Market Predictors of Homelessness:

How Housing and Community Factors Shape Homelessness Rates Within Continuums of Care

Multidisciplinary
Research Team

U.S. Department of Housing and Urban Development | Office of Policy Development and Research

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FOREWORD

Reducing homelessness is a key objective within HUD's FY 2018–2022 Strategic Framework. Recent changes in how homelessness manifests within communities, most visibly in west coast communities where unsheltered homelessness has increased in recent years, is shaping HUD's approach to meeting this objective. Though total homelessness has generally been declining nationally since 2011, unsheltered homelessness rose by nearly 25 percent in major cities and largely urban Continuums of Care (CoCs) between 2015 and 2017.

While the causes of homelessness are complex and interconnected, community-level factors can be strong predictors of homelessness rates. The national data set developed for this study helps to fill this gap by disentangling which factors matter most in different types of communities and by offering some clues about places where more targeted analysis is needed.

By assessing the relative effects of housing, economic, safety net, demographic, and climate factors on homelessness rates, the study's findings support the idea that improving the availability and affordability of rental housing is often a community's best line of defense against homelessness. Across the country, housing market factors more consistently predicted rates of total homelessness than other economic factors. This finding is consistent with what many communities have experienced—increases in homelessness where rents are high. Finding opportunities to relax restrictions on producing a greater supply of housing that is affordable in these places may provide relief. High median rents, overcrowding, and evictions were particularly strong predictors of total homelessness rates in urban areas and tight, high-cost housing markets. Holding these factors constant, the study finds that increased housing density is protective against homelessness. HUD's work to reduce regulatory barriers to affordable housing production, including an increase in the supply of unsubsidized middle-market housing for workers, and to encourage private landlord participation in subsidized housing programs is, therefore, especially timely and directly relevant to reducing the incidence of homelessness nationally. As Chair of the White House Council on Eliminating Regulatory Barriers to Affordable Housing, Secretary Ben Carson is leading efforts to boost the supply of housing that is affordable by identifying policies, regulations, and administrative obstacles to cost-effective development. This initiative serves related goals—to open avenues for increasing both the quantity and density of affordable homes where regulatory barriers are currently prohibitive. HUD's task force to increase private landlord participation in subsidized housing programs is similarly intended to increase the efficiency of rental subsidies in the private market by making existing stock more accessible to vulnerable populations.

Demographics also play a role, particularly in ways that reflect strain on a community's housing supply. The study finds higher levels of net in-migration and more one-person households correspond with higher rates of homelessness across several market types, suggesting that housing production goals should account for both population growth and adequate unit types to reduce homelessness risk. Consistent with this study, HUD's biennial Worst Case Housing Needs Report to Congress shows that people living alone are often vulnerable to severe housing problems as rents rise. More efficiently tapping existing housing stock by increasing opportunities to share housing—both on the private market and within subsidized housing programs—is an important companion to constructing more affordable homes as we work to end homelessness nationally. Creating opportunities for vulnerable households to

better withstand rent increases may also provide relief in challenging markets. For example, HUD has proposed changes to its rental assistance programs to encourage income gains by relaxing rent penalties and by eliminating barriers that can discourage household formation such as the current annual rent certification structure.

HUD has long pushed for communities to bring their own public, private, and philanthropic resources to the table to address homelessness. Indeed, there are communities around the country making major progress on ending homelessness by bringing these often disconnected actors together. This shows up in HUD's data in different ways. For example, a local church group offering space for emergency shelter could mean fewer people get counted as unsheltered but are still counted as homeless. Decisions around resources are often just as complex and interconnected as the factors in this study, so while it's helpful to have breakouts of rates of total homelessness, readers should be cautious about interpreting differences between factors related to unsheltered and sheltered homelessness.

Other studies of community-level factors tend to focus on a specific slice of the larger picture of what causes homelessness. This study is intended to be a wider, exploratory look at as many predictive influences on homelessness as possible to see which rise to the top, which certain housing market factors did. It is important to view these findings as a valuable foundation upon which further research can build, which may provide conclusions about the causal relationship between these factors and homelessness.

Seth D. Appleton

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EXECUTIVE SUMMARY

More than 550,000 people in communities across the United States experienced homelessness on a single night in 2018—about 17 in every 10,000 people. The myriad of negative economic, health, and social outcomes linked to homelessness requires an understanding of its root causes so policymakers can develop and implement effective strategies to prevent and curb the incidences and duration of homelessness. This study provides insight into our understanding of the underlying community-level factors that may be associated with homelessness in the United States.

A key motivation for this study is the desire to understand the larger economic forces influencing the homelessness policy landscape; and, therefore, the work related to ending and preventing homelessness across communities. While both sheltered and unsheltered homeless populations have declined since 2011, in more recent years, the unsheltered homeless population has increased substantially. Unsheltered homelessness in major cities and mostly urban Continuums of Care (CoCs)[1] rose by nearly 25 percent, from 87,345 in 2015 to 109,252 in 2017. In contrast, between 2015 and 2017, suburban CoCs experienced a very small increase in unsheltered homelessness, and rural CoCs experienced a decline in unsheltered homelessness.

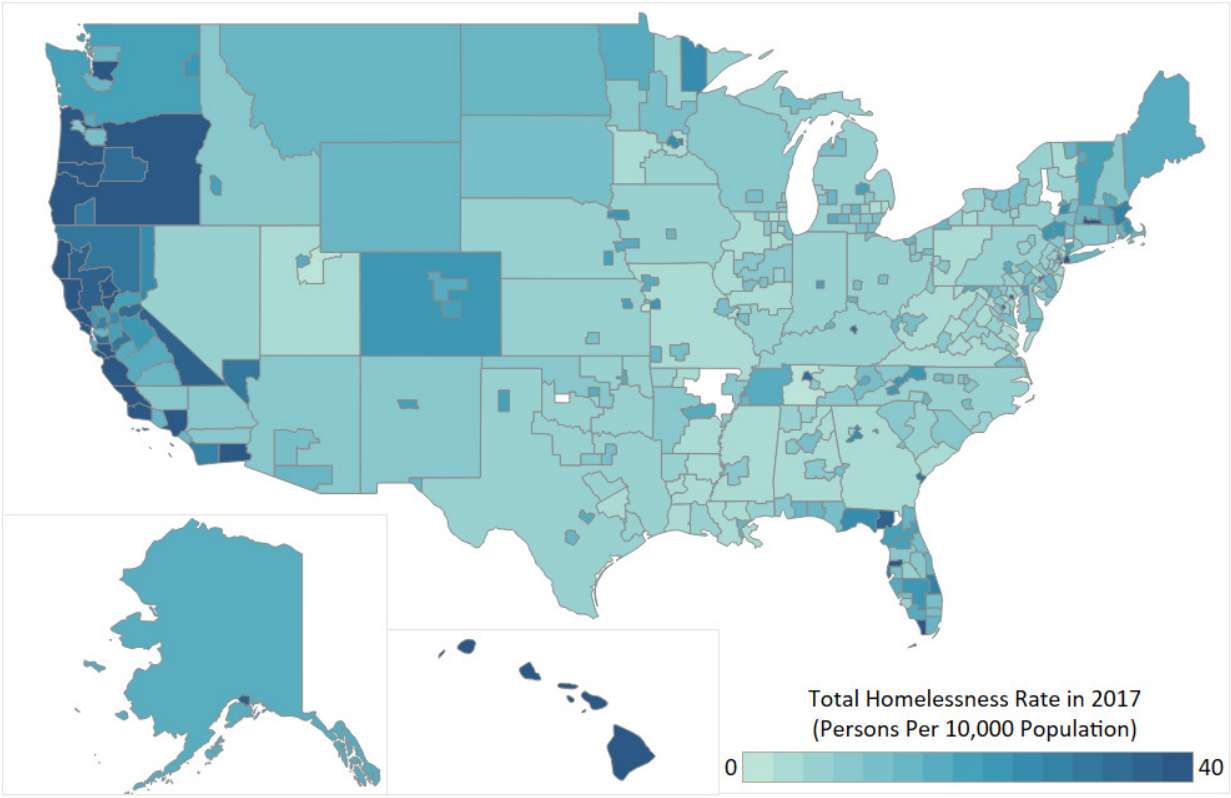
To continue progressing toward the goals of ending and preventing homelessness, we must further our knowledge of the basic community-level determinants of homelessness. The primary objectives of this study are to (1) identify market factors that have established effects on homelessness, (2) construct and evaluate empirical models of community-level homelessness, (3) use these models to identify and analyze relationships within subgroup populations of local markets, and (4) assess the feasibility of conducting future research to support local communities' efforts to prevent and end homelessness.

Exhibit ES-1 and our descriptive analyses show differences in homelessness rates across communities in the United States. This map illustrates the concentration of homelessness in predominantly urban areas and the west coast. While the average rate of total homelessness across all communities was around 17 homeless people per population of 10,000, this number varied from 9.4 in rural communities to 28.4 in urban communities. Accordingly, urban communities had large sheltered and unsheltered homeless population rates relative to rates for suburban and rural communities. The reasons for this difference might be many and beyond the scope of this study. We provide some exploratory analysis to evaluate this phenomenon. Overall, housing variables show a tight and overcrowded housing market in urban communities, with housing costs that are much higher compared with rural communities. Economic conditions vary by urbanicity as well, with suburban communities having the highest median income, lower poverty, and lower participation rates in safety net programs than urban and rural communities. With respect to demographic characteristics, urban communities are more diverse in terms of race and ethnicity and have a higher share of residents with a bachelor's degree or higher compared with rural communities. Also, urban areas tend to have more housing assistance resources allocated to support the homeless. These inherent differences show that varying factors may contribute to homelessness

[1] Continuums of Care (CoCs) are organizations that administer and support various community-wide programs with the goals of ending homelessness and increasing self-sufficiency among populations experiencing homelessness (https://www.hudexchange.info/programs/coc/).

within communities. As a result, we expand the analysis to subgroups, including communities with tight, high-cost rental markets and communities on the west coast (in California, Oregon, and Washington).

Exhibit ES-1 | Map of Total Homelessness Rates (Per 10,000 Population) Across CoCs



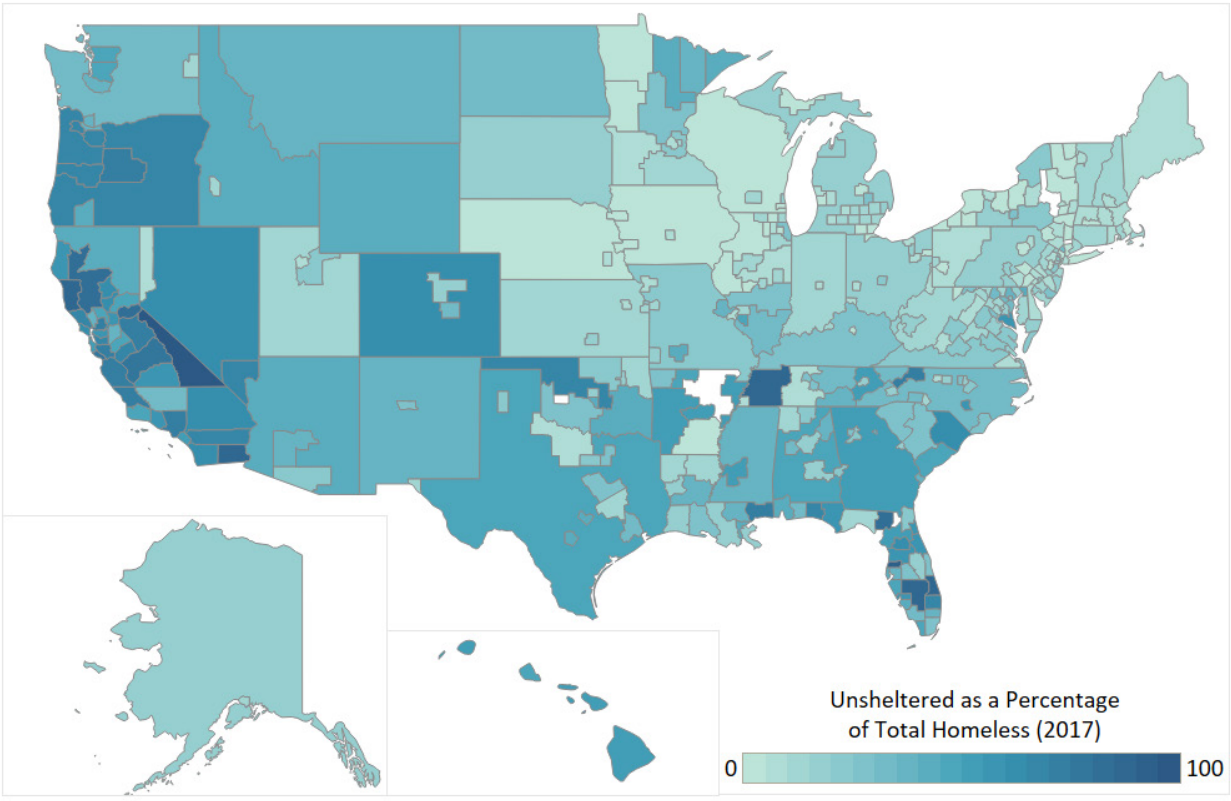
Sources: U.S. Census's (Census) intercensal population estimates; U.S. Department of Housing and Urban Development (HUD) Point-in-Time (PIT) count data

These subgroup analyses shed light on the differences in factors associated with homelessness across communities. The average rate of total homelessness was around 37 homeless people per 10,000 population in tight, high-cost rental markets and 11.4 homeless people in other rental markets. Communities in tight, high-cost rental markets also had higher rates of sheltered and unsheltered homelessness due to reduced availability and affordability of housing units. Economic conditions also varied, with higher median incomes, lower unemployment rates, and lower poverty rates in tight, high-cost rental markets. With respect to safety net programs, there are no clear trends between tight, high-cost rental markets and other rental markets. For demographic characteristics, tight, high-cost markets are more diverse in terms of race and ethnicity, with populations having higher levels of education compared with other markets.

Distinct differences also exist between communities on the west coast (California, Oregon, and Washington) and communities in other regions of the United States. In west coast communities, the average rate of total homelessness was around 33 homeless people per 10,000 population in 2017, compared with 14 for communities in other regions; west coast communities also had higher proportions of unsheltered homelessness (see exhibit ES-2). Housing characteristics vary greatly across regions, with higher home values, median rents, and shares of renter-occupied units in west coast communities. Economic and safety net conditions across regions indicate that west coast communities

have higher median incomes and unemployment rates, with safety net participation varying across the west coast and other regions. In terms of demographic characteristics, west coast communities have a lower percentage of White people and a higher percentage of Hispanic and Asian people than communities in other regions. Net-migration rates are also much higher in west coast communities. Our descriptive analyses illustrate a possible relationship between community-level housing market dynamics, the availability of affordable housing, and homelessness.

Exhibit ES-2 | Map of Unsheltered Homelessness as a Percentage of Total Homelessness in 2017



Sources: Census's intercensal population estimates; HUD PIT count data

This study combined several datasets to identify and generate community-level factors across five broad domains—housing market, economic conditions, safety net, demographic composition, and climate conditions—that the literature hypothesizes are associated with homelessness. Our analytical approach involved the estimation of several regression specifications—(1) national-level, (2) urbanicity subgroups, (3) tight, high-cost rental market subgroup, and (4) unsheltered homelessness in the west coast subgroup—with rates of total, sheltered, and unsheltered homelessness as the dependent variables for the first three specifications.

Results of our regression analysis indicate that a wide variety of factors are associated with rates of homelessness and that different factors contribute to the type of homelessness (total, sheltered, and unsheltered) across various communities. Housing factors are among the most consistent determinants of community-level homelessness, confirming previous studies' findings that housing market factors, particularly housing costs and housing market tightness, matter. Furthermore, issues of housing affordability are inherently related to factors in the economic and safety net domains, as economically

disadvantaged populations may struggle to afford housing in areas with high housing costs. Across the various specifications, the significant independent variables associated with rates of homelessness differ based on the outcome of interest and subgroup category.

Housing affordability is a central issue in examining the factors that are associated with homelessness across communities. Our estimates indicate that communities with higher median rents have increased rates of total homelessness. In line with concerns regarding affordability (or lack thereof), our estimates indicate that the share of renters with a housing cost burden greater than 30 percent of their income is also positively associated with rates of total homelessness, mainly in rural areas and tight, high-cost rental markets. Higher density of housing units is associated with lower rates of total homelessness, particularly in the tight, high-cost rental markets. Furthermore, overcrowded housing units also indicate a lack of housing availability and are a potentially important factor that is positively associated with rates of total homelessness, especially in the national model and in tight, high-cost rental markets. We find fewer significant estimates and contradictory results for economic and safety net factors in determining community-level total homelessness. We find that higher unemployment rates are associated with increased rates of total homelessness in communities with tight, high-cost rental markets; however, the relationship is negative in urban areas, and higher poverty rates are negatively associated with total homelessness in rural areas. The number of households receiving cash assistance is positively correlated with homelessness in urban areas, and the share of HUD-assisted units is positively correlated with homelessness in suburban areas as well as in the national model. The findings on demographic characteristics indicate variation in the factors that are related to rates of total homelessness across the nation and subgroup categories. We find few significant relationships between total homelessness and race and ethnicity categories. In the national model, in rural areas, and in communities with tight, high-cost rental markets, the share of the Hispanic population is associated with lower rates of total homelessness. Finally, across specifications, there is no clear relationship between rates of total homelessness and climate conditions. These findings indicate that, other than the measures in the housing domain, the important factors in the other domains that matter depend on the subgroup of interest.

The factors associated with rates of sheltered homelessness[2] may be different from those associated with total and unsheltered homelessness. Counts of sheltered homeless people are necessarily constrained by the resources allocated to create shelter options. Our estimates in the national model indicate that communities with higher median rents have increased rates of sheltered homelessness. Communities with high housing density have lower rates of sheltered homelessness in the national model, as well as in urban areas and communities in tight, high-cost rental markets. High eviction rates are related to high rates of sheltered homelessness, mainly in tight, high-cost rental markets. Changes in eviction rates are positively associated with rates of sheltered homelessness in urban areas. Eviction may displace individuals and families from their rental homes, forcing them to seek shelter in areas that may not have available or affordable housing options. We find that high unemployment rates are

[2] Sheltered homelessness refers to people who are staying in emergency shelters, transitional housing programs, or safe havens. Emergency shelters provide temporary shelter, and transitional housing programs provide a place to stay and supportive services for up to 24 months. Safe havens, a much less common program model, provide temporary shelter and services for hard-to-serve individuals, whereas transitional housing programs provide a place to stay and supportive services for up to 24 months. People in safe havens are included in the PIT counts but not included in the yearly shelter count in Part 2 of the Annual Homeless Assessment Report to Congress (Henry et al., 2018a). Sheltered homelessness is also dependent on the amount of funding a community receives.

associated with higher rates of sheltered homelessness in communities with tight, high-cost rental markets. These estimates illustrate the important relationship between housing affordability and rates of sheltered homelessness. Furthermore, across several specifications, we find no consistently significant relationships between rates of sheltered homelessness and poverty (other than positive association in the national model). This finding potentially indicates that poverty rates affect sheltered homelessness in communities in different ways. For example, housing cost burden may be a more important factor than considering poverty rate alone. There are fewer consistently significant relationships between rates of sheltered homelessness and demographic and climate characteristics.

For unsheltered homelessness,[3] across several specifications and subgroups, our estimates suggest that housing market characteristics vary in magnitude and significance in terms of their association with rates of unsheltered homelessness. We consistently find, however, that the share of overcrowded housing units is positively associated with rates of unsheltered homelessness. Furthermore, the association of unsheltered homelessness with economic and safety net variables also depends on the subgroup, with a negative association between unemployment rates and unsheltered homelessness in urban CoCs but a positive association in suburban and west coast CoCs. Similarly, in the safety net domain, our results show that high shares of HUD-assisted units are associated with lower rates of unsheltered homelessness in urban areas and communities with tight, high-cost rental markets, while high shares of HUD-assisted units are associated with higher rates of unsheltered homelessness in suburban areas and communities on the west coast. In addition, the share of houses built prior to 1940, used as a proxy for federal funding,[4] is associated with lower rates of unsheltered homelessness in suburban CoCs; such results suggest that CoC funding may reduce rates of unsheltered homelessness. For the demographic domain, net-migration and household composition are consistent positive significant factors associated with rates of unsheltered homelessness across different specifications. Regarding education, a high share of the population with less than a college degree is associated with increased rates of unsheltered homelessness in suburban and rural areas.

The findings from this study provide key insights into the various factors that contribute to the rates of total, sheltered, and unsheltered homelessness in various communities across the United States. This study identifies new factors that provide insights into predicting homelessness across different areas. The study found that the significant factors associated with rates of homelessness varied by outcome and subgroup, suggesting more research is needed to understand these factors as policymakers work to prevent and end homelessness at the national and local levels.

[3] Unsheltered homeless individuals have a primary nighttime location that is not typically designated for sleeping accommodations (Henry et al., 2017).

[4] Following the literature, we also use an instrument variable strategy and find similar association between federal funding and unsheltered homelessness.

INTRODUCTION

Understanding the Problem

More than 550,000 people in communities across the United States experienced homelessness[5] on a single night in 2018—that is about 17 in every 10,000 people in the United States (Henry et al., 2018b). Over the past decade, the homeless assistance world has evolved to implement evidence-based practices, such as rapid rehousing, coordinated entry, and Housing First, that led to more effective and long-term solutions for persons experiencing homelessness. As communities have incorporated these practices, there has been a steady decline in homelessness nationally. In the last 2 years, however, homelessness has increased, albeit modestly. The myriad negative issues linked to homelessness, such as economic status, health and mental state, and social and emotional outcomes, require an understanding of the root causes of homelessness so that policymakers can develop and implement effective policies to prevent the incidence and reduce the duration of homelessness. Zeroing in on the root causes of homelessness involves understanding the underlying community-level factors that are associated with homelessness. The need for such research is also reflected in the U.S. Department of Housing and Urban Development's (HUD) Strategic Plan 2018–2022 (HUD, 2018a), which seeks to "end homelessness by preventing it whenever possible and quickly helping Americans who experience a housing crisis to ensure such experiences are brief and non-recurring," to "enhance and reform our rental assistance programs by providing sustainable models to empower communities to address local affordable housing needs," and to work with "local partners to identify and tear down regulatory barriers that are stifling the development of affordable homes." This research is intended to inform strategies for reducing the number of people experiencing sheltered and unsheltered homelessness measured by the Point-in-Time (PIT) by each Continuum of Care (CoC).[6]

Following a decade of decline, between 2017 and 2018, the number of people experiencing unsheltered homelessness increased again by 3 percent, following an 8-percent increase in 2017, as measured in a single night. This trend, however, varies across geography and markets. Recent increases in homelessness have been attributed to increases in homelessness in some of the largest metropolitan areas (Henry et al., 2018a). Exhibit 1-1 provides a visual depiction of CoCs with an increase in total homelessness from 2015 to 2017. The emergence and persistence of homelessness has been noted specifically in large rental markets with low vacancy rates in the west; high and rising rents; and low construction of new housing, including in areas such as Los Angeles, San Diego, Portland, and Oakland. By contrast, rental burdens are lower in some cities that have similar conditions (such as Seattle and the San Francisco Bay area),[7] perhaps due to their expanding employment and income opportunities. Unsustainably high rent burdens are becoming the norm in these cities, locking people into constant

[5] HUD terminology defines a homeless person as a person who lacks a fixed, regular, and adequate nighttime residence.

[6] CoCs administer and support various community-wide programs with the goals of ending homelessness and increasing self-sufficiency among populations experiencing homelessness (https://www.hudexchange.info/programs/coc/).

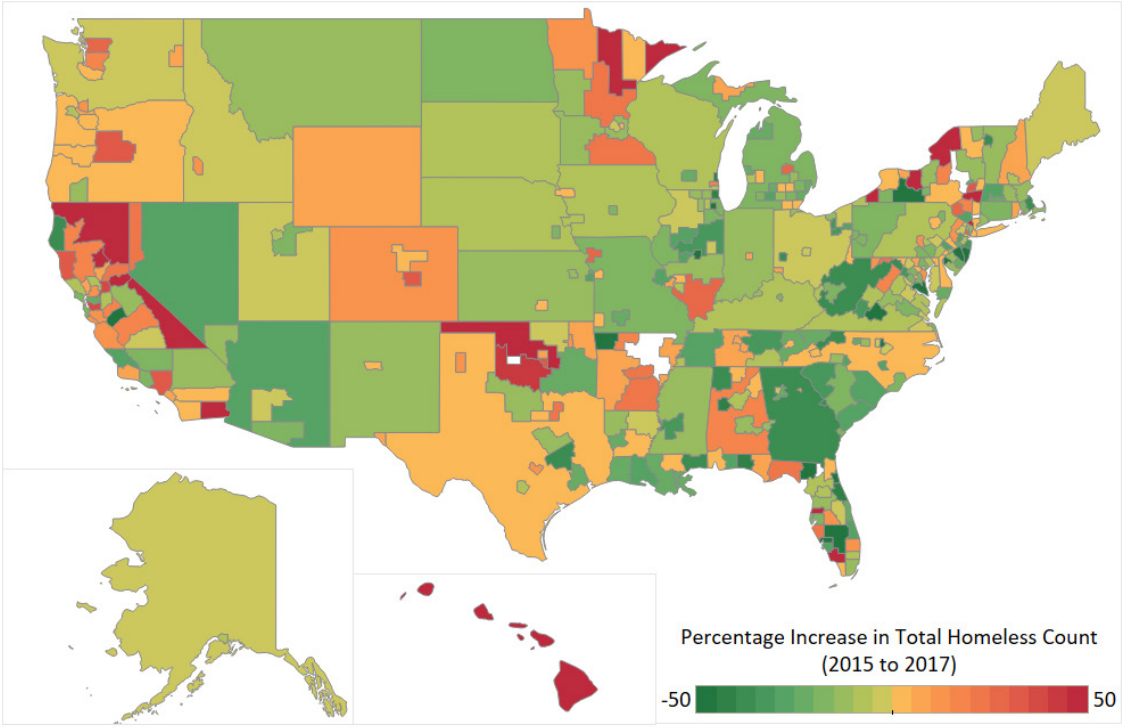
[7] Mansur et al. (2002) suggested that the number of homeless population is sensitive to the income distribution and changes in housing costs in cities. Glynn, Byrne, and Culhane (2018) provided empirical evidence that homelessness in a community sharply increases once the median rental costs exceeds 32 percent of median income (close to the federal definition of affordable housing).

financial and personal crises related to finding and maintaining housing. Greater knowledge of these underlying structural determinants requires further research on the complex ways that levels of homelessness are affected by conditions in local housing and labor markets, the demographic characteristics of the population, and local policies. This study solicits research that will accomplish the following—

1. Identify, through a comprehensive literature review, market factors with established and robust effects on homelessness.
2. Construct and evaluate empirical models to analyze recent trends in homelessness and how those trends relate to community-level factors such as housing and economic markets and demographic variations.
3. Use these models to analyze relationships within subpopulations of local markets.
4. Assess, after controlling for market and economic forces, the feasibility of conducting future research on the effects that regulations and land use policies may have on levels of homelessness.

By using more recent estimates of homelessness within communities, this study expands the existing literature regarding factors that are associated with rates of homelessness across communities. Quantifying this association between community factors and homelessness provides HUD with opportunities to sharpen focus on the factors within the community and to help those at risk of homelessness. This study also provides HUD insights that may inform and guide policies for tackling homelessness in areas experiencing increases in their unsheltered homeless populations.

Exhibit 1-1 | Map of Percentage Increase in Total Homelessness from 2015 to 2017



Notes: Exhibit D-2 in appendix D provides the top five CoCs with the largest changes in rates of homelessness from 2015 to 2017. Exhibit D-3 in appendix D maps the percentage increase in the rates of *total* homelessness from 2015 to 2017.
Source: HUD PIT count data

Literature Review on Homelessness

Homelessness research over the past two and a half decades has been shaped by a collection of notable developments in approaches to examining the factors associated with homelessness. Chief among these changes is increased recognition of the need to integrate individual and structural perspectives when studying homelessness (Fargo et al., 2013; Lee, Price-Spratlen, and Kanan, 2003). These multidimensional models acknowledge the role of adverse events (for example, mental illness and domestic violence) in shaping the likelihood that individuals become homeless, but the models also recognize that this likelihood is contingent on community-level factors such as rent prices and other economic factors.

The increasingly important role of multidimensional models that combine aggregate individual- and community-level factors is supplemented by research highlighting the considerable differences between homelessness within rural and urban communities (Fitchen, 1992; Lawrence, 1995). In contrast to their urban counterparts, rural communities are less likely to have large, visible homeless populations. Despite evidence of a higher proportionate incidence of homelessness than in urban communities (Lawrence, 1995), and according to field interviews conducted by researchers in upstate New York, the rural homeless population is more likely to "double up" or accept grossly inadequate housing, as opposed to the urban image of literal homelessness meaning that people will be sleeping in public view (Fitchen, 1992). The associated effect is a notable undercounting of the homeless within rural communities,[8] thereby underscoring the need to account for the degree of "rurality" within community-level analyses of homelessness. In addition, innate theoretical differences seem to exist in the causes of homelessness in rural and urban communities. Subgroup analysis can help flesh out the different factors associated with homelessness in rural communities and suggest new directions for policies and programs that target rural homelessness.

A third development pertains to improvements in the data used to study homelessness over the past two decades. Byrne et al. (2012) criticized prior research for relying on methodologically flawed estimates of the size of the homeless population. Notably, previous measures of homelessness suffered from methodological limitations in the form of sole reliance on informant interviews, the use of shelter bed capacity as a proxy for homelessness, and the use of inconsistent protocols by communities counting the homeless population. In response to these challenges, HUD provided extensive technical assistance to communities to improve the enumeration of their homeless populations and developed the HUD PIT counts of unsheltered and sheltered homeless people (Dunton, 2014). The PIT count methodology provides a systematic approach used by the CoCs to conduct accurate counts of sheltered and unsheltered homelessness during the last 10 days of January. This methodology has been shown to

[8] PIT counts are not designed to include households who are doubled up or living in poor-quality housing. PIT counts are designed to count people living in homeless shelters and people living in unsheltered locations not meant for human habitation, such as in cars or on the street. PIT count data are collected by homelessness service providers and by street count volunteers. The U.S. Department of Education has different measures, like doubling up, because data are collected at schools. Household-level surveys like the American Housing Survey (AHS) identify poor-quality housing. In short, different data sources would need to be combined and deduplicated in order to capture all types of homelessness described previously. HUD considers doubling up and poor-quality housing to be an indicator of housing insecurity among housed people but does not consider these factors to be indicators of homelessness. HUD is currently developing new AHS measures to better capture these issues (see Watson and Carter, 2018).

provide more reliable estimates of homelessness throughout the country (Byrne et al., 2014) and has been credited with providing an improved ability to examine the effects of public policies on homelessness (O'Flaherty, 2018).[9] Researchers have used different measures of the homelessness rate in a community. Most recent studies have used the number of total homeless, sheltered homeless, or unsheltered homeless adults per 10,000 adults in the general population or per 10,000 adults living in poverty (Byrne et al., 2012; Glynn and Fox, 2017; Hanratty, 2017; Lee, Price-Spratlen, and Kanan, 2003; Lucas, 2017).

EXAMINING FACTORS ASSOCIATED WITH HOMELESSNESS

Over the past several decades, a growing body of empirical research confirms that key market and community conditions affect levels of homelessness (Byrne et al., 2012; Glynn and Fox, 2017; Hanratty, 2017; Lee, Price-Spratlen and Kanan, 2003; Quigley, Raphael, and Smolensky, 2001). These studies have commonly modeled homelessness in a geographic area as a function of various community-level factors—

- Housing market conditions.
- Economic market conditions.
- Local policy factors and the available safety net.
- Demographic composition.
- Climate conditions.

The literature reviews in Byrne et al. (2012) and O'Flaherty (2018) provided a starting point for the current study. In the sections below, we provide summaries of the pertinent findings across the five factors identified previously.

Relationship Between Housing Market Conditions and Homelessness

An array of studies found consistent evidence of a significant positive relationship between a community's housing market conditions and the size of its homeless population. Economic principles governing the availability and pricing of housing and the growth in demand for the lowest quality housing explain a vast portion of the variation in homelessness across metropolitan housing markets (Quigley, Raphael, and Smolensky, 2001). Similarly, Lee, Price-Spratlen, and Kanan (2003) found that the median rent level exerts a dominant effect on metropolitan homelessness rates and that higher priced areas have higher rates of homelessness. Byrne et al. (2012) used HUD's PIT count data to model the community-level variation in homelessness across the United States. Their estimates suggest that rent level, the prevalence of single-person households, and the presence of households that had recently moved to the area were all important factors in determining homelessness. In a study of homeless families and single adults, Fargo et al. (2013) found that housing market factors explained a greater proportion of variance in homelessness rates than were explained by demographic, behavioral, public health, and safety net factors. Notably, the findings confirmed results from previous studies that showed housing market factors and housing costs are the strongest predictors of homelessness.

[9] Homeless Management Information System data can be used to provide an unduplicated count of people who are experiencing sheltered homelessness and have client-level information and service use patterns. In recent years, HUD has provided technical assistance in clarifying some of the data collection procedures within communities to improve sheltered homelessness estimates. This study is focused on homelessness measures from HUD's PIT count. Other studies may wish to investigate opportunities to use housing inventory count and System Performance Measures data to assess availability of shelter beds or outcomes for sheltered homeless people.

More recently, a study of increases in the Zillow Rent Index and homeless counts in the 25 largest U.S. Metropolitan Statistical Areas found strong, significant, and positive relationships between rental costs and homelessness in some areas (New York; Los Angeles; Washington, DC; and Seattle) but insignificant relationships elsewhere (Glynn and Fox, 2017). Glynn, Byrne, and Culhane (2018) provide empirical evidence that homelessness in a community sharply increases once the median rental costs exceed 32 percent of median income (close to the federal definition of affordable housing). In right-to-shelter localities, homelessness increased with higher median rent, demonstrating that median rents remain an important determinant of area homelessness rates even after controlling for community-level, time-invariant differences via a fixed effects model (Hanratty, 2017). Collectively, the strong relationship between housing market conditions and homelessness has notable implications for efforts to address homelessness across communities. Research suggests that modest improvements in the affordability and availability of rental housing can have significant effects on the incidence of homelessness (Quigley, Raphael, and Smolensky, 2001) and that policies that expand access to affordable housing may be an important component of the tools used to reduce homelessness (Hanratty, 2017).

In short, rental markets are tightening nationwide with high housing costs, forcing even people with higher incomes to rent instead of purchasing affordable homes and leaving fewer affordable rental units to low-income households (Galvez et al., 2017). As a result, finding an affordable house to rent might not be possible for this vulnerable population.

Relationship Between Economic Market Conditions and Homelessness

The relationship between local economic conditions and homelessness has been the focus of several previous studies. Most studies generally find a strong association between homelessness, income, and unemployment rates. Individual-level studies have found homelessness occurs in families who tend to occupy the lower end of the income spectrum. Curtis et al. (2013) examined the relationship between individual-level shocks to family incomes, such as the birth of children with severe health conditions, and homelessness. The study found that shocks to family incomes were a key factor affecting the likelihood that families will become homeless.

As a result, community-level studies have included both these factors—average household income and unemployment rate—while modeling homelessness. The magnitude and significance of estimates have varied greatly, however, based on the other variables included in the regression model (Byrne et al., 2012). Although the individual-level studies suggest some amount of association between income and homelessness, more recent reviews of the extant literature have suggested that, on an aggregate level, changes in the unemployment rate cannot be expected to trigger significant changes in community homelessness rates (O'Flaherty, 2018).

Previous studies have identified household income as a significant economic factor, with the percentage of households with low income positively associated with community homelessness rates (Byrne et al., 2012; Lee, Price-Spratlen, and Kanan, 2003). Across families and single adults residing within metropolitan areas, measures of household discretionary income were found to be the most important factors in determining community homelessness rates (Fargo et al., 2013). The association of unemployment and poverty rates on homelessness with 1 year of cross-sectional data might not provide enough statistical power to estimate the relationship. As a result, studies have found mixed results of unemployment rates on homelessness within a community. For example, Quigley, Raphael, and

Smolensky (2001) found the coefficient on unemployment rate was negative and insignificant, whereas Byrne et al. (2012) found a positive and significant association in non-metropolitan areas.

In summary, economic conditions, in contrast to housing market conditions, are anticipated to have a more secondary relationship with community levels of homelessness. While the magnitude and significance of variables measuring economic conditions have varied across studies (Hanratty, 2017), these variables play a theoretically and methodologically important role in the development of robust models for examining the factors associated with community levels of homelessness.

Relationship Between Local Policy Conditions/Safety Net and Homelessness

A wide range of studies has examined the extent to which various state and local policy factors may influence homelessness. Such studies have typically examined policies impacting the general social safety net and those specifically targeting housing and homelessness. The former category includes state supplements to Temporary Assistance for Needy Families (TANF) and Supplemental Security Income, as well as availability of treatment programs for people with mental illnesses, disabilities, and substance abuse disorders. The latter category includes right-to-shelter, bus-out, and permanent supportive housing policies, among others (Byrne et al., 2012). Khadduri (2008) described the interconnection between homelessness and various policy factors, explaining that housing subsidies (such as the Housing Choice Voucher program) can prevent homelessness by filling gaps in the availability of affordable housing. That study also explains how housing subsidies may differentially benefit certain populations, such as single mothers and TANF recipients, suggesting other potential interactions[10] between various factors that influence homelessness.

Previous studies have shown that safety net policies focusing on providing some form of income or other support for individuals experiencing adverse life events have had mixed effects. At the end of the 20th century, many experts viewed the magnitude of homelessness as a function of the size of the safety net, which had contracted in size during the previous decade (Lee, Price-Spratlen, and Kanan, 2003). Subsequent empirical research, however, has raised questions about the veracity of this assumption. Notably, Lee, Price-Spratlen, and Kanan (2003) found that the availability of public assistance was indeed negatively associated with homelessness rates, suggesting that the programs were effective in keeping impoverished families and individuals from slipping into homelessness. At the same time, the study found that expenditures from Aid to Families with Dependent Children (AFDC), the precursor to TANF, had a positive association with homelessness rates in the community. The authors suggested that the size of these expenditures may have had a "magnet" effect so that higher AFDC payments attracted disadvantaged families from other communities. Popov (2016) and Lucas (2017) presented some preliminary evidence that homeless families migrate to communities with more generous programs. Meanwhile, Fargo et al. (2013) found safety net measures to be among the poorest predictors of homelessness rates. Few safety net variables were significantly associated with homelessness rates in metropolitan communities, while higher levels of TANF expenditures were associated with higher levels of homelessness in nonmetropolitan communities.

[10] Potential interactions of individual characteristics have been suggested in the literature. For community-level studies, however, interactions of percentages of single mothers and TANF recipients achieves little without including the percentage of single mothers who are TANF recipients. Due to the data limitations and the degrees of freedom in the number of covariates that can be included in the model, this study has only included a few pertinent and available interaction terms in the model.

In contrast, policies specifically targeting housing and homelessness within communities were found to have higher levels of empirical support. Previous research by Mansur et al. (2002) found that a substantial portion of homelessness can be eliminated through increased reliance on housing subsidies. Similarly, O'Flaherty (2012) found that housing subsidies provide an optimal homelessness prevention program. Meanwhile, Burt, Pearson, and Montgomery (2007) found evidence that a combination of prevention strategies, rapid exits from shelter strategies, and community support strategies provided the most effective and efficient approaches to reducing homelessness rates. Moulton (2013) found that a combination of long-term housing and services to homeless individuals with disabilities can reduce chronic homelessness. Meanwhile, increased investment in permanent supportive housing, which has emerged as a preferred policy intervention for addressing chronic homelessness in recent years, was found to have modest negative associations with chronic homelessness at the community level in earlier studies (Byrne et al., 2014). A study using more recent data, however, may find an even stronger negative relationship as the policy matures.

The findings that were shown previously demonstrate empirical support for a variety of policy interventions focused on targeting housing and homelessness, but questions persist about which policies may be optimal. A recent study by Gubits et al. (2018) provides critical insight into which policies may be most effective in reducing homelessness. This large, randomized controlled trial of 2,282 homeless families compared housing stability for families receiving long-term rent subsidies, short-term rent subsidies, and transitional housing programs with supportive services against a common control group of usual care. The findings conclusively demonstrate that long-term rent subsidies reduced individual-level homelessness, while the other interventions had little effect. Accordingly, the study provides strong support for the view that long-term housing subsidies effectively resolve the enduring economic problems that most homeless families face while demonstrating a notable lack of support for the view that policies must require homeless families to address psychosocial problems in order to maintain housing.

Relationship Between Demographic Composition and Homelessness

Throughout the literature, previous studies have often found strong relationships between homelessness and various demographic characteristics, including age, gender, family status, and race. Byrne et al. (2012), however, have highlighted a lack of consensus among previous studies on the specific demographic factors that are consistently associated with homelessness. The lack of significant relationships between demographic factors may be attributed to the diversity of demographic variables included within previous studies, and the likelihood of interactions between demographic variables may be attributed to other economic and housing market factors (Shinn et al., 1998). For example, in areas with high rents and tight markets, single-parent families may find it more difficult to make ends meet due to lack of a second income, leading to higher rates of homelessness. Avenues for future research and avenues of particular interest in this study include the interaction of demographic factors with other factors that may influence homelessness. Further on, we review pertinent categories of demographic variables including key subpopulations, household compositions and personal networks, and cultural factors.

Several key subpopulations have been identified as significantly more likely to comprise homeless populations. Baby boomers (individuals born between 1946 and 1964) have been shown to make up a highly disproportionate share of the homeless population and to be positively associated with the size of a community's homeless population (Byrne et al., 2012; Culhane et al., 2013). Similarly, veterans have

been found to have higher levels of risk for homelessness and to be significantly overrepresented within the homeless population (Fargo et al., 2012). The size of the Hispanic population was also found to be positively associated with homelessness rates (Byrne et al., 2012). Notably, this finding was inconsistent with previous research that showed Hispanics were more likely to be underrepresented, given a greater propensity for using informal housing arrangements to avoid homelessness (Rosenheck, Bassuk, and Salomon, 1999). Accordingly, Byrne et al. (2012) identified a need for future research to further examine the associations between Hispanic ethnicity and homelessness.

Variables pertaining to the size and composition of households (Bohanon, 1991; Burt, 1993) and personal networks (Fitchen, 1992) present another important category of demographic variables. Single-person households, which are more economically vulnerable and intensify the demand for housing, exert a notable influence on homelessness rates (Lee, Price-Spratlen, and Kanan, 2003). Household composition also exerts significant influence, with the proportion of female-headed households associated with increased homelessness (Burt, 1993; Elliott and Krivo, 1991). The positive associations between single-person and female-headed households may be attributed, in part, to social networks. Notably, previous research has found that in both urban and rural communities, personal networks serve as the first line of defense against literal homelessness (Fitchen, 1992). Relatives and friends, given their inherent abilities to provide social and housing assistance, are argued to be instrumental to the recovery of families and individuals that are on the brink of homelessness.

Numerous behavioral and public health factors, which may vary considerably across communities, have also been shown to affect a community's level of homelessness. Early studies found violent crime rates have a significant positive relationship to homelessness (Grimes and Chressanthis, 1997). More recently, notable public health outcomes differences between metropolitan and nonmetropolitan communities have been shown to influence rates (Fargo et al., 2013). Within metropolitan regions, community aggregate levels of alcohol consumption and individuals reporting no social support were uniquely associated with family homelessness, while community-level aggregate drug use and homicide rates were uniquely associated with individuals experiencing homelessness. In contrast, life expectancy, religious adherence, and crime were cultural factors uniquely associated with homelessness within nonmetropolitan communities. Finally, previous individual-level studies have also demonstrated a significant relationship between experiencing family abuse and neglect and subsequent homelessness within rural and urban communities (Thrane et al., 2006).

Relationship Between Climate Conditions and Homelessness

A final category of variables focuses on the relationship between climate conditions and homelessness rates. Previous research has long theorized that a community's climate, including its average summer and winter temperatures and levels of precipitation, affects its rate of homelessness. Empirical evidence has indeed suggested that communities with warm climates have higher rates of unsheltered homelessness, on average, than communities with colder climates (Corinth and Lucas, 2018). This relationship, however, appears to be more tenuous among homelessness studies that control for an array of factors within their explanatory models. O'Flaherty (2018) suggests including the interaction between population characteristics such as poverty rates and conditions that affect the entire population (like temperature) in the model.[11] Across metropolitan contexts, average temperature

[11] This study considered using interactions, but due to the limitations of using cross-sectional data with 376 observations and the number of independent variables, we leave this for future studies with better data.

ranges were unassociated with homelessness rates, while areas with heavy precipitation had a significant negative association (Lee, Price-Spratlen, and Kanan, 2003). To more fully examine the relationship between climate and homelessness, Corinth and Lucas (2018) analyzed the relationship between the distribution of temperatures on CoC homelessness rates. CoCs with cold climates were found to have uniformly low rates of unsheltered homelessness, while warmer CoCs demonstrated substantial variation in the size of the unsheltered population. These findings seem to be clearly tied to the fact that the underlying data—namely PIT counts—are collected in January. The authors noted the need for future research to carefully account for climate factors when examining the determinants of homelessness.

DATA

Through a comprehensive data assessment that included a literature review and a descriptive data analysis, the study team constructed a dataset of factors believed to influence homelessness across communities. The study team started with a list of predictors suggested by HUD and identified additional variables during the literature review.[12] All potential variables were then examined for any issues related to data quality and availability. This assessment of potential variables involved exploratory descriptive analysis of independent variables available at the county, metropolitan statistical area, or state levels from a number of data sources within the same domains that have been identified in prior research associated with homelessness (housing, economic, safety net, demographic, and climate factors). Variables were excluded from the analysis for several reasons—

- Geographic incompatibility.[13]
- Sparseness or data availability.
- Higher quality data available from another source.
- High degree of correlation with other dependent variables in the same domain.

Exhibit 2-2 outlines the primary outcome variables and predictors of homelessness used in this study.[14] The final dataset consists of various housing, economic, safety net, demographic, and climate factors sourced largely from HUD and U.S. Census Bureau (Census) databases. The sections below describe in detail the full set of variables, along with their associated data sources and years of measurement.

Dependent Variables: HUD Point-in-Time Counts

Each year since 2007, HUD has estimated the number of people experiencing homelessness—in both sheltered and unsheltered situations—on a single night in the last week of January in approximately 400

[12] The initial set of variables suggested by HUD were renter share, median rents, and rental vacancy rates; housing density; per unit (or square foot) land cost; per unit (or square foot) construction cost; prevalence of overcrowded housing; median incomes, poverty, and unemployment; available homeless assistance resources, including supportive housing beds; the number of HUD-subsidized units within a community; population change and racial and ethnic population characteristics; prevalence of single-parent households; prevalence of opioid disorders or deaths; right-to-shelter policies; bus-out policies; Public Housing Authority homeless preference policies; weather conditions; and ratio of unassisted extremely low-income (ELI) renters to number of turnover-assisted units annually.

[13] The section entitled "Constructing the Dataset at the CoC Level" provides an overview of how the dataset was constructed, including the geographic level of aggregation.

[14] The study primarily relied on publicly available data. As a result, some data sources were not available for the study. appendix B presents the rationale for their exclusion.

Continuums of Care (CoCs)[15] across all 50 states, the District of Columbia, and U.S. territories.[16] These estimates form HUD's Point-in-Time (PIT) count data. CoCs are local planning bodies responsible for coordinating a full range of homelessness services in a geographic area, which may cover a city, county, group of counties, or an entire state.[17] The data reported for each CoC typically include the number of sheltered and unsheltered homeless people and subgroup counts of veterans, children and youth, the chronically homeless, individuals, and families.[18] For the primary outcomes of this study, we constructed three rates of homelessness for each CoC using the PIT estimates—

One in every four persons experiencing homelessness in 2017 were in New York City or Los Angeles (Henry et al., 2017).

1. Total number of homeless people per 10,000 population.[19]
2. Total number of sheltered homeless people per 10,000 population.[20]
3. Total number of unsheltered homeless people per 10,000 population.

The overall population in each CoC, by which the PIT counts are scaled,[21] is obtained from the Census's intercensal population estimates.[22]

For approximately 70 CoCs, PIT count data collection occurs biennially in January of odd years, while the remainder conduct counts annually. Due to this nuance in the reporting requirements of CoCs' PIT count data and due to data availability of the independent variables discussed later, the study team used the

[15] There are currently around 400 CoCs operating across all 50 states, the District of Columbia, and U.S. territories. CoCs administer and support various community-wide programs with the goals of ending homelessness and increasing self-sufficiency among populations experiencing homelessness (https://www.hudexchange.info/programs/coc/).

[16] In this study, we focus on outcomes for all 50 states and the District of Columbia. Puerto Rico and all other U.S. territories were excluded due to concerns of external validity, as well as availability of data on independent variables. The factors related to homelessness in Puerto Rico and other U.S. territories may be different from those on the mainland. For example, Puerto Rico is grappling with its worst financial crisis and defaulting on its debt. Puerto Rico's economy has been in a recession for more than a decade, with median income around $16,000 and a high unemployment rate (around 10 percent) and decreasing labor force due to drastic net-migration out of Puerto Rico. In addition, more than half of the population of Puerto Rico are living in poverty. (For more details, see https://www.census.gov/quickfacts/fact/table/puertorealcomunidadpuertorico/IPE120217).

[17] The CoC definition is specified in more detail in the Annual Homeless Assessment Report (Henry et al., 2017).

[18] The PIT count of unsheltered homeless people in each CoC relies on volunteers who spent the night gathering information. Many of the volunteers are homelessness researchers, but some may be amateurs. As a result, the unsheltered homeless count may have some measurement error that might not be just noise and may be correlated to the characteristics of the CoC (see O'Flaherty, 2018 for more details). The PIT count data, however, remain the best available national unduplicated count of homeless people.

[19] This definition of homelessness using the PIT counts follows the literature (Byrne et al., 2012; Fargo et al., 2013).

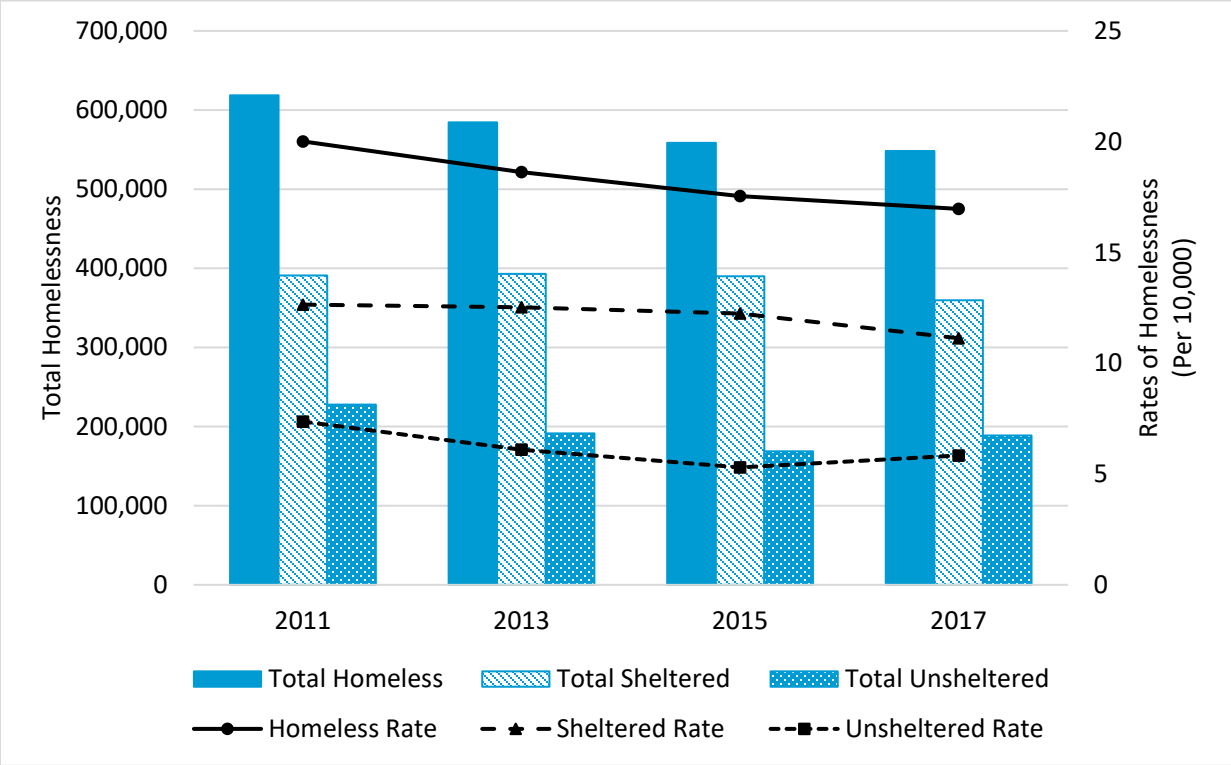
[20] Counts of sheltered homelessness should not be viewed as a pure reflection of the demand for temporary crisis housing. Rather, the number of people counted is a function of available beds, which is necessarily constrained by the resources allocated to create shelter options in a CoC. Furthermore, CoCs can and do choose to allocate scarce funding to permanent housing programs, which are used to house homeless individuals and families who will not show up in sheltered homeless counts.

[21] CoCs in large metro areas would have large homeless populations. To provide a reasonable measure of the issue of homelessness in a community, we follow the literature in scaling the PIT counts by the community population.

[22] Throughout the report, we will reference two distinct sources of Census data. The intercensal estimates come from the Population Estimates Program that publishes annual categorical counts of persons and housing units. The other frequently mentioned data source is the ACS 5-year estimates that feature similar population estimates but are subject to availability constraints. For the remainder of the report, we refer to intercensal population estimates or use of them as "intercensal population" and refer to ACS data as "ACS" or "ACS 5-year."

PIT count data from 2017 for regression analysis.[23] The county-level data from one of our data sources, American Community Survey (ACS), are only available as 5-year estimates.[24,25] Exhibit 2-1 presents the total homeless populations and rates of homelessness from 2011 through 2017.[26] While levels and rates of total homelessness have decreased during this period, the count of unsheltered homeless people increased by nearly 20,000 between 2015 and 2017, as depicted by the lower dashed line. Throughout our discussions of data and results, any years discussed for the outcome of interest reflect the year the PIT count was collected and reported. All independent variables, however, apart from January temperature and precipitation, represent the year prior to the PIT data collection. For example, rates of homelessness from the 2017 PIT count data are associated with 2016 measures of the dependent variable.

Exhibit 2-1 | Total Homelessness and Rates of Homelessness, 2011 through 2017



Sources: Census's intercensal population estimates; HUD PIT count data

Independent Variables: Predictors of Homelessness

In consultation with HUD, the study team used the literature review to find data sources, with the measures highlighted in the Introduction chapter having clear evidence and theoretical underpinnings to

[23] Years correspond to the years HUD PIT counts were collected. As PIT counts are collected in January, right-hand side variables correspond to data from the previous year. For example, 2017 PIT counts are merged with 2016 Census data.

[24] ACS 1-year estimates are available for approximately 800 out of more than 3,100 counties. Future studies can consider using ACS 1-year estimates and concentrating their analyses on this smaller set of counties and associated CoCs.

[25] Earlier ACS 5-year estimates from 2007 through 2011 contains housing market data that capture a major part of the recession/foreclosure crisis and might create potential issues in explaining homelessness in the community.

[26] See appendix F for more details on homelessness in specific cities.

make them important factors associated with homelessness. Data on factors were gathered from a wide variety of sources. Exhibit 2-2 presents the independent variables collected across the five domains that are included in the dataset: housing, economic, safety net, demographic, and climate.

HOUSING MARKET VARIABLES

In accordance with the literature review, the study includes measures of housing market factors—mainly tightness of the housing markets and availability of affordable housing that are associated with homelessness as independent variables. Most of these housing market variables are derived from ACS and include those that affect homeowners (median home values and cost burden of homeowners)[27] and renters (median rent, median rental utility costs,[28] cost burden of renters, percent of renter-occupied housing units in a community, vacancy rate of rental units); rate of overcrowding;[29] and housing density[30] in the community. While other measures of housing costs (namely home values) may be theoretically important in models of homelessness, rents reflect the type of housing costs that are most likely to matter in determining homelessness at the community level. Due to the high correlation between median home values and median rent (0.93) in the community and in order not to hinder our ability to interpret the results, we only include median rent in our regressions, even though we present the home values in exhibit 2-2. Other sources of data were exploited to capture information on evictions and home price growth. We extracted data on eviction rates from the Eviction Lab at Princeton University and scaled the data by the number of renter-occupied housing units (Desmond et al., 2018b).[31] Finally, the data include a house price index representing percentage growth in housing prices since 2009, obtained from the Federal Housing Finance Agency (FHFA) (Bogin, Doerner, and Larson, 2016). Finally, we also included a categorical urbanicity variable.[32]

ECONOMIC VARIABLES

Our set of economic variables includes labor market characteristics obtained from the Bureau of Labor Statistics (BLS), in addition to labor and income figures from the Census. Our broadest measure of unemployment is sourced from the BLS Local Area Unemployment Statistics and is calculated by dividing the total unemployed population by the labor force population (BLS, 2018). We also included in our dataset local median household income and poverty rate measures from the Census's Small Area Income and Poverty Estimates (SAIPE). As explained previously, the median income, median house values, and median rent represent whether individuals in the community can afford housing in that community. Due to the high correlation between median income and median rent (0.82) in the community and so as not to hinder our ability to interpret the results, we only include median rent in

[27] Cost burden for homeowners and renters is defined as the share of homeowners (or renters) with housing costs greater than 30 percent of their income.

[28] Cost of utilities was estimated by taking the difference of median contract rent and median gross rent.

[29] The rate of overcrowding in a housing unit is defined as the share of units with more than 1.5 people per room.

[30] We use a dummy variable that is equal to 1 when density is greater than or equal to the 75th percentile (408 units per square mile) value in 2017.

[31] Eviction Lab uses estimates of renter-occupied households from the 2000 and 2010 Census and ESRI Business Analyst 2016. There are cases of states—Alaska, Arkansas, South Dakota and North Dakota—and counties in states that do not have consistent data coverage. The estimates from these states were achieved by using an adjustment from state-reported county statistics. See the Methodology report (Desmond et al., 2018a) for more detail.

[32] The four CoC urbanicity categories in the data include Major City, Largely Urban, Largely Suburban, and Largely Rural. Our analysis combines Major City CoCs with Largely Urban CoCs. We refer to this new category as "Urban" throughout the text and results.

our regressions, even though we present the median income in exhibit 2-2. Estimates of income inequality included a Gini coefficient sourced from ACS 5-year estimates.[33] The Gini coefficient is a representation of an area's income distribution. Gini coefficients can range from 0 to 100 percent, with 100 percent reflecting maximum income inequality (in other words, a large share of income or wealth in the hands of a small number of individuals) and a value of 0 representing perfect equality.

SAFETY NET VARIABLES

The measures for participation in social safety net programs include the Earned Income Tax Credit (EITC), Social Security Disability Insurance (SSDI), and Supplemental Security Income (SSI). Using data from the Internal Revenue Service (IRS) (Internal Revenue Service, 2018), we calculated the share of households benefiting from EITC by dividing the number of federal income tax returns receiving EITC by the total number of tax returns, which are comparable to the number of households in a given area. The study team extracted numerators for the participation rates in SSDI and SSI from Social Security Administration (SSA) reports (SSA, 2017a, 2017b). We estimated participation rates in both SSDI and SSI by scaling participation by intercensal population. The final rate modeled was the proportion of households receiving cash assistance income to all families.[34] Cash assistance includes general assistance and Temporary Assistance for Needy Families (TANF). Housing market variables also include programmatic data on HUD-assisted households from the Picture of Subsidized Households (HUD, 2018b) and federal funding reports for each CoC.[35] The measures of occupancy rates[36] of HUD-assisted units were extracted from the Picture of Subsidized Households. The study team calculated an additional variable to capture the proportion of HUD-assisted units by dividing the total number of HUD-assisted units in the Picture of Subsidized Households by the total number of housing units in that area (obtained from Census intercensal housing unit estimate).[37] Programmatic information on a measure (percentage of houses built before 1940) related to awarded federal CoC funding but not related to homelessness was included as an instrument to measure if communities with high funding affect homelessness in the community (following some of the recent literature).

DEMOGRAPHIC VARIABLES

We include broad intercensal population estimates by race and ethnicity, gender, age distributions, and net migration. The study team divided each of these estimates by the overall intercensal population to create proportions of individuals in each group. We included specific measures from the ACS 5-year

[33] Census describes the Gini coefficient in the 2017 ACS subject definition as "a measure of how much a distribution varies from a proportionate distribution." Further information can be found at https://www2.census.gov/programs-surveys/acs/tech_docs/subject_definitions/2017_ACSSubjectDefinitions.pdf (U.S. Census Bureau, 2017).

[34] Public assistance income includes general assistance and TANF. Separate payments received for hospital or other medical care (vendor payments) are excluded. This does not include SSI or noncash benefits such as Food Stamps.

[35] HUD's Picture of Subsidized Households is publicly available at https://www.huduser.gov/portal/datasets/assthsg.html, while HUD provided federal CoC funding data for 2010 through 2017 to the study team.

[36] Occupancy rates measured in HUD administrative data are not necessarily a true measure of assistance utilization. For example, a unit may be assigned but unoccupied during the application and inspection process (artificially reducing the numerator). In addition, the number of subsidized units available are the number of units that HUD has financially paid for and can financially pay for in rental assistance, which depends on the actual per-unit cost of assistance. For the housing choice voucher program, however, some units may have costs that are higher than the anticipated per-unit cost (artificially inflated denominator).

[37] HUD's Worst Case Housing Needs (WCN) report (Watson et al., 2017) uses an alternate measure of HUD assistance: the income-eligible population that receives housing assistance. The WCN report can be accessed at https://www.huduser.gov/portal/sites/default/files/pdf/Worst-Case-Housing-Needs.pdf.

estimates to control for family composition in terms of single-parent households, the prevalence of single-adult households, educational attainment, and veteran status. Our variable for the share of veterans is scaled by the total adult population 25 years and over, and the proportion of children living in single-parent households is scaled by the overall number of children under age 18. Educational attainment is measured by the share of the population with at least a bachelor's degree compared with the overall population.

Measures of health and access to health care are considered important determinants of homelessness in a community. We include healthcare costs, availability of mental health providers, and alcohol consumption as proxies for the measures of health. As a potential source of individual-level income shocks that may cause low-income households to be homeless, healthcare costs are represented through the average Medicare parts A and B reimbursements per enrollee.[38] The study team obtained precalculated reimbursement figures from the Dartmouth Atlas of Health Care (2018). We measure the availability of mental health treatment through counts of mental health providers, which are scaled by the overall intercensal population. These counts were provided by the County Health Rankings (CHR) program from The University of Wisconsin Population Health Institute (2018). Alcohol consumption is factored through measures of mortality rates and the prevalence of excessive drinking in adults, which is also obtained from CHR. The Institute for Health Metrics and Evaluation (IMHE) at the University of Washington, which supplied mortality rate data, and CHR precalculated these proportions (IMHE, 2018).

CLIMATE VARIABLES

We included variables accounting for climate conditions that may explain PIT counts, especially because the data are collected in January, and some of the homelessness measures may be sensitive to weather. More specifically, we extracted measures of the average temperature for the month of January, average summer temperatures, total precipitation for the month of January, and total annual precipitation. We obtained these county-level measurements from the National Oceanic and Atmospheric Administration (NOAA) Climate Divisional Database (nCLIMDIV) (Vose et al., 2014).[39]

CONSTRUCTING THE DATASET AT THE CONTINUUM OF CARE LEVEL

As our primary outcome is measured at the CoC level, the study team created a dataset in which the unit of measurement is the CoC. An overarching challenge of constructing the dataset at the CoC level is twofold. First, CoC boundaries change over time.[40] Second, there are discrepancies between CoC boundaries and the geographic boundaries across the other datasets (most datasets are available at the county level). CoCs typically serve areas representing a city, individual county, group of counties, or entire state. Given these issues, there are four possible relationships between county and CoC boundaries—

1. A single county is served by a single CoC.
2. Multiple counties are served by a single CoC.
3. Multiple CoCs serve areas within a single county.

[38] Medicare enrollees are not the actual population of interest, but the costs faced by the recipients represent the healthcare costs in the community.

[39] County-level data were not available for Alaska, District of Columbia, and Hawaii. All areas within Alaska and Hawaii were assigned city-level records from Anchorage and Honolulu, respectively. Climate data for District of Columbia were measured at Ronald Reagan Washington National Airport in Virginia (NOAA, 2019).

[40] The exact number of CoCs vary due to the creation, dissolution, and merging of CoCs between 2011 and 2017. In 2011, there were 432 CoCs, whereas in 2017, there were 399 CoCs.

4. Combination of 2 and 3: A county is served by multiple CoCs that also serve other counties.

In the first possible case, no changes are made to CoCs or counties. In the second case, the data for all counties served by a single CoC are aggregated to the CoC level by taking the sum or a population-weighted average of the county-level measures. In the third case, all the PIT estimates are summed up to create a combined CoC-level estimate. The fourth possible case involves a county served by multiple CoCs that also serve other counties. In these cases, we sum up the PIT estimates, as well as the county-level estimates, to more accurately reflect the data for the areas served by those CoCs.[41] Ultimately, our dataset includes 376 individual CoCs or combined CoC areas serving 3,117 counties (more than 99 percent of the total counties in the United States).[42]

Exhibit 2-2 | Potential Variables to Be Included in Model of Homelessness

Predictors of Homelessness	Data Source (Years)	Geography Available	Scaling Variable
Dependent Variables			
Rate of Homelessness	HUD PIT (2017)	CoC	Estimated total population
Rate of Sheltered Homelessness	HUD PIT (2017)	CoC	Estimated total population
Rate of Unsheltered Homelessness	HUD PIT (2017)	CoC	Estimated total population
Housing Domain			
Median House Values	ACS 5-Year (2016)	County	–
House Price Growth Index	FHFA (2016)	County	–
Percentage of Homeowners with Cost Burden	ACS 5-Year (2016)	County	Owner-occupied housing units
Median Rent	ACS 5-Year (2016)	County	–
Median Rental Utility Cost	ACS 5-Year (2016)	County	–
Percentage of Renters with Cost Burden	ACS 5-Year (2016)	County	Rental-occupied housing units
Share of Renter-Occupied Units	ACS 5-Year (2016)	County	Occupied housing units
Rental Vacancy Rates	ACS 5-Year (2016)	County	Rental housing units
Housing Density	ACS 5-Year (2016)	County	Total housing units
Eviction Rate	Eviction Lab (2016)	County	Renter-occupied households
Share of Overcrowded Housing Units	ACS 5-Year (2016)	County	Occupied housing units
Urbanicity	HUD (2016)	CoC	–
Economic Domain			
Median Household Income	SAIPE (2016)	County	–
Unemployment Rate	BLS (2016)	County	Civilian noninstitutionalized labor force 16 years and older
Gini Coefficient of Income Inequality	ACS 5-Year (2016)	County	–
Poverty Rate	SAIPE (2016)	County	–
Safety Net Domain			
Share of Families Receiving Cash Assistance	ACS 5-Year (2016)	County	Total households
Share of Households Eligible for EITC	IRS (2016)	County	Income tax returns
SSDI Participation Rate	SSA (2016)	County	Estimated total population
SSI Participation Rate	SSA (2016)	County	Estimated total population
Share of HUD-Assisted Units	HUD Picture of Subsidized Households (2016)	County	Total estimated housing units
HUD-Assisted Unit Occupancy Rate	HUD Picture of Subsidized Housing (2016)	County	HUD-supported housing units (occupied and unoccupied)

[41] We updated a HUD-provided CoC-county crosswalk to aggregate county estimates to the CoC level and overcome this mismatch of boundaries across datasets. Future studies can either use this crosswalk or handle the aggregations differently if granular Census data are available.

[42] See appendix C for a more detailed description of how we constructed the final CoC-level dataset.

Predictors of Homelessness	Data Source (Years)	Geography Available	Scaling Variable
Federal CoC Funding[+]	HUD Administrative Data (2016)	CoC	
Percentage of Houses Built Before 1940	ACS (2016)	County	-
Demographic Domain			
White Percentage[a]	Census (2016)	County	Estimated total population
Black Percentage[a]	Census (2016)	County	Estimated total population
Asian Percentage[a]	Census (2016)	County	Estimated total population
Hispanic Percentage[a]	Census (2016)	County	Estimated total population
Other Race Percentage[a]	Census (2016)	County	Estimated total population
Proportion of Children[b]	Census (2016)	County	Estimated total population
Proportion of Adults[b]	Census (2016)	County	Estimated total population
Proportion of Seniors[b]	Census (2016)	County	Estimated total population
Proportion of Females	Census (2016)	County	Estimated total population
Net Migration Rate	Census (2016)	County	Estimated total population
Share of Single-Adult Households	ACS 5-Year (2016)	County	Total households
Share of Children in Single-Parent Households	ACS 5-Year (2016)	County	Population under 18 years
Share of Veterans	ACS 5-Year (2016)	County	Civilian population 25 years and older
Percentage with Bachelor's Degree or Higher	ACS 5-Year (2016)	County	Population 25 through 64 years
Percentage with Some College	ACS 5-Year (2016)	County	Population 25 through 64 years
Percentage with High School Diploma	ACS 5-Year (2016)	County	Population 25 through 64 years
Percentage with Less than High School	ACS 5-Year (2016)	County	Population 25 through 64 years
Healthcare Cost per Enrollee	Dartmouth[c] (2016)	County	Medicare enrollees
Ratio of Mental Health Providers	Robert Wood Johnson Foundation (RWJF) CHR[d] (2017)	County	Estimated total population
Alcohol Mortality Rate (Per 100,000)	IMHE[d] (2014)	County	Unstated population
Proportion of Excess Drinkers	RWJF CHR[c] (2017)	County	Unstated population
Climate Domain			
Average January Temperature	NOAA nCLIMDIV (2017)	County	-
Average Summer Temperature[e]	NOAA nCLIMDIV (2016)	County	-
Precipitation in January	NOAA nCLIMDIV (2017)	County	-
Total Annual Precipitation	NOAA nCLIMDIV (2016)	County	-

[+] Following Lucas (2017) and Popov (2016), we use the percentage of houses built before 1940 as an instrument or proxy for the Federal CoC funding to estimate the association between funding in the community and homelessness.

[a] Race and ethnicity comprise an exclusive category for which Hispanic or Latino is treated as a separate race. The estimated population categories for Native American, Hawaiian, or Pacific Island or two-or-more-race persons is combined with the "Other race" category.

[b] Age comprises an exclusive category that classifies children as younger than 20 years old and seniors as older than 64 years.

[c] Healthcare cost and mental health provider data are obtained from the Dartmouth Atlas of Health Care and the University of Wisconsin-CHR, respectively. The underlying source of the data is the Centers for Medicare & Medicaid Services (The Dartmouth Institute for Health Policy and Clinical Practice, 2018; University of Wisconsin Population Health Institute, 2018).

[d] Alcohol mortality rate and excess drinking are obtained from the Institute for Health Metrics and the University of Wisconsin-CHR, respectively. The underlying source of the data is the Centers for Disease Control and Prevention (University of Wisconsin Population Health Institute, 2018).

[e] Average summer temperature reflects the average of monthly temperatures for June, July, and August.

Notes: Denominator variables "Estimated total population" and "Total estimated housing units" are from Census's intercensal population estimate.

EMPIRICAL STRATEGY

On a single night in January 2017, nearly 550,000 people were living in homelessness in the United States, representing nearly 17 of every 10,000 individuals. More than 350,000 of these homeless people were sheltered, while nearly 200,000 were unsheltered. Our descriptive analysis in the first section sheds light on the variation in sheltered and unsheltered homelessness among urban, suburban, and rural areas. The second section presents our systematic way of identifying the relevant independent variables to include in the model across the five domains: housing, economics, safety net, demographics, and climate. The third section details our model and analysis approach to estimating the relationship between rates of homelessness and community-level factors across these domains.

Descriptive Analysis

The study team computed descriptive statistics for all three primary outcome variables—the overall rate of homelessness, sheltered homelessness rate, and unsheltered homelessness rate—and more than 60 independent variables. We compared their means and distributions across three categories of urbanicity:[43] largely urban Continuums of Care (CoCs) (*N* = 104), largely suburban CoCs (*N* = 160), and largely rural CoCs (*N* = 110).[44]

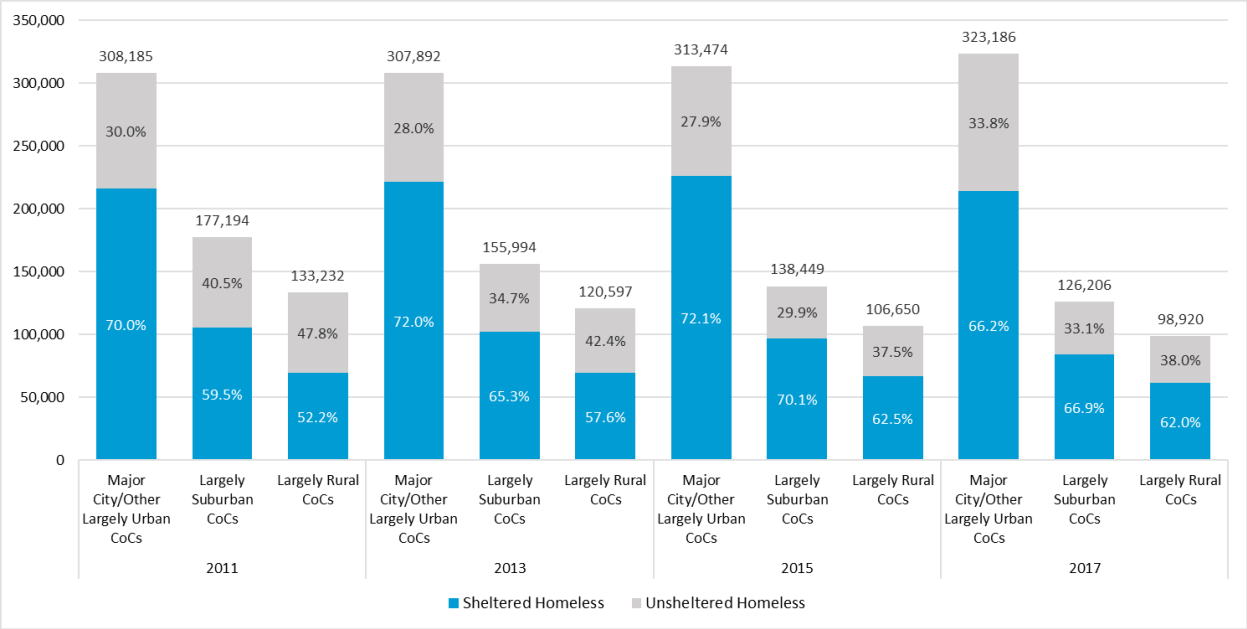
The increase in number of people experiencing homelessness in largely urban areas from 2015 to 2017 is entirely driven by unsheltered homelessness.

Exhibit 3-1 presents the Point-in-Time (PIT) counts of total homeless, sheltered homeless, and unsheltered homeless people from 2011 through 2017 for all CoCs by urbanicity category. The overall estimates for all CoCs show that homelessness decreased from 2011 through 2017 (Panel A in exhibit D-1 in appendix D). The reduction between 2015 and 2017, however, was mitigated by a relatively sizeable increase in the unsheltered homeless population. The population of unsheltered homeless people increased by nearly 20,000, from 168,726 in 2015 to 188,643 in 2017. Exhibit 3-1 shows that aggregate estimates for the total homeless population for largely suburban and largely rural CoCs show a reduction in overall homeless population estimates, whereas largely urban CoCs experienced an increase from 308,185 in 2011 to 323,186 in 2017. In addition, this increase in the overall homeless population in major city CoCs and largely urban CoCs is entirely driven by an increase in unsheltered homelessness in those CoCs (an increase of 22,000—from 87,345 in 2015 to 109,252 in 2017). Similarly, largely suburban CoCs also saw an increase (albeit small) in their unsheltered homeless population.

[43] A CoC is defined as urban, rural, or suburban based on whether the population resides more in one type of area than the others, based on data from the Census Bureau. For example, a rural CoC has more people residing in the rural areas than in the suburban or urban areas. It is common for CoCs to have people living in urban, suburban, or rural areas; however, this urbanicity designation reflects the aggregate data about the types of geographies where people in the CoC reside.

[44] Major city and largely urban CoC urbanicity categories were combined for the descriptive analyses. A comprehensive list of CoCs by urbanicity is provided in exhibit D-4 in appendix D.

Exhibit 3-1 | Point-in-Time Counts of Total Homelessness in 2011 Through 2017, by Urbanicity



Notes: These totals are for the populations of all 50 states plus the District of Columbia. All U.S. territories are excluded from this analysis.

Exhibit 3-2 presents, by urbanicity category, the CoC-level summary statistics for the primary outcomes of this study in 2017. While the average rate of homelessness across all CoCs was around 17 homeless people per population of 10,000, this number varied from 9.4 in largely rural CoCs to 28.4 in largely urban CoCs. Similarly, largely urban CoCs had large sheltered and unsheltered homeless populations relative to homeless populations in largely suburban and largely rural CoCs. For largely urban CoCs, the average sheltered and unsheltered population rates were 18.8 and 9.6 per 10,000, respectively. In contrast, sheltered homelessness rates for largely suburban and largely rural CoCs were 8.2 and 5.8 per 10,000, respectively, and the unsheltered homelessness rates were around 4 in 10,000 for both types of CoCs. In general, these numbers show that the largely urban CoCs tend to have large homeless populations.

Exhibit 3-2 | Average Point-in-Time Counts by Urbanicity in 2017

PIT Counts Per CoC	All CoCs		Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Average Homeless (per 10,000 population)	17.0	18.4	28.4	24.2	12.2	9.8	9.4	9.4
Average Sheltered Homeless (per 10,000 population)	11.1	14.2	18.8	21.0	8.2	5.5	5.8	3.7
Average Unsheltered Homeless (per 10,000 population)	5.8	9.8	9.6	12.7	4.1	7.2	3.6	7.0
Observations	374		104		160		110	

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2017. All U.S. territories are excluded from this analysis.

Exhibit 3-3 presents the 2016 summary statistics for variables in the housing domain by urbanicity. Overall, the housing variables show a tight and overcrowded housing market in the largely urban CoCs. As expected, the housing costs are much higher in urban and suburban CoCs, with median home values more than $100,000 greater and median rents more than $300 greater per month compared with rural

CoCs. In 2016, median home values in urban and suburban CoCs were around $286,000 and $261,000, respectively, and median rents were around $950 in both urbanicity categories. In contrast, home values in rural CoCs were around $146,000 in 2016, and median rents were around $600 per month. Furthermore, urban CoCs have a larger share of renter-occupied units (45.3 percent) compared with suburban (33.3 percent) and rural CoCs (30.4 percent). Rental vacancy rates, however, are greater in rural CoCs (6.9 percent), compared with slightly under 6 percent in urban and suburban CoCs. The cost burden for homeowners and renters is also slightly higher in urban and suburban CoCs compared with rural CoCs, with about half the renters spending more than 30 percent of their income on rent. Urban CoCs also have more overcrowded housing units (5 percent) compared with suburban and rural CoCs with slightly higher eviction rates (2.3 percent compared with 2 percent).

Exhibit 3-3 | Summary Statistics for Continuum of Care-Level Housing Variables, 2016

Variables in Housing Domain	All CoCs		Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Median Home Value ($1,000s)	232.2	141.6	285.8	167.9	260.7	135.4	145.9	43.1
House Price Index	11.1	15.6	19.5	16.1	9.5	16.4	3.5	8.5
Percentage of Homeowners with Cost Burden (%)	25.7	6.4	28.1	6.4	27.7	6.3	21.1	3.4
Median Rent ($100s)	8.3	2.8	9.4	2.6	9.5	2.8	6.0	1.1
Median Rental Utility Cost ($10s)	14.7	3.0	13.5	3.2	14.7	2.5	16.0	2.7
Percentage of Renters with Cost Burden (%)	50.5	4.9	52.0	4.9	52.2	4.8	47.5	3.6
Percentage of Renter-Occupied Units (%)	36.6	9.6	45.3	8.7	33.3	7.5	30.4	3.4
Rental Vacancy Rate (%)	6.2	2.2	5.7	2.4	5.9	2.0	6.9	2.0
Percentage of CoCs with High Housing Density (%)	37.3	48.4	67.7	47	42	49.5	0.0	0.0
Eviction Rate (%)	2.1	1.8	2.3	1.9	2.0	2.1	2.0	1.4
Change in Eviction Rate (%) [a]	-0.4	1.4	-0.4	1.4	-0.4	1.6	-0.3	1.0
Percentage of Overcrowded Housing Units (%)	3.5	2.6	5.0	3.1	2.9	2.2	2.5	1.5

[a] Change in Eviction Rate represents the difference between 2016 and 2012 values.

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis. Due to the high correlation with median rent, median home value is excluded from the regression analysis.

Exhibit 3-4 shows that suburban CoCs operate in economically better areas with higher median income, lower unemployment, and lower poverty rates. Areas where suburban CoCs operate have the highest median income at $68,000, followed by the median income of $62,000 for areas where urban CoCs operate and about $52,000 for rural CoCs. In addition, poverty rates are higher in urban CoCs (14.9 percent) and rural CoCs (14.6 percent) compared with suburban CoCs (11.4 percent). Estimates of income inequality, as measured by the Gini coefficient, show slightly higher dispersions in urban CoCs than suburban and rural CoCs.

Exhibit 3-4 | Summary Statistics for Continuum of Care-Level Economic Variables, 2016

Variables in Economic Domain	All CoCs		Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Median Income ($1,000s)	60.4	14.5	61.6	13.6	67.6	17.0	52.1	6.1
Unemployment Rate (%)	4.9	1.2	4.9	1.3	4.8	1.2	5.1	1.0
Gini Coefficient of Income Inequality (%)	46.1	2.9	48.2	2.4	45.5	3.0	44.3	1.5
Poverty Rate (%)	13.7	3.8	14.9	3.8	11.4	3.5	14.6	3.0

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis. Due to the high correlation with median rent, median income is excluded from the regression analysis.

Exhibit 3-5 presents the 2016 summary statistics for variables in the safety net domain. Urban and rural CoCs have higher rates of participation in safety net programs than suburban CoCs have. While rates of cash assistance do not vary greatly, household Earned Income Tax Credit (EITC) eligibility is higher in urban CoCs (19.6 percent) and rural CoCs (19.9 percent) compared with suburban CoCs (16.1 percent). Similarly, Supplemental Security Income (SSI) participation is also higher in urban CoCs (3 percent) and rural CoCs (2.5 percent) compared with suburban CoCs (2.1 percent). Rural CoCs have the largest Social Security Disability Insurance (SSDI) participation rates, with 3.4 percent of the population qualifying for the program, compared with 2.2 percent in urban CoCs and 2.5 percent in suburban CoCs. Finally, urban CoCs receive more than five times as much federal CoC funding ($35.5 million) as suburban CoCs ($6.7 million) and rural CoCs ($6.6 million). As federal CoC funding is high in CoCs servicing places with higher homelessness rates, the study uses an instrument for the percentage of houses built before 1940, which determines 25 percent of the federal CoC funding formula. HUD-assisted housing is more prevalent in urban CoCs, with HUD-assisted units representing 4.6 percent of all units compared with 3.2 percent of units in suburban CoCs and 2.8 percent of units in rural CoCs.[45]

Exhibit 3-5 | Summary Statistics for Continuum of Care-Level Safety Net Variables, 2016

Variables in Safety Net Domain	All CoCs		Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Percentage of Households Receiving Cash Assistance (%)	2.7	1.2	3.0	1.5	2.6	1.2	2.5	0.8
Percentage of Households Eligible for EITC (%)	18.6	5.5	19.6	5.5	16.1	5.1	19.9	4.9
SSDI Participation Rate (%)	2.7	1.0	2.2	0.7	2.5	0.9	3.4	0.9
SSI Participation Rate (%)	2.5	1.1	3.0	1.3	2.1	0.9	2.5	0.9
Share of HUD-Assisted Units (%)	3.6	2.1	4.6	2.7	3.2	1.9	2.8	0.7
Occupancy Rate of HUD-Assisted Units (%)	92.6	3.6	93.3	3.1	92.8	3.9	91.5	3.6
Percentage of Houses Built Before 1940 (%)	12.6	11.0	14.2	13.5	11.1	10.0	12.5	8.4

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis. Due to high correlation with poverty rates, EITC eligibility and SSI participation are excluded from the regression analysis. SSDI participation is excluded from regression analysis due to the high correlation with median rent.

[45] Another way to think about this is that the share of the income-eligible population that receives housing assistance is the approach HUD reports in the Worst-Case Housing Needs (WCN) report. By the WCN measure, income-eligible households in nonmetro areas are more likely to receive housing assistance than similar households in cities or suburbs. See exhibits 2-1 and 2-2 at https://www.huduser.gov/portal/sites/default/files/pdf/Worst-Case-Housing-Needs.pdf.

Exhibit 3-6 presents the 2016 summary statistics for variables in the demographic domain. Urban CoCs operate in more diverse regions in terms of race and ethnicity. Urban CoCs are 46.5 percent White, 16 percent Black, 26 percent Hispanic, and 8.6 percent Asian. By comparison, suburban CoCs and rural CoCs are 62.9 percent and 75.2 percent White, respectively. Urban CoCs also appear to be slightly younger, with a lower share of residents older than age 65 (13.1 percent) compared with suburban CoCs (16 percent) and rural CoCs (16.7 percent).

There appears to be little variation across geographies by household type. Single-person households comprise 28.7 percent of all households in urban CoCs, 26.4 percent in suburban CoCs, and 26.8 percent in rural CoCs. In addition, urban CoCs have a slightly larger share of children (0 through 18 years) living in single-parent households (28.6 percent) compared with suburban (24.5 percent) and rural CoCs (24.6 percent). Finally, rural CoCs have a larger share of veterans (10.7 percent) compared with urban (7.5 percent) and suburban CoCs (9 percent).

The education distribution varies greatly by urbanicity. Rural CoCs have a much lower share of residents with bachelor's degrees (23.8 percent) compared with urban (35.8 percent) and suburban CoCs (34.8 percent). While urban CoCs have the largest share of residents with a bachelor's degree or higher, they also have the largest share of residents with less than a high school education.

Among health categories, healthcare costs are slightly higher in urban CoCs than in suburban and rural CoCs. Alcohol mortality is slightly higher in major city and urban CoCs, while rates of excessive drinking do not appear to vary across geographies.

Exhibit 3-7 shows climate conditions across the nine Census geographic divisions. For the climate conditions observed at the time of PIT counts, CoCs within the South region experienced warmer and wetter conditions in the month of January. Similarly, South region CoCs were warmer during the previous summer months and experienced more precipitation in 2016. The summary statistics also show that CoCs within the Pacific region experienced notably higher precipitation totals in January 2017 (9.7 inches) than the second highest region (6.0 in the East South Central region).[46] Additional summary statistics for climate conditions by urbanicity categories are included in exhibit D-5 in appendix D.

Exhibit 3-6 | Summary Statistics for Continuum of Care-Level Demographic Characteristics, 2016

Variables in Demographic Domain	All CoCs		Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Total Population (1,000s)	862.8	1,257.0	1,094.9	1574.3	644.9	523.6	960.3	1,592.0
Percentage White (%)	61.1	20.3	46.5	16.8	62.9	16.9	75.2	15.6
Percentage African-American (%)	12.5	11.2	16.0	12.3	12.7	10.5	8.4	9.2
Percentage Hispanic (%)	17.9	15.6	26.0	17.1	15.7	12.9	11.2	12.4
Percentage Asian (%)	5.5	6.2	8.6	6.8	6.0	6.4	1.8	1.7
Percentage Children (Age 0 through 19) (%)	25.4	2.5	25.6	2.5	25.0	2.8	25.6	2.0

[46] Mean January precipitation values reflect inch totals from January 2017 and may seem intuitively higher than expected for the Pacific Census region. A further review revealed exceptionally higher values for California CoCs, which are further explained by this article from the National Oceanic and Atmospheric Administration: https://www.climate.gov/news-features/event-tracker/soaking-rains-and-massive-snows-pile-california-january-2017 (Di Liberto, 2017).

Variables in Demographic Domain	All CoCs		Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Percentage Adult (Age 20 through 64) (%)	59.4	2.5	61.2	2.2	59.0	2.5	57.7	1.1
Percentage Senior (Age 65 and Older) (%)	15.2	3.2	13.1	1.7	16.0	4.1	16.7	2.1
Percentage Female (%)	50.8	0.8	51.0	0.9	51.0	0.7	50.3	0.7
Net-Migration Rate (%)	0.4	0.8	0.3	0.7	0.5	0.9	0.3	0.6
Change in Net-Migration Rate [a]	0.0	0.6	-0.2	0.5	0.1	0.6	0.2	0.6
Percentage of One-Person Households (%)	27.4	3.9	28.7	4.3	26.4	4.4	26.8	2.2
Percentage of Under 18 Population in Single-Parent Households (%)	26.0	6.3	28.6	6.8	24.5	6.5	24.6	4.6
Percentage Veteran (25 and Older) (%)	9.0	2.9	7.5	3.3	9.0	2.8	10.7	1.2
Percentage with Bachelor's Degree or Higher (%)	31.5	9.6	35.8	9.0	34.8	9.7	23.8	3.9
Percentage with Some College (%)	30.6	4.6	28.7	4.7	30.3	4.7	32.8	3.3
Percentage with High School Diploma (%)	26.2	6.1	22.3	4.3	25.0	5.4	31.7	4.0
Percentage with Less than High School (%)	11.7	4.5	13.3	4.7	9.9	4.0	11.7	3.9
Healthcare Costs ($1,000s)	10.4	1.5	11.1	1.8	10.5	1.3	9.5	0.8
Mental Health Providers as Share of Population (%)	0.1	0.2	0.0	0.0	0.1	0.1	0.3	0.2
Alcohol Mortality (Per 100,000)	2.9	1.3	3.1	1.4	2.6	1.0	2.9	1.4
Excessive Drinking Rate (%)	18.6	2.6	19.2	2.5	18.6	2.2	18.0	2.8

[a] Change in Net-Migration Rate represents the difference between 2016 and 2012 values.

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis. For the regression analysis, percentage White is the omitted race/ethnicity category; percentage other (two or more races, Native American, Pacific Islander) is excluded from the analysis; and percentage adult is the omitted age category.

Exhibit 3-7 | Summary Statistics for Continuum of Care-Level Climate Conditions, by Census Division

Variables in Climate Domain	Northeast Region				Midwest Region				South Region						West Region			
	New England		Middle Atlantic		East North Central		West North Central		South Atlantic		East South Central		West South Central		Mountain		Pacific	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Average January Temperature (°F)	30.8	3.7	32.8	3.9	30.1	3.8	25.8	9.2	49.1	11.0	47.9	5.1	48.9	7.2	30.9	10.9	41.8	11.2
Average June, July, and August Temperature (°F)	70.1	2.2	72.4	3.2	73.0	2.5	73.8	4.7	79.3	3.5	79.6	1.9	82.0	1.6	73.2	7.9	70.5	7.5
Total January Precipitation (Inches)	3.7	1.0	3.5	0.7	3.0	0.9	1.3	0.7	3.8	2.2	6.0	2.7	3.7	2.0	2.6	1.6	9.7	6.1
Total Annual Precipitation (Inches)	37.5	2.3	38.2	3.5	37.4	3.5	36.4	5.7	46.2	9.0	47.5	7.1	44.9	17.0	14.9	5.1	35.7	24.1

Notes: These estimates represent the weighted average temperature and precipitation for each CoC for January 2017 and the average summer and annual precipitation from 2016. Estimates represent the population of all 50 states plus the District of Columbia. All U.S. territories are excluded from this analysis. Summer temperature represents the average temperature for June, July, and August.[47] Further information on Census regions can be found at https://www2.census.gov/programs-surveys/sahie/reference-maps/2015/us-regdiv.pdf

[47] These 3 months were selected for average summer temperatures according to sources such as the following: https://www.washingtonpost.com/news/capital-weather-gang/wp/2018/09/06/hot-nights-summer-low-temperatures-were-warmest-on-record-in-lower-48/?utm_term=.e5b411b3b8eb.

Variable Selection

The data assessment outlined in the Data chapter resulted in the identification of more than 60 independent variables across the five domains: housing, economic, safety net, demographic, and climate conditions. Preliminary regression analysis of the relationship between these independent variables and the outcomes of interest—total homeless, sheltered homeless, and unsheltered homeless people—suggested potential overfitting and a large degree of multicollinearity.[48] These factors may make the relationships between these collinear regressors and the dependent variables of interest difficult to interpret. The study team followed a two-step data selection approach to deal with these issues of multicollinearity and model overfit—

1. Qualitative analysis.
2. Backward stepwise selection.

First, the study team used qualitative assessment to identify the initial list of variables to include in the model. This assessment relied on theoretical context from the literature, as well as the examination of correlation among specific pairs of independent variables. Through this process, the study team dropped several potential independent variables that were highly correlated with each other (median home values and median income were correlated with median rent in the community) and other modeling issues into our regression specifications. Variables dropped during the qualitative assessment are further outlined in appendix B.

Following this qualitative assessment, the study team applied a systematic variable selection process using statistical and econometric methodologies to select a set of independent variables that maximizes the explanatory power of the model. We used the *vselect* module in Stata[49] to run a stepwise variable selection process that reduced the set of explanatory variables based on overall model fit, thereby allowing the study team to select those independent variables that maximize the adjusted R-squared (Lindsey, 2014; Lindsey and Sheather, 2010). Variables dropped in this process because they did not add any explanatory power for the outcome of interest. Additional exhibits in appendix D provide regression analysis results for models with the same variables to provide easier comparison across models. The results using the same set of variables show findings like the regression results in this chapter and the next. A detailed description of the stepwise elimination process and the overall results of the variable selection process are presented in appendix E.

Statistical Model and Analysis

Previous studies have typically modeled homelessness as a function of various geographic-level factors, including local housing and economic conditions, safety net program participation, demographic composition, and climate conditions. This framework provided the study team with a useful starting point as we considered potential models and estimation strategies. To examine this relationship and further our understanding of the CoC-level factors that are associated with rates of homelessness, the

[48] Post-estimation analysis involving the assessment of the variance inflation factor of the independent variables suggested a large degree of multicollinearity.

[49] Further information on *vselect* dynamics can be found at https://www.stata-journal.com/sjpdf.html?articlenum=st0213.

study team used ordinary least squares (OLS) to estimate the national-level model presented in equation (1).

The study team modeled rates of homelessness in the following manner:

$$H_i = \alpha + \beta M_i + \gamma E_i + \delta S_i + \theta D_i + \rho W_i + \varepsilon \qquad (1)$$

The dependent variable H is the rate of total, sheltered, or unsheltered homelessness per 10,000 population in CoC i in 2017. The right-hand side of equation (1) consists of five vectors representing each domain: M includes variables in the housing market domain, E includes variables in the economic domain, S includes variables in the safety net domain, D includes variables in the demographic domain, and W includes variables in the climate conditions domain. The variables included in each vector are determined by the variable selection process outlined in the previous section. Coefficient estimates β, γ, δ, θ, and ρ provide insight into the factors associated with rates of homelessness at the CoC level. Regression models include controls for state effects as necessary. Standard errors are clustered at the state level for the OLS regression.

Our overall estimation approach was shaped, in part, by the data availability constraints outlined in the Data chapter. Because some variables, especially the American Community Survey (ACS) 5-year estimates, exhibit little variation from 2012 through 2017, we present cross-sectional estimates of equation (1).[50] Our cross-sectional models allow for the inclusion of the most robust set of independent variables but clearly hamper our ability to exploit variations in rates of homelessness over time. Future studies, particularly those interested in large population areas, could also use the ACS 1-year data instead of the ACS 5-year estimates used in this study. Finally, in addition to estimates of the national-level model, the study team examined the factors that are associated with rates of homelessness among various categories of urbanicity, on the west coast and in tight, high-cost markets with large shares of renters.

[50] With respect to ACS 5-year estimates, it should be noted that during the period between 2011 and 2016, the economy was also recovering from the Great Recession.

NATIONAL MODEL OF HOMELESSNESS

This chapter presents the estimates of our national-level model for the three outcomes of interest: rates of total, sheltered, and unsheltered homelessness per 10,000 population. The dependent variable is the rate of homelessness and the set of independent variables are those that were chosen through the variable selection process described in the "Variable Selection" section of the Empirical Strategy chapter.[51]

Exhibit 4-1 presents the regression estimates of the relationship between Continuum of Care-(CoC) level factors and rates of total, sheltered, and unsheltered homelessness per 10,000 population as estimated by the Point-in-Time (PIT) counts in 2017.[52] These estimates show that many variables across the five domains are significantly associated with rates of homelessness. Across all three specifications, R-squared estimates (0.82 for total homeless, 0.81 for sheltered homeless, and 0.68 for unsheltered homeless people) indicate that the variables in our models account for a high degree of variation in rates of homelessness across CoCs. These estimates do show some differences in the magnitude and significance of estimates across the outcomes of interest.

TOTAL HOMELESSNESS

Estimates in the housing domain indicate that rates of total homelessness may be related to factors that crowd individuals out of the formal housing market. The effects for median rent, the presence of overcrowded housing units, and living in a CoC with high housing density were particularly salient in the national model of total homelessness.[53] While both median rent and the share of overcrowded units are positively associated with rates of total homelessness, housing density is negatively associated with rates of total homelessness. Our estimates indicate that a 10-percent increase in median rent is associated with a 1.92-person increase in the rate of total homelessness per 10,000, and a 1-percentage-point increase in the share of overcrowded housing units is associated with a 5.44-person increase in the rate of total homelessness per 10,000. In addition, CoCs going from a low housing density to high housing density is associated with a 3.37 per 10,000 population reduction in the rate of total homelessness. Given that the mean rate of total homelessness across all communities is around 17 per 10,000 population, these estimates show substantively relevant relationships between total homelessness and median rents, the presence of overcrowded housing units, and housing density.

[51] As mentioned previously, all dependent variables presented in this report reflect the year the PIT count was collected. All independent variables, however, except for January temperature and precipitation, represent the year prior to the PIT data collection. For example, rates of homelessness from the 2017 PIT count data are associated with 2016 dependent variables, including the American Community Survey (ACS) 5-year estimates that correspond to the 2012 through 2016 ACS.

[52] The regression models presented in the National Model of Homelessness chapter and the Subgroup Analysis Chapter are weighted by the population in each CoC. appendix D presents alternative specifications and sensitivity tests that illustrate our estimates are generally robust to weighting and the inclusion of additional independent variables.

[53] As mentioned in the Data chapter, housing density is a dummy variable that is equal to 1 when density is greater than or equal to the 75th percentile (408 units per square mile) value in 2017.

High median rents may prevent low-income or otherwise economically disadvantaged individuals from affording adequate shelter.[54] Similarly, an increased prevalence of overcrowded rental housing units in a community indicates tighter housing markets or lack of availability of affordable rentals, contributing to increased rates of total homelessness. Furthermore, low housing density in a CoC is associated with higher rates of total homelessness. Low housing density could be an indication of low housing availability and vice versa; therefore, areas with low availability may have higher rates of total homelessness. In practice, the picture is more complex. The New York City and San Francisco CoCs have the two highest rates of housing density (11,466 and 8,397 units per square mile, respectively), accompanied by high median rents and rates of overcrowding. They also have some of the highest rates of total homelessness. Of all CoCs, the New York City CoC's rate of total homelessness per 10,000 population is the 3rd highest, the rents are the 32nd highest, and the rate of overcrowding is 4th highest. In the San Francisco CoC, the rate of total homelessness is 6th highest, the median rents are 6th highest, and the rate of overcrowding is 11th highest. These major cities and their high nominal homelessness counts often receive substantially more focus in media and public discussion, but they may be extreme examples when viewing the relationship between density and homelessness, all else being equal. For example, Anchorage CoC has a relatively low housing density (68 units per square mile) with high rates of total homelessness (37.9 per 10,000) and high median rents and thus may be more reflective of the national environment.

New York City CoC
Rate of Total Homelessness: 88.8 per 10,000
Median Rent: $1,220
Share of Overcrowded Units: 9.2 percent

San Francisco CoC
Rate of Total Homelessness: 78.3 per 10,000
Median Rent: $1,573
Share of Overcrowded Units: 6.2 percent

Anchorage CoC
Rate of Total Homelessness: 37.9 per 10,000
Median Rent: $1,146
Share of Overcrowded Units: 4.1 percent

Within the economic domain, the Gini coefficient has a negative relationship with total homelessness rates within that community. We interpret this association as an increase in the dispersion of incomes, which may be associated with lower total homelessness rates, and vice versa. While income is not included in the model, estimates of the relationship between the Gini coefficient and total homelessness may illuminate the association between income and total homelessness. Although this result may seem counterintuitive, variation in the measure of income inequality may suggest that higher incomes among top earners relative to low-income individuals are associated with lower rates of overall homelessness. Income inequality rises when the incomes of top earners are higher relative to the rest of the population, thereby increasing overall incomes (or median incomes). Areas with high inequality and many high-income earners may also use their tax systems to fund various policies that reduce homelessness, or these areas could have such high housing costs that lower-income households at higher risk of falling into homelessness may move to other communities. The summary statistics in exhibit 3-3 suggest that the variability and influence of suburban CoCs may possibly be driving these

[54] High home values make homeownership unaffordable. This barrier may increase the demand for rental housing even for some high-income individuals who may prefer to own a home and may lead to crowding many low-income individuals out of the housing market altogether. While measures of housing costs (such as home values) may be theoretically important in models of homelessness, rents reflect the costs of temporary rather than permanent housing solutions that are likely to matter in determining homelessness at the community level. Median home value and median income are excluded from all regressions due to high correlation with median rent and to enable easier interpretation of regression estimates, as stated in the Empirical Strategy chapter.

results. For example, the Everett/Snohomish County CoC is a suburban CoC in Washington that serves as an example of this negative relationship between the Gini coefficient and total homelessness. The Everett/Snohomish County CoC has a relatively high rate of total homelessness (above the median value for all CoCs) and a low Gini coefficient of income inequality.

*In 2017, the **Everett/Snohomish County CoC** in Washington had a total homelessness rate higher than the national median (13.5 per 10,000) with the 22nd lowest Gini coefficient (41), with median rent and a share of overcrowded households near the top 25 percent of all CoCs.*

In the safety net domain, the share of HUD-assisted units in a CoC is positively associated with rates of total homelessness. A high share of HUD-assisted units may indicate high need among hard-to-house or otherwise economically disadvantaged individuals. These estimates for safety net variables should not be interpreted as causal, and this relationship is likely a reflection of the housing options and needs of the low-income population in a given CoC. [55]

Estimates for the demographic domain illustrate a few significant relationships between these factors and rates of total homelessness. The share of a CoC's population who are Hispanic and the share who are children are both negatively associated with rates of total homelessness. Khadduri et al. (2018) emphasized that Hispanic populations have lower measures of housing instability compared with African-American populations. In addition, families with children may receive other forms of assistance that prevent them from becoming homeless. These estimates also suggest that CoCs with high net-migration rates have higher rates of total homelessness. This result may indicate that an increase in population during this timeframe and an increase in housing demand from new migrants can crowd others out of the housing market. Finally, there are no significant relationships between climate variables and rates of total homelessness.

SHELTERED HOMELESSNESS

As with total homelessness, estimates in the housing domain indicate that rates of sheltered homelessness are associated with factors that crowd individuals out of the formal homeownership and rental markets. As with total homelessness, these results indicate that high median rents, a large share of overcrowded units, and low housing density are associated with increased rates of sheltered homelessness. Each of these estimates indicates that the lack of available, affordable housing plays an important role in sheltered homelessness.

Within the economic domain, our estimates suggest that inequality is associated with lower levels of sheltered homelessness. Increased income inequality, as measured by the Gini coefficient, is also associated with lower rates of sheltered homelessness. As outlined in the total homelessness section, high inequality may indicate a large high-income population that is less likely to experience homelessness. In line with these results, our estimates also suggest that poverty rates are positively associated with

*In 2017, the **Overland Park/Shawnee/Johnson County CoC** in Kansas had the fifth lowest rate of sheltered homelessness (1.9 per 10,000), with a poverty rate around 5.5 percent (seventh lowest), inequality around the median for all CoCs, and a share of HUD-assisted units around 1.5 percent (bottom 10 percent).*

[55] HUD's Worst Case Housing Needs (WCN) report (Watson et al., 2017) uses an alternate measure of HUD assistance: the income-eligible population that receives housing assistance. The WCN report can be accessed from https://www.huduser.gov/portal/sites/default/files/pdf/Worst-Case-Housing-Needs.pdf.

rates of sheltered homelessness. Areas with high poverty rates may also have lower income and employment, meaning that a large share of the population is unable to afford suitable housing. Within the safety net domain, our estimates indicate that the share of HUD-assisted units in an area is positively associated with rates of sheltered homelessness. The relationship between sheltered homelessness and HUD-assisted units should not be interpreted as causal.

Race is significantly associated with rates of sheltered homelessness. These estimates indicate that areas with a larger share of Hispanic or Asian residents compared with the share of White residents in the community have lower rates of sheltered homelessness. In addition, high net-migration rates are associated with increased rates of sheltered homelessness. As outlined previously, net-migration rates may be associated with other local factors that increase the demand for housing and crowd vulnerable populations out of the housing market, leading to higher rates of sheltered homelessness. Furthermore, two health-related variables, alcohol mortality rate and excessive drinking rate, are positively associated with rates of sheltered homelessness. These variables serve as proxies for other health and addiction conditions that may be related to sheltered homelessness. Individuals suffering from addiction or other health issues may be unable to participate in the labor market and find affordable housing. Finally, precipitation (January and annual) are both associated with sheltered homelessness. While the relationship between January precipitation and sheltered homelessness is negative, the coefficient on annual precipitation is positive. Estimates in the climate domain may be driven by regional trends in weather, as illustrated in exhibit 3-7.

UNSHELTERED HOMELESSNESS

For rates of unsheltered homelessness, the estimates from our national model indicate few significant factors. The estimates suggest that the prevalence of overcrowded rental units is associated with higher rates of unsheltered homelessness. Overcrowded rental housing units in a community may indicate tighter housing markets or unavailability of affordable rents, contributing to increased rates of unsheltered homelessness. No variables in the economic and safety net domains are associated with unsheltered homelessness.

Within the demographic domain, our estimates suggest that unsheltered homelessness is associated with age, net migration, household status, and veteran status in a CoC. Estimates indicate that the share of seniors is negatively associated with rates of unsheltered homelessness. Like children, seniors represent a vulnerable population who may receive other forms of assistance, such as pensions or social security, that prevent unsheltered homelessness. In addition, these estimates suggest that CoCs with large increases in the net-migration rates between 2012 and 2016 have higher rates of unsheltered homelessness. The share of one-person households is positively associated with rates of unsheltered homelessness. One-person households may be at increased risk for homelessness, especially in the case of unforeseeable events, particularly within regions that lack affordable housing. At the community level, the prevalence of one-person households may also represent a lower incidence of shared housing arrangements, such as having a roommate, that

Honolulu CoC
Rate of Unsheltered Homelessness: 23.4 per 10,000
Share of Overcrowded Units: 9.2 percent
Share of Veterans: 11.7 percent

San Antonio/Bexar County CoC
Rate of Unsheltered Homelessness: 5.7 per 10,000
Share of Overcrowded Units: 4.5 percent
Share of Veterans: 12.9 percent

provide affordable rental options in otherwise expensive markets. Furthermore, the share of veterans is positively associated with rates of unsheltered homelessness. This finding aligns with findings in Fargo et al. (2012) that veterans are more likely to be homeless than people in the overall population. The Honolulu CoC in Hawaii and the San Antonio/Bexar County CoC in Texas have relatively high rates of unsheltered homelessness, high shares of overcrowded housing units, and high shares of veterans. For the Honolulu CoC, the share of unsheltered homelessness is near the highest 5 percent, the share of overcrowded units near the highest 1 percent, and the share of veterans in the population is in the highest 25 percent. Similarly, in the San Antonio/Bexar County CoC, the rate of unsheltered homelessness is in the highest 25 percent, the share of overcrowded units is near the highest 10 percent, and the share of veterans in the population is near the highest 10 percent.

Finally, CoCs with high average January precipitation have higher rates of unsheltered homelessness. As with sheltered homelessness, these estimates may be driven by the regional weather patterns illustrated in exhibit 3-7. The Census's Pacific division, which includes Alaska, California, Hawaii, Oregon, and Washington, had the highest January precipitation and some of the highest rates of unsheltered homelessness. The Subgroup Analysis chapter presents additional insights into unsheltered homelessness in the west.

Exhibit 4-1 | Regression Estimates of National-Level Model

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index					0.042	(0.034)
Percentage of Homeowners with Cost Burden	-0.14	(0.25)	-0.38*	(0.20)	0.30*	(0.16)
Natural Logarithm of Median Rent ($100s)	19.2**	(8.14)	28.8***	(8.44)	-14.3	(9.90)
Median Rental Utility Cost ($10s)			0.40	(0.30)	-0.31	(0.29)
Percentage of Renters with Cost Burden	0.039	(0.22)	-0.28	(0.19)	0.29*	(0.15)
Percentage of Renter-Occupied Units	0.15	(0.24)	0.39	(0.23)	-0.18	(0.13)
Rental Vacancy Rate	-0.011	(0.29)	0.066	(0.23)	0.035	(0.24)
High Housing Density CoC	-3.37**	(1.49)	-2.84**	(1.34)	-1.55	(0.94)
Eviction Rate	0.47	(0.31)	0.72*	(0.37)		
Change in Eviction Rate					-0.33	(0.26)
Percentage of Overcrowded Housing Units	5.44***	(0.82)	2.43***	(0.82)	3.12***	(0.90)
Urban CoC	1.80	(2.37)	0.59	(2.08)	1.10	(1.01)
Suburban CoC	-2.60	(1.93)	-1.70	(1.38)	-0.90	(1.02)
Economic Domain						
Unemployment Rate	0.12	(0.91)	-0.34	(0.46)	0.44	(0.67)
Gini Coefficient of Income Inequality	-0.70**	(0.30)	-0.89**	(0.42)		
Poverty Rate	0.047	(0.71)	1.07***	(0.39)	-0.84	(0.56)
Safety Net Domain						
Share of HUD-Assisted Units	2.99***	(0.70)	3.90***	(0.70)	-0.70*	(0.37)
Occupancy Rate of HUD-Assisted Units	-0.11	(0.18)	0.056	(0.090)	-0.18	(0.16)
Percentage of Houses Built Before 1940	0.15	(0.11)	0.11	(0.11)		
Demographic Domain						
Percentage African-American	-0.12	(0.13)	-0.031	(0.11)	-0.023	(0.040)
Percentage Hispanic	-0.30***	(0.10)	-0.25***	(0.080)	-0.020	(0.059)
Percentage Asian	-0.24	(0.26)	-0.45**	(0.20)	0.20	(0.17)
Percentage Children (Age 0 through 19)	-0.91**	(0.43)	-0.29	(0.54)	-0.65*	(0.34)
Percentage Senior (Age 65 and Older)	-0.049	(0.39)	0.72	(0.51)	-0.60**	(0.28)
Percentage Female			1.82*	(1.01)	-1.14	(0.99)
Net-Migration Rate	3.20**	(1.26)	2.24**	(0.97)		

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Change in Net-Migration Rate	2.36*	(1.33)			2.78**	(1.11)
Percentage of One-Person Households	1.24*	(0.63)			1.18***	(0.39)
Percent of Under 18 Population in Single-Parent Households	-0.22	(0.36)	-0.51	(0.31)		
Percentage Veteran (Age 25 and Older)			-0.50	(0.35)	0.66**	(0.28)
Percentage without a Bachelor's Degree					-0.17	(0.16)
Healthcare Costs ($1,000s)					0.54	(0.66)
Alcohol Mortality (Per 100,000)	0.89	(0.68)	1.31**	(0.52)		
Excessive Drinking Rate			0.48**	(0.22)	-0.47*	(0.26)
Climate Domain						
Average January Temperature (°F)	-0.071	(0.15)	-0.16	(0.12)	0.095	(0.058)
Average June, July, and August Temperature (°F)	0.19	(0.29)	0.32	(0.20)	-0.19	(0.13)
Total January Precipitation (Inches)	0.49	(0.32)	-0.39**	(0.19)	0.81***	(0.17)
Total Annual Precipitation (Inches)	0.088	(0.067)	0.12**	(0.049)		
Intercept	-33.3	(31.8)	-151.6***	(49.6)	107.5	(74.8)
Observations	**374**		**374**		**374**	
R-Squared	**0.82**		**0.81**		**0.68**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the variables selected for the subgroup and outcome of interest using the procedures outlined in the Empirical Strategy chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables and ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the reference urbanicity category; percentage White is the reference race/ethnicity category; and percentage adult is the reference age category.

SUBGROUP ANALYSIS

Past research has highlighted the considerable differences between homelessness within rural and urban communities (Fitchen, 1992; Lawrence, 1995). As our literature review shows, innate theoretical differences exist in the causes of homelessness in rural and urban communities. In the first subsection, we first examine the different factors that affect homelessness in urban, suburban, and rural communities. Numerous studies place the primary cause of homelessness on the lack of available affordable housing, which is common in tight, high-cost rental markets. These markets are characterized by high housing/rental cost burden and low rental vacancy rates in a high relative share of rental units. In the second subsection, we explore the role of community-level factors in these tight, high-cost markets with large shares of renters. Finally, nearly one-third of homeless people in the United States live in California, Oregon, and Washington state, despite the west coast comprising only 16 percent of the population. Not only is homelessness more common on the west coast, but it is also more visible because a larger proportion of homeless people are unsheltered. Nationwide, 35 percent of homeless people sleep outside, in vehicles, or other locations not intended for human habitation. In California, however, 68 percent of homeless people are unsheltered, and 57 percent are unsheltered in Oregon. In the final section of this chapter, we examine the factors that are related to unsheltered homelessness on the west coast.

The "descriptive analysis" section in the Empirical Strategy chapter displayed descriptive statistics for the urbanicity categories. In Appendices F and G, we provide descriptive statistics for the other two subgroup analyses. Below we list the number of Continuums of Care (CoCs) in each subgroup that we examine—

1. Urbanicity: urban CoCs (*N* = 104), suburban CoCs (*N* = 160), and rural CoCs (*N* = 110).[56]
2. CoCs in tight, high-cost markets with large shares of renters (*N* = 59).
3. West coast CoCs in California, Oregon, and Washington state (*N* = 51).[57]

The estimates do show some differences in the magnitude and significance of estimates across the outcomes of interest and for each subgroup. These models, however, are exploratory in nature, designed to provide insight into the interactions between various subgroups and into factors associated with homelessness, and the estimates should not be interpreted as identifying causal relationships. As a result, the study team only emphasizes associations with factors for which the coefficients are significant, at least at a 5-percent level.

Urbanicity

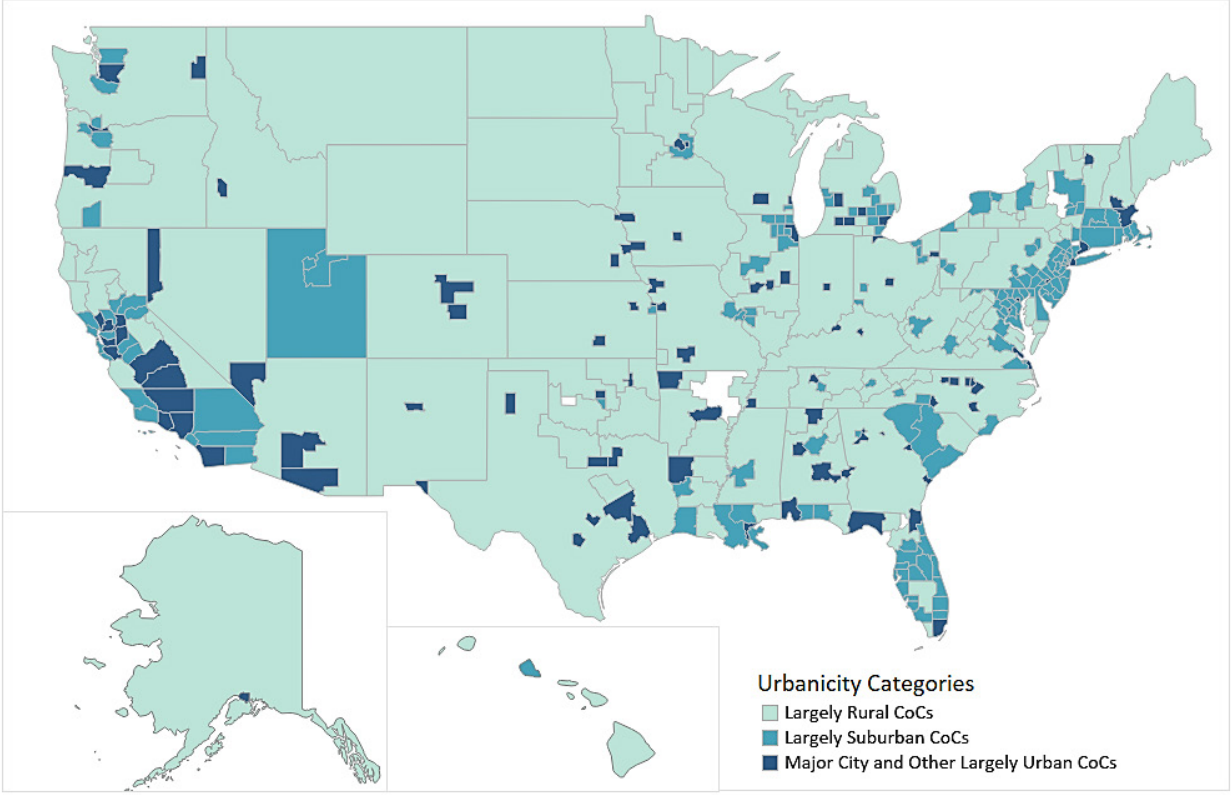
This section presents the estimates of our model stratified by CoC urbanicity categories: urban CoCs, suburban CoCs, and rural CoCs (mapped in exhibit 5-1). Exhibits 5-2, 5-3, and 5-4 present regression

[56] As discussed in the Empirical Strategy chapter, urbanicity is determined by the type of area (urban, suburban, and rural) in which most of the population in a CoC resides.

[57] Several CoCs in California were combined to reflect mergers and county geographies. See appendix C for details on the construction of the dataset. appendix D also presents regression analysis of the entire west Census region subgroup (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming [*N* = 73]).

estimates by urbanicity for rates of total, sheltered, and unsheltered homelessness per 10,000 population, respectively. These subgroup estimates illustrate a high degree of variation in magnitude and statistical significance across urbanicity categories. A major caveat of these models, however, is that they have slightly more than 100 CoC observations each; their results should be considered exploratory and interpreted with some caution.

Exhibit 5-1 | Map of Continuums of Care by Urbanicity Category



Source: HUD urbanicity data

LARGELY URBAN COCS

Exhibit 5-2 presents the regression estimates, for urban CoCs, of the relationship between CoC-level factors and total homeless people per 10,000 population. Across all three specifications, R-squared estimates (0.87 for total homeless people; 0.90 for sheltered homeless people; 0.88 for unsheltered homeless people) indicate that the variables in our models account for a high degree of variation in rates of homelessness across CoCs.

Total Homelessness

For the housing domain, these estimates indicate that the availability of affordable housing may be a significant factor associated with rates of total homelessness in urban CoCs. High median rents and a high share of renter-occupied units are both associated with increased rates of total homelessness in urban CoCs. These estimates align with those from the national model. High median rents may price many people out of the rental market; similarly, a high share of renters can indicate high costs of home ownership, with economically disadvantaged individuals crowded out of the rental market and more likely to face homelessness. In the economic domain, our estimates suggest that high rates of unemployment are associated with lower rates of total homelessness. Low unemployment rates may

indicate a high-income area with high median rents, where individuals are more likely to be homeless due to a lack of affordable housing despite attachment to the labor market. The share of households receiving cash assistance is positively associated with rates of total homelessness, suggesting that poorer urban areas have higher rates of total homelessness, perhaps due to inability to afford suitable housing. Estimates in the demographic and climate domains suggest that these characteristics are not significant factors associated with rates of total homelessness.

Nashville/Davidson County CoC
Rate of Total Homelessness: 33.9 per 10,000
Median Rent: $756
Share of Rental Units: 46 percent
Unemployment Rate: 3.6 Percent
Share of Households Receiving Cash Assistance: 4.6 percent

Oakland/Alameda County CoC
Rate of Total Homelessness: 34.1 per 10,000
Median Rent: $1,344
Share of Rental Units: 47.4 percent
Unemployment Rate: 4.3 Percent
Share of Households Receiving Cash Assistance: 3.6 percent

The Nashville/Davidson County CoC in Tennessee and the Oakland/Alameda County CoC in California represent urban CoCs with high rates of total homelessness, median rents, shares of rental units, and rates of cash assistance, as well as low unemployment rates. These areas have booming regional economies (as represented by low unemployment rates) and high poverty rates (as represented by the share of people receiving cash assistance), and these dynamics contribute to local housing affordability crises. For the Nashville/Davidson County CoC, the rate of total homelessness is in the highest 25 percent, median rent is in the highest 50 percent, the share of rental units is near the highest 25 percent, unemployment is in the lowest 10 percent, and the share receiving cash assistance is in the highest 25 percent, compared with all other urban CoCs. Similarly, for the Oakland/Alameda County CoC, the rate of total homelessness is in the highest 25 percent, median rent is in the highest 10 percent, the share of rental units is in the highest 25 percent, unemployment is in the lowest 50 percent, and the share of households receiving cash assistance is in the highest 25 percent for all urban CoCs.

Sheltered Homelessness

For urban CoCs, many variables in the housing domain demonstrate significant relationships with rates of sheltered homelessness and align with total homelessness in the urban CoCs. High housing costs are associated with increased rates of sheltered homelessness. Growth in home prices since 2009, as measured by the house price index, is positively associated with rates of sheltered homelessness in urban CoCs.[58] While the coefficient on median rent is positive, it is only marginally significant for sheltered homelessness in urban CoCs. The association between the share of cost-burdened renters and the rate of sheltered homelessness in urban CoCs is negative; therefore, areas with a low share of renters with a cost burden greater than 30 percent of their income have high rates of sheltered homelessness. Such estimates could be the result of local economic dynamics, especially if the low burden is driven by high-income renters (spending a relatively low share of income on rent) who crowd out lower-income renters from the market, leading to higher rates of sheltered homelessness. In this specification for sheltered homelessness in urban CoCs, median rent is marginally significant, as so many

[58] The house price index has a base year of 2009. We calculate the percentage growth in home prices since 2009 using this index.

variables explain variation in sheltered homelessness, and many significant factors associated with housing costs may be picked up by the house price index, rather than median rents.[59] High shares of renter-occupied units and being in a low-density urban area with high eviction rates and overcrowded units are both associated with increased rates of sheltered homelessness. These findings reinforce the narrative that lower-income individuals may be crowded out of the market due to the lack of available and affordable housing options. Within this general framework, urban localities exhibit variation. For example, the Baltimore City CoC in Maryland is an example of a high housing density CoC with a rate of sheltered homelessness in the highest 5 percent, a share of cost-burdened renters in the highest 25 percent, and a share of HUD-assisted units in the highest of all urban CoCs.

Baltimore City CoC
Rate of Sheltered Homelessness: 34.4 per 10,000
Share of Renters with Cost Burden: 53.7 percent
Share of HUD-Assisted Units: 11.9 percent

We find no significant association between economic factors and sheltered homelessness in urban areas. For urban CoCs, estimates in the safety net domain indicate that areas with low-income populations that need housing assistance (as indicated by higher shares of HUD-assisted units) are associated with higher rates of sheltered homelessness. In the demographic domain, we find a negative relationship between the share of Asians in a community and the rate of sheltered homelessness in urban areas. In addition, estimates indicate that the share of women in the community is positively associated with rates of sheltered homelessness. This result may reflect that sheltering programs may be more likely to serve women or homeless families, especially single mothers with children. Finally, in the climate domain, the average January temperature is negatively associated with rates of sheltered homelessness, while total annual precipitation is positively associated with rates of sheltered homelessness. Higher January temperatures may be associated with lower rates of sheltered homelessness due to regional weather patterns and policies regarding homelessness such as "Right to Shelter" Laws. For example, warm weather areas on the west coast tend to have relatively high rates of unsheltered homelessness, while colder weather areas like New York City and Boston have relatively high rates of sheltered homelessness. As mentioned previously, regional climate patterns illustrated in exhibit 3-7 shed more light on these relationships.

Unsheltered Homelessness

For urban CoCs, several variables in the housing domain are significantly associated with rates of unsheltered homelessness. Higher shares of overcrowded housing units are associated with higher rates of unsheltered homelessness in urban CoCs. Similarly, a large share of homeowners who have a cost burden greater than 30 percent of their income and high rental vacancy rates are associated with increased rates of unsheltered homelessness in urban CoCs. In the economic domain, estimates indicate that a low

San Jose/Santa Clara City & County CoC
Rate of Unsheltered Homelessness: 28.2 per 10,000
Share of Homeowners with Cost Burden: 30.6 percent
Share of Renters with Cost Burden: 48 percent
Share of Overcrowded Housing Units: 7.8 percent
Unemployment Rate: 3.8 percent

[59] In an alternate specification not included in this report, we exclude the house price index from the urban CoC regression of sheltered homelessness and find that the coefficient on median rent is positive and statistically significant, while the share of renters with cost burden is no longer significant. These results illustrate the importance of housing cost variables as factors associated with rates of sheltered homelessness, especially in urban CoCs.

unemployment rate is associated with high rates of unsheltered homelessness in urban CoCs. As mentioned previously, low unemployment may signal a strong market in which economically disadvantaged individuals are more likely to be homeless due to the lack of affordable housing. Estimates in the safety net domain indicate that high shares of HUD-assisted units are associated with lower rates of unsheltered homelessness. These estimates could indicate that the prevalence and use of HUD programs may curb rates of unsheltered homelessness in urban CoCs. Among urban CoCs, the San Jose/Santa Clara City and County CoC in California has the third highest rate of unsheltered homelessness, a share of homeowners with cost burden in the highest 25 percent, a share of renters with cost burden in the lowest 25 percent, a share of overcrowded housing units in the highest 5 percent, and an unemployment rate in the lowest 25 percent.

Exhibit 5-2 | Regression Estimates of Model for Largely Urban Continuums of Care

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index			0.22**	(0.10)		
Percentage of Homeowners with Cost Burden			-0.76	(0.72)	1.10**	(0.41)
Natural Logarithm of Median Rent ($100s)	23.83**	(11.13)	29.62*	(14.72)	-13.63	(10.24)
Percentage of Renters with Cost Burden	-0.77*	(0.42)	-0.85***	(0.29)	-0.39	(0.28)
Percentage of Renter-Occupied Units	1.71***	(0.36)	1.25***	(0.39)	-0.78***	(0.23)
Rental Vacancy Rate	0.17	(0.58)	0.01	(0.59)	0.77**	(0.32)
High Housing Density CoC	-8.37*	(4.60)	-10.38***	(3.34)		
Change in Eviction Rate	1.19*	(0.65)	1.39**	(0.56)		
Percentage of Overcrowded Housing Units			1.57**	(0.73)	4.18***	(0.96)
Economic Domain						
Unemployment Rate	-4.56**	(2.13)	0.17	(1.20)	-2.61***	(0.96)
Gini Coefficient of Income Inequality	1.32	(1.06)			-0.62	(0.41)
Poverty Rate	0.07	(0.83)	0.51	(0.56)	0.44	(0.44)
Safety Net Domain						
Percentage of Households Receiving Cash Assistance	3.53**	(1.56)			0.79	(0.61)
Share of HUD-Assisted Units	0.58	(1.15)	2.84***	(0.93)	-1.32**	(0.50)
Occupancy Rate of HUD-Assisted Units	0.22	(0.31)	0.33	(0.27)	0.40*	(0.20)
Demographic Domain						
Percentage African-American			-0.07	(0.16)	0.07	(0.11)
Percentage Hispanic			-0.05	(0.09)	-0.12	(0.10)
Percentage Asian			-0.75**	(0.28)	0.25	(0.21)
Percentage Children (Age 0 through 19)	-1.60	(1.11)	0.26	(1.02)	-1.64*	(0.88)
Percentage Senior (Age 65 and Older)	-0.10	(1.35)	1.21	(1.13)	-1.18	(0.84)
Percentage Female			5.05***	(1.49)	-1.99*	(1.04)
Net-Migration Rate					1.42	(1.22)
Percentage of One-Person Households					1.53***	(0.37)
Percentage Veteran (25 and Older)	0.59	(0.41)				

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Percentage without a Bachelor's Degree			1.06	(0.81)	-0.56	(0.58)
Alcohol Mortality (Per 100,000)					-0.64*	(0.33)
Excessive Drinking Rate			-0.07	(0.16)	0.07	(0.11)
Climate Domain						
Average January Temperature (°F)	-0.27	(0.24)	-0.37**	(0.16)	0.29	(0.20)
Average June, July, and August Temperature (°F)					-0.79**	(0.33)
Average January Precipitation (Inches)	0.81	(0.51)			0.59*	(0.31)
Total Annual Precipitation (Inches)	0.09	(0.15)	0.27***	(0.07)	-0.15**	(0.06)
Intercept	-122.94*	(66.02)	-362.57***	(85.88)	221.62***	(66.84)
Observations	**104**		**104**		**104**	
R-Squared	**0.87**		**0.90**		**0.88**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the variables selected for the subgroup and outcome of interest using the procedures outlined in the Empirical Strategy chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. American Community Survey (ACS) variables and ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Percentage White is the omitted race/ethnicity category, and percentage adult is the omitted age category. A list of CoCs by urbanicity is listed in appendix D.

In the demographic domain, only the share of one-person households is associated with rates of unsheltered homelessness in urban CoCs. Areas with a higher share of one-person households have higher rates of unsheltered homelessness. This result could indicate that single-income households struggle to afford suitable housing accommodations. In addition, as mentioned previously, because housing assistance is often targeted at more vulnerable populations, one-person households may not be a high priority for shelters, leading to higher rates of unsheltered homelessness. In the climate domain, estimates indicate that average summer temperature and total annual precipitation are both negatively associated with rates of unsheltered homelessness.

LARGELY SUBURBAN CONTINUUMS OF CARE

Exhibit 5-3 presents the regression estimates, for suburban CoCs, of the relationship between CoC-level factors and total homeless people per 10,000 population. Across all three specifications, R-squared estimates (0.61 for total homeless people, 0.50 for sheltered homeless people, and 0.59 for unsheltered homeless people) indicate that the variables in our models account for a relatively high degree of variation in rates of homelessness.

Total Homelessness

For the housing domain, these estimates indicate that housing costs are significant factors associated with rates of total homelessness in suburban CoCs. High median rents are associated with increased rates of total homelessness, suggesting that rental housing affordability (or lack of affordability) may contribute to rates of total homelessness in suburban CoCs. We find that areas with a low share of

Naples/Collier County CoC
Rate of Total Homelessness: 17 per 10,000
Median Rent: $975
Change in the Net Migration Rate: +1 percent

homeowners who have a cost burden greater than 30 percent of their income have high rates of total homelessness. Such estimates could be the result of local economic dynamics, especially if the low burden is driven by high-income homeowners (spending a relatively low share of income on housing) who crowd out lower-income individuals from the market, leading to higher rates of total homelessness. While there are no significant factors in the economic domain, for the safety net domain, the existence of a high share of HUD-assisted units is associated with higher rates of total homelessness in suburban CoCs. The share of HUD-assisted units in an area may reflect overall economic conditions and a low-income population that may be more vulnerable to homelessness. In the demographic domain, the change in the net migration rate is positively associated with rates of total homelessness, and high alcohol mortality rates are also related to increased rates of total homelessness. In addition, a high share of the population under age 18 living in single-parent households is associated with lower rates of total homelessness in suburban CoCs. Previous discussions indicate that families with children are targets of other social and housing assistance that may prevent homelessness. Finally, estimates in the climate domain indicate that higher average January temperatures are associated with higher rates of total homelessness in suburban CoCs. The Naples/Collier County CoC in Florida has rates of total homelessness in the highest 25 percent, with median rents near the highest 25 percent and a change in the net migration rate in the highest 10 percent among all suburban CoCs.

Sheltered Homelessness

For suburban CoCs, few variables across all domains are significantly related to rates of sheltered homelessness. In the housing domain, estimates indicate that a high share of cost-burdened renters is associated with higher rates of sheltered homelessness in suburban CoCs. A higher share of renters with a cost burden greater than 30 percent of their income may signal a tight, high-cost rental market in which economically disadvantaged individuals may be crowded out of affordable rental housing in suburban areas. Certain individuals may be priced out of the market and are not finding other long-term subsidized housing, contributing to rates of sheltered homelessness. Estimates in the safety net domain suggest that lack of availability of affordable housing contribute to increased rates of sheltered homelessness. We find that a high share of HUD-assisted units is positively associated with rates of sheltered homelessness. In the demographic domain, alcohol mortality rates are positively associated with higher rates of sheltered homelessness. Finally, in the climate domain, high average January temperatures are associated with higher rates of sheltered homelessness in suburban CoCs, while higher average summer temperatures are associated with lower rates of sheltered homelessness in suburban CoCs.

The Atlantic City and County CoC in New Jersey and the Springfield CoC in Massachusetts are suburban CoCs with high rates of sheltered homelessness with high shares of cost-burdened renters and high shares of HUD-assisted units. For the Atlantic City CoC, the rate of sheltered homelessness is in the highest 25 percent, the share of renters with high-cost burden is near the highest 1 percent, and the share of HUD-assisted units is in the highest 10 percent of all suburban CoCs. The Springfield CoC has the highest rate of sheltered homelessness among all CoCs, the share of renters with

Atlantic City & County CoC
Rate of Sheltered Homelessness: 11.6 per 10,000
Share of Renters with Cost Burden: 61.6 percent
Share of HUD-Assisted Units: 5.7 percent

Springfield CoC (Massachusetts)
Rate of Sheltered Homelessness: 48.1 per 10,000
Share of Renters with Cost Burden: 55.9 percent
Share of HUD-Assisted Units: 10.5 percent

high-cost burden is in the highest 25 percent, and the share of HUD-assisted units is in the highest 1 percent of all suburban CoCs. The high rate of sheltered homelessness in the Springfield CoC could be related to the fact that Massachusetts is a right-to-shelter state for families.

Exhibit 5-3 | Regression Estimates of Model for Largely Suburban CoCs

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
Percentage of Homeowners with Cost Burden	-0.45**	(0.17)	-0.21	(0.15)	-0.21**	(0.10)
Natural Logarithm of Median Rent ($100s)	10.82**	(4.39)	0.62	(2.97)	7.46**	(3.17)
Percentage of Renters with Cost Burden	0.65*	(0.33)	0.40**	(0.17)	0.21	(0.18)
Percentage of Renter-Occupied Units	0.19	(0.17)	0.02	(0.19)	0.15	(0.09)
Rental Vacancy Rate	0.11	(0.33)	0.41*	(0.21)	-0.22	(0.16)
High Housing Density CoC	-2.69	(2.08)			-1.63	(1.36)
Economic Domain						
Unemployment Rate	2.00*	(1.13)	-0.60	(0.80)	2.09***	(0.64)
Gini Coefficient of Income Inequality			-0.19	(0.17)		
Poverty Rate	-1.23*	(0.62)	-0.50	(0.34)	-0.67**	(0.25)
Safety Net Domain						
Percentage of Households Receiving Cash Assistance					0.73	(0.77)
Share of HUD-Assisted Units	2.54**	(1.00)	2.12**	(0.94)	1.17**	(0.51)
Occupancy Rate of HUD-Assisted Units	-0.07	(0.16)	-0.02	(0.11)	-0.01	(0.10)
Percentage of Houses Built Before 1940					-0.15**	(0.06)
Demographic Domain						
Percentage African-American			-0.09*	(0.05)		
Percentage Hispanic			0.02	(0.11)		
Percentage Asian			-0.10	(0.12)		
Net-Migration Rate	-3.05*	(1.77)	-1.04	(0.62)		
Change in Net-Migration Rate	4.00***	(1.21)			2.46***	(0.70)
Percentage of One-Person Households	0.64**	(0.29)			0.69***	(0.23)
Percentage of Under-18 Population in Single-Parent Households	-0.58**	(0.28)			-0.54**	(0.20)
Percentage without a Bachelor's Degree	0.16*	(0.09)			0.15**	(0.05)
Healthcare Costs ($1,000s)	-1.34	(0.98)			-0.70	(0.49)
Alcohol Mortality (per 100,000)	2.72***	(0.87)	1.06**	(0.40)		
Climate Domain						
Average January Temperature (°F)	0.54***	(0.11)	0.22***	(0.06)	0.26***	(0.06)
Average June, July, and August Temperature (°F)	-0.36	(0.27)	-0.31**	(0.13)		
Total January Precipitation (Inches)	0.50	(0.32)			0.57***	(0.11)
Total Annual Precipitation (Inches)	-0.09	(0.09)	-0.03	(0.04)	-0.05	(0.03)
Intercept	-35.43	(38.33)	15.98	(18.52)	-45.04**	(21.24)
Observations	**160**		**160**		**160**	
R-Squared	**0.61**		**0.50**		**0.59**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the variables selected for the subgroup and outcome of interest using the procedures outlined in the Empirical Strategy chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables and ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Percentage White is the omitted race/ethnicity category, and percentage adult is the omitted age category. A list of CoCs by urbanicity is listed in appendix D.

Unsheltered Homelessness

Variables across all domains are significantly associated with rates of unsheltered homelessness in suburban CoCs. In the housing domain, high median rents are associated with high rates of unsheltered homelessness in suburban CoCs. The percentage of homeowners with cost burden greater than 30 percent of their income is negatively related to rates of unsheltered homelessness in suburban CoCs. In the economic domain, high unemployment rates are associated with increased rates of unsheltered homelessness, while high poverty rates are associated with lower rates of unsheltered homelessness. High-poverty populations may be eligible for other forms of housing and shelter assistance that can prevent them from becoming part of the unsheltered homeless population. Estimates in the safety net domain indicate that high shares of HUD-assisted units are associated with increased rates of unsheltered homelessness. The share of houses built prior to 1940, which serves as a proxy for CoC funding, is associated with lower rates of unsheltered homelessness. Because CoC funding supports shelters, these estimates suggest that funding may prevent unsheltered homelessness in suburban CoCs.

In the demographic domain, migration, household composition, and education variables are most significant in suburban CoCs. An increase in the net migration rate is associated with higher rates of unsheltered homelessness. As described previously, migration can increase the demand for housing, crowding vulnerable individuals out of the rental market and increasing unsheltered homelessness in suburban CoCs. While a high share of the under-18 population living in single-parent households is associated with lower rates of unsheltered homelessness, a high share of one-person households is associated with increased rates of unsheltered homelessness in suburban CoCs. A high share of the population who lack a college degree is associated with increased rates of unsheltered homelessness. Finally, in the climate domain, high January precipitation and temperatures are associated with higher rates of unsheltered homelessness in suburban CoCs. The Riverside City and County CoC in California is a suburban CoC with a rate of unsheltered homelessness in the highest 25 percent, median rents in the highest 25 percent, unemployment rates in the highest 10 percent, and a share of the population without a college degree near the highest 5 percent of all suburban CoCs.

Riverside City & County CoC
Rate of Unsheltered Homelessness: 6.9 per 10,000
Median Rent: $1,062
Unemployment Rate: 6.1 percent
Share with Less than a Bachelor's Degree: 79.5 percent

LARGELY RURAL CONTINUUMS OF CARE

Exhibit 5-4 presents the regression estimates, for rural CoCs, of the relationship between CoC-level factors and the total number of homeless people per 10,000 population. Across all three specifications, R-squared estimates (0.82 for total homeless people, 0.78 for sheltered homeless people, and 0.72 for unsheltered homeless people) indicate that the variables in our models account for a high degree of variation in rates of homelessness across CoCs.

Total Homelessness

For the housing domain, these estimates indicate that several factors are associated with rates of total homelessness in rural CoCs. High shares of homeowners experiencing cost burden, a high house price index, a high share of renter-occupied units, and a high share of renters with housing costs greater than 30 percent of their income are all associated with higher rates of total homelessness in rural CoCs. The share of renters and share of individuals with a housing cost burden are both positively associated with

increased rates of total homelessness. These findings indicate that the housing market is an important and dominant determinant of rates of total homelessness in rural areas.

Central Oregon CoC
Rate of Total Homelessness: 34.4 per 10,000
Share of Homeowners with Cost Burden: 29.2 percent
Share of Renters with Cost Burden: 52.8 percent
Poverty Rate: 11.6 percent

Estimates in the economic domain indicate that areas with high poverty may have lower rates of total homelessness. As described previously, individuals living in poverty may qualify for housing or social assistance that prevents homelessness. From estimates of unsheltered homelessness in rural areas described later, the coefficient on poverty in the model of total homelessness may be driven by the results for the unsheltered homeless population. The Central Oregon CoC is a rural CoC with rates of total homelessness in the highest 10 percent, the share of homeowners with high cost burden near the highest 10 percent, the share of renters with high cost burden in the highest 25 percent, and a poverty rate in the lowest 10 percent of all rural CoCs. In the safety net domain, the HUD-assisted housing variables are insignificant, possibly because U.S. Department of Agriculture (USDA) rural development subsidized housing may be more prevalent than HUD-subsidized housing in rural areas. The data on USDA housing programs are not included in this study.

For the demographic domain, high shares of Hispanic people and high shares of veterans are associated with reduced rates of total homelessness in rural CoCs. In contrast, high shares of seniors and high shares of the population without a college degree are associated with higher rates of total homelessness. Regarding health, high alcohol mortality rates are associated with higher rates of total homelessness. Finally, higher January temperatures and higher precipitation are both associated with increased rates of total homelessness in rural CoCs.

Sheltered Homelessness

Monroe County CoC
Rate of Sheltered Homelessness: 43.9 per 10,000
Share of Homeowners with Cost Burden: 37.6 percent
Share of Renters with Cost Burden: 61.5 percent
Share of One-Person Households: 32.5 percent

In the housing domain, a high share of homeowners and renters with housing costs greater than 30 percent of their income are both associated with high rates of sheltered homelessness in rural CoCs. There are no significant factors associated with sheltered homelessness in the economic or safety net domains. Estimates in the demographic domain indicate that race, age, and a high share of one-person households are significantly associated with sheltered homelessness. High shares of African-American and Hispanic populations are both associated with lower rates of sheltered homelessness in rural CoCs.[60] In the climate domain, no variables are significantly associated with rates of sheltered homelessness in rural CoCs. Among all rural CoCs, the Monroe County CoC in Florida has the highest rates of sheltered homelessness and homeowners with high-cost burden, the second highest rate of renters with high-cost burden, and a share of one-person households near the highest 5 percent.

[60] Regarding the share of African-American people in a population, these estimates may seem counterintuitive, especially because African-Americans make up a relatively large share of the homeless population (Henry et al., 2017). The independent variable, however, is the share of African-Americans in the overall population, which may not necessarily be related to the share of African-Americans experiencing sheltered homelessness or the overall rate of sheltered homelessness in rural CoCs.

Unsheltered Homelessness

For rural CoCs, several variables in the housing domain are significantly associated with rates of unsheltered homelessness. As with total homelessness above, high shares of homeowners experiencing cost burden, a high house price index, a high share of renter-occupied units, and a high share of renters with housing costs greater than 30 percent of their income are all associated with higher rates of unsheltered homelessness in rural CoCs. In the economic domain, our estimates suggest that rural CoCs with high poverty have lower rates of unsheltered homelessness. For rural CoCs, in the safety net domain, we find no factors significantly associated with rates of unsheltered homelessness. In rural CoCs, higher shares of African-Americans and veterans are associated with lower rates of unsheltered homelessness. In contrast, high shares of the population without a college degree and high alcohol mortality rates are associated with higher rates of unsheltered homelessness in rural CoCs. Finally, in the climate domain, estimates indicate that high January precipitation rates are associated with high rates of unsheltered homelessness. As mentioned previously, these estimates may be driven by regional weather patterns illustrated in exhibit 3-7.

The North Dakota Statewide CoC is a rural CoC with a rate of unsheltered homelessness in the highest 25 percent, the highest growth in home prices, a share of renters in the highest 10 percent, and poverty rates in the lowest 5 percent of rural CoCs. The high growth in home prices, as measured by the house price index, is likely related to the oil boom in North Dakota that increased the demand for housing.

North Dakota Statewide CoC
Rate of Unsheltered Homelessness: 4.4 per 10,000
House Price Index: 40.5 percent
Share of Renters: 36.7 percent
Poverty Rate: 10.2 percent

Exhibit 5-4 | Regression Estimates of Model for Largely Rural Continuums of Care

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index	0.26***	(0.06)			0.22***	(0.06)
Percentage of Homeowners with Cost Burden	0.86***	(0.18)	0.33**	(0.15)	0.37**	(0.16)
Natural Logarithm of Median Rent ($100s)	0.13	(9.55)	5.28	(3.52)	-8.99	(6.14)
Median Rental Utility Cost ($10s)	-0.55	(0.34)	-0.17	(0.15)	-0.44	(0.42)
Percentage of Renters with Cost Burden	0.78***	(0.27)	0.26**	(0.10)	0.52**	(0.24)
Percentage of Renter-Occupied Units	0.92***	(0.17)	0.13	(0.10)	0.82***	(0.14)
Rental Vacancy Rate	0.30	(0.39)	0.13	(0.11)	0.27	(0.29)
Percentage of Overcrowded Housing Units			0.72*	(0.36)		
Economic Domain						
Unemployment Rate	-0.40	(0.72)	-0.06	(0.32)	-0.69	(0.68)
Poverty Rate	-1.24***	(0.33)	-0.29	(0.20)	-0.92***	(0.29)
Safety Net Domain						
Percentage of Households Receiving Cash Assistance			0.39	(0.38)		
Share of HUD-Assisted Units	-0.50	(0.78)	0.30	(0.50)	-0.64	(0.66)
Occupancy Rate of HUD-Assisted Units	-0.04	(0.15)	-0.03	(0.06)	-0.05	(0.13)
Demographic Domain						
Percentage African-American	-0.30*	(0.15)	-0.14**	(0.06)	-0.18***	(0.07)
Percentage Hispanic	-0.19**	(0.08)	-0.10***	(0.04)	-0.05	(0.06)
Percentage Asian	0.14	(0.34)	-0.20	(0.26)	0.35	(0.28)

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Percentage Children (Age 0 through 19)	1.69*	(0.88)	0.63**	(0.28)	0.47	(0.60)
Percentage Senior (Age 65 and Older)	1.09**	(0.52)	0.14	(0.17)	0.92*	(0.54)
Percentage of One-Person Households	1.46*	(0.80)	0.92***	(0.18)		
Percentage of Under-18 Population in Single-Parent Households	-0.26	(0.43)	-0.06	(0.17)		
Percentage Veteran (25 and Older)	-1.34***	(0.34)			-1.13***	(0.38)
Percentage without a Bachelor's Degree	0.68**	(0.27)			0.51***	(0.17)
Alcohol Mortality (Per 100,000)	1.66***	(0.54)			1.44***	(0.35)
Climate Domain						
Average January Temperature (°F)	0.51*	(0.26)	0.03	(0.04)	0.30*	(0.15)
Average June, July, and August Temperature (°F)	-0.57**	(0.26)			-0.36	(0.24)
Average January Precipitation (Inches)	0.41*	(0.23)			0.69***	(0.21)
Intercept	-153.62***	(53.35)	-61.91***	(17.97)	-53.98*	(31.50)
Observations	**110**		**110**		**110**	
R-Squared	**0.82**		**0.78**		**0.72**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the variables selected for the subgroup and outcome of interest using the procedures outlined in the Empirical Strategy chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables and ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Percentage White is the omitted race/ethnicity category, and percentage adult is the omitted age category. A list of CoCs by urbanicity is listed in appendix D.

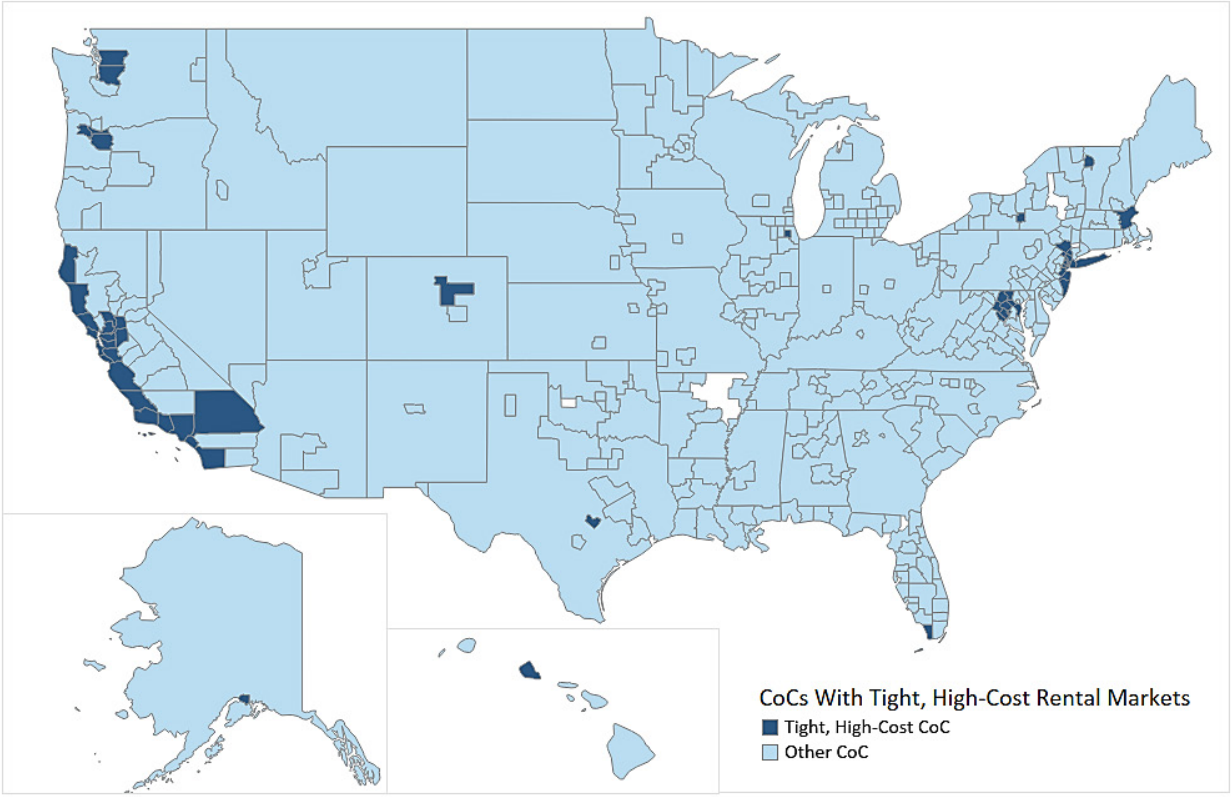
Tight, High-Cost Rental Markets

The study team defined a CoC as existing within a tight, high-cost rental market if three out of the following four criteria were met—

- Tight rental market with rental vacancy rate less than or equal to 5 percent in 2017.
- High-cost rental market with median rents greater than or equal to the 75th percentile value in 2017 ($901.80 per month).
- High-cost housing market with median home values greater than or equal to the 75th percentile value in 2017 ($246,800).
- Market with renter share greater than or equal to 75th percentile value in 2017 (39.68 percent).

Exhibit 5-5 displays the tight, high-cost rental markets across the country, with most of the CoCs along the east and west coasts.

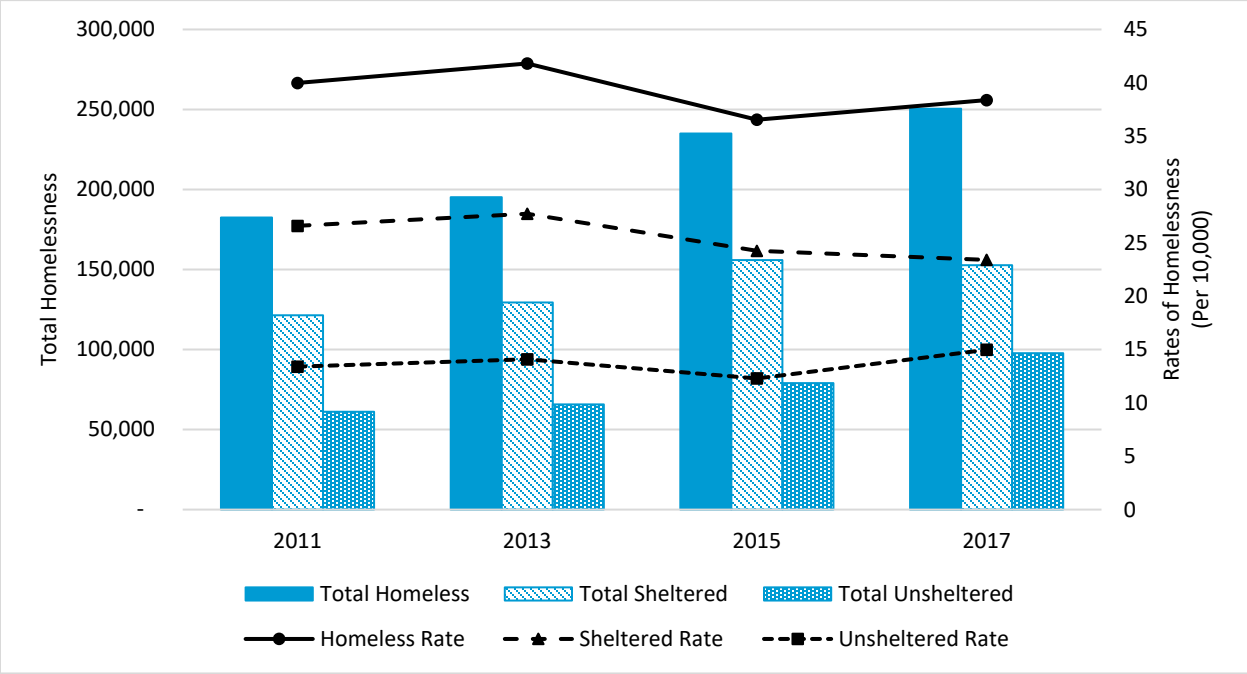
Exhibit 5-5 | Map of Tight, High-Cost Rental Market Continuums of Care



Source: Census ACS 5-Year Estimates

Exhibit 5-6 presents the total, sheltered, and unsheltered homeless populations and rates of homelessness from 2011 through 2017 for the subgroup of CoCs in tight, high-cost rental markets. Overall, there was little change in the rates of total, sheltered, and unsheltered homelessness during this period. As depicted by the solid bars, however, total homelessness in CoCs with tight, high-cost rental markets increased by nearly 68,000 between 2015 and 2017, mainly driven by the increase in the unsheltered population. In addition, rates of unsheltered homelessness increased from around 13 percent in 2015 to 15 percent in 2017, as illustrated by the lowest dashed line.

Exhibit 5-6| Homelessness in Continuums of Care with Tight, High-Cost Rental Markets, 2011 through 2017



Sources: Census's intercensal population estimates; HUD Point-in-Time (PIT) count data

Exhibit 5-7 presents the regression estimates of the relationship between CoC-level factors and rates of total, sheltered, and unsheltered homelessness per 10,000 population for CoCs in tight, high-cost rental markets and other CoCs. These estimates show that many variables across the five domains are significantly associated with rates of homelessness. This exhibit presents three separate specifications, where the independent variables are interacted with a dummy variable representing the subgroup. Therefore, the group of columns under each outcome of interest are the estimates from a single specification. Across all three specifications, R-squared estimates (0.90 for total homeless people; 0.92 for sheltered homeless people; 0.79 for unsheltered homeless people) indicate that the variables in our models account for a high degree of variation in rates of homelessness across CoCs. The independent variables in these specifications are the same variables as the national model in the National Model of Homelessness chapter, with the variables associated with the subgroup determination removed (in other words, rental vacancy rates, median rent, and renter share).

TOTAL HOMELESSNESS

For the housing domain, these estimates indicate that total homelessness is negatively associated with housing density in CoCs in tight, high-cost rental markets. A greater number of housing units per square mile is associated with lower rates of total homelessness for CoCs in tight, high-cost rental markets compared with CoCs in other rental markets. This estimate could mean that greater housing availability prevents low-income individuals from being crowded out of the market. For all CoCs, regardless of rental market status, the results show that larger percentages of renters with high-cost burdens are associated with increased rates of total homelessness. In contrast, for CoCs in tight, high-cost rental markets, estimates indicate that a large share of homeowners with a high-cost burden is associated with lower rates of total homelessness. Furthermore, high eviction rates and high shares of overcrowded units are both associated with higher rates of total homelessness in CoCs with tight, high-cost rental

markets. Perhaps unsurprisingly, these estimates suggest that lack of housing availability is an important factor driving homelessness in tight, high-cost rental markets.

In the economic domain, for CoCs in tight, high-cost rental markets, labor market conditions appear to be strongly related to rates of total homelessness. The estimates suggest that higher unemployment rates are associated with increased rates of total homelessness in CoCs in tight, high-cost markets compared with other CoCs. If a higher population of people in a CoC are unemployed and not able to afford housing costs, there may be higher rates of total homelessness, especially in tight, high-cost rental market CoCs. Complementary to this point, we also observe that a high rate of overcrowded housing is associated with higher rates of total homelessness. In other rental markets, these estimates indicate that high-income inequality, as measured by the Gini coefficient, is associated with lower rates of total homelessness. Because these other markets are not tight and high-cost rental markets, even in areas where income dispersion favors the wealthy, low-income individuals are able to afford housing, leading to lower rates of total homelessness.

In the safety net domain, for tight, high-cost rental markets the estimates suggest that high occupancy rates in HUD-assisted units are related to lower rates of total homelessness, especially when compared with CoCs in other housing markets.[61] High occupancy rates of HUD-assisted units may reflect the overall market conditions for CoCs in tight, high-cost rental markets. These estimates could indicate that HUD-assisted units are filling a need in these markets, providing housing to those who may be crowded out of housing in tight, high-cost rental markets. For CoCs within tight, high-cost rental markets, the share of houses built prior to 1940 (a proxy for CoC funding) is positively associated with rates of total homelessness.[62] In addition, a higher share of HUD-assisted units is associated with lower rates of total homelessness for CoCs within tight, high-cost rental markets.

Estimates for the demographic domain illustrate a broad range of significant factors that are associated with rates of total homelessness for CoCs in tight, high-cost rental markets. For race and ethnicity, these estimates suggest that the share of Hispanic residents is negatively related to rates of total homelessness for CoCs in tight, high-cost rental markets relative to those in other market CoCs. Khadduri et al. (2018) point out that, on average, Hispanic populations have lower measures of housing instability and are less likely to be homeless than African-Americans, even though the two groups have similar rates of poverty. The study illustrates that some of these results may be related to lower mobility (in other words, Hispanic populations move less frequently than their African-American or White peers), so Hispanic populations may not face the negative effects of tight, high-cost rental markets and may have support structures to prevent homelessness.

Other demographic factors that show significance in tight, high-cost rental markets include the change in net-migration rates, age distribution, and health conditions. The results suggest that an increasing year-over-year migration rate is associated with lower rates of total homelessness in tight, high-cost rental markets. This estimate could reflect areas experiencing sudden economic growth or recovery that

[61] As explained in the "independent variables: predictors of homelessness" section in the Data chapter, estimates of the occupancy rate of HUD-assisted units from the Picture of Subsidized Households may underestimate the true occupancy rate.

[62] These estimates for CoC funding should not be interpreted as causal as CoC funding will be targeted toward areas with high rates of homelessness. Estimates from alternative specification estimates for tight, high-cost rental markets in appendix D indicate that the coefficient estimates of the share of houses built prior to 1940 are sensitive to the inclusion of additional independent variables, and the proxy for CoC funding is only significant (and negative) for unsheltered homelessness in other rental market CoCs.

may coincide with promising labor market conditions. In contrast, CoCs that are not within tight, high-cost rental markets tend to experience higher rates of homelessness with an increase in net migration rate. The estimates suggest that tight rental market CoCs with higher percentages of seniors are also associated with higher rates of homelessness, while a high percentage of children is associated with lower rates of total homelessness for CoCs in tight, high-cost rental markets. Furthermore, these estimates indicate that a high share of one-person households is associated with higher rates of total homelessness in other market CoCs. Health factors also differ in their association with homelessness. Alcohol mortality is associated with higher rates of total homelessness in CoCs that are not in tight, high-cost rental markets. Finally, in the climate domain, for CoCs in tight, high-cost rental markets, higher total annual precipitation is associated with higher rates of homelessness compared with CoCs in other rental markets. Of CoCs in tight, high-cost rental markets, the Austin/Travis County CoC has total homelessness above the median, unemployment rates in the lowest 25 percent, an occupancy rate of HUD-assisted units at the median, and a share of Hispanic residents in the highest 25 percent.

Austin/Travis County CoC
Rate of Total Homelessness: 16.9 per 10,000
Unemployment Rate: 3.2 percent
Occupancy Rate of HUD-Assisted Units: 93 percent
Percent Hispanic: 33.9 percent

SHELTERED HOMELESSNESS

For the housing domain, results indicate that high eviction rates are associated with higher rates of sheltered homelessness in CoCs with tight, high-cost rental markets. Eviction rates provide insights into the displacement of renters, especially when comparing CoCs in tight, high-cost rental markets to other CoCs. As with total homelessness in tight, high-cost rental market CoCs, we find that housing density is negatively associated with rates of sheltered homelessness. There is a positive association between sheltered homelessness and the share of renters with cost burden in other market CoCs but not for CoCs in tight, high-cost rental markets. Being an urban CoC and having a high share of overcrowded housing units are both associated with positive rates of sheltered homelessness for all CoCs.

Within the economic domain, our estimates suggest that high unemployment rates are associated with higher levels of sheltered homelessness for CoCs in tight, high-cost rental markets relative to other CoCs. For CoCs in tight, high-cost rental markets, no safety net factors appear significantly associated with rates of sheltered homelessness. For other market CoCs, however, our estimates indicate that the share of houses built prior to 1940, the proxy for CoC funding, is associated with higher rates of sheltered homelessness. As mentioned previously, these estimates should not be interpreted as causal because CoC funding is target toward areas with a higher need for shelter beds.

For the demographic domain, these estimates suggest that a broad group of factors is associated with rates of sheltered homelessness. For race and ethnicity, we find that the share of African-American residents is positively related to rates of total homelessness for CoCs in tight, high-cost rental markets, while there is a negative relationship between the share of Asian residents and the rate of sheltered homelessness. The share of seniors aged 65 and older is associated with higher rates of sheltered homelessness in other CoCs relative to those in tight, high-cost rental

District of Columbia CoC
Rate of Sheltered Homelessness: 96.1 per 10,000
Eviction Rate: 2.6 percent
Under-18 Population in Single-Parent Households: 47.7 percent

markets. In addition, for CoCs in tight, high-cost rental markets, the share of veterans is negatively associated with rates of sheltered homelessness compared with CoCs in other markets. Alcohol mortality rates are positively associated with rates of sheltered homelessness, especially for CoCs in tight, high-cost rental markets. Finally, our estimates indicate that total annual precipitation is associated with high rates of sheltered homelessness in CoCs in tight, high-cost rental markets. Of all CoCs in tight, high-cost rental markets, the District of Columbia CoC in Washington, DC has the highest rate of sheltered homelessness, an eviction rate in the highest 10 percent, and the highest share of children under 18 living in single-parent households.

UNSHELTERED HOMELESSNESS

In the housing domain, the house price index and share of homeowners with a cost burden greater than 30 percent of their income are positively associated with rates of unsheltered homelessness, especially for other CoCs compared with CoCs in tight, high-cost rental markets. In addition, a high share of overcrowded units is associated with high rates of unsheltered homelessness for CoCs in tight, high-cost rental markets compared with other CoCs. There is a negative relationship between the change in eviction rates and rates of unsheltered homelessness for CoCs in tight, high-cost rental markets. These estimates indicate that CoCs with lower changes in eviction rates may have higher rates of unsheltered homelessness. Some areas with tight high-cost rental markets may have policies in place that protect renters, thus leading to low eviction rates (or changes in eviction rates) while still maintaining high rates of unsheltered homelessness.

For all CoCs, there are no significant relationships between unsheltered homelessness and factors in the economic domain. In the safety net domain, a high share of HUD-assisted units is associated with lower rates of unsheltered homelessness for CoCs in tight, high-cost rental markets. This result could indicate that low-income populations may be using HUD assistance, resulting in lower rates of sheltered homelessness. Estimates from the demographic domain indicate that veteran status is positively associated with rates of unsheltered homelessness in CoCs in tight, high-cost rental markets. As for the other rental market status, higher percentages of Asian residents and a large increase in the net-migration rate are associated with higher rates of unsheltered homeless. High shares of veterans are associated with increased rates of unsheltered homelessness in CoCs with tight, high-cost rental markets compared with CoCs with other markets. Veterans populations may be a low-priority for capacity-constrained shelters because these populations are more likely to consist of older males (Fargo et al., 2012).

Vallejo/Solano County CoC
Rate of Unsheltered Homelessness: 20.8 per 10,000
Share of Overcrowded Housing Units: 4.6 percent
Percentage Veteran: 11.6 percent

Higher shares of the population without a bachelor's degree is associated with lower unsheltered homelessness rates in tight, high-cost rental markets. Although tight, high-cost markets may be experiencing an economic boom, they are typically comprised of low shares of persons without a bachelor's degree while also experiencing noticeably higher unsheltered homeless rates. Lastly, higher January precipitation totals in CoCs with higher January precipitation totals are associated with higher rates unsheltered homelessness rates in tight, high-cost CoCs. Of all CoCs in tight, high-cost rental markets, the Vallejo/Solano County CoC in California has a rate of unsheltered homelessness in the highest 25 percent, shares of overcrowded housing units in the highest 50 percent, and a share of veterans in the highest 10 percent.

Exhibit 5-7 | Regression Estimates of Model for Continuums of Care with Tight, High-Cost Rental Markets

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)											
	Total				Sheltered				Unsheltered			
	Other CoCs		CoCs in Tight, High-Cost Rental Markets		Other CoCs		CoCs in Tight, High-Cost Rental Markets		Other CoCs		CoCs in Tight, High-Cost Rental Markets	
Housing Domain												
House Price Index									0.10**	(0.04)	-0.03	(0.05)
Percentage of Homeowners with Cost Burden	0.19	(0.15)	-0.90***	(0.32)	-0.06	(0.11)	-0.55*	(0.28)	0.22***	(0.07)	0.34	(0.31)
Median Rental Utility Cost ($10s)					-0.03	(0.15)	0.07	(0.77)	-0.07	(0.16)	1.79	(1.52)
Percentage of Renters with Cost Burden	0.36**	(0.15)	0.73***	(0.24)	0.23**	(0.11)	-0.16	(0.64)	0.06	(0.06)	0.51	(0.52)
High Housing Density CoC	-2.19*	(1.13)	-11.95***	(3.39)	-0.58	(0.75)	-11.55***	(3.82)	-1.42*	(0.76)	-4.29	(4.65)
Eviction Rate	-0.40	(0.24)	3.62**	(1.49)	-0.23	(0.16)	7.44***	(1.54)				
Change in Eviction Rate									-0.03	(0.15)	-6.31**	(2.89)
Percentage of Overcrowded Housing Units	1.01	(0.82)	7.97***	(1.51)	0.98**	(0.41)	5.04**	(2.18)	-0.01	(0.64)	6.31***	(1.85)
Urban CoC	1.20	(1.57)	14.21	(10.34)	2.38***	(0.84)	16.13**	(7.10)	-0.04	(0.76)	-11.59	(7.54)
Suburban CoC	-1.27	(1.36)	0.81	(13.13)	0.58	(0.78)	10.31	(8.64)	-0.65	(0.68)	-17.46*	(10.14)
Economic Domain												
Unemployment Rate	0.28	(1.06)	6.92***	(1.61)	-0.66	(0.47)	5.55***	(1.19)	0.77	(0.70)	3.74	(2.45)
Gini Coefficient of Income Inequality	-0.55**	(0.22)	1.47	(0.92)	0.13	(0.20)	-0.11	(1.02)				
Poverty Rate	-0.32	(0.42)	-0.69	(0.96)	-0.31	(0.28)	-1.21	(1.61)	-0.10	(0.14)	-0.18	(1.03)
Safety Net Domain												
Share of HUD-Assisted Units	1.88***	(0.67)	-3.21*	(1.63)	0.87*	(0.52)	3.30*	(1.78)	0.41	(0.30)	-1.87**	(0.78)
Occupancy Rate of HUD-Assisted Units	0.04	(0.09)	-1.20***	(0.35)	-0.05	(0.06)	-0.30	(0.41)	-0.02	(0.06)	-0.12	(0.30)
Percentage of Houses Built Before 1940	-0.05	(0.10)	0.54**	(0.22)	0.15**	(0.06)	-0.12	(0.28)				
Demographic Domain												
Percentage African-American	-0.12	(0.12)	0.51	(0.40)	-0.09	(0.07)	0.56**	(0.23)	-0.01	(0.04)	0.19	(0.29)
Percentage Hispanic	-0.04	(0.09)	-0.90***	(0.28)	-0.06	(0.04)	-0.77*	(0.39)	0.02	(0.05)	-0.44*	(0.22)
Percentage Asian	0.50	(0.35)	-0.22	(0.26)	0.04	(0.14)	-0.62***	(0.19)	0.57**	(0.26)	0.18	(0.26)
Percentage Children (Age 0 through 19)	0.25	(0.39)	-2.65**	(1.16)	-0.49*	(0.25)	-2.46	(1.54)	-0.11	(0.28)	-1.75	(1.08)
Percentage Senior (Age 65 and Older)	-0.11	(0.27)	2.16**	(0.95)	-0.47***	(0.15)	1.44	(1.13)	0.01	(0.13)	-0.01	(1.26)
Percentage Female					0.38	(0.45)	0.79	(2.52)	-1.61*	(0.90)	-1.88	(2.39)
Net-Migration Rate	3.40***	(1.25)	-0.10	(3.11)	1.56**	(0.64)	-3.06	(4.91)				
Change in Net-Migration Rate	0.47	(1.15)	-12.46**	(4.70)					2.74***	(0.97)	2.66	(5.65)
Percentage of One-Person Households	1.04***	(0.36)	0.18	(1.16)					0.37*	(0.19)	0.98	(0.91)
Percentage of Under-18 Population in Single-Parent Households	0.11	(0.36)	0.46	(0.53)	0.34	(0.22)	-0.88	(0.77)				
Percentage Veteran (25 and Older)					0.21*	(0.12)	-2.61***	(0.61)	0.23	(0.17)	1.97**	(0.94)
Percentage without a Bachelor's Degree									0.00	(0.07)	-0.81**	(0.37)
Healthcare Costs ($1,000s)									-0.69	(0.53)	1.09	(1.07)
Alcohol Mortality (Per 100,000)	1.33**	(0.54)	1.51	(1.15)	1.00***	(0.26)	4.12***	(1.35)				
Excessive Drinking Rate					-0.02	(0.11)	-0.51	(0.69)	-0.24*	(0.13)	0.36	(0.92)

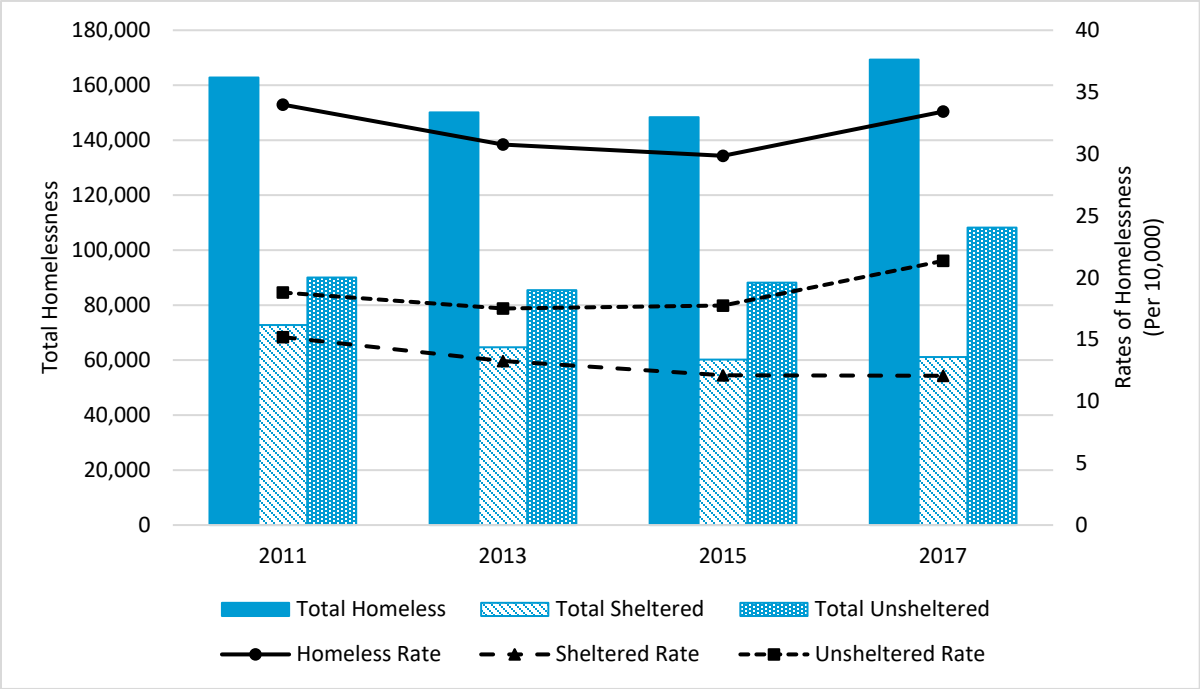
Independent Variables	2017 Homelessness Rate (Per 10,000 Population)											
	Total				Sheltered				Unsheltered			
	Other CoCs		CoCs in Tight, High-Cost Rental Markets		Other CoCs		CoCs in Tight, High-Cost Rental Markets		Other CoCs		CoCs in Tight, High-Cost Rental Markets	
Climate Domain												
Average January Temperature (°F)	0.04	(0.16)	-0.21	(0.30)	-0.07	(0.08)	0.66	(0.40)	0.06	(0.08)	-0.57	(0.81)
Average June, July, and August Temperature (°F)	-0.16	(0.26)	0.63	(0.74)	-0.04	(0.13)	0.65	(0.80)	-0.02	(0.21)	0.18	(0.87)
Total January Precipitation (Inches)	0.31	(0.20)	0.58	(0.64)	0.09	(0.09)	-1.05	(0.77)	0.17	(0.15)	2.04**	(0.96)
Total Annual Precipitation (Inches)	-0.03	(0.06)	0.53***	(0.12)	-0.02	(0.03)	0.39***	(0.09)				
Intercept	-23.99	(30.23)			-7.97	(24.10)			72.95	(47.74)		
Observations	**374**				**374**				**374**			
R-Squared	**0.90**				**0.92**				**0.80**			

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the variables included in the national model for the outcome of interest (total, sheltered, or unsheltered homelessness) in the National Model of Homelessness chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables and ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category.

Unsheltered Homelessness on the West Coast

Exhibit 5-8 presents the total, sheltered, and unsheltered homeless populations and rates of homelessness from 2011 through 2017 for the west coast CoCs in California, Oregon, and Washington state. The levels and rates of total homelessness decreased from 2011 through 2015 but increased by nearly 20,000 between 2015 and 2017. This increase can be attributed entirely to the increase in unsheltered homelessness. From 2015 to 2017, unsheltered homelessness increased by nearly 20,000 people, and the rate of unsheltered homelessness increased from 18 homeless people per 10,000 in 2015 to 21 homeless people per 10,000 in 2017. In 2017, west coast CoCs accounted for nearly 60 percent of the unsheltered homeless population nationwide. As a result, in this section, the study team focuses solely on the unsheltered homeless population on the west coast.

Exhibit 5-8 | Homelessness in West Coast Continuums of Care, 2011 through 2017



Sources: Census's intercensal population estimates; HUD PIT count data

Exhibit 5-9 presents the regression estimates of the relationship between CoC-level factors and rates of unsheltered homelessness per 10,000 population for west coast CoCs and CoCs in other regions. These estimates show that many variables across the five domains are significantly associated with rates of homelessness. This exhibit presents one regression specification, in which the independent variables are interacted with a dummy variable representing the west coast subgroup, and the coefficient estimates for each subgroup (other region and west coast) are presented side-by-side. For this model, the R-squared estimate of 0.87 indicates that the variables in our models account for a high degree of variation in rates of unsheltered homelessness across west coast CoCs. The independent variables in these specifications are the same variables used for the national model in the National Model of Homelessness chapter.

For rates of unsheltered homelessness, the model illustrates more significant factors compared with the national model presented in the National Model of Homelessness chapter. In the housing domain, high median rent is associated with higher rates of unsheltered homelessness for CoCs in other regions. Notably, the coefficient on median rent is negative but only marginally significant for west coast CoCs, which may be surprising given the substantial increases in both rent and the unsheltered population in west coast communities in recent years. Because so many housing domain variables explain variations in unsheltered homelessness and many are significant in this specification for unsheltered homelessness in west coast CoCs, factors associated with housing costs may be picked up by the other independent variables, rather than median rents. Furthermore, because this analysis uses a nominal rent level rather than a measure of change, this coefficient may be capturing the differences between larger, higher income communities with high rents who may have a large total unsheltered population, but lower rates than smaller, poorer communities with higher rates of unsheltered homelessness. Additional research may be needed to fully explore the relationships between changes in the relative and absolute rents in communities and changes in their unsheltered population.

Focusing on other elements of the housing domain, a high share of homeowners with cost burden is associated with high rates of unsheltered homelessness in west coast CoCs, a high share of renters with cost burden is associated with lower rates of unsheltered homelessness in west coast CoCs. Large increases in eviction rates are associated with lower rates of unsheltered homelessness in west coast CoCs. This association might be due to local policies that support households that have been evicted. We examine some of these policies in appendix H. Furthermore, high housing density, which may indicate the availability of housing, is associated with lower rates of unsheltered homelessness for west coast CoCs as compared with CoCs in other regions. In addition, for west coast CoCs, both urban and suburban CoC statuses are associated with lower rates of unsheltered homelessness compared with rural CoCs on the west coast. In the economic domain, a high unemployment rate is associated with high rates of unsheltered homelessness in west coast CoCs compared with CoCs in other regions.

For west coast CoCs, housing-related safety net variables are significant factors associated with rates of unsheltered homelessness in the safety net domain. For the housing-related safety net variables, a high share of HUD-assisted units in west coast CoCs is associated with higher rates of unsheltered homelessness. In addition, the occupancy rate of HUD-assisted units is negatively related to rates of unsheltered homelessness. High occupancy rates of HUD-assisted units may signal that a small but important segment of low-income housing needs are met through HUD programs, possibly contributing to lower rates of unsheltered homelessness in west coast CoCs.

Imperial County CoC
Rate of Unsheltered Homelessness: 56.7 per 10,000
Median Rent: $641
Share of Homeowners with Cost Burden: 29.9 percent
Rental Vacancy Rate: 4.7 percent
Share of Overcrowded Units: 10.4 percent

Watsonville/Santa Cruz City and County CoC
Rate of Unsheltered Homelessness: 65.4 per 10,000
Median Rent: $1,385
Share of Homeowners with Cost Burden: 35.2 percent
Rental Vacancy Rate: 1.9 percent
Share of Overcrowded Units: 6.7 percent

The Imperial County and Watsonville/Santa Cruz City and County CoCs in California are both suburban CoCs with higher rates of unsheltered homelessness than two urban CoCs, Los Angeles City and County and Seattle/King County, even though these smaller communities have different median rents and rental vacancy rates. The Imperial County CoC has the third highest rate of unsheltered homelessness, median rents in the lowest 25 percent, a share of homeowners with cost burden around the median, a rental vacancy rate around the highest 25 percent, the third highest share of overcrowded units, and a share of HUD-assisted units in the highest 25 percent of all west coast CoCs. The Watsonville/Santa Cruz City and County CoC has the second highest rate of unsheltered homelessness, median rents in the highest 25 percent, a share of homeowners with cost burden near the highest 5 percent, the lowest rental vacancy rate, a share of overcrowded units near the highest 25 percent, and the highest share of HUD-assisted units of all west coast CoCs. The Los Angeles CoC has the largest unsheltered homeless population of any community in the country at 42,828 in 2017. [63] In addition, the Los Angeles City and County CoC has a rate of unsheltered homelessness in the highest 10 percent, median rents near the highest 25 percent, the highest share of homeowners with cost burden, a rental vacancy rate in the lowest 50 percent, and the second highest share of overcrowded units of all west coast CoCs. The Seattle/King County CoC has the third largest unsheltered homeless population among all communities in the country. Furthermore, the Seattle/King County CoC has a rate of unsheltered homelessness near the highest 25 percent, median rents near the highest 25 percent, a share of homeowners with cost burden in the lowest 25 percent, a rental vacancy rate in the lowest 25 percent, and a share of overcrowded units near the lowest 25 percent of all west coast CoCs. More context around local policy approaches in Seattle is available in appendix H.

Los Angeles City & County CoC
Rate of Unsheltered Homelessness: 42.2 per 10,000
Median Rent: $1,167
Share of Homeowners with Cost Burden: 38.3 percent
Rental Vacancy Rate: 3.3 percent
Share of Overcrowded Units: 11.8 percent

Seattle/King County CoC
Rate of Unsheltered Homelessness: 25.4 per 10,000
Median Rent: $1,149
Share of Homeowners with Cost Burden: 27.6 percent
Rental Vacancy Rate: 3.1 percent
Share of Overcrowded Units: 3.2 percent

Estimates from the demographic domain indicate that several factors are significantly associated with rates of unsheltered homelessness in west coast CoCs. The share of Asian residents in CoCs in other regions is associated with higher rates of unsheltered homelessness. The shares of children and seniors are both negatively associated with rates of unsheltered homelessness; these are vulnerable populations that could be eligible to receive other forms of housing assistance that prevent unsheltered homelessness. In contrast, the share of women is positively associated with rates of unsheltered homelessness in west coast CoCs. Similarly, high increases in the net-migration rate are associated with high rates of unsheltered homelessness in west coast CoCs. High shares of one-person households are related to high rates of unsheltered homelessness in all CoCs; however, the coefficient estimate is larger for west coast CoCs. One-person households may be a low priority for shelters, or these households may feel like shelters will not meet their needs and, as a result, they may be more

[63] The total count of unsheltered homelessness represents the total unsheltered homeless population in all four CoCs within Los Angeles County. The Los Angeles City and County CoC was combined with the Glendale, Long Beach, and Pasadena CoCs as all are within Los Angeles County. See appendix C for further details on CoC aggregation assumptions.

likely to become part of the unsheltered homeless population if opportunities for shared housing arrangements are scarce. Furthermore, high healthcare costs and high excessive drinking rates are associated with lower rates of homelessness in west coast CoCs. Finally, for the climate domain, high January temperatures, summer temperatures, and January precipitations are related to increased rates of unsheltered homelessness in west coast CoCs. In contrast, high January precipitation is associated with lower rates of unsheltered homelessness for CoCs in other regions.

Exhibit 5-9 | Regression Estimates of Model for Unsheltered Homelessness in West Coast Continuums of Care (CoCs) Compared with Other Region CoCs

Independent Variables	2017 Unsheltered Homelessness Rate (Per 10,000 Population)			
	Other Region CoCs		West Coast CoCs	
Housing Domain				
House Price Index	0.04	(0.03)	0.17	(0.15)
Percentage of Homeowners with Cost Burden	0.12	(0.09)	2.27***	(0.38)
Natural Logarithm of Median Rent ($100s)	5.45**	(2.27)	-10.14*	(5.76)
Median Rental Utility Cost ($10s)	0.03	(0.10)	0.56	(1.09)
Percentage of Renters with Cost Burden	-0.01	(0.07)	-2.20***	(0.22)
Percentage of Renter-Occupied Units	-0.03	(0.09)	-0.41	(0.31)
Rental Vacancy Rates	0.47***	(0.15)	-2.49***	(0.77)
High Housing Density CoC	-1.11*	(0.63)	-14.41**	(5.73)
Change in Eviction Rate	-0.23*	(0.13)	-3.00**	(1.22)
Percentage of Overcrowded Housing Units	0.11	(0.41)	5.64***	(0.98)
Urban CoC	0.21	(0.72)	-2.51**	(1.18)
Suburban CoC	-0.42	(0.40)	-9.79***	(1.39)
Economic Domain				
Unemployment Rate	0.07	(0.35)	1.18**	(0.49)
Poverty Rate	-0.01	(0.12)	-0.59*	(0.32)
Safety Net Domain				
Share of HUD-Assisted Units	0.29*	(0.15)	5.06***	(1.38)
Occupancy Rate of HUD-Assisted Units	0.05	(0.04)	-0.40***	(0.14)
Demographic Domain				
Percentage African-American	-0.03	(0.03)	-0.91*	(0.50)
Percentage Hispanic	-0.05	(0.04)	-0.63	(0.41)
Percentage Asian	0.31***	(0.12)	-0.84*	(0.44)
Percentage Children (Age 0 through 19)	0.01	(0.18)	-2.86***	(0.62)
Percentage Senior (Age 65 and Older)	-0.14	(0.12)	-2.89**	(1.23)
Percentage Female	-0.80	(0.54)	3.41***	(0.42)
Change in Net-Migration Rate	1.71**	(0.71)	7.44**	(3.48)
Percentage of One-Person Households	0.41**	(0.17)	2.82***	(0.26)
Percentage Veteran (25 and Older)	0.10	(0.10)	0.02	(0.88)
Percentage without a Bachelor's Degree	0.13**	(0.05)	-0.18	(0.43)
Healthcare Costs ($1,000s)	-0.51	(0.37)	-3.41***	(0.64)
Excessive Drinking Rate	-0.08	(0.08)	-4.65***	(0.35)
Climate Domain				
Average January Temperature (°F)	0.12	(0.08)	0.47***	(0.10)
Average June, July, and August Temperature (°F)	-0.05	(0.17)	1.50***	(0.30)
Total January Precipitation (Inches)	-0.45***	(0.16)	0.93***	(0.26)
Intercept	9.83		(27.47)	
Observations	**374**			
R-Squared	**0.87**			

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the variables included in the national model for the outcome of interest (total, sheltered, or unsheltered homelessness) in the National Model of Homelessness chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables and ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category. States in the west coast region include California, Oregon, and Washington.

CONCLUSION

This study provides new insights into the factors associated with homelessness in communities across the United States. While homelessness is an acknowledged problem in many areas, its causes are myriad and may vary based on the characteristics of respective communities. This report furthers the collective understanding of the heterogeneity in community-level rates of total, sheltered, and unsheltered homelessness.

Results from our regression analysis indicate that a wide variety of factors across the five domains (housing market, economic conditions, safety net, demographic characteristics, and climate conditions) are associated with rates of homelessness and that these factors vary by type of homelessness (total, sheltered, and unsheltered). In general, the regression specifications presented in this study improve on the explanatory power of models presented in previous studies. Our national models explain between 68 and 82 percent of the variation in the outcome of interest, compared with 58 percent in the Byrne et al. (2012) study.

Notably, the model specifications presented in this study also expand on the sets of covariates included in previous studies. This expansion of the independent variables represents a methodological challenge, in that including the full set of covariates in each specification would result in overfitted models plagued by multicollinearity muddling model interpretation. To address this challenge, the current study also contributes important methodology to the literature, including the use of systematic variable selection algorithms. The rich set of covariates allows for individual model specifications and the inclusion of different variables within and across domains that, in turn, allow us to illustrate nuances in the relationships between variables in each domain and the outcomes of interest.

We find that factors within the housing domain are most consistently associated with community-level homelessness, confirming the findings from previous studies.[64] Specifically, our estimates for variables in the housing domain echo the finding in Byrne et al. (2012) that housing market dynamics and the availability of affordable housing are closely tied to homelessness at the Continuum of Care (CoC) level. Furthermore, issues of housing affordability are inherently related to factors in the economic and safety net domains because economically disadvantaged populations may struggle to afford housing in areas with high costs. Our findings demonstrate that the ability to obtain affordable housing is related to factors across domains. Across the various specifications presented in the National Model of Homelessness chapter and the Subgroup Analysis chapter, however, the significant independent variables associated with rates of homelessness differ based on the outcome of interest and subgroup category.

[64] These findings corroborate results in previous studies that find housing market factors are strong predictors of homelessness (Byrne et al., 2012; Fargo et al., 2013; Lee, Price-Spratlen, and Kanan, 2003).

TOTAL HOMELESSNESS

With regard to rates of total homelessness and consistent with previous studies, we find a positive association between median rents and rates of total homelessness, except in rural CoCs.[65] In line with concerns regarding affordability, our estimates do indicate that the share of renters with housing cost burden greater than 30 percent of their income is also positively associated with rates of total homelessness in rural CoCs and communities with tight, high-cost rental markets.[66] The positive association of overcrowded housing units and total homelessness, in both the national model and in communities in tight, high-cost rental markets, also supports housing availability being an important factor. If the existing units have more people per room, fewer units may be available to low-income renters. Alternatively, larger homes may not be affordable for low-income renters.

Estimates in the economic domain indicate that total homelessness and the affordability of housing are tied to local economic and labor market characteristics. Our estimates regarding the relationship between unemployment rates and total homelessness are inconclusive. Specifically, we find that higher unemployment rates are associated with increased rates of total homelessness in CoCs with tight, high-cost rental markets; however, the association is negative in urban CoCs. In the safety net domain, we find that housing-related assistance factors are more strongly associated with total homelessness. In the national model and for suburban CoCs, we find a high share of HUD-assisted units is associated with higher rates of total homelessness in the community. High shares of HUD-assisted units may suggest that the area has a large population that needs housing assistance and is more likely to be homeless. For communities with tight, high-cost rental markets, we find that a higher occupancy rate of HUD-assisted units is associated with lower rates of total homelessness. This finding suggests that access to affordable units through HUD assistance is reducing total homelessness. There is no clear relationship between rates of total homelessness and participation in other social safety net programs as measured by the share of the population receiving cash assistance, mainly in urban areas. Earlier literature found a positive relationship between participation in social safety net programs and individual-level homelessness. Our estimates indicate that measuring the effect of other social safety net programs at the community level may be difficult.[67]

Our findings on demographic characteristics indicate variation in the factors that affect rates of total homelessness across the national and subgroup analysis. We find few significant relationships between homelessness and race and ethnicity categories. Across several specifications, however, CoCs with higher shares of the Hispanic population are associated with lower rates of total homelessness, like the findings in Byrne et al. (2012). Khadduri et al. (2018) provided a plausible explanation, suggesting that Hispanic populations have lower measures of housing instability.[68] Net-migration rates are positively associated with rates of total homelessness in the national model, while changes in net-migration rates

[65] While most studies that include median rent find a positive coefficient, Glynn and Fox (2017) found a significant and positive association between median rents and rates of homelessness in New York, Los Angeles, Washington, DC, and Seattle, but insignificant estimates in other urban areas.

[66] Fargo et al. (2013) also found that a high share of households with rental cost burden of greater than 30 percent of the household income is associated with higher rates of homelessness among both families and single adults.

[67] These results mirror the finding in Fargo et al. (2013) that, in general, safety net variables do not serve as strong predictors of homelessness.

[68] While Khadduri et al. (2018) pointed out that, on average, Hispanic populations have lower measures of housing instability than African-Americans, Byrne et al. (2012) found a positive relationship between the share of Hispanic residents and rates of homelessness.

are positively associated with total homelessness in suburban CoCs. For communities with tight, high-cost rental markets, however, we find a negative relationship between changes in the net-migration rate and total homelessness. These results may provide further evidence that housing market dynamics and availability are associated with rates of total homelessness. In some cases, an influx of population may crowd out vulnerable renters and increase rates of homelessness.[69] In addition, community-level age distribution appears to be associated with rates of total homelessness with a negative coefficient on the share of children in the national model and for CoCs in tight, high-cost rental markets and a positive coefficient on the share of senior adults in rural areas and for CoCs in tight, high-cost rental markets. Such estimates indicate that the shares of vulnerable populations are associated with rates of total homelessness. The effect varies across different models, suggesting that the other demographic characteristics may not be robustly associated with total homelessness and could represent proxies for other omitted constructs, as already highlighted in the literature.[70] Finally, the relationship between climate conditions and rates of total homelessness appears inconclusive.

SHELTERED HOMELESSNESS

Sheltered homeless people are those in emergency shelters, transitional housing programs, or safe haven temporary shelters (Henry et al., 2017). Because shelters are often geared toward providing accommodations for the most vulnerable, hard-to-house populations, the factors associated with rates of sheltered homelessness may be different from those associated with total and unsheltered homelessness. Housing affordability is still of paramount importance, however, in terms of factors related to rates of sheltered homelessness in communities across the country. Our national model estimates indicate that CoCs with higher median rents have increased rates of sheltered homelessness. We find no significant association, however, between median rents and rates of sheltered homelessness in other specifications (in urban CoCs, the association is positive but marginally statistically significant, possibly due to the sample size issue). In addition, our findings suggest that the share of homeowners with a housing cost burden greater than 30 percent of their income is also positively associated with rates of sheltered homelessness, especially in suburban and rural CoCs. Estimates for renters with cost burden vary in sign and significance across specifications. Together, these findings suggest that areas with families and individuals who have a large cost burden due to owning expensive homes or renting high-cost apartments, relative to their income, may be more susceptible to higher rates of sheltered homelessness. Results for CoCs in tight, high-cost rental markets show that high eviction rates are related to high rates of sheltered homelessness, possibly driven by displaced families who tend to seek shelter instead of living on the streets, especially as these areas lack affordable housing options.

For rates of sheltered homelessness, estimates in the economic domain indicate various significant factors across model specifications. Notably, we find that high unemployment rates are associated with higher rates of sheltered homelessness in CoCs in tight, high-cost rental markets. This finding illustrates the relationship between housing affordability and rates of sheltered homelessness because high unemployment rates indicate that fewer residents can access affordable housing units due to lack of

[69] Lee, Price-Spratlen, and Kanan (2003) found that rates of migration are positively associated with rates of homelessness, particularly in metropolitan areas. The authors indicated that higher demand for housing may increase the exposure of vulnerable populations to homelessness and subpar housing accommodations.

[70] Byrne et al. (2012) highlighted a lack of consensus in the previous literature regarding the specific demographic characteristics that affect homelessness.

employment opportunities. In the national model, we find that high-income inequality is associated with lower rates of total homelessness, while high poverty is associated with higher rates of total homelessness. Across other specifications, however, we find no significant relationships between rates of sheltered homelessness and poverty.[71] We do find a strong positive association between the share of HUD-assisted units in a community and sheltered homelessness in the national model, as well as urban and suburban areas.

Estimates of the relationship between rates of sheltered homelessness and demographic characteristics indicate that race and ethnicity, migration, household composition, and health conditions are important factors. Across the nation and rural CoCs, there is a strong negative relationship between the share of the Hispanic population and rates of sheltered homelessness. In addition, a high share of Asian residents is associated with lower rates of sheltered homelessness in the national model, as well as urban CoCs and communities with tight, high-cost rental markets. Estimates of the relationship between net-migration rates indicate that the coefficient is positive and significant in the national model but negative and insignificant in other models. As explained previously, such dynamics may crowd out vulnerable populations from the housing market. Household composition and the share of one-person households appear to be positively associated with rates of sheltered homelessness in rural CoCs.[72] Finally, high alcohol mortality and excessive drinking rates, which function as measures of health and wellbeing in the community, are associated with high rates of sheltered homelessness, mainly in the national model. Finally, the relationship between climate conditions and rates of sheltered homelessness appears inconclusive with only the total annual precipitation having consistent positive association across the national, urban and tight, high-cost rental markets.

UNSHELTERED HOMELESSNESS

Unsheltered homeless individuals have a primary nighttime location that is not typically designated for sleeping accommodations (Henry et al., 2017). Given that unsheltered homeless people lack a formal attachment to housing and rental markets, factors associated with rates of total and sheltered homelessness may not have the same relationship with unsheltered homelessness rates. Within the housing domain, estimates for independent variables vary in direction and significance across specifications, indicating that the factors associated with unsheltered homelessness depend on local market within the subgroup of interest. For example, the coefficient on median rents is positive and significant for suburban CoCs but negative and insignificant across all other specifications. The share of homeowners with cost-burden greater than 30 percent of their income tends to increase rates of unsheltered homelessness in urban, rural, and west coast CoCs but decreases unsheltered homelessness in suburban communities. The share of renter-occupied units is associated with lower rates of unsheltered homelessness in urban CoCs, while the association is positive in rural CoCs.[73] Across several specifications, our estimates suggest that the share of overcrowded housing units is positively associated with rates of unsheltered homelessness.

[71] Hanratty (2017) illustrated the sign and significance of poverty coefficients from various studies. While most previous studies found no significant relationship, Quigley, Raphael, and Smolensky (2001) found a positive and significant relationship.

[72] Shinn et al. (1998) indicated that shelters may state whether to accept men. If shelter rules vary by CoC, these factors could affect estimates of the relationship between one-person households and rates of sheltered homelessness.

[73] Fargo et al. (2013) found a positive and significant association between homelessness and the share of renter-occupied housing.

Rates of unsheltered homelessness are associated with few factors in the economic domain. Our estimates indicate that high unemployment rates are associated with low rates of unsheltered homelessness in urban CoCs but high rates of unsheltered homelessness in suburban CoCs and west coast CoCs. In the safety net domain, our results show that factors related to housing assistance are associated with rates of unsheltered homelessness, with the direction of the relationships varying across specifications. The share of HUD-assisted units is negatively associated with unsheltered homelessness in urban CoCs and CoCs in tight, high-cost rental markets, while the coefficient is positive in suburban and west coast CoCs. A high occupancy rate is associated with lower rates of unsheltered homelessness in west coast CoCs but not significant in other specifications. In addition, the share of houses built prior to 1940, used as a proxy for federal CoC funding, is associated with lower rates of unsheltered homelessness in suburban CoCs.[74] Such results suggest that CoC funding may curb rates of unsheltered homelessness.

For the demographic domain, net-migration and household composition are consistently significant factors associated with rates of unsheltered homelessness. Increases in net-migration rates are associated with higher rates of unsheltered homelessness in the national model and suburban and west coast CoCs. The share of one-person households is positively associated with rates of unsheltered homelessness across most specifications. Finally, the relationship between climate conditions and rates of unsheltered homelessness show that average January temperature and precipitation have consistent positive association across subgroup analysis other than communities in tight, high-cost rental markets.

LIMITATIONS OF THE STUDY

We would like to caution the reader, as there are certain limitations on the estimates that should be taken into consideration when interpreting the results. The limitations largely stem from data availability that restricts the methodological options available. As such, we focus on rates of homelessness from a single year (2017) as presented in various specifications outlined in the previous two chapters. In addition, the estimates presented in this study do not imply causality. For example, increases in estimates for an independent variable should not be interpreted as a causal relationship between homelessness and that variable but rather as a factor that is associated with rates of homelessness. Further understanding of these relationships is crucial to our understanding of potential policy remedies for preventing homelessness.

NEXT STEPS AND PLANS FOR FUTURE RESEARCH

While this study provides new estimates of the factors associated with homelessness in communities across the United States, future research should further expand the subgroup analysis and delve deeper into the factors that may affect homelessness in specific areas, such as rural communities or cities with tight, high-cost rental markets.[75] Additional models examining the differences between urban and rural areas would broadly increase our understanding of the factors that contribute to homelessness. Future studies should explore the possibility of using data from the Annual Homelessness Assessment Report, Part II (Henry et al., 2018a), system performance measures, and housing inventory count available in the

[74] Lucas (2017) used the share of houses built prior to 1940 as an instrument for federal CoC funding and found a positive but statistically insignificant relationship between funding and rates of unsheltered homelessness.

[75] See appendix H for an assessment of the local policies regarding homelessness in New York, San Francisco, and Seattle.

Homeless Management Information System to perform a more in-depth analysis of those experiencing sheltered homelessness.

CONCLUDING REMARKS

The findings from this study provide key insights into the various factors that contribute to rates of total, sheltered, and unsheltered homelessness in communities across the nation. In addition, this study identifies new factors that provide insights into predicting homelessness across different regions. The study found that the significant factors associated with rates of homelessness varied by outcome and subgroup, suggesting a need for more research to increase understanding of these factors and targeted policy interventions to further prevent and end homelessness nationally and locally.

APPENDIX A: RESEARCH QUESTIONS

The 10 research questions (RQs) are listed. Exhibit A-1 presents our proposed RQs for each project phase.

1. What data are available to model market predictors of homelessness?
2. Which local and regional housing market and economic factors best explain recent homelessness trends?
3. Which local and regional demographic trends and population dynamics help explain recent homelessness trends?
4. What control variables are important to include in models of homelessness trends?
5. Which factors heighten or mitigate the risk of homelessness across metropolitan areas and regions?
6. Which community-level fixed effects, demographic effects, or policy-driven interaction effects should the models account for?
7. How do communities that implemented a suite of local homelessness policies (such as preferences, shelter rights, or bus-out policies) relate to comparable locations?
8. Among tight, high-cost housing markets with large renter shares, are there particular conditions that exacerbate or protect against homelessness?
9. Which factors are driving homelessness levels in the west?
10. What data are available for a potential future study on how regulations and land-use policies may be contributing to these problems?

Exhibit A-1 | Mapping of Research Phases and Research Questions

Phases of Research Project	RQs
Phase 1: Build a robust dataset of factors with known influence on homelessness.	RQs 1 through 6
Phase 2: Produce a national model of market predictors of homelessness, accounting for appropriate explanatory and control variables.	RQs 2 through 8
Phase 3: Conduct subgroup analysis at urbanicity-level, for CoCs in tight, high-cost housing markets and CoCs in the west.	RQ 9
Phase 4: Assess the feasibility of a future study on how regulations and land-use policies may be contributing to these problems after controlling for exogenous market forces.	RQs 7 through 10

APPENDIX B: OTHER DATA SOURCES CONSIDERED

Exhibit B-1 presents the variables and data sources not included in the model. These variables had significant limitations that are outlined in the "Explanation" column in the exhibit.

Exhibit B-1 | Data Sources Not Included in Model

Predictors of Homelessness	Data Source	Geography Available	Years Available	Explanation
Housing Domain				
Ratio of unassisted extremely low-income renters to number of turnovers of assisted units annually	HUD Picture of Subsidized Households (PSH); HUD administrative data	County	Unknown	The study team was unable to obtain administrative data related to the number of turnovers.
Per unit (or square foot) construction cost	Lincoln Institute	46 Metropolitan Statistical Areas (MSAs)	1984 through 2016	This data source represents 46 MSAs. In addition, house values are included as a proxy for cost.
Per unit (or square foot) land cost	Lincoln Institute	46 MSAs	1984 through 2016	
Median year home built	ACS	County	2009 through 2017	This variable was dropped during the qualitative review. Originally intended to proxy for housing quality stock, the addition of "Percent of Houses Built Before 1940" raised concerns over redundancy.
Eviction filing rate	Eviction Lab	County	2000 through 2016	This variable was dropped during the qualitative review. The eviction filling rate counts the total number of filed evictions in which multiple evictions can be filed to a single address per year. Thus, formulating a rate by dividing by population or housing units would result in double counting.
Rate of new unit construction	Census Building Permits Survey	County	2009 through 2017	This variable was dropped during the qualitative review. New construction is likely correlated to other housing market and economic variables and may not hold theoretical value.
Economic Domain				

Predictors of Homelessness	Data Source	Geography Available	Years Available	Explanation
Employment rate for low, middle and high skilled workers	ACS	County	2010 through 2017	This variable was dropped during the qualitative review in favor of separate unemployment rate and educational attainment variables.
Safety Net Domain				
Percent of HUD-assisted households with more bedrooms than people	HUD Picture of Subsidized Housing (PSH)	County	2009 through 2018	This variable was dropped during the qualitative review. This measure of over-housing would serve as a proxy for low-income housing disequilibrium. The variable was omitted as HUD suggested the values are largely driven by programmatic requirements and do not reflect the overall population.
People per unit in HUD-assisted households	HUD PSH	County	2009 through 2018	This variable was dropped during the qualitative review in favor of an ACS measure of overcrowded housing. This measure was specific to HUD households rather than the overall population.
Percent of HUD-assisted households with income below 30 percent of local median family income	HUD PSH	County	2009 through 2018	This variable was dropped during the qualitative review. The variable was omitted as HUD suggested this would like driven by programmatic requirements and does not reflect the overall population.
Permanent supportive housing beds[a]	HUD Housing Inventory Counts (HIC)	CoC	2005 through 2018	This variable was dropped during the qualitative review as it may introduce endogeneity through simultaneity. While the number of beds contributes directly to sheltered homeless counts, CoCs experiencing high levels of homelessness may mediate this issue by increasing shelter capacity.
Temporary housing beds[b]	HUD HIC	CoC	2005 through 2018	This variable was dropped during the qualitative review as it may introduce endogeneity through simultaneity. While the number of beds contributes directly to sheltered homeless counts, CoCs experiencing high levels of homelessness may mediate this issue by increasing shelter capacity.
Local Demographic Domain				

Predictors of Homelessness	Data Source	Geography Available	Years Available	Explanation
Population density	Census	County	1980 through 2018	This variable was dropped during the qualitative review as it is presumably correlated to CoC urbanicity.
Domestic violence	Centers for Disease Control and Prevention (CDC)	State	2012	Data are not available at county level.
Drug and alcohol abuse (drug overdose deaths)	CDC	County	1999 through 2016 (CDC)	Sparse data are available at the county level. Excess alcohol consumption and alcohol mortality rates are included in the model.
	Substance Abuse and Mental Health Services Administration (SAMHSA)	State	2002 through 2017 (SAMHSA)	Data are not available at the county level. Interstate CoC would complicate the use of state-level data.
Incarceration rate	Bureau of Justice Statistics	Jurisdiction	1970 through 2015	Data are not available at the county level. Data reported at the jurisdiction level may include multicounty jurisdictions that are incompatible with a Continuum of Care-level dataset.
Prevalence of opioid disorders or deaths	CDC	County	1999 through 2016	Data are not available at the county level. Alcohol consumption and alcohol death rates are included in the model.
Additional Policies Recommended by HUD				
Bus-out policies	The Guardian	25 largest U.S. cities	2011 through 2016	These data represent policies in the largest 25 U.S. cities as of mid-2016, so bus-out policies may potentially not be included in the model for all counties.
Public Housing Authority (PHA) homelessness preference policies	HUD data on PHA homelessness preference policies	PHA	2012	The study team did not include these data due to issues of recency and mapping PHA coverage areas.
Right-to-shelter policies	National Law Center on Homelessness and Poverty	Municipal	2014	A study by the National Law Center on Homelessness and Poverty provides an overview of municipal policies regarding homelessness. The study team's concerns over the consistency of estimation led us to exclude these data. They are discussed, however, in appendix H.

[a] Permanent supportive housing (PSH) beds also include Rapid Re-Housing (RRH), and Other Permanent Housing (OPH).
[b] Temporary housing beds include Emergency Shelter (ES), Transition Housing (TH), and Safe Haven (SH).
ACS = American Community Survey. CDC = Centers for Disease Control and Prevention. HIC = housing inventory counts. MSA = metropolitan statistical area. PHA = public housing authority. PSH = picture of subsidized housing. SAMHSA = Substance Abuse and Mental Health Services Administration.

APPENDIX C: CREATION OF CONTINUUM OF CARE-TO-COUNTY CROSSWALK

HUD provided the study team with three datasets that served as the sources for our updated Continuum of Care (CoC)-to-county crosswalk—

1. Point-in-Time (PIT) data that defined CoC mergers over time.
2. County-to-CoC crosswalk.
3. Urbanicity file that defined CoCs as one of four categories—major city, largely urban largely suburban and largely rural.

The study team used the HUD-provided data to create a unique list of CoCs to be compared with the HUD-provided CoC-to-county crosswalk. This process revealed several inconsistencies between CoC and county geographies, which are outlined in the Data chapter. This section provides a specific account of the relationships between CoCs and counties in the HUD-provided data.

CONTINUUM OF CARE MISSING FROM HUD-PROVIDED CROSSWALK

The first issue the study team encountered was that the HUD-provided crosswalk did not include some CoCs that were included in the other HUD-provided data sources. Several city-based CoCs were absent from the crosswalk, with only the county or balance of state CoC appearing. The following list provides an accounting of the states, counties, and 19 CoCs missing from the HUD-provided crosswalk:

- Arkansas—Sebastian County: Old Fort Homeless Coalition CoC.
- California—Los Angeles County: Pasadena CoC, Long Beach CoC, Glendale CoC.
- Georgia—Fulton County: Atlanta CoC.
- Illinois—Cook County: Chicago CoC.
- Massachusetts—Bristol County: New Bedford CoC, Fall River CoC; Essex County: Lynn CoC; Middlesex County: Somerville CoC, Cambridge CoC, Lowell CoC; Suffolk County: Boston CoC.
- Michigan—Wayne County: Detroit CoC.
- New Hampshire—Hillsborough County: Manchester CoC.
- Nebraska—Lancaster County: Lincoln CoC.
- New Mexico—Bernalillo County: Albuquerque CoC.
- Texas—Potter County and Randall County: Amarillo CoC.
- Oklahoma—Oklahoma County: Oklahoma City CoC.

Each of the 19 CoCs was handled on a case-by-case basis. After identifying the respective counties of each CoC, the study team scrutinized the coverage area of the CoC reported in the crosswalk.

CONTINUUM OF CARE AND COUNTY AGGREGATION ASSUMPTIONS

Exhibit C-1 displays our mapping of CoCs to county data in cases for which multiple CoCs were aggregated due to overlapping geographies and CoC coverage.[76] We also observed several alignment

[76]CoC dashboard reports, which display some county coverage, can be found at https://www.hudexchange.info/programs/coc/coc-dashboard-reports/?filter_Year=&filter_State=AR&filter_CoC=AR-503&program=CoC&group=Dash.

issues for CoCs within Massachusetts. The HUD-provided crosswalk indicated that Middlesex County was jointly covered by a CoC from the Essex County CoC and Massachusetts Balance of State. In addition, several CoCs within counties also existed. Exhibit C-1 outlines our approach to matching these Massachusetts counties to combined CoCs.

Exhibit C-1 | Mapping of Multiple Continuums of Care That Were Combined to County

State	County	CoC Name	Combined CoC Name
Arkansas	Sebastian	AR-508 Old Fort Homeless Coalition	AR-503 Arkansas Balance of State CoC
		AR-503 Arkansas Balance of State CoC	
California	Los Angeles	CA-600 Los Angeles City and County CoC	CA-600 Los Angeles City and County CoC
		CA-606 Long Beach CoC	
		CA-607 Pasadena CoC	
		CA-612 Glendale CoC	
Georgia	DeKalb and Fulton	GA-500 Atlanta/Roswell/DeKalb, Fulton Counties CoC (2010–2012)[a]	GA-500 Atlanta/Roswell/DeKalb, Fulton Counties CoC
		GA-502 Fulton County CoC (2013–2017)[a]	
		GA-508 DeKalb County CoC (2013–2017)[a]	
		GA-500 Atlanta CoC (2013–2017)[a]	
Illinois	Cook	IL-511 Cook County CoC	IL-511 Cook County CoC
		IL-510 Chicago CoC	
Massachusetts	Bristol	MA-519 Attleboro/Taunton/Bristol County CoC	MA-519 Attleboro/Taunton/Bristol County CoC
		MA-509 New Bedford CoC	
		MA-515 Fall River CoC	
	Essex	MA-502 Lynn CoC	MA-516 Massachusetts Balance of State CoC
		MA-510 Gloucester, Haverhill, Salem/Essex County CoC	
	Middlesex	MA-508 Lowell CoC	
		MA-509 Cambridge CoC	
		MA-510 Gloucester, Haverhill, Salem/Essex County CoC	
		MA-516 Massachusetts Balance of State	
		MA-517 Somerville CoC	
	Norfolk	MA-516 Massachusetts Balance of State	
	Suffolk	MA-500 Boston CoC	
		MA-516 Massachusetts Balance of State	
Michigan	Wayne	MI-502 Dearborn/Dearborn Heights/Westland/Wayne County CoC	MI-502 Dearborn/Dearborn Heights/Westland/Wayne County CoC
		MI-501 Detroit CoC	
New Hampshire	Hillsborough	NH-502 Nashua/Hillsborough County CoC	NH-502 Nashua/Hillsborough County CoC
		NH-501 Manchester CoC	

[a] The provided PIT data included separate records of "GA-500 Atlanta/Roswell/DeKalb, Fulton Counties" CoC, "GA-500 Atlanta CoC," "GA-502 Fulton County CoC," and "GA-508 DeKalb County CoC," in which the latter three CoCs did not have data for years 2010 through 2012. For consistency across years, we aggregated all CoC and county-level data together.

In other cases, city CoCs served counties that were also served by the balance of state CoC, and the county data were disaggregated from the balance of state to preserve the CoC observation (see exhibit C-2). The study team determined that these cities would have substantial influence in their respective county-level data and combining them with substantively different counties could result in lost precision.

Exhibit C-2 | Counties Reassigned from Balance of State Continuums of Care

State	County	CoC Name	Crosswalk CoC	City Share of County Population
Nebraska	Lancaster	NE-502 Lincoln CoC	NE-500 Nebraska Balance of State	90.53%
New Mexico	Bernalillo	NM-500 Albuquerque CoC	NM-501 New Mexico Balance of State	82.38%
Oklahoma	Oklahoma[a]	OK-502 Oklahoma City CoC[a]	OK-503 Oklahoma Balance of State	65.63%
Texas	Potter	TX-611 Amarillo CoC	TX-607 Texas Balance of State	87.13%
	Randall	TX-611 Amarillo CoC	TX-607 Texas Balance of State	70.58%

[a] Like Amarillo, Texas, the city of Oklahoma City covers portions within Cleveland, Canadian, and Pottawatomie Counties.

Notes: The city share of the county population was derived from the 2010 Decennial Census. These values were obtained from https://www.census.gov/quickfacts/fact/table/US/PST045218 and http://statsamerica.org/CityCountyFinder/Default.aspx.

OTHER GEOGRAPHIC ASSUMPTIONS

When aggregating CoCs with different urbanicity profiles, we assigned the resulting areas the highest level of urbanicity. For example, Chicago CoC (major city) and Cook County CoC (largely suburban) will take on the value of "Major City CoC" when combined.

In addition to missing CoCs, there were also issues regarding CoCs that cross state lines. For most of these cases, we assign the CoC to the state represented in its CoC number. At the request of HUD, we differentiated CoC and county data for "Kansas City, Independence, Lee's Summit/Jackson, Wyandotte Counties CoC" into Missouri and Kansas records.

The HUD-provided PIT data included areas that split and presented counts for the newly formed CoCs. To allow for consistent measurement of the same geographic areas over time, we aggregated areas that experienced splits. This was the case with CA-523 Colusa, Glenn, Trinity Counties CoC that previously contained areas covered by CA-527 Tehama County CoC and CA-529 Lake County CoC.

The HUD-provided PIT data also included a CoC (CA-528) without a CoC title. On further review, we found that this CoC may have served as "Del Norte CoC" but had been combined with "CA-516 Redding/Shasta, Siskiyou, Lassen, Plumas, Del Norte, Modoc, Sierra Counties CoC" during the period of interest from 2010 through 2017. Assuming that CA-528 merged into CA-516, we added all CoC data tied to the former to the latter.

Some areas were intentionally dropped from our dataset under the assumption that they are not serviced by the CoC program. The HUD-provided crosswalk included counties identified as "unassigned" and the crosswalk assigned a CoC ID of "ZZ-999." Exhibit C-3 displays counties that are currently not covered by a CoC.

Exhibit C-3 | Counties That are Not Covered by a Continuum of Care

State	County	Rationale or Assumption
Florida	Baker	Listed as unclaimed in crosswalk
	Dixie	Listed as unclaimed in crosswalk
	Union	Listed as unclaimed in crosswalk
New York	Herkimer	Listed as unclaimed in crosswalk
	Putnam	Listed as unclaimed in crosswalk
Oklahoma	Washita	Listed as unclaimed in crosswalk

APPENDIX D: ADDITIONAL TABLES

ADDITIONAL SUMMARY STATISTICS AND DESCRIPTIVE ANALYSIS

Exhibit D-1 | Population and Point-in-Time (PIT) Counts for All Years, 2010 through 2017

	Total Population	Homeless	Sheltered Homeless	Unsheltered Homeless
Panel A: All Continuums of Care (CoCs)				
2010	306,427,728	630,806	401,865	228,941
2011	309,103,669	618,611	390,924	227,687
2012	311,409,685	616,556	388,516	228,040
2013	313,759,219	584,483	393,049	191,434
2014	316,000,844	570,514	399,434	171,080
2015	318,389,398	558,573	389,847	168,726
2016	320,806,928	544,084	372,049	172,035
2017	323,173,216	548,312	359,669	188,643
Panel B: Major City and Largely Urban CoCs				
2010	106,871,294	316,864	224,274	92,590
2011	106,762,106	308,185	215,863	92,322
2012	107,977,167	307,302	214,884	92,418
2013	109,269,974	307,892	221,648	86,244
2014	110,438,575	309,888	229,868	80,020
2015	111,629,394	313,474	226,129	87,345
2016	112,826,797	311,551	219,405	92,146
2017	113,865,635	323,186	213,934	109,252
Panel C: Largely Suburban CoCs				
2010	97,514,157	177,141	104,626	72,515
2011	98,642,943	177,194	105,518	71,676
2012	99,365,764	173,649	103,050	70,599
2013	100,093,358	155,994	101,915	54,079
2014	100,841,426	149,348	100,209	49,139
2015	101,611,382	138,449	97,091	41,358
2016	102,392,379	129,497	90,074	39,423
2017	103,190,766	126,206	84,397	41,809
Panel D: Largely Rural CoCs				
2010	102,042,277	136,801	72,965	63,836
2011	103,698,620	133,232	69,543	63,689
2012	104,066,754	135,605	70,582	65,023
2013	104,395,887	120,597	69,486	51,111
2014	104,720,843	111,278	69,357	41,921
2015	105,148,622	106,650	66,627	40,023
2016	105,587,752	103,036	62,570	40,466
2017	106,116,815	98,920	61,338	37,582

Notes: The totals are for the population of all 50 states plus the District of Columbia. All U.S. territories are excluded from this analysis.

Sources: Census's intercensal population estimates; HUD PIT count data

Exhibit D-2 | CoCs with Largest Changes in Rates of Homelessness From 2015 to 2017

CoCs with the Largest Increase in Rates of Homelessness (Per 10,000) from 2015 to 2017

	Total Homelessness				Sheltered Homelessness				Unsheltered Homelessness			
	State	CoC Name	2015 Rate	Increase	State	CoC Name	2015 Rate	Increase	State	CoC Name	2015 Rate	Increase
1	CA	Mendocino County	108.4	32.9	CA	Redding/Shasta, Siskiyou, Lassen, Plumas, Del Norte, Modoc, Sierra Counties	7.8	9.2	CA	Imperial County	20.4	36.3
2	CA	Imperial County	31.0	32.8	CA	Chico/Paradise/Butte County	12.8	7.1	CA	Mendocino County	91.0	32.1
3	FL	Pasco County	21.1	29.7	FL	Tallahassee/Leon County	14.8	6.8	FL	Pasco County	17.8	29.5
4	CA	Chico/Paradise /Butte County	25.5	27.2	OR	Portland-Gresham-Multnomah County	24.6	6.7	CA	Inyo, Mono, Alpine Counties	13.4	21.5
5	CA	Inyo, Mono, Alpine Counties	15.8	20.6	NY	Albany City & County	18.7	6.4	CA	Chico/Paradise/Butte County	12.7	20.1

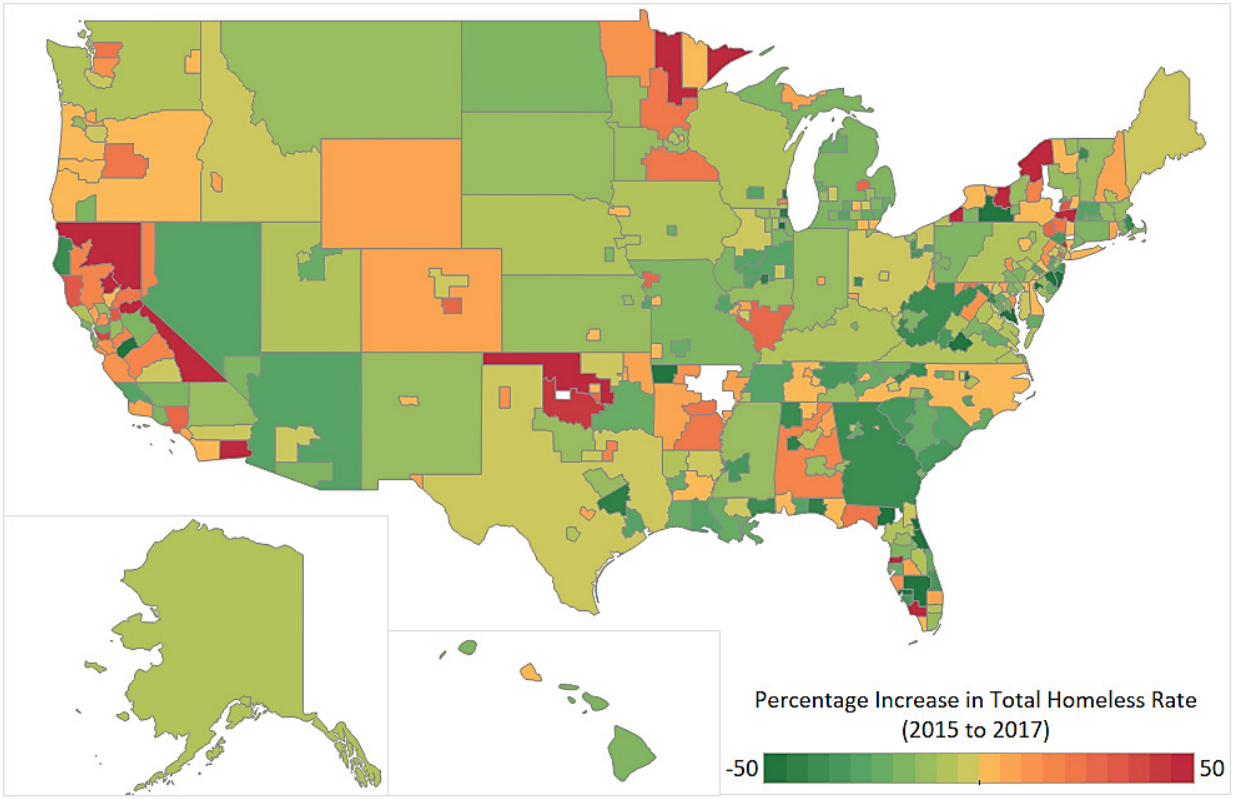
CoCs with the Largest Decrease in Rates of Homelessness (Per 10,000) from 2015 to 2017

	Total Homelessness				Sheltered Homelessness				Unsheltered Homelessness			
	State	CoC Name	2015 Rate	Decrease	State	CoC Name	2015 Rate	Decrease	State	CoC Name	2015 Rate	Decrease
5	FL	Punta Gorda/Charlotte County	33.4	-20.9	NY	Elmira/Steuben, Allegany, Livingston, Chemung, Schuyler Counties	15.1	-9.0	CA	Merced City & County	28.0	-16.9
4	FL	Hendry, Hardee, Highlands Counties	48.3	-24.8	MA	Quincy/Brockton/Weymouth/Plymouth City and County	35.0	-14.4	FL	Hendry, Hardee, Highlands Counties	37.3	-17.3
3	CA	Humboldt County	87.7	-32.1	MA	Springfield	63.7	-15.6	FL	St. Johns County	44.2	-32.9
2	FL	St. Johns County	53.3	-34.3	NC	Durham City & County	26.0	-16.5	CA	Humboldt County	69.5	-37.7
1	FL	Columbia, Hamilton, Lafayette, Suwannee Counties	82.9	-46.0	NJ	Burlington County	29.7	-17.2	FL	Columbia, Hamilton, Lafayette, Suwannee Counties	78.0	-48.3

Notes: The "2015 Rate" is the rate of homelessness for each type in 2015 per 10,000 population. The "Increase" and "Decrease" represent the change (per 10,000) from 2015 to 2017.

Sources: Census's intercensal population estimates; HUD PIT count data

Exhibit D-3 | Map of Percentage Increase in Total Homelessness Rate from 2015 to 2017



Notes: The "Increase" represents the change (per 10,000) from 2015 to 2017.
Sources: Census's intercensal population estimates; HUD PIT count data

Exhibit D-4 | List of CoCs by Urbanicity Category

CoC Number	CoC Name
	Largely Rural CoCs
AK-501	Alaska Balance of State CoC
AL-502	Florence/Northwest Alabama CoC
AL-505	Gadsden/Northeast Alabama CoC
AL-507	Alabama Balance of State CoC
AR-503	Arkansas Balance of State CoC [a]
AR-504	Delta Hills CoC
AR-505	Southeast Arkansas
AR-512	Boone, Baxter, Marion, Newton Counties CoC
AZ-500	Arizona Balance of State CoC
CA-506	Salinas/Monterey, San Benito Counties CoC
CA-509	Mendocino County CoC
CA-516	Redding/Shasta, Siskiyou, Lassen, Plumas, Del Norte, Modoc, Sierra Counties CoC
CA-519	Chico/Paradise/Butte County CoC
CA-522	Humboldt County CoC
CA-523	Lake County CoC
CA-526	Amador, Calaveras, Tuolumne and Mariposa Counties CoC
CA-530	Inyo, Mono, Alpine Counties CoC
CO-500	Colorado Balance of State CoC
FL-508	Gainesville/Alachua, Putnam Counties CoC
FL-515	Panama City/Bay, Jackson Counties CoC
FL-517	Hendry, Hardee, Highlands Counties CoC
FL-518	Columbia, Hamilton, Lafayette, Suwannee Counties CoC
FL-604	Monroe County CoC
GA-501	Georgia Balance of State CoC
HI-500	Hawaii Balance of State CoC
IA-501	Iowa Balance of State CoC
ID-501	Idaho Balance of State
IL-512	Bloomington/Central Illinois CoC
IL-515	South Central Illinois CoC
IL-518	Rock Island/Moline/Northwestern Illinois CoC
IL-519	West Central Illinois CoC
IL-520	Southern Illinois CoC
IN-502	Indiana Balance of State CoC
KS-507	Kansas Balance of State CoC
KY-500	Kentucky Balance of State CoC
LA-500	Lafayette/Acadiana CoC
LA-505	Monroe/Northeast Louisiana CoC
LA-507	Alexandria/Central Louisiana CoC
MD-510	Garrett County CoC
MD-511	Mid-Shore Regional CoC
MD-513	Wicomico/Somerset/Worcester County CoC
ME-500	Maine Balance of State CoC
MI-500	Michigan Balance of State CoC
MI-511	Lenawee County CoC
MI-512	Grand Traverse, Antrim, Leelanau Counties CoC
MI-513	Marquette, Alger Counties CoC
MI-517	Jackson City & County CoC
MN-502	Rochester/Southeast Minnesota CoC
MN-504	Northeast Minnesota CoC
MN-505	St. Cloud/Central Minnesota CoC

CoC Number	CoC Name
MN-506	Northwest Minnesota CoC
MN-508	Moorhead/West Central Minnesota CoC
MN-509	Duluth/St. Louis County CoC
MN-511	Southwest Minnesota CoC
MO-602	Joplin/Jasper, Newton Counties CoC
MO-606	Missouri Balance of State CoC
MS-501	Mississippi Balance of State CoC
MS-503	Gulf Port/Gulf Coast Regional CoC
MT-500	Montana Statewide CoC
NC-503	North Carolina Balance of State CoC
NC-516	Northwest North Carolina CoC
ND-500	North Dakota Statewide CoC
NE-500	Nebraska Balance of State CoC
NH-500	New Hampshire Balance of State CoC
NM-501	New Mexico Balance of State CoC
NV-502	Nevada Balance of State CoC
NY-501	Elmira/Steuben, Allegany, Livingston, Chemung, Schuyler Counties CoC
NY-504	Cattaraugus County CoC
NY-506	Fulton, Montgomery, Schoharie Counties CoC
NY-510	Ithaca/Tompkins County CoC
NY-511	Binghamton, Union/Broome, Otsego, Chenango, Delaware, Cortland, Tioga Counties CoC
NY-513	Wayne, Ontario, Seneca, Yates Counties CoC
NY-514	Jamestown/Dunkirk/Chautauqua County CoC
NY-516	Clinton County CoC
NY-518	Utica/Rome/Oneida, Madison Counties CoC
NY-519	Columbia/Greene County CoC
NY-520	Franklin County CoC
NY-522	Jefferson/Lewis/St. Lawrence Counties CoC
NY-607	Sullivan County CoC
NY-608	Kingston/Ulster County CoC
OH-507	Ohio Balance of State CoC
OK-500	North Central Oklahoma CoC
OK-503	Oklahoma Balance of State CoC
OK-505	Northeast Oklahoma CoC
OK-506	Southwest Oklahoma Regional CoC
OK-507	Southeastern Oklahoma Regional CoC
OR-503	Central Oregon CoC
OR-505	Oregon Balance of State CoC
PA-509	Eastern Pennsylvania CoC
PA-601	Western Pennsylvania CoC
SC-503	Myrtle Beach/Sumter City & County CoC
SD-500	South Dakota Statewide CoC
TN-500	Chattanooga/Southeast Tennessee CoC
TN-503	Central Tennessee CoC
TN-506	Oak Ridge/Upper Cumberland CoC
TN-507	Jackson/West Tennessee CoC
TN-509	Appalachian Regional CoC
TN-512	Morristown/Blount, Sevier, Campbell, Cocke Counties CoC
TX-604	Waco/McLennan County CoC
TX-607	Texas Balance of State (BoS) CoC
TX-624	Wichita Falls/Wise, Palo Pinto, Wichita, Archer Counties CoC
VA-504	Charlottesville CoC
VA-508	Lynchburg CoC
VA-513	Harrisburg, Winchester/Western Virginia CoC

CoC Number	CoC Name
VA-521	Virginia Balance of State (BoS) CoC
VT-500	Vermont Balance of State CoC
WA-501	Washington Balance of State CoC
WI-500	Wisconsin Balance of State CoC
WV-500	Wheeling/Weirton Area CoC
WV-501	Huntington/Cabell, Wayne Counties CoC
WV-508	West Virginia Balance of State CoC
WY-500	Wyoming Statewide CoC
	Largely Suburban CoCs
AL-500	Birmingham/Jefferson, St. Clair, Shelby Counties CoC
CA-504	Santa Rosa/Petaluma/Sonoma County CoC
CA-505	Richmond/Contra Costa County CoC
CA-507	Marin County CoC
CA-508	Watsonville/Santa Cruz City & County CoC
CA-510	Turlock/Modesto/Stanislaus County CoC
CA-512	Daly/San Mateo County CoC
CA-515	Roseville/Rocklin/Placer, Nevada Counties CoC
CA-520	Merced City & County CoC
CA-521	Davis/Woodland/Yolo County CoC
CA-524	Yuba City & County/Sutter County CoC
CA-525	El Dorado County CoC
CA-602	Santa Ana/Anaheim/Orange County CoC
CA-603	Santa Maria/Santa Barbara County CoC
CA-608	Riverside City & County CoC
CA-609	San Bernardino City & County CoC
CA-613	Imperial County CoC
CA-614	San Luis Obispo County CoC
CT-505	Connecticut Balance of State CoC
DE-500	Delaware Statewide CoC
FL-500	Sarasota/Bradenton/Manatee, Sarasota Counties CoC
FL-501	Tampa/Hillsborough County CoC
FL-502	St. Petersburg/Clearwater/Largo/Pinellas County CoC
FL-503	Lakeland/Winter Haven/Polk County CoC
FL-504	Daytona Beach/Daytona/Volusia, Flagler Counties CoC
FL-505	Fort Walton Beach/Okaloosa, Walton Counties CoC
FL-507	Orlando/Orange, Osceola, Seminole Counties CoC
FL-509	Fort Pierce/St. Lucie, Indian River, Martin Counties CoC
FL-511	Pensacola/Escambia/Santa Rosa County CoC
FL-512	St. Johns County CoC
FL-513	Palm Bay/Melbourne/Brevard County CoC
FL-514	Ocala/Marion County CoC
FL-519	Pasco County CoC
FL-520	Citrus, Hernando, Lake, Sumter Counties CoC
FL-601	Ft Lauderdale/Broward County CoC
FL-602	Punta Gorda/Charlotte County CoC
FL-603	Ft Myers/Cape Coral/Lee County CoC
FL-605	West Palm Beach/Palm Beach County CoC
FL-606	Naples/Collier County CoC
GA-506	Marietta/Cobb County CoC
HI-501	Honolulu CoC
IL-500	McHenry County CoC
IL-501	Rockford/Winnebago, Boone Counties CoC
IL-502	Waukegan/North Chicago/Lake County CoC

CoC Number	CoC Name
IL-504	Madison County CoC
IL-506	Joliet/Bolingbrook/Will County CoC
IL-507	Peoria/Perkin/Fulton, Peoria, Tazewell, Woodford CoC
IL-508	East Saint Louis/Belleville/Saint Clair County CoC
IL-509	Dekalb City & County CoC
IL-514	DuPage County CoC
IL-517	Aurora/Elgin/Kane County CoC
KS-505	Overland Park/Shawnee/Johnson County CoC
LA-506	Slidell/Southeast Louisiana CoC
LA-509	Houma-Terrebonne, Thibodaux CoC
MA-503	Cape Cod/Islands CoC
MA-504	Springfield CoC
MA-506	Worcester City & County CoC
MA-507	Pittsfield/Berkshire County CoC
MA-511	Quincy/Brockton/Weymouth/Plymouth City and County CoC
MA-519	Attleboro/Taunton/Bristol County CoC [a]
MD-500	Cumberland/Allegany County CoC
MD-502	Harford County CoC
MD-503	Annapolis/Anne Arundel County CoC
MD-504	Howard County CoC
MD-505	Baltimore County CoC
MD-506	Carroll County CoC
MD-507	Cecil County CoC
MD-508	Charles, Calvert, St. Mary's Counties CoC
MD-509	Frederick City & County CoC
MD-512	Hagerstown/Washington County CoC
MD-600	Prince George`s County/Maryland CoC
MD-601	Montgomery County CoC
MI-503	St. Clair Shores/Warren/Macomb County CoC
MI-504	Pontiac/Royal Oak/Oakland County CoC
MI-505	Flint/Genesee County CoC
MI-509	Ann Arbor/Washtenaw County CoC
MI-510	Saginaw City & County CoC
MI-515	Monroe City & County CoC
MI-516	Norton Shores/Muskegon City & County CoC
MI-518	Livingston County CoC
MI-519	Holland/Ottawa County CoC
MI-523	Eaton County CoC
MN-503	Dakota, Anoka, Washington, Scott, Carver Counties CoC
MO-500	St. Louis County CoC
MO-503	St. Charles, Lincoln, Warren Counties CoC
MS-500	Jackson/Rankin, Madison Counties CoC
NC-501	Asheville/Buncombe County CoC
NC-506	Wilmington/Brunswick, New Hanover, Pender Counties CoC
NC-509	Gastonia/Cleveland, Gaston, Lincoln Counties CoC
NJ-500	Atlantic City & County CoC
NJ-501	Bergen County CoC
NJ-502	Burlington County CoC
NJ-503	Camden City/Camden, Cumberland, Gloucester, Cape May Counties CoC
NJ-504	Newark/Essex County CoC
NJ-506	Jersey City/Bayonne/Hudson County CoC
NJ-507	New Brunswick/Middlesex County CoC
NJ-508	Monmouth County CoC
NJ-509	Morris County CoC

CoC Number	CoC Name
NJ-510	Lakewood Township/Ocean County CoC
NJ-511	Paterson/Passaic County CoC
NJ-512	Salem County CoC
NJ-513	Somerset County CoC
NJ-514	Trenton/Mercer County CoC
NJ-515	Elizabeth/Union County CoC
NJ-516	Warren, Sussex, Hunterdon Counties CoC
NY-500	Rochester/Irondequoit/Greece/Monroe County CoC
NY-503	Albany City & County CoC
NY-505	Syracuse, Auburn/Onondaga, Oswego, Cayuga Counties CoC
NY-507	Schenectady City & County CoC
NY-508	Buffalo, Niagara Falls/Erie, Niagara, Orleans, Genesee, Wyoming Counties CoC
NY-512	Troy/Rensselaer County CoC
NY-523	Glens Falls/Saratoga Springs/Saratoga, Washington, Warren, Hamilton Counties CoC
NY-601	Poughkeepsie/Dutchess County CoC
NY-602	Newburgh/Middletown/Orange County CoC
NY-603	Nassau, Suffolk Counties/Babylon/Islip/ Huntington CoC
NY-604	Yonkers/Mount Vernon/New Rochelle/Westchester CoC
NY-606	Rockland County CoC
OH-500	Cincinnati/Hamilton County CoC
OH-502	Cleveland/Cuyahoga County CoC
OH-505	Dayton/Kettering/Montgomery County CoC
OH-506	Akron/Barberton/Summit County CoC
OH-508	Canton/Massillon/Alliance/Stark County CoC
OK-504	Norman/Cleveland County CoC
OR-502	Medford/Ashland/Jackson County CoC
OR-506	Hillsboro/Beaverton/Washington County CoC
OR-507	Clackamas County CoC
PA-501	Harrisburg/Dauphin County CoC
PA-502	Upper Darby/Chester/Haverford/Delaware County CoC
PA-503	Wilkes-Barre/Hazleton/Luzerne County CoC
PA-504	Lower Marion/Norristown/Abington/Montgomery County CoC
PA-505	Chester County CoC
PA-506	Reading/Berks County CoC
PA-508	Scranton/Lackawanna County CoC
PA-510	Lancaster City & County CoC
PA-511	Bristol/Bensalem/Bucks County CoC
PA-512	York City & County CoC
PA-600	Pittsburgh/McKeesport/Penn Hills/Allegheny County CoC
PA-603	Beaver County CoC
PA-605	Erie City & County CoC
PR-502	Puerto Rico Balance of Commonwealth CoC
PR-503	South/Southeast Puerto Rico CoC
RI-500	Rhode Island Statewide CoC
SC-500	Charleston/Low Country CoC
SC-501	Greenville/Anderson/Spartanburg Upstate CoC
SC-502	Columbia/Midlands CoC
TN-502	Knoxville/Knox County CoC
TN-510	Murfreesboro/Rutherford County CoC
UT-500	Salt Lake City & County CoC
UT-503	Utah Balance of State CoC
UT-504	Provo/Mountainland CoC
VA-500	Richmond/Henrico, Chesterfield, Hanover Counties CoC
VA-501	Norfolk/Chesapeake/Suffolk/Isle of Wight, Southampton Counties CoC

CoC Number	CoC Name
VA-502	Roanoke City & County/Salem CoC
VA-514	Fredericksburg/Spotsylvania, Stafford Counties CoC
VA-601	Fairfax County CoC
VA-602	Loudoun County CoC
VA-604	Prince William County CoC
WA-503	Tacoma/Lakewood/Pierce County CoC
WA-504	Everett/Snohomish County CoC
WA-508	Vancouver/Clark County CoC
WI-502	Racine City & County CoC
WV-503	Charleston/Kanawha, Putnam, Boone, Clay Counties CoC
	Largely Urban and Major City CoCs
AK-500	Anchorage CoC
AL-501	Mobile City & County/Baldwin County CoC
AL-503	Huntsville/North Alabama CoC
AL-504	Montgomery City & County CoC
AL-506	Tuscaloosa City & County CoC
AR-500	Little Rock/Central Arkansas CoC
AR-501	Fayetteville/Northwest Arkansas CoC
AZ-501	Tucson/Pima County CoC
AZ-502	Phoenix/Mesa/Maricopa County Regional CoC
CA-500	San Jose/Santa Clara City & County CoC
CA-501	San Francisco CoC
CA-502	Oakland/Alameda County CoC
CA-503	Sacramento City & County CoC
CA-511	Stockton/San Joaquin County CoC
CA-513	Visalia, Kings, Tulare Counties CoC
CA-514	Fresno/Madera County CoC
CA-517	Napa City & County CoC
CA-518	Vallejo/Solano County CoC
CA-600	Los Angeles City & County CoC [a]
CA-601	San Diego City and County CoC
CA-604	Bakersfield/Kern County CoC
CA-611	Oxnard/San Buenaventura/Ventura County CoC
CO-503	Metropolitan Denver Homeless Initiative CoC
CO-504	Colorado Springs/El Paso County CoC
CT-503	Bridgeport/Norwalk /Stamford/Fairfield County CoC
DC-500	District of Columbia CoC
FL-506	Tallahassee/Leon County CoC
FL-510	Jacksonville-Duval, Clay Counties CoC
FL-600	Miami/Dade County CoC
GA-500	Atlanta/Roswell/DeKalb, Fulton Counties CoC [a]
GA-503	Athens/Clarke County CoC
GA-504	Augusta CoC
GA-505	Columbus-Muscogee/Russell County CoC
GA-507	Savannah/Chatham County CoC
IA-500	Sioux City/Dakota, Woodbury Counties CoC
IA-502	Des Moines/Polk County CoC
ID-500	Boise/Ada County CoC
IL-503	Champaign/Urbana/Rantoul/Champaign County CoC
IL-511	Cook County CoC [a]
IL-513	Springfield/Sangamon County CoC
IL-516	Decatur/Macon County CoC
IN-503	Indianapolis CoC
KS-502	Wichita/Sedgwick County CoC

CoC Number	CoC Name
KS-503	Topeka/Shawnee County CoC
KY-501	Louisville/Jefferson County CoC
KY-502	Lexington/Fayette County CoC
LA-502	Shreveport/Bossier/Northwest CoC
LA-503	New Orleans/Jefferson Parish CoC
MA-516	Massachusetts Balance of State CoC [a]
MD-501	Baltimore City CoC
MI-502	Dearborn/Dearborn Heights/Westland/Wayne County CoC [a]
MI-506	Grand Rapids/Wyoming/Kent County CoC
MI-507	Portage/Kalamazoo City & County CoC
MI-508	Lansing/East Lansing/Ingham County CoC
MI-514	Battle Creek/Calhoun County CoC
MN-500	Minneapolis/Hennepin County CoC
MN-501	Saint Paul/Ramsey County CoC
MO-501	St. Louis City CoC
MO-600	Springfield/Greene, Christian, Webster Counties CoC
MO-603	St. Joseph/Andrew, Buchanan, DeKalb Counties CoC
MO-604K	Kansas City/Wyandotte County CoC (Kansas)
MO-604M	Kansas City/Independence/Lee's Summit/Jackson County CoC (Missouri)
NC-500	Winston Salem/Forsyth County CoC
NC-502	Durham City & County CoC
NC-504	Greensboro/High Point CoC
NC-505	Charlotte/Mecklenberg CoC
NC-507	Raleigh/Wake County CoC
NC-511	Fayetteville/Cumberland County CoC
NC-513	Chapel Hill/Orange County CoC
NE-501	Omaha/Council Bluffs CoC
NE-502	Lincoln CoC
NH-502	Nashua/Hillsborough County CoC [a]
NM-500	Albuquerque CoC
NV-500	Las Vegas/Clark County CoC
NV-501	Reno/Sparks/Washoe County CoC
NY-600	New York City CoC
OH-501	Toledo/Lucas County CoC
OH-503	Columbus/Franklin County CoC
OH-504	Youngstown/Mahoning County CoC
OK-501	Tulsa City & County/Broken Arrow CoC
OK-502	Oklahoma City CoC
OR-500	Eugene/Springfield/Lane County CoC
OR-501	Portland-Gresham-Multnomah County CoC
PA-500	Philadelphia CoC
TN-501	Memphis/Shelby County CoC
TN-504	Nashville/Davidson County CoC
TX-500	San Antonio/Bexar County CoC
TX-503	Austin/Travis County CoC
TX-600	Dallas City & County/Irving CoC
TX-601	Fort Worth/Arlington/Tarrant County CoC
TX-603	El Paso City & County CoC
TX-611	Amarillo CoC
TX-700	Houston, Pasadena, Conroe/Harris, Ft. Bend, Montgomery, Counties CoC
TX-701	Bryan/College Station/Brazos Valley CoC
VA-503	Virginia Beach CoC
VA-505	Newport News/Hampton/Virginia Peninsula CoC
VA-507	Portsmouth CoC

CoC Number	CoC Name
VA-600	Arlington County CoC
VA-603	City of Alexandria CoC
VT-501	Burlington/Chittenden County CoC
WA-500	Seattle/King County CoC
WA-502	Spokane City & County CoC
WI-501	Milwaukee City & County CoC
WI-503	Madison/Dane County CoC

[a] Aggregated CoCs described in appendix C

Exhibit D-5 | Summary Statistics for CoC-Level Climate Variables, by Urbanicity

Variables in Climate Domain	All CoCs		Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Average January Temperature (°F)	39.1	12.1	40.4	10.8	40.3	11.8	36.2	13.1
Average June, July, and August Temperature (°F)	75.2	5.9	76.6	5.8	75.2	5.5	73.8	6.2
Total January Precipitation (Inches)	4.4	3.7	4.4	3.3	4.5	3.8	4.2	3.8
Total Annual Precipitation (Inches)	39.4	13.7	37.4	15.2	40.4	13.0	39.9	13.0

Notes: These estimates represent the weighted average temperature and precipitation for each CoC for January 2017 and the average summer and annual precipitation from 2016. Estimates represent the population of all 50 states plus the District of Columbia. All U.S. territories are excluded from this analysis. Summer temperature represents the average temperature for June, July, and August.

NATIONAL MODEL ADDITIONAL REGRESSION TABLES

Exhibit D-6 presents regression estimates of factors associated with total, sheltered, and unsheltered homelessness, where the independent variables are the same across all specifications and represent the union of all variables included in the model in the National model of Homelessness chapter. These estimates show that the national models of total, sheltered, and unsheltered homelessness are robust to the inclusion of additional independent variables. Notably, there are more significant variables associated with unsheltered homelessness, with the share of HUD-assisted units and the share of children in the population significant in the current model.

Exhibit D-6 | Regression Estimates of National-Level Model Using a Consistent Set of Independent Variables

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index	0.03	(0.06)	-0.01	(0.05)	0.04	(0.03)
Percentage of Homeowners with Cost Burden	-0.09	(0.28)	-0.41*	(0.21)	0.32	(0.23)
Natural Logarithm of Median Rent ($100s)	17.81*	(9.87)	32.04***	(9.78)	-14.23	(10.39)
Median Rental Utility Cost ($10s)	0.12	(0.32)	0.44	(0.29)	-0.32	(0.34)
Percentage of Renters with Cost Burden	0.02	(0.24)	-0.28	(0.20)	0.30	(0.18)
Percentage of Renter-Occupied Units	0.15	(0.25)	0.35	(0.25)	-0.20	(0.13)
Rental Vacancy Rate	0.05	(0.28)	0.02	(0.24)	0.03	(0.24)
High Housing Density CoC	-3.81**	(1.71)	-2.75*	(1.62)	-1.06	(0.98)
Eviction Rate	0.46	(0.31)	0.66*	(0.38)	-0.20	(0.29)
Change in Eviction Rate	-0.01	(0.36)	0.28	(0.43)	-0.29	(0.30)
Percentage of Overcrowded Housing Units	5.52***	(0.88)	2.31***	(0.71)	3.21***	(1.04)
Urban CoC	1.70	(2.30)	0.72	(1.99)	0.97	(1.03)
Suburban CoC	-2.81	(2.12)	-1.62	(1.42)	-1.19	(1.14)
Economic Domain						
Unemployment Rate	0.17	(1.00)	-0.34	(0.50)	0.51	(0.74)
Gini Coefficient of Income Inequality	-0.82*	(0.42)	-0.78**	(0.34)	-0.04	(0.35)
Poverty Rate	0.07	(0.78)	1.02**	(0.41)	-0.95*	(0.54)
Safety Net Domain						
Share of HUD-Assisted Units	2.92***	(0.70)	3.90***	(0.65)	-0.98**	(0.45)
Occupancy Rate of HUD-Assisted Units	-0.11	(0.20)	0.06	(0.09)	-0.18	(0.17)
Percentage of Houses Built Before 1940	0.15	(0.11)	0.10	(0.11)	0.05	(0.09)
Demographic Domain						
Percentage African-American	-0.13	(0.17)	-0.03	(0.13)	-0.10	(0.08)
Percentage Hispanic	-0.30***	(0.11)	-0.24***	(0.08)	-0.05	(0.05)
Percentage Asian	-0.26	(0.32)	-0.42**	(0.21)	0.16	(0.17)
Percentage Children (Age 0 through 19)	-0.92*	(0.54)	-0.33	(0.55)	-0.59**	(0.24)
Percentage Senior (Age 65 and Older)	-0.07	(0.39)	0.55	(0.47)	-0.62***	(0.21)
Percentage Female	0.56	(1.83)	1.95*	(1.10)	-1.39	(1.20)
Net-Migration Rate	2.86**	(1.33)	2.20**	(1.00)	0.66	(0.78)
Change in Net-Migration Rate	2.58*	(1.42)	0.16	(0.94)	2.43**	(0.95)
Percentage of One-Person Households	1.27*	(0.68)	0.21	(0.40)	1.07**	(0.44)
Percentage of Under 18 Population in Single-Parent Households	-0.22	(0.50)	-0.58	(0.35)	0.36	(0.28)
Percentage Veteran (25 and Older)	0.03	(0.35)	-0.61*	(0.36)	0.64**	(0.27)
Percentage without a Bachelor's Degree	-0.07	(0.24)	0.14	(0.15)	-0.21	(0.24)
Healthcare Costs ($1,000s)	0.14	(0.93)	-0.24	(0.73)	0.39	(0.57)
Alcohol Mortality (Per 100,000)	0.94	(0.85)	1.25*	(0.64)	-0.32	(0.45)
Excessive Drinking Rate	-0.07	(0.41)	0.46*	(0.24)	-0.52	(0.36)

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Climate Domain						
Average January Temperature (°F)	-0.07	(0.14)	-0.16	(0.12)	0.09	(0.07)
Average June, July, and August Temperature (°F)	0.14	(0.29)	0.34*	(0.20)	-0.20	(0.22)
Total January Precipitation (Inches)	0.47	(0.34)	-0.39**	(0.18)	0.85***	(0.22)
Total Annual Precipitation (Inches)	0.09	(0.07)	0.11**	(0.04)	-0.02	(0.05)
Intercept	-48.59	(102.10)	-174.34***	(59.49)	125.75	(92.36)
Observations	**374**		**374**		**374**	
R-Squared	**0.82**		**0.81**		**0.68**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the union of variables across all outcomes of interest (total, sheltered, or unsheltered homelessness) included in the national model in the National Model of Homelessness chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category.

Exhibit D-7 presents regression estimates where the share of homes built prior to 1940 is used as an instrument for federal CoC funding, following the approach used in Lucas (2017) and Popov (2016). As mentioned previously, the relationship between CoC funding and rates of total, sheltered, and unsheltered homelessness is endogenous because CoC funding may directly impact homelessness. The share of homes built prior to 1940 is used as an instrument because it is a part of the CoC funding formula but is otherwise unrelated to rates of homelessness. The independent variables included in these specifications are the same as those included in the national model in the National Model of Homelessness chapter. These results indicate using the share of homes built prior to 1940 as an instrument for CoC funding does not change the interpretation of the coefficients. In particular, federal CoC funding is not a significant factor associated with rates of total, sheltered, and unsheltered homelessness in the national model.

Exhibit D-7 | Instrumental Variables Regression Estimates of National-Level Model

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index					0.07**	(0.03)
Percentage of Homeowners with Cost Burden	-0.17	(0.23)	-0.42**	(0.20)	0.34*	(0.18)
Natural Logarithm of Median Rent ($100s)	17.77**	(7.31)	28.20***	(8.66)	-13.07*	(7.37)
Median Rental Utility Cost ($10s)			0.43	(0.30)	-0.31	(0.26)
Percentage of Renters with Cost Burden	0.13	(0.21)	-0.22	(0.19)	0.34**	(0.16)
Percentage of Renter-Occupied Units	0.24	(0.22)	0.46**	(0.20)	-0.20	(0.13)
Rental Vacancy Rate	0.06	(0.30)	0.09	(0.21)	0.09	(0.22)
High Housing Density CoC	-4.03**	(1.60)	-2.93**	(1.25)	-1.34	(1.02)
Eviction Rate	0.19	(0.34)	0.57	(0.36)		
Change in Eviction Rate					-0.38	(0.26)
Percentage of Overcrowded Housing Units	3.45**	(1.52)	1.04	(1.18)	2.21**	(0.97)
Urban CoC	-0.04	(2.59)	-0.46	(1.72)	0.53	(1.35)
Suburban CoC	-1.91	(1.64)	-0.91	(1.35)	-0.09	(0.86)
Economic Domain						
Unemployment Rate	0.40	(1.16)	-0.28	(0.54)	0.59	(0.83)
Gini Coefficient of Income Inequality	-0.94***	(0.23)	-0.98***	(0.36)		
Poverty Rate	0.02	(0.59)	1.05***	(0.35)	-0.79*	(0.44)

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Safety Net Domain						
Share of HUD-Assisted Units	3.21***	(0.61)	4.18***	(0.65)	-0.64*	(0.36)
Occupancy Rate of HUD-Assisted Units	-0.12	(0.17)	0.05	(0.08)	-0.20	(0.17)
Federal CoC Funding ($100,000s)	0.02	(0.01)	0.01	(0.01)	0.01	(0.01)
Demographic Domain						
Percentage African-American	-0.12	(0.12)	-0.01	(0.11)	-0.04	(0.04)
Percentage Hispanic	-0.24**	(0.10)	-0.21***	(0.08)	-0.00	(0.06)
Percentage Asian	-0.09	(0.23)	-0.35*	(0.20)	0.24*	(0.13)
Percentage Children (Age 0 through 19)	-0.12	(0.78)	0.23	(0.59)	-0.34	(0.45)
Percentage Senior (Age 65 and Older)	0.20	(0.39)	0.97*	(0.51)	-0.55***	(0.21)
Percentage Female			0.98	(0.74)	-1.77	(1.59)
Net-Migration Rate	3.35***	(1.16)	1.92**	(0.97)		
Change in Net-Migration Rate	1.25	(1.26)			2.61***	(0.92)
Percentage of One-Person Households	1.34**	(0.56)			1.18***	(0.35)
Percent of Under 18 Population in Single-Parent Households	-0.31	(0.36)	-0.55*	(0.31)		
Percentage Veteran (25 and Older)			-0.50	(0.37)	0.69***	(0.26)
Percentage without a Bachelor's Degree					-0.15	(0.12)
Healthcare Costs ($1,000s)					-0.22	(0.79)
Alcohol Mortality (Per 100,000)	1.52*	(0.91)	1.68**	(0.68)		
Excessive Drinking Rate			0.58***	(0.22)	-0.51**	(0.25)
Climate Domain						
Average January Temperature (°F)	0.07	(0.16)	-0.07	(0.14)	0.14	(0.09)
Average June, July, and August Temperature (°F)	-0.03	(0.25)	0.20	(0.19)	-0.20	(0.13)
Total January Precipitation (Inches)	0.45	(0.32)	-0.40**	(0.19)	0.80***	(0.18)
Total Annual Precipitation (Inches)	0.06	(0.06)	0.10**	(0.05)		
Intercept	-36.06	(35.53)	-118.55***	(38.68)	132.29	(91.85)
Observations	**374**		**374**		**374**	
R-Squared	**0.82**		**0.81**		**0.69**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the variables selected for the subgroup and outcome of interest using the procedures outlined in the Empirical Strategy chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category.

Exhibit D-8 presents unweighted regression estimates of the national model for the set of independent variables used in the National Model of Homelessness chapter. These results are quantitatively and qualitatively like those in that chapter; however, the significance of some variables differs from those in the main body of the report. Notably, median rent is not significant in these specifications.

Exhibit D-8 | Unweighted Regression Estimates of National-Level Model

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index					0.02	(0.06)
Percentage of Homeowners with Cost Burden	0.02	(0.28)	-0.20	(0.16)	0.24	(0.20)
Natural Logarithm of Median Rent ($100s)	14.80	(9.51)	13.13*	(7.04)	5.93	(6.03)
Median Rental Utility Cost ($10s)			0.16	(0.21)	-0.28	(0.34)
Percentage of Renters with Cost Burden	0.18	(0.22)	0.01	(0.19)	0.09	(0.13)
Percentage of Renter-Occupied Units	0.06	(0.25)	0.02	(0.19)	0.09	(0.09)
Rental Vacancy Rate	-0.03	(0.28)	0.22	(0.15)	-0.18	(0.25)
High Housing Density CoC	-4.21***	(1.51)	-2.31**	(1.08)	-0.72	(0.84)
Eviction Rate	0.33	(0.33)	0.14	(0.24)		
Change in Eviction Rate					-0.32	(0.30)
Percentage of Overcrowded Housing Units	3.00***	(1.00)	1.71**	(0.78)	0.98*	(0.54)
Urban CoC	-1.92	(3.44)	1.60	(1.62)	-2.85	(2.21)
Suburban CoC	-4.80**	(2.12)	-0.98	(1.06)	-3.26**	(1.60)
Economic Domain						
Unemployment Rate	1.31	(0.98)	-0.25	(0.45)	1.49**	(0.66)
Gini Coefficient of Income Inequality	-0.11	(0.33)	0.17	(0.25)		
Poverty Rate	-0.74	(0.53)	-0.02	(0.30)	-0.60	(0.44)
Safety Net Domain						
Share of HUD-Assisted Units	2.17***	(0.72)	2.01***	(0.60)	0.04	(0.26)
Occupancy Rate of HUD-Assisted Units	-0.20	(0.21)	0.02	(0.06)	-0.21	(0.24)
Percentage of Houses Built Before 1940	0.17	(0.11)	0.19***	(0.07)		
Demographic Domain						
Percentage African-American	-0.21	(0.16)	-0.08	(0.07)	-0.17**	(0.08)
Percentage Hispanic	-0.13	(0.12)	-0.14**	(0.06)	-0.06	(0.06)
Percentage Asian	-0.13	(0.23)	-0.22	(0.17)	0.02	(0.14)
Percentage Children (Age 0 through 19)	0.07	(0.73)	-0.46	(0.42)	0.76*	(0.38)
Percentage Senior (Age 65 and Older)	-0.21	(0.33)	-0.08	(0.23)	0.06	(0.21)
Percentage Female			0.29	(0.53)	-1.27*	(0.72)
Net-Migration Rate	1.65	(1.40)	1.67	(1.05)		
Change in Net-Migration Rate	2.26**	(1.06)			2.09***	(0.77)
Percentage of One-Person Households	1.44*	(0.81)			1.18*	(0.62)
Percent of Under 18 Population in Single-Parent Households	-0.11	(0.39)	0.12	(0.19)		
Percentage Veteran (25 and Older)			-0.10	(0.21)	0.07	(0.22)
Percentage without a Bachelor's Degree					0.09	(0.07)
Healthcare Costs ($1,000s)					-0.56	(0.40)
Alcohol Mortality (Per 100,000)	2.15***	(0.74)	1.34***	(0.35)		
Excessive Drinking Rate			0.40	(0.25)	-0.04	(0.26)
Climate Domain						
Average January Temperature (°F)	0.27	(0.17)	-0.10	(0.12)	0.36***	(0.12)
Average June, July, and August Temperature (°F)	-0.00	(0.31)	0.20	(0.21)	-0.19	(0.15)
Total January Precipitation (Inches)	0.86***	(0.23)	0.05	(0.11)	0.82***	(0.16)
Total Annual Precipitation (Inches)	0.00	(0.07)	-0.01	(0.04)		
Intercept	-65.28*	(35.47)	-61.78*	(35.21)	15.24	(38.49)
Observations	**374**		**374**		**374**	
R-Squared	**0.58**		**0.56**		**0.53**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are unweighted. Independent variables represent the variables selected for the subgroup and outcome of interest

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	

using the procedures outlined in the Empirical Strategy chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category.

Exhibit D-9 presents unweighted regression estimates of factors associated with total, sheltered, and unsheltered homelessness, where the independent variables are the same across all specifications and represent the union of all variables included in the models in the National Model of Homelessness chapter. These estimates are in line with those presented in that chapter.

Exhibit D-9 | Unweighted Regression Estimates of National-Level Model Using a Consistent Set of Independent Variables

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index	0.04	(0.09)	0.04	(0.05)	0.00	(0.06)
Percentage of Homeowners with Cost Burden	0.06	(0.26)	-0.18	(0.12)	0.23	(0.22)
Natural Logarithm of Median Rent ($100s)	20.57**	(9.87)	18.39**	(7.13)	2.18	(6.27)
Median Rental Utility Cost ($10s)	-0.06	(0.37)	0.16	(0.19)	-0.22	(0.35)
Percentage of Renters with Cost Burden	0.08	(0.27)	-0.05	(0.20)	0.13	(0.13)
Percentage of Renter-Occupied Units	0.10	(0.29)	-0.05	(0.23)	0.15	(0.10)
Rental Vacancy Rate	-0.05	(0.30)	0.20	(0.17)	-0.25	(0.23)
High Housing Density CoC	-4.21***	(1.51)	-2.31**	(1.08)	-0.72	(0.84)
Eviction Rate	0.45	(0.39)	0.14	(0.26)	0.31	(0.32)
Change in Eviction Rate	-0.38	(0.45)	-0.07	(0.25)	-0.32	(0.32)
Percentage of Overcrowded Housing Units	2.31**	(1.07)	1.52**	(0.68)	0.80	(0.73)
Urban CoC	-1.57	(3.44)	1.95	(1.51)	-3.52	(2.34)
Suburban CoC	-4.26*	(2.18)	-0.55	(1.00)	-3.70**	(1.78)
Economic Domain						
Unemployment Rate	1.27	(0.99)	-0.23	(0.46)	1.50**	(0.66)
Gini Coefficient of Income Inequality	0.07	(0.45)	0.38	(0.26)	-0.32	(0.37)
Poverty Rate	-0.66	(0.70)	0.00	(0.34)	-0.66	(0.46)
Safety Net Domain						
Share of HUD-Assisted Units	2.50***	(0.79)	2.00***	(0.62)	0.50	(0.40)
Occupancy Rate of HUD-Assisted Units	-0.21	(0.23)	0.01	(0.06)	-0.22	(0.22)
Percentage of Houses Built Before 1940	0.13	(0.11)	0.20***	(0.07)	-0.07	(0.06)
Demographic Domain						
Percentage African-American	-0.20	(0.18)	-0.09	(0.08)	-0.11	(0.13)
Percentage Hispanic	-0.18	(0.11)	-0.15**	(0.07)	-0.03	(0.06)
Percentage Asian	-0.12	(0.27)	-0.19	(0.18)	0.08	(0.15)
Percentage Children (Age 0 through 19)	0.25	(0.77)	-0.58	(0.46)	0.83**	(0.41)
Percentage Senior (Age 65 and Older)	-0.03	(0.33)	-0.33	(0.28)	0.30*	(0.15)
Percentage Female	-0.93	(1.24)	0.48	(0.70)	-1.42*	(0.75)
Net-Migration Rate	1.28	(1.33)	1.10	(1.00)	0.19	(0.70)
Change in Net-Migration Rate	2.46**	(1.04)	0.82	(0.67)	1.63**	(0.69)
Percentage of One-Person Households	1.34	(0.81)	0.16	(0.29)	1.18*	(0.65)
Percent of Under 18 Population in Single-Parent Households	-0.14	(0.40)	0.05	(0.23)	-0.18	(0.30)
Percentage Veteran (25 and Older)	-0.32	(0.32)	-0.14	(0.21)	-0.18	(0.18)
Percentage without a Bachelor's Degree	0.21	(0.17)	0.18*	(0.09)	0.03	(0.14)
Healthcare Costs ($1,000s)	-0.81	(1.02)	-0.66	(0.82)	-0.15	(0.46)

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Alcohol Mortality (Per 100,000)	2.05***	(0.70)	1.26***	(0.37)	0.79*	(0.43)
Excessive Drinking Rate	0.39	(0.45)	0.33	(0.25)	0.06	(0.30)
Climate Domain						
Average January Temperature (°F)	0.28*	(0.16)	-0.13	(0.12)	0.40***	(0.10)
Average June, July, and August Temperature (°F)	0.09	(0.28)	0.30	(0.20)	-0.21	(0.16)
Total January Precipitation (Inches)	0.83***	(0.23)	0.01	(0.10)	0.82***	(0.16)
Total Annual Precipitation (Inches)	0.00	(0.08)	0.00	(0.04)	0.00	(0.05)
Intercept	-55.59	(59.80)	-92.94**	(46.27)	37.35	(51.07)
Observations	**374**		**374**		**374**	
R-Squared	**0.59**		**0.57**		**0.55**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are unweighted. Independent variables represent the union of variables across all outcomes of interest (total, sheltered, or unsheltered homelessness) included in the national model in the National Model of Homelessness chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category.

Exhibit D-10 presents unweighted regression estimates where the share of homes built prior to 1940 is used as an instrument for federal CoC funding. The independent variables in these specifications are the same as those in the models in the National Model of Homelessness chapter. These results indicate using the share of homes built prior to 1940 as an instrument for CoC funding does not change the interpretation of the coefficients. Median rent, however, is insignificant across all specifications, as in the unweighted national model presented in exhibit D-8. In this specification, federal CoC funding is a significant factor associated with rates of sheltered homelessness in the national model but as expected, is not significant for rates of total or unsheltered homelessness. The results indicate that higher rates of CoC funding are associated with high rates of sheltered homelessness.

Exhibit D-10 | Unweighted Instrumental Variables Regression Estimates of National-Level Model

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index					0.03	(0.07)
Percentage of Homeowners with Cost Burden	-0.03	(0.21)	-0.29	(0.18)	0.21	(0.26)
Natural Logarithm of Median Rent ($100s)	12.53	(8.39)	11.40	(7.01)	4.69	(7.48)
Median Rental Utility Cost ($10s)			0.16	(0.24)	-0.28	(0.36)
Percentage of Renters with Cost Burden	0.34*	(0.20)	0.19	(0.15)	-0.04	(0.23)
Percentage of Renter-Occupied Units	0.22	(0.21)	0.23	(0.17)	0.08	(0.13)
Rental Vacancy Rate	0.06	(0.30)	0.27*	(0.15)	-0.22	(0.24)
High Housing Density CoC	-5.78***	(2.17)	-3.61***	(1.07)	-0.25	(1.06)
Eviction Rate	0.15	(0.34)	0.02	(0.23)		
Change in Eviction Rate					-0.13	(0.31)
Percentage of Overcrowded Housing Units	1.38	(1.16)	-0.18	(0.86)	1.94	(1.27)
Urban CoC	-3.72	(3.47)	0.19	(1.72)	-2.38	(2.23)
Suburban CoC	-4.42**	(2.15)	-0.19	(1.08)	-4.47***	(1.63)
Economic Domain						
Unemployment Rate	1.66	(1.20)	0.05	(0.64)	1.10*	(0.61)
Gini Coefficient of Income Inequality	-0.42	(0.26)	-0.06	(0.19)		

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Poverty Rate	-0.98**	(0.48)	-0.32	(0.25)	-0.45	(0.49)
Safety Net Domain						
Share of HUD-Assisted Units	2.19***	(0.71)	2.11***	(0.56)	0.16	(0.27)
Occupancy Rate of HUD-Assisted Units	-0.28	(0.22)	-0.08	(0.07)	-0.13	(0.23)
Federal CoC Funding ($100,000s)	0.05	(0.03)	0.05**	(0.02)	-0.04	(0.03)
Demographic Domain						
Percentage African-American	-0.25*	(0.15)	-0.11	(0.07)	-0.13	(0.08)
Percentage Hispanic	-0.12	(0.13)	-0.14*	(0.08)	-0.05	(0.06)
Percentage Asian	-0.18	(0.22)	-0.28*	(0.16)	0.09	(0.17)
Percentage Children (Age 0 through 19)	0.75	(0.83)	0.25	(0.51)	0.27	(0.58)
Percentage Senior (Age 65 and Older)	0.02	(0.31)	0.29	(0.32)	-0.03	(0.29)
Percentage Female			-0.73	(0.48)	-0.25	(1.27)
Net-Migration Rate	0.92	(1.47)	0.79	(0.97)		
Change in Net-Migration Rate	2.05**	(0.95)			2.22***	(0.72)
Percentage of One-Person Households	1.58**	(0.68)			1.07*	(0.63)
Percent of Under 18 Population in Single-Parent Households	-0.20	(0.42)	0.10	(0.20)		
Percentage Veteran (25 and Older)			-0.17	(0.23)	0.08	(0.24)
Percentage without a Bachelor's Degree					0.08	(0.09)
Healthcare Costs ($1,000s)					0.85	(1.29)
Alcohol Mortality (Per 100,000)	2.50***	(0.82)	1.67***	(0.40)		
Excessive Drinking Rate			0.37	(0.27)	0.14	(0.32)
Climate Domain						
Average January Temperature (°F)	0.38**	(0.16)	0.01	(0.08)	0.31***	(0.11)
Average June, July, and August Temperature (°F)	-0.16	(0.21)	0.06	(0.13)	-0.23	(0.18)
Total January Precipitation (Inches)	0.86***	(0.24)	0.06	(0.11)	0.76***	(0.13)
Total Annual Precipitation (Inches)	-0.03	(0.07)	-0.04	(0.04)		
Intercept	-60.01	(38.66)	-8.47	(27.49)	-30.29	(67.48)
Observations	**374**		**374**		**374**	
R-Squared	**0.56**		**0.42**		**0.42**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are unweighted. Independent variables represent the variables selected for the subgroup and outcome of interest using the procedures outlined in the Empirical Strategy chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category.

URBANICITY SUBGROUP ADDITIONAL REGRESSION TABLES

Exhibit D-11 presents regression estimates for urban CoCs, where the independent variables are the same across all specifications and represent the union of all variables included in the models in the National Model of Homelessness chapter. These results indicate that the inclusion of additional independent variables does not tend to change the interpretation of most coefficients. In the model of total homelessness, however, median rent and unemployment lose significance, and the share of HUD-assisted units becomes significant.

Exhibit D-11 | Regression Estimates of Model for Urban CoCs Using a Consistent Set of Independent Variables

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index	-0.07	(0.14)	-0.02	(0.11)	-0.05	(0.08)
Percentage of Homeowners with Cost Burden	-0.39	(0.86)	-1.28**	(0.58)	0.90*	(0.45)
Natural Logarithm of Median Rent ($100s)	32.74*	(19.32)	39.95***	(14.43)	-7.21	(10.84)
Percentage of Renters with Cost Burden	-0.89**	(0.37)	-0.49*	(0.28)	-0.40	(0.29)
Percentage of Renter-Occupied Units	0.15	(0.38)	0.89**	(0.38)	-0.74***	(0.22)
Rental Vacancy Rate	0.10	(0.50)	-0.52	(0.53)	0.63**	(0.30)
High Housing Density CoC	-7.10***	(2.43)	-8.57***	(2.62)	1.47	(1.95)
Change in Eviction Rate	0.70	(0.65)	1.24**	(0.55)	-0.54	(0.49)
Percentage of Overcrowded Housing Units	6.42***	(1.01)	2.28***	(0.80)	4.14***	(0.92)
Economic Domain						
Unemployment Rate	-1.65	(1.77)	0.82	(1.14)	-2.48**	(1.11)
Gini Coefficient of Income Inequality	0.47	(0.67)	0.98*	(0.49)	-0.51	(0.48)
Poverty Rate	0.93	(0.77)	0.48	(0.64)	0.45	(0.47)
Safety Net Domain						
Percentage of Households Receiving Cash Assistance	0.79	(1.07)	0.10	(1.20)	0.69	(0.68)
Share of HUD-Assisted Units	2.32**	(0.96)	3.50***	(0.89)	-1.18**	(0.48)
Occupancy Rate of HUD-Assisted Units	0.16	(0.26)	-0.15	(0.30)	0.30	(0.19)
Demographic Domain						
Percentage African-American	0.04	(0.21)	0.02	(0.20)	0.02	(0.13)
Percentage Hispanic	-0.28	(0.17)	-0.12	(0.11)	-0.15	(0.12)
Percentage Asian	-0.13	(0.40)	-0.34	(0.28)	0.20	(0.25)
Percentage Children (Age 0 through 19)	-3.11**	(1.32)	-1.40	(1.42)	-1.71*	(1.01)
Percentage Senior (Age 65 and Older)	-1.28	(1.25)	-0.07	(1.55)	-1.21	(1.02)
Percentage Female	1.69	(1.54)	3.71***	(1.32)	-2.01*	(1.05)
Net-Migration Rate	7.35***	(1.96)	5.68***	(1.83)	1.68	(1.34)
Percentage of One-Person Households	0.72	(0.83)	-0.77	(0.69)	1.49***	(0.38)
Percentage without a Bachelor's Degree	0.59**	(0.24)	0.44	(0.29)	0.15	(0.19)
Alcohol Mortality (Per 100,000)	1.33	(1.12)	1.86**	(0.83)	-0.54	(0.63)
Excessive Drinking Rate	-0.72	(0.69)	-0.04	(0.55)	-0.68	(0.41)
Climate Domain						
Average January Temperature (°F)	-0.20	(0.23)	-0.53**	(0.20)	0.33	(0.21)
Average June, July, and August Temperature (°F)	-0.43	(0.43)	0.40	(0.32)	-0.82**	(0.32)
Total January Precipitation (Inches)	-0.43	(0.45)	-0.93**	(0.37)	0.50	(0.32)
Total Annual Precipitation (Inches)	0.12	(0.10)	0.28***	(0.07)	-0.16**	(0.07)
Intercept	-69.54	(84.72)	-283.43***	(71.49)	213.89** *	(70.77)
Observations	**104**		**104**		**104**	
R-Squared	**0.93**		**0.93**		**0.88**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the union of variables across all outcomes of interest (total, sheltered, or unsheltered homelessness) included in the national model in the National Model of Homelessness chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Percentage White is the omitted race/ethnicity category and percentage adult is the omitted age category. A list of CoCs by urbanicity is listed in appendix D.

Exhibit D-12 presents regression estimates for suburban CoCs, where the independent variables are the same across all specifications and represent the union of all variables included in the models in the National Model of Homelessness chapter. These results indicate that the inclusion of additional independent variables does not change the interpretation of the regression coefficients.

Exhibit D-12 | Regression Estimates of Model for Suburban CoCs Using a Consistent Set of Independent Variables

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
Percentage of Homeowners with Cost Burden	-0.36**	(0.17)	-0.15	(0.17)	-0.21	(0.12)
Natural Logarithm of Median Rent ($100s)	8.80	(7.53)	2.79	(5.18)	6.01	(3.82)
Percentage of Renters with Cost Burden	0.61*	(0.34)	0.37*	(0.20)	0.24	(0.17)
Percentage of Renter-Occupied Units	0.17	(0.24)	-0.01	(0.18)	0.19	(0.12)
Rental Vacancy Rate	0.21	(0.32)	0.32	(0.22)	-0.11	(0.18)
High Housing Density CoC	-2.12	(1.92)	-0.09	(1.15)	-2.03	(1.27)
Economic Domain						
Unemployment Rate	1.78	(1.32)	-0.65	(0.80)	2.44***	(0.65)
Gini Coefficient of Income Inequality	-0.25	(0.53)	-0.11	(0.34)	-0.14	(0.35)
Poverty Rate	-1.18*	(0.60)	-0.52	(0.37)	-0.66**	(0.29)
Safety Net Domain						
Percentage of Households Receiving Cash Assistance	0.31	(0.93)	-0.03	(0.53)	0.35	(0.66)
Share of HUD-Assisted Units	2.70**	(1.26)	1.87*	(0.95)	0.83	(0.55)
Occupancy Rate of HUD-Assisted Units	-0.10	(0.14)	-0.03	(0.10)	-0.06	(0.08)
Percentage of Houses Built Before 1940	-0.04	(0.12)	0.08	(0.08)	-0.12	(0.08)
Demographic Domain						
Percentage African-American	-0.04	(0.15)	-0.09	(0.09)	0.04	(0.14)
Percentage Hispanic	0.04	(0.13)	0.04	(0.09)	-0.01	(0.07)
Percentage Asian	-0.11	(0.30)	-0.08	(0.11)	-0.04	(0.25)
Net-Migration Rate	-3.29	(1.99)	-1.58*	(0.92)	-1.71	(1.53)
Change in Net-Migration Rate	4.11***	(1.40)	0.90	(0.89)	3.21***	(0.92)
Percentage of One-Person Households	0.69*	(0.36)	0.07	(0.16)	0.62**	(0.26)
Percent of Under 18 Population in Single-Parent Households	-0.55	(0.47)	0.02	(0.22)	-0.57	(0.40)
Percentage without a Bachelor's Degree	0.08	(0.19)	0.04	(0.13)	0.04	(0.12)
Healthcare Costs ($1,000s)	-1.47	(1.00)	-0.89*	(0.45)	-0.59	(0.63)
Alcohol Mortality (Per 100,000)	2.49**	(1.09)	1.06**	(0.41)	1.43	(0.94)
Climate Domain						
Average January Temperature (°F)	0.59***	(0.15)	0.21**	(0.09)	0.38***	(0.12)
Average June, July, and August Temperature (°F)	-0.42*	(0.21)	-0.21	(0.16)	-0.21*	(0.12)
Total January Precipitation (Inches)	0.53*	(0.27)	0.05	(0.10)	0.48**	(0.18)
Total Annual Precipitation (Inches)	-0.10	(0.06)	-0.03	(0.04)	-0.07**	(0.03)
Intercept	-9.20	(43.59)	7.57	(31.86)	-16.77	(25.32)
Observations	**160**		**160**		**160**	
R-Squared	**0.61**		**0.52**		**0.61**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the union of variables across all outcomes of interest (total, sheltered, or unsheltered homelessness) included in the national model in the National Model of Homelessness chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Percentage White is the omitted race/ethnicity category and percentage adult is the omitted age category. A list of CoCs by urbanicity is listed in appendix D.

Exhibit D-13 presents regression estimates for rural CoCs, where the independent variables are the same across all specifications and represent the union of all variables included in the models in the National Model of Homelessness chapter. These results indicate that the inclusion of additional independent variables does not change the interpretation of the regression coefficients.

Exhibit D-13 | Regression Estimates of Model for Rural CoCs Using a Consistent Set of Independent Variables

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)					
	Total		Sheltered		Unsheltered	
Housing Domain						
House Price Index	0.23***	(0.08)	0.02	(0.04)	0.21**	(0.09)
Percentage of Homeowners with Cost Burden	0.77***	(0.21)	0.38**	(0.17)	0.40**	(0.15)
Natural Logarithm of Median Rent ($100s)	-0.66	(9.64)	6.67*	(3.71)	-7.32	(8.61)
Median Rental Utility Cost ($10s)	-0.52	(0.35)	-0.13	(0.15)	-0.39	(0.38)
Percentage of Renters with Cost Burden	0.78***	(0.29)	0.24**	(0.10)	0.54**	(0.25)
Percentage of Renter-Occupied Units	0.91***	(0.21)	0.17*	(0.10)	0.74***	(0.18)
Rental Vacancy Rate	0.32	(0.40)	0.12	(0.11)	0.20	(0.38)
Percentage of Overcrowded Housing Units	0.56	(0.93)	0.37	(0.40)	0.19	(0.91)
Economic Domain						
Unemployment Rate	-0.62	(0.80)	0.08	(0.38)	-0.70	(0.76)
Poverty Rate	-1.24***	(0.34)	-0.33	(0.22)	-0.90***	(0.32)
Safety Net Domain						
Percentage of Households Receiving Cash Assistance	0.30	(0.76)	0.42	(0.38)	-0.12	(0.65)
Share of HUD-Assisted Units	-0.57	(0.92)	0.13	(0.62)	-0.70	(0.80)
Occupancy Rate of HUD-Assisted Units	-0.06	(0.15)	-0.01	(0.06)	-0.04	(0.14)
Demographic Domain						
Percentage African-American	-0.30**	(0.15)	-0.15**	(0.07)	-0.15	(0.14)
Percentage Hispanic	-0.19*	(0.10)	-0.12***	(0.03)	-0.07	(0.10)
Percentage Asian	0.03	(0.40)	-0.25	(0.22)	0.29	(0.42)
Percentage Children (Age 0 through 19)	1.51*	(0.85)	0.82**	(0.34)	0.69	(0.85)
Percentage Senior (Age 65 and Older)	1.06*	(0.56)	0.17	(0.19)	0.89*	(0.52)
Percentage of One-Person Households	1.41*	(0.82)	1.04***	(0.21)	0.38	(0.81)
Percent of Under 18 Population in Single-Parent Households	-0.22	(0.45)	-0.07	(0.21)	-0.15	(0.37)
Percentage Veteran (25 and Older)	-1.34***	(0.37)	-0.25	(0.30)	-1.09***	(0.33)
Percentage without a Bachelor's Degree	0.61**	(0.28)	0.08	(0.14)	0.53**	(0.20)
Alcohol Mortality (Per 100,000)	1.51**	(0.63)	0.07	(0.39)	1.44**	(0.56)
Climate Domain						
Average January Temperature (°F)	0.48*	(0.26)	0.12	(0.07)	0.36	(0.23)
Average June, July, and August Temperature (°F)	-0.53*	(0.27)	-0.14	(0.14)	-0.39	(0.27)
Total January Precipitation (Inches)	0.50*	(0.29)	-0.17	(0.15)	0.67**	(0.25)
Intercept	-139.57***	(51.74)	-69.68***	(21.40)	-69.90	(46.97)

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)		
	Total	Sheltered	Unsheltered
Observations	**110**	**110**	**110**
R-Squared	**0.82**	**0.79**	**0.72**

Notes: Regression models include an intercept and state dummy variables. Robust standard errors in parentheses are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. For ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS, and estimates for 2012 correspond to the 2007 through 2011 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; percentage adult is the omitted age category; and percentage with bachelor's degree or higher is the omitted education category.

TIGHT, HIGH-COST RENTAL MARKET SUBGROUP ADDITIONAL REGRESSION TABLES

Exhibit D-14 presents regression estimates for CoCs in tight, high-cost rental markets, where the independent variables are the same across all specifications and represent the union of all variables included in the models in the National Model of Homelessness chapter. These results indicate that the inclusion of additional independent variables does not change the interpretation of the regression coefficients. There are more significant variables, however, in the economic and safety net domains related to unsheltered homelessness.

Exhibit D-14 | Regression Estimates of Model for CoCs in Tight, High-Cost Rental Markets Using a Consistent Set of Independent Variables

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)											
	Total				Sheltered				Unsheltered			
	Other CoCs		CoCs in Tight, High-Cost Rental Markets		Other CoCs		CoCs in Tight, High-Cost Rental Markets		Other CoCs		CoCs in Tight, High-Cost Rental Markets	
Housing Domain												
House Price Index	0.07	(0.06)	-0.08	(0.10)	0.00	(0.04)	-0.04	(0.10)	0.07	(0.04)	-0.04	(0.09)
Percentage of Homeowners with Cost Burden	0.25	(0.16)	-1.47**	(0.56)	0.04	(0.10)	-0.09	(0.21)	0.21**	(0.10)	-1.38***	(0.38)
Median Rental Utility Cost ($10s)	0.08	(0.23)	0.26	(0.78)	0.04	(0.16)	-0.02	(0.45)	0.03	(0.16)	0.28	(0.74)
Percentage of Renters with Cost Burden	0.36***	(0.13)	1.19	(0.81)	0.27**	(0.11)	0.29	(0.52)	0.09	(0.06)	0.90	(0.61)
High Housing Density CoC	-1.99	(1.36)	-12.98**	(6.04)	-0.82	(0.87)	-5.09	(3.38)	-1.16	(0.92)	-7.90**	(3.11)
Eviction Rate	-0.37	(0.26)	4.69***	(1.70)	-0.18	(0.18)	5.34***	(1.24)	-0.19	(0.18)	-0.65	(0.68)
Change in Eviction Rate	-0.04	(0.26)	1.89	(1.45)	-0.16	(0.18)	8.80***	(2.62)	0.12	(0.17)	-6.92***	(2.16)
Percentage of Overcrowded Housing Units	0.68	(0.97)	6.87**	(2.71)	1.11**	(0.50)	2.80	(2.86)	-0.44	(0.66)	4.07	(2.47)
Urban CoC	1.37	(1.45)	13.01	(9.19)	1.99**	(0.88)	10.08**	(4.38)	-0.62	(0.84)	2.93	(6.25)
Suburban CoC	-0.98	(1.51)	2.92	(12.67)	0.27	(0.84)	5.06	(5.39)	-1.25	(0.93)	-2.14	(7.76)
Economic Domain												
Unemployment Rate	0.30	(1.17)	9.56***	(2.22)	-0.53	(0.45)	5.72***	(1.00)	0.83	(0.80)	3.84**	(1.83)
Gini Coefficient of Income Inequality	-0.46	(0.30)	2.30**	(0.94)	-0.15	(0.26)	0.34	(0.67)	-0.32	(0.23)	1.96**	(0.74)
Poverty Rate	-0.30	(0.45)	-1.01	(1.90)	-0.31	(0.32)	-1.25	(1.55)	0.01	(0.19)	0.23	(0.76)
Safety Net Domain												
Share of HUD-Assisted Units	1.93**	(0.73)	-2.99	(2.05)	0.93*	(0.55)	0.62	(0.97)	1.00**	(0.41)	-3.61**	(1.38)
Occupancy Rate of HUD-Assisted Units	0.01	(0.09)	-1.31***	(0.46)	-0.03	(0.06)	-0.38	(0.49)	0.04	(0.06)	-0.93***	(0.29)
Percentage of Houses Built Before 1940	-0.00	(0.09)	0.51**	(0.20)	0.13**	(0.06)	0.00	(0.14)	-0.13***	(0.04)	0.51***	(0.16)
Demographic Domain												
Percentage African-American	-0.11	(0.15)	0.22	(0.47)	-0.13*	(0.08)	-0.03	(0.37)	0.02	(0.10)	0.24*	(0.14)
Percentage Hispanic	-0.03	(0.08)	-0.67	(0.40)	-0.06	(0.04)	-0.57	(0.37)	0.04	(0.06)	-0.09	(0.23)
Percentage Asian	0.58	(0.37)	0.01	(0.33)	-0.06	(0.16)	-0.36	(0.29)	0.64**	(0.27)	0.36*	(0.21)
Percentage Children (Age 0 through 19)	0.10	(0.41)	-2.37	(1.57)	-0.09	(0.33)	-0.87	(0.95)	0.19	(0.27)	-1.50	(1.28)
Percentage Senior (Age 65 and Older)	-0.12	(0.25)	2.17*	(1.16)	-0.34	(0.20)	1.71***	(0.52)	0.21	(0.16)	0.46	(1.11)
Percentage Female	-1.14	(1.09)	-2.55	(3.68)	0.07	(0.41)	-0.70	(2.05)	-1.21	(0.98)	-1.85	(2.77)
Net-Migration Rate	2.87**	(1.09)	0.93	(5.93)	1.81**	(0.73)	7.41**	(3.21)	1.06	(0.69)	-6.47	(6.07)
Change in Net-Migration Rate	1.11	(1.18)	-13.66***	(4.91)	-0.41	(0.67)	-14.70***	(3.46)	1.52*	(0.84)	1.03	(4.63)
Percentage of One-Person Households	0.89**	(0.37)	0.69	(1.33)	0.39	(0.24)	0.45	(0.86)	0.50*	(0.26)	0.24	(0.65)
Percentage of Under-18 Population in Single-Parent Households	0.21	(0.49)	0.66	(0.65)	0.34	(0.25)	0.63	(0.49)	-0.13	(0.37)	0.03	(0.56)
Percentage Veteran (25 and Older)	0.17	(0.22)	1.69	(1.26)	0.13	(0.11)	-1.31	(0.94)	0.05	(0.18)	3.00***	(0.52)
Percentage without a Bachelor's Degree	-0.06	(0.15)	-0.39	(0.30)	-0.08	(0.10)	0.11	(0.14)	0.03	(0.12)	-0.49*	(0.27)
Healthcare Costs ($1,000s)	-0.42	(0.84)	3.72**	(1.39)	-0.16	(0.39)	0.77	(1.52)	-0.26	(0.60)	2.95**	(1.38)
Alcohol Mortality (Per 100,000)	1.20*	(0.61)	2.26	(1.36)	0.76***	(0.27)	2.35**	(0.98)	0.44	(0.46)	-0.08	(1.11)

Independent Variables	2017 Homelessness Rate (Per 10,000 Population)											
	Total				Sheltered				Unsheltered			
	Other CoCs		CoCs in Tight, High-Cost Rental Markets		Other CoCs		CoCs in Tight, High-Cost Rental Markets		Other CoCs		CoCs in Tight, High-Cost Rental Markets	
Excessive Drinking Rate	-0.14	(0.24)	-1.02	(0.77)	-0.08	(0.11)	-0.84	(0.56)	-0.06	(0.17)	-0.17	(0.50)
Climate Domain												
Average January Temperature (°F)	0.01	(0.18)	-0.07	(0.85)	-0.04	(0.08)	0.15	(0.35)	0.05	(0.12)	-0.23	(0.80)
Average June, July, and August Temperature (°F)	-0.11	(0.28)	0.30	(1.34)	-0.06	(0.12)	0.12	(0.85)	-0.05	(0.22)	0.18	(1.06)
Total January Precipitation (Inches)	0.28	(0.21)	0.22	(1.32)	0.10	(0.08)	-1.03	(0.89)	0.18	(0.15)	1.24	(1.03)
Total Annual Precipitation (Inches)	-0.02	(0.07)	0.55***	(0.14)	-0.02	(0.03)	0.16**	(0.07)	-0.01	(0.05)	0.39***	(0.11)
Intercept	41.80	(53.44)			0.63	(25.21)			41.18	(58.43)		
Observations	**374**				**374**				**374**			
R-Squared	**0.91**				**0.94**				**0.83**			

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the union of variables across all outcomes of interest (total, sheltered, or unsheltered homelessness) included in the national model in the National Model of Homelessness chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category.

WEST CENSUS REGION SUBGROUP REGRESSION TABLES

Exhibit D-15 presents regression estimates of unsheltered homelessness for CoCs in the West Census region, where the independent variables are the same as those included in the models in the National Model of Homelessness chapter. States in the West Census region include Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. This model is an alternative to the specification presented in the "unsheltered homelessness on the west coast" section of the Subgroup Analysis chapter and sheds light on factors associated with unsheltered homelessness in a broader group of states in the west. These results are quantitatively and qualitatively like those presented in that section, however, the significance of factors varies. Specifically, median rent, poverty, and race and ethnicity are all significant in West Census region CoCs. In contrast, rental vacancy, housing density, unemployment, occupancy of HUD-assisted units, age, the share of women in the population, migration, one-person households, healthcare costs, and January temperatures are only significant in the model of west coast CoCs.

Exhibit D-15 | Regression Estimates of Model for West Census Region CoCs

Independent Variables	2017 Unsheltered Homelessness Rate (Per 10,000 Population)			
	Other Region CoCs		West Census Region CoCs	
Housing Domain				
House Price Index	-0.01	(0.02)	0.62***	(0.01)
Percentage of Homeowners with Cost Burden	0.02	(0.10)	3.74***	(0.20)
Natural Logarithm of Median Rent ($100s)	3.51*	(1.98)	3.39	(14.68)
Median Rental Utility Cost ($10s)	0.03	(0.12)	-0.53	(0.55)
Percentage of Renters with Cost Burden	0.01	(0.06)	-4.73***	(0.44)
Percentage of Renter-Occupied Units	-0.01	(0.09)	-1.17**	(0.49)
Rental Vacancy Rates	0.45***	(0.16)	-4.15***	(0.77)
High Housing Density CoC	-0.58	(0.66)	-13.30***	(2.68)
Change in Eviction Rate	-0.12	(0.13)	-3.40***	(1.00)
Percentage of Overcrowded Housing Units	-0.20	(0.39)	7.07***	(0.57)
Urban CoC	0.01	(0.74)	-5.51	(4.43)
Suburban CoC	-0.37	(0.55)	-14.23***	(4.58)
Economic Domain				
Unemployment Rate	-0.09	(0.35)	-0.77**	(0.29)
Poverty Rate	0.03	(0.13)	5.40***	(1.00)
Safety Net Domain				
Share of HUD-Assisted Units	0.70***	(0.24)	8.62***	(0.70)
Percent of Houses Built Before 1940	-0.07**	(0.03)	-0.93***	(0.18)
Demographic Domain				
Percentage African-American	-0.01	(0.03)	-1.29***	(0.28)
Percentage Hispanic	-0.05**	(0.02)	-0.36**	(0.17)
Percentage Asian	0.05	(0.06)	-0.56***	(0.18)
Percentage Children (Age 0 through 19)	-0.07	(0.19)	-0.54	(0.40)
Percentage Senior (Age 65 and Older)	0.01	(0.11)	-1.61	(1.03)
Percentage Female	-0.85	(0.59)	0.15	(0.83)
Change in Net-Migration Rate	1.07	(0.67)	1.83	(2.77)
Percentage of One-Person Households	0.32	(0.19)	1.66*	(0.89)
Percentage Veteran (25 and Older)	0.09	(0.08)	0.85	(0.60)
Percentage without a Bachelor's Degree	0.02	(0.04)	-0.47**	(0.21)
Healthcare Costs ($1,000s)	-0.22	(0.27)	-0.11	(1.19)
Excessive Drinking Rate	0.01	(0.06)	-3.25***	(0.47)
Climate Domain				
Average January Temperature (°F)	0.13***	(0.05)	-0.07	(0.14)
Average June, July, and August Temperature (°F)	0.05	(0.12)	0.69***	(0.24)
Total January Precipitation (Inches)	-0.39***	(0.12)	0.70***	(0.23)
Intercept	21.87		(33.60)	

Independent Variables	2017 Unsheltered Homelessness Rate (Per 10,000 Population)	
	Other Region CoCs	West Census Region CoCs
Observations	**374**	
R-Squared	**0.87**	

Notes: Each regression model includes an intercept, and robust standard errors (in parentheses) are clustered at the state level. The symbols ***, **, and * represent significance values of $p \leq 0.01$, $p \leq 0.05$, and $p \leq 0.1$, respectively. Regression models are weighted by the population in each CoC. Independent variables represent the variables included in the national model for the outcome of interest (total, sheltered, or unsheltered homelessness) in the National Model of Homelessness chapter. Change variables are calculated by subtracting the 2012 value from the 2016 value for each CoC. ACS variables, ACS 5-year estimates for 2016 correspond to the 2012 through 2016 ACS. Rural CoC is the omitted urbanicity category; percentage White is the omitted race/ethnicity category; and percentage adult is the omitted age category. States in the West Census region include Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

APPENDIX E: VARIABLE SELECTION PROCESS RESULTS

The second step in our variable selection process was used to eliminate redundant variables in terms of overall model fit. The backward *vselect* selection process functioned by regressing on potential explanatory variables and iteratively eliminating until the selected information criteria (adjusted R-squared) no longer improves. This process works in stages where the initial stage contains all specified explanatory variables and the subsequent stages contain a list of remaining variables from the iterative elimination. At each stage, regressions omitting a single predictor from the list of remaining variables are run. The variable omitted in the highest performing model—in terms of the adjusted R-squared—will then be eliminated. This process continues until the adjusted R-squared is no longer improved by the omission of any remaining variables. To ensure that key variables would not be omitted from the final models, we fixed the regressions of each stage to include 10 variables. When the resulting *vselect* variable list included partial sets of categorical variables, we added the eliminated categorical variables into the final models for interpretability.

As the number of observations substantially differ between models, we ran different stepwise elimination processes for national and urbanicity-specific models. For each of the three national models (national model, tight high-cost rental markets, and west coast), we ran the elimination process across all variables. Because the urbanicity models contained far fewer observations, a stricter elimination process was needed to preserve degrees of freedom. The models for urbanicity followed a two-step process in which the first stepwise elimination was conducted within each domain. The resulting mix of variables for each domain was then run through another elimination process across all the remaining variables. We did not run additional stepwise elimination processes for tight, high-cost rental markets and west coast CoCs analyses. These models included the resulting variables identified in the corresponding national model selection. As the tight, high-cost rental market indicator was constructed from median home value, median rent, rental vacancy rate, and rental share values, we excluded these from the regressions. The final model variables are outlined in exhibit E-1 through exhibit E-3.

Exhibit E-1 | Variable Selection Results for Total Homelessness (Per 10,000 population)

Independent Variables	Qualitative Review	National	Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs		Tight Rental Markets
			Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	
Housing Domain									
Natural Logarithm of Median Home Value ($1,000s)									
House Price Index	✓						✓	✓	
Percentage of Homeowners with Cost Burden	✓	✓			✓	✓	✓	✓	✓
Natural Logarithm of Median Rent ($100s)	✓	✓	✓	✓	✓	✓	✓	✓	
Change in Median Rent ($100s)									
Median Rental Utility Cost ($10s)	✓		✓		✓		✓	✓	
Percentage of Renters with Cost Burden	✓	✓	✓	✓	✓	✓	✓	✓	✓
Median Year Home Built									
Percentage of Renter-Occupied Units	✓	✓	✓	✓	✓	✓	✓	✓	
Rental Vacancy Rate	✓	✓	✓	✓	✓	✓	✓	✓	
High Housing Density CoC	✓	✓	✓	✓	✓	✓			✓
Eviction Rate	✓	✓			✓		✓		✓
Change in Eviction Rate	✓		✓	✓					
Eviction Filing Rate									
Percentage of Overcrowded Housing Units	✓	✓							✓
Permitted Units as a Share of Total Units									
Percentage of Urban CoCs	✓	✓							✓
Percentage of Suburban CoCs	✓	✓							✓
Economic Domain									
Natural Logarithm of Median Income ($1,000s)									
Change in Median Income ($10,000s)									
Unemployment Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Employment Rate for Middle-Skilled Workers									
Gini Coefficient of Income Inequality	✓	✓	✓	✓	✓		✓		✓
Poverty Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Safety Net Domain									
Percentage of Households Receiving Cash Assistance	✓		✓	✓	✓		✓		
Percentage of Households Eligible for EITC									
SSDI Participation Rate									
SSI Participation Rate									
Share of HUD-Assisted Units	✓	✓	✓	✓	✓	✓	✓	✓	✓
Occupancy Rate of HUD-Assisted Units	✓	✓	✓	✓	✓	✓	✓	✓	✓
Percentage of HUD-Assisted Households with More Bedrooms than People									

Independent Variables	Qualitative Review	National	Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs		Tight Rental Markets
			Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	
People Per Unit in HUD-Assisted Households									
Percentage of HUD-Assisted Households with Income Below 30% of Local Median Family Income									
Percentage of Houses Built Before 1940	✓	✓			✓		✓		✓
Federal CoC Funding ($100,000s)	✓								
Permanent Supportive Housing Beds									
Temporary Housing Beds									
Demographic Domain									
Population Density									
Percentage White									
Percentage African-American	✓	✓	✓					✓	✓
Percentage Hispanic	✓	✓			✓		✓	✓	✓
Percentage Asian	✓	✓	✓		✓		✓	✓	✓
Percentage Other Race									
Percentage Children (Age 0 through 19)	✓	✓	✓	✓	✓		✓	✓	✓
Percentage Adult (Age 20 through 64)									
Percentage Senior (Age 65 and Older)	✓	✓	✓	✓			✓	✓	✓
Percentage Female	✓		✓						
Net-Migration Rate	✓	✓			✓	✓	✓		✓
Change in Net-Migration Rate	✓	✓			✓	✓			✓
Percentage of One-Person Households	✓	✓			✓	✓	✓	✓	✓
Change in Percentage of One-Person Households									
Percentage of Under-18 Population in Single-Parent Households	✓	✓	✓		✓	✓	✓	✓	✓
Percentage Veteran (25 and Older)	✓				✓		✓	✓	
Percentage without a Bachelor's Degree	✓								
Healthcare Costs ($1,000s)	✓				✓	✓			
Mental Health Providers as Share of Population	✓								
Alcohol Mortality (Per 100,000)	✓								
Excessive Drinking Rate	✓	✓	✓					✓	✓
Climate Domain									
Average January Temperature (°F)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Average June, July, and August Temperature (°F)	✓	✓	✓		✓	✓	✓	✓	✓
Total January Precipitation (Inches)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total Annual Precipitation (Inches)	✓	✓	✓	✓	✓	✓	✓		✓

Exhibit E-2 | Variable Selection Results for Sheltered Homelessness

Independent Variables	Qualitative Review	National	Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs		Tight Rental Markets
			Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	
Housing Domain									
Natural Logarithm of Median Home Value ($1,000s)									
House Price Index	✓		✓	✓	✓				
Percentage of Homeowners with Cost Burden	✓	✓	✓	✓	✓	✓	✓	✓	✓
Natural Logarithm of Median Rent ($100s)	✓	✓	✓	✓	✓	✓	✓	✓	
Change in Median Rent ($100s)									
Median Rental Utility Cost ($10s)	✓	✓			✓		✓	✓	✓
Percentage of Renters with Cost Burden	✓	✓	✓	✓	✓	✓	✓	✓	✓
Median Year Home Built									
Percentage of Renter-Occupied Units	✓	✓	✓	✓	✓	✓	✓	✓	
Rental Vacancy Rate	✓	✓	✓	✓	✓	✓	✓	✓	
High Housing Density CoC	✓	✓	✓	✓					✓
Eviction Rate	✓	✓			✓		✓		✓
Change in Eviction Rate	✓		✓	✓			✓		
Eviction Filing Rate									
Percentage of Overcrowded Housing Units	✓	✓	✓	✓	✓		✓	✓	✓
Permitted Units as a Share of Total Units									
Percentage of Urban CoCs	✓	✓							✓
Percentage of Suburban CoCs	✓	✓							✓
Economic Domain									
Natural Logarithm of Median Income ($1,000s)									
Change in Median Income ($1,000s)									
Unemployment Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Employment Rate for Middle-Skilled Workers									
Gini Coefficient of Income Inequality	✓	✓	✓		✓	✓	✓		✓
Poverty Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Safety Net Domain									
Percentage of Households Receiving Cash Assistance	✓						✓	✓	
Percentage of Households Eligible for EITC									
SSDI Participation Rate									
SSI Participation Rate									
Share of HUD-Assisted Units	✓	✓	✓	✓	✓	✓	✓	✓	✓
Occupancy Rate of HUD-Assisted Units	✓	✓	✓	✓	✓	✓	✓	✓	✓
People Per Unit in HUD-Assisted Households									

Independent Variables	Qualitative Review	National	Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs		Tight Rental Markets
			Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	
Percentage of HUD-Assisted Households with Income Below 30 Percent of Local Median Family Income									
Percentage of Houses Built Before 1940	✓	✓	✓		✓		✓		✓
Federal CoC Funding ($100,000s)	✓								
Permanent Supportive Housing Beds									
Temporary Housing Beds									
Demographic Domain									
Population Density									
Percentage White									
Percentage African-American	✓	✓	✓	✓	✓	✓		✓	✓
Percentage Hispanic	✓	✓	✓	✓		✓	✓	✓	✓
Percentage Asian	✓	✓	✓	✓	✓	✓	✓	✓	✓
Percentage Other Race									
Percentage Children (Age 0 through 19)	✓	✓	✓	✓	✓		✓	✓	✓
Percentage Adult (Age 20 through 64)									
Percentage Senior (Age 65 and Older)	✓	✓	✓	✓			✓	✓	✓
Percentage Female	✓	✓	✓	✓					✓
Net-Migration Rate	✓	✓			✓	✓			✓
Change in Net-Migration Rate	✓						✓		
Percentage of One-Person Households	✓						✓	✓	
Change in Percentage of One-Person Households									
Percentage of Under-18 Population in Single-Parent Households	✓	✓	✓		✓		✓	✓	✓
Percentage Veteran (25 and Older)	✓	✓							✓
Percentage without a Bachelor's Degree	✓								
Healthcare Costs ($1,000s)	✓		✓						
Mental Health Providers as Share of Population	✓				✓				
Alcohol Mortality (Per 100,000)	✓	✓	✓	✓	✓	✓	✓		✓
Excessive Drinking Rate	✓	✓							✓
Climate Domain									
Average January Temperature (°F)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Average June, July, and August Temperature (°F)	✓	✓			✓	✓	✓		✓
Total January Precipitation (Inches)	✓	✓			✓		✓		✓
Total Annual Precipitation (Inches)	✓	✓	✓	✓	✓	✓			✓

Exhibit E-3 | Variable Selection Results for Unsheltered Homelessness

Independent Variables	Qualitative Review	National	Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs		Tight Rental Markets
			Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	
Housing Domain									
Natural Logarithm of Median Home Value ($1,000s)									
House Price Index	✓	✓	✓		✓		✓	✓	✓
Percentage of Homeowners with Cost Burden	✓	✓	✓	✓	✓	✓	✓	✓	✓
Natural Logarithm of Median Rent ($100s)	✓	✓	✓	✓	✓	✓	✓	✓	
Change in Median Rent ($100s)									
Median Rental Utility Cost ($10s)	✓	✓	✓				✓	✓	✓
Percentage of Renters with Cost Burden	✓	✓	✓	✓	✓	✓	✓	✓	✓
Median Year Home Built									
Percentage of Renter-Occupied Units	✓	✓	✓	✓	✓	✓	✓	✓	
Rental Vacancy Rate	✓	✓	✓	✓	✓	✓	✓	✓	
High Housing Density CoC	✓	✓			✓	✓			✓
Eviction Rate	✓				✓				
Change in Eviction Rate	✓	✓	✓						✓
Eviction Filing Rate									
Percentage of Overcrowded Housing Units	✓	✓	✓	✓			✓		✓
Permitted Units as a Share of Total Units									
Percentage of Urban CoCs	✓	✓							✓
Percentage of Suburban CoCs	✓	✓							✓
Economic Domain									
Natural Logarithm of Median Income ($10,000s)									
Change in Median Income ($10,000s)									
Unemployment Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Employment Rate for Middle-Skilled Workers									
Gini Coefficient of Income Inequality	✓		✓	✓	✓		✓		
Poverty Rate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Safety Net Domain									
Percentage of Households Receiving Cash Assistance	✓		✓	✓	✓	✓	✓		
Percentage of Households Eligible for EITC									
SSDI Participation Rate									
SSI Participation Rate									
Share of HUD-Assisted Units	✓	✓	✓	✓	✓	✓	✓	✓	✓
Occupancy Rate of HUD-Assisted Units	✓	✓	✓	✓	✓	✓	✓	✓	✓

Independent Variables	Qualitative Review	National	Major City and Largely Urban CoCs		Largely Suburban CoCs		Largely Rural CoCs		Tight Rental Markets
			Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	Step 2. Domain-Specific Variable Selection	Step 3. Across-Domain Variable Selection	
Percentage of HUD-Assisted Households with More Bedrooms than People									
People Per Unit in HUD-Assisted Households									
Percentage of HUD-Assisted Households with Income Below 30 Percent of Local Median Family Income									
Percentage of Houses Built Before 1940	✓		✓		✓	✓	✓		
Federal CoC Funding ($100,000s)	✓								
Permanent Supportive Housing Beds									
Temporary Housing Beds									
Demographic Domain									
Population Density									
Percentage White									
Percentage African-American	✓	✓	✓	✓	✓		✓	✓	✓
Percentage Hispanic	✓	✓		✓	✓		✓	✓	✓
Percentage Asian	✓	✓	✓	✓	✓		✓	✓	✓
Percentage Other Race									
Percentage Children (Age 0 through 19)	✓	✓	✓	✓			✓	✓	✓
Percentage Adult (Age 20 through 64)									
Percentage Senior (Age 65 and Older)	✓	✓	✓	✓	✓		✓	✓	✓
Percentage Female	✓	✓	✓	✓					✓
Net-Migration Rate	✓		✓	✓			✓		
Change in Net-Migration Rate	✓	✓	✓		✓	✓			✓
Percentage of One-Person Households	✓	✓	✓	✓	✓	✓	✓		✓
Change in Percentage of One-Person Households									
Percentage of Under-18 Population in Single-Parent Households	✓				✓	✓	✓		
Percentage Veteran (25 and Older)	✓	✓			✓		✓	✓	✓
Percentage without a Bachelor's Degree	✓								
Healthcare Costs ($1,000s)	✓	✓			✓	✓			✓
Mental Health Providers as Share of Population	✓				✓				
Alcohol Mortality (Per 100,000)	✓		✓	✓			✓	✓	
Excessive Drinking Rate	✓	✓	✓	✓	✓		✓		✓
Climate Domain									
Average January Temperature (°F)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Average June, July, and August Temperature (°F)	✓	✓	✓	✓	✓		✓	✓	✓
Total January Precipitation (Inches)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total Annual Precipitation (Inches)	✓		✓	✓	✓	✓	✓		

APPENDIX F: SUMMARY STATISTICS FOR TIGHT, HIGH-COST RENTAL MARKETS

Exhibit F-1 | Average PIT Counts by Tight, High-Cost Rental Market Status, 2017

PIT Counts Per CoC	CoCs in Tight, High-Cost Rental Markets		All Other CoCs	
	Mean	SD	Mean	SD
Average Homeless (Per 10,000 population)	37.1	28.5	11.4	8.0
Average Sheltered Homeless (Per 10,000 population)	22.5	25.7	8.0	5.5
Average Unsheltered Homeless (Per 10,000 population)	14.6	16.1	3.4	5.1
Observations	59		315	

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2017. All U.S. territories are excluded from this analysis.

Exhibit F-2 | Summary Statistics for Housing Variables by Tight, High-Cost Rental Market Status, 2016

Variables in Housing Domain	CoCs in Tight, High-Cost Rental Markets		All Other CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Median Home Value ($1,000s)	451.9	134.7	170.9	58.6
House Price Index	25.6	15.8	7.0	13.0
Percentage of Homeowners with Cost Burden (%)	33.2	5.3	23.6	5.0
Median Rent ($100s)	12.4	2.0	7.2	1.7
Median Rental Utility Cost ($10s)	11.9	2.7	15.5	2.6
Percentage of Renters with Cost Burden (%)	54.0	4.9	49.6	4.5
Percentage of Renter-Occupied Units (%)	45.6	12.7	34.1	6.6
Rental Vacancy Rate (%)	3.8	1.1	6.8	1.9
Percentage of CoCs with High Housing Density (%)	75.9	43.1	26.6	44.3
Eviction Rate (%)	1.0	1.1	2.4	1.9
Change in Eviction Rate (%) [a]	-0.1	1.1	-0.5	1.4
Percentage of Overcrowded Housing Units (%)	6.4	3.4	2.7	1.6
Percentage of Urban CoCs (%)	61.0	49.2	28.2	45.0
Percentage of Suburban CoCs (%)	37.7	48.9	30.4	46.1
Percentage of Rural CoCs (%)	1.3	11.4	41.5	49.3

[a] Change in Eviction Rate represents the difference between 2016 and 2012 values.

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis.

Exhibit F-3 | Summary Statistics for Economic Variables by Tight, High-Cost Rental Market Status, 2016

Variables in Economic Domain	CoCs in Tight, High-Cost Rental Markets		All Other CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Median Income ($1,000s)	75.9	16.9	56.1	10.2
Unemployment Rate	4.5	1.0	5.0	1.2
Gini Coefficient of Income Inequality	47.3	3.2	45.7	2.7
Poverty Rate	12.2	4.1	14.1	3.6

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis.

Exhibit F-4 | Summary Statistics for Safety Net Variables by Tight, High-Cost Rental Market Status, 2016

Variables in Safety Net Domain	CoCs in Tight, High-Cost Rental Markets		All Other CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Percentage of Households Receiving Cash Assistance (%)	3.1	1.2	2.6	1.2
Percentage of Households Eligible for EITC (%)	15.5	5.4	19.4	5.2
SSDI Participation Rate (%)	1.7	0.5	2.9	0.9
SSI Participation Rate (%)	2.7	1.3	2.5	1.0
Share of HUD-Assisted Units (%)	4.8	3.1	3.2	1.6
Occupancy Rate of HUD-Assisted Units (%)	92.6	3.6	92.5	3.6
Percentage of Houses Built Before 1940 (%)	16.0	13.8	11.7	9.9

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis.

Exhibit F-5 | Summary Statistics for Demographic Variables by Tight, High-Cost Rental Market Status, 2016

Variables in Demographic Domain	CoCs in Tight, High-Cost Rental Markets		All Other CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Total Population (1,000s)	1,188.6	1,782.7	801.8	1,125.3
Percentage White (%)	45.4	16.6	65.5	19.0
Percentage African-American (%)	9.7	7.9	13.2	11.9
Percentage Hispanic (%)	27.8	13.5	15.1	15.1
Percentage Asian (%)	13.8	8.2	3.2	2.5
Percentage Children (Age 0 through 19) (%)	24.6	2.2	25.6	2.5
Percentage Adult (Age 20 through 64) (%)	61.8	2.4	58.7	2.1
Percentage Senior (Age 65 and Older) (%)	13.7	1.9	15.7	3.4
Percentage Female (%)	50.8	0.9	50.8	0.8
Net-Migration Rate (%)	0.1	0.6	0.4	0.8
Change in Net-Migration Rate [a]	-0.3	0.4	0.1	0.6
Percentage of One-Person Households (%)	26.1	4.5	27.7	3.7
Percentage of Under-18 Population in Single-Parent Households (%)	23.5	6.2	26.6	6.2
Percentage Veteran (25 and Older) (%)	6.3	2.6	9.8	2.5
Percentage with Bachelor's Degree or Higher (%)	40.2	10.0	29.2	8.1
Percentage with Some College (%)	26.7	5.0	31.6	3.9
Percentage with High School Diploma (%)	20.1	4.2	27.9	5.4
Percentage with Less than High School (%)	13.0	5.3	11.3	4.1

Variables in Demographic Domain	CoCs in Tight, High-Cost Rental Markets		All Other CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Healthcare Costs ($1,000s)	11.7	1.8	10.0	1.2
Mental Health Providers as Share of Population (%)	0.0	0.1	0.1	0.2
Alcohol Mortality (Per 100,000)	2.7	1.3	2.9	1.3
Excessive Drinking Rate (%)	19.0	2.3	18.5	2.6

[a] Change in Net-Migration Rate represents the difference between 2016 and 2012 values.

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis. For the regression analysis, percentage White is the omitted from the race/ethnicity category; while percentage other (two or more races, Native American, Pacific Islander) is excluded from the analysis; and percentage adult is the omitted age category.

Exhibit F-6 | Summary Statistics for Climate Variables by Tight, High-Cost Rental Market Status

Variables in Climate Domain	CoCs in Tight, High-Cost Rental Markets		All Other CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Average January Temperature (°F)	41.0	9.7	38.8	12.5
Average June, July, and August Temperature (°F)	72.5	6.2	75.7	5.7
Total January Precipitation (Inches)	6.5	5.1	4.0	3.2
Total Annual Precipitation (Inches)	36.4	18.3	40.0	12.6

Notes: These estimates represent the weighted average temperature and precipitation for each CoC for January 2017 and the average summer and annual precipitation from 2016. Estimates represent the population of all 50 states plus the District of Columbia. All U.S. territories are excluded from this analysis. Summer temperature represents the average temperature for June, July, and August.

APPENDIX G: SUMMARY STATISTICS FOR WEST COAST CONTINUUMS OF CARE

Exhibit G-1 | Average PIT Counts by West Coast CoC Status, 2017

PIT Counts Per CoC	West Coast CoCs		All Other Region CoCs		California CoCs		Oregon CoCs		Washington CoCs	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Average Homeless (Per 10,000 population)	33.4	19.9	13.9	16.4	34.2	20.8	34.1	15.8	29.0	18.0
Average Sheltered Homeless (Per 10,000 population)	12.1	6.7	11.0	15.2	10.8	5.4	14.7	10.1	17.2	8.7
Average Unsheltered Homeless (Per 10,000 population)	21.4	15.6	3.0	4.1	23.3	16.5	19.5	8.3	11.8	9.7
Observations	51		323		38		7		6	

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2017. All U.S. territories are excluded from this analysis. Some CoCs in California were merged; please see appendix C for further detail on this process.

Exhibit G-2 | Summary Statistics for Housing Variables by West Coast Status, 2016

Variables in Housing Domain	West Coast CoCs		All Other Region CoCs	
	Mean	SD	Mean	SD
Median Home Value ($1,000s)	403.9	171.9	200.0	108.8
House Price Index	30.1	14.8	7.5	13.0
Percentage of Homeowners with Cost Burden (%)	32.5	4.3	24.4	5.9
Median Rent ($100s)	11.3	2.8	7.8	2.4
Median Rental Utility Cost ($10s)	11.7	2.7	15.2	2.7
Percentage of Renters with Cost Burden (%)	55.3	4.5	49.7	4.5
Percentage of Renter-Occupied Units (%)	44.1	7.4	35.2	9.3
Rental Vacancy Rate (%)	3.9	1.1	6.6	2.1
Percentage of CoCs with High Housing Density (%)	47.7	50.4	35.4	47.9
Eviction Rate (%)	0.8	0.6	2.4	1.9
Change in Eviction Rate (%) [a]	-0.3	0.7	-0.4	1.5
Percentage of Overcrowded Housing Units (%)	7.2	3.2	2.8	1.8
Percentage of Urban CoCs (%)	55.4	50.2	31.5	46.5
Percentage of Suburban CoCs (%)	33.0	47.5	31.8	46.6
Percentage of Rural CoCs (%)	11.6	32.3	36.7	48.3

[a] Change in Eviction Rate represents the difference between 2016 and 2012 values.

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis.

Exhibit G-3 | Summary Statistics for Economic Variables by West Coast Status, 2016

Variables in Economic Domain	West Coast CoCs		All Other Region CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Median Income ($1,000s)	68.6	16.4	58.9	13.6
Unemployment Rate	5.5	1.9	4.8	0.9
Gini Coefficient of Income Inequality	46.7	2.5	46.0	2.9
Poverty Rate	13.6	3.8	13.7	3.8

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis.

Exhibit G-4 | Summary Statistics for Safety Net Variables by West Coast Status, 2016

Variables in Safety Net Domain	West Coast CoCs		All Other Region CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Percentage of Households Receiving Cash Assistance (%)	3.8	1.5	2.5	1.0
Percentage of Households Eligible for EITC (%)	16.9	5.5	18.9	5.4
SSDI Participation Rate (%)	1.9	0.7	2.8	1.0
SSI Participation Rate (%)	3.0	1.0	2.5	1.1
Share of HUD-Assisted Units (%)	3.3	1.1	3.6	2.2
Occupancy Rate of HUD-Assisted Units (%)	93.3	3.2	92.4	3.6
Percentage of Houses Built Before 1940 (%)	9.5	7.6	13.2	11.4

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis.

Exhibit G-5 | Summary Statistics for Demographic Variables by West Coast Status, 2016

Variables in Demographic Domain	West Coast CoCs		All Other Region CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Total Population (1,000s)	993.4	1,534.2	842.2	1,209.0
Percentage White (%)	45.3	18.4	64.1	19.3
Percentage African-American (%)	5.1	3.1	13.8	11.7
Percentage Hispanic (%)	33.0	16.1	15.1	13.8
Percentage Asian (%)	12.7	8.8	4.2	4.5
Percentage Children (Age 0 through 19) (%)	25.5	2.9	25.4	2.4
Percentage Adult (Age 20 through 64) (%)	60.6	2.8	59.2	2.4
Percentage Senior (Age 65 and Older) (%)	14.0	2.4	15.5	3.3
Percentage Female (%)	50.3	0.6	50.9	0.8
Net-Migration Rate (%)	0.4	0.7	0.3	0.8
Change in Net-Migration Rate [a]	0.1	0.6	0.0	0.6
Percentage of One-Person Households (%)	24.6	3.6	27.9	3.8
Percentage of Under-18 Population in Single-Parent Households (%)	22.3	3.2	26.6	6.5
Percentage Veteran (25 and Older) (%)	7.7	3.1	9.3	2.8
Percentage with Bachelor's Degree or Higher (%)	32.4	10.8	31.4	9.4
Percentage with Some College (%)	31.3	5.0	30.4	4.5
Percentage with High School Diploma (%)	20.9	4.4	27.2	5.8
Percentage with Less than High School (%)	15.5	5.9	11.0	3.7
Healthcare Costs ($1,000s)	11.3	1.9	10.2	1.4
Mental Health Providers as Share of Population (%)	0.1	0.2	0.1	0.2
Alcohol Mortality (Per 100,000)	2.8	1.4	2.9	1.3
Excessive Drinking Rate (%)	18.5	1.7	18.6	2.7

[a] Change in Net-Migration Rate represents the difference between 2016 and 2012 values.

Notes: These estimates represent the weighted average, based on the overall population of each CoC. Estimates represent the population of all 50 states plus the District of Columbia for 2016. All U.S. territories are excluded from this analysis. For the regression analysis, percentage white is the omitted race/ethnicity category; while percentage other (two or more races, Native American, Pacific Islander) is excluded from the analysis; and percentage adult is the omitted age category.

Exhibit G-6 | Summary Statistics for Climate Variables by West Coast Status

Variables in Climate Domain	West Coast CoCs		All Other Region CoCs	
	Mean	Standard Deviation	Mean	Standard Deviation
Average January Temperature (°F)	41.6	8.0	38.7	12.6
Average June, July, and August Temperature (°F)	70.5	7.3	75.9	5.3
Total January Precipitation (Inches)	10.4	5.8	3.4	1.9
Total Annual Precipitation (Inches)	37.3	24.3	39.8	11.2

Notes: These estimates represent the weighted average temperature and precipitation for each CoC for January 2017 and the average summer and annual precipitation from 2016. Estimates represent the population of all 50 states plus the District of Columbia. All U.S. territories are excluded from this analysis. Summer temperature represents the average temperature for June, July, and August.

APPENDIX H: LOCAL POLICY SCANS

The study team, in coordination with the U.S. Department of Housing and Urban Development, identified three locations (New York City, Seattle, and San Francisco) as potential sites for further analysis of local policies that may alleviate or exacerbate homelessness in each area. Collectively, this group of cities ranks in the top 10 of total and unsheltered homelessness and represents diverse factors and settings associated with the issue of homelessness in each city. Each area has tried to solve its growing homelessness crisis through varied responses and approaches. While we focus on three cities in this appendix, recommendations for future feasible comparison cities, based on policy, geography, and weather factors, include Washington, DC (New York City); Los Angeles or Oakland, CA (San Francisco); and Portland, OR (Seattle). The feasibility of a deep-dive study in each of these cities is contingent on data availability and cooperation from various stakeholders at the local level. For each city of interest, the study team has identified several organizations and potential data sources that will be useful for further exploration into why homelessness is so prevalent in these cities and how the cities have responded to its growing crisis.

HOMELESSNESS AND LOCAL POLICIES IN NEW YORK CITY, SAN FRANCISCO, AND SEATTLE

This section presents a preliminary overview of homelessness and the policy landscape in New York City, San Francisco, and Seattle. Exhibit H-1 presents counts, rates, and rankings of the total, sheltered, and unsheltered homelessness in New York City, San Francisco, and Seattle in 2017. All three cities have among the highest counts and rates of homelessness in the United States, with all three ranking in the top 10 cities in terms of the total homeless population. Exhibit H-2 presents a more detailed overview of various policies and regulations related to homelessness and housing.[77] Given the serious issue of homelessness in these cities, understanding the relationship between homelessness and the policy and regulatory landscape is an important step toward the goal of ending homelessness.

Exhibit H-1 | Homelessness in New York City, San Francisco, and Seattle in 2017

Continuum of Care (CoC) Name	Count (Ranking)		Rate Per 10,000 Population (Ranking)	
Total Homelessness				
New York City CoC	76,501	(1)	88.8	(3)
San Francisco CoC	6,858	(9)	78.3	(6)
Seattle/King County CoC	11,643	(3)	54.0	(12)
Sheltered Homelessness				
New York City CoC	72,565	(1)	84.2	(2)
San Francisco CoC	2,505	(23)	28.6	(11)
Seattle/King County CoC	6,158	(5)	28.6	(12)
Unsheltered Homelessness				
New York City CoC	3,936	(7)	4.6	(105)
San Francisco CoC	4,353	(5)	49.7	(5)
Seattle/King County CoC	5,485	(3)	25.4	(22)

[77] Exhibit H-2 is intended to provide a comprehensive but not conclusive list of homelessness and housing policies and regulations in New York City, San Francisco, and Seattle.

New York City has the largest homeless population in the United States (76,501 in 2017) and the third highest rate of total homelessness (88.8 homeless people per 10,000 population in 2017). The city has implemented several strategies to help its homeless population, as such a large share of homeless people can create a strain on social and public resources, such as emergency response, public safety, and other health resources. New York is a "right-to-shelter" city, meaning that the city government holds an obligation to provide shelter to all residents (individuals and families) who have no alternative shelter accommodations (New York City Department of Homeless Services). The right-to-shelter policy contributes to New York City's low unsheltered homeless population relative to the overall homeless population. While New York City's 2017 unsheltered homeless population ranked 7th of all CoCs in the United States, its rate of unsheltered homelessness was ranked 105th. Previous research in New York City has shown that lack of affordable housing, triggered by various factors such as eviction, domestic violence, job loss, or dangerous housing conditions, is one of the leading causes of homelessness, especially for families. The Preventive Assistance and Temporary Housing program developed under former Mayor Bloomberg is a basis for finding alternative housing for those who seek shelter. Since taking office in 2014, Mayor de Blasio has tried a three-pronged approach to tackle the increasing homeless population in New York City (De Blasio, Palacio, and Banks, 2017). The first plan he implemented sought to stem the number of homeless people seeking shelter by aggressively expanding anti-eviction measures to provide legal and emergency rental assistance to keep families in their homes and out of the shelter system. The second plan aims to streamline some of the city's preventive services by reorganizing the homeless-services bureaucracy. The third strategy aims to build 90 new shelters in the next 5 years, ending the city's reliance on expensive commercial hotels and private apartments to shelter its homeless people. In addition, New York City has a combination of mandatory and voluntary inclusionary zoning policies that require a certain share of new construction to be affordable to those with lower incomes (New York City Department of City Planning).

While policies like right-to-shelter and inclusionary zoning are aimed at reducing the unsheltered and total homeless populations, respectively, New York City has several other policies and programs that may exacerbate the problem. For example, New York has building codes that place height restrictions on residential buildings, thereby reducing the number of high-rises and affordable housing units that can be built (Bui, Chaban, and White, 2016). In this regard, Mayor de Blasio aims to build or preserve 200,000 units of affordable housing. Washington, DC, has been identified as an appropriate analog due to its physical proximity to New York City, as well as similar weather and climate conditions. In addition, Washington, DC, is also a "right-to-shelter" city, with potential parallels in existing strategies and policies.

San Francisco ranked fifth in the count (4,543) and rate (49.7 homeless people per 10,000 population) of unsheltered homelessness in 2017 in the United States. In 2016, Mayor Lee launched the Department of Homelessness and Supportive Housing to address the decade-long stagnation of the number of homeless people in San Francisco. The new data-driven, evidence-based Homelessness Response System coordinates and aligns all the interventions in San Francisco that provide support and services including prevention, Housing First—a system focused on permanent supportive housing and a rapid rehousing model, client-focused services of care, and short-term rental subsidies and support services to help people exit homelessness (City and County of San Francisco Department of Homelessness and Supportive Housing, 2017). During the implementation of the Housing First approach, however, the number of shelter beds and daytime hours has been reduced during the same time frame, which some

believe is related to an increase in the number of homeless people on the streets. Recently, the city has started to build new shelters, called Navigation Centers, to tackle this particular issue.

San Francisco, like New York City, has an inclusionary zoning program designed to address growing housing affordability (City and County of San Francisco Mayor's Office of Housing and Community Development, 2018). This program is designed to incentivize and/or fund the construction of affordable housing units. Most residents are also covered by rent control efforts on behalf of the city, limiting the legal amount that a landlord may increase tenants' rents annually (San Francisco Tenants Union, 2018). Such policies work to reduce the number of San Franciscans on the street without appropriate shelter.

The city's current vagrancy and "quality of life" laws, however, are designed to prevent homelessness through more punitive interventions that may do little to reduce the total and unsheltered homeless populations (City and County of San Francisco Board of Supervisors, 2016). In recent years, San Francisco has worked to break up large, long-standing tent encampments of unsheltered homeless people within the city (Davila, 2018). These efforts are believed to reduce street homelessness while improving the quality of life of all San Franciscans.

Seattle has seen increasing issues related to the availability of affordable housing, and the subsequent impact on the city's homeless population is evident. In particular, Seattle has the third highest total (11,643) and unsheltered (5,485) homeless populations in the United States. The City of Seattle has outlined a three-pronged approach for addressing homelessness: (1) programs to prevent people from falling into homelessness, (2) affordable housing programs geared toward moving people from shelters, and (3) emergency shelter programs that provide safety to unsheltered homeless people while they search for housing accommodations (City of Seattle Homelessness Response Blog, 2018). Specifically, regarding the third approach, Seattle is supporting the use of "tiny house" emergency service villages that provide safe accommodations in tiny homes for those living in tent encampments. This model creates small, permanent housing units for people who would otherwise be homeless, providing these individuals a chance to look for employment or to address underlying health issues. This form of intervention seeks to more directly affect the number of unsheltered homeless people on the street.

Housing affordability and availability are major issues in Seattle. The city's Multifamily Tax Exemption Program is a zoning policy that offers an incentive to developers to set aside 20 to 25 percent of the units on their property as income- and rent-restricted, creating another opportunity for lower income individuals to avoid becoming homeless (City of Seattle Office of Housing, n.d.). More recently, Seattle has relaxed policies regarding mandatory parking requirements in new multifamily construction projects, which may reduce the costs of developing additional lower-income housing options (Waller, 2018). Currently, the Seattle City Council is in the process of finalizing a suite of reforms related to mandatory housing affordability and designed to relax stringent zoning standards, allowing for the construction of denser housing and more multifamily units (Lloyd, 2019).

The policies and regulations outlined in this section (and exhibit H-2) represent a comprehensive but not conclusive list. Our research, however, indicates that a future mixed-methods study on homelessness in New York City, San Francisco, and Seattle would shed additional light on the relationships between policy and homelessness at the local level. A high-level research plan for such a study is outlined in the following section.

Exhibit H-2 | The Presence of Local Policies and Regulations Regarding Homelessness and Housing in New York City, San Francisco, and Seattle

Local Policies and Regulations	New York City	San Francisco	Seattle
Policies Regulating the Presence and Conduct of Homeless People			
Bus-out	✓	✓	
Encampment zone/tent city		✓	✓
Local homelessness ordinances (for example, sit/lie restrictions)	✓	✓	✓
Right-to-shelter	✓		
Safe parking accommodations for homeless people living in automobiles		✓	
Development and Zoning Regulations			
Development impact fees		✓	
Height restrictions on development	✓	✓	✓
Inclusionary zoning policies	✓	✓	
Local employment and wage requirements for construction			✓
Minimum unit set-asides for low income			✓
Parking requirements for developing multifamily housing	✓	✓	✓
Percentage of land zoned for multifamily housing	✓	✓	✓
Requirements for energy efficient construction, such as LEED	✓	✓	✓
Stormwater runoff requirements		✓	✓
Tiny home zoning allowances		✓	✓
Transit-oriented development policies	✓	✓	✓
Units per developable acre limitations	✓	✓	
Funding and Taxation			
Local property tax policies for rental units	✓	✓	✓
Local tax on land sales			✓
Per capita annual funding for local affordable housing trust funds		✓	
Regulations Associated with Housing Costs			
Local rent controls/ordinances	✓	✓	✓
Requirements for hazard/flood/earthquake insurance			

FUTURE STUDY ON THE RELATIONSHIP BETWEEN LOCAL POLICIES AND HOMELESSNESS

This section outlines the plans for a future mixed-methods study examining the relationship between homelessness and local policies and regulations in New York City, San Francisco, and Seattle. The proposed study would minimally include the following components—

1. Review of local data sources and quantitative data analysis.
2. Interviews with local stakeholders and qualitative data analysis.

A rigorous qualitative component would complement the findings of any quantitative data analysis with insights from people with boots-on-the-ground experience with homelessness. For each of the cities, the study should continue to review and assess the availability of local and regional data sources overviewed in exhibit H-2. The process to identify potential data sources, however, may include preliminary data analysis, additional review of literature, and a public records search.

The proposed qualitative study would involve a series of interviews with local stakeholders to examine (1) their perspectives on the factors contributing to homelessness in their area, (2) the activities and policies implemented, and (3) the estimated effectiveness of these activities and lessons learned. Such interviews will provide important information about how local stakeholders view the factors associated with homelessness, as well as the policies designed to alleviate it. These interviews can provide insights into promising practices that could be adopted more widely to reduce homelessness in other areas.

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