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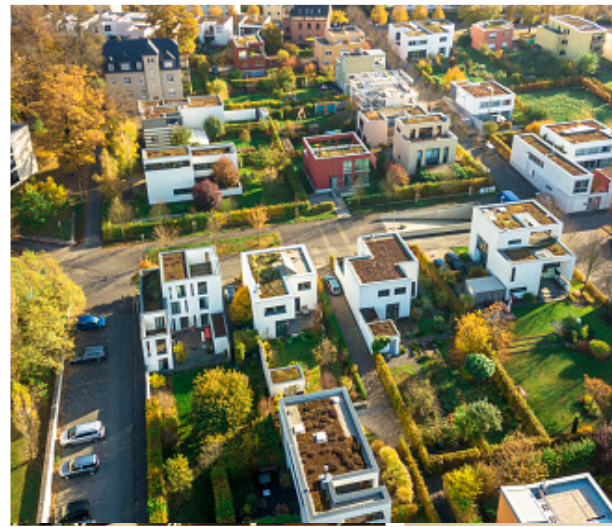
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# Household Food Insecurity and U.S. Department of Housing and Urban Development Federal Housing Assistance

Veronica Helms, Alisha Coleman-Jensen,  
Regina Gray, and Debra L. Brucker





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## Abstract

The U.S. Department of Housing and Urban Development (HUD) provides housing rental assistance to more than 4.5 million low-income households. Using health survey data from the National Health Interview Survey (NHIS) linked to Federal housing administrative data, household food insecurity was assessed among adults receiving housing assistance at the time of their NHIS interview during 2011 and 2012 (n=2,089). Food-insecure households had difficulty at times providing adequate food for all their members due to limited resources. Among NHIS adult respondents receiving HUD assistance, 37.2 percent reported household food insecurity (including low and very low food security), while 19.1 percent experienced very low food security, the more severe range of food insecurity characterized by disrupted eating patterns and reduced food intake. Analyses revealed that adults in the Housing Choice Voucher program were significantly more likely to report household food insecurity than adults in other HUD programs (Public Housing and Multifamily Housing), net of other characteristics. Although housing assistance programs are designed to free financial resources associated with housing cost burden, household food insecurity is still prominent among low-income, HUD-assisted adults.

**Keywords:** food insecurity, food security, low-income households, housing, poverty

## About the Authors

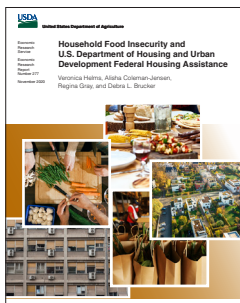
Veronica Helms is a social science analyst with the Office of Program Monitoring, Research and Evaluation, Office of Policy Development and Research, U.S. Department of Housing and Urban Development. Alisha Coleman-Jensen is a sociologist in the Food Assistance Branch, Food Economics Division, Economic Research Service, U.S. Department of Agriculture. Regina Gray is the director of the Affordable Housing Research and Technology Division, Office of Policy Development and Research, U.S. Department of Housing and Urban Development. Debra L. Brucker is a research associate professor at the Institute on Disability, University of New Hampshire.

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# Contents

|                                                                                       |           |
|---------------------------------------------------------------------------------------|-----------|
| <b>Summary</b> .....                                                                  | <b>iv</b> |
| <b>Introduction</b> .....                                                             | <b>1</b>  |
| U.S. Department of Housing and Urban Development (HUD)                                |           |
| Rental Assistance Programs .....                                                      | 2         |
| HUD Rental Assistance and Possible Implications for Food Insecurity .....             | 6         |
| Housing and Food Insecurity .....                                                     | 6         |
| <b>Data and Methods</b> .....                                                         | <b>8</b>  |
| National Health Interview Survey (NHIS) .....                                         | 8         |
| HUD Administrative Data .....                                                         | 9         |
| Data Linkage .....                                                                    | 9         |
| Description of Variables .....                                                        | 9         |
| <b>Results</b> .....                                                                  | <b>13</b> |
| Person-Level Sociodemographic Characteristics of HUD-                                 |           |
| Assisted Adults .....                                                                 | 13        |
| Household-Level Sociodemographic Characteristics of                                   |           |
| HUD-Assisted Adults .....                                                             | 14        |
| Household Food Insecurity Among HUD-Assisted Adults .....                             | 16        |
| Person-Level Characteristics Associated with Food Insecurity                          |           |
| Among HUD-Assisted Adults .....                                                       | 17        |
| Household-Level Characteristics Associated with Food Insecurity Among                 |           |
| HUD-Assisted Adults .....                                                             | 18        |
| Multivariate Logistic Regression Models Exploring the Association                     |           |
| Between Household Food Insecurity and HUD Program Type .....                          | 20        |
| Adjusted Predictions of Living in a Food-Insecure Household by HUD Program Type ..... | 23        |
| <b>Discussion and Conclusions</b> .....                                               | <b>24</b> |
| <b>References</b> .....                                                               | <b>27</b> |



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## What Is the Issue?

Most U.S. households have consistent, dependable access to enough food for active, healthy living—they are food secure. Some households experience food insecurity at times during the year, meaning that due to a lack of money or other resources, they had difficulty providing adequate food for all household members. As low-income families juggle competing economic demands, public assistance programs that do not explicitly target food insecurity may improve household food security by reducing overall household financial burden. The U.S. Department of Housing and Urban Development (HUD) serves more than 4.5 million low-income households via three assistance programs that help families obtain affordable housing. However, because housing assistance is targeted to very low-income households, even with assistance, these households may remain food insecure.

This study sought to answer the following research question: “What is the prevalence of household food insecurity among individuals receiving housing assistance from HUD and how does household food insecurity vary by housing assistance program type?” To answer this research question, this report describes household food insecurity among National Health Interview Survey (NHIS) adult participants, who received HUD assistance at the time of their health interview, examining household food insecurity among HUD-assisted households overall, and focusing on food insecurity in households that receive assistance from each of the three housing assistance programs: the Housing Choice Voucher program, the Multifamily Housing program, and the Public Housing program. This study provides information on the prevalence of food insecurity of participants in each of these HUD program types.

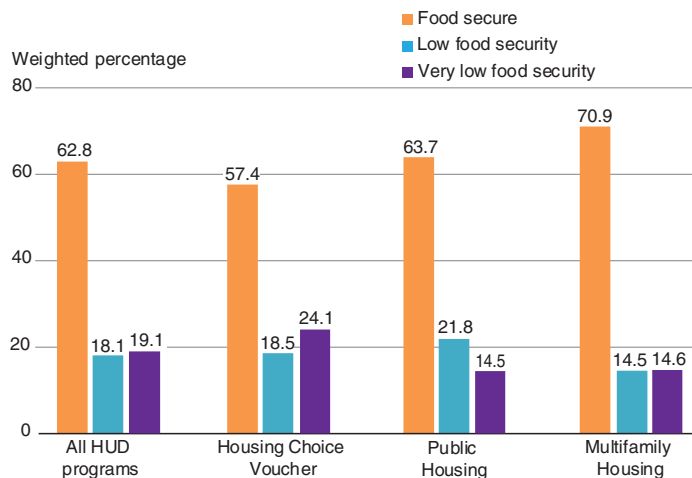
## What Did the Study Find?

Among NHIS adult participants receiving HUD assistance in 2011 and 2012, 37.2 percent reported household food insecurity (including low and very low food security) in the 30 days before the survey interview. For context, in 2018, an estimated 11.1 percent of households in the general population were food insecure at least once during the prior year; among low-income households with incomes below 185 percent of the poverty threshold, the prevalence was 29.1 percent. In 2012, 14.5 percent of all U.S. households were food insecure during the year and 34.3 percent of low-income households with incomes below 185 percent of the poverty threshold were food insecure during the year.

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- An estimated 19.1 percent of HUD-assisted adults were in households with very low food security, the more severe range of food insecurity characterized by disrupted eating patterns and reduced food intake.
- The prevalence of food insecurity varied across HUD program type, with the highest prevalence of both food insecurity and very low food security among those in the Housing Choice Voucher program (42.6 percent and 24.1 percent, respectively). The lowest rate of food insecurity was among those in Multifamily Housing (29.1 percent).

**Prevalence of food security, low food security, and very low food security by HUD program type, 2011–2012 NHIS linked with HUD administrative data**



The differences in the prevalence of food insecurity across HUD program type were not explained by the characteristics of the households in the programs. Even after accounting for differences in individual- and household-level characteristics across HUD programs (for example, age, race, poverty, household structure, and health status), adult recipients of Housing Choice Vouchers and adult residents of Public Housing were more likely to be food insecure than were adults in Multifamily Housing.

- When controlling for individual and household characteristics, an estimated 41 percent of adults with Housing Choice Vouchers, 37 percent of adults in Public Housing, and 31 percent of adults in Multifamily Housing reported food insecurity.

When comparing NHIS adult participants receiving HUD assistance who were food insecure with those who were food secure, certain demographic and economic characteristics of HUD-assisted households were related to a higher likelihood of food insecurity, including adults aged 45 to 61, individuals who are part of racial and ethnic minority groups, individuals living below the Federal poverty threshold, individuals with disabilities, individuals living in households with no children, and individuals living in households where at least one family member had fair or poor health.

Observed differences in the likelihood of food insecurity across HUD program type may be attributable to key economic and social components that vary across program type, including whether a unit is assigned or is independently selected by members of the household, and differences in characteristics of neighborhoods. Additionally, HUD program types also differ in terms of subsidy type, payment standards, and methods of paying utility bills—factors that influence housing-cost burden and that potentially contribute to food insecurity. When compared with adults who are in Public Housing and Multifamily Housing programs, adults in the Housing Choice Voucher program had the highest rates of poverty and the highest percentage reporting difficulty paying family medical bills during the past year.

## How Was the Study Conducted?

The National Health Interview Survey (NHIS) is an annual cross-sectional population-based health survey designed to monitor the health of the U.S. civilian, non-institutionalized population. NHIS data from 2011 and 2012 were linked to HUD administrative data to examine the relationship between household food insecurity and HUD program type. Analyses focused on the prevalence of household food insecurity among NHIS adult participants receiving HUD assistance, and characteristics associated with food insecurity. To adjust for differences in the populations served by the different HUD programs, regression analyses were used to examine household food insecurity across HUD program type while accounting for sociodemographic characteristics at the individual and household levels.

# Household Food Insecurity and U.S. Department of Housing and Urban Development Federal Housing Assistance

## Introduction

Food insecurity is a serious public health concern affecting many low-income households in the United States. A food-insecure household reports having times when, due to insufficient resources, the household is unable to acquire adequate food for one or more household members (Coleman-Jensen et al., 2019). Low-income households are more likely than are higher-income households to be food insecure. In 2018, an estimated 11.1 percent of households in the general population were food insecure at least once during the prior year; among low-income households with incomes below 185 percent of the poverty threshold, the prevalence was 29.1 percent (Coleman-Jensen et al., 2019).

Food insecurity is associated with many factors, including State and local characteristics and household socioeconomic factors. Living in a State with comparatively high levels of poverty and unemployment, with low rates of homeownership, and with greater access to Federal nutrition assistance and unemployment insurance is associated with higher rates of food insecurity (Bartfeld and Dunifon, 2006; Bartfeld and Men 2017; Gundersen, Engelhard, and Waxman, 2014). Food insecurity is also highly associated with certain household socioeconomic factors, including low income, low educational attainment, unemployment, and a household's difficulty with paying bills (Loopstra and Tarasuk, 2013; Furness et al., 2004; Wehler et al., 2004; and Bartfeld and Dunifon, 2006). When compared with the national average, household food insecurity is consistently more prevalent among single-adult households with children, single-person households, households that are headed by Black or Hispanic individuals, and households in the South (Coleman-Jensen et al., 2019). Households that include one or more adults living with a disability are more likely to experience food insecurity than are households that do not include adults who live with a disability (Bartfeld and Dunifon, 2006; Brucker, 2016; Brucker and Nord, 2016; Brucker and Coleman-Jensen, 2017; and, Coleman-Jensen and Nord, 2013).

Low-income families face financial strain across multiple domains. Limited financial resources can lead to families making spending tradeoffs as they struggle to address competing childcare, food, housing, medical, and transportation costs. A key example is the “treat or eat” tradeoff that households make between purchasing adequate food and paying for medicine (Herman et al., 2015; Knowles et al., 2015; and Berkowitz et al., 2014). Members of households that have trouble paying rent may choose to economize on food or compromise housing quality (Kirkpatrick and Tarasuk, 2011). The USDA administers several programs that provide targeted nutrition assistance for low-income people who are at risk of food insecurity (Oliveira, 2018; Bartfeld et al., 2015). Previous research suggests that the Supplemental Nutrition Assistance Program (SNAP) reduces by an estimated 30 percent the risk of recipients' being food insecure (Ratcliffe et al., 2011). An economic analysis also suggests that when the population receiving public assistance was reduced by 10 percent due to eligibility restrictions, the percentage of food-insecure households increased by approximately 5 percent (Borjas, 2004). For a recent review of the effectiveness of SNAP in reducing food insecurity, see Gundersen and Ziliak (2018). Given this evidence, public assistance programs, even those that do not explicitly target food insecurity, may raise levels of household food security by alleviating overall household financial burden. As housing costs are typically among a household's larger expenses, programs that help to



reduce housing costs may be effective in reducing the risk of household food insecurity. Levels of food insecurity among low-income households receiving Federal housing assistance are, however, unknown. Housing assistance may be a resource that helps low-income families avoid food insecurity. Alternatively, families that qualify for housing assistance may have such limited resources that they risk food insecurity even when they receive housing assistance.

## U.S. Department of Housing and Urban Development (HUD) Rental Assistance Programs

Housing costs represent a significant expenditure for low-income families, with some research having found that more than half of low-income families with children spend more than 50 percent of their income on housing (Holupka and Newman, 2011). Households that spend 50 percent or more of their income on housing costs are defined by HUD as having severe rent burden (Watson et al., 2017). In 2015, 8.15 million households faced severe rent burdens. “Paying one-half of a limited total income for rent leaves very little income for other essentials, such as food, medical care, transportation expenses, education, and childcare” (Watson et al., 2017, p. 3). Households that include members of racial or ethnic minority groups and households with children that are headed by single adults are disproportionately affected by severe rent or housing-cost burden. In 2015, over one-quarter of Black households and nearly one-third of single-adult-headed households with children had severe housing-cost burden (Joint Center for Housing Studies, 2015). For low-income households, high housing-cost burden is a chronic issue that reduces housing stability and increases the risk of food insecurity (Bartfeld and Dunifon, 2006). HUD rental assistance programs seek to reduce housing-cost burden and to promote housing security by providing subsidies that allow families to pay only 30 percent of their household income on rent (Lloyd and Helms, 2016).

HUD subsidizes rent for over 10 million low-income individuals across multiple types of housing assistance programs via three major rental assistance program categories: **Public Housing, Multifamily Housing, and the Housing Choice Voucher program** (U.S. Department of Housing and Urban Development 2018; also see appendices in Lloyd and Helms, 2016 and Watson et al., 2017). A common feature among the three HUD program types is that a participating household typically contributes at least 30 percent of its combined income for rent or pays a minimum rent (often set at \$50 per month), with the HUD-provided subsidy paying the remaining amount up to a specified limit that varies by program. Though potential recipients of HUD assistance are afforded the ability to select the program or programs for which they wish to apply, housing stock is limited and is based on local availability. The three HUD program types have similar eligibility criteria. Due to limited resources and high demand, waitlists, preferences, and/or targeting requirements are common for each of the three HUD programs (see box, “Characteristics of U.S. Department of Housing and Urban Development (HUD) Rental Assistance Programs: Eligibility, Waitlists, Preferences, and Targeting Requirements,” page 3). These HUD assistance programs vary by size, by payment structure, and by subsidy type. Differences across the three HUD program categories (Public Housing, Multifamily Housing, and Housing Choice Voucher) are further highlighted in the box on pages 4 and 5, “U.S. Department of Housing and Urban Development (HUD) Rental Assistance Programs.”

## **Box A: Characteristics of U.S. Department of Housing and Urban Development (HUD) rental assistance programs**

### **Eligibility**

For all three HUD program categories, local housing agencies and owners of privately managed buildings determine eligibility for rental assistance programs based on three factors:

- Citizenship or eligible immigration status,
- Family size; and,
- Gross annual income.

The most complex of the three eligibility criteria is gross family annual income. To determine the eligibility of applicants, HUD sets income limits based on area median income. Though these limits vary from one area to another, other eligibility requirements are nationally uniform. Tenants must recertify their income every 12–36 months, depending on the HUD program type. For most HUD programs, families become ineligible for assistance when their income exceeds eligibility guidelines during a recertification.

### **Waitlists**

Demand for housing assistance greatly exceeds the Federal and local resources available. Long waiting lists are common, and only 25 percent of eligible households receive housing assistance. Often, families are placed on waiting lists for all programs available and, in some jurisdictions, selection is based on a lottery system.

### **Preferences**

Local housing authorities or private building owners may also establish local preferences for selecting applicants from the waiting list. For example, housing authorities may give a preference to a family that is homeless, is living in substandard housing, is paying more than 50 percent of its income for rent, or is involuntarily displaced. Families that qualify for local preferences move ahead of families on the list that do not qualify for any preferences.

### **Targeting Requirements**

Some housing assistance programs have targeting requirements based on income. For example, housing authorities are required to issue 75 percent of Housing Choice Vouchers that become newly available each year to extremely low-income families (a classification determined by HUD income limits).

Similarly, the Public Housing program and the project-based Section 8 program—the largest of the Multifamily Housing programs—require that at least 40 percent of newly available units serve extremely low-income families.

Due to high demand and limited resources, assisted housing demand exceeds supply. More families that meet the targeting requirement income levels are eligible for housing assistance than HUD programs can accommodate.

## Box B: U.S. Department of Housing and Urban Development (HUD) rental assistance programs

### Public Housing

- **Physical unit(s) description:** Public Housing units range from single-family detached houses to large apartment complexes.
- **Program oversight:** Public Housing units are owned by local housing agencies. Administrative data are collected by local housing agency staff.
- **Program size:** Approximately 1 million Public Housing dwellings are occupied nationwide.
- **Type of assistance:** The Public Housing program subsidizes specific affordable units via place-based assistance, which does not allow tenants flexibility when choosing the physical location of their housing; however, beneficiaries still have the choice of accepting subsidized housing in a specific location or not.
- **Payment structure:** Public Housing tenants have the option to pay a flat rent, a constant payment that often falls well below 30 percent of total household income.

### Housing Choice Voucher Program

- **Physical unit(s) description:** With a few exceptions, Housing Choice Voucher Program participants choose their own housing units from units currently available in the private market.
- **Program oversight:** Local housing agencies manage program operations, including waitlists. Administrative data are collected by local housing agency staff.
- **Program size:** The Housing Choice Voucher Program is the Federal Government's largest rental housing assistance program. Approximately 2 million households participate in the program.
- **Type of assistance:** Housing Choice Voucher Program participants lease affordable rental housing in the private market from owners who agree to participate in the program, a subsidy type often referred to as tenant-based.
- **Payment structure:** Local housing authorities determine a payment standard that represents the amount needed to rent a moderately priced unit in the local housing market. The payment standard is used to calculate the amount of housing assistance a family will receive. Payments seek to cover the difference between 30 percent of a household's adjusted gross income and the predetermined payment standard, which reflects the estimated cost of renting a standard-quality housing unit in the tenant's jurisdiction. Local housing authorities have discretionary authority to set payment standards at approximately 90 percent to 110 percent of fair market rent within the locality, but any payment standard above 110 percent requires HUD approval. A voucher-receiving household can select a unit with a rent that is below or above the payment standard.

— continued

## Box B: U.S. Department of Housing and Urban Development (HUD) rental assistance programs — continued

### Multifamily Housing

- **Physical unit(s) description:** Multifamily buildings contain at least four housing units.
- **Program oversight:** One commonality exists among programs in the Multifamily Housing domain; subsidies are paid directly to private property owners, who are required to provide a certain percentage of their housing units at affordable rates for low-income persons. Private building owners collect administrative data.
- **Program size:** The Multifamily Housing Program encompasses several separate, distinct HUD programs, serving more than 2 million households. The largest Multifamily Housing Program is project-based Section 8.
- **Type of assistance:** Multifamily Housing Programs subsidize specific affordable units via place-based assistance, which does not allow tenants flexibility when choosing the physical location of their housing; however, beneficiaries still have the choice of accepting subsidized housing in a specific location or not.
- **Payment structure:** For Multifamily Housing Programs, each program has specific rules and affordability restrictions; however, most participating households contribute approximately 30 percent of their gross annual income to rental payments.

## HUD Rental Assistance and Possible Implications for Food Insecurity

As Federal housing assistance programs reduce housing-cost burden for low-income households, one might expect that housing-assisted households have a greater share of resources available for food than do non-housing-assisted households with similar income levels, and that, in turn, those resources might mitigate food insecurity. However, this relationship is complex and may differ across HUD program type. While some studies have examined the relationship between a specific housing program and food insecurity, research has not compared the programs or examined how each program may have a different impact on food insecurity. For example, rent burden, a key aspect of overall household financial management, varies across program type and is generally lower for households receiving assistance through the Public Housing program than it is for households receiving assistance through the Housing Choice Voucher program. This is because Public Housing tenants have the option to pay a flat rent, a fixed payment that often falls well below the 30 percent total household income amount that is used to calculate Housing Choice Voucher tenant subsidies (Mast, 2012). Like Public Housing program tenants, Multifamily Housing program participants pay a pre-determined, fixed amount. Because household food insecurity is closely associated with economic resources, and because residents of Public Housing and residents of Multifamily Housing generally spend less of their household income on housing than do those who receive Housing Choice Vouchers, residents of Public Housing and Multifamily Housing units may experience lower rates of household food insecurity than do members of households receiving Housing Choice Vouchers.

In addition, programmatic and target-population differences may be associated with differences in levels of household food insecurity across the program types. For example, the structure of a housing assistance program may influence access to services and supports that can alleviate food insecurity. Many Public Housing sites are in high-poverty urban areas. While such areas have been shown to have higher levels of social support and greater access to social services, they have also been shown to have more limited access to sources of nutritious food (Keene and Geronimus, 2011; Larson et al., 2009; Zenk et al., 2005; and, Moore and Roux, 2006).<sup>1</sup> By contrast, the Housing Choice Voucher Program facilitates recipients' living in socioeconomically diverse environments, which might influence food insecurity in other ways. For example, prior research suggests that neighborhood socioeconomic status is associated with fruit and vegetable intake (Dubowitz et al., 2008). Another study found that neighborhood socioeconomic status is related to health care costs and to key social determinants such as food and housing security (Fitzpatrick et al., 2015). These findings underscore the potential role of neighborhood socioeconomic status, a factor that is more variable among Housing Choice Voucher families than it is among families participating in project-based rental assistance programs (e.g., Public Housing and Multifamily Housing).

### Housing and Food Insecurity

To date, little is known about the national prevalence of food insecurity among HUD-assisted adults and across HUD program type. This study estimates the prevalence of household food insecurity among HUD-assisted adults and examines differences in the likelihood of food insecurity across HUD program type, accounting for observable individual and household characteristics.

One might expect that HUD rental assistance reduces household food insecurity, as it adds resources to a household, thereby freeing some income for food purchasing. However, rental assistance may

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<sup>1</sup>See Rhone and colleagues 2019 report, "Understanding Low-Income and Low-Access Census Tracts Across the Nation: Subnational and Subpopulation Estimates of Access to Healthy Food," for statistics on geographic access to food stores in metropolitan area

not eliminate food insecurity for all households receiving it. For example, there is the possibility that those families with the greatest financial needs—households that are in extreme poverty, for instance, or households that have other high expenses, such as medical expenses—receive housing assistance, and that such households may, even with a reduction in housing-cost burden, experience food insecurity. Another possibility is that without housing assistance, families might choose to live with other family members, which might facilitate members of a merged household pooling resources for food and for other expenses. If members of a HUD-assisted household reduce work effort and, by extension, earnings in response to receiving rental assistance, or reduce work effort and earnings in order to maintain eligibility for rental assistance programs, food insecurity may persist. Additionally, rental assistance may slightly reduce the severity of food insecurity without helping a household become fully food secure (see Berger et al., 2008 for a thorough discussion of the theoretical impact of housing assistance on well-being). This study does not assess causality; instead it provides descriptive information on the well-being of HUD-assisted adults.

Previous research has found mixed associations between housing assistance and food insecurity (Kirkpatrick and Tarasuk, 2011; Fletcher et al., 2009). An experimental study revealed that when homeless families were offered permanent housing subsidies, after 18 months, these families experienced significant reductions in food insecurity (Gubits et al., 2015). Another HUD-funded, randomized control trial examined food insecurity among families that did and families that did not receive Housing Choice Vouchers. When compared with the control group, families that received Housing Choice Vouchers increased household expenditures on food, but not by enough to significantly reduce household food insecurity (Mills et al., 2006). Long-term results of a 10-year demonstration that combined subsidies with housing counseling designed to help low-income families move from high-poverty to low-poverty neighborhoods found that adults in the treatment group reported higher levels of food sufficiency (Sanbonmatsu et al., 2011). Lastly, one Canadian study examined food insecurity among a sample of renter households in Government-subsidized housing and found that half of the households studied were food insecure (St-Germain and Tarasuk, 2017).

Although some studies, such as the randomized trials described above, have tried to estimate the causal effect of rental or housing assistance on food insecurity, the relationship remains unclear. One study used instrumental variable models to account for selection into the housing assistance program and to estimate the causal impact of housing assistance on measures of hardship including food insecurity. The study showed no statistically significant effect of housing assistance on food insecurity (Berger et al., 2008). Another study, attempting to control for selection effects into a housing assistance program, compared food insecurity among families receiving housing assistance subsidies with food insecurity among families that were on a waiting list for subsidized housing. This study found that families living in subsidized housing were less likely to be food insecure than were families on a waiting list for subsidized housing (Kirkpatrick and Tarasuk 2011).

Other studies have found that over time, housing-cost increases are related to an increased likelihood of food insecurity (Fletcher et al., 2009) and that States that have higher costs of rental housing also have higher rates of food insecurity (Bartfeld and Dunifon 2006). However, a more recent study, using data from 2002–2014, finds more limited evidence that the cost of rental housing affects food insecurity, showing significant results only for some population subgroups (Bartfeld and Men, 2017). Bartfeld and Men found that high rents were related to a higher likelihood of very low food security for households that include children, where the household income is below 300 percent of the poverty line. High rents were also related to a higher likelihood of food insecurity and to a higher likelihood of very low food security for households that include an adult with a bachelor's degree.

## Data and Methods

We conducted a cross-sectional analysis of pooled health survey data from the 2011 and 2012 National Health Interview Survey (NHIS) linked to HUD housing administrative data.<sup>2</sup> From each family in the NHIS, one sample adult is selected at random to receive a more detailed questionnaire. The study sample consisted of NHIS sample adults who linked to any of the three HUD housing assistance program types at the time of their health interview during the NHIS years of 2011 or 2012 (n=2,089). In this report, the term “HUD-assisted adults” refers to NHIS sample adult participants who linked to HUD administrative data at the time of their health interview survey. This population does not necessarily represent all HUD-assisted adults. Estimates for low-income non-recipients of HUD assistance were not provided in this report because, when examining important sociodemographic and health characteristics, this population differs significantly from HUD-assisted adults (Helms et al., 2017).

Although past researchers have used housing-assistance waitlist information to assess causal effects, it is important to note that the HUD administrative data used in the linkage did not contain housing-assistance waitlist information. Local housing authorities and private owners are responsible for administering their own waitlist systems. Because the NHIS is cross-sectional and the HUD administrative data are longitudinal, it is possible to examine characteristics of NHIS participants who have not yet received assistance but will in the future as observed in later HUD administrative records. Using this concept, other researchers have developed a “pseudo-waitlist” comparison group by examining individuals “imminent” to receive HUD assistance, meaning that they were not receiving HUD assistance when responding to the NHIS, but, according to HUD administrative records, received HUD assistance soon after (Fenelon et al., 2018). However, the food security module is only in 2 years of currently linked data; therefore, there was not enough time to develop the “pseudo-waitlist.” With only 2 years of food security data, we would be able to observe food security status only in 2011, and new receipt of HUD assistance only in 2012. This type of analysis is planned for a time in the future when additional survey and administrative data are linked.

### National Health Interview Survey (NHIS)

The NHIS is an annual cross-sectional population-based health survey designed to monitor the health of the United States civilian, non-institutionalized population. The NHIS sample is nationally representative and includes about 35,000 households. When compared with other national health surveys, strengths of the NHIS include: robust sample size, sizable and diverse range of health and sociodemographic variables, and the ability to link to other datasets. The USDA began sponsoring the inclusion of the 30-day, 10-item Adult Food Security Survey Module in the 2011 NHIS. Inclusion of this module in the NHIS provides a unique opportunity to examine a wide range of health variables associated with food insecurity that are otherwise unavailable in any other data source.

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<sup>2</sup>The years 2011 and 2012 are the only survey years for which both linkable HUD administrative data and NHIS food security data are available.

## HUD Administrative Data

HUD administrative data are collected via Federal forms, and capture program participation information. For the Public Housing and Housing Choice Voucher programs, data are collected locally, by housing agencies, while for the Multifamily Housing program, data are collected through private building owners. To determine eligibility, laws require housing authorities and private building owners to verify complete and accurate Social Security numbers for each household applicant over the age of 6. Form completion is a mandatory prerequisite for receiving housing assistance. Several systems, including the Social Security Administration database and the Enterprise Income Verification System, are used to verify income and identity.

## Data Linkage

As the NHIS does not include details about HUD rental assistance program types, linking to HUD administrative data created a useful resource for researchers. More information about the NCHS-HUD data linkage, including linkage details, linkage representativeness, and linkage eligibility, can be found in the box on page 11, “Data linkage details: National Health Interview Survey linked to U.S. Department of Housing and Urban Development (HUD) administrative data.”

## Description of Variables

### *Outcome Variable*

For all analyses, the outcome variable was household food insecurity. We determined whether an adult’s household was food insecure using the food security variable available in the NHIS. The categorical food security indicator used in this study was calculated from USDA’s 30-day, 10-item U.S. Adult Food Security Survey Module. Prior research has suggested that food insecurity measured with the 30-day food-security scale in the NHIS tends to be somewhat higher than food insecurity measured with the 30-day food-security scale in the Current Population Survey Food Security Supplement (CPS-FSS). The CPS-FSS measures food security in the 30 days before the survey interview only among those survey respondents who reported household food insecurity in the 12 months prior to the survey, while the NHIS asks about food insecurity in the 30 days before the survey interview only, and does not ask first about food insecurity in the 12 months prior to the survey. As such, households in the NHIS may be somewhat less sensitive than those in the CPS-FSS to the exact timing of food insecurity having occurred in the last 30 days. However, USDA, Economic Research Service (ERS) assessments of the psychometric properties of the 30-day food security measure in the NHIS indicate that the data fit the assumptions of the underlying measurement model. The pattern of responses is consistent with the pattern of responses to the food-security measure in other surveys.

Each of the 10 questions asked about food-insecure conditions experienced in the 30 days prior to the survey and identified a resource constraint as the reason for the food-insecure condition. Questions covered a range of severity, from anxiety about the household food supply (for example: “We worried whether our food would run out before we got money to buy more. Was that often, sometimes, or never true for you in the last 30 days?”) to going a whole day without eating due to a lack of money and other resources for food (for example: “In the last 30 days did you or other adults in your household ever not eat for a whole day because there wasn’t enough money for food? Yes/No”).



## **Box C: Data linkage details: National Health Interview Survey (NHIS) linked to U.S. Department of Housing and Urban Development (HUD) administrative data**

### **General Information**

The data linkage process was managed by the U.S. Department of Health and Human Services (HHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS).

The linkage was mostly a deterministic, rules-based process, meaning that a predetermined set of matching criteria had to be met before a pair of records could be linked. A comprehensive CDC report entitled “Linkage of 1999–2012 National Health Interview Survey and National Health and Nutrition Examination Survey Data to U.S. Department of Housing and Urban Development Administrative Records” describes in greater detail the data linkage of 1999–2012 NHIS to HUD administrative records. The report includes information on methods used for linkage and discusses important analytic considerations (Lloyd et al., 2017).

### **Representativeness**

To assess the representativeness of the linked sample, linkage analysts examined the linked data alongside the universe of HUD administrative data during the same period. Evaluation of the linked data revealed that characteristics were similar among the two samples (Lloyd et al., 2017). The National Center for Health Statistics also developed weights that adjust for the potential bias of linkage eligibility.

### **Linkage Eligibility**

Participants were linkage eligible if they consented to data linkage and provided sufficient linkage information, including the last four digits of their Social Security number, date of birth, sex, first name, and last name. Participants who refused to answer a question about their housing assistance status during the household interview were deemed linkage ineligible. Specifically, families that reported living in a rental property were asked one question about receipt of rental assistance during the NHIS interview. Very few (less than 1 percent of) families living in a rental property refused to answer the rental assistance question.

In NHIS 2011 and 2012, approximately 60 percent of participants were linkage eligible. Among the linkage eligible, approximately 10 percent ever linked to HUD administrative data, meaning that the NHIS participant linked to HUD administrative records regardless of whether receipt of HUD assistance and the survey interview occurred concurrently.

The 10 food-security questions were used to create two composite variables. First, a binary indicator was used to simply determine whether an individual resided in a household that was food secure or food insecure. A participant with affirmative—“often”, “sometimes”, or “yes”—responses to three or more items was classified as living in a food-insecure household (Coleman-Jensen et al., 2019; Bickel et al., 2000). The binary indicator was utilized for the multivariate analyses. Second, a three-category food security variable was used to measure the severity of household food insecurity (food secure, low food security, and very low food security). This variable was used for the descriptive analyses. Food-insecure households were separated into two categories based on the severity of food insecurity experienced: low food security (participants who affirmed three to five food security questions) or very low food security (participants who affirmed six or more food security questions). Low food-secure households reported reduced dietary quality or variety, while very low food-secure households also reported reduced food intake and disrupted eating patterns, such as skipped meals.

### *Independent Variables*

We measured HUD program type using linked administrative records that determined housing assistance status at the time of the NHIS interview. Although the NHIS asks participants a general question about receipt of housing rental assistance, previous research suggests that such survey questions are unreliable due to misreporting (Gordon et al., 2005). Timing of housing assistance status alongside the timing of the health interview survey was utilized to determine a participant's housing assistance status at the time of the participant's health interview. Given that longitudinal data (HUD administrative data) was linked to cross-sectional data (NHIS), timing of both the survey interview and receipt of assistance were utilized to categorize HUD rental assistance participation as follows: (1) never received HUD housing rental assistance during the respective timeframe (1996–2012), (2) ever received HUD housing rental assistance regardless of the timing of the assistance, and/or (3) received HUD assistance at the time of their health interview. Details about HUD participation episode creation, the mechanism used to assess whether a sample adult was concurrent in HUD at the time of the health interview, are described elsewhere (Lloyd et al., 2017).

### *Control Variables*

Based on previous literature, we controlled for several variables potentially associated with household food insecurity and housing assistance. Individual-level control variables from the NHIS included age, sex, race/ethnicity, and disability status. Prior research has found a high rate of disability among HUD-assisted adults, but it is unclear whether this high rate is attributable to people with disabilities being more likely to seek and receive housing assistance, or to the fact that people with disabilities experience higher rates of poverty (Brucker et al., 2017). Disability was defined using two conceptual disability models described in previous Centers for Disease Control and Prevention literature (Altman and Bernstein, 2008): basic actions difficulty and complex activity limitation. A basic actions difficulty was identified if an individual reported experiencing one or more of the following difficulties: movement, emotional, sensory, or cognitive. A complex activity limitation was identified when an individual reported having one or more limitations related to self-care, socialization, and/or employment.

A number of household-level variables served as additional controls: poverty level, region, highest education level present in the family, family type (four categories included: one adult, no child(ren) under age 18; multiple adults, no child(ren) under 18; one adult, 1+ child(ren) under 18; and, multiple adults, 1+ child(ren) under 18), the presence of an elderly person in the household, whether any family member had fair or poor health, whether any family member was working last week, and whether the family reported trouble paying medical bills in the last 12 months. Health insurance was not used as a control variable because prior research shows that most HUD-assisted adults have public (74.6 percent) or private (8.1 percent) health insurance; therefore, the sample size of those with no health insurance (approximately 17 percent) was not sufficient for inclusion (Helms et al, 2017).

Poverty level was measured using the ratio of family income to poverty threshold. It was recoded as a categorical variable (below 1.0 and at or above 1.0) for two reasons. First, HUD program application and eligibility processes ensure that all program participants have low incomes relative to the household's locality. Second, bivariate analyses revealed that higher income levels were both infrequent in the population and did not significantly relate to food insecurity.

## *Statistical Analysis*

All analyses were weighted to account for the NHIS complex survey design. Additionally, weights were used to adjust for sample characteristic differences between those who consented and provided information for linkage and those who did not consent or provide adequate information for linkage (Judson et al., 2013). This report uses income values that were imputed by the NHIS to account for missing self-reported income data (NHIS, 2012).

## *Descriptive Analysis*

Descriptive statistics were used to examine person-level and household-level characteristics of the study population, HUD-assisted adults (tables 1 and 2). The share of HUD-assisted adults by food security status and program is shown in table 3. Lastly, the percentage of food-insecure HUD-assisted adults by person-level and household-level characteristics, including HUD program type, is shown in tables 4 and 5. Statistical differences were assessed using t-tests and chi-square analyses where the variance was estimated using the complex design.

## *Logistic Regression Models*

Binary logistic regression models were used to estimate the odds of living in a food-insecure household, controlling for individual-level and household-level covariates. The odds ratios serve as a relative measure to compare the likelihood that one group experienced food insecurity compared with a reference group. For example, the odds that a female experienced food insecurity relative to a male (the reference).

Four separate logistic regression models were run (table 6). The first used the entire sample. Each subsequent model was restricted to individuals who resided in a specific HUD program type: Housing Choice Voucher, Public Housing, or Multifamily Housing. Collinearity was detected using variance inflation factors (VIF). Using appropriate weighting, the following variables were assessed for collinearity: HUD program type, age, gender, race/ethnicity, poverty status, region, disability status, education level, family type, the presence of one or more elderly people in the household, whether any family member had fair or poor health, whether any family members were working last week, and whether the family reported trouble paying medical bills in the last 12 months. VIF ratios revealed minimal collinearity. A VIF ratio  $> 5$  was established as the conservative cutoff criterion to determine multicollinearity. No scores exceeded this threshold (range: 1.03–2.94).

Lastly, the probability of an individual residing in a food-insecure household across all three HUD program types was assessed (table 7). The model-adjusted risk of living in a food-insecure household was presented by HUD program type.

## Results

### Person-Level Sociodemographic Characteristics of HUD-Assisted Adults

Among sample adults concurrent in any HUD program at the time of their NHIS interview, most were between 18–44 years of age, female, and living with a disability (table 1). These demographic estimates are consistent with HUD administrative data for the same years. The largest share of adults in both the Housing Choice Voucher and Public Housing programs were non-Hispanic Black (42.6 percent and 41.6 percent, respectively), whereas nearly half of Multifamily Housing residents were non-Hispanic White (48.9 percent). Adults in the Multifamily Housing program have the highest rate of disability (64.0 percent) and the largest share of sample adults aged 62 or older (38.7 percent).

Table 1

**Distribution of HUD-assisted adults across person-level characteristics by HUD program**

|                                                    | All programs<br>(n=2,089) | Housing Choice<br>Voucher<br>(n=907) | Public<br>Housing<br>(n=546) | Multifamily<br>Housing<br>(n=636) |
|----------------------------------------------------|---------------------------|--------------------------------------|------------------------------|-----------------------------------|
| Weighted percent (Unweighted number of adults [n]) |                           |                                      |                              |                                   |
| <b>Age</b>                                         |                           |                                      |                              |                                   |
| 18–44                                              | 52.3 (930)                | 61.1 (501)                           | 51.4 (224)                   | 38.5 (206)                        |
| 45–61                                              | 24.3 (533)                | 26.2 (255)                           | 22.7 (138)                   | 22.8 (141)                        |
| 62+ <sup>1</sup>                                   | 23.4 (626)                | 12.7 (151)                           | 26.0 (184)                   | 38.7 (291)                        |
| <b>Sex</b>                                         |                           |                                      |                              |                                   |
| Male                                               | 27.8 (517)                | 28.2 (204)                           | 29.4 (153)                   | 25.8 (160)                        |
| Female                                             | 72.2 (1,572)              | 71.8 (703)                           | 70.6 (393)                   | 74.2 (478)                        |
| <b>Race/Ethnicity</b>                              |                           |                                      |                              |                                   |
| Hispanic                                           | 19.1 (361)                | 18.4 (150)                           | 24.1 (114)                   | 16.2 (98)                         |
| Non-Hispanic White                                 | 37.9 (757)                | 34.4 (300)                           | 31.4 (170)                   | 48.9 (287)                        |
| Non-Hispanic Black                                 | 39.0 (873)                | 42.6 (412)                           | 41.6 (236)                   | 30.8 (226)                        |
| Other                                              | 4.1 (98)                  | 4.6 (45)                             | 2.9 (26)                     | 4.1 (27)                          |
| <b>Disability status<sup>2</sup></b>               |                           |                                      |                              |                                   |
| Individual has a disability                        | 58.0 (1,294)              | 57.4 (544)                           | 52.0 (317)                   | 64.0 (434)                        |

Notes: <sup>1</sup>For programmatic purposes, HUD considers “elderly” adults to be adults aged 62 or older.

<sup>2</sup>Disability status was defined using two conceptual disability models described in previous Centers for Disease Control and Prevention literature: complex activity limitation (CAL) and basic actions difficulty (BAD).

Source: Data are from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2011–2012 National Health Interview Survey (NHIS), linked to U.S. Housing and Urban Development (HUD) administrative data.

## Household-Level Sociodemographic Characteristics of HUD-Assisted Adults

When examining household-level characteristics of sample adults concurrent in any HUD program at the time of their NHIS interview, the majority (66.4 percent) had family incomes below the poverty threshold (table 2). One-third of Housing Choice Voucher households were in the South, while over one-third of Public Housing households were in the Northeast, and one-third of Multifamily households were in the Midwest.

In 27.2 percent of HUD-assisted households<sup>3</sup>, the adult with the highest level of education did not graduate from high school. A higher percentage (31.8 percent) lived in households in which the adult with the highest level of education had a high school diploma, while the lowest percentage (16.4 percent) lived in households in which the adult with the highest level of education was a college graduate.

Among residents of Public Housing and Multifamily Housing, single adults without children made up the largest share by family type, while the largest share of Housing Choice Voucher families included multiple adults and at least one child.

When considering familial health, 40.8 percent of HUD-assisted adults reported at least one family member with fair or poor health, and over one-quarter reported difficulty paying family medical bills. While a majority of HUD-assisted households did not have an employed family member, over 20 percent included a full-time worker.

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<sup>3</sup>Throughout this report, the term “HUD-assisted household” refers to the household of the sample adult who linked to HUD administrative data. Analyses were not conducted at the household level; rather, the unit of analysis was the NHIS sample adult who linked to HUD administrative data.

Table 2

**Distribution of HUD-assisted adults across household-level characteristics by HUD program**

|                                                    | All programs<br>(n=2,089)                          | Housing Choice Voucher<br>(n=907) | Public Housing<br>(n=546) | Multifamily Housing<br>(n=636) |
|----------------------------------------------------|----------------------------------------------------|-----------------------------------|---------------------------|--------------------------------|
|                                                    | Weighted percent (Unweighted number of adults [n]) |                                   |                           |                                |
| <b>Ratio of family income to poverty threshold</b> |                                                    |                                   |                           |                                |
| Below 1.0                                          | 66.4 (1,431)                                       | 68.1 (637)                        | 63.2 (370)                | 66.3 (424)                     |
| At or above 1.0                                    | 33.6 (658)                                         | 31.9 (270)                        | 36.8 (176)                | 33.7 (212)                     |
| <b>Region</b>                                      |                                                    |                                   |                           |                                |
| Northeast                                          | 24.2 (473)                                         | 19.1 (158)                        | 35.7 (172)                | 22.9 (143)                     |
| Midwest                                            | 25.5 (518)                                         | 21.6 (188)                        | 23.7 (130)                | 33.2 (200)                     |
| South                                              | 32.2 (701)                                         | 33.0 (309)                        | 31.8 (186)                | 31.4 (208)                     |
| West                                               | 18.2 (397)                                         | 26.2 (252)                        | 8.91 (58)                 | 12.6 (87)                      |
| <b>Highest education in family</b>                 |                                                    |                                   |                           |                                |
| Did not graduate from high school                  | 27.2 (662)                                         | 22.7 (239)                        | 31.4 (204)                | 31.4 (220)                     |
| High school graduate <sup>1</sup>                  | 31.8 (652)                                         | 32.6 (294)                        | 32.0 (164)                | 30.2 (194)                     |
| Some college                                       | 24.6 (452)                                         | 27.1 (228)                        | 18.6 (89)                 | 25.5 (136)                     |
| College graduate                                   | 16.4 (318)                                         | 17.7 (144)                        | 18.0 (88)                 | 12.9 (86)                      |
| <b>Family type</b>                                 |                                                    |                                   |                           |                                |
| One adult, no child(ren) under age 18              | 36.1 (1,027)                                       | 28.2 (353)                        | 36.4 (286)                | 49.0 (389)                     |
| Multiple adults, no child(ren) under 18            | 16.6 (204)                                         | 16.3 (92)                         | 18.3 (57)                 | 15.6 (55)                      |
| One adult, 1+ child(ren) under 18                  | 22.2 (589)                                         | 24.3 (309)                        | 20.1 (134)                | 20.4 (147)                     |
| Multiple adults, 1+ child(ren) under 18            | 25.1 (269)                                         | 31.2 (153)                        | 25.3 (69)                 | 15.0 (47)                      |
| <b>Elderly presence</b>                            |                                                    |                                   |                           |                                |
| Elderly in household                               | 21.4 (541)                                         | 12.0 (124)                        | 23.2 (157)                | 35.4 (260)                     |
| <b>Familial health status</b>                      |                                                    |                                   |                           |                                |
| Any family members with poor/fair health           | 40.8 (850)                                         | 42.2 (378)                        | 40.4 (225)                | 38.7 (247)                     |
| <b>Any family members working last week</b>        |                                                    |                                   |                           |                                |
| Full-time                                          | 21.5 (321)                                         | 24.6 (169)                        | 24.0 (96)                 | 14.2 (56)                      |
| Part-time                                          | 18.4 (318)                                         | 21.7 (165)                        | 16.5 (72)                 | 14.7 (81)                      |
| No                                                 | 60.1 (1,450)                                       | 53.7 (573)                        | 59.6 (378)                | 71.1 (499)                     |
| <b>Difficulty paying medical bills</b>             |                                                    |                                   |                           |                                |
| Family had problems paying medical bills           | 26.4 (499)                                         | 28.8 (238)                        | 22.9 (123)                | 25.3 (138)                     |

Note: <sup>1</sup>High school graduate category includes tests of general educational development (GED).

HUD = U.S. Department of Housing and Urban Development.

Source: Data are from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2011–2012 National Health Interview Survey (NHIS), linked to U.S. Housing and Urban Development (HUD) administrative data.

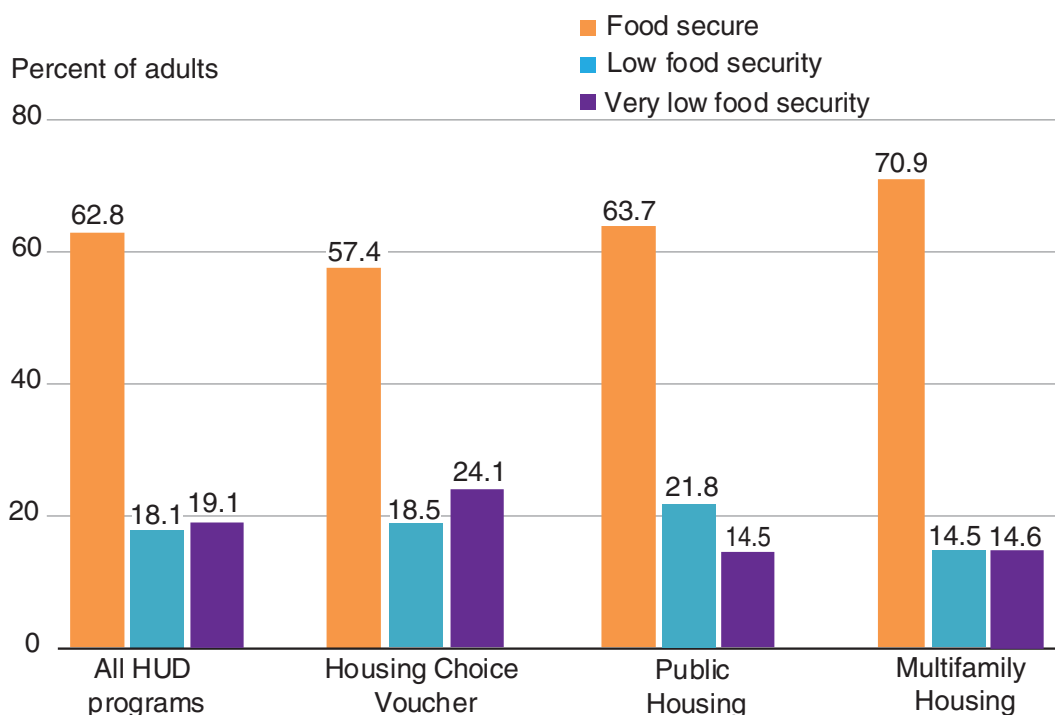
## Household Food Insecurity Among HUD-Assisted Adults

Among HUD-assisted adults concurrently participating in any HUD program at the time of their NHIS interview, 37.2 percent reported household food insecurity in the previous 30 days (figure 1, table 3). When examining the severity of household food insecurity across all three HUD program types, 18.1 percent had low food security and 19.1 percent had very low food security.

Analyses show significant differences in prevalence of food insecurity by HUD program type (figure 1): 42.6 percent of Housing Choice Voucher recipients, 36.3 percent of residents of Public Housing, and 29.1 percent of residents of Multifamily Housing units reported any level of food insecurity. Adults in the Housing Choice Voucher program also reported a rate of very low food security (24.1 percent) that was almost 10 percentage points higher than rates found in the other two programs. Very low food security among Public Housing residents was 14.5 percent and among Multifamily Housing was 14.6 percent. Given the small sample size of individuals with very low food security by HUD program type (unweighted n <100 for Public Housing and Multifamily Housing), the binary household food-insecurity variable was used for the logistic regression models.

Figure 1

### Prevalence of food security, low food security, and very low food security among adults receiving HUD assistance by HUD program type



Note: Food insecurity includes low and very low food security. Presented percentages are weighted.

Source: Data are from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC), 2011–2012 National Health Interview Survey (NHIS) linked to U.S. Housing and Urban Development (HUD) administrative data.

Table 3

**Percent of HUD-assisted adults by food security status and program type**

|                                                 | All programs<br>(n=2,089)       | Housing Choice<br>Voucher<br>(n=907) | Public<br>Housing<br>(n=546) | Multifamily<br>Housing<br>(n=636) |
|-------------------------------------------------|---------------------------------|--------------------------------------|------------------------------|-----------------------------------|
|                                                 | Weighted percent (Unweighted n) |                                      |                              |                                   |
| <b>Binary food insecurity indicator</b>         |                                 |                                      |                              |                                   |
| Food secure                                     | 62.8 (1,325)                    | 57.4 (525)                           | 63.7 (353)                   | 70.9 (447)                        |
| Food insecure (Low or very low food security)   | 37.2 (764)                      | 42.6 (382)                           | 36.3 (193)                   | 29.1 (189)                        |
| <b>Three-category food insecurity indicator</b> |                                 |                                      |                              |                                   |
| Food secure                                     | 62.8 (1,325)                    | 57.4 (525)                           | 63.7 (353)                   | 70.9 (447)                        |
| Low food security                               | 18.1 (374)                      | 18.5 (174)                           | 21.8 (102)                   | 14.5 (98)                         |
| Very low food security                          | 19.1 (390)                      | 24.1 (208)                           | 14.5 (91)                    | 14.6 (91)                         |

Source: Data are from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2011–2012 National Health Interview Survey (NHIS), linked to U.S. Housing and Urban Development (HUD) administrative data.

## Person-Level Characteristics Associated with Food Insecurity Among HUD-Assisted Adults

Among HUD-assisted adults, age was statistically associated with household food insecurity. Over half of sample adults aged 45–61 experienced household food insecurity, while 35.2 percent of adults aged 18–44 and 27.3 percent of adults aged 62 or older reported household food insecurity (table 4). Chi-square testing also revealed that among HUD-assisted adults in any HUD program, disability status ( $p < 0.01$ ) and race/ethnicity ( $p < 0.05$ ) were associated with food insecurity. No other person-level characteristics emerged as statistically significant.

Across HUD programs, non-Hispanic White respondents were less likely to live in food-insecure households than respondents of other races. Forty-four percent of sample adults with a disability lived in a food-insecure household, compared with 28 percent of sample adults without a disability ( $p < 0.01$ ).



Table 4

**Prevalence of food insecurity among HUD-assisted adults by person-level characteristics and program type**

|                                            | All programs<br>(n=2,089) | Housing Choice<br>Voucher<br>(n=907) | Public<br>Housing<br>(n=546) | Multifamily<br>Housing<br>(n=636) |
|--------------------------------------------|---------------------------|--------------------------------------|------------------------------|-----------------------------------|
|                                            | Weighted percent          |                                      |                              |                                   |
| <b>Age</b>                                 |                           |                                      |                              |                                   |
| 18–44 <sup>a</sup>                         | 35.2                      | 37.8                                 | 35.2                         | 28.4                              |
| 45–61 <sup>a</sup>                         | 51.1                      | 58.1                                 | 46.2                         | 42.1                              |
| 62 and older <sup>a</sup>                  | 27.3                      | 34.3                                 | 29.8                         | 22.2                              |
| <b>Sex</b>                                 |                           |                                      |                              |                                   |
| Male                                       | 37.4                      | 41.4                                 | 37.5                         | 30.1                              |
| Female <sup>a</sup>                        | 37.1                      | 43.1                                 | 35.8                         | 28.7                              |
| <b>Race/Ethnicity</b>                      |                           |                                      |                              |                                   |
| Hispanic                                   | 41.1                      | 44.6                                 | 42.4                         | 32.9                              |
| Non-Hispanic White <sup>a</sup>            | 31.8                      | 38.9                                 | 28.7                         | 25.1                              |
| Non-Hispanic Black                         | 40.4                      | 43.9                                 | 38.6                         | 34.6                              |
| Other                                      | 39.3                      | 50.8                                 | 34.4                         | 21.2                              |
| <b>Disability status</b>                   |                           |                                      |                              |                                   |
| Individual has a disability <sup>a,b</sup> | 44.0                      | 50.1                                 | 46.0                         | 33.6                              |
| No disability <sup>a</sup>                 | 28.2                      | 33.1                                 | 26.0                         | 21.1                              |

<sup>a</sup>Estimated difference of household food insecurity statistically significant ( $p < 0.05$  derived from t-test) when comparing Multifamily Housing to Housing Choice Voucher program.

<sup>b</sup>Estimated difference of household food insecurity statistically significant ( $p < 0.05$  derived from t-test) when comparing Public Housing to Multifamily Housing.

Note: No significant differences were observed when comparing the Housing Choice Voucher program to the Public Housing program.

Source: Data are from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2011–2012 National Health Interview Survey (NHIS) linked to U.S. Housing and Urban Development (HUD) administrative data.

## Household-Level Characteristics Associated with Food Insecurity Among HUD-Assisted Adults

There were statistically significant differences in the prevalence of food insecurity by program type for the following household-level characteristics: poverty level, the presence of an elderly person in the household, familial health status, familial work status, and difficulty paying medical bills ( $p < 0.01$ ; table 5). A more modest, but still significant relationship also emerged when assessing food insecurity and the following household-level characteristics: family type, and highest level of education attained by an adult in the household ( $p < 0.05$ ).

When examining differences across HUD program type, family type appeared to be especially important to understanding food insecurity among HUD-assisted households, as the presence of children is associated with somewhat lower household rates of food insecurity than those seen in households that include no children.

Table 5

**Prevalence of food insecurity among HUD-assisted adults by household-level characteristics and program type**

|                                                         | All programs<br>(n=2,089) | Housing Choice Voucher<br>(n=907) | Public Housing<br>(n=546) | Multifamily Housing<br>(n=636) |
|---------------------------------------------------------|---------------------------|-----------------------------------|---------------------------|--------------------------------|
|                                                         | Weighted percent          |                                   |                           |                                |
| <b>Ratio of family income to poverty threshold</b>      |                           |                                   |                           |                                |
| Below 1.0 <sup>a</sup>                                  | 40.5                      | 46.1                              | 40.6                      | 31.0                           |
| At or above 1.0                                         | 30.7                      | 35.2                              | 28.8                      | 25.3                           |
| <b>Region</b>                                           |                           |                                   |                           |                                |
| Northeast                                               | 34.5                      | 32.0                              | 39.8                      | 30.8                           |
| Midwest <sup>a,b</sup>                                  | 40.1                      | 52.3                              | 40.9                      | 26.7                           |
| South <sup>c</sup>                                      | 35.2                      | 40.6                              | 28.4                      | 31.7                           |
| West <sup>a</sup>                                       | 40.3                      | 45.0                              | 38.1                      | 25.8                           |
| <b>Highest level of education in family</b>             |                           |                                   |                           |                                |
| Did not graduate from high school <sup>a,b</sup>        | 40.5                      | 46.0                              | 43.9                      | 31.2                           |
| High school graduate                                    | 32.2                      | 36.0                              | 31.5                      | 26.1                           |
| Some college                                            | 36.9                      | 41.1                              | 33.0                      | 31.8                           |
| College graduate <sup>a</sup>                           | 41.6                      | 52.3                              | 35.0                      | 25.0                           |
| <b>Family type</b>                                      |                           |                                   |                           |                                |
| One adult, no child(ren) under age 18 <sup>a,c</sup>    | 37.5                      | 47.4                              | 35.8                      | 29.3                           |
| Multiple adults, no child(ren) under age 18             | 43.5                      | 47.5                              | 47.3                      | 33.0                           |
| One adult, 1+ child(ren) under age 18 <sup>a,b</sup>    | 31.0                      | 33.6                              | 34.6                      | 23.0                           |
| Multiple adults, 1+ child(ren) under 18                 | 38.1                      | 42.8                              | 30.5                      | 32.6                           |
| <b>Elderly presence</b>                                 |                           |                                   |                           |                                |
| Elderly in household                                    | 23.8                      | 31.0                              | 23.1                      | 20.1                           |
| Elderly not in household <sup>a</sup>                   | 40.9                      | 44.2                              | 40.3                      | 34.0                           |
| <b>Familial health status</b>                           |                           |                                   |                           |                                |
| Any family members with poor/fair health <sup>a,b</sup> | 51.7                      | 59.6                              | 52.5                      | 36.8                           |
| <b>Any family members working last week</b>             |                           |                                   |                           |                                |
| Full-time                                               | 28.0                      | 30.2                              | 26.3                      | 24.2                           |
| Part-time                                               | 39.3                      | 44.3                              | 32.9                      | 33.1                           |
| No <sup>a,b</sup>                                       | 39.6                      | 47.6                              | 41.2                      | 28.6                           |
| <b>Difficulty paying medical bills</b>                  |                           |                                   |                           |                                |
| Family had problems paying medical bills                | 55.7                      | 57.6                              | 54.1                      | 53.2                           |

<sup>a</sup>Estimated difference of household food insecurity statistically significant ( $p < 0.05$  derived from t-test) when comparing Multifamily Housing to Housing Choice Voucher program.

<sup>b</sup>Estimated difference of household food insecurity statistically significant ( $p < 0.05$  derived from t-test) when comparing Public Housing to Multifamily Housing.

<sup>c</sup>Estimated difference of household food insecurity statistically significant ( $p < 0.05$  derived from t-test) when comparing Public Housing to Housing Choice Voucher program.

Note: High school graduate category includes tests of general educational development (GED).  
HUD = U.S. Department of Housing and Urban Development.

Source: Data are from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2011–2012 National Health Interview Survey (NHIS) linked to U.S. Housing and Urban Development (HUD) administrative data.

## Multivariate Logistic Regression Models Exploring the Association Between Household Food Insecurity and HUD Program Type

Multivariate logistic models suggest that the likelihood of experiencing household food insecurity was independently associated with HUD program type when controlling for age, sex, race/ethnicity, disability status, poverty level, region, family type, highest level of education attained by an adult in the family, presence of one or more elderly people in the household, whether any family members reported fair or poor health, family work status during the last week, and difficulty paying family medical bills.

Compared with adults in the Multifamily Housing program type, adults in the Housing Choice Voucher program were 61 percent more likely to report household food insecurity (table 6). Adults in the Public Housing program were 38 percent more likely to report household food insecurity than were adults in the Multifamily Housing program. Among all HUD-assisted households, Hispanic and non-Hispanic Black adults were more likely than adults of other racial and ethnic backgrounds to be food insecure, and individuals with disabilities were more likely to be food insecure than were individuals without disabilities. Households without children and households without elderly adults were more likely to be food insecure than were households that included children and households that included elderly adults. Households that included family members with fair or poor health and households having problems with paying medical bills were more likely to report food insecurity than were households that included no family members in fair or poor health and households that did not report problems with paying medical bills.

When examining household food insecurity by HUD program type, adults in the Housing Choice Voucher program were more likely to experience food insecurity if they were Hispanic or non-Hispanic Black, resided in the Midwest, or resided in households without children. Adults in Public Housing were more likely to report household food insecurity if they were Hispanic or non-Hispanic Black, if the household did not include an adult who graduated from high school, or if the household did not include an elderly person or people. Adults in the Multifamily Housing program were more likely to report household food insecurity if they were non-Hispanic Black, had a disability, or if the household did not include elderly members.

Table 6

**Multivariate logistic regression models of household food insecurity and relevant controls among HUD-assisted adults**

|                                                    | All HUD programs                                     | Housing Choice Voucher | Public Housing     | Multifamily Housing |
|----------------------------------------------------|------------------------------------------------------|------------------------|--------------------|---------------------|
|                                                    | Adjusted odds ratio (95 percent confidence interval) |                        |                    |                     |
| <b>HUD program type</b>                            |                                                      |                        |                    |                     |
| Multifamily Housing (Reference)                    | 1.00                                                 | -                      | -                  | -                   |
| Public Housing                                     | 1.38* (1.00, 1.89)                                   | -                      | -                  | -                   |
| Housing Choice Voucher                             | 1.61** (1.19, 2.17)                                  | -                      | -                  | -                   |
| <b>Age</b>                                         |                                                      |                        |                    |                     |
| 18–44                                              | 1.01 (0.54, 1.88)                                    | 1.21 (0.46, 3.19)      | 0.96 (0.31, 2.92)  | 0.74 (0.29, 1.85)   |
| 45–61                                              | 1.28 (0.75, 2.18)                                    | 1.77 (0.71, 4.42)      | 0.84 (0.34, 2.08)  | 1.08 (0.46, 2.53)   |
| 62+ (Reference)                                    | 1.00                                                 | 1.00                   | 1.00               | 1.00                |
| <b>Sex</b>                                         |                                                      |                        |                    |                     |
| Male (Reference)                                   | 1.00                                                 | 1.00                   | 1.00               | 1.00                |
| Female                                             | 1.07 (0.78, 1.47)                                    | 1.10 (0.70, 1.71)      | 1.04 (0.53, 2.04)  | 0.93 (0.50, 1.72)   |
| <b>Race/Ethnicity</b>                              |                                                      |                        |                    |                     |
| Hispanic                                           | 1.99*** (1.40, 2.82)                                 | 1.86* (1.08, 3.19)     | 2.12* (1.01, 2.04) | 1.87 (0.95, 3.66)   |
| Non-Hispanic White (Reference)                     | 1.00                                                 | 1.00                   | 1.00               | 1.00                |
| Non-Hispanic Black                                 | 2.02*** (1.50, 2.73)                                 | 1.91** (1.18, 3.11)    | 1.95* (1.13, 3.35) | 2.05** (1.24, 3.39) |
| Other                                              | 1.77 (0.92, 3.39)                                    | 1.98 (0.79, 4.96)      | 1.25 (0.38, 4.12)  | 1.61 (0.33, 7.74)   |
| <b>Individual has a disability</b>                 |                                                      |                        |                    |                     |
| Yes                                                | 1.52* (1.09, 2.10)                                   | 1.33 (0.85, 2.07)      | 1.92 (0.96, 3.81)  | 2.16** (1.14, 4.09) |
| No (Reference)                                     | 1.00                                                 | 1.00                   | 1.00               | 1.00                |
| <b>Ratio of family income to poverty threshold</b> |                                                      |                        |                    |                     |
| Below 1.0                                          | 1.32 (0.96, 1.80)                                    | 1.26 (0.81, 1.96)      | 1.19 (0.55, 2.59)  | 1.47 (0.88, 2.46)   |
| At or above 1.0 (Reference)                        | 1.00                                                 | 1.00                   | 1.00               | 1.00                |
| <b>Region</b>                                      |                                                      |                        |                    |                     |
| Northeast (Reference)                              | 1.00                                                 | 1.00                   | 1.00               | 1.00                |
| Midwest                                            | 1.39 (0.93, 2.07)                                    | 2.30* (1.18, 4.50)     | 1.14 (0.53, 2.42)  | 0.86 (0.45, 1.67)   |
| South                                              | 0.85 (0.61, 1.20)                                    | 1.29 (0.71, 2.35)      | 0.50 (0.24, 1.01)  | 0.86 (0.47, 1.57)   |
| West                                               | 1.19 (0.79, 1.78)                                    | 1.65 (0.87, 3.13)      | 0.82 (0.34, 1.97)  | 0.87 (0.42, 1.78)   |

— continued

**Table 6**  
**Multivariate logistic regression models of household food insecurity and relevant controls**  
**among HUD-assisted adults — continued**

|                                                   | All HUD programs                                     | Housing Choice Voucher | Public Housing      | Multifamily Housing  |
|---------------------------------------------------|------------------------------------------------------|------------------------|---------------------|----------------------|
|                                                   | Adjusted odds ratio (95 percent confidence interval) |                        |                     |                      |
| <b>Family type</b>                                |                                                      |                        |                     |                      |
| One adult, no child(ren) under age 18             | 1.53* (1.01, 2.31)                                   | 1.71* (1.00, 2.92)     | 0.93 (0.38, 2.26)   | 1.50 (0.57, 3.94)    |
| Multiple adults, no child(ren) under age 18       | 2.04** (1.34, 3.10)                                  | 2.12* (1.09, 4.11)     | 1.86 (0.77, 4.48)   | 1.42 (0.56, 3.60)    |
| One adult, 1+ child(ren) under age 18 (Reference) | 1.00                                                 | 1.00                   | 1.00                | 1.00                 |
| Multiple adults, 1+ child(ren) under age 18       | 1.36 (0.91, 2.04)                                    | 1.54 (0.90, 2.65)      | 1.41 (0.65, 3.06)   | 0.92 (0.38, 2.25)    |
| <b>Highest education in family</b>                |                                                      |                        |                     |                      |
| Did not graduate from high school                 | 1.10 (0.74, 1.64)                                    | 0.93 (0.56, 1.546)     | 1.95* (1.00, 3.82)  | 1.08 (0.50, 2.36)    |
| High school graduate or GED equivalent            | 0.71 (0.47, 1.06)                                    | 0.55* (0.33, 0.90)     | 1.01 (0.40, 2.60)   | 0.98 (0.43, 2.24)    |
| Some college                                      | 0.91 (0.61, 1.37)                                    | 0.91 (0.52, 1.58)      | 0.91 (0.42, 1.96)   | 1.05 (0.48, 2.33)    |
| College graduate (Reference)                      | 1.00                                                 | 1.00                   | 1.00                | 1.00                 |
| <b>Elderly in household</b>                       |                                                      |                        |                     |                      |
| Yes (Reference)                                   | 1.00                                                 | 1.00                   | 1.00                | 1.00                 |
| No                                                | 2.40** (1.40, 4.13)                                  | 1.82 (0.71, 4.67)      | 3.34** (1.38, 8.12) | 2.55** (1.17, 5.56)  |
| <b>Any family members with poor/fair health</b>   |                                                      |                        |                     |                      |
| Yes                                               | 2.27*** (1.69, 3.04)                                 | 2.64*** (1.74, 3.99)   | 2.58** (1.44, 4.61) | 1.52* (1.02, 2.28)   |
| No (Reference)                                    | 1.00                                                 | 1.00                   | 1.00                | 1.00                 |
| <b>Any family members working last week</b>       |                                                      |                        |                     |                      |
| Full-time (Reference)                             | 1.00                                                 | 1.00                   | 1.00                | 1.00                 |
| Part-time                                         | 1.35 (0.82, 2.23)                                    | 1.31 (0.71, 2.42)      | 1.32 (0.51, 3.44)   | 1.68 (0.58, 4.83)    |
| No                                                | 1.52 (0.99, 2.34)                                    | 1.52 (0.85, 2.71)      | 1.77 (0.69, 4.54)   | 1.19 (0.52, 2.71)    |
| <b>Family had problems paying medical bills</b>   |                                                      |                        |                     |                      |
| Yes                                               | 2.58*** (1.92, 3.48)                                 | 2.01** (1.26, 3.20)    | 3.03** (1.57, 5.85) | 4.37*** (2.45, 7.81) |
| No (Reference)                                    | 1.00                                                 | 1.00                   | 1.00                | 1.00                 |
| Model N                                           | 2,039                                                | 890                    | 533                 | 616                  |
| Intercept beta coefficient                        | -3.78                                                | -3.42                  | -3.69               | -3.50                |

Note: Estimates are weighted. \*\*\*p<0.001, \*\*p<0.01, \*p<0.05

Source: Data are from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2011–2012 National Health Interview Survey (NHIS) linked to U.S. Housing and Urban Development (HUD) administrative data.

## Adjusted Predictions of Living in a Food-Insecure Household by HUD Program Type

After controlling for all variables in the model displayed in the first column of table 6,<sup>4</sup> the probability was assessed across all three HUD program types of an individual residing in a food-insecure household (table 7). For each program type, an estimated model was used to predict the probability of an individual residing in a food-insecure household. By computing the model-adjusted risk ratio for individuals in each program type, HUD program differences were quantified.

Among adults in the Housing Choice Voucher program, the probability of residing in a food-insecure household was 41 percent, while among adults in Public Housing and Multifamily Housing programs, the probabilities of living in a food-insecure household were 37 percent and 31 percent, respectively. The unconditional prevalence rates presented in table 3 are virtually identical to model-adjusted predicted probabilities presented in table 7.

Table 7

### Model-adjusted risk of living in a food-insecure household by HUD program type

|                         | Predicted marginal proportion | SE   | 95 percent CI | p-value |
|-------------------------|-------------------------------|------|---------------|---------|
| <b>HUD program type</b> |                               |      |               |         |
| Housing Choice Voucher  | 0.41                          | 0.02 | 0.36, 0.45    | <0.001  |
| Public Housing          | 0.37                          | 0.03 | 0.32, 0.43    | <0.001  |
| Multifamily Housing     | 0.31                          | 0.02 | 0.27, 0.36    | <0.001  |

Notes: SE = standard error. 95 percent CI = 95 percent confidence interval.

Source: Data are from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2011–2012 National Health Interview Survey (NHIS) linked to U.S. Housing and Urban Development (HUD) administrative data.

<sup>4</sup> Control variables included age, sex, race/ethnicity, disability status, poverty level, region, highest level of education attained by a member of the household, family type, the presence of an elderly person in the household, whether any member of the household had fair/poor health, whether any family members were working last week, and whether the family reported problems paying medical bills in the last 12 months.

## Discussion and Conclusions

This study is the first to assess household food insecurity among a national sample of adults linked to HUD administrative data, finding that 37.2 percent of HUD-assisted adults were living in food-insecure households in the 30 days before the NHIS interview. This is higher than the annual prevalence (14.5 percent) or the 30-day prevalence (8.2 percent) for the overall U.S. population in 2012, but similar to the annual prevalence among households with incomes below the poverty threshold (40.9 percent) while also higher than the 30-day prevalence for households with incomes below the poverty threshold (24.4 percent) (Coleman-Jensen et al., 2013a, b).

In addition, we find substantive differences in the likelihood of food insecurity across HUD program type while controlling for individual and household characteristics. Adults residing in Housing Choice Voucher program residences had the highest risk of food insecurity (41 percent), while adults living in Multifamily Housing had the lowest risk of food insecurity (31 percent). Analyses also revealed that unconditional prevalence rates of food insecurity are virtually identical to model-adjusted predicted probability rates, indicating a stable relationship between HUD program type and food insecurity.

There are several potential reasons why adults residing in Housing Choice Voucher program residences face higher rates of household food insecurity. First, adults living in Housing Choice Voucher housing have the highest rates of poverty and the highest percentage reporting difficulty with paying family medical bills during the past year. These households also have the highest rates of adults living with disabilities and the highest rates of fair or poor health among household members. More detail about the relative health, access to health care, and health care utilization among persons residing in Housing Choice Voucher housing as compared with the persons receiving other types of housing assistance can better determine the extent to which health care costs may diminish the availability of household resources that might be used to purchase adequate food. Such information may also help determine whether certain types of preventative health care programs may help to reduce health care costs for this population, freeing up household resources which might be used to facilitate or ensure improved access to food.

Second, previous literature suggests that it can be difficult for families that pay rent and utility bills separately to manage overall finances and to adapt accordingly. While Multifamily Housing and Public Housing residents typically pay one flat amount that covers rent and utilities, Housing Choice Voucher tenants must manage these bills separately (Popkin et al., 2001; Orr et al., 2003). Financial management challenges associated with paying rent and utility bills separately could be one reason for higher rates of household food insecurity among Housing Choice Voucher tenants, as financial management skills are associated with food insecurity (Gundersen and Garasky, 2012). The higher food insecurity rates may also be attributable to higher overall utility and rent costs, though further research is needed to better understand how payment standards and the separation of rent from utility payments might contribute to food insecurity among Housing Choice Voucher tenants.

Third, rent burden is higher for participants in the Housing Choice Voucher program than it is for participants in Public Housing and Multifamily Housing programs (Mast, 2012; McClure, 2005). As mentioned in the “U.S. Department of Housing and Urban Development (HUD) Rental Assistance Programs” section, payment standards for Housing Choice Voucher tenants differ from other programs. Theoretically, Housing Choice Voucher tenants should not spend more than 30 percent of their household income on rent; however, in reality, many Housing Choice Voucher tenants

experience housing cost burdens that exceed 30 percent. One study found that for Housing Choice Voucher recipients, housing cost burden has risen steadily since 2003 (Dawkins and Jeon, 2017). Hypothesized reasons for this rent burden include: scarcity of affordable rental housing in desired areas, variable household income streams that do not keep pace with adjustments to housing assistance payments, poor program compliance monitoring, and rising utility costs that are not offset by allowances (Dawkins and Jeon, 2017). Higher rent burden for Housing Choice Voucher tenants may reduce the amount of available income for food purchases; however, more research in this area is needed to better understand the relationship between rent burden and food insecurity among Housing Choice Voucher tenants.

Multivariate analyses accounted for several of the aforementioned potential reasons for elevated rates among Housing Choice Voucher recipients when compared with Multifamily Housing or Public Housing recipients (for example, controlling for disability status). However, controlling for key characteristics such as poverty, disability, and health status does not appear to mitigate food-insecurity rates. Food insecurity may also be more common among Housing Choice Voucher and Public Housing recipients than it is among Multifamily Housing recipients even after controlling for person-level and household-level differences due to neighborhood-level geographic differences. As noted earlier, there are variations in location of Multifamily Housing and Public Housing units and places where Housing Choice Voucher benefits are accepted.

Additionally, the delivery mechanism of a housing subsidy may play an important role in food insecurity. While Public Housing and Multifamily Housing assistance is place-based, meaning that tenants cannot choose their units, Housing Choice Voucher residents are allowed portability to choose their places of residence. Research has suggested that people who receive vouchers face challenges associated with living in low-poverty neighborhoods, including limited access to public transportation; therefore, many Housing Choice Voucher tenants continue to reside in high-poverty neighborhoods (Rosenblatt and DeLuca, 2012). As HUD's largest housing assistance program, Housing Choice Voucher emerged as the HUD program with the highest rate of household food insecurity. Further research is needed to better understand the complexities associated with portable, tenant-based housing subsidies that allow tenants to choose their places of residence.

This study also revealed disparities in food security among HUD-assisted adults, suggesting that even among low-income groups, certain characteristics are associated with increased risk of household food insecurity. Among HUD-assisted adults, the following populations faced increased risk for household food insecurity: adults aged 45–61, members of racial and ethnic minority groups, people living below the Federal poverty threshold, adults with disabilities, adults living in households that include no children, and individuals living in households where at least one family member has fair or poor health.

In sum, although HUD-assisted adults receive housing benefits which are meant to alleviate a substantial monthly expense, our study findings suggest that a substantial portion of HUD-assisted adults still face a high risk of household food insecurity. This finding suggests that low-income persons face budget challenges not alleviated by housing subsidies alone.

Although the linked data provide an innovative opportunity to explore food insecurity among HUD-assisted adults, the study has some limitations. The study was not designed to uncover the causal impact of HUD assistance on food insecurity. The relationship documented between participating in HUD assistance and food insecurity is purely an association. This report is an important first step in understanding the well-being of HUD-assisted adults, as measured by food insecurity.



While not necessarily a limitation, it is important to note that the prevalence of food insecurity among HUD-assisted adults examined here is not perfectly comparable with national annual prevalence rates reported by USDA. The National Health Interview Survey (NHIS) uses a 30-day reference period while the Current Population Survey, which provides statistics on food insecurity for the USDA's annual reports, uses both a 12-month and a 30-day reference period. Therefore, the prevalence estimates reported here are 30-day prevalence rates, not annual rates. A 30-day reference period is used in the NHIS so that current food insecurity can be investigated along with current health, for example see Gregory and Coleman-Jensen (2017). If a 12-month measure of food insecurity were available in the NHIS, we would expect 12-month food insecurity rates to be higher than the 30-day rates, but the relative ranking in prevalence of food insecurity by HUD assistance type and other characteristics would likely be the same.

Lastly, as with other public assistance programs, self-selection bias exists as a study limitation. Self-selection bias occurs when individuals select themselves into a specific group. Certain characteristics or attributes make some persons more likely to apply for and participate in housing programs. Unlike other public benefits programs which are available to all eligible entities, affordable housing stock is limited. Approximately 25 percent of eligible families receive housing assistance and often, assistance is determined by waiting lists or lottery systems. Such systems indicate some degree of randomness associated with eventual participation. In this study, selection bias is less of a concern since all HUD-assisted groups have "selected" to participate in housing assistance and we are comparing among them.

Future research should attempt to account for program selection and estimate the causal impact of HUD assistance on food insecurity. Despite high levels of food insecurity among HUD-assisted households, food insecurity rates may still be higher if those households were not receiving HUD assistance.

In summary, this descriptive study suggests that household food insecurity is prevalent among HUD-assisted adults. More research is needed to further investigate the relationship between household food insecurity and housing subsidies. As exhibited from study findings, the use of HUD administrative data linked to other data sources has the potential to elucidate the complex relationship between poverty, social conditions, and key forms of material hardship, including housing and food insecurity.

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