



Kentucky Housing Corporation
Housing Needs Assessment

Housing Demand Index

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Housing Demand Index

The housing demand index was generated from county level variables that influence the demand for housing in the state of Kentucky. This index utilizes an aggregate scoring system that ranks counties from greatest to least demand for each of the 18 variables included (see Table One, below); counties with the highest demand for a variable receive a 1, while counties with the lowest demand receive a 120. Each individual variable was ranked (e.g. percentage change in population) from 1 to 120. Once all individual elements were ranked, each corresponding rank was aggregated to a total score (i.e. summation of all individual scores). This aggregate score was ranked using the same methodology as the individual elements, creating an "Overall Rank" by county.

Table One: Variables included in Housing Demand Index with Definitions and Sources

Variable	Definition	Source
Percentage of Renters with Housing Costs Greater than 30% making less than \$35,000 per year	Current percentage of renters by county earning less than \$35,000 per year, whose monthly housing costs are greater than 30% of their monthly income	<i>American Community Survey 5-year Estimates. (2016). "Household Income by Gross Rent as a Percentage of Household Income in the past 12 Months." (Table B25074)</i>
Percentage of Owners with Housing Costs Greater than 30% making less than \$35,000 per year	Current percentage of owners by county earning less than \$35,000 per year, whose monthly housing costs are greater than 30% of their monthly income	<i>American Community Survey 5-year Estimates. (2016). "Household Income by Selected Monthly Owner Costs as a Percentage of Household Income in the past 12 Months." (Table B25095)</i>
Percentage of Households below VLIL (50% of Median Family Income)	Utilizing the HUD generated "Very Low Income Limit" (VLIL) cut point by county (50% of Median Family Income), the percentage of households within that county falling below that Median Family Income limit were calculated based upon PUMS data.	<i>Income information: Department of Housing and Urban Development. "Data for Section 8 Income Limits"; cross-referenced with IPUMS data</i>
Percentage of Households below LIL (80% of Median Family Income)	Utilizing the HUD generated "Low Income Limit" (LIL) cut point by county (80% of Median Family Income), the percentage of households within that county falling below that Median Family Income limit were calculated based upon PUMS household data.	<i>Income information: Department of Housing and Urban Development. "Data for Section 8 Income Limits"; cross-referenced with IPUMS data</i>
Health - ESHE Score	ESHE Score is the aggregate score generated to determine the access to food by county.	<i>County Health Rankings. (2016). "Kentucky Rankings Data."</i>
Health - Number of Major Medical Centers	Count of major medical centers by county.	<i>Dartmouth Atlas of Health Care (2015). "Data by Hospital: Kentucky"</i>
Health - Number of Primary Care Physicians	Estimate of the number of primary care physicians working in each county.	<i>County Health Rankings. (2016). "Kentucky Rankings Data."</i>
Health - Number of HIV Diagnosis per 100,000	AIDSVu provides the Number of HIV Diagnosis per 100,000 residents, which is generated from the U.S. Centers for Disease Control and Prevention national HIV Surveillance Database.	<i>AIDSVu (www.aidsvu.org). Emory University, Rollins School of Public Health.</i>
Employment - Change in Unemployment Rate between 2009 and 2016	Percentage change calculated between 2009 and 2016 based up on the estimated unemployment rate by county	<i>American Community Survey 5-year Estimates. (2009, 2016). "Employment Status." (Table: S2301)</i>

Variable	Definition	Source
Employment - Percent Change in Labor Force Participation (2009 to 2016)	Percentage change calculated based upon the total number of employed individuals residing in a county between 2009 and 2016	<i>American Community Survey 5-year Estimates. (2009, 2016). "Selected Economic Characteristics." (Table DP03)</i>
Housing - Total housing units - Occupied housing units (%)	Percentage of total occupied housing units within a county.	<i>American Community Survey 5-year Estimates. (2016). "Selected Housing Characteristics." (Table DP04)</i>
Housing - Percentage of Loans Denied	Percentage of loans denied by county for single family loans (primary residence).	<i>Consumer Financial Protection Bureau. (2016) "HMDA Data."</i>
Housing - Dwellings Built before 1979 (%)	Aggregate value generated for the number of homes built before 1979; percentage of total housing units built within a county build before 1979	<i>American Community Survey 5-year Estimates. (2016). "Selected Housing Characteristics." (Table DP04)</i>
Housing - Percentage Change in Housing Units (2009 to 2016)	Percentage change in the total number of housing units in a county between 2009 to 2016	<i>American Community Survey 5-year Estimates. (2009, 2016). "Selected Housing Characteristics." (Table DP04)</i>
Percentage of VLIL Households with HCV	Percentage of estimated "Very Low Income Households" residing within a county who receive a Housing Choice Voucher for monthly housing expenses	<i>*Author's Calculation using HCV data and HUD estimates</i>
Total Homeless	Estimated total homeless individuals within a county	<i>Kentucky Housing Corporation. 2017 K-COUNT.</i>
Population - Cumulative Estimates of the Components of Population Change - April 1, 2010 to July 1, 2016 - Total Population Change (ACS - PEPTCOMP)	Population change between 1 April 2010 and 1 July 2016 (total amount)	<i>American Community Survey. (2016). "Estimates of the Components of Resident Population Change: April 1, 2010 to July 1, 2016. 2016 Population Estimates" (Table PEPTCOMP)</i>
Industry: Percent Change in Industry Total	Percentage change of the total number of industries by county ("total number of establishments") between 2002 and 2012.	<i>Economic Census of the United States. (2002, 2012). "All sectors: Geographic Area Series: Economy-Wide Key Statistics: 200" (Table ECO200A1)</i>

Methodology

Creation of any index is an exercise in balancing parsimony with inclusion; the unmet need is not observed but estimated. The index itself utilizes variables that indicate greater levels of unmet need may exist in counties across the Commonwealth. The list of variables that can be included in any index is extremely long. Our experience with indices (both construction and utilization) has been that additional variables seldom add much to the index. They also make it more difficult to then understand the factors which led to the rankings.

We chose the variable list to be broad. Demand for housing is a multi-faceted, complex topic that is influenced by a broad spectrum of elements. We include a broad variety of factors which are correlated with both the individual and the community. The variables included can be grouped into four broad topical groups: Income, employment, health, and housing. They can also be grouped into three broad measurement types: level, percent of size, and growth. Many variables serve dual roles in the topical type. All serve dual roles by being in both a group and measurement type. We have worked to balance each type, since all factors contribute to demand.

Demand for housing is the latent amount of housing desired in the community. Measuring demand for any good is a challenge as the observed equilibrium amount of the good in the economy reflects a combination of both the demand for the good and the supply of the good. There are always individuals in an economy would like some amount of the good who obtain less than that amount. The problem is even more difficult when we consider the demand for affordable housing. This market has a public goods aspect in that there is no free market mechanism to allocate that

housing efficiently. We have chosen variables which have often been used in the analysis of the provision of other similar types of government support for low income individuals.

Income is a crucial component for understanding the demand for any good and in the present index we focus on the low income population. Six variables are used: percentage of renters and percentage of owners with housing costs greater than 30% making less than \$35,000 per year, percentage of households below VLIL, percentage of households below LIL, population growth, and total number of homeless. It may seem odd to include population growth in income, but total income in a county is highly correlated with total population. Homelessness is only weakly correlated with overall population growth, but this group clearly has severe unmet need.

Employment is included in housing demand because it measure of the overall economic status of the economy. We include the change in the unemployment rate, the change in the labor force participation rate, and the change in industries. We focus on change here as positive changes will drive the index up (similar to other measures of low income for examples). While change in unemployment is a measure of unmet need (higher unemployment indicates more need), change in total industries represents overall economic growth in the county, thus measuring total demand.

Our measures of housing focus on unmet housing need: the percentage of occupied units, percentage of loans denied, percentage of dwellings built before 1979, and percentage change in housing units. The first two clearly measure unmet need, while the last two are more subtle, measuring demand for more modern or updated units. We also note that particularly with this type of capital product, supply lags demand, hence growth in units indicates higher demand at this time (and past growth is indicative of population growth as well).

Health is included because poor health is typically associated with need for many support programs. These measures help capture both the overall growth of the economy but also the overall health of the population.

Choosing weights for any index is challenging. This is the first such index constructed and methodology for choosing weights is highly dependent on the subject matter. However, many well respected indices use the simple approach we adopted: equal weighting. Any weighting is highly controversial. A careful look at many indices will reveal that even after considerable research, weights are quite often close to equal across categories (see for example the Appalachian Regional Commissions' County Economic Status or the University of Wisconsin's County Health Rankings). Even these well-established indices are often criticized for their weights. Our approach here, given the limited scope of the project, was parsimony. The complex analysis required to achieve more subtle weighting is a large project, requiring substantial time and resources. We note too, the complexity of the myriad low income housing programs implies that some variables will be important for certain programs, while other variables will be important for other programs. To see this more clearly, consider the varied slope coefficients on these variables in the Needs Assessment (KHC Outputs and Outcomes).

How to Use the Demand Index

The Demand Index was created to provide an overall view of low income housing demand within a county. Housing is a multi-product industry and extremely complex. Demand for the type of products supplied by the Kentucky Housing Corporation is a particularly complicated industry. The purpose of any index like this is to summarize complex data and provide a starting point for deeper, detailed analysis, rather than an ending point that provides a single answer. Many times, individuals familiar with one aspect of a program find the overall ranking at odds with their perceptions. Individuals can then examine in detail factors of which they were previously unaware and place the factors they typically rely upon in a broader context. An individual seeking to dig deeper can then use the Kentucky Demographics Section of the Housing Needs Assessment (which provides detail for all variables in the index).

The index is not the only variable or value that decision makers should consider. Given the breadth of the programs offered by KHC, it would be impossible to summarize these outcomes in a single measure. The index is designed to

be used only as a starting place. The advantage is that it provides an organization with a single starting place, which then focuses the discussion surrounding topics.

Results

Based upon the ranking methodology and discussion in the previous section, Figure One displays the results of the index in a map (below). (Table Two provides the correlating rank to the colors in the map). Taking into account variables that influence demand for housing within a county, the counties shaded in red are those counties with the highest demand for housing in the state; counties shaded in dark blue have the lowest demand for housing in the state. In terms of regional trends, we see that a large portion of Eastern Kentucky is shaded in Orange (Moderate to High Demand) and Red (High Demand). Calloway County has the highest demand rank in the state, followed by Robertson, Clay, Knox, and Letcher Counties (respectively). Hancock County has the lowest demand rank in the state, followed by Spencer, Carter, Nicholas, and Webster Counties (respectively). Table Three (next page) displays all counties with their corresponding rank by category from Low Demand to High Demand.

Figure One: Demand Index Rank by County

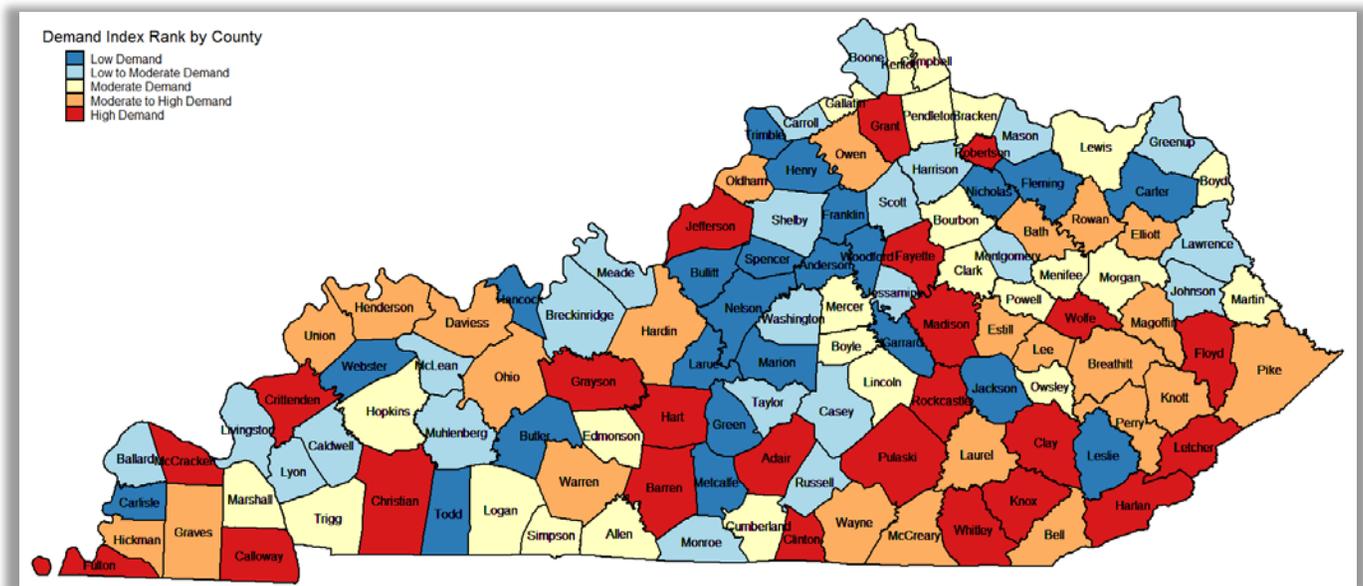


Table Two: Demand Index Categories

Category	Rank	Color
Low	97 to 120	Dark Blue
Low to Moderate	73 to 96	Light Blue
Moderate	49 to 72	Yellow
Moderate to High	25 to 48	Orange
High	1 to 24	Red

Table Three: Ranks by County and Category

Low Demand		Low to Moderate Demand		Moderate Demand		Moderate to High Demand		High Demand	
County Name	Rank	County Name	Rank	County Name	Rank	County Name	Rank	County Name	Rank
Butler County	98	Breckinridge County	74	Marshall County	49	Bell County	25	Calloway County	1
Larue County	98	Washington County	75	Kenton County	50	Breathitt County	26	Robertson County	2
Jackson County	100	Johnson County	76	Mercer County	51	Lee County	27	Clay County	3
Garrard County	101	Taylor County	77	Lincoln County	52	Henderson County	28	Knox County	4
Trimble County	102	Caldwell County	78	Campbell County	53	Elliott County	29	Letcher County	5
Nelson County	103	Lyon County	78	Powell County	54	Hardin County	30	Madison County	6
Leslie County	104	Muhlenberg County	78	Allen County	55	Perry County	30	Jefferson County	7
Todd County	105	Shelby County	81	Morgan County	56	Wayne County	32	Wolfe County	8
Woodford County	106	Mason County	82	Boyd County	57	Graves County	33	Hart County	9
Bullitt County	107	Monroe County	83	Owsley County	58	Pike County	34	Harlan County	10
Henry County	108	Russell County	84	Gallatin County	59	Estill County	35	Christian County	11
Anderson County	109	Carroll County	85	Martin County	59	Knott County	36	Floyd County	12
Green County	110	Greenup County	86	Boyle County	61	Bath County	37	Fayette County	13
Marion County	111	Casey County	87	Trigg County	61	Daviess County	38	Fulton County	13
Fleming County	112	Meade County	87	Bourbon County	63	Magoffin County	39	McCracken County	15
Franklin County	113	Lawrence County	89	Clark County	64	Laurel County	40	Rockcastle County	16
Carlisle County	114	McLean County	89	Bracken County	65	McCreary County	41	Grayson County	17
Metcalfe County	115	Boone County	91	Hopkins County	66	Owen County	42	Crittenden County	18
Webster County	116	Harrison County	92	Logan County	67	Union County	42	Adair County	19
Nicholas County	117	Ballard County	93	Edmonson County	68	Warren County	42	Whitley County	20
Carter County	118	Montgomery County	93	Cumberland County	69	Hickman County	45	Barren County	21
Spencer County	119	Scott County	93	Menifee County	69	Ohio County	45	Clinton County	21
Hancock County	120	Jessamine County	96	Pendleton County	71	Oldham County	47	Grant County	23
		Livingston County	96	Lewis County	72	Rowan County	48	Pulaski County	24
				Simpson County	72				