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Toward Implementation of a National Housing Insecurity Research Module

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Abstract

This article provides a summary of the motivation, process, and status of a collaborative federal effort to develop a housing insecurity survey module that is transferable across household surveys and studies. The module will serve as the basis of a validated and transferable composite index of housing insecurity. This index is intended to be suitable for use in a variety of survey and evaluation instruments that have previously excluded or insufficiently specified housing problems.

Researchers, policymakers, and program leaders regularly invoke the concept of housing insecurity in marshaling evidence to inform decisionmaking and improve outcomes. In the absence of a unified definition and measure, however, the transactional costs of building evidence in this field can be high, given the time and effort required to cultivate and choose among a variety of potential measures. Similarly, making use of evidence requires a detailed investigation of each study's unique definition and measures. This fragmented approach to building, applying, sharing, and understanding evidence on housing needs, tradeoffs, and correlates stands in contrast to the widely understood, standardized continuum of food security measured by the transferable U.S. Household Food Security Survey Module.

Abstract (cont.)

This article expands on previous research on the need for a housing insecurity index and addresses why traditional measures of housing cost burden and quality are insufficient for constructing a measure that is transferable across household surveys. This article then introduces the U.S. Department of Housing and Urban Development's (HUD) efforts to design a national housing insecurity research module that was implemented as a follow-on to the 2019 American Housing Survey (AHS) and identifies how the module's design is expected to inform the development of a validated index of housing insecurity. Discussion includes factors related to scale development that influenced the module's design; the basis of the module's sampling frame; and plans to assess the validity of a resulting index using contextual questions about stress and basic needs tradeoffs, food security index scores, and core affordability and quality measures from the most comprehensive national housing survey in the United States.

Problem: Why Traditional Measures are Insufficient for Constructing a Housing Insecurity Index that is Transferable Across Household Surveys

Housing insecurity is a concept that is regularly used by researchers, policymakers, and program leaders to inform decisionmaking and improve various outcomes. There is no consensus in the research literature, however, as to how housing insecurity should be defined and measured. Different definitions focus on aspects of the home (for example, affordability, residential stability, housing quality, and safety) and neighborhood (for example, neighborhood quality and safety) that make housing situations more or less stable and secure. In short, researchers and policymakers lack common definitions and measures as they conduct research on housing problems and the relationship between housing and other outcomes like health and education. This section expands on previous research on the need for a housing insecurity index and addresses why traditional measures of housing cost burden and quality are insufficient for constructing a measure that is transferable across household surveys and suitable for use in a variety of survey instruments.

Our Toolbox is Incomplete

Researchers, program designers, program evaluators, and other local and federal policymaking bodies are often in search of a vetted means of measuring and describing an array of housing problems, their correlates, and their consequences. Some research is intimately focused on specific housing problems like crowding, cost burden, or housing quality—all of which have a variety of definitions and measures. Many other researchers are seeking a vetted means of gauging whether an individual or household is more or less housing secure and how that level of housing insecurity may be related to or explain other observed outcomes. Others are curious about housing insecurity as a dependent variable; for example, to learn more about which intervention types or doses are

likely to improve housing security. The transactional costs of building evidence in this field can be high, given the time and effort required to cultivate and choose among a variety of potential measures. Similarly, making use of evidence requires a detailed investigation of each study's unique definition and measures.

The various quests described, often make their way to the doorstep of the U.S. Department of Housing and Urban Development (HUD), commonly in the form of a quick turnaround request to staff in the Office of Policy Development and Research (PD&R) for a short, vetted list of housing insecurity questions to include in large- or small-scale surveys and program evaluations. Requesters (both internal and external) often seek a short-form means of identifying housing problems with predictable or theoretical correlation with other outcomes, such as child development, health, education, self-sufficiency, employment, crime, homelessness, and community development. A series of questions from PD&R staff typically ensues: Which aspect of housing insecurity? Why not other elements? How many questions? What is the population of interest? What is the level of inquiry?

While these types of probing and exploratory questions are good standard practice for any research endeavor, the process of searching for good housing insecurity measures presents an additional challenge. As has been well-documented in recent research reports (for example, Cox et al., 2019; Cunningham, Leopold, and Posey, 2016; Leopold et al., 2016), there is no consistent definition of housing insecurity that captures its various dimensions across a continuum of security. The lack of uniformity in the measurement of housing needs, tradeoffs, and correlates stands in contrast to the widely understood standardized continuum of food security measured by the transferable U.S. Household Food Security Survey Module. A validated composite index of housing insecurity would bring a valuable and much-desired tool to the research and policy development world, a practical and policy-relevant alternative to the variety of definitions and measures that currently compete (or amicably coexist) in existing research. Namely, a composite, transferable index of housing insecurity suitable for use in a variety of survey and evaluation instruments could significantly improve research that has previously excluded or insufficiently specified housing problems.

Traditional Measures Inform the Conceptual Framework for a Continuous Housing Insecurity Index

To begin, it is instructive to review the ways in which existing measures of housing problems provide a starting point for developing such an index. Researchers have long been engaged in the development of definitions and measures of housing insecurity. These measures inform both the conceptual scope of a housing insecurity index and provide precedent for constructing new measures over a continuous scale. A few examples illustrate the variety of measurement approaches employed.[1] The concept for "worst case" housing problems in HUD's longitudinal Worst Case Housing Needs Report to Congress was developed in the early 1980s from discussions among Senate appropriations staff, the Office of Management and Budget (OMB), and HUD (HUD, 1991). HUD produces biennial estimates of very low-income renter households without federal

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[1] These examples tend to coalesce around themes of housing affordability, stability, and quality. Other approaches measure narrower or broader conceptual themes.

rental assistance experiencing severe housing affordability or quality problems using data from the American Housing Survey (AHS).[2] In addition to affordability and quality measures, other approaches integrate measures of housing instability such as frequent moves or temporary housing situations. For example, Children's HealthWatch developed a survey to track health outcomes of low-income children and families as a function of housing insecurity, measured by frequent moves, living in temporary doubled up or crowded conditions, or being behind on rent (Children's HealthWatch, 2018). Similarly, the Urban Institute launched a Well-Being and Basic Needs Survey (WBNS) in December 2017 that identified housing problems using various measures drawn from the AHS, the American Community Survey (ACS), the National Health Interview Survey (NHIS), and the Survey of Income and Program Participation (SIPP) on tenure and structure type, rental assistance, difficulty affording housing or utilities, and forced moves (Karpman, Zuckerman, and Gonzalez, 2018).[3] Each of these approaches captures important dimensions of housing problems and provides useful insights about their consequences.

Existing measures also provide a framework for thinking about particular elements of housing insecurity across a continuum. Affordability measures like cost burden, or quality measures like physical adequacy or crowding, are often conceptualized in this way. The percentage of a household's gross income consumed by gross rent is a continuous measure of cost burden from 0 to 100 percent.[4] Categorically, cost burden over 50 percent of household income is a common indicator of severe affordability problems, while burdens between 30 and 50 percent typically indicate moderate affordability problems. Housing quality can also be measured across a scale. For example, HUD uses AHS data to identify whether a home has severe or moderate physical problems, defined by type and number of functional and maintenance inadequacies (Watson et al., 2017). Crowding measured by persons per room offers another continuous scale (Blake, Kellerson, and Simic, 2007). Continuous or scaled measures like these describe household trends across time, geography, and other demographic dimensions and assess outcomes associated with increasingly severe housing problems.

Some researchers have begun examining ways to use existing data to construct multi-dimensional housing insecurity scales. Routhier (2019) made a case for measuring housing insecurity with a multidimensional index, arguing that freestanding concepts overlook the exacerbating effects of overlapping housing problems. Using factor analysis of AHS data, Routhier found four distinct dimensions of housing insecurity: unaffordability, physical problems, forced moves, and crowding. A positive correlation is found within and across dimensions, with 22 percent of renters nationally experiencing three or more overlapping problems, undercutting the notion that households trade off between dimensions. Cox et al. (2017) similarly argued that single-dimension measures do not adequately capture the multidimensionality of housing insecurity, particularly considering differences across geography. Analyzing AHS data, Cox et al. (2017) found seven dimensions of housing security. Four dimensions are similar to Routhier's (2019) findings, coalescing around

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[2] HUD categorizes households by relative income adjusted for household size, for programing purposes. Extremely low-, very low-, and low-income categories represent households with incomes not exceeding 30 percent, 50 percent, and 80 percent of the local area's median family income (AMI), respectively (Watson et al., 2017).

[3] Both the Children's HealthWatch Survey and WBNS also measure respondents' level of food security across a continuum using the U.S. Department of Agriculture's (USDA) food security module.

[4] For more information on very high rent burdens, see Eggers and Moumen (2010).

affordability, instability, unit safety, and unit quality concepts. Cox et al. (2017) additionally argued for including neighborhood quality, neighborhood safety, and homelessness elements.

Traditional Measures Alone are Insufficient for Constructing a Transferable Housing Insecurity Index

Although these traditional measures are informative, we contend they are insufficient for constructing a transferable housing insecurity index. The indices proposed by Routhier (2019) and Cox et al. (2017) offer insight into the insufficiency of single-dimension population estimates of housing problems, but require the harnessing of a large amount of data from dozens of survey questions—more questions than can practically be included in survey instruments where housing insecurity is just one of many areas of inquiry. In contrast, USDA's short-form food security module, which consists of only six questions, has spurred a growing body of research that examines food security as one element of a larger area of inquiry (for example, Children's HealthWatch, 2018; Karpman, Zuckerman, and Gonzalez, 2018). In the same way, housing research would benefit from a validated measure of housing insecurity based on a reasonable number of survey questions that are transferable across household surveys. In short, a composite, transferable index of housing insecurity suitable for use in a variety of survey and evaluation instruments could significantly advance research that has previously excluded or insufficiently specified housing problems. The next section will introduce HUD's efforts to design a national housing insecurity research module collected as a follow-on to the 2019 AHS.

Opportunity: Designing a National Housing Insecurity Research Module

PD&R has initiated a project to develop and leverage a common language of housing insecurity through a pilot household-level survey module that integrates several conceptual dimensions. As core AHS variables provided necessary data for Routhier (2019) and Cox et al.'s (2017) analysis of existing housing insecurity measures, a new multidimensional research module provides an opportunity for future scale analysis to refine our understanding of how various housing insecurity concepts relate to one another or overlap to exacerbate housing problems.[5] This section outlines the goals of the housing insecurity research module and details the process PD&R undertook to define the scope of the module.

Defining the Goals of a Housing Insecurity Research Module

The research module was designed for inclusion in the 2019 AHS and is ultimately intended to inform development of a streamlined module that is transferable to other household-level surveys. The resulting index is intended to (1) provide a validated method for calculating household-level scores across a scale of housing insecurity; (2) improve evaluations and survey instruments that have previously excluded or insufficiently specified housing problems; (3) help researchers build a

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[5] The USDA food security module was initially designed to account for multiple dimensions and evolved into a unidimensional measure following scale analysis of pilot tests. See "Chapter 2: History of the Development of Food Security and Hunger Measures" (National Research Council, 2006).

more robust and coherent body of knowledge around housing needs, tradeoffs, and correlates; (4) enhance the quality and consistency of policy-relevant research; and (5) amplify visibility of the continuum of housing needs.

Process of Developing the Scope of the Research Module

This effort is similar in many ways to the process employed by the U.S. Department of Agriculture (USDA) in developing their transferable U.S. Household Food Security Survey Module.[6] That process included a staff review of literature on the conceptual basis for food security measures and practical questionnaire development, an expert convening on conceptual frameworks and implementation strategies, cognitive assessment and field testing of the inaugural food security questionnaire, survey administration in the annual Current Population Survey, and ongoing analysis to refine the scale and definition of food security.[7] The scale development literature similarly advises researchers to begin with a clear conceptual framework, proceed to generating a pool of potential survey items[8] and soliciting expert review, consider inclusion of validation items, and determine an appropriate sampling frame (Carpenter, 2018; DeVellis, 2017). PD&R staff have endeavored to accomplish several of these tasks. Namely, staff reviewed literature on housing insecurity concepts, measures, and related outcomes; reviewed scale development literature and sought advice from measurement analysts; developed a working definition of housing insecurity; compiled and drafted transferable survey questions in line with this conceptual definition; identified an implementation strategy modeled on the topical module framework of the AHS; hosted an expert roundtable to vet the scope and content of a pilot housing insecurity module; engaged partner agencies in revising the module instrument and implementation plans; completed cognitive testing of the module in partnership with the U.S. Census Bureau (Virgile et al., 2019);[9] and solicited public comment on HUD's plan to implement a follow-on housing insecurity module with the 2019 AHS that will inform development of a composite housing insecurity scale.[10] The next steps in the process include administering the research module to a development sample, evaluating item performance, and analyzing which items are best suited for a final scale (Carpenter, 2018; DeVellis, 2017).

A key outcome of this deliberation and development process was crafting a definition of housing insecurity that would frame the scope and content of the research module questionnaire. This conceptual work is an important first step in developing a scale (Carpenter, 2018; DeVellis, 2017).

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[6] USDA has developed a set of survey modules for calculating household food security scale scores in formats that are adaptable to different survey contexts. See https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools/.

[7] More history on food security scale development is available at https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/history-background/.

[8] Items refer to individual survey questions.

[9] Census subject matter experts and survey methodology experts provided significant input on module improvements during the questionnaire revision and testing process. See Virgile et al. (2019).

[10] The 2019 American Housing Survey 60-day Notice of Proposed Information Collection was published on September 11, 2018: https://www.govinfo.gov/content/pkg/FR-2018-09-11/pdf/2018-19707.pdf. The 30-day Notice was published on March 20, 2019: https://www.federalregister.gov/documents/2019/03/20/2019-05303/30-day-notice-of-proposed-information-collection-2019-american-housing-survey. Household surveys are expected to be administered through the fall of 2019.

Our proposed definition focuses on stable occupancy in a quality affordable housing unit. More specifically, "housing insecurity" is defined as a significant lapse for a given household of one or more elements of secure housing, where "secure housing" is stable occupancy of a decent, safe, and affordable housing unit. "Affordable" implies that shelter costs are manageable over the long term without severely burdening or compromising other consumption that normally is essential for health and well-being. "Stable occupancy" implies that the household does not face substantial risk of involuntary displacement for economic or noneconomic reasons. Finally, "decent and safe" implies that the unit has physical attributes that satisfy functional needs for well-being related to health, security, and support for activities of daily living. Such attributes include appropriate facilities for excluding external threats, providing climate control, storing and preparing food, maintaining physical and mental hygiene, and developing human potential.

As important as defining what would be included in the scope of the research module was defining dimensions to exclude. Most notably, aspects of the neighborhood or environment that one encounters beyond the confines of the structure or property were excluded from the scope and content of the module. Three concerns drove this decision. First, including neighborhood factors blurs the conceptual focus on housing needs and would significantly expand the scope and questionnaire length of a pilot module. Second, neighborhood amenities and location are a major part of the bundle of housing services that drives housing price, which will be captured by the affordability and quality components of the module. Finally, the negative association between neighborhood amenities and affordability means that including both would reduce the explanatory power of a composite housing insecurity indicator.

Other approaches or measures of housing insecurity may be more detailed and comprehensive than our research module. While the deliberation and vetting process we employed to produce this pilot supports our proposed dimensions as essential components of housing security, Cox et al. (2019) and Leopold et al. (2016) advocate for developing an index that is perhaps more comprehensive than ours (including multiple neighborhood dimensions, for example). The following section sets forth additional details about the content and design of the research module and how it is expected to inform development of a composite, validated, and transferable housing insecurity scale.

Toward Implementation of a National Housing Insecurity Research Module

As noted previously, other researchers have begun to produce and propose indices of housing insecurity based on the analysis of existing AHS measures of housing problems. HUD, however, is in the unique position to design a new method of data collection in tandem with the AHS that is specifically tailored with scale development and transferability in mind. We consider our pilot module to be a "research module" because it will provide the basis for further analysis of the quality of piloted survey questions and an evidence base for how the dimensions of housing insecurity fit together across a continuum. It is our hope that the housing insecurity research module represents an opportunity to expand knowledge about building and analyzing composite indices in the housing field. To that end, this section explains the scale development factors that

influenced the module's design; the basis of the module's sampling frame; and plans to assess the validity of a resulting index using contextual questions about stress and basic needs tradeoffs, food security index scores, and core AHS affordability and quality measures.

Motivating Scale Development Factors Influencing Module Design

During this process, we learned several important question design and scale development tenets. First, we learned that many existing housing questionnaire items are ill-suited for transferable scale development purposes. For example, existing housing survey questions often seek to identify a single objective estimate that requires administering a long series of detailed survey questions, such as identifying each component of gross housing cost expenditures. Long series of questions are counter to the goal of selecting a reasonable number of survey questions to detect an underlying level of housing insecurity and order households along a continuum. The research module presents the opportunity to develop new or revised ways of asking about affordability, stability, and quality concepts.[11] In contrast to a detailed series of objective questions designed to determine whether a problem occurred, for instance, the research module presents an opportunity to also test subjective questions, in addition to concise objective questions, that may better capture the stress or anxiety associated with housing problems. In this way, the research module is designed to move us toward meaningful development of item composites, rather than a mere assembly of existing items (DeVellis, 2017).

Traditional measures of crowding provide a prime example of this opportunity. Survey questions used to calculate crowding often require several separate questions about the number of residents and the physical size of the housing unit. Responses to those questions then require some quantitative calculation, such as persons per room or bedroom or square footage per person, to identify the level of crowding across a continuum. The research module will provide us with new options for asking about crowding in the "decent and safe" section of the module. New questions will ask respondents for their opinions about crowding in their home in a more concise way, allowing for comparison between quantitative measures of crowding in the AHS core. For example, we propose to ask research module participants:[12] *"Thinking about the number of people in your home and the space you have, are there more people staying here than can live comfortably in this unit?"*[13] An alternative research question will allow respondents to select multiple problems associated with crowding under the hypothesis that more associated problems indicate greater housing insecurity:

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[11] Although some questions in the research module are original, many are modified versions of measures from various existing studies or surveys, including the Delinquent Payments and Notices AHS module (Census, 2017), Recent Mover AHS module (Census, 2017), Healthy Homes AHS module (Census, 2015), Problems/Breakdown AHS module (Census, 2013), Southeastern Pennsylvania Household Health Survey (Pollack, Griffin, and Lynch, 2010), Behavioral Risk Factor Surveillance Survey (Bossarte et al., 2013), National Survey of America's Families (Urban Institute and Child Trends, 2007), Milwaukee Area Renters Study (Desmond and Shollenberger, 2015), Children's HealthWatch Survey (Children's HealthWatch, 2018), Bailey et al.'s (2016) housing insecurity study, HUD's study of Housing Needs of American Indians and Alaska Natives in Tribal Areas (Pindus et al., 2017); Entner Wright et al.'s (1998) doubling up study; Arcury et al.'s (2012) migrant farmworker housing study, and Datar, Nicosia, and Shier's (2013) study of parent perceptions of neighborhood safety.

[12] The final research module implemented with the 2019 AHS will be published with the AHS core questionnaire on Census's AHS website: https://www.census.gov/programs-surveys/ahs.html.

[13] Modeled on a similar question included in HUD's study of Housing Needs of American Indians and Alaska Natives in Tribal Areas (Pindus et al., 2017).

"Thinking about the number of people in your household and the space you have, are any of the following problems a major issue in your household? [Mark all that apply] *1. Not enough personal space, 2. Not enough privacy, 3. Too noisy, 4. Too much conflict, 5. None of the above."*[14]

A related lesson learned from our expert convening was to use the research module to test more questions than will be included in the final scale to ensure adequate coverage across the multiple dimensions of housing insecurity to allow for selection between tested measures. The initial module PD&R presented to expert conveners in August 2017 consisted of 13 questions, with 4 to 5 questions per dimension. We learned, however, that scale analysis of more questions would provide greater opportunity for developing an evidence base for narrowing the list of questions that adequately capture a continuum of severity across multiple dimensions. Prior to pretesting, scale construction guides recommend generating more than two or three times the number of items that will be needed for a final scale (Carpenter, 2018; DeVellis, 2017; Hinkin, Tracey, and Enz, 1997). In short, more data provides a richer platform for analyzing options for a potential index, and a longer research module allows for greater power to detect items that cover the continuum of problems across multiple dimensions.[15] Therefore, the research module was designed to sometimes ask similar questions in different ways to allow for assessment and selection between items. In a similar vein, we designed questions to provide adequate coverage across two important subgroups of interest: renters and owners. Therefore, the final research module includes approximately 63 questions for renters and 55 questions for owners.

Further, we designed the module with some hypotheses in mind about where we might expect certain experiences to fall along a continuum within each dimension of housing insecurity and endeavored to write questions along that continuum. We employed a variety of universe screens and skip patterns to target increasingly severe experiences while reducing respondent burden and cognitive complexity. For example, in the "affordability" section of the module, participants will be asked to respond to a series of questions indicating difficulty affording housing costs, such as: *"Overall, [in the last 12 months / since you've lived here] how difficult was it for you to afford your [rent/ mortgage] payments? 1. Very difficult, 2. Moderately difficult, 3. A little difficult, 4. Not at all difficult."*[16] Those with "very difficult" or "moderately difficult" responses will then be asked a follow up question indicating the frequency of that difficulty: *"How often [in the last 12 months / since you've lived here] was it difficult to afford your [rent/mortgage]? 1. Only 1 or 2 months, 2. Some months but not every month, 3. Almost every month, 4. Every month."* Respondents with greater difficulty affording costs with higher frequency are expected to have higher housing insecurity scores within the affordability dimension than respondents with little or infrequent difficulty.

The development of the research module highlighted the difficulties inherent in anchoring

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[14] For research on crowding, including its measurement and effects, see Ahrentzen (2003), Blake, Kellerson, and Simic (2007), Booth, Johnson, and Edwards (1980), Gove, Hughes, and Galle (1979), Myers, Baer, and Choi (1996), and Sandel and Wright (2006).

[15] Similar to the process employed by USDA in developing the food security scale, we plan to engage scale design experts to analyze research module data using psychometric methods and produce a report of statistically supported options for a narrower set or sets of questions for a housing insecurity scale. We anticipate this analysis will be conducted between 2019 and 2021.

[16] Modeled on a similar question in the Southeastern Pennsylvania Household Health Survey (Pollack, Griffin, and Lynch, 2010).

respondents to a consistent time period across question domains. While some of the questions we ask are about a household's housing situation "right now," most refer to the time period of the "last 12 months." For instance, in the "stable occupancy" section of the module, we are interested in the number of times the household has moved in the last 12 months, a measure related to health outcomes. Detailed questions about multiple residences were more difficult to ask. For example, respondents are asked about eviction threats and notices and foreclosure notices in their current unit and, if they've moved in the last year, in their previous unit.[17] If they've lived in their current unit for 12 months, they are asked to think about "in the last 12 months," and if they have lived there for less than 12 months, they are asked to consider the time "since you've lived here." We sought to balance collecting accurate information by cognitively anchoring respondents to specific housing units with the goal of collecting complete information for the entire 12 months.

This challenge also affected questions about housing affordability and housing quality. For most questions in those domains, we ask respondents to answer about their current place of residence. This approach is similar to that used in the "worst case needs" tabulations of housing cost burden and housing inadequacy. For the housing cost burden measures, average monthly household income is used in the calculation, but housing costs are average monthly costs for the current home. Housing inadequacy estimates are also for the current home. In this sense, "worst case needs" for a given year are anchored in the unit respondents live in at the time of the interview. Anchoring on the unit at the time of interview reduces the cognitive burden of respondents having to average housing affordability and housing quality across multiple housing units if they have lived in multiple units over the last year. It also ensures that questions are asked about one household, as respondents who have moved multiple times may have lived in multiple households of varying composition over the previous year.

Finally, the multidimensional design of the research module affected our expectations about how a resulting index may ultimately be scored across a continuum. Although current literature suggests that problems within some dimensions of our proposed definition of housing insecurity are more common than others (for example, HUD's Worst Case Housing Needs reports suggest that severe affordability problems are more prevalent than severe quality deficiencies), we propose that housing insecurity under any one dimension (affordability, stable occupancy, or decent and safe housing) could be understood as housing insecurity in general. Therefore, we envision scoring survey responses for each dimension of secure housing separately. Further scale analysis will provide additional insight into the feasibility of scoring households across a single latent dimension of housing insecurity. The following section discusses the sample design for the module, which is based on policy-relevant demographic factors and scale development requirements.

Sampling Frame and Opt-in Strategy

An important aspect of the module development process was defining the target population for the research module. Given that the module is longer than a standard topical module appearing in the AHS, PD&R partnered with Census to structure an implementation plan to implement the research module as a separate but close-in-time follow-on to the administration of the regular AHS survey. This strategy will mitigate respondent burden for the regular AHS, allow for appropriate sample

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[17] Questions are dependent on tenure of the current and previous unit.

targeting for the research module, and allow for linkage with key affordability, stable occupancy, and housing quality questions in the core AHS.

Our goals in designing the sampling frame were multifold. First, we wanted the selection criteria to ensure coverage of different household types, such as owners and renters, households with roomers, and so on, so that the pilot could be validated—and a resulting index would be relevant—across household types. In our consultation with scale development experts, we also learned the importance of adequate coverage of rare events for scale calibration. Each item in the index series will provide information about the scale. Therefore, the sample plan would need to target enough households expected to say "yes" to rare events so that the "tail" of the scale can be developed. For example, we hypothesize that the lowest income renters with recent moves will be more likely to experience severe housing insecurity than other households (for example, Desmond, 2016; Sandel et al., 2018). Therefore, sufficient coverage of this population is especially important during the piloting stage.

Finally, we sought to target policy-relevant demographic groups. The USDA Economic Research Service (ERS) uses a means test for food security, 185 percent of the federal poverty line, plus an initial screener question about having enough to eat in the last 12 months. This strategy targets a policy-relevant demographic for food assistance programs. By analogy, HUD-defined income limits and fair market rents are designed to account for program-relevant geographic variation in incomes and housing costs. Most housing assistance programs target low-income households, a relative measure based on how household income compares with median incomes in the local area.[18] Compared with the poverty threshold commonly referred to in the food security field, relative income based on geography is more commonly used in the housing context because housing costs vary so widely across geography.[19]

We conducted additional analysis to determine the income thresholds that were likely to capture households experiencing housing insecurity. For example, HUD's Worst Case Housing Needs report provides useful housing cost burden estimates by program-relevant income levels. As shown in exhibit 1, very low-income and extremely low-income renters are highly likely to experience rent burdens, although renters up to 80 percent of area median income (AMI) are still fairly likely to be moderately burdened. As shown in exhibit 2, cost burden prevalence is somewhat less for owners. Elderly owners at the lowest income levels, however, may have greater risk of experiencing affordability problems than younger owners (Goodman and Ganesh, 2017).

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[18] By statute, HUD programs are designed to target families with low incomes, below 80 percent of AMI (42 U.S.C. §1437a). Many programs require or set aside most assistance for families with even lower incomes (for example, 42 U.S.C. §1437f(o)(4); 42 U.S.C. §1437n(a), (b), and (c)).

[19] Unlike the food security module, the housing insecurity research module will rely on a means test opt-in approach without a second sufficiency screen. Given the multidimensional nature of the module, a second screen that allows households at any income level to opt in to the module based on insufficiency in any one dimension may screen out households that experience other types of housing insecurity (for example, they are secure in terms of affordability, but insecure in terms of decent and safe housing). After the data are collected, we intend to analyze questions to determine if there is a second survey question that predicts housing insecurity among those at higher income levels that may be a good candidate for a second opt-in screen.
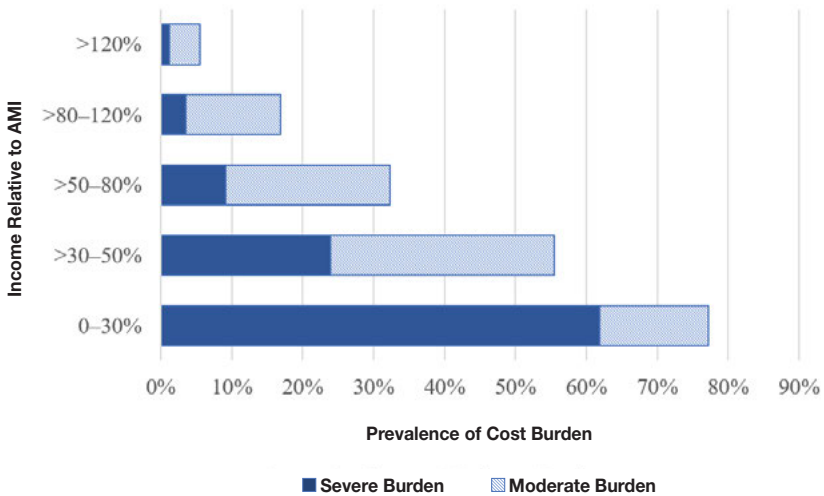
Exhibit 1

Prevalence of Rent Burden by Relative Income (Renters)
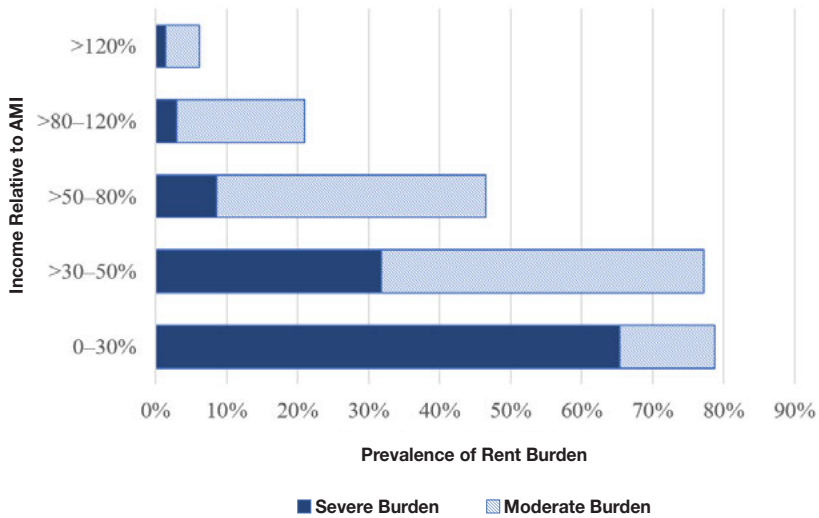
AMI = Area Median Income.
Source: 2017 Worst Case Housing Needs Report

Exhibit 2

Prevalence of Cost Burden by Relative Income (Owners)
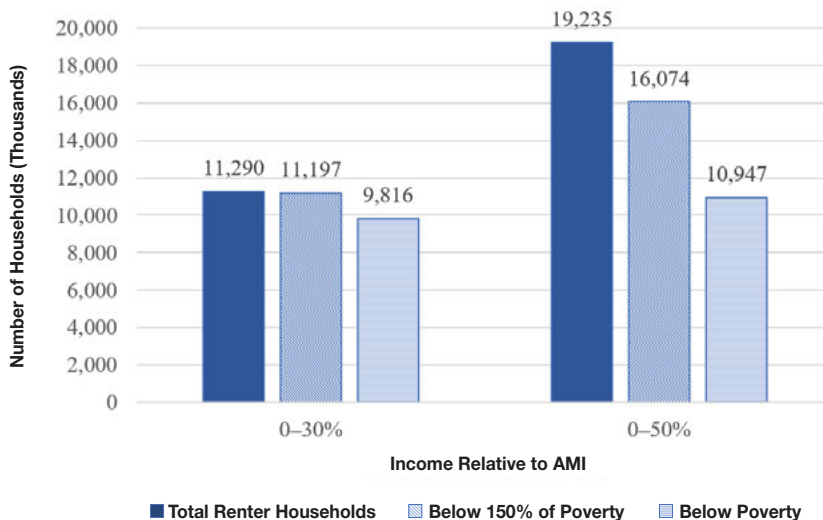

AMI = Area Median Income.
Source: 2017 Worst Case Housing Needs Report

From a policy and program relevance perspective, the 80 percent of AMI threshold represents a reasonable means test for selecting households for the module. Owners and renters below this threshold are likely to experience either moderate or severe cost burdens, offering a good representation of our population of interest with enough variation to identify households along a continuum of housing security. The 80 percent of AMI threshold also represents the threshold for "low-income" that is used to determine eligibility for various types of housing assistance. Although most households receiving HUD assistance have incomes below 30 percent of AMI, including some cases up to 80 percent of AMI in the research sample will be useful for calibrating housing security across a continuum. Households above HUD's low-income threshold are less likely to experience the types of housing problems within the scope of the research module. From a practical perspective, broadening the sample to higher income groups would also result in fewer lower-income cases in the sample.

From an implementation perspective, however, defining sample criteria that varies across geography is less practical for developing a module intended to be easily transferable across household surveys. It is practically difficult for Census to apply geographically varying income opt-in criteria to survey administration. Therefore, we identified a poverty-based threshold designed to capture low-income households. HUD's Worst Case Housing Needs report provides some helpful information about the relationship between poverty levels and HUD's AMI thresholds. As shown in exhibit 3, almost all extremely low-income renter households had incomes below 150 percent of the poverty line, as did 84 percent of very low-income renters.

Exhibit 3

Number of Renter Households by Relative Income and Poverty Status

AMI = Area Median Income.
Source: 2017 Worst Case Housing Needs Report

Further regional analysis suggested that households with incomes below three times the poverty line (by household size) represents a threshold reasonably sufficient to capture low-income households nationally. Therefore, households up to this income level will be eligible to opt-in to the research module. To enhance scale development and program relevance, the majority of the sample will target households with incomes below two times the poverty line. Further, the sample will target more renters than owners to account for differences in tenure distribution by income[20] and higher rates of housing problems like cost burden among renters compared to similarly situated owners. The sample will also account for variation in population size and tenure across the nine Census divisions, resulting in the target sample distribution set forth in exhibit 4.

Finally, for future scale analysis to have the power to detect statistically-supported options for developing a housing insecurity index, we looked to scale development literature and consulted scale development experts to determine the appropriate sample size for the research module. The sample size does not need to be large enough to test the scale for invariance across subpopulations during the piloting stage, but it does need to be large enough to account for the fact that we are essentially creating two scales: one for renters and another for owners. Similarly, models with more parameters, such as our anticipated multidimensional model, may require larger sample sizes than unidimensional scales (Carpenter, 2018). Further, larger sample sizes tend to offer more reliable index results. While there does not seem to be strong consensus in the literature for determining what sample size is adequate for scale development in every context, the literature on subject to item ratios (for example, using a 20:1 rule of thumb ratio) was instructive in determining the appropriate sample size for the research module.

Research by Osborne and Costello (2005) examined the effects of subject-to-item ratios on producing correct factor structures in exploratory factor analysis. They found that larger samples tended to produce solutions that were more accurate, with samples with a 20:1 subject-to-item ratio producing more accurate solutions compared with samples with lower ratios. Samples with a 20:1 ratio were also found to have a lower misclassification rate. Smaller samples ran into problems with converging and producing factor solutions. Osborne and Costello (2004) also found that the best principal components analysis outcomes occur where large sample sizes and high subject-to-item ratios are present.

Given the foregoing considerations, the research module will target a sample that meets a subject-to-item ratio of 20:1 and ensures a sample that is 55 percent renter and 45 percent owner. To estimate an adequate sample size, we first estimated the maximum number of items that renters and owners would receive, considering research module items and comparison questions in the AHS core. For renters, we estimated 63 items in the research module and 35 comparison items in the AHS core for a total of 98 items. For owners, we estimated 55 items in the research module and 35 comparison items in the AHS core for a total of 90 items. Accounting for subject-to-item ratio targets and adjusting for tenure distribution targets to increase the probability of adequate coverage of households expected to experience more severe forms of housing insecurity, the sample will target 1,800 owner cases and 2,200 renter cases for a total of sample of 4,000 cases. Exhibit

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[20] The 2017 Worst Case Housing Needs Report identified a 58/42 split between renters and owners with very low incomes (see Tables A-1A, 1B) (Watson et al., 2017). Similarly, there is about a 60/40 split of renters to owners among households with household incomes less than three times the federal poverty line.

4 shows the number of households in each tenure and income group targeted for the research module sample.

Exhibit 4

Target Module Sample Size by Tenure and Poverty Level

Tenure	Renter		Owner	
Poverty Threshold	**<2x**	**2-3x**	**<2x**	**2-3x**
Poverty x Tenure (n)	1,837	363	1,312	488
Poverty x Tenure (%)	84%	17%	73%	27%
Tenure (n)	2,200		1,800	
Tenure (%)	55%		45%	
Total (N)	4,000			

Exhibit 5 shows the overall distribution of the target sample by tenure and poverty level, compared to the distribution of U.S. households by tenure, poverty level, and worst-case needs status. Comparing the target sample to the distribution of all households, about 80 percent of the research sample will target the distribution of American households with incomes below twice the poverty line. The remaining 20 percent of the target sample will be drawn from the distribution of American households above that level, with incomes up to three times the poverty line.

Exhibit 5

Distribution of Target Sample Compared to U.S Households

Tenure	Renter			Owner		
Poverty Threshold	**<2x**		**>=2x**	**<2x**	**>=2x**	**Total**
Worst Case Needs Status	Yes	No	N/A	N/A	N/A	
Share of U.S. Households	7%	12%	18%	15%	48%	100%
Share of Target Sample	46%		9%	33%	12%	100%

N/A = data not available
Source: 2015 American Housing Survey

Assessing Index Validity

Beyond crafting survey questions and a target sampling frame, the module development process included plans to assess the validity of a resulting index. The AHS is the most comprehensive national housing survey in the United States. Therefore, a key advantage of matching the research module to the AHS is the ability to link module responses to core AHS affordability and quality measures. This strategy serves dual purposes. First, it will allow us to compare core measures to research measures for suitability in a resulting index. Second, leveraging respondent data from the AHS provides a means of vetting subjective research questions against a longer series of objective questions and calculations from the AHS core, for example, comparing subjective research questions about stress associated with affordability problems to quantitative cost burden calculations from the AHS core.

Because the AHS is drawn from a longitudinal sample of housing units, linking data between the AHS core and the research module will be most useful if the household composition remains the same between the time the AHS core and follow-on research module are administered. Therefore, the research module will be implemented close in time to the core survey and will require that at least one household member from the core survey still lives in the household. We are also requesting the same respondent for the core and follow-on modules but allowing for other respondents to help achieve sample size targets for the research module.[21] Respondents will also be offered an incentive to increase response rates for the follow-on research module.[22]

An additional point of comparison for the research module will be household food security index scores. One of the topical modules to be included in a split sample of the 2019 AHS is the USDA food security module. The research module sample will be drawn from the same split sample of U.S. households as the food security module. This strategy will allow us to use food security scores as a point of comparison while building the housing insecurity scale. While we don't anticipate a perfect correlation between these two scores, we would expect some correlation. For example, we hypothesize that households with severe housing affordability problems may experience greater food insecurity than households living in more affordable housing. Implementing the research module in tandem with the AHS will provide the opportunity to assess this relationship and the mitigating role of federal assistance in developing a housing insecurity scale. Implementing the module in tandem with the AHS will also provide the opportunity to examine housing insecurity in relation to shelter poverty,[23] a relationship currently under examination with regards to food security (Steffen, Carter, and Coleman-Jensen, 2018; Steffen and Carter, 2019).

Finally, the research module includes contextual questions about stress and basic needs tradeoffs. Contextual questions will provide deeper insights into module responses and provide additional points of comparison for assessing the validity of a resulting index. For example, at the beginning of the research module, respondents will be asked to rate their overall stress level and health status with: *"On a scale of one to 10 where one means you have "little or no stress" and 10 means you have "a great deal of stress," how would you rate your average level of stress during the past month?"*[24] and *"Would you say your health in general is excellent, very good, good, fair, or poor? 1. Excellent, 2. Very good, 3. Good, 4. Fair, 5. Poor."*[25] We hypothesize that more severe housing insecurity will be associated with higher general stress levels and poorer overall health ratings. Similarly, we've added some contextual questions to the module that may be associated with the experience of shelter poverty. For example, we expect households experiencing severe housing insecurity in terms of affordability may also experience difficulty with affording other necessities like medical or transportation

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[21] It is possible we may miss some mobile households from our sample if the entire household is replaced between the core interview and research module interview. We plan to administer the research module close in time to the core interview to mitigate this potential.

[22] Administratively, Census was not able to provide respondent incentives at the opt-in decision point. Rather, the incentive will be mailed after follow-on completion.

[23] Shelter poverty measures the amount of residual income for non-shelter expenses that remains after paying for housing. Households are classified as shelter poor when they do not have enough money to meet a specified amount on nonshelter expenses after paying for housing costs (Stone, 1993).

[24] American Psychological Association (APA) Stress in America survey (APA, 2017).

[25] National Health Interview Survey (NHIS), PHStat (CDC, 2016).

expenses. In this way, the research module allows for additional points of comparison to vet a resulting index while also providing opportunities to learn more about the relationship between housing insecurity and other hardships.

Next Steps

Consistent with scale development guidelines, the next steps in this project include administering the research module to the target sample, evaluating item performance, and engaging in scale analysis to select which items may be best suited for a final scale. Accordingly, the research module is currently being implemented nationally in tandem with administration of the 2019 AHS. Interviews are expected to be conducted through the fall of 2019. Following data collection, we encourage feedback from scale developers and housing insecurity researchers and policymakers as the index development process proceeds. With the data from the housing insecurity research module, HUD aims to use data reduction techniques like exploratory factor analysis and principal components analysis to identify a smaller set of questions that can be used in a validated index of housing insecurity. Further assessment and calibration of a scale developed through this process would be required over time. HUD hopes that a composite housing insecurity scale could eventually be a tool for federal agencies and external researchers to track trends in housing insecurity, build evidence about a variety of associated outcomes, and improve research about prevention and intervention programming.

Acknowledgments

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