Urban Development*. Source: <https://www.huduser.gov/portal/datasets/cp.html>

^{ix} Mortgage Data (HMDA). *Consumer Protection Financial Bureau*. Source: <https://www.consumerfinance.gov/data-research/hmda/>

^x FHEO Home. *U.S. Department of Housing and Urban Development*. Source: <https://www.hud.gov/fairhousing>