

TELEPHONE COVERAGE, HOUSING QUALITY, AND RENTS: RDD SURVEY BIASES

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1. Introduction

The Department of Housing and Urban Development (HUD) uses Random Digit Dialing (RDD) surveys to establish and update its Fair Market Rents (FMRs) for a large part of the nation. In the Section 8 Certificate program, FMRs are the maximum rents allowed for units in the program and therefore serve as an upper limit on subsidy payment allowances. In the Section 8 Voucher program, they serve as the basis for calculating program participant subsidy payments. To be eligible for use in the Section 8 program, rental units must meet a set of HUD housing quality standards.

HUD's objective in setting FMRs is to obtain an estimate of the 40th percentile rent paid by recent movers in units that pass the American Housing Survey "Moderate Physical Problem" housing quality standard. Its RDD surveys do not contain housing quality questions. HUD's assumption is that rental surveys of units with telephones have an upward bias, and that this offsets the downward bias from including some units with telephones that would fail the AHS "Moderate" housing quality standard.

Telephone coverage in the United States is high but by no means universal. In rural areas it may be as low as 70%. It is even lower in some areas for rural rental households with low incomes.

This paper describes the relationship between telephone coverage, the quality of rental units, and rent levels. Its intent is to provide information on the extent to which the upward bias in median rents that results from surveying only units with telephones is counter-balanced by the downward bias from including some substandard units in the telephone survey.

The analysis is based on two data sources that provide data on rents, telephone coverage, and housing quality: the 1% Public User Microdata Sample of the 1990 Census (PUMS) and the 1993 American Housing Survey (AHS.) It first examines housing quality

measures, telephone coverage, and their interrelationships. It then examines median rents among different groups, and assesses the potential bias introduced by not screening out rental units that would fail Section 8 housing quality standards.

The major finding is that, regardless of which data source is used for comparison, the RDD surveys used by HUD have a very small survey bias relative to the intended standard. More detailed findings are summarized as follows:

- Units with severe housing deficiencies tend to have lower than average rents but only comprise 2-3% of the overall inventory and have only a slight downward bias on rents at the national and Census Region levels of geography examined.
- Units without telephones are far more common than deficient units, especially in rural areas. Surveys limited to units with phones have an upward bias.
- Median rents for all units with telephones are 1% or less higher than the rents of all rental units, including those without phones, that pass the more extensive housing quality measures available in the American Housing Survey.
- The net effect of surveying only units with telephones and not screening for housing deficiencies is to produce RDD survey rent estimates that have a slight upward bias relative to surveys that include all rental units and screen out units failing available housing quality measures.

The next sections assess the Census-based and AHS-based quality measures, respectively.

¹ Economists, Office of Policy Development and Research. None of the views expressed herein are the official policies of the U.S. Department of Housing and Urban Development or the Federal Government. Prepared for the Joint Statistical Meetings, Section on Survey Research Methods, August 1996, Chicago, IL.

2. 1990 Census Analysis

Census Housing Quality Measures.--This analysis is limited to 1-to-3 bedroom rental units paying a cash rent of \$1,200 or below, and is based on unweighted tabulations of the 1990 1 percent Public Use Microdata Sample (PUMS.) "Nonmetropolitan" is used as a proxy for "rural". "Deficiency," as measured by the 1990 Census, is a relatively simple housing quality standard. A unit is considered "Deficient" if either or both of the following questions is answered "No":

H10 Do you have COMPLETE plumbing facilities in this house or apartment; that is, 1) hot and cold piped water, 2) a flush toilet, and 3) a bathtub or shower?

Yes, have all three facilities No

H11 Do you have COMPLETE kitchen facilities; that is, 1) a sink with piped water, 2) a range or cookstove, and 3) a refrigerator?

Yes No

Only 1.2% of all rental units are identified as deficient using the Census questions. A more detailed breakdown follows:

Table 1

Percentages	Total	Metro	Non-Metro
Deficient:	1.2	1.0	2.1
With Phone	0.9	0.8	1.3
No Phone	4.2	3.5	5.7
Without Phone	10.3	8.5	18.0

The Census definition of deficiency is less inclusive than the AHS's "Severe Physical Problem" or "Moderate Physical Problem" housing quality standards,² although the measurement outcomes of the Census standard and the AHS "Severe" standard are similar. For example, 2.8% of AHS rental units have "severe" problems, and an additional 6.6% have "moderate" problems.³ Using the two Census deficiency questions

²A detailed description of these housing quality standards is available from the authors.

³American Housing Survey for the United States in 1993, "Current Housing Reports," H150/93, 1995,

alone would not approximate the criteria specified by HUD's Housing Quality Standards (HQS) for the Section 8 program. Those criteria are difficult to measure without on-site inspection.

Telephone Coverage.--10.3% of all rental units had no telephone in 1990. Metropolitan areas had 8.5% non-coverage and nonmetropolitan areas had 18% non-coverage (see Table 1, above).

Previous research has shown a wide range of telephone non-coverage, and a strong relationship between non-coverage and low incomes. The highest non-coverage rate was found among black households living in the nonmetropolitan South, about 30% of whom did not have telephones.⁴ A substantial proportion of renters, especially in rural areas, do not have telephones and hence would be excluded from RDD-type surveys.

Telephone Coverage and Unit Quality.--Table 1 shows that 4.2% of units without phones were Deficient, while only 0.9% of those with phones were Deficient. This pattern was similar for metropolitan and nonmetropolitan areas. Only 1.3% of nonmetro rental units with phones were Deficient. This leads to the following conclusions:

- A sample of rental units with telephones is likely to encounter few that are Deficient, as measured by the two Census questions.
- One cannot assert that all or most nonmetropolitan units without phones are Deficient; less than 6% of nonmetropolitan units without phones fail the Census housing quality questions.
- The assertion that "everybody has a telephone," including many living in shacks that are obviously deficient, is incorrect. So is the assertion that not screening for housing quality causes RDD telephone surveys to be biased downward. First, units with phones have higher rents. Second, a much higher percentage of units lack telephones than are deficient. Third, not having a phone means that a unit has a much

Tables 2-7.

⁴1980 Census data, in Alan Fox, Effects of Phone Non-Coverage on FMR Telephone Surveys. (HUD, 1991, unpublished). That paper did not separate units by tenure, so the rate of non-coverage is likely to be even higher for rental units.

higher than normal likelihood of being Deficient.

Rents and Telephone Coverage.--The Census median gross rent of units with telephones (\$453) is 42% higher than those without phones (\$319; Table 2). However, because most units do have telephones, a better comparison is between the median rent for all Census units (\$439) and Census units with phones (\$453). Thus, a telephone survey without any housing quality screening questions would overstate median rents by about 3%.

Because more nonmetropolitan units do not have phones, a nonmetropolitan survey of telephone households would overstate the median rent of all rental units by about 4%. A metropolitan survey would overstate rents by about 2%.

Table 2

Median Rents	Total	Metro	Non-Metro
Units With Phone	\$453	\$484	\$324
All Units	\$439	\$473	\$312
Ratio: Phone/All	1.032	1.023	1.038

Rents and Housing Deficiencies.--The Census median gross rent of units without housing deficiencies (\$440) is 39% higher than the median of those identified as Deficient (\$316; Table 3).

Table 3

Median Rents	Total	Metro	Non-Metro
All Units	\$439	\$473	\$312
Not Deficient	\$440	\$474	\$314
Deficient	\$316	\$398	\$170
Ratio: Not Deficient/Deficient	1.39	1.19	1.85

Serious housing deficiencies are more common in nonmetropolitan areas and appear to have a much greater effect on rents: median rents for non-Deficient units were 85% higher in nonmetropolitan areas, compared with only 19% higher in metropolitan areas. (Income and rent data suggest that some urban consumers without phones may be *choosing* not to have them, and that relatively more rural renters may not have them because they cannot *afford* them.)

Again, however, because almost all Census units are judged not to be Deficient (about 99%), the difference between all Census units (\$439) and those that are not Deficient (\$440) is negligible.

RDD Survey Bias: Census.--Because RDD surveys are conducted by phone, some units are missing from the sample frame. Table 1 showed that, at the national level, 8.5% of metropolitan units and 18% of nonmetropolitan units would be excluded because they lack telephones. Telephone rent surveys that don't have housing quality screening have two biases--an upward bias from only including units with telephones, and a downward bias from including units that the Census would classify as physically deficient. On net, Table 4 shows that the surveys produce an upwardly biased measure of rent relative to the Census of from 2 to 3%.

Table 4

Median Gross Rents	Total	Metro	Non-Metro
What RDD Survey Gets: With Phone	453	484	324
What is Desired: No Deficiencies	440	474	314
Ratio: RDD Survey Bias	+3.0%	+2.1%	+3.2%

3. American Housing Survey Analysis

The American Housing Survey-National Sample, conducted every other year, contains a much more detailed set of quality-related questions than does the Census. An appendix to this paper contains descriptive and computer-oriented definitions of AHS's two adequacy measures--called "Severe Physical Problems" and "Moderate Physical Problems." Because of the far more extensive set of questions that can be asked in an hour-long personal interview survey such as the AHS, housing units can be screened for adequacy with far greater detail than is possible with the Census.

This analysis is based on rental units in the 1993 national AHS, and essentially replicates what was done with the Census PUMS. Table 5 below shows that a total of 9.4% of rental units had physical problems--2.8% met the Severe problems standard and an additional 6.6% fail the "Moderate Physical Problems" standard. Physical problems were slightly more prevalent in nonmetropolitan areas than elsewhere, as seen below:

Table 5

Rental Unit Problems (AHS)	Percent With Physical Problems		
	Total	Metro	Non-Metro
No Problems	90.6%	91%	91%
Moderate Problems Only	6.6%	6%	7%
Severe Problems	2.8%	3%	2%

As expected, the following table shows that median rents decrease with the severity of housing problems:

Table 6

Rental Unit Problems	Median Gross Rents		
	Total	Metro	Non-Metro
No Problems	\$492	\$547	\$420
Moderate Problems	\$405	\$467	\$337
Severe Problem	\$390	\$423	\$310

Far more rental units were without telephones than had physical problems. This was particularly notable among non-metropolitan units, where 27-28 % of those with moderate or severe problems lacked a telephone. As with rents, Table 7 shows little difference in telephone coverage between those with moderate and those with severe problems:

Table 7

Problems	Percent Without Telephone		
	Total	Metro	Non-Metro
No Problems	12%	11%	14%
Moderate Problems	23%	20%	27%
Severe Problems	23%	21%	28%

RDD Survey Bias: AHS.--HUD's objective is setting Fair Market Rents is to replicate the 40th percentile recent mover rent for units passing the AHS "Moderate Physical Problems" standard. RDD surveys that only target units with telephones but fail to screen out units with problems produce rent estimates that are very close to what would occur from a survey of rental housing units that did filter out units failing the "Moderate Physical Problems" standard. Using the AHS national survey as a reference point, the average RDD survey bias is to slightly overstate FMR estimates. At the national level, the 40th percentile recent mover rent estimate from the universe of rental units with telephones is within 1% of the 40th percentile rent of all rental units passing the "Moderate" quality standard:

Table 8

Survey Bias	Median Gross Rents		
	Total	Metro	Non-Metro
What RDD Gets: With phone	\$496	\$549	\$424
What is Desired: No problems	\$492	\$547	\$420
Ratio ("RDD Survey Bias")	+0.8%	+0.4%	+1.0%

Because of the relatively high incidence of housing problems and low proportion of telephones in the rural South, further analysis was conducted to assess the risk that the RDD survey bias might be significantly higher at the Census Regional level. The results showed that the bias rarely exceeded 1% even at a Census Region metropolitan/nonmetro level of geography. As shown in Table 9, the net bias ranged from -1.3% to +1.3%.

Table 9

Survey Bias	Northeast		Midwest		South		West	
	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro	Metro	Non-Metro
What RDD Gets: With Phone	\$587	\$481	\$480	\$379	\$502	\$404	\$640	\$488
What is Wanted: No Problems	\$595	\$484	\$479	\$374	\$501	\$402	\$637	\$484
Ratio: "RDD Survey Bias"	-1.3%	-0.6%	+0.2%	+1.3%	+0.2%	+0.5%	+0.5%	+0.8%

4. Conclusion: Are Telephone Rent Surveys Seriously Biased?

A comparison with Census and American Housing Survey data shows that Random Digit Dialing telephone surveys that do not screen for unit quality produce 40th percentile rent estimates that are very similar to 40th percentile rent estimates for units meeting the desired Census American Housing Survey (AHS) "Moderate" quality housing standard. The upward bias that results from surveying only units with telephones is almost exactly counter-balanced by the downward bias from including units that would fail the AHS "Moderate" housing quality standard.

Depending on the data source (and hence the extent of sub-standard housing), this paper finds that RDD surveys overestimate rents by at most 3%, even in nonmetropolitan areas with large numbers of units not covered by telephones. Using the more complete housing quality definition found in the AHS, the bias is in the 1% range. The AHS definition comes closest to reproducing the Section 8 Housing Quality Standards, which implies that RDD-based estimates closely approximate the desired rent estimate outcome. Based on Census and AHS analysis done to date, HUD's RDD surveys appear to have a very low bias relative to the desired estimates of rent and, to the extent there is a bias, it is normally upward and less than 1% in magnitude.

5. Additional Research

HUD has considered adding the full set of AHS housing quality questions to some of its RDD surveys to study their impacts. Doing so would result in somewhat higher refusal rates. However, the real difficulty is implicit in the results provided in this paper--the downward bias in rent estimates caused by inclusion of low-rent units that do not meet housing quality standards tends to be at least offset by the exclusion of units without telephones. Without being able to correct for the upward bias introduced by excluding units without telephones, research on how to modify HUD RDD surveys to screen out units that appear likely to fail HUD Housing Quality Standards has little point.

The 1990 Census offers a more fruitful future research option. The 5% PUMS sample can be used to provide more detailed locational information on the housing quality of units with and without telephones. The next objective would be to measure the impacts of using only the universe of units with telephones on a state-by-state metro/nonmetro basis using the 5% PUMS. County or county-group analysis also appears feasible.