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MEMORANDUM FOR ACS Research and Evaluation Advisory Group

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Subject: Plumbing and Kitchen Facilities in Housing Units

Attached is the final American Community Survey (ACS) Research and Evaluation report, "Plumbing and Kitchen Facilities in Housing Units". We conducted this evaluation to identify the combinations of plumbing and kitchen facilities as reported by the 2009-2013 ACS 5-year, and the effect on estimates of occupied housing units lacking facilities if the flush toilet question was removed from the ACS. If you have any questions about this report, please contact David Raglin at 301-763-4226.

Attachment

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# Plumbing and Kitchen Facilities in Housing Units

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## EXECUTIVE SUMMARY

For many years, the Census Bureau has asked about plumbing and kitchen facilities in the Decennial Census and the American Community Survey. The facilities are:

- Hot and cold running water
- A flush toilet
- A bathtub or shower
- A sink with a faucet
- A stove or range
- A refrigerator

The Census Bureau considers housing units having each of the first three facilities to have complete plumbing facilities, and housing units having each of the last three facilities to have complete kitchen facilities. The Census Bureau publishes tables on complete plumbing facilities and complete kitchen facilities.

Through the 2014 Content Review process, we learned that there are Federal agencies that have mandatory and required uses for the data on plumbing and kitchen facilities. For example, the Department of Housing and Urban Development uses the data from these questions to identify housing units that have all of the six listed facilities (referred to in this paper as having “fully complete facilities”).

However, asking explicitly about flush toilets has resulted in negative attention from the public. Given that, we studied some of the effects of removing the flush toilet question and leaving the other facilities questions on the survey, focusing on changes in the measurement of housing units with fully complete facilities and complete plumbing facilities.

We found that

- Based on the 2009-2013 American Community Survey 5-Year data, 1.06 percent of housing units in the United States lack one or more of the six facilities.
- Of the 115.6 million occupied housing units in the country, 33,680 of them do not have a flush toilet but have the other five facilities (0.03 percent). These units do not have fully complete facilities as currently measured, but if we removed the toilet question from the American Community Survey, they would be considered to have fully complete facilities.
- There are 38,690 occupied housing units that do not have a flush toilet but have the other two plumbing facilities (0.03 percent). These units do not have complete plumbing facilities as currently measured, but if we removed the toilet question from the American Community Survey, they would be considered to have complete plumbing facilities.
- If we remove the flush toilet question from the American Community Survey, 11 counties would see an increase in housing units with fully complete facilities of one percent or more, and 13 counties would see an increase in occupied housing units with complete plumbing facilities of one percent or more.

## INTRODUCTION

The American Community Survey (ACS) question on plumbing and kitchen facilities asks about six specific facilities. They are:

**Figure 1: Current ACS Plumbing and Kitchen Facilities Questions**

<b>8</b>	<b>Does this house, apartment, or mobile home have –</b>	Yes	No
	a. hot and cold running water?	<input type="checkbox"/>	<input type="checkbox"/>
	b. a flush toilet?	<input type="checkbox"/>	<input type="checkbox"/>
	c. a bathtub or shower?	<input type="checkbox"/>	<input type="checkbox"/>
	d. a sink with a faucet?	<input type="checkbox"/>	<input type="checkbox"/>
	e. a stove or range?	<input type="checkbox"/>	<input type="checkbox"/>
	f. a refrigerator?	<input type="checkbox"/>	<input type="checkbox"/>

We use the first three questions to determine if the housing unit has complete plumbing facilities, and the last three to determine if a housing unit has complete kitchen facilities. ACS tables B25016, B25047, B25048, B25049, and B25050 on American FactFinder have information on complete plumbing facilities. Tables B25051, B25052, B25053, and B25054 have information on complete kitchen facilities. Tables DP04 and S2504 have information on both complete plumbing facilities and complete kitchen facilities. No ACS tables provide information about the individual components of complete plumbing and complete kitchen facilities, but that information is available on the ACS Public Use Microdata Sample (PUMS) files.

The recent ACS Content Review showed that there are many mandatory and required uses of the facilities question by several Federal agencies, including the Department of Agriculture, the Department of Commerce, the Department of Health and Human Services (HHS), the Department of Housing and Urban Development (HUD), the Environmental Protection Agency (EPA), the Small Business Administration (SBA), and the Federal Reserve Board. The data are used for many programs, including the Fair Market Rents, the Emergency Solutions Grant (ESG), the Community Development Block Grants (CDBG), and the Historically Underutilized Business Zones (HUBZone) programs, among others (U.S. Census Bureau, 2014). For example, HUD uses the data in combination; if a housing unit lacks either complete plumbing facilities or complete kitchen facilities, HUD considers the unit to be substandard.

The question about a flush toilet has received negative attention from Congress, the media, and respondents. We wondered how removing the flush toilet question from the ACS but keeping the other plumbing and kitchen facility questions would change the estimates of the number of occupied housing units with all facilities and the number with complete plumbing facilities. This paper gives the results of that research.

## BACKGROUND

The Decennial Census and the ACS have long asked about various housing facilities. The 1970 Census form asked “Is there hot and cold piped water in this building?”, “Do you have a flush toilet?”, “Do you have a bathtub or shower?”, and “Do you have complete kitchen facilities? Complete kitchen facilities are a sink with piped water, a range or stove, and a refrigerator.” In the 1980 Census, the 1990 Census, and Census 2000, we combined the plumbing questions into one question on the long form. In Census 2000, the question was, “Do you have COMPLETE plumbing facilities in this house, apartment, or mobile home; that is: 1) hot and cold piped water, 2) a flush toilet, and 3) a bathtub or shower?”<sup>1</sup> (The question on kitchen facilities was also reformatted along the lines of the plumbing facilities question.)

The ACS asked the same complete plumbing and kitchen questions as Census 2000 until 2008, when the survey first asked separately about the three plumbing and three kitchen facilities as shown in Figure 1. The change improved the editing of the data and gave us the ability to evaluate the relationship between substandard housing and individual components of plumbing and kitchen in the US and Puerto Rico (Woodward, 2007).

In this paper, we refer to a housing unit with all six facilities to have “fully complete facilities”, consistent with our terminology about complete plumbing and complete kitchen facilities. We consider a housing unit with all of the facilities except a flush toilet to not have fully complete facilities, but if the flush toilet data were unavailable, the unit would be considered to have fully complete facilities. This paper looks at the combination of facilities lacking in occupied housing units and the effect on the determination of housing units with fully complete facilities and complete plumbing facilities if the flush toilet question was dropped.

## RESEARCH QUESTIONS

- 1) What combinations of facilities are lacking in occupied housing units?
- 2) What is the increase at the county-level in occupied housing units with fully complete facilities and complete plumbing facilities without the flush toilet question?<sup>2</sup>

## METHODOLOGY

We used the 2009-2013 ACS 5-Year data for this analysis, since we want to make estimates for all counties, which is only possible using the 5-year data.

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<sup>1</sup> Images of the 1970, 1980, 1990, and 2000 Census questionnaires can be found at [https://www.census.gov/history/www/through\\_the\\_decades/questionnaires/](https://www.census.gov/history/www/through_the_decades/questionnaires/). Images of the ACS questionnaires can be found at [http://www.census.gov/acs/www/methodology/questionnaire\\_archive/](http://www.census.gov/acs/www/methodology/questionnaire_archive/).

<sup>2</sup> We did the analysis at the county-level because that is a key geographic level used for the HUD Fair Market Rent determinations and it is a detailed geographic summary level that covers the entire country.

- The data in this paper are estimates which are subject to error, both sampling and nonsampling. For more information please see: [http://www.census.gov/acs/www/data\\_documentation/documentation\\_main/](http://www.census.gov/acs/www/data_documentation/documentation_main/).
- The data were weighted using the final weights, the same ones that are used to produce tabulations and account for the probability of selection with adjustments for unit nonresponse and population controls.
- We included only occupied housing units, not vacant housing units, because most of the tables on facilities include only occupied housing units.
- The data are shown separately for owner-occupied and renter-occupied housing units because some of the tables break out the data that way and many users focus on one or the other.
- The county-level effect is measured by the percentage increase in occupied housing units with fully complete facilities and complete plumbing facilities if the toilet question was removed.

## RESULTS

### 1. What combinations of facilities are lacking in occupied housing units?

Table 1.1 shows the number of occupied housing units having all facilities, lacking one facility, lacking two facilities, and so on. We show the margins of error in the appendix.

**Table 1.1: Number of Lacking Facilities in Occupied Housing Units**

Number of Lacking Facilities	Number of Occupied Housing Units			Percent of Occupied Housing Units		
	All	Owners	Renters	All	Owners	Renters
No Facilities Lacking*	114,383,000	74,646,070	39,736,935	98.94	99.43	98.03
Some Facilities Lacking	1,227,215	429,630	797,580	1.06	0.57	1.97
Exactly 1 Facility Lacking	699,265	217,810	481,455	0.60	0.29	1.19
Exactly 2 Facilities Lacking	162,065	44,370	117,700	0.14	0.06	0.29
Exactly 3 Facilities Lacking	53,945	21,415	32,530	0.05	0.03	0.08
Exactly 4 Facilities Lacking	42,030	23,035	18,995	0.04	0.03	0.05
Exactly 5 Facilities Lacking	52,715	23,995	28,720	0.05	0.03	0.07
All 6 Facilities Lacking	217,195	99,010	118,185	0.19	0.13	0.29
Total Occupied Housing Units	115,610,216	75,075,700	40,534,516	100.00	100.00	100.00

\* Otherwise known in this paper as housing units with fully complete facilities.

Data may not add to totals due to rounding.

Source: 2009-2013 American Community Survey 5-Year. For more information, see <http://www.census.gov/acs>.

The data show that an extremely high percentage of occupied housing units have all six facilities; 0.60 percent of units are lacking exactly one facility and 0.19 percent of units are lacking all six facilities. Owner-occupied units are lacking one facility 0.29 percent of the time, while renter-occupied units are missing exactly one facility 1.19 percent of the time.

When only one facility is lacking, which facility is lacking? Table 1.2 provides that information. We show the margins of error in the appendix.



**Table 1.2: The Missing Facility When Only One is Lacking**

Missing Facility	Number Of Occupied Housing Units			Percent of Occupied Housing Units		
	All	Owners	Renters	All	Owners	Renters
Hot and Cold Running Water	103,230	55,115	48,115	0.09	0.07	0.12
Flush Toilet	33,680	20,335	13,345	0.03	0.03	0.03
Bathub or Shower	28,615	15,545	13,070	0.02	0.02	0.03
Sink With Faucet	36,820	16,725	20,095	0.03	0.02	0.05
Stove or Range	415,565	83,210	332,350	0.36	0.11	0.82
Refrigerator	81,355	26,875	54,480	0.07	0.04	0.13
Total: Exactly 1 Facility Lacking	699,265	217,810	481,455	0.60	0.29	1.19
Total: Occupied Housing Units	115,610,216	75,075,700	40,534,516	100.00	100.00	100.00

Data may not add to totals due to rounding.

Source: 2009-2013 American Community Survey 5-Year. For more information, see <http://www.census.gov/acs>.

When only one facility is missing, it is most likely to be a stove or range, with 415,565 units lacking only a stove or range. We found there are 33,680 occupied units that do not have a flush toilet but have the other five facilities (0.03 percent of the 115,610,216 occupied housing units), meaning they would be considered to have fully complete facilities without the flush toilet question.

In a separate calculation (not shown in the table) using only the three components of complete plumbing facilities (hot and cold running water, flush toilet, and bathtub or shower), we found there are 38,690 occupied units (0.03 percent) that have no flush toilet but have the other two plumbing facilities, so they would be considered to have complete plumbing facilities if we did not ask about flush toilets.

## 2. What is the increase at the county-level in occupied housing units with fully complete facilities and complete plumbing facilities without the flush toilet question?

Table 2.1 classifies the 3,143 counties or county equivalents in the United States by the percent increase in the number of occupied housing units that would be considered to have fully complete facilities if the toilet question was removed.

For example, if there are 10,000 occupied housing units in a county that have fully complete facilities and 144 more that have all facilities except flush toilet (and therefore would have 10,144 occupied housing units with fully complete facilities if we eliminated the toilet question). That is an increase of 144/10,000, or 1.44 percent.

**Table 2.1: Number of Counties by Percent Increase in Units  
With Fully Complete Facilities Without the Flush Toilet Question**

Counties by Percent Increase of Units With Fully Complete Facilities	Number of Counties			Percent of Counties		
	All	Owners	Renters	All	Owners	Renters
Number of Counties: Increase of 1% or greater	11	20	34	0.3	0.6	1.1
Number of Counties: Increase of less than 1%	1,187	942	496	37.8	30.0	15.8
Number of Counties: No increase	1,945	2,180	2,613	61.9	69.4	83.1
Total counties in the United States	3,143	*3,142	3,143	100.0	100.0	100.0

\* Kalawao County, Hawaii, had no owner-occupied housing units sampled in the 2009-2013 American Community Survey 5-Year, and is therefore not included in that column.

Source: 2009-2013 American Community Survey 5-Year. For more information, see <http://www.census.gov/acs>.

In Table 2.1, we estimate that 61.9 percent of counties have no occupied housing units lacking a toilet but possessing all of the other facilities, and therefore the estimate of occupied housing units with fully complete facilities would not be affected if the toilet question was removed from the questionnaire. For owner-occupied units, 69.4 percent of counties would not be affected, and for renter-occupied units, 83.1 percent of counties would not be affected.

On the other side, 11 counties would have an increase of one percent or more in the estimate of housing units with fully complete facilities if the toilet question was removed. For owner-occupied housing units, there would be 20 counties with an increase of one percent or more, and for renter-occupied units, 34 counties would have an increase of one percent or more. All of these counties with large increases are small counties (only one with more than 10,000 occupied housing units), and therefore the margins of error on such a rare characteristic in a small area are very large.

Table 2.2 looks at the percent increase in occupied housing units with complete plumbing facilities if the flush toilet question was not in the ACS, measuring the impact at the county level.

**Table 2.2: Number of Counties by Percent Increase in Units  
With Complete Plumbing Facilities Without the Flush Toilet Question**

Counties by Percent Increase of Units With Complete Plumbing Facilities	Number of Counties			Percent of Counties		
	All	Owners	Renters	All	Owners	Renters
Number of Counties: Increase of 1% or greater	13	24	33	0.4	0.7	1.0
Number of Counties: Increase of less than 1%	1,296	1,031	560	41.2	32.8	17.8
Number of Counties: No increase	1,834	2,087	2,550	58.4	66.4	81.1
Total counties in the United States	3,143	*3,142	3,143	100.0	100.0	100.0

\* Kalawao County, Hawaii, had no owner-occupied housing units sampled in the 2009-2013 American Community Survey 5-Year, and is therefore not included in that column.

Source: 2009-2013 American Community Survey 5-Year. For more information, see <http://www.census.gov/acs>.

The data in Table 2.2 are similar to the data in Table 2.1, and show that there would be few counties with an increase of one percent or more in occupied housing units with complete plumbing facilities if the toilet question was dropped from the ACS, and that most counties would see no change in the estimate of complete plumbing facilities.

## **FUTURE RESEARCH**

If we want to know the full effect of dropping the flush toilet question, we would need to compare current tabulations to tabulations that would consider units lacking only a flush toilet to be fully complete and to have complete plumbing facilities. We also could do other research to better understand housing units lacking complete plumbing and kitchen facilities as asked about in the ACS.

## **REFERENCES**

U.S. Census Bureau (2014). "American Community Survey: Handbook of Questions and Current Federal Uses".

[http://www.census.gov/acs/www/Downloads/congress/ACS\\_Federal\\_Uses.pdf](http://www.census.gov/acs/www/Downloads/congress/ACS_Federal_Uses.pdf)

Woodward, J; Wilson, E; and Chesnut, J. (2007). "Evaluation Report Covering Facilities".

[http://www.census.gov/acs/www/Downloads/library/2007/2007\\_Woodward\\_02.pdf](http://www.census.gov/acs/www/Downloads/library/2007/2007_Woodward_02.pdf)

## APPENDIX – Margins of Error

**Margins of Error, Table 1.1: Number of Lacking Facilities in Occupied Housing Units**

# of Facilities Lacking	Number of Occupied Housing Units			Percent of Occupied Housing Units		
	All	Owners	Renters	All	Owners	Renters
No Facilities Lacking	245,210	348,272	110,004	0.01	0.01	0.02
Some Facilities Lacking	10,440	4,946	8,071	0.01	0.01	0.02
Exactly 1 Facility Lacking	5,409	3,210	4,780	<0.01	<0.01	0.01
Exactly 2 Facilities Lacking	2,623	1,324	2,311	<0.01	<0.01	0.01
Exactly 3 Facilities Lacking	1,617	825	1,492	<0.01	<0.01	<0.01
Exactly 4 Facilities Lacking	1,321	903	870	<0.01	<0.01	<0.01
Exactly 5 Facilities Lacking	1,822	980	1,475	<0.01	<0.01	<0.01
All 6 Facilities Lacking	5,986	3,039	3,807	0.01	<0.01	0.01
Total Occupied Housing Units	238,223	345,645	114,260	NA	NA	NA

<0.01 indicates that there is a margin of error but it rounds to less than 0.01.

Source: 2009-2013 American Community Survey 5-Year. For more information, see <http://www.census.gov/acs>.

**Margins of Error, Table 1.2: The Missing Facility When Only One is Lacking**

Lacking Facility	Number of Occupied Housing Units			Percent of Occupied Housing Units		
	All	Owners	Renters	All	Owners	Renters
Running Water	2,444	1,612	1,805	<0.01	<0.01	<0.01
Flush Toilet	1,331	989	926	<0.01	<0.01	<0.01
Bathtub or Shower	1,375	914	864	<0.01	<0.01	<0.01
Sink With Faucet	1,418	953	982	<0.01	<0.01	<0.01
Stove or Range	4,178	1,860	3,975	<0.01	<0.01	0.01
Refrigerator	1,706	1,044	1,387	<0.01	<0.01	<0.01
Total With 1 Facility Lacking	5,409	3,210	4,780	<0.01	<0.01	0.01

<0.01 indicates that there is a margin of error but it rounds to less than 0.01.

Source: 2009-2013 American Community Survey 5-Year. For more information, see <http://www.census.gov/acs>.