Accessibility Features for Older Households in Subsidized Housing

JANUARY 2020 | WHITNEY AIRGOOD-OBRYCKI AND JENNIFER MOLINSKY

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January 2020

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Abstract

As the overall population ages, the number of very low-income older adult households that qualify for HUD housing assistance is rising rapidly. Older adults tend to stay in subsidized housing longer than younger families. As a result, older adults make up a growing share of HUD-subsidized renter households. In the last ten years alone, the share of older adults in HUD-subsidized housing has risen five percentage points, and older adult households now make up over a third of all subsidized renters. In this paper, we examine whether the subsidized housing stock is suitable for aging in place. We ask: What physical challenges do older subsidized renters face? What difficulties do they experience with their housing environment? And, are subsidized units more equipped with accessibility features than units without rent assistance?

To answer these questions, we used the 2011 American Housing Survey, the last vintage of this survey to include detailed questions about housing accessibility and household mobility difficulties. We constructed a comparison group of eligible, unsubsidized renters making up to 30 percent of area median income. We used chi-square statistics, logistic regression modeling, and propensity score matching to identify differences in housing accessibility and mobility difficulties between subsidized and unsubsidized, eligible older adults. We also compare households receiving project-based subsidies to those receiving tenant-based vouchers.

The findings confirm that older subsidized renters have many vulnerabilities, but rental housing assistance provides more livable housing in terms of accessibility than private-market rentals. We also find that renters receiving project-based rental assistance typically have more accessibility features than those receiving tenant-based assistance, but the differences are not statistically significant. Ultimately, our results highlight the benefit of subsidized housing but also point to unmet needs. Livable and wheelchair accessible units are lacking for older, extremely low-income renters, whether they receive a subsidy or not. While many units are potentially modifiable, only a small share have basic accessibility features that make them currently livable for older adults.

Introduction

The aging of the baby boom generation is driving rapid increases in the number and share of older adult households age 65 and over nationwide. With age, more older adults experience functional disabilities that make walking, climbing stairs, bending, and reaching more difficult, increasing the need for housing that offers accessibility features. This paper examines the need for accessible housing among low-income renters and analyzes data from the American Housing Survey to ascertain the extent to which older adults receiving rental subsidies live in accessible housing.

Older adults' incomes have risen over the last fifteen years (Joint Center for Housing Studies, 2018), but still nearly two million older households age 62 and over have very low incomes, pay more than 30 percent of their incomes for housing, and/or live in overcrowded or poor quality units (US Department of Housing and Urban Development, 2017). As the older population has grown with the aging of the baby boomer population, the number of older, very low-income renters meeting eligibility requirements for Department of Housing and Urban Development (HUD) housing subsidies has risen. From 2013 to 2015 alone, it increased from 3.95 million to 4.65 million (US Department of Housing and Urban Development, 2017). Yet housing assistance for older adults remains well below need, serving only one in three older adults (Joint Center for Housing Studies, 2018). At the same time, however, older adult households make up a large and growing share of subsidized renter households. According to HUD data from the 2018 Picture of Subsidized Households, 36 percent of HUD-subsidized renters are older adults, up five percentage points from 2008.

Housing assistance can provide a crucial safety net for older households, significantly lowering housing costs and providing stable housing. HUD subsidies targeted specifically to older households and persons with disabilities began in the 1990s and enable public housing authorities (PHAs) to set aside public housing units for elderly tenants. Today, many PHAs also offer supportive services that help households age in place. Thus, housing subsidies go well beyond being a financial support. Subsidized housing may be better suited for promoting aging in place among older adult households than non-assisted housing.

Despite the increasing number of older adult households who are eligible for and occupying subsidized rental housing, few studies to date have examined the experiences of older adults in subsidized housing, the suitability of subsidized housing for aging in place, or the supportive services that are provided at affordable housing sites. This paper addresses one element of these gaps in the existing literature by examining the availability of accessibility features for older, subsidized renters and comparing them to older, unsubsidized renters in the private market.

In particular we ask: What physical challenges do older subsidized renters face? What difficulties do they experience with their housing environment? And, are subsidized units more equipped with accessibility features than units without rent assistance? Using data from the American Housing Survey, we answer these questions through chi-square tests, logistic regression modeling, and treatment effect estimation through propensity score matching. The findings confirm that older subsidized renters have many vulnerabilities, but rental housing assistance provides more livable housing in terms of accessibility than private-market rentals. We also find that renters receiving project-based rental assistance have more features than those receiving tenant-based assistance, but the differences are not statistically significant. The results point to the greatest unmet needs and can help shape policies and practices for our most vulnerable older adults.

In the following sections, we first review the literature on aging in subsidized housing, focusing on the characteristics of these older households, the suitability of the subsidized rental stock, and the legal framework for renters to request reasonable modifications to make their housing accessible. Next, we describe the data and methods we used, followed by the results, a discussion of what these results mean, and concluding thoughts on the needs of older adults in subsidized housing and how policy might meet their needs.

Aging in Subsidized Housing

While there are HUD programs designed specifically for elderly households, older adults aged 62 and over who receive federal rental subsidies live in units with all kinds of subsidies. HUD's 2018 Picture of Subsidized Households reports that older adults make up 27 percent of households receiving Housing Choice Vouchers, 33 percent of public housing residents, and 49 percent of project-based Section 8 residents. In total, 1.6 million older households receive HUD subsidies, and more older adults live in federally-subsidized housing than in nursing homes (McFadden & Lucio, 2014). The largest share, 38 percent, live in project-based Section 8 units. Another 20 percent live in public housing. The Section 202 program was specifically designed to provide housing and services for older adults as they age and become frailer (Spillman, Biess, & MacDonald, 2012), but only eight percent of all HUD-subsidized older adults live in these units. For many, subsidized housing brings stability and provides a crucial safety net as they age. Larkin, Aykanian, Dean, & Lee (2017) found that one in five older adults were homeless before receiving housing assistance.

Characteristics of Older Adults in Subsidized Housing

Older adults live in subsidized housing longer than younger households. Older adults stay in subsidized housing for about nine years on average, which is longer than the typical duration for younger households, and subsidy duration for older adults has increased over the last 20 years (McClure, 2018). In a longitudinal study from 2000 to 2008, Locke et al. (2011) found that older tenants left HUD programs at age 78 on average, and 27 percent were at least 85 at the time of exit, with higher age of exits for residents of project-based multifamily units than for voucher recipients.

Low-income older adults tend to be more vulnerable given their financial status, lack of savings and assets, and higher rates of disability. The older adults receiving federal housing subsidies have characteristics that make them particularly vulnerable. Case studies from across the country and across different types of subsidized housing developments consistently show that these households often consist of a single person living alone (Beard & Carnahan, 2011; Elliott, McGwin Jr., Kline, & Owsley, 2015; Pater, Agimi, & Albert, 2014; Shin, Sims, Bradley, Pohlig, & Harrison, 2014), which can be a disadvantage when a householder requires personal assistance or help with household chores. In several studies, residents are overwhelmingly black (Black, Rabins, German, McCuire, & Roca, 1997; Elliott et al., 2015; Simning, van Wijngaarden, Fisher, Richardson, & Conwell, 2012), though Beard's (2011) examination of LIHTC residents in Ohio and Shin et al.'s (2014) study of public housing residents in a Delaware city both had majority white samples. Chronic diseases are prevalent among older subsidized households, and many of these households have unmet healthcare needs. Across studies, between a third to over one-half of residents rate their health as only fair or poor (Black et al., 1997; Gonyea, Curley, Melekis, Levine, & Lee, 2018; Noonan, Hartman, Briggs, & Biederman, 2017; Pater et al., 2014; Sanders, Stone, Meador, & Parker, 2010).

Activities of daily living (ADL) and instrumental activities of daily living (IADL) limitations are also common among older subsidized households (Black et al., 1997; Blass et al., 2006; Cotrell & Carder, 2010; Gonyea et al., 2018). These limitations can include difficulties with stooping or crouching (Pater et al., 2014), which impact residents' abilities to safely move about their homes. Additionally, these limitations are correlated with a greater likelihood of anxiety and depression (Gonyea et al., 2018; Sanders et al., 2010; Simning, Conwell, Fisher, Richardson, & van Wijngaarden, 2012).

Given the overwhelming need for mental and physical healthcare as well as need for assistance with ADL and IADL tasks, there is a role for public housing authorities and subsidized housing property owners to provide accessible housing and on-site services (such as social workers, meals programs, or medical checks). It is unknown how widespread services are, particularly given the range of services and

programs that might be provided, but previous studies have found that accessibility falls short of need (Dawkins & Miller, 2017).

Reasonable Modifications for Accessibility Features

The Fair Housing Amendments Act of 1988 (FHAA) and Section 504 of the Rehabilitation Act of 1973 provide a legal structure for residents to obtain accessible features as needed and specify the percentage of units in a federally subsidized project that must be accessible. These laws require property owners to allow for reasonable accommodations that ensure households with disabilities can use their housing and are not denied the benefits of federal programs on the basis of disability alone. Disability is defined broadly in HUD's program regulation for Section 504 as a "physical or mental impairment that substantially limits one or more major life activities" (24 CFR § 8.22, 1991). Accommodations can include reasonable modifications, which are structural changes that make the unit accessible to the resident. Installing grab bars in the unit or a ramp to the building are both examples of reasonable modifications (US Department of Housing and Urban Development, 2008).

Under the Fair Housing Act, all renters with disabilities, whether in subsidized or private market housing, can request reasonable modifications. When reasonable modifications are approved, tenants in the private market are responsible for making and paying for the modifications (US Department of Housing and Urban Development, 2008). They may also be required to return the unit to its previous state when they move. Under Section 504, housing providers receiving federal financial assistance are required to provide and pay for any needed modifications (US Department of Housing and Urban Development, 2008). HUD's regulatory guidance specifies, however, that accepting a tenant-based voucher does not count as receiving federal financial assistance (24 CFR § 8.22, 1991). Thus, property owners of project-based subsidized housing, such as public housing or project-based Section 8, are required to pay for reasonable accommodations, while renters using vouchers in the private market would typically be responsible for covering those costs.

This framework of course requires renters to know what their legal rights are and, in the case of private market renters and voucher holders, to be able to afford the cost of modification. It also requires property owners and landlords to know their legal responsibilities. Renters in subsidized housing and those receiving vouchers might be more likely to obtain modifications than those in the private market because the PHAs serve as an information-sharing agency that can help educate these renters about their rights. Additionally, those receiving project-based subsidies might be more likely than voucher

recipients to obtain reasonable modifications because there are lower barriers in terms of cost and in terms of interaction with on-site staff in project-based communities.

Federal law also governs the share of units in multifamily projects that must be accessible. HUD's Section 504 guidance states that, for newly-constructed buildings, "a minimum of five percent of the total dwelling units or at least one unit in a multifamily housing project [with at least five units], whichever is greater, shall be made accessible for persons with mobility impairments" (24 CFR § 8.22, 1991).[1] The same five percent rule applies for existing buildings with at least 15 units that undergo major alterations. Even the Section 202 program, designed specifically for elderly renters, requires that only five percent of units have accessibility features (Pynoos, Nishita, Cicero, & Caraviello, 2008).

While the five percent rule serves as a minimum requirement, it is unknown how many subsidized units actually have accessibility components or how many tenants have requested reasonable modifications (Pynoos et al., 2008). In fact, the existing literature provides little assessment of the appropriateness of physical accessibility for meeting the needs of residents who frequently have ambulatory difficulties. High rates of ambulatory difficulties and inabilities to perform activities of daily living suggest that some older adults are restricted by the accessibility of their homes. Chi et al. (2013) argue that there is a need for addressing structural problems in subsidized rental buildings that can heighten the risk of falls and impede older residents who rely on walkers or wheelchairs.

Data and Methods

This paper uses data from the 2011 American Housing Survey (AHS). The AHS documents demographic characteristics of subsidized households, their physical disabilities, the challenges they have with navigating their housing environment, and the accessibility features available in their homes. While this wave of the AHS is slightly dated, it is the most recent vintage to include modules on accessibility and healthy homes.

The AHS is a nationally representative sample, and HUD validates the subsidy status variable in the dataset using administrative records. Subsidized renters either receive a federal Housing Choice Voucher or live in a unit with a project-based subsidy (such as public housing, project-based Section 8, or Section 202).[2] We include in our analysis any household with an "elderly" person present, which HUD defines as age 62 and over.

[1] This rule also applies to LIHTC properties that are cross-subsidized with federal funding.
[2] Given data limitations, this analysis does not include units built with Low Income Housing Tax Credits, though this is an important source of affordable housing.

The analyses and results are split into two sections. We first compare older subsidized households to older, income-eligible but unsubsidized renter households making up to 30 percent of area median income.[3] We then compare older, subsidized households receiving project-based assistance to those receiving tenant-based assistance.

We use a variation of Bo'sher et al.'s (2015) index to assess the accessibility of units. Bo'sher et al. developed the index after conducting extensive analysis of the AHS accessibility module and discussing the most crucial elements of accessibility with experts in the field. They use a three-level approach to categorize units as modifiable, livable, or wheelchair accessible.[4]

- Modifiable units have the basic structural components of accessible housing, including a no-step entrance into the building, a bathroom and bedroom on the entry level of the unit, or an elevator within the unit.
- Livable units are suitable for households with moderate mobility difficulties and have the components of modifiable units plus no steps between rooms (or the presence of grab bars along steps) and an accessible bathroom with grab bars.
- Wheelchair accessible units meet the above criteria but have no steps between rooms, extra-wide doors and hallways, handles and levers instead of knobs, wheelchair-accessible electrical switches, outlets, and climate controls, and accessible countertops, cabinets, and kitchen features.

We initially replicated this index but found that, for our sample of units inhabited by extremely low-income older adults, very few were fully wheelchair accessible. This left inadequate sample sizes for statistical analysis. We also found the potentially modifiable category to be insufficient for this analysis because these units do not currently have accessible features, merely the possibility to have them in the future. We do present descriptive statistics for the three levels of accessibility from Bo'sher et al. (2015), but in subsequent analyses, we use a binary measure that combines the livable and wheelchair accessible levels into one category and the modifiable and unmodifiable units into a second category. After presenting descriptive statistics on challenges that older adults have with their housing, we use weighted chi-square statistics to identify statistically significant differences in housing accessibility

[3] For some programs, income-eligibility extends up to 80 percent of area median income, the HUD classification of "low-income." The majority of older adults receiving assistance are extremely low-income, so we use the 30 percent cutoff as a closer comparison group. The results are sensitive to this threshold. We also compared older, subsidized renters to older, unsubsidized renters with incomes up to 50 percent of area median income and found even greater differences between these two samples.

[4] Units that do not meet any of these requirements are considered unmodifiable with no potential for accessibility in their current state.

between the samples. Next, we use survey-weighted logistic regression models to compare the likelihood of having accessibility features when controlling for other housing and household characteristics. The dependent variable for the models is the collapsed index indicating whether a unit is at least livable or not. The independent variable of interest is whether a household receives a housing subsidy in the first set of models and whether a household receives a project-based housing subsidy in the second set of models. Each set includes a model with: 1) regional fixed effects, 2) regional and metro fixed effects, and 3) regional, metro, and neighborhood type fixed effects. The neighborhood types correspond to the AHS designation of neighborhood locations within and outside of metro areas as urban or rural. Shares and means for the remaining independent variables are shown in **Table 1**.

Table 1: Descriptive statistics for independent variables used in logistic regression models (Percents/means)

		Subsidy Receipt		Subsidy Type	
	All Households	Eligible, Unsubsidized	Subsidized	Voucher	Project-Based
n	2,366,175	1,272,302	1,093,873	370,006	723,868
Share of sample	100	53.77	46.23	33.83	66.17
Household Characteristics					
Lives in inadequate housing	10.52	11.85	8.98	11.26	7.82
Cost-burdened	69.41	81.71	55.09	64.46	50.30
Household income ($1,000s)	10.14	8.25	12.33	13.01	11.99
Age of householder	74.25	73.52	75.10	73.88	75.72
Number of persons in household	1.47	1.56	1.37	1.53	1.29
Two or more elderly persons in household	9.42	9.62	9.18	11.98	7.75
Race of Householder					
White	52.15	55.26	48.53	53.33	46.08
Black	23.12	21.97	24.45	21.18	26.12
Hispanic	16.76	15.59	18.13	17.63	18.39
Asian/other	7.97	7.18	8.88	7.86	9.41
Marital Status					
Married	15.43	16.76	13.89	16.83	12.39
Widowed	41.76	40.65	43.05	41.51	43.83
Divorced/separated	30.26	27.06	33.99	35.57	33.18
Never married	12.54	15.52	9.08	6.10	10.60

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Table 1 (continued): Descriptive statistics for independent variables used in logistic regression models (Percents/means)

	All Households	Subsidy Receipt: Eligible, Unsubsidized	Subsidy Receipt: Subsidized	Subsidy Type: Voucher	Subsidy Type: Project-Based
Gender of Householder					
Male	31.27	32.70	29.61	29.64	29.60
Female	68.73	67.30	70.39	70.36	70.40
Uses cane/walker	31.59	26.56	37.16	36.63	37.43
Has functional disability	46.12	38.77	54.68	52.78	55.65
Uses manual wheelchair	6.55	6.10	7.04	8.04	6.53
Housing Characteristics					
Housing Age					
pre-1930	9.52	12.54	6.00	11.11	3.39
1930-1949	10.52	12.70	7.98	12.16	5.84
1950-1969	20.79	23.15	18.03	17.39	18.36
1970-1989	41.71	33.48	51.29	37.19	58.50
1990–present	17.46	18.12	16.70	22.16	13.91
Structure Type					
Single-family/mobile home	23.23	32.88	12.00	22.17	6.80
2–4 units	17.83	19.17	16.28	25.04	11.80
5–19 units	17.54	18.86	16.01	22.66	12.60
20–49 units	12.84	11.00	14.97	14.59	15.17
50+ units	28.57	18.10	40.74	15.53	53.62

Diagnostics for multicollinearity showed all tolerance scores were at least 0.2 and variance inflation factors (VIF) did not exceed 5.0, with the exception of one dummy-coded variable with a VIF of 5.01. The insignificant Hosmer-Lemeshow chi-square test in the second and third models of each set suggest that additional geographic controls produced better-fitting models.

Finally, we use propensity score matching to further control for household and housing characteristics to estimate the effect of the subsidy "treatment" on housing accessibility. Propensity score matching uses logistic regression to model the probability that a household receives the treatment, which in this analysis corresponds to a housing subsidy in the first comparison and to a project-based housing subsidy in the second comparison. The logit results for both comparisons are presented in **Table 2**. This method matches an untreated household to a treated household with a similar propensity score and is a more robust method for identifying the effects of a treatment than logistic regression (Cepeda, Boston, Farrar, & Storm, 2003). We use one-to-one nearest-neighbor

Table 2: Logistic regression models predicting subsidy status for propensity score matching

	Outcome: Receives HUD housing subsidy			Outcome: Receives project-based subsidy		
	Coefficient	Std. Error	*p*	Coefficient	Std. Error	*p*
Household Characteristics						
Lives in inadequate housing	-0.50	0.14	***	-0.09	0.23	
Cost-burdened	-1.41	0.10	***	-0.52	0.13	***
Household income ($1,000s)	0.06	0.01	***	-0.01	0.01	
Age of Householder	0.00	0.00		0.03	0.01	**
Number of persons in household	-0.34	0.06	***	-0.05	0.09	
Two or more elderly persons in household	-0.03	0.18		-0.37	0.29	
Race of Householder						
Black	0.88	0.11	***	0.06	0.17	
Hispanic	0.73	0.13	***	0.55	0.20	**
Asian/other	0.81	0.15	***	0.81	0.24	**
Marital Status						
Widowed	0.00	0.18		-0.21	0.28	
Divorced/separated	0.33	0.17		-0.24	0.28	
Never married	-0.07	0.19		0.01	0.31	
Gender of Householder						
Female	0.24	0.09	*	-0.15	0.15	
Uses cane/walker	0.07	0.10		0.00	0.15	
Has functional disability	-0.36	0.10	***	0.03	0.15	
Uses manual wheelchair	-0.10	0.17		-0.31	0.23	
Self-Rated Health						
Very Good	0.20	0.13		-0.17	0.22	
Fair	0.27	0.13		-0.02	0.22	
Poor	0.52	0.16	**	0.01	0.25	
Housing Characteristics						
Housing Age						
1930-1949	0.18	0.19		0.22	0.30	
1950-1969	0.44	0.16	*	0.66	0.26	*
1970-1989	1.23	0.16	***	1.21	0.24	***
1990–present	0.81	0.17	***	0.63	0.25	*
Structure Type						
2–4 units	0.72	0.13	***	0.57	0.20	**
5–19 units	0.85	0.13	***	0.44	0.19	
20–49 units	1.36	0.15	***	1.12	0.22	***
50+ units	1.89	0.13	***	2.28	0.21	***

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Table 2 (continued): Logistic regression models predicting subsidy status for propensity score matching

	Outcome: Receives HUD housing subsidy			Outcome: Receives project-based subsidy		
	Coefficient	Std. Error	*p*	Coefficient	Std. Error	*p*
Constant	-3.02	1.11	**	-3.55	1.61	*
Region Fixed Effects	X			X		
Metro Fixed Effects	X			X		
Neighborhood Location Fixed Effects	X			X		
Pearson chi-square	1651.61		***	612.28		***
Log likelihood	-2018.6			-909.5		
Pseudo r-squared	0.29			0.25		

**p<.05, **p<.01, ***p<.001*

matching with replacement. In both comparisons, the matches produced well-balanced covariates with variance ratios close to 1 and with matched standardized differences close to 0. This was true for all variables in both comparisons except for household income when eligible and unsubsidized households were matched. In this case, household income had a variance ratio of 2.41 and a matched standardized difference of 0.12. Propensity score density plots also confirm that the matched samples are balanced.

We report the average treatment effect (ATE) and the average treatment effect on the treated (ATT). The outcome is again whether housing is livable. For the ATE, the coefficient is interpreted as the average difference in the probability of having livable housing features between the untreated group and the treated group. The ATT coefficient is interpreted as the average difference in the probability of having livable housing features for the treated group against a counterfactual that they were untreated.

Results

The results are presented in two parts. In the first section, we describe the characteristics of older adults in subsidized housing and report the shares of older adult renter households who have mobility difficulties and challenges with their housing. We also present the chi-square comparisons for subsidized and eligible households. The second section includes descriptive information about housing accessibility levels and the results of the propensity score matching.

Characteristics and Housing Challenges of Subsidized Older Adults

In our sample of extremely low-income households with older adults, 46 percent receive a HUD housing subsidy. Of those subsidized households, two-thirds live in units with project-based subsidies and the remainder receive Housing Choice Vouchers. While all renters in the sample make up to 30 percent of area median income, the subsidized renters have incomes of $12,300 on average, more than the $8,300 average for eligible but unsubsidized renters (hereafter referred to as "eligible renters"), with voucher holders making the highest incomes. Eligible households and voucher holders are roughly the same age on average (73.5 and 73.9 years old respectively) while project-based tenants are slightly older (75.7 years old), bringing the average age of subsidized residents up to 75.1 years old. Subsidized households are also smaller on average with lower shares of married couples. Subsidized households tend to live in larger buildings with at least 50 apartments and are more likely to live in units built after 1970; both of these characteristics tend to be associated with a greater prevalence of accessibility features (Bo'sher et al., 2015; Joint Center for Housing Studies, 2018).

Older, subsidized renters face more challenges with physically navigating their housing, which is also related to their higher rates of disability and greater likelihood of using assistive devices (**Table 3**).

Table 3: Older adult difficulties with housing environment (Percent with difficulty)

	Subsidy Receipt				Subsidy Type		
	Eligible, Unsubsidized	Subsidized	Chi-square		Voucher	Project-Based	Chi-square
Household Difficulties							
Mental/physical disabilities	46.1	60.3	25.0	***	61.3	59.8	0.1
Walking/climbing stairs	33.4	45.7	19.2	***	43.2	46.9	0.7
Stooping/kneeling	27.2	38.7	18.3	***	37.5	39.3	0.2
Reaching above head	11.8	18.1	9.1	**	20.1	17.1	0.7
Grasping objects	8.6	12.7	5.5	*	12.2	13.0	0.1
Difficulties with Housing							
Any difficulty with housing	20.7	26.9	6.5	*	26.5	27.2	0.0
Difficulty getting into bathtub	11.6	17.8	9.2	**	19.1	17.1	0.3
Using walk-in shower	8.0	11.0	19.3	***	9.5	11.8	0.7
Getting to bathroom	4.4	7.3	4.7	*	6.7	7.6	0.2
Using faucets	2.8	4.2	1.5		4.8	3.8	0.3
Reaching kitchen cabinets	14.6	17.7	2.3		16.4	18.4	0.4
Opening kitchen cabinets	5.8	8.7	4.0	*	8.4	8.9	0.0
Using stove	4.6	5.0	0.1		3.4	5.8	1.5

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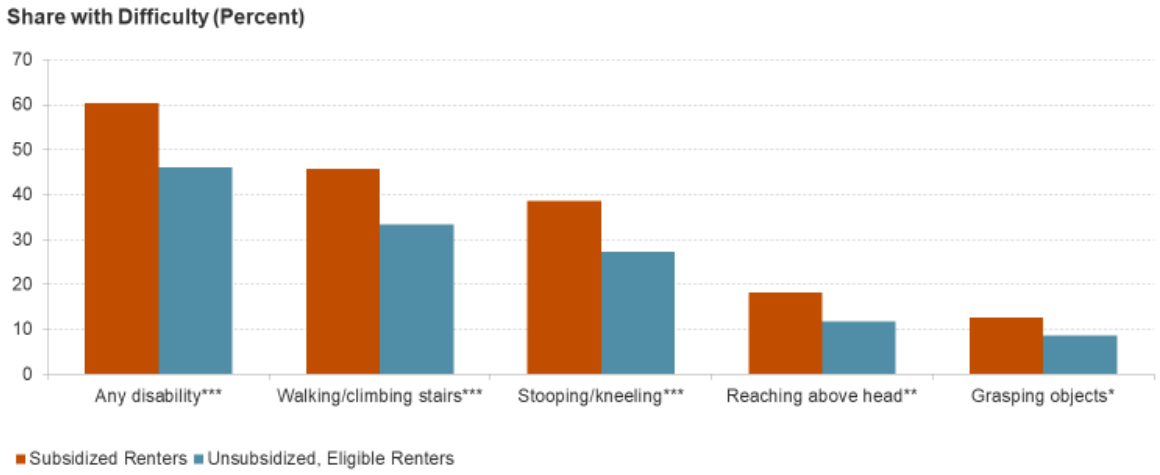
Table 3 (continued): Older adult difficulties with housing environment (Percent with difficulty)

	Subsidy Receipt				Subsidy Type		
	Eligible, Unsubsidized	Subsidized	Chi-square		Voucher	Project-Based	Chi-square
Difficulties with Housing							
Using kitchen counters	3.7	3.9	0.0		4.1	3.8	0.0
Using sink	2.7	3.6	0.7		4.7	3.0	1.0
Use of Assistive Devices							
Any mobility device	31.9	44.0	19.3	***	43.4	44.3	0.0
Cane/walker	26.6	37.2	16.2	***	36.6	37.4	0.0
Electric wheelchair/scooter/cart	4.8	7.2	3.3		6.2	7.7	0.4
Manual wheelchair	6.1	7.0	0.4		8.0	6.5	0.5

**p<.05, **p<.01, ***p<.001*

Figure 1: Subsidized renters have significantly more mobility difficulties than eligible renters

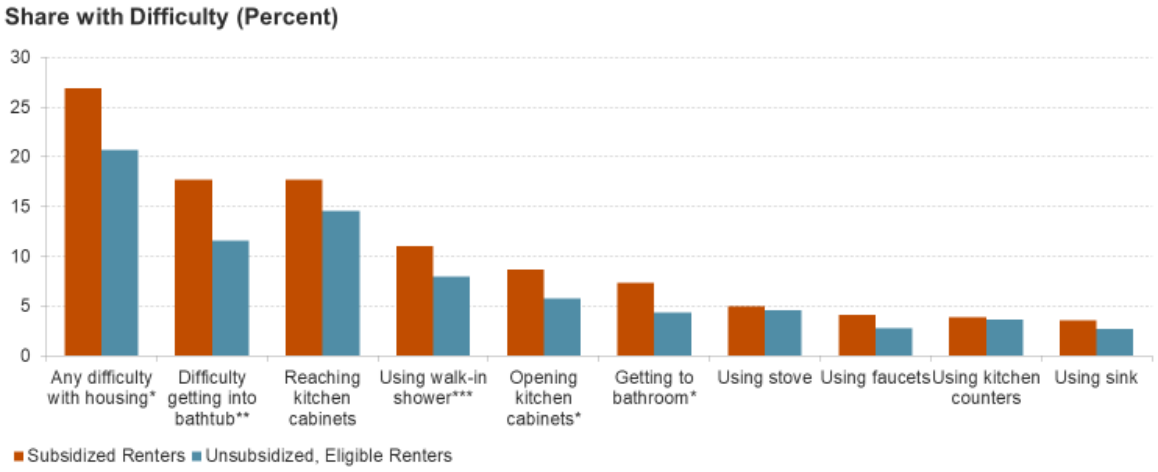


Note: ***p<0.001, **p<0.01, *p<0.05

Source: JCHS tabulations of HUD, American Housing Survey 2011.

Each of these difficulties has consequences for navigating any housing environment, and subsidized households also report challenges related to specific elements of their housing (**Figure 2**). Difficulties with using bathroom features are most common, with 18 percent of subsidized renters reporting difficulty getting into the bathtub and 11 percent reporting difficulty using a walk-in shower, significantly higher shares as compared to eligible renters (12 and 8 percent respectively). Reaching

Figure 2: More than a quarter of subsidized renters have difficulties with their housing environment



Note: ***p<0.001, **p<0.01, *p<0.05

Source: JCHS tabulations of HUD, American Housing Survey 2011.

kitchen cabinets is the other major housing challenge for both subsidized (18 percent) and eligible (15 percent) households, corresponding closely to the share of households with a member who has difficulty reaching above their head. While the shares are low for households including a person who has difficulties with some of the features, it should be noted that over a quarter of older, subsidized households and about a fifth of eligible households report at least one difficulty with using their housing. Across all features, voucher holders and project-based residents have similar levels of difficulty, nearly matching the overall share for subsidized households.

Access to Livable Housing

Housing units with HUD subsidies have more accessible features than unsubsidized units occupied by extremely low-income renters. The shares of households with different accessibility features are shown in **Table 4** with the corresponding chi-square statistics. An appallingly small share of all units are fully wheelchair accessible, resulting in insufficient sample sizes for making estimates. In fact, we present shares of *nearly* accessible units (meeting the wheelchair accessible requirements except for door and sink handles and accessible kitchen cabinets) because so few had full accessibility.

Table 4: Accessibility features by subsidy status (Percent with feature)

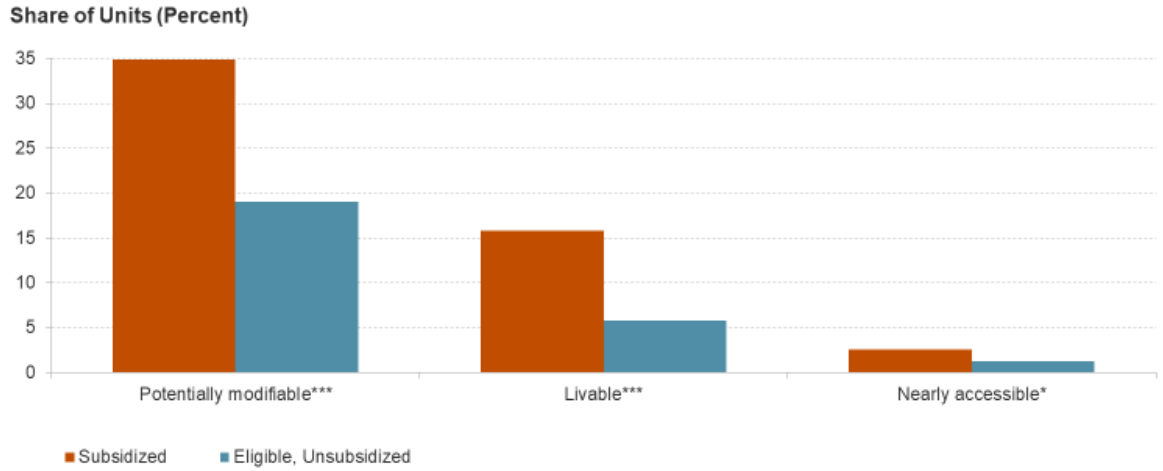
	Subsidy Receipt				Subsidy Type			
	Eligible, Unsubsidized	Subsidized	Chi-square		Voucher	Project-Based	Chi-square	
Accessibility Level								
Potentially modifiable	19.0	34.9	43.09	***	29.85	37.49	3.42	
Livable	5.8	15.8	36.77	***	10.73	18.35	5.34	*
Nearly accessible	1.3	2.6	4.81	*	0.57	3.5	–	
Accessibility Features								
Stair rails/no stairs	75.2	82.7	9.13	**	78.83	84.62	3.20	
First-floor bathroom/elevator	49.7	63.3	22.59	***	62.25	63.83	0.15	
Grab bars in bathroom	34.9	60.7	78.05	***	36.05	73.33	79.19	***
First-floor bedroom/elevator	47.6	60.0	18.80	***	59.59	60.24	0.02	
No-step building entrance	44.6	59.5	26.82	***	52.73	62.93	5.89	*
Accessible countertops	47.6	51.6	1.86		46.11	54.33	3.69	
Wheelchair accessible bathroom	40.4	46.8	4.92	*	37.13	51.69	11.79	***
Accessible switches	38.5	43.9	3.51		39.93	45.91	1.90	
Accessible kitchen	27.8	30.2	0.85		24.99	32.81	4.13	*
Extra wide doors/hallways	12.4	21.4	20.37	***	12.48	26.03	13.58	***

**p<.05, **p<.01*, ****p<.001*, – indicates sample sizes were too small for reliable chi-square statistic

An estimated 27,430 subsidized units occupied by older adults are nearly accessible, amounting to less than three percent of the subsidized stock occupied by older residents (**Figure 3**). In comparison, 12.7 percent of households report the use of a manual or electric wheelchair or scooter. The share of nearly accessible units occupied by subsidized tenants is significantly but not substantially larger than the 1.3 percent of units (16,200) that are nearly wheelchair accessible and occupied by older eligible but unsubsidized residents, 9.1 percent of whom report using wheelchairs or scooters. Greater shares are currently livable, reaching 16 percent (172,530 units) for subsidized renters and just 6 percent (73,390) for eligible renters.

The picture improves when considering units that could be modified into livable or accessible housing: 35 percent of older, subsidized renters have modifiable housing, compared to 19 percent of eligible but unassisted older renters. Looking at accessibility across different types of subsidies, residents with project-based subsidies are significantly more likely to have units qualifying as livable than those using mobile vouchers. They also have a higher rate of nearly accessible units, though these shares are presented with caution as the sample sizes are very small.

Figure 3: Very few subsidized or market-rate units are fully accessible

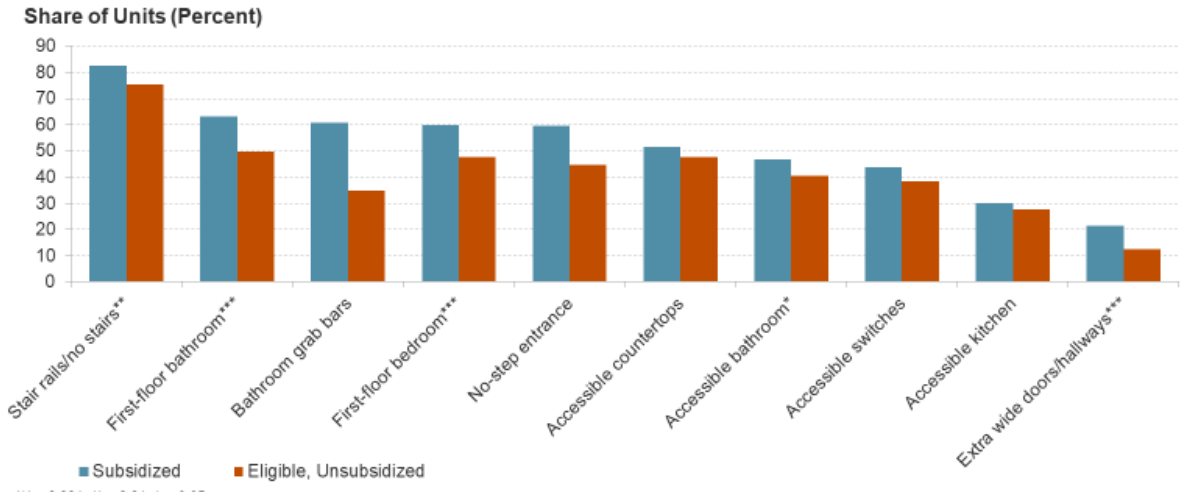


Note: ***p<0.001, **p<0.01, *p<0.05

Source: JCHS tabulations of HUD, American Housing Survey 2011.

The pattern of greater housing accessibility among subsidized renters and among project-based residents in particular holds across features. The majority of subsidized renters have access to single-floor living, a no-step building entrance, and bathroom grab bars (**Figure 4**). The shares are high but significantly lower for eligible households. Extra wide doors and hallways are most lacking across both groups, with only 21 percent of subsidized and 12 percent of eligible renters having this feature.

Figure 4: The majority of subsidized renters have basic accessibility features



Note: ***p<0.001, **p<0.01, *p<0.05

Source: JCHS tabulations of HUD, American Housing Survey 2011.

Table 5: Logistic regression models with outcome of livable housing unit

	Eligible, unsubsidized vs. Subsidized								
	Odds Ratio	**Std. Error**		**Odds Ratio**	**Std. Error**		**Odds Ratio**	**Std. Error**	
Household Characteristics									
Receives HUD housing subsidy	1.6	0.4	*	1.6	0.4	***	1.6	0.4	*
Lives in inadequate housing	0.8	0.3		0.8	0.3		0.8	0.3	
Cost-burdened	0.6	0.1		0.6	0.1		0.7	0.1	
Household income ($1,000s)	1.0	0.0		1.0	0.0		1.0	0.0	
Age of householder	1.0	0.0		1.0	0.0		1.0	0.0	
Number of persons in household	1.1	0.2		1.1	0.2		1.2	0.2	
Two or more elderly persons in hh	1.5	0.7		1.5	0.7		1.6	0.7	
Race of Householder									
Black	0.7	0.2		0.7	0.2		0.7	0.2	
Hispanic	0.7	0.2		0.7	0.2		0.8	0.3	
Asian/other	0.7	0.3		0.7	0.3		0.8	0.3	
Marital Status									
Widowed	1.2	0.5		1.2	0.6		1.2	0.6	
Divorced/separated	0.9	0.4		0.9	0.4		0.9	0.5	
Never married	0.9	0.5		0.9	0.5		0.9	0.5	
Gender of Householder									
Female	1.3	0.3		1.3	0.3		1.3	0.3	
Uses cane/walker	1.6	0.3	*	1.6	0.4	*	1.7	0.4	*
Has functional disability	1.2	0.3		1.3	0.3		1.2	0.3	
Uses manual wheelchair	1.4	0.5		1.4	0.5		1.4	0.5	
Housing Characteristics									
Housing Age									
1930-1949	0.3	0.2		0.3	0.2		0.3	0.2	*
1950-1969	1.3	0.7		1.2	0.6		1.1	0.6	
1970-1989	2.0	1.0		2.0	1.0		1.8	0.9	
1990–present	2.7	1.4		2.6	1.4		2.3	1.3	
Structure Type									
2–4 units	5.7	3.8	**	5.9	3.9	***	6.1	4.1	**
5–19 units	14.8	8.7	***	15.6	9.2	***	16.5	10.3	***
20–49 units	25.1	14.6	***	27.6	16.0	***	30.1	18.8	***
50+ units	41.1	22.6	***	44.2	24.4	***	53.0	31.8	***
Constant	0.0	0.0	***	0.0	0.0	***	0.0	0.0	***
Region Fixed Effects		X			X			X	
Metro Fixed Effects					X			X	
Neighborhood Location Fixed Effects								X	
Hosmer-Lemeshow Chi-Square	5.82	***		1.51			1.22		

**p<.05, **p<.01, ***p<.001*

Table 5 (continued): Logistic regression models with outcome of livable housing unit

	Voucher subsidy vs. Project-based subsidy								
	Odds Ratio	Std. Error		Odds Ratio	Std. Error		Odds Ratio	Std. Error	
Household Characteristics									
Receives HUD housing subsidy	1.3	0.4		1.2	0.4		1.1	0.3	
Lives in inadequate housing	0.9	0.4		1.0	0.4		0.9	0.4	
Cost-burdened	0.6	0.1	***	0.6	0.1	***	0.6	0.1	
Household income ($1,000s)	1.0	0.0		1.0	0.0		1.0	0.0	
Age of householder	1.0	0.0		1.0	0.0		1.0	0.0	
Number of persons in household	1.0	0.2		1.0	0.2		0.9	0.2	
Two or more elderly persons in hh	1.3	0.6		1.4	0.6		1.4	0.6	
Race of Householder									
Black	0.7	0.2		0.7	0.2		0.8	0.2	
Hispanic	0.8	0.3		0.8	0.3		0.9	0.3	
Asian/other	0.5	0.2		0.6	0.3		0.7	0.3	
Marital Status									
Widowed	0.7	0.3		0.7	0.3		0.7	0.3	
Divorced/separated	0.6	0.3		0.6	0.3		0.6	0.3	
Never married	0.8	0.4		0.7	0.4		0.7	0.4	
Gender of Householder									
Female	1.3	0.3		1.3	0.3		1.3	0.3	
Uses cane/walker	1.6	0.4	***	1.6	0.4	***	1.6	0.4	***
Has functional disability	1.3	0.3		1.3	0.3		1.2	0.3	
Uses manual wheelchair	1.2	0.5		1.2	0.5		1.2	0.5	
Housing Characteristics									
Housing Age									
1930-1949	0.3	0.2	***	0.2	0.2	***	0.2	0.2	***
1950-1969	0.7	0.4		0.7	0.4		0.7	0.4	
1970-1989	1.1	0.6		1.0	0.5		0.9	0.5	
1990–present	1.2	0.7		1.1	0.6		1.1	0.6	
Structure Type									
2–4 units	2.8	2.3		3.1	2.4		3.4	2.8	
5–19 units	6.0	4.2	*	6.5	4.6	**	7.6	5.9	**
20–49 units	9.1	6.3	**	10.1	7.0	**	11.1	8.3	**
50+ units	14.6	9.6	***	15.9	10.5	***	19.6	14.3	***
Constant	0.0	0.0	***	0.0	0.0	**	0.0	0.0	**
Region Fixed Effects		X			X			X	
Metro Fixed Effects					X			X	
Neighborhood Location Fixed Effects								X	
Hosmer-Lemeshow Chi-Square	2.29	*		1.70			1.93		

**p<.05, **p<.01, ***p<.001*

The descriptive percentages and chi-square statistics indicate that accessibility features are a more common element of subsidized and project-based rental housing. As noted above, though, these households are more likely to live in newer units in larger buildings than their counterparts. Differences in the household characteristics between eligible and subsidized households, such as household disability status or income, could also affect their access to livable housing. The logistic regression models consistently show that receiving a HUD subsidy significantly increases the odds of being in livable housing when controlling for these household and housing characteristics (**Table 5**). This finding is robust to variations in the geographic controls included. Across all iterations of the models, the odds of having a livable unit are about 1.6 times greater for households receiving a HUD subsidy than the odds for eligible, unassisted households. All models also confirm that apartments in buildings with more units are associated with significantly and substantially greater odds of livable housing.

In the second set of models, the subsidy receipt variable is broken out into type of subsidy and compares those receiving vouchers (reference category) to those living in project-based units. Across all models, the project-based variable is associated with higher odds of living in accessible units but is statistically insignificant. Using a cane or walker also significantly increases the odds of having a unit that is at least livably accessible. This makes sense, given that housing authorities and subsidized housing property owners can prioritize accessible units for households who need them most. Building size is again significant and positive across all models but with a smaller effect than in the previous four models. Additionally, being cost burdened (spending more than 30 percent of income on housing) is significant and associated with decreased odds of having a livable housing unit.

Table 6: Treatment effect estimations

	Eligible, unsubsidized vs. Subsidized			Voucher subsidy vs. Project-based subsidy		
	Coefficient	Std. Error	*p*	Coefficient	Std. Error	*p*
Average Treatment Effect	0.061	0.015	***	0.050	0.039	
Average Treatment Effect on the Treated	0.073	0.019	***	0.052	0.045	

****p<.001*

The propensity score matching estimation confirms the logistic regression findings. The ATE and ATT estimations are presented in **Table 6**. The chance of residing in a livable unit is 6.1 percent higher for subsidized households as compared to eligible, unassisted households, and this finding is significant at the $p<0.001$ level. For the treated group living in subsidized housing, the

probability of residing in a livable unit is 7.3 percent greater than the counterfactual of those households not receiving a subsidy, significant again at the $p<0.001$ level. When considering a project-based subsidy to be the treatment, the effect is about the same size but statistically insignificant.

Discussion

The results highlight the benefit of subsidized housing but also point to unmet needs. Livable and wheelchair accessible units are lacking for older, extremely low-income renters, whether they receive a subsidy or not. While many units are modifiable, only a small share meet the basic requirements of accessible livability. For example, 9 percent of eligible households and 13 percent of subsidized households reported using a wheelchair or scooter, but less than 3 percent of units are even nearly wheelchair accessible. Similarly, about a third of eligible and 44 percent of subsidized older renter households have at least one person who uses a mobility device, and the share of units with at least livable accessibility features falls well short of this. Of the subsidized households, voucher recipients in particular lack accessibility features with 43 percent reporting the use of a mobility device and only 11 percent of units meeting the threshold for basic livable accessibility.

Even if households aren't using assistive mobility devices, housing with at least livable accessibility and preferably with full wheelchair accessibility provides good universal design for older adults, which can potentially protect from falls and other injuries (Pynoos, Steinman, Nguyen, & Bressette, 2012). Wheelchair accessible units grant enough room for caregivers to help a resident maneuver throughout the unit (Pynoos et al., 2008) and can help older adults navigate their housing with greater independence. Many older adults in the sample have difficulties with stooping down, reaching cabinets, and grasping objects. Fully accessible housing includes counters and cabinets at their level, switches and outlets that they don't have to bend down to reach, and handles or levers that people with arthritis can comfortably work. Accessible units could also help older adult households weather short-term ambulatory disabilities and potentially allow them to remain in the same unit as they age. As the number of older adults in subsidized households increases, incorporating basic accessibility features into project-based housing and connecting voucher recipients with accessible housing in the private market will become even more crucial.

While a relatively small share of units have accessible livability, several of the individual accessibility features are present in most houses. As noted above, the majority of units have no-step entrances, single-floor living, and grab bars in the bathroom. But the prevalence of these features does not translate to full accessible livability in most units. Of the subsidized housing units occupied by an

older adult, about a fifth meet all but one requirement for accessible livability and an additional fifth meet all but two criteria. The most common missing feature for these units are wheelchair accessible bathrooms. This represents a significant hurdle as it may require reconfiguration of the unit (which can be expensive but also requires sufficient space in which to expand) and, for voucher holders especially, may fall outside of a *reasonable* modification.

While it is encouraging that roughly 40 percent of subsidized units occupied by older adults are very close to accessible livability, the high shares of households that report difficulties with their housing environment confirm the unmet need for greater accessibility in both subsidized and market-rate housing. Many households have difficulty with using their bathrooms and kitchens, and these two areas could be prioritized for upgrading. Bathrooms could specifically include no-step entry showers, raised toilets, and newer forms of towel and toilet paper holders that double as grab bars. Many renters report difficulty with reaching kitchen cabinets as well, which could be amended by reconfiguring cabinetry to be lower in height and ensuring that appliances (such as ovens and freezers) are accessible without reaching. Thoughtful kitchen layout may also allow users to drag pots from the sink to the stove without lifting.

Finally, the lack of accessibility for extremely low-income older adults renting in the private market is of concern. While these households do have lower rates of ambulatory difficulties and disabilities, the lack of units with accessibility features could hinder their ability to age in place. Subsidized households typically receive information through public housing authorities that manage most subsidies, but without this point of contact, extremely low-income renters in the private market may not know where to turn to find supports to navigate the reasonable modification process and may also be less likely to obtain accessible features when they are needed.

Conclusion

The study has significant implications for policy interventions. Above all, the findings show that subsidized housing is valuable for our aging population beyond the financial benefit that it provides, in that subsidized housing offers a more accessible living environment, even when controlling for household and housing characteristics. Within different subsidy programs, project-based subsidies provide more accessibility than voucher subsidies, but this is primarily a function of project-based units being in larger and newer buildings. While not captured in our analysis, it may also reflect more knowledgeable property owners and a higher concentration of older tenants. However, even older

voucher holders have a greater degree of accessibility than unassisted extremely low-income renters in the private market.

While subsidized housing helps overall, there are areas for improvement. Conversions of public housing and Section 202 units through the Rental Assistance Demonstration (RAD) program offer an opportunity to incorporate greater accessibility into project-based subsidized housing. The RAD program restructures funding streams and can enable public housing authorities to redevelop units and leverage funds for capital improvements. The redevelopment process could and should include efforts to make the stock more accessible. For voucher holders, public housing authorities can place additional emphasis on recruiting landlords of accessible units and, if they don't already, create listings of accessible apartments in the area.

Across all older adult households, efforts to educate households about their right to reasonable modifications and to inform landlords of their responsibilities in granting these modifications could increase accessibility for those who need it most. In the process of conducting this research, we noticed that HUD's website left many questions unanswered about how to go through a reasonable modification process and who would shoulder the expense of modifications. Clear documentation of tenants' rights and what they should expect when they make a reasonable modification request would be useful. This information should also be made available at local community and senior centers and distributed to landlords. The process for requesting modifications should be made as clear and simple as possible so it is not a hindrance to obtaining accessible features.

There is a role for public intervention for older, extremely low-income renters who do not receive subsidies – and for those who are low-income but higher up the income spectrum who need modifications. Aside from increasing funding for housing subsidies and the number of households served, which we do recommend, HUD and state and local governments could also create reasonable modification funds. These funds could be deployed in situations where a tenant needs a physical modification but cannot afford the expense of it. CDBG and HOME funds can be used in this way by local governments.

Data are lacking on accessibility generally and particularly for HUD-subsidized housing. The data in this study are from 2011 because that was the last year the AHS included this line of questioning. As the population ages, accessible housing will become an increasingly important component in defining where people can live and whether they can safely and comfortably live in their housing of choice. Because this is a nationally crucial issue, making the accessibility module a regular element of the AHS would improve our understanding of accessibility needs for different types of households.

This study has limitations, of course, and leaves several questions for future research. We did not explore the geography of these units, for example, and instead looked at the national picture. Future research could examine the location of accessible units to determine whether they are located in age-friendly neighborhoods and are evenly distributed across the country. The focus on HUD subsidies is a function of the available data, but the Low-Income Housing Tax Credit is currently the largest production program for affordable housing. An analysis of accessibility in LIHTC properties and the Qualified Allocation Plans that states use to allocate LIHTC would provide a more complete picture of how well federal housing subsidies serve older adult households. As a matter of public policy, subsidized renters typically are dually eligible for Medicare and Medicaid, and a detailed analysis of how these residents use their benefits in the context of subsidized housing would aid housing providers in targeting unmet needs for services and accessibility features. Most importantly, future research should examine and document the redevelopment projects, strategies, and policies that public housing authorities have implemented to serve their aging tenants.

As the population ages, we will ultimately need more housing with accessibility features. The lowest-income older adult renters are both the most vulnerable and the least likely to have the resources to modify their housing. Going forward, expanding the affordable, accessible rental stock in a range of neighborhoods should be a planning and policy priority.

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