



Measuring Overcrowding in Housing



U.S. Department of Housing and Urban Development
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Table of Contents

Introduction.....	1
1. Definitions of Overcrowding.....	2
2. Overcrowding Measures	5
2.1 Persons-Per-Room (PPR).....	5
2.2 Persons-Per-Bedroom (PPB)	6
2.3 Unit Square Footage-Per-Person (USFPP)	8
2.4 Persons-Per-Room (PPR) by Unit Square Footage-Per-Person (USFPP)	10
3. Demographic Cross-tabulations	12
3.1 Persons-Per-Room (PPR).....	12
3.2 Demographics for Persons-Per-Bedroom (PPB) and Unit Square Footage-Per-Person (USFPP)	17
4. Conclusions.....	23
APPENDIX A: Literature Review	A-1
APPENDIX B: Home Size.....	B-1

List of Figures

Figure 1: Overcrowding Standards for PPR and PPB Included in the UK ODPM Report.....	3
Figure 2: Traditional and Alternate Definitions of Overcrowding.....	4
Figure 3: Persons-Per-Room, Using AHS National Data.....	6
Figure 4: Persons-Per-Bedroom, Using AHS National Data.....	7
Figure 5: Square Footage-Per-Person, Using AHS National Data.....	9
Figure 6a: PPR by USFPP, 2005.....	10
Figure 6b: PPR by USFPP, 1985.....	10
Figure 7: Persons-Per-Room (PPR) by Unit Square Footage-Per-Person (USFPP), Using AHS National Data.....	11
Figure 8: Persons-Per-Room, by Ethnicity and Race.....	13
Figure 9: Person-Per-Room, by Income.....	14
Figure 10: Person-Per-Room, by Tenure.....	14
Figure 11: Persons-Per-Room, by Region.....	15
Figure 12: Persons-Per-Room, by Metropolitan Area.....	16
Figure 13: Persons-Per-Room by Citizenship.....	16
Figure 14: Overcrowding by Ethnicity and Race.....	18
Figure 15: Overcrowding by Income.....	19
Figure 16: Overcrowding by Tenure.....	20
Figure 17: Overcrowding by Region.....	20
Figure 18: Overcrowding by Metropolitan Area.....	21

List of Figures (Cont.)

Figure 19: Overcrowding by Citizenship Status.....	22
Figure 20: Comparison of the PPR and USFPP Measures.....	24
Figure B1: Distribution of Square Footage-Per-Person, Using 2005 AHS National Data.....	B-1

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Introduction

The U.S. Department of Housing and Urban Development (HUD) funds the U.S. Census Bureau to conduct the American Housing Survey (AHS), a biennial record of the physical characteristics, quality, and condition of the nation's housing stock and of the characteristics of the households in occupied housing units. Separate AHS surveys provide periodic examinations of the housing stock in 21 major metropolitan areas.

In 2006, HUD contracted with Econometrica, Inc. and ICF International to support the production and use of the AHS. As part of that contract, HUD commissioned a study of overcrowding and how alternative definitions could be quantified using the AHS. Specifically, HUD asked the Econometrica team to explore alternative ways to define overcrowding, and to base those alternatives on what is known about the consequences of overcrowding.

We conducted this research in two parts. The first being a literature review focused on the consequences of overcrowding. We should note that HUD directed us to focus on the consequences of overcrowding for occupants and to not consider the consequences for neighbors. Specifically HUD advised us to ignore the issues of large immigrant households or households composed of many college students that are frequently discussed in newspaper articles or the popular press.

After performing an extensive literature review, it is clear that there are only a few accepted definitions of overcrowding. And of these definitions, persons-per-room (PPR) is the measure most prevalent in the literature. In this report, we utilized multiple definitions in conjunction with the AHS National data to demonstrate how overcrowding changed over time from 1985 until 2005. Our report is organized as follows:

- Section 1 presents alternative definitions of overcrowding as well as key findings from our literature review. We explore both the generally accepted measure of *persons-per-room* as well as other alternate definitions.
- Section 2 presents a summary of the different measures that were applied to the AHS and what these measures demonstrated at a high level.
- Section 3 extends the analysis in Section 2 by examining how overcrowding affects various segments of the population using each of the overcrowding measures.
- Section 4 presents our conclusions and potential next steps.

1. Definitions of Overcrowding

The most common measure of overcrowding is persons-per-room in a dwelling unit. Prior to starting our research, we understood that other popular definitions of overcrowding included: the total number of persons in a unit, regardless of unit size; the ratio of persons to floor space in square feet; and the person-to-size ratio adjusted for household composition, structure type, location, or lot size. We were interested in exploring as many of these measures as possible during our literature review to identify the best measures to capture overcrowding and the most appropriate standards.

We began our research using the extensive bibliography of a relevant research paper, “The Impact of Homeownership on Child Outcomes” (Haurin, Haurin, Parcel, 1999), web searches of Google and KnowledgePlex, and recommendations of colleagues well-versed in a variety of connected subject matters. Our preliminary research led us to journals ranging from *Child Development* to *Land Economics*. After reviewing the articles in these journals, and finding less than relevant material, we met with HUD to discuss how to re-focus our search. The agreed upon approach was to examine the prevalence of communicable diseases in overcrowded environments and the effects they have on a child’s growth and development. And of these, we focused primarily on Meningitis, Hepatitis, and Tuberculosis. These three disease vectors were in addition to looking at the effects of second-hand smoke and household hazards in overcrowded homes. Our shift in focus was fortunate as we found a report commissioned by the United Kingdom Office of the Deputy Prime Minister in 2004 that answered the key questions posed in this research task.

“The Impact of Overcrowding on Health and Education: A Review of the Evidence and Literature” was commissioned in late 2003 by the United Kingdom Office of the Deputy Prime Minister and uses chiefly primary resources and studies.¹ This report, hereafter referred to as the UK ODPM report, was the most recent and most comprehensive report we found during our literature review. The UK ODPM report identified the known impacts of overcrowding on people’s health and education, and dispelled some common misconceptions. The analysis focused on physical and mental health, childhood growth, development and education, in addition to personal safety and accidents. The review contained a bibliography of 97 articles and summarized the key conclusions of most research reports with respect to the potential relationships or associations of overcrowding.

The UK ODPM report did not attempt to recommend either a single overcrowding measure or a single standard. Instead, it recognized the benefits of multiple definitions depending on the variables being evaluated. But the two measures most evident in the 97 studies were persons-per-room (PPR) and/or persons-per-bedroom (PPB).

The standards applied to these measures are noteworthy and are included below. Figure 1 presents the standards reported for PPR and then PPB, by each health vector.

¹ The United Kingdom Office of the Deputy Prime Minister. “*The Impact of Overcrowding on Health & Education: A Review of Evidence and Literature.*” Office of the Deputy Prime Minister Publications, 2004.

Figure 1: Overcrowding Standards for PPR and PPB Included in the UK ODPM Report

Measure	Standard
PPR	
Physical Health	
Child Mortality	>1.50
Respiratory Conditions	>1.00
Children's Bronchitis	>1.50
Meningococcal Disease in Children Under 5 yrs.	>1.50
Stomach Cancer Mortality	>1.00
Mental Health	
Psychiatric Symptoms	>1.00
Mental Illness	>0.75
Reading and Mathematical Testing	>1.50
Personal Safety	
Accidents	>1.50
Child Maltreatment	>1.00
PPB	
Physical Health	
Meningitis	Not given
H. Pylori Infection	>2.00
Childhood Health, Development, and Education	
School Performance	>2.00

Source: The United Kingdom Office of the Deputy Prime Minister. *“The Impact of Overcrowding on Health & Education: A Review of Evidence and Literature.”* Office of the Deputy Prime Minister Publications, 2004.

The above figure shows that the overcrowding standard for PPR most often reported is a standard of more than 1.5 while PPB has a standard of two. In our analyses, we used a standard of two (2) for PPB but for PPR, instead of the 1.5 persons-per-room standard, we used a standard of more than one (>1). We felt a standard of more than one for PPR was both a more conservative as well as a more intuitive standard for our research.

We then considered what other measures could also be explored using the AHS National data. Our choices were unit square footage-per-person (USFPP) and then a hybrid measure that blends PPR with USFPP. Figure 2 presents a summary of each of these four measures, what the standards are for each, and the estimated percentage of overcrowding evident using the AHS National data from 1985 and 2005.

Figure 2: Traditional and Alternate Definitions of Overcrowding

Measure	Discussion of Measures and Standards	% of Overcrowded Households, Using AHS National Data		% Point Change Since 1985
		1985	2005	
Persons-Per-Room (PPR)	This measure was the one most frequently seen during our literature review. The UK ODPM report reports standards ranging from greater than 0.75 to greater than 1.50.	2.82	2.41	(0.41)
	We defined overcrowding as more than one persons-per-room. The percentage of households considered overcrowded is at the right. (We also present the percentage of households overcrowded when PPR exceed 1.50, which is shown after the one persons-per-room standard.)	0.82	0.63	(0.19)
Persons-Per-Bedroom (PPB)	<p>The UK ODPM Report also included PPB as a measure of overcrowding and it reported a standard of two persons-per-bedroom. We learned from speaking with Mr. Joe Riley about Public Housing Authorities (PHA) and overcrowding that generally PHAs try to keep to two or fewer people-per-bedroom. (There is guidance about who can share a bedroom and who cannot, the circumstances of sharing, etc.)</p> <p>With the PPB measure, overcrowding occurs as values increase (e.g., a unit with 6 people and 2 bedrooms is considered more crowded than a similar unit with only 4 people and 2 bedrooms). We used a standard of two persons-per-bedroom</p>	3.25	2.65	(0.60)
Unit Square Footage-Per-Person (USFPP)	<p>Square footage is a tangible measure of crowding and is important when considering air-borne disease. The reason being that, all else held constant, human proximity is the key to disease transmission.</p> <p>We defined an overcrowding standard of 165 square feet per person. This standard was chosen because it produced a level of overcrowding equal to the 2.4 percent of the households overcrowded for PPR when using the 2005 AHS National data.</p>	3.00	2.44	(0.56)
Persons-Per-Room (PPR) by Unit Sq Foot-Per-Person (USFPP)	This measure is a mix of PPR and USFPP. We did a cross-tabulation of PPR and USFPP, using our standards of more than one person and 165 square feet. We felt this was an important measure because it highlights how households considered overcrowded under one measure might not be under another. This cross-tabulation can yield a more accurate picture of the populations who are overcrowded and the degree that they are overcrowded.	1.10	0.90	(0.20)

Note: Negative values are shown in parentheses.

Source: ICF International analysis of AHS data.

2. Overcrowding Measures

In this section we assess overcrowding using three measures: persons-per-room (PPR), persons-per-bedroom (PPB), and unit square footage-per-person (USFPP). We also analyze overcrowding using an approach that incorporates both the PPR and the USFPP measures.

2.1 Persons-Per-Room (PPR)

We use a standard for PPR of more than one person in our analysis. Note that this measure utilizes rooms and not bedrooms. This is an important distinction because many datasets contain data on rooms – in part because rooms are easy to count. PPR is instructive because while room size may vary considerably, custom and building codes will establish either a de facto or an explicit minimum size for rooms to be considered healthy and safe.

A standard of one person per room is intuitive especially when considering occupancy of the rooms which are pressed into service as sleeping quarters. These non-traditional sleeping quarters may provide a modicum of privacy to the occupant but are likely considered less than ideal by the occupant. A standard of more than one will not address privacy concerns and relative room preferences – e.g., a single person sleeping in a living room will have less privacy compared to a bedroom with a single person.

We see that in Figure 3 the percentage of people defined as being overcrowded is relatively low – totaling approximately 2.4 percent in 2005. And over time, overcrowding appears to have fallen since the rate of overcrowding fell from 2.82 percent to 2.41 percent between 1985 and 2005.

This figure also allows us to see that if the standard was no longer more than one but was instead 0.75, as one study from the UK ODPM Report noted, the rate of overcrowding fell 3.5 percentage points between 1985 and 2005. Conversely, if the standard was tightened and was more than 1.25, then the rate of overcrowding still fell between 1985 and 2005 but only by 0.34 percentage points. If the standard was further tightened, then the decrease was only 0.19 percentage points between 1985 and 2005.

The absolute degree of overcrowding using these alternative standards for PPR is also interesting. Loosening the standard to more than 0.75 meant that rates of overcrowding in 1985 were almost 18 percent, falling to 14.4 percent in 2005. But if the standard was tightened to more than 1.5, then the rates of overcrowding fall dramatically – i.e., 0.83 percent in 1985 and 0.63 in 2005.

**Figure 3: Persons-Per-Room,
Using AHS National Data**

Persons-Per-Room	1985 (%)	2005 (%)	% Point Change from 1985 to 2005	1985 Cumulative Percent	2005 Cumulative Percent	% Point Change from 1985 to 2005
0 to <0.50	50.75	58.85	8.10	100.00	100.00	0.00
0.50 to < 0.75	31.35	26.75	(4.60)	49.25	41.15	(8.10)
0.75 through 1.00	15.07	11.99	(3.08)	17.90	14.40	(3.50)
Greater than 1.00 to <1.25	0.84	0.77	(0.07)	2.82	2.41	(0.42)
1.25 to <1.50	1.15	1.00	(0.15)	1.98	1.64	(0.34)
1.50 to <1.75	0.42	0.36	(0.06)	0.83	0.63	(0.19)
1.75 to < 2.00	0.10	0.10	0.00	0.41	0.28	(0.13)
2.00 to < 2.50	0.24	0.14	(0.10)	0.31	0.18	(0.14)
2.50 to < 3.00	0.03	0.01	(0.01)	0.07	0.03	(0.04)
Greater than 3.00	0.05	0.02	(0.03)	0.05	0.02	(0.03)

Notes: 1) Negative values are shown in parentheses. 2) The change in the distribution of overcrowded and not overcrowded households from 1985 to 2005 is statistically significant at the five percent significance level.

Source: ICF International analysis of AHS data.

2.2 Persons-Per-Bedroom (PPB)

PPB is another interesting measure in that it reflects rules and standards used with assisted housing. Those rules and standards are more specific than the standard we are using (i.e., more than two) but both effectively capture overcrowding.

In order to better understand our choice for a PPB standard, it will be helpful to provide some context on housing assistance. One of the key issues in providing housing assistance is what quality of housing to provide. This issue applies equally to project-based housing assistance where the government supports the building of units to house low-income persons and to voucher assistance where the government contributes to the rent of private units occupied by low-income households. The tension in both cases is to ensure that the assisted households receive adequate housing while avoiding providing them with housing substantially superior to that occupied by unassisted households. One dimension of this quality issue is the size of the unit. It would not make sense to offer a two-person household a three-bedroom unit that could be used by a larger household.

In its periodic Quality Control (QC) studies, HUD examines whether assisted households are over-housed or under-housed with respect to the number of bedrooms. The 2003 study found that 10 percent of all households occupied a unit with too many or too few bedrooms in 2003, according to the guidelines used for the quality control study.² With respect to under-housing, the QC guidelines were that the ratio of persons to bedrooms could not exceed two. (A one-person household could occupy a zero-bedroom unit without being considered under-housed.) The QC standard is not a HUD regulation. In general, HUD requires the agents that administer

² *Quality Control For Rental Assistance Subsidies Determinations for FY 2003*, prepared for the Department of Housing and Urban Development, by ORC Macro, Calverton, MD, August 30, 2004.

Measuring Overcrowding in Housing

its program to ensure that households are placed in appropriate sized units. The most common HUD agents are Public Housing Authorities (PHAs) and PHAs typically require that the ratio of people to bedrooms not exceed two. Many PHAs apply additional rules that take the age and the sex of children into account. The net effect of these additional rules is that some situations where the ratio of household members to bedrooms is two would still be considered cases of under-housing.

Figure 4 demonstrates that overcrowding declined between 1985 and 2005, as quantified by PPB. The share of households with more than two people-per-bedroom decreased from 3.2 percent in 1985 to 2.6 percent in 2005. In percentage point terms, the reduction in overcrowding is somewhat higher when defined in terms of PPB as opposed to PPR.

**Figure 4: Persons-Per-Bedroom,
Using AHS National Data**

Persons-Per-Bedroom	1985 (%)	2005 (%)	% Point Change from 1985 to 2005	1985 Cumulative Percent	2005 Cumulative Percent	% Point Change from 1985 to 2005
<=2	96.75	97.35	0.60	96.75	97.35	0.60
0.1 to <0.5	6.34	10.66	4.33	96.75	97.35	0.60
0.5 to <1	26.51	33.16	6.65	90.41	86.68	(3.72)
1	33.51	30.03	(3.47)	63.90	53.53	(10.37)
>1 to <1.25	0.29	0.33	0.04	30.39	23.49	(6.90)
1.25 to <1.5	11.14	9.77	(1.37)	30.10	23.16	(6.94)
1.5 to <1.75	10.44	7.51	(2.93)	18.96	13.39	(5.56)
1.75 to <2	0.26	0.29	0.03	8.51	5.88	(2.63)
2	8.26	5.59	(2.66)	8.26	5.59	(2.66)
>2	3.25	2.65	(0.60)	3.25	2.65	(0.60)
>2 to <2.25	0.01	0.01	0.01	3.25	2.65	(0.60)
2.25 to <2.5	0.41	0.33	(0.08)	3.25	2.64	(0.61)
2.5 to <3	1.09	0.85	(0.25)	2.84	2.31	(0.53)
3 to <4	1.16	1.00	(0.16)	1.75	1.46	(0.28)
4 to <5	0.37	0.34	(0.03)	0.59	0.46	(0.13)
5 to <8.5	0.22	0.12	(0.10)	0.22	0.12	(0.10)

Notes: 1) Negative values are shown in parentheses. 2) The change in the distribution of overcrowded and not overcrowded households from 1985 to 2005 is statistically significant at the five percent significance level.

Source: ICF International analysis of AHS data.

Over the past 20 years, household size, on average, has decreased while the size of an average home has increased. These have been the main drivers behind a decrease in overcrowding as measured by the PPB metric. An increasing incidence of less than two PPB may reflect consumers understanding that housing is one of the largest purchases they will make during their lives. Consumers purchase housing not just in terms of the current period and current needs but with future needs in mind as well. For example, young couples without children may choose a house with more than two bedrooms because they plan to have children at some point in the future. This purchase pattern prevents them from needing to “upgrade” their housing choices as often as they might otherwise need to do. Another reason for an increasing incidence of less than two PPB could be the aging of America. As older Americans retain the houses they raised their children in, they will technically be considered “over-housed” by any number of measures, including PPB. It is also possible that the increase in the share of households with less than two PPB is due to a change in how consumers view or define housing space with a growing trend of each room having a well defined “function”. Thus, rooms that have previously not been used much (or were used for storage) may have been converted to a spare or guest bedroom.

One of the factors that will drive how extensively PPB is used in research will be availability of the data on the number of bedrooms in a dwelling. The kind and quality of data will vary between datasets but may be more prevalent than with number of room variables, even if the number of rooms is considered easier to count.

PPB is likely to be a measure of choice when the health effects of overcrowding are a research focus. PPB effectively captures issues of human proximity, which is a critical concern when examining infection rates and airborne disease. And as a societal norm, bedrooms continue to be an area where privacy concerns are most heavily vested.

2.3 Unit Square Footage-Per-Person (USFPP)

USFPP is a measure that quantifies the amount of available personal space. It also is a measure where inter-annum comparisons are interesting in that such comparisons can demonstrate how the size of the average house has changed over time, which in turn affects crowding patterns.

Our literature review did not yield a single, widely accepted standard for USFPP. Knowing this, we created a USFPP standard by identifying a threshold (in square feet-per-person) below which overcrowding is expected to occur. We did this by using the PPR and its standard of more than one person, which indicated 2.4 percent of the population was overcrowded in 2005. We then calculated how many square feet-per-person would match this 2.4 percent threshold. Based on our calculations, overcrowding would occur when there is less than 165 square feet-per-person. (And we include as Appendix B a figure with the distribution of the 2005 AHS National data.)

We recognize that data availability is likely to hinder widespread use of this measure. As well, those datasets that do include square foot information may use different protocols for measuring square feet. For example, are common areas included? What about hallways or porches?

Measuring Overcrowding in Housing

While these are valid concerns and should ensure that researchers approach this measure with caution, the AHS National datasets includes high quality square foot data. Using these data, we see that homes, on average, have become larger over the past 20 years. In 1985, households had, on average, 740 square feet per person of living space (with the median being 596 square feet per person). In 2005, the size of the living space per person has increased, on average, by almost 24 percent to 916 square feet per person (with the median of 675 square feet per person).

Figure 5 shows that using a standard of 165 square feet, overcrowding fell between 1985 and 2005, as with the other measures discussed in this section.

**Figure 5: Square Footage-Per-Person,
Using AHS National Data**

Square Feet-Per-Person	1985 (%)	2005 (%)	% Pt Change from 1985 to 2005	1985 Percent more than	2005 Percent more than	% Point Change from 1985 to 2005
0 to <165	3.00	2.44	(0.56)	100.00	100.00	-
165 to <200	2.01	1.39	(0.62)	97.00	97.56	0.56
200 to <225	2.29	1.94	(0.35)	94.99	96.17	1.18
225 to <250	2.49	1.78	(0.71)	92.69	94.22	1.53
250 to <300	5.05	3.62	(1.44)	90.21	92.44	2.24
300 to <350	6.68	5.54	(1.13)	85.15	88.83	3.68
350 to <400	5.89	4.24	(1.65)	78.48	83.28	4.81
400 to <450	6.61	5.78	(0.83)	72.58	79.05	6.46
450 to <500	5.66	4.81	(0.85)	65.98	73.26	7.29
500 to <600	10.40	9.56	(0.84)	60.31	68.45	8.14
600 to <700	9.90	9.65	(0.25)	49.91	58.89	8.98
700 to <800	7.47	7.42	(0.06)	40.01	49.24	9.23
800 to <900	5.69	6.41	0.72	32.54	41.82	9.28
900 to <1,000	4.99	5.73	0.74	26.85	35.42	8.56
1,000 to <1,500	13.07	16.21	3.14	21.86	29.69	7.82
1,500 to <2,000	4.60	6.36	1.75	8.79	13.48	4.68
2,000 to <4,500	3.92	5.53	1.61	4.19	7.12	2.93
Greater than 4,500	0.27	1.59	1.33	0.27	1.59	1.33

Notes: 1) Negative values are shown in parentheses. 2) The change in the distribution of overcrowded and not overcrowded households from 1985 to 2005 is statistically significant at the five percent significance level.

Source: ICF International analysis of AHS data.

2.4 Persons-Per-Room (PPR) by Unit Square Footage-Per-Person³ (USFPP)

PPR and USFPP are both useful measures but each has its drawbacks. For example, neither accounts for differences in the type and characteristics of housing units. In order to provide more clarity about the degree of overcrowding, we applied both definitions simultaneously to the AHS National data.

Specifically, we created a hybrid measure that is a cross-tabulation of 1) households who are overcrowded or not overcrowded under the PPR measure, and 2) households who are overcrowded or not overcrowded under the USFPP measure. As can be seen in Figures 6a and 6b, these two measures do greatly overlap, i.e., over 96 percent of all households in 2005 lived in homes with less than one persons-per-room and had 165 square feet or more of living space per person.

The cross-tabulation analysis also provides some useful information on the degree of overcrowding. Of the 2.4 percent of households who lived in homes with less than 165 square feet-per-person, about two thirds had less than one person-per-room. They lived in less crowded households compared to the remaining one third who lived in homes with more than one person-per-room. We repeated the same analysis but raised the standard to 250 square feet-per-person. Of the 6.9 percent of the households who, in 2005, lived in homes with less than 250 square feet-per-person, about three quarters lived in homes with less than one person-per-room.

Figures 6a and 6b illustrate that when assessing overcrowding, it may be best to do so using more than a single definition or measure. Using a mixed- or multi-measure approach can be helpful to policy makers in that it can provide them with a finer degree of resolution. This in turn can ensure the best allocation of limited resources in addressing this social problem.

Figure 6a: PPR by USFPP, 2005

		USFPP		
		165 or more sq ft	Less than 165 sq ft	TOTAL
PPR	Less than One	96.27	1.54	97.81
	One or More	1.29	0.90	2.19
	TOTAL	97.56	2.44	100.00

Source: ICF International analysis of AHS data.

Figure 6b: PPR by USFPP, 1985

		USFPP		
		165 or more sq ft	Less than 165 sq ft	TOTAL
PPR	Less than One	95.74	1.70	97.44
	One or More	1.26	1.31	2.57
	TOTAL	97.00	3.00	100.00

Source: ICF International analysis of AHS data.

³ Square footage pertains exclusively to one unit detached and mobile homes.

Measuring Overcrowding in Housing

The 1985 and 2005 AHS National data indicates that the share of truly overcrowded population (i.e., those who are considered overcrowded under both the PPR and USFPP measures) has decreased. As can be seen in Figure 7, the share has dropped by about 40 basis points⁴ from 1.3 percent in 1985 to 0.9 percent in 2005.

**Figure 7: Persons-Per-Room (PPR) By
Unit Square Footage-Per-Person (USFPP), Using AHS National data**

USFPP (Sq Ft)	PPR			
	Less than One		One or More	
	1985 (%)	2005 (%)	1985 (%)	2005 (%)
0 to <165	1.70	1.54	1.31	0.90
165 to < 500	35.49	27.89	1.19	1.22
500 to 1,000	38.39	38.74	0.06	0.02
1,000 to <1,500	13.06	16.18	0.01	0.04
1,500 to <2,000	4.60	6.34	0.00	0.01
2,000 to <4,500	3.92	5.53	0.00	0.00
Greater than 4,500	0.27	1.59	0.00	0.00

Source: ICF International analysis of AHS data.

⁴ A basis point is defined as one-hundredth (1/100th) of one (1) percent.

3. Demographic Cross-tabulations

The summary data presented in this report are increasingly granular. The tables in this section focus on whether some segments of the population have a higher incidence of overcrowding than others. We also can see whether the trend over time is similar across the different demographic subpopulations.

The demographic variables explored in this section include ethnicity and race⁵, income, tenure, region, metropolitan status, and citizenship status.⁶ Section 3.1 describes how the PPR measure captures differences across these variables. Section 3.2 presents the same type of information jointly for PPB and USFPP, one table for each of the demographic variables.

3.1 Persons-Per-Room (PPR)

As previously explained, our standard for PPR is more than one person-per-room. Figure 8 shows that overcrowding among the Non-Hispanic, White population is relatively low compared to other ethnicities and races. Further, the rate of overcrowding appears stable over time with the share of overcrowded population being the same in 2005 as it was in 1985.

By comparison, overcrowding appears most prevalent among the Hispanic population. The share of Hispanic households considered to be overcrowded has decreased from 13 percent in 1985 to 12 percent in 2005, although the actual number of overcrowded Hispanic households more than doubled over the same period. A rise in overcrowding, both in relative and in absolute terms, is evident among the Hispanic, Black households. In relative terms, the share of overcrowded Hispanic, Black households increased from 5 percent in 1985 to 6 percent in 2005. In comparison, the share of overcrowded Non-Hispanic, Black households was halved in the past 20 years.

⁵ For our analytic purposes, we defined ethnicity and race as being one of four categories – i.e., Hispanic; Hispanic, Black; Non-Hispanic, Black; or Non-Hispanic-White. We did not include in these categories those considered to be American Indian, Asian, Pacific Islander, or those who were of two or more races. Further, we note that the four groupings we used are not mutually exclusive since Hispanic, Black is a subset of Hispanic.

⁶ Note that income data from 1985 have been adjusted for inflation.

Figure 8: Persons-Per-Room, By Ethnicity and Race

Persons-Per-Room	Ethnicity/Race	1985		2005	
		Households	%	Households	%
Less than One	Hispanic	4,272,293	87	9,910,528	88
	Hispanic, Black	161,175	95	379,401	94
	Non-Hispanic, White	70,695,763	99	78,030,766	99
	Non-Hispanic, Black	9,116,707	94	12,707,767	97
One or More	Hispanic	636,562	13	1,339,152	12
	Hispanic, Black	7,626	5	23,727	6
	Non-Hispanic, White	1,047,576	1	698,964	1
	Non-Hispanic, Black	617,068	6	340,683	3

Source: ICF International analysis of AHS data.

Figure 9 provides the distribution of income by persons-per-room. (We inflated the 1985 income data from 1985 dollars to 2005 dollars using the CPI from the U.S. Bureau of Labor Statistics.)

Based on the 1985 and 2005 AHS National data, overcrowding has been reduced over the past 20 years among the populations with the greatest economic need (i.e., households with negative income or without income, and the households earning less than \$25,000/year). However, the data indicate overcrowding increased among the households earning between \$25,000/year and \$100,000/year.

It is interesting to note that there are instances of overcrowding among households earning more than a quarter of a million dollars per year. This finding indicates that for some segment of the population, overcrowding would appear to be a matter of choice rather than a lack of financial means.

Figure 9: Persons-Per-Room, By Income

Persons-Per-Room	Income	1985		2005	
		Households	%	Households	%
Less than One	Negative	109,793	98	45,158	100
	No Income	1,047,224	98	1,597,012	99
	\$1-\$25,000	46,120,648	96	29,187,514	97
	\$25,000-\$50,000	26,316,689	98	27,561,301	97
	\$50,000-\$75,000	8,177,177	99	19,542,492	97
	\$75,000-\$100,000	2,288,477	99	11,770,097	98
	\$100,000-\$250,000	1,866,870	99	14,527,594	99
	Greater than \$250,000	2,199	100	2,048,124	99
One or More	Negative	2,701	2	-	-
	No Income	22,180	2	19,072	1
	\$1-\$25,000	1,684,469	4	795,121	3
	\$25,000-\$50,000	652,030	2	852,988	3
	\$50,000-\$75,000	89,942	1	581,597	3
	\$75,000-\$100,000	26,397	1	189,208	2
	\$100,000-\$250,000	18,441	1	170,462	1
	Greater than \$250,000	-	-	12,907	1

Source: ICF International analysis of AHS data.

The average size of a household considered overcrowded and earning between \$1,000 and \$75,000 per year is 6 to 7 people. For comparison, the average size of a household of comparable means but which is not considered overcrowded is 2 to 3 people.

As can be seen in Figure 10, overcrowding is most prevalent among the households who rent. Based on the published 2005 AHS report, the median size of an owner-occupied home was 1,858 square feet compared to the median size of an occupied, rented home of 1,344 square feet.

Figure 10: Persons-Per-Room, By Tenure

Persons-Per-Room	Tenure	1985		2005	
		Households	%	Households	%
Less than One	Owners	55,165,573	97	73,963,683	99
	Renters	29,252,973	95	30,577,515	95
	No-Cash Rent	2,017,156	96	1,738,093	98
One or More	Owners	979,825	2	986,282	1
	Renters	1,425,487	5	1,603,574	5
	No-Cash Rent	90,847	4	31,499	2

Source: ICF International analysis of AHS data.

When analyzed at the regional level, AHS data indicate that overcrowding is comparatively more prevalent in the Western part of the U.S.

Figure 11: Persons-Per-Room, By Region

Persons-Per-Room	Region	1985		2005	
		Households	%	Households	%
Less than One	Northeast	18,551,808	98	19,957,024	98
	Midwest	21,924,138	98	24,599,096	99
	South	29,477,806	97	38,937,093	98
	West	17,013,748	96	22,786,079	96
One or More	Northeast	410,236	2	418,772	2
	Midwest	444,983	2	355,271	1
	South	971,520	3	784,266	2
	West	669,421	4	1,063,047	4

Source: ICF International analysis of AHS data.

To gain some insight into why the degree of overcrowding differs across geographic regions, we analyzed demographic and economic characteristics of the population living in each of the four regions.

The Hispanic households, which as shown in Figure 8 have the highest rate of overcrowding among households of different ethnicities and races, predominantly live in the West and the South U.S. (40 percent and 36 percent, respectively, based on 2005 AHS National data). In 2005, they accounted for about 22 percent of the total households in the Western U.S. and about 11 percent of the total households in the Southern U.S.⁷

As can be seen in Figure 12, overcrowding is more prevalent in urban areas than in rural. This is likely a function of available space for building residential properties.

Within urban areas, the rate of overcrowding is the highest in central cities. Relative to other urban areas, central cities tend to have a higher concentration of renters, lower income households, and foreign-born population which are more likely to live in overcrowded homes.

⁷ Hispanic households' median income in 2005 was \$35,967 compared to the average income for all households of \$46,326 (Source: U.S. Census Bureau, *Income, Poverty, and Health Insurance Coverage in the United States: 2005*, available at <http://www.census.gov/prod/2006pubs/p60-231.pdf>).

Figure 12: Persons-Per-Room, By Metropolitan Area

Persons-Per-Room	Metropolitan Area	1985		2005	
		Households	%	Households	%
Less than One	Central City of MSA	28,793,419	96	30,484,907	96
	Inside MSA – Urban	28,568,607	98	34,817,035	98
	Inside MSA – Rural	9,945,661	97	14,673,484	99
	Outside MSA – Urban	7,728,635	98	10,106,109	98
	Outside MSA – Rural	11,931,177	98	16,197,757	99
One or More	Central City of MSA	1,095,049	4	1,145,871	4
	Inside MSA – Urban	669,886	2	873,334	2
	Inside MSA – Rural	258,278	3	156,721	1
	Outside MSA – Urban	179,639	2	202,634	2
	Outside MSA – Rural	293,307	2	242,796	1

Note: The Metropolitan Area categories in the 1985 AHS National data did not correspond to the categories in the 2005 AHS National data. We assumed that “Urbanized Suburb” and “Other Urban Suburb” corresponded to the 2005 category of “Inside MSA – Urban.” Similarly, we assumed that “Urbanized Area, Non-Metro” and “Other Urban, Non-Metro” corresponded to the 2005 category of “Outside MSA – Urban.”

Source: ICF International analysis of AHS data.

Figure 13 demonstrates that foreign-born, non-U.S. citizens have the highest share of overcrowded households.⁸ And those who are foreign-born, non-U.S. citizens predominantly live in the West and the South U.S. (52 percent and 28 percent, respectively, based on 2005 AHS National data).

Figure 13: Persons-Per-Room, By Citizenship⁹

Persons-Per-Room	Citizenship Status	2005	
		Households	%
Less than One	Native, Born in U.S.	92,419,256	99
	Native, Born in PR or U.S. outlying area	1,991,101	94
	Native born abroad of U.S. parents	596,900	99
	Foreign born, U.S. citizen by naturalization	5,703,815	95
	Foreign born, not a U.S. citizen	5,568,220	85
One or More	Native, Born in U.S.	1,202,531	1
	Native, Born in PR or U.S. outlying area	137,538	6
	Native born abroad of U.S. parents	7,283	1
	Foreign born, U.S. citizen by naturalization	281,173	5
	Foreign born, not a U.S. citizen	992,831	15

Source: ICF International analysis of AHS data.

⁸ When the analysis is carried out by the person’s citizenship status.

⁹ The 1985 AHS National data does not appear to contain a valid citizenship variable (i.e., CITZ80 is not present as the 1985 AHS Codebook indicates).

3.2 Demographics for Persons-Per-Bedroom (PPB) and Unit Square Footage-Per-Person (USFPP)

In this section we present two alternative measures of overcrowding, PPB and USFPP. These measures are presented jointly for the same set of demographic variables from the AHS National data as were used in the previous section. This streamlined approach was chosen in order to allow an easier comparison across the two measures, especially since the findings tend to be very similar.

The standards we apply to these two measures are the same as were discussed in Section 2. Specifically, we define a standard of two (2) for PPB and 165 square feet for USFPP.

Overall, both PPB and USFPP measures, when applied to the AHS National data, indicate that overcrowding decreased between 1985 and 2005. The same conclusion was reached when PPR measure was used with the AHS national data. Further, the trends in overcrowding among various demographic subgroups measured in terms of PPB and USFPP are generally very similar to the trends in overcrowding measured in terms of PPR.¹⁰

Figure 14 shows that in relative terms (i.e., percentage terms) overcrowding in all four ethnicity/race categories declined for both measures over the past 20 years to 2005. The largest percentage point decline during this period was among the Non-Hispanic, Black population as measured by PPB.

In absolute terms, overcrowding among the Hispanic households rose over the past 20 years, with the number of Hispanic households considered overcrowded doubling between 1985 and 2005. In comparison, the number of overcrowded households declined among the Non-Hispanic population.

Both PPB and USFPP measures indicate that overcrowding is still most prevalent among the foreign-born residents as well as households who rent homes, and/or live in central cities. When analyzed at the regional and income level, the magnitude and the trend in overcrowding differ somewhat depending on whether the PPB or the USFPP measure is used. The PPB measure indicates that overcrowding is most prevalent among the households living in the Western U.S., while the USFPP measure indicates that overcrowding is most prevalent among the households living in the Western and the Northeast U.S. Both measures indicate that the prevalence of overcrowding has decreased among the households earning less than \$50,000/year, while it has stayed constant among the households earning between \$50,000 and \$100,000. The results are different, however, for the households without income. The PPB measure indicates that overcrowding has decreased among those households from 1985 to 2005, while the USFPP measure indicates that the share of overcrowded households without any income has stayed constant during the same period.

¹⁰ The notable exception being income trends.

Figure 14: Overcrowding By Ethnicity and Race

	Ethnicity/Race	PPB				USFPP			
		1985		2005		1985		2005	
		Households	%	Households	%	Households	%	Households	%
Not Overcrowded	Hispanic	4,168,533	85	9,716,134	86	4,434,992	90	10,302,880	92
	Hispanic, Black	150,525	89	372,664	92	158,949	94	382,676	95
	Non-Hispanic, White	70,557,486	98	78,028,965	99	70,611,676	98	77,952,453	99
	Non-Hispanic, Black	9,073,523	93	12,701,049	97	9,251,125	95	12,601,747	97
Overcrowded	Hispanic	740,322	15	1,533,546	14	473,862	10	946,800	8
	Hispanic, Black	18,275	11	30,463	8	9,852	6	20,451	5
	Non-Hispanic, White	1,185,853	2	700,765	1	1,131,663	2	777,277	1
	Non-Hispanic, Black	660,253	7	347,400	3	482,651	5	446,702	3

Source: ICF International analysis of AHS data.

Measuring Overcrowding in Housing

Figure 15: Overcrowding by Income

	Income	PPB				USFPP			
		1985		2005		1985		2005	
		Households	%	Households	%	Households	%	Households	%
Not Overcrowded	Negative	112,494	100	45,158	100	112,494	100	45,158	100
	No Income	1,036,915	97	1,597,552	99	1,047,784	98	1,581,409	98
	\$1-\$25,000	25,141,537	96	28,984,675	97	25,218,001	96	28,956,720	97
	\$25,000-\$50,000	25,146,667	96	27,492,421	97	25,397,278	97	27,758,345	98
	\$50,000-\$75,000	16,204,729	97	19,592,952	97	16,385,810	98	19,718,356	98
	\$75,000-\$100,000	8,694,083	98	11,752,797	98	8,718,104	99	11,783,916	99
	\$100,000-\$250,000	8,895,620	99	14,529,101	99	8,958,831	99	14,596,543	99
	Greater than \$250,000	362,760	100	2,040,342	99	360,551	99	2,048,771	99
Overcrowded	Negative	-	-	-	-	-	-	-	-
	No Income	32,489	3	18,532	1	21,619	2	34,675	2
	\$1-\$25,000	1,067,374	4	997,960	3	990,910	4	1,025,915	3
	\$25,000-\$50,000	1,003,706	4	921,868	3	753,095	3	655,944	2
	\$50,000-\$75,000	468,019	3	531,136	3	286,939	2	405,733	2
	\$75,000-\$100,000	140,427	2	206,509	2	116,407	1	175,389	1
	\$100,000-\$250,000	118,416	1	168,956	1	55,204	1	101,514	1
	Greater than \$250,000	-	-	20,689	1	2,209	1	12,260	1

Source: ICF International analysis of AHS data.

Figure 16: Overcrowding By Tenure

	Tenure	PPB				USFPP			
		1985		2005		1985		2005	
		Households	%	Households	%	Households	%	Households	%
Not Overcrowded	Owners	55,728,213	98	74,072,123	99	55,863,217	99	74,204,936	99
	Renters	28,881,232	94	30,231,477	94	29,337,972	96	30,565,636	95
	No-Cash Rent	2,023,784	96	1,731,398	98	2,036,087	97	1,718,646	97
Overcrowded	Owners	948,983	2	877,843	1	813,979	1	745,030	1
	Renters	1,797,229	6	1,949,612	6	1,340,488	4	1,615,453	5
	No-Cash Rent	84,219	4	38,194	2	71,916	3	50,947	3

Source: ICF International analysis of AHS data.

Figure 17: Overcrowding By Region

Persons-per-bedroom	Region	PPB				USFPP			
		1985		2005		1985		2005	
		Households	%	Households	%	Households	%	Households	%
Not Overcrowded	Northeast	18,415,453	97	19,831,523	97	18,574,575	98	19,769,362	97
	Midwest	21,859,674	98	24,572,819	98	22,017,651	98	24,624,332	99
	South	29,465,163	97	38,908,763	98	29,522,304	97	39,063,645	98
	West	16,892,940	96	22,721,893	95	17,122,747	97	23,031,879	97
Overcrowded	Northeast	546,591	3	544,273	3	387,468	2	606,434	3
	Midwest	509,447	2	381,547	2	351,470	2	330,035	1
	South	984,164	3	812,596	2	927,023	3	657,714	2
	West	790,230	4	1,127,233	5	560,422	3	817,247	3

Source: ICF International analysis of AHS data.

Measuring Overcrowding in Housing

Figure 18: Overcrowding By Metropolitan Area

	Metropolitan Area	PPB				USFPP			
		1985		2005		1985		2005	
		Households	%	Households	%	Households	%	Households	%
Not Overcrowded	Central City of MSA	28,492,951	95	30,216,201	96	28,944,438	97	30,496,431	96
	Inside MSA - Urban	28,492,913	97	34,762,308	97	28,688,104	98	34,957,970	98
	Inside MSA - Rural	9,988,775	98	14,684,247	99	9,948,379	97	14,704,132	99
	Outside MSA - Urban	7,745,910	98	10,131,635	98	7,721,519	98	10,105,388	98
	Outside MSA - Rural	11,912,680	97	16,240,607	99	11,934,836	98	16,225,296	99
Overcrowded	Central City of MSA	1,395,518	5	1,414,577	4	944,030	3	1,134,347	4
	Inside MSA - Urban	745,580	3	928,061	3	550,390	2	732,399	2
	Inside MSA - Rural	215,164	2	145,957	1	255,560	3	126,072	1
	Outside MSA - Urban	162,364	2	177,108	2	186,755	2	203,355	2
	Outside MSA - Rural	311,804	3	199,946	1	289,648	2	215,257	1

Source: ICF International analysis of AHS data.

Figure 19: Overcrowding By Citizenship Status¹¹

	Citizenship Status	PPB		USFPP	
		2005		2005	
		Households	%	Households	%
Not Overcrowded	Native, Born in U.S.	92,417,801	99	92,240,676	99
	Native, Born in PR or U.S. outlying area	1,968,946	92	1,986,943	93
	Native born abroad of U.S. parents	587,268	97	594,502	98
	Foreign born, U.S. citizen by naturalization	5,665,337	95	5,771,972	96
	Foreign born, not a U.S. citizen	5,395,645	82	5,895,125	90
Overcrowded	Native, Born in U.S.	1,203,986	1	1,381,111	1
	Native, Born in PR or U.S. outlying area	159,692	8	141,696	7
	Native born abroad of U.S. parents	16,914	3	9,681	2
	Foreign born, U.S. citizen by naturalization	319,651	5	213,015	4
	Foreign born, not a U.S. citizen	1,165,406	18	665,926	10

Source: ICF International analysis of AHS data.

¹¹ The 1985 AHS National data does not contain a valid citizenship variable (i.e., CITZ80 is not present as the 1985 AHS Codebook indicates).

4. Conclusions

There are a variety of measures researchers use to objectively quantify the degree of overcrowding a certain segment of the population has. We found that the most widely used measure is apparently PPR. In our study, we analyzed overcrowding by applying three measures to the AHS National data. The measures we used are: PPR, PPB, and USFPP. We also analyzed overcrowding using a hybrid measure of PPR and USFPP.

At HUD's direction, our report focused on the affected household and did not analyze the effects overcrowded dwellings have on the neighbors. This focus led to the choice of PPR, PPB, and USFPP as measures of overcrowding because they address the amount of interior space available to household members.

Our results demonstrate that over time, the prevalence of overcrowding has decreased. This finding is not surprising. As people's standard of living improved and additional debt-financing instruments became available, more people could afford to buy homes and/or upgrade to larger ones. Further, as home ownership rates increased (and non-ownership rates declined), the average house size increased. Simultaneously, we have seen a decrease in household size over the past 20 years. As a result of all these factors, people now tend to be less crowded in their homes than in years past.

Our findings suggest that although different measures generally produce similar results, the extent of overcrowding among some subpopulations may be under-/over-estimated depending on the measure or standard used.

In Figure 20, we compare the results derived using the PPR and the USFPP measures for six demographic groups. The results indicate that the PPR measure may be overestimating the incidence of overcrowding among the Hispanic households and the households of foreign-born, non-U.S. citizens (the opposite may be said for the USFPP measure).

Figure 20: Comparison of the PPR and the USFPP Measures

	Population segments	2005	
		PPR (%)	USFPP (%)
Not Overcrowded	Hispanics	88	92
	Households with annual income \$1-\$25,000	97	97
	Renters	95	95
	West U.S.	96	97
	Central City of MSA	96	96
	Foreign born, not a U.S. citizen	85	90
Overcrowded	Hispanics	12	8
	Households with annual income \$1-\$25,000	3	3
	Renters	5	5
	West U.S.	4	3
	Central City of MSA	4	4
	Foreign born, not a U.S. citizen	15	10

Source: ICF International analysis of AHS data.

To assess the ‘true’ extent of overcrowding, a multi-vector measure (i.e., one comprised of more than a single measure) could be more appropriate. Such measures would result in a more refined assessment of overcrowding and would minimize instances of false positive outcomes. This is especially important for policymakers when determining how best to allocate limited resources to address overcrowding.

APPENDIX A: Literature Review

This Appendix contains the final literature review we conducted at the start of this task and that was provided to HUD on May 25, 2007. We include this literature review as an appendix to this report for background context and completeness.

Purpose

The Econometrica/ICF team conducted this literature review as a part of Task E: Investigating Overcrowding of the Analytical Support of the American Housing Survey 2006. The review collected articles and case studies from the existing, relevant literature. We also conducted a multi-disciplinary search for additional relevant authors and journals -- e.g., economics, public health, sociology, demography.

The information we collected responded to HUD's most immediate need, identifying plausible research linking housing conditions to medical and social problems. It also provided some guidance in advancing the remaining work on the task, namely, to determine the impacts of overcrowding, determine why overcrowding is important and how best to measure it, and to try to track trends in overcrowding.

Methodology

We began our research using the extensive bibliography of a relevant research paper, "The Impact of homeownership on Child Outcomes" (Haurin, Haurin, Parcel, 1999), web searches of Google and KnowledgePlex, and recommendations of colleagues well-versed in a variety of connected subject matters. Our preliminary research led us to journals ranging from *Child Development* to *Land Economics*. After reviewing the articles in these journals, and finding less than relevant material, we re-focused our search to examine the prevalence of communicable diseases in overcrowded environments and the effects they have on a child's growth and development. We focused primarily on Meningitis, Hepatitis, and Tuberculosis. These were in addition to looking at the effects of second-hand smoke and household hazards, in overcrowded homes, specifically. This shift in focus was fortunate as it led us to a report commissioned by the United Kingdom Office of the Deputy Prime Minister in 2004 that happens to answer all the questions posed in Task E.

"The Impact of Overcrowding on Health and Education: A Review of the Evidence and Literature" was commissioned in late 2003 by the Deputy Prime Minister and uses chiefly primary resources and studies. The report identifies the known impacts of overcrowding on people's health and education, and dispels some common misconceptions on the topic. The analysis is focused on physical and mental health, childhood growth, development and education, in addition to personal safety and accidents. The review contains a bibliography of 97 articles and summarizes the key conclusions of most with respect to the potential relationships or associations of overcrowding.

Copies of this report, *The Impact of Overcrowding on Health and Education: A Review of the Evidence and Literature*, were submitted to HUD in electronic and hard copy forms in late February.

While we did not use the reports found in our initial search, we still feel that they were helpful in that they helped narrow our focus and led us to discover the United Kingdom Office of the Deputy Prime Minister's report.

We searched through many pertinent journals and found that most were not useful. Relevant articles, if only loosely related to overcrowding, are summarized below.

Literature and Case Studies

"The Impact of Home Ownership on Child Outcomes," Donald Haurin, R. Jean Haurin, and Toby Parcel, 1999.

Haurin, Haurin, and Parcel's study, through controlling social, demographic, economic, child-specific, unobserved, and influential factors, finds that owning a home will ultimately lead to a better home environment than what would be achieved when renting a home.

Most notably, their study finds that children of homeowners tend to do six and seven percent better on reading achievement and math achievement, respectively. Additionally, children of homeowners are slightly less (four percent) likely to have behavioral problems. Tangentially, the authors refer to literature that suggests that these differences in achievement and behavior often results in a more promising economic and social future for children of homeowners.

"Patterns of Childhood Residence and the Relationship to Young Adult Outcomes", R. Jean Haurin, 1992.

Focusing on the effects of stability in housing and parenting, Haurin concludes that disruptions in a child's development, specifically divorce or a change to a single-parent household, leads to inconsistency in the raising of the child and often results in economic and social disadvantages. When a divorce happens in a family, the child most often goes to live with the mother.

According to Haurin, the sooner the custody transition, joint or other wise, happens, the better. Multiple moves, changes in schools, friends, role models etc., effects the child's socialization and sense of attachment. Data in Haurin's report supports that children who encounter disruptions of this sort are less likely to complete high school, more likely to have behavioral problems, and even more likely to engage in illegal activity and unwanted pregnancies. While Haurin does not make a point to discuss overcrowding, the report does lay out a clear case as to the effect a well-balanced and nurturing home has on the raising of a child.

“The Relation of Infants’ Home Environments to Achievement Test Performance in First Grade: A Follow-Up Study”, Robert H. Bradley, Bettye M. Caldwell, 1984.

Rather than view the home environment in the sense of neighborhood, space, and amenities, Bradley and Caldwell measure the home environment through the Home Observation for Measurement of the Environment test. This instrument was used to evaluate infants and children 12-24 months old and their families, and included some of the following observations: the emotional and responsiveness of the mother; acceptance of child; organization of the environment; provision of appropriate play materials; material involvement with the child; and variety in daily stimulation. When the child was three years old, a more mature version of the tool was administered measuring the following: toys, games, and reading materials; language stimulation; physical environment; pride, affection, and warmth; stimulation of academic behavior; modeling and encouraging of social maturity; variety of stimulation; and physical punishment.

The children were then given the Mental Development scale at age three and were administered the SRA Achievement Test upon entering first grade. The layers of testing were done to compare the differences amongst the children and the environments in which they were raised.

One of the most notable correlations between the infant testing and the first grade testing is the importance of toys and materials in shaping a child’s cognitive abilities. Bradley and Caldwell make an understated connection to the income of the parents and their ability to provide the appropriate amount of space and toys to cultivate this learning in a child, but there are no conclusions associated to homeownership or overcrowding in the home.

“Home Observation for Measurement of the Environment: Development of a Home Inventory for Use with Families Having Children 6 to 10 Years Old”, Robert H. Bradley, Bettye M. Caldwell, Stephen L. Rock, Holly M Hamrick, and Pandia Harris, 1988.

This study, by Bradley, Caldwell, Rock, Hamrick, and Harris is a continuation of Bradley and Caldwell’s research using the HOME methods for measuring infants to first graders.

Elementary HOME is a 59-item scale evaluating a child’s emotional climate, provision for active stimulation, paternal involvement, among other factors that will give evaluators a clearer picture of the child’s environment. Information derived from this version of HOME may be a useful way to identify risk factors in the home. In this way, the tool will be especially helpful for social workers and school guidance counselors in understanding a child’s behavior or problems in underachievement.

“Measuring the Benefits of Homeowning: Effects on Children”, Richard Green and Michelle White, 1997.

Richard Greene and Michelle White explore the effects homeownership has on their children versus parents who are renters. While this paper does not address issues in overcrowding, explicitly, it does touch on the different housing environments that children grow up in and the way that those environments shape their lives physically, emotionally, and behaviorally. Through probit models and bivariate probit techniques, Greene and White conclude that children who grow up in a home, owned by their parents or guardians, have an advantage over those children raised in a rented home. This is based on data suggesting that homeownership is often indicative of a two-parent family which provides stability for raising a family.

A homeowner is also more likely to be invested in their neighborhood and community; ensuring a safe and diverse environment for their family. Renters, on the other hand, are less likely to be as invested in their neighborhood because of the instability and lack of continuity in a renter's home tenure.

Furthermore, the researchers use the data to conclude that homeowners will often be of a higher level of education and therefore in a higher income bracket than those of renters. Children raised with greater economic resources will have the benefit of superior health care, better education, and more social opportunities than children raised in a poorer home.

“The Epidemic Theory of Ghettos and Neighborhood Effects on Dropping Out and Teenage Childbearing”, Jonathan Crane, 1991.

Jonathan Crane seeks to defend ghettos by defining them as communities that have an epidemic of social problems. He believes that as such, these communities are a victim of a destructive pattern that has negative effects on the community, especially its youth.

A neighborhood susceptible to crime, gangs, and unemployment creates a negative environment, especially for youth because of impressionability. Crane examines teenagers in this study, and finds that, regardless of race, youth in the worst neighborhoods of the largest U.S. cities, will see a dramatic rise in the number of high drop-outs and teenage childbearing.

“Economic Development and Early Childhood Development”, Greg J. Duncan, Jeanne Brooks-Gunn, Pamela Kato-Klebanov, 1994.

The authors of this study examine the effects of poverty on a child's development.

A key finding of this report is that the duration of poverty has the most profound effect on a child, and not the timing in early childhood.

In addition, their findings show that income does have a determining factor on a child's cognitive development and behavioral tendencies, as does maternal academic achievement. A mother's level of schooling can have a causal effect on the income of the family, and therefore effect a child's early development.

“When Bigger Is Not Better: Family Size, Parental Resources, and Children's Educational Performance”, Douglas B. Downey, 1995.

The inverse relationship between the number of siblings in a family and the educational performance of a child can be traced back to the available resources the child is exposed to. Downey uses this claim to more acutely investigate the relationship between parent, child, and resources to illustrate why this is so.

“Empirical Evidence on Cross-Tenure Differences in Home Maintenance and Conditions”, George C. Galster, 1983.

Galster sets out to challenge the claim that homeowners occupy a higher-quality dwelling than their renter counterparts.

This study is not based on the initial purchase of the home or of the payments on the rental, but by the maintenance performed to improve or otherwise maintain the quality of the dwelling.

Galster concludes that owner-occupants do generally spend more on the maintenance of their dwelling, but considers other factors as to why this may be so. Primarily, that an owner-occupant has an investment in their dwelling and by maintaining it structurally and aesthetically, they will be more likely to remain in their home.

“Determining Children's Home Environments: the Impact of Maternal Characteristics and Current Occupational and Family Conditions”, Elizabeth G. Menaghan and Toby L. Parcel, 1991.

The past few decades have sparked a wave of research exploring the effect that working mothers have on their children. Menaghan and Parcel focus on the cognitive and socioemotional relationship that a working mother has on the home environment she creates for her child(ren).

They found that maternal characteristics such as age, education, ethnicity, and initial self-esteem and locus of control are critical factors in determining the environment created for the child. By in large, a working mother will be of higher education, have greater self-esteem, and have a greater locus of control, all attributed of someone who is successful in

their job. These same attributes are also large contributors to a home environment that will allow a child to excel academically, socially, and behaviorally.

“Do Neighborhoods Influence Child and Adolescent Development?”, Jeanne Brooks-Gunn, Greg J. Duncan, Pamela Kato-Klebanov, and Naomi Sealand, 1993.

Brooks-Gunn, Duncan, Klebanov, and Sealand prove that neighborhoods have a large influence on the children raised within it. Not surprisingly, children of affluent neighborhoods tend to do better than children raised in low-income neighborhoods.

The authors examined the effect of integrating low-income children into affluent neighborhoods and have found that this has an adverse effect on the child’s development.

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APPENDIX B: Home Size

**Figure B1: Distribution of Square Footage-Per-Person,
Using 2005 AHS National Data**

Square Feet-per-Person	Count of Households	Percent	Cumulative Percent
0 to < 10	2,955	0.00	0.0
10 to < 20	18,270	0.02	0.02
20 to < 30	44,325	0.04	0.07
30 to < 40	48,166	0.05	0.12
40 to < 50	64,655	0.07	0.18
50 to < 60	74,903	0.08	0.26
60 to < 70	46,167	0.05	0.30
70 to < 80	74,519	0.08	0.38
80 to < 90	84,429	0.09	0.46
90 to < 100	141,870	0.14	0.61
100 to < 110	242,772	0.25	0.85
110 to < 120	157,228	0.16	1.01
120 to < 130	282,909	0.29	1.30
130 to < 140	186,580	0.19	1.49
140 to < 150	195,273	0.20	1.68
150 to < 160	521,738	0.53	2.21
160 to < 170	543,320	0.55	2.76
170 to < 180	363,836	0.37	3.13
180 to < 190	452,541	0.46	3.59
190 to < 200	242,799	0.25	3.83
200 to < 210	1,225,484	1.24	5.07
210 to < 220	443,370	0.45	5.52
220 to < 230	817,115	0.83	6.35
230 to < 240	453,328	0.46	6.81
240 to < 250	742,204	0.75	7.56
250 to < 500	23,717,750	23.99	31.55
500 to <600	9,453,932	9.56	41.11
600 to <700	9,535,762	9.65	50.76
700 to <800	7,333,025	7.42	58.18
800 to <900	6,333,041	6.41	64.58
900 to <1,000	5,662,679	5.73	70.31
1,000 to < 1,500	16,025,209	16.21	86.52
1,500 to < 2,000	6,284,055	6.36	92.88
2,000 to < 2,500	2,786,349	2.82	95.70

Measuring Overcrowding in Housing

Square Feet-per-Person	Count of Households	Percent	Cumulative Percent
2,500 to < 3,000	1,459,944	1.48	97.18
3,000 to < 3,500	975,542	0.99	98.16
3,500 to < 4,000	159,697	0.16	98.32
4,000 to < 4,500	83,436	0.08	98.41
Greater than 4,500	1,573,020	1.59	100.00

Source: ICF International analysis of AHS data.