

## APPENDIX C METHODOLOGY FOR CALCULATING AFFORDABLE AND AFFORDABLE AND AVAILABLE RENTAL HOUSING UNITS USING CHAS DATA

### Methodology

To analyze the affordability and availability of Pennsylvania’s rental housing stock, we used special tabulations of the decennial census data called comprehensive housing affordability strategies (CHAS) data. CHAS data are available for 1990 and 2000 from HUD.<sup>1</sup>

Several indicators calculated from CHAS data are used in this study to assess Pennsylvania’s rental housing needs:

1. Housing problems for renters
2. Vacancy rates
3. Affordable rental housing units
4. Affordable and available rental housing units

### Housing Problems for Renters

Three housing problems were calculated from the CHAS data for ELI, VLI, and LI renters:

1. Cost burden
2. Housing lacking complete kitchen or plumbing facilities
3. Overcrowding, defined as more than one person per room.<sup>2</sup>

The first problem, cost burden, occurs when a renter is paying more than 30 percent of household income on rent and utilities (“gross rent”). Renters with “severe” cost burden are defined as those paying more than 50 percent of income on gross rent.

The second two problems are referred to as “housing unit” problems. According to the U.S. Census Bureau, complete plumbing facilities include (1) hot and cold piped water, (2) a flush toilet, and (3) a bathtub or shower, for the sole use of a household. Complete kitchen facilities include (1) a sink with piped water; (2) a range, or cooktop and oven; and (3) a refrigerator, also for the sole use of a household.<sup>3</sup>

These measures are the only housing quality measures included within the CHAS data. The more

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<sup>1</sup> CHAS data are funded by HUD for state and local housing planning use. The 1990 data were re-released in September 2003 and are available on CD by contacting the U.S. Census Bureau. The 2000 data are available through HUD’s website: <http://www.huduser.org/datasets/cp.html>. These data were re-released in November 2004.

<sup>2</sup> The Census Bureau does not have an official definition for overcrowding. Following standard practice, this study defines overcrowding as households with more than one occupant per room. See Blake et al. (2007) for a detailed discussion of different definitions of overcrowding and a literature review.

<sup>3</sup>Source: U.S. Census Bureau, “2000 Census – Summary File 3,” [http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en)

comprehensive quality measures available through the American Housing Survey are available only at the national level, the regional level, and for select metropolitan areas.

## Vacancy Rates

The most commonly used measure to assess rental housing supply is the vacancy rate. Yet, vacancy rates do not indicate if an available unit is in adequate condition.

While this study provides vacancy rates for each area analyzed, it does not focus on these data as the primary indicator of rental housing supply. Instead, this study gives more weight to measures of shortages of affordable housing that can be calculated from CHAS data, as defined in the next section.

## Affordable Rental Housing Units

This study calculates the numbers of renter households by HUD-adjusted area median family income (HAMFI) group and the number of rental housing units affordable to each group, assuming that gross rents that are 30 percent or less of income are affordable. The shortage/surplus of units affordable to an income group is the difference between these two numbers.

### Example: State of Pennsylvania in 2000

	Household Income ≤ 30.0% AMI (ELI)	Household Income 30.1 - 50.0% (VLI)	Household Income 50.1-80.0% (LI)	Household Income > 80.0%	Total
<b>Total Renter Households by HAMFI Group*</b>	<b>334,600</b>	<b>242,571</b>	<b>298,571</b>	<b>495,140</b>	<b>1,370,882</b>
% Distribution of HAMFI Groups	24%	18%	22%	36%	100%
<b>Total Occupied and Vacant Rental Housing Units Affordable to HAMFI Group</b>	<b>320,803</b>	<b>558,684</b>	<b>499,467</b>	<b>98,813</b>	<b>1,477,767</b>
Occupied Rental Housing Units	287,874	509,140	479,822	94,046	1,370,882
Vacant Rental Housing Units	32,929	49,544	19,645	4,767	106,885
<b>Total Shortage/Surplus of Units Affordable to HAMFI Group (Total Housing Units – Total Renter Households Within Group)</b>	<b>(13,797)</b>	<b>316,113</b>	<b>200,896</b>	<b>(396,327)</b>	<b>106,885</b>

Source: Federal Reserve Bank of Philadelphia calculations based on CHAS data, U.S. Census Bureau and HUD, 2000, Tables A10C and A12, <http://www.huduser.org/datasets/cp.html>

\* Values for total renter households are from CHAS File A10C in this example. Using CHAS files F5C and F5D to determine the total renter households by HAMFI group is also feasible and will produce slightly different results due to suppression and rounding rules for the two separate files. In other sections of the report, we have used files F5C and F5D to calculate total households. The total renter households shown in the various CHAS tables may also differ slightly from the totals in the SF3 decennial census files.

In order to more easily compare the affordability of rental housing across the state or time using CHAS data, we regularly report affordable housing unit shortages/surpluses as “mismatch” ratios (per 100 renter households). To do so, we calculated the total units affordable per 100 renter households as detailed in the following table. For example, for every 100 ELI renter households in Pennsylvania, there were 96 housing units affordable to them. The results identify a modest shortage of rental housing units affordable to ELI households but a surplus of units affordable to households with incomes between 0-50 percent AMI

and 0-80 percent of AMI. The measures suggest that there is not a substantial need for additional rental housing units for any HAMFI group, including those that were ELI.

	Household Income ≤ 30.0% AMI (ELI Renters)	Household Income 0.0- 50.0%	Household Income 0.0-80%
<b>Affordable Units per 100 Renter Households*</b> (Total Housing Units/Total Renter Households * 100)	96	152	157

\* The results for household incomes that are between 0-50 percent of AMI and 0-80 percent of AMI are cumulated to include all households with incomes at or below the income threshold and all rental housing units affordable at or below that threshold. For example, for households with incomes between 0-50 percent of AMI, the calculation is: (320,803+558,684)/(334,600+242,571)\*100.

## Affordable and Available Rental Housing Units

Calculations from the CHAS data to estimate whether the units that are affordable to a particular HAMFI group are actually available to them are performed as follows:

**Step 1:** Determine the income of the occupants actually residing in the rental housing units in each affordability range. In addition, determine the number of vacant units in each affordability range.

Example: State of Pennsylvania

Rental Units Are Occupied by:	Rent Affordable to:				Total Renters by HAMFI Group
	Household Income ≤ 30.0% AMI	Household Income 30.1- 50.0%	Household Income 50.1-80.0%	Household Income > 80.0%	
Renters with Household Incomes ≤ 30.0% AMI	131,347	121,043	69,794	12,416	334,600
Renters with Household Incomes between 30.1 - 50.0% AMI	57,919	107,439	66,929	10,284	242,571
Renters with Household Incomes between 50.1-80.0%	44,501	127,240	111,712	15,118	298,571
Renters with Household Incomes ≥ 80.0%	54,107	153,418	231,387	56,228	495,140
<b>Total Occupied Units</b>	<b>287,874</b>	<b>509,140</b>	<b>479,822</b>	<b>94,046</b>	<b>1,370,882</b>
<b>Total Vacant Units</b>	<b>32,929</b>	<b>49,544</b>	<b>19,645</b>	<b>4,767</b>	<b>106,885</b>

Source: Federal Reserve Bank of Philadelphia calculations based on CHAS data, U.S. Census Bureau and HUD, 2000, Tables A10C and A12, <http://www.huduser.org/datasets/cp.html>

**Step 2:** From the preceding table, add all cells in which units are affordable to those at each low-income threshold and occupied by renters with incomes less than or equal to the applicable thresholds. (The cells that should be added together for those with household incomes less than or equal to 50 percent of AMI are highlighted in red in the chart above as an example.)

	Rent Is Affordable to Those at Specified Income Levels and Occupied by Renters At or Below the Income Level:		
	Household Income ≤ 30.0% AMI	Household Income 0.0- 50.0%	Household Income 0.0-80%
Final Occupied Units	131,347	417,748	837,924

**Step 3:** Using the table from Step 1, determine the vacant units available to each HAMFI group and cumulate the values at or below each threshold.

	Household Income ≤ 30.0% AMI	Household Income 0.0- 50.0%	Household Income 0.0-80%
Final Vacant Units (cumulated)	32,929	82,473	102,118

**Step 4:** Add the total occupied units and total vacant units at each threshold. To estimate if there is a shortage or surplus of affordable and available units, subtract the total renter households with incomes below each threshold from the total affordable and available units.

	Household Income ≤ 30.0% AMI	Household Income 0.0- 50.0%	Household Income 0.0-80%
<b>Total Units Affordable and Available</b> (Final Occupied Units + Final Vacant Units)	164,276	500,221	940,042
<b>Total Renter Households</b>	334,600	577,171	875,742
<b>Total Shortage/Surplus of Units Affordable to Income groups</b> (Total Affordable and Available Units-Total Households)	(170,324)	(76,950)	64,300
<b>Affordable and Available Units Per 100 Renter Households*</b> (Total Affordable and Available Units/Total Renter Households * 100)	49	87	107

\* The results from the table above are cumulated. For example, to determine the affordable and available units per 100 renter households for those with household income between 0-80 percent, the calculation is: (940,042)/(334,600+242,571+298,571)\*100.