Measuring Doubled-Up Homelessness with Census Microdata

By

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Introduction

Housing is a critical determinant of health, so the housing insecurity and homelessness experienced by millions in the United States is of pressing public health concern (Fazel, Geddes, & Kushel, 2014; Krieger & Higgons, 2002). Official estimates of homelessness reported by the U.S. Department of Housing and Urban Development (HUD) include people staying in emergency shelter or transitional housing programs (sheltered homelessness) or staying in a place not meant for human habitation, such as a park, car, or abandoned building (unsheltered homelessness) (HUD, 2009). HUD calls this "literal homelessness," and using this definition conducts one-night counts of sheltered and unsheltered homelessness and one-year administrative reports of sheltered homelessness homelessness (HUD, 2020a; HUD, 2020b). According to these measures, over half a million people experienced sheltered or unsheltered homelessness on a single night in January 2019, and approximately 1.4 million experienced sheltered homelessness over the course of 2018 (HUD 2020b). However, to avoid these forms of homelessness, many Americans who lose or cannot afford housing turn to "doubling up"—sharing a home with others when one of their own is out of reach.

Doubling up can help people avoid shelter or the street and allow households to pool resources. In the past decade, Census Bureau and HUD researchers have made use of the Current Population Survey (CPS) and American Housing Survey (AHS), respectively, to examine doubling up across households irrespective of income level (Mykyta & Macartney 2011; Eggers & Moumen, 2013). These researchers found that doubling up increased during the Great Recession as people coped with economic conditions by combining households. In response, a 2013 supplement to the AHS focused on doubling up and found that almost one third of

household members who recently moved in or out did so due to inability to pay for their own housing (HUD, 2020b).

While household sharing may help large segments of the population through periods of financial stress, scholars and policymakers agree that for many low-income individuals and families, doubling up is a form of "hidden" homelessness that can last for extended periods of time with consequences for physical, mental, and economic wellbeing. Qualitative research with doubled-up, low-income families documents instability, strains on social ties, lack of autonomy, conflict, and frequent moves (Bush & Shinn, 2017; Cusack & Montgomery, 2019; Skobba & Goetz, 2015; Vacha & Marin, 1993). These unstable, shared arrangements can expose children to unwelcoming environments and disrupt education (Ahrentzen, 2003; Harvey, 2020b). Doubling up often involves overcrowding (Bush & Shinn, 2017; Clampet-Lunquist, 2003), itself a risk to mental and physical health (Evans, 2003; Krieger & Higgons, 2002), and crowding can make infectious diseases, such as COVID-19, more transmittable through increased risk of exposure and reduced air quality (Baker et al., 2008; Colosia et al., 2012; Mehdipanah, 2020).

Despite these risks, doubled-up homelessness is not incorporated into official estimates of total homelessness, potentially obscuring understandings of the nature and extent of the problem and misinforming policies to address it. Although Census and HUD studies have examined doubling up across all households (Mykyta & Macartney 2011; Eggers & Moumen, 2013), estimating the number of individuals who would otherwise be "literally homeless" is a challenge for researchers. In 1990, a nationally representative phone survey asked respondents whether they had ever "considered [themselves] homeless," and then asked where (Link, 1994). Researchers estimated lifetime prevalence of homelessness in shelters and unsheltered locations as 7.4%, rising to 14% when doubling up was included. This study offered important findings on

the extent of doubled-up homelessness for a cohort of adults, but annual, state, and local estimates remain unmeasured.

Currently, the only annual data on doubled-up homelessness is collected by the Department of Education (DoE) and available for school districts. Although HUD counts only people who are sheltered or visibly unsheltered, the McKinney-Vento Act (2001) requires public schools, in their identification of children eligible for federally-funded programs, to include those "who are sharing the housing of other persons due to loss of housing, economic hardship, or a similar reason" (U.S. Department of Education, 2001). One million students lived doubled up by this definition in the 2018-19 school year (U.S. Department of Education, 2020).

Finally, the National Alliance to End Homelessness has used the American Community Survey (ACS) to estimate the total number of people in poor households who are doubled up for its *State of Homelessness* reports. Although their definition has varied, the 2020 report considered a person doubled up and at risk of "literal" homelessness if they were a poor non-relative or relative, excluding spouses, minor children, and adult children and grandchildren in school (National Alliance to End Homelessness, 2020). They report 4 million people living doubled up in 2018 and publish state-level estimates. In contrast to the AHS and CPS, ACS microdata allow for estimates for all states, metro areas, and smaller geographies known as Public Use Micro Areas (PUMAs). To advance use of the ACS for estimating doubled-up homelessness, the current study clarifies a definition, incorporates overcrowding and regional variation in housing costs, and shares information to reproduce the measure. The goal of this study is to disseminate a standard measure of doubling up to support efforts to estimate homelessness, consistently research doubling up, and accurately respond to the nation's housing needs.

<center>**Methods**</center>

Data

We used ACS 2019 1-year microdata obtained from Integrated Public Use Microdata Series (IPUMS) (Ruggles et al., 2020). ACS microdata represent nationally representative 1-in-100 random samples of the population, obtained on a rolling basis (a small percent of the population sampled every month), with the smallest identifiable geographic unit (PUMA) containing at least 100,000 persons. ACS 1-year data are designed to describe average characteristics of the U.S. over a given year.

Measure of Doubling Up

Constructing the measure of doubling up was a collaborative effort that included feedback from various experts (Acknowledgements). ACS surveys do not ask whether household members are present due to housing loss or economic hardship, so we defined doubled-up individuals as poor or near poor individuals in a poor or near poor household (at or below 125% of a geographically adjusted poverty threshold) who met the following conditions: a relative that the household head does not customarily take responsibility for (based on age and relationship); or a non-relative who is not a partner and not formally sharing in household costs (not roomers/roommates). Single adult children and relatives over 65 may be seen as a householder's responsibility, so such cases are only included if the household is overcrowded—an arrangement that provides evidence of economic hardship. Table 1 describes detailed inclusion criteria.

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Table 1. Household Members Considered Doubled Up, if Poor or Near Poor

Adult children and children in-law
▪ Who have children of their own, are married, or are single but living in an overcrowded (more than two people per bedroom) situation.
Grandchildren
▪ Minor and adult grandchildren, excluding:
• Minor grandchildren of the household head when the household head claims responsibility for their needs (asked directly by the ACS).
• Minor grandchildren whose single parent is living at home and is under 18 (i.e., children of teenage dependents).
Other relatives
▪ Parents/parents-in-law, siblings/siblings-in-law, cousins, aunts/uncles, and other unspecified relatives of the household head who are under the age of 65, *excluding:*
• Minor siblings of the household head when the minor's parent is not present (so that the household head may assume responsibility for minor siblings.
• Single and childless adult siblings of the household head, when the household head is also single with no children—resembling a roommate situation.
▪ Parents/parents-in-law, siblings/siblings-in-law, cousins, aunts/uncles, and other unspecified relatives of the household head who are over age 65 and in an overcrowded situation.
Non-relatives
▪ Individuals unrelated to the householder, including friends, visitors, and "other" non-relatives, e*xcluding:*
• An unmarried partner or their children, roommates/housemates, and roomers/boarders.

Adjusted poverty measure. Determining doubled-up status also requires assessing whether a person would be able to afford housing on their own. Housing costs vary across the country, so we adjusted poverty following the method of the Supplemental Poverty Measure (Renwick, 2011). This geographic adjustment relies on comparing area median rents and adjusting the portion of a household's poverty threshold allocated towards housing, based on housing type (owning versus renting). Adjustment factors were calculated using the following formula, where *a* denotes geographic area (PUMA), *h* denotes housing type, and *n* denotes national:

$$\text{Factor}_{ah} = \text{HousingShare}_h \times (\text{Rent}_a / \text{Rent}_n) + (1 - \text{HousingShare}_h).$$

Since ACS "poverty" variables express income as a percentage of poverty thresholds, we then adjusted poverty by dividing it by Factor$_{ah}$. For example, if unadjusted poverty was 150 (150% of federal poverty threshold) and the adjustment factor was 1.2, adjusted poverty would be 150/1.2, or 125% of the area threshold.

Data Analysis

Analyses for this paper were conducted in SAS version 9.4. Person weights were applied to all analyses to approximate representative statistics. Margins of error at 90 percent confidence levels were calculated using standard errors from Jackknife Repeated Replications simulation, which uses replicate weights following Census and IPUMS guidelines (U.S. Census Bureau, 2018a; Minnesota Population Center, 2018). Different measures of homelessness were compared using Pearson correlations. Bivariate analyses examining relationships between doubling up and other variables were conducted using Rao-Scott adjusted chi-square tests to account for survey design (Rao & Scott, 1981).

<div align="center">

Results

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Comparison to Existing Homelessness Measures

Table 2 compares the current measure with existing measures of homelessness. Based on ACS 1-year data, there were 3,717,589 people– 1.2% of the population –doubled up in the U.S. in 2019. ACS questionnaires are administered to households once per year, so this figure is most comparable to the point-in-time count of "literal" homelessness of 567,715 or .017% of the population in January 2019. The correlation of these two measures across 50 states and the District of Columbia is .44 (p=.001). More people are likely to experience homelessness over a year than at the survey timepoints, and people may move between doubling up and "literal" homelessness during this period, making it difficult to report a total of all forms of homelessness.

However, including estimates of doubling up alongside sheltered and unsheltered homelessness can more accurately represent the population without adequate housing.

Of the 3.7 million doubled up by the ACS measure, an estimated 737,886 were school-age children. Across states and D.C., this correlates .51 (p=.0001) with DoE figures, which are based on parents' report at school enrollment and updated by school personnel throughout the year. By DoE counts, there were 1.04 million doubled-up students in school year 2018-2019, and the difference in timeframe likely explains the difference in scope. Further, variability in whether preschool students are included in district totals and in how schools identify doubled-up children (Miller & Bourgeois, 2013; Mullins et al., 2016), suggest that the ACS measure may offer added consistency.

Table 2. Comparison to Existing Homelessness Measures

Measure	2019 Estimate (millions)	Time Frame	Definition	State-Level Correlation with ACS Doubling Up
ACS Doubling Up	3.7 total 0.74 school-age (5 to 17 years)	Rolling point-in-time	Current measure of additional poor/near poor relatives and non-relatives (See Table 1)	--
DoE Doubling up	1.04 school-age	Point-in-time with additions	Public school children sharing the housing with others due to loss of housing, economic hardship	.51 (school-age children) [a]
HUD Homeless [b]	0.57	Point-in-time	Sheltered and unsheltered homeless	.44

[a] Calculated using the ACS 2017 1-year sample and rates of doubled-up students per all enrolled students for school year 2016-17, the most recent timeframe that these rates have been published by DoE.
[b] Estimates from HUD's one-year administrative data are not available at the state or Continuum of Care level, so it is not possible to measure that correlation.

Geography of Doubling Up

Next, we examine the geography of doubling up and compare it to sheltered and unsheltered homelessness. Some states, such as Alaska, California, D.C., New York, and Hawai'i suffer from high rates of both. In contrast, Mississippi, Louisiana, Alabama, New

Mexico, and Arizona have some of the highest rates of doubling up but lower than average rates of "literal" homelessness. Supplemental Table A shows the number of people doubled-up and literally homeless per 10,000 in the population for each state and D.C. in 2019. Figures 1 and 2 map these measures. Sheltered and unsheltered homelessness data are available at the Continuum-of-Care (CoC) level, unique geographic areas through which HUD administers homeless services funding. Doubling up data are available at a smaller unit, PUMAs, and reveal greater within state variation. For example, South Dakota's doubling-up rate (0.79%) is less than the national rate, but the Lakota Region, 43% Native American and home to several reservations (U.S. Census Bureau, 2020), has a very high (4.7%) rate. Supplemental Table B shows the 50 PUMAs with greatest rates, predominately major cities (the highest rate, 9.23%, in Northeast Philadelphia), but also including a rural area of Mississippi and two containing tribal lands (Lakota Region in South Dakota and Navajo Nation in New Mexico).

Figure 1. Sheltered and Unsheltered Homelessness for the United States in 2019

Sheltered and Unsheltered Homeless
by Continuum of Care

Persons Per 10,000
- 0 - 10
- 10 - 20
- 20 - 40
- 40 - 70
- 70 - 126
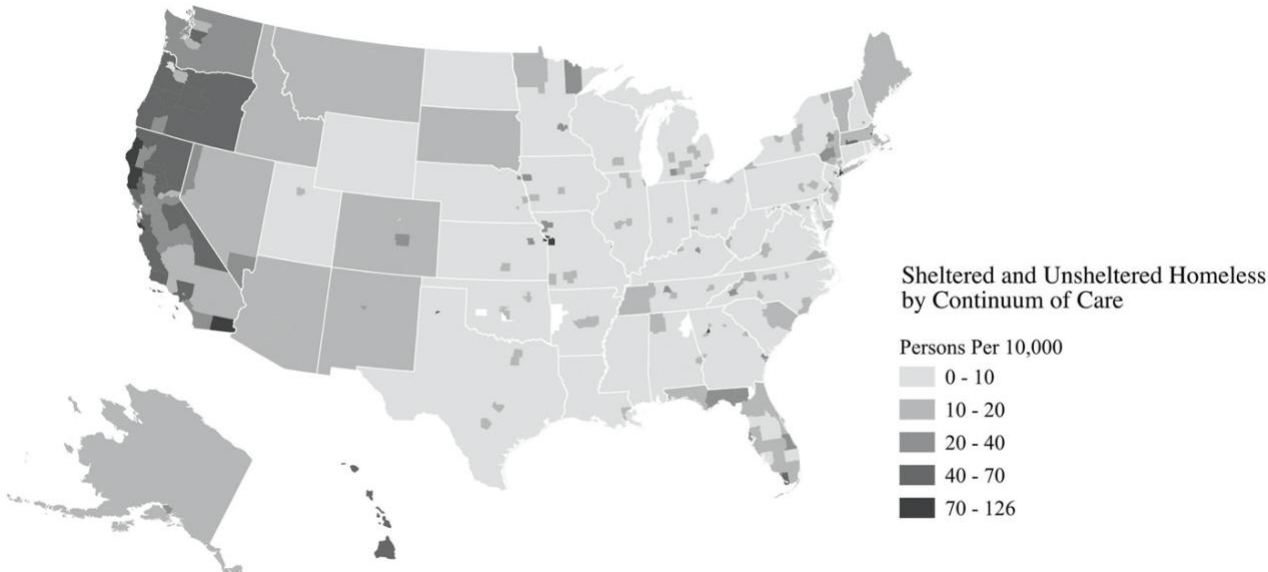
Figure 2. Doubled-Up Homelessness for the United States in 2019

Doubled-Up Homeless by PUMA

Persons Per 10,000
- 0 - 70
- 70 - 160
- 160 - 300
- 300 - 500
- 500 - 923
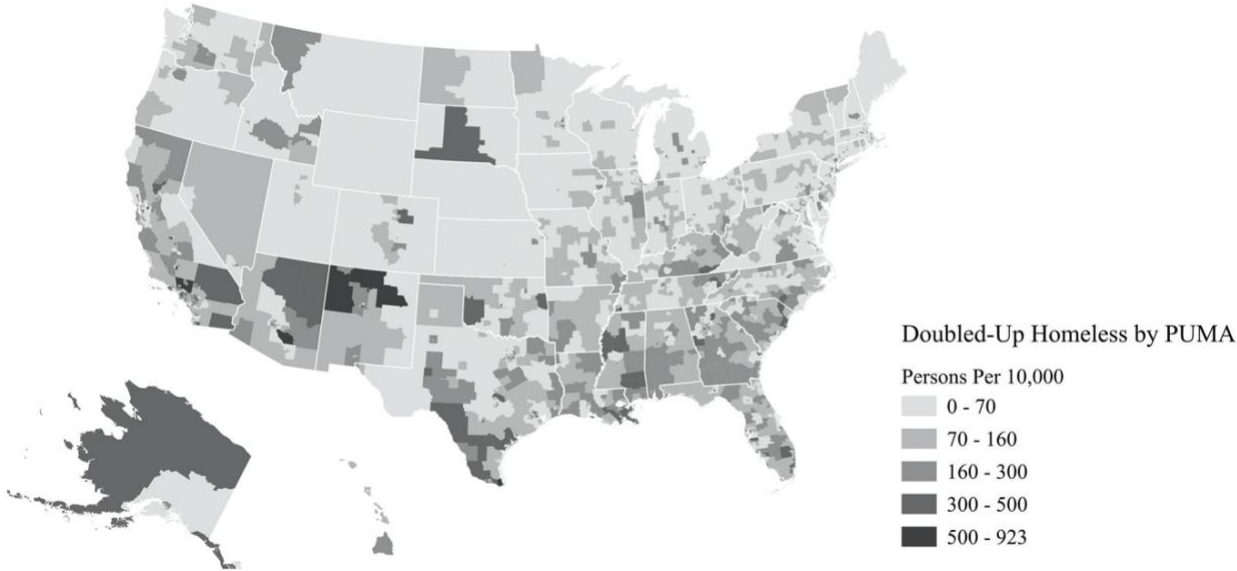
Individual and Household Characteristics

Table 3 describes how individual, household, and geographic variables relate to doubling up at the person level. Nationally, there were significant differences in doubling up by region, race and ethnicity, gender, marital status, education, and employment. People in the South and West were more likely to be doubled up. Rates of "literal" homelessness are also high on the West coast, but they tend to be lower in Southern states (HUD, 2020b). Although rates of doubling up are relatively lower in the Northeast, rates of sheltered homelessness are especially high in this region (HUD, 2020b). White individuals were least likely to be doubled up, as in estimates of "literal" homelessness. People who identified as Black, American Indian/Alaska Native, and "other" race had the highest rates of doubling up among racial groups. Although people who identify as Hispanic are reported in counts of "literal" homelessness at rates only slightly above their proportion in the general population (HUD, 2020b), ACS data show high rates of doubling up among those who are Hispanic/Latinx/Spanish. Sheltered and unsheltered homelessness is more common in urban areas, and there was a significant relationship between doubling up and living in a metropolitan area. Women were more likely to be doubled up (other sex and gender categories not available in the ACS), whereas men are more likely to experience sheltered and unsheltered homelessness. Finally, doubled-up adults were more likely to be unemployed, unmarried, and have lower educational attainment, but doubling up was unrelated to school enrollment.

Table 3. Characteristics of People Living Doubled Up in 2019

	Percent of population doubled up (row percent)	Margin of Error for Percent	*P*	*F*
Region			<.001	146.13
Northeast	1.03	+/-0.05		
Midwest	0.68	+/-0.04		
South	1.30	+/-0.04		
West	1.45	+/-0.05		
Metropolitan status [a]			<.001	55.46
Not metropolitan area	0.98	+/-0.04		
In metropolitan area	1.21	+/-0.03		
Tenure (ownership of dwelling)			<.001	2269.37
Owner or being bought	0.71	+/-0.02		
Rented	2.07	+/-0.05		
Age [b]			--	
0 to 4	1.92	+/-0.09		
5 to 17	3.19	+/-0.09		
18 to 24 years	0.97	+/-0.03		
25 to 64 years	1.38	+/-0.05		
65 years or more	0.23	+/-0.02		
Sex *(population 18 and over)*			<.001	180.48
Male	0.93	+/-0.03		
Female	1.17	+/-0.03		
Ethnicity			<.001	2316.27
Hispanic/Latinx/Spanish	2.40	+/-0.07		
Non-Hispanic	0.88	+/-0.02		
Race			<.001	557.63
White	0.82	+/-0.02		
Black	2.19	+/-0.08		
American Indian or Alaska Native	3.03	+/-0.26		
Asian or Pacific Islander	1.19	+/-0.08		
Other race	2.96	+/-0.19		
Two or more major races	1.39	+/-0.12		
Marital status *(population 15 and over)* [b]			--	
Married	0.37	+/-0.02		
Widowed/separated/divorced	1.02	+/-0.04		
Never married	2.13	+/-0.05		
Educational attainment *(populations 25 and over)*			<.001	1426.32
Less than high school	2.28	+/-0.09		
High school graduate and equivalency	1.13	+/-0.04		

Some college	0.55	+/-0.03		
Bachelor's degree or more	0.20	+/-0.01		
School (*population 18 to 24*)			0.815	0.06
Enrolled	3.20	+/-0.12		
Not enrolled	3.18	+/-0.14		
Employment status (*population 25 to 64*)			<.001	3541.91
Employed	0.46	+/-0.02		
Unemployed	3.13	+/-0.19		
Not in labor force	2.59	+/-0.08		
Total	1.16	+/-0.02		

Note: All estimates are calculated using person weights and exclude people living in group quarters.
[a] Metro status does not include "Metropolitan status indeterminable (mixed)."
[b] Chi square tests were not conducted for age or marital status because both variables are included in the construction of the measure.

Discussion

Some definitions of homelessness include people who are doubled-up—living with family or friends due to economic hardship or housing loss. Doubling up can have negative consequences for health and wellbeing, but annual methods for enumerating the population experiencing homelessness excludes people in these arrangements. Using ACS microdata, we estimate that 3.7 million people were doubled up in 2019, more than six times the number found in point-in-time counts of sheltered and unsheltered homelessness.

Maps reveal areas where rates of doubling up are high, but rates of "literal" homelessness are low. Broadly, some urban areas with high rates of unsheltered and sheltered homelessness are also areas with high rates of doubling up. Meanwhile, there are more rural areas with low rates of literal homelessness but high rates of doubling up. With HUD's estimates, most rural areas are aggregated up to large jurisdictions, but ACS doubled-up measures can support research, policy, and planning at smaller levels of geography. Two areas with the highest rates were tribal lands, which aligns with previous research from HUD of tribal areas in Arizona, New Mexico, and

Alaska that found tribal homelessness to more often manifest as doubling up and overcrowding than street or sheltered homelessness (Pindus et al., 2017).

We found significant differences in doubling up by race, ethnicity, marital status, education, metropolitan status, and employment that parallel research on "literal" homelessness. However, rates among women and Hispanic/Latinx people were greater than sheltered/unsheltered homelessness rates. Research suggests that shelter-based counts underestimate Hispanic/Latinx homelessness (Baker, 1996), with evidence of lower service use among Hispanic/Latinx individuals due to linguistic exclusion, misinformation about eligibility for immigrants, and concerns about family separation (Chinchilla & Gabrielian, 2019; Culhane et al., 2019). Previous research also suggests that women are more likely to double up and may avoid shelter and unsheltered locations due to safety concerns for themselves or children (Skobba & Goetz, 2015; Vacha & Marin, 1993).

Public Health Implications

This study has specific implications for homelessness and housing policy. In addition to supporting calls for more affordable housing, the extent of doubling up beyond school-aged children may suggest that efforts to encourage HUD to expand its definition of homelessness, which affects who is eligible for various HUD-funded homeless assistance programs, are warranted. Although there is concern for expanding eligibility for homeless services when resources are scarce, advocates and policymakers can use estimates of doubling up to call for increased funding. This may be especially important for marginalized groups more likely to double up than stay in shelters or in unsheltered locations.

The COVID-19 pandemic highlights implications of doubling up and overcrowding for infectious disease spread. The homelessness response system requires adequate resources to

house people on their own, whether temporarily with hotel vouchers or, ideally, permanently with short- or long-term rental subsidies. The impact of COVID-19 on employment and income is likely to lead to a rise in the number of housing insecure renters, evictions, and people left choosing between doubling up, shelters, or the streets. Due to systemic racism, people of color are disproportionately impacted by the coronavirus itself and by housing hardship. Increasing our understanding of doubling up may be vital in addressing COVID-19 related health disparities, and policies to support people in this crisis—from eviction moratoria to cash stimuli to rent relief— may be crucial public health measures (Benfer, 2020; Leifheit, 2020).

Limitations

This study should be considered alongside limitations. Despite anonymity of the ACS, renters may avoid reporting additional household members for fear of being evicted if housing more people than a lease allows. Next, although the Census Bureau engages in complex sampling procedures, it has been criticized for underestimating people in poverty, people of color, and immigrants (Bazuin & Fraser, 2013). Due to these limitations, the ACS may underestimate doubling up. There are also limitations to using ACS 1-year data to study annual change for small areas and subpopulations. Ability to accurately detect year-to-year changes decreases as sample size decreases, so changes in subpopulation estimates may have large margins of error and should be interpreted with caution. For increased statistical reliability in research specific to small areas and subpopulations, ACS 5-year data, though less current, may be appropriate (U.S. Census Bureau, 2018b).

Conclusion

Despite limitations, this study introduces an important new measure to estimate doubled-up homelessness using publicly available data. Before the COVID-19 pandemic, we were a

nation in housing crisis. As the economic hardships of the pandemic continue to take their toll, more families will turn to doubling up. Informed action at local, state, and federal levels are needed to prevent and end this form of homelessness. Beyond this urgency, researchers and policymakers have long debated how to measure homelessness and housing hardship to determine interventions. This measure is an important addition to existing methods.

References

Ahrentzen, S. (2003). Double indemnity or double delight? The health consequences of shared housing and "doubling up." *Journal of Social Issues*, *59*(3), 547–568.

Baker, M., Das, D., Venugopal, K., & Howden-Chapman, P. (2008). Tuberculosis associated with household crowding in a developed country. *Journal of Epidemiology & Community Health*, *62*(8), 715-721.

Baker, Susan González. 1996. Homelessness and the Latino paradox. In *Homelessness in America,* eds. Jim Baumohl, 132-140. Phoenix, AZ: Oryx Press.

Bazuin, J. T., & Fraser, J. C. (2013). How the ACS gets it wrong: The story of the American Community Survey and a small, inner city neighborhood. *Applied Geography*, *45*, 292-302.

Benfer E et al. (2020). Eviction, health inequity, and the spread of COVID-19: Housing policy as a primary pandemic mitigation strategy. *Journal of Urban Health, 98,* 1-12.

Bush, H., & Shinn, M. (2017). Families' experiences of doubling up after homelessness. *Cityscape, 19*(3), 331-356.

Chinchilla, Melissa, and Sonya Gabrielian. (2019). Stemming the rise of Latinx homelessness: Lessons from Los Angeles County. *Journal of Social Distress and the Homeless*.

Clampet-Lundquist, S. (2003). Finding and keeping affordable housing: Analyzing the experiences of single-mother families in North Philadelphia. *Journal of Sociology and Social Welfare*, 30(4), 123-140.

Colosia, A. D., Masaquel, A., Hall, C. B., Barrett, A. M., Mahadevia, P. J., & Yogev, R. (2012). Residential crowding and severe respiratory syncytial virus disease among infants and young children: A systematic literature review. *BMC infectious diseases*, *12*(1), 95.

Conroy, Stephen J., and David Heer. 2003. Hidden Hispanic homelessness in Los Angeles: The "Latino paradox" revisited. *Hispanic Journal of Behavioral Sciences* 25 (4): 530-538.

Culhane, Dennis, Metraux, Stephen, Dan Treglia, Kim Lowman, and Angel Ortiz-Siberon.. 2019. *Latinx homelessness in Philadelphia: Rates of services use, perceived barriers and assets, and potential opportunities for leveraging city reform efforts to address service gaps*. Philadelphia, PA: University of Pennsylvania.

Cusack, M., & Montgomery, A. E. (2019). Examining the risk factors and needs of veterans involuntarily doubling-up with family or friends. *Housing and Society*, *46*(3), 144–156.

Eggers, Fredrick J., and Fouad Moumen (2013). *Analysis of trends in household composition using American Housing Survey Data*. Prepared for the U.S. Department of Housing and Urban Development, Office of Policy Development and Research. Washington, DC: Government Printing Office.

Evans, G. W. (2003). The built environment and mental health. *Journal of Urban Health*, *80*(4), 536-555.

Fazel, S., Geddes, J. R., & Kushel, M. (2014). The health of homeless people in high-income countries: Descriptive epidemiology, health consequences, and clinical and policy recommendations. *The Lancet*, *384*(9953), 1529-1540.

Harvey, H. (2020). Cumulative effects of doubling up in childhood on young adult outcomes. *Demography*, 1-28.

Krieger, J., & Higgins, D. L. (2002). Housing and health: Time again for public health action. *American Journal of Public Health*, *92*(5), 758–768.

Leifheit KM, et al. Expiring eviction moratoriums and COVID-19 incidence and mortality (2020). Available at SSRN: http://dx.doi.org/10.2139/ssrn.3739576

Link, B. G., Susser, E., Stueve, A., Phelan, J., Moore, R. E., & Struening, E. (1994). Lifetime and five-year prevalence of homelessness in the United States. *American Journal of Public Health*, *84*(12), 1907-1912.

Mehdipanah, R. (2020). Housing as a determinant of COVID-19 inequities. *American Journal of Public Health*, *110*(9), 1369-1370.

Miller, P. M., & Bourgeois, A. K. (2013). Considering the geographic dispersion of homeless and highly mobile students and families. *Educational Researcher*, *42*(4), 242-249.

Minnesota Population Center. (2020). *Replicate weights in the American Community Survey*. https://usa.ipums.org/usa/repwt.shtml

Mullins, M. H., Wilkins, B. T., Mahan, A., & Bouldin, J. B. (2016). Homeless liaisons' perceptions of McKinney-Vento Act implementation: Examining geographical trends and differences. *Social work in Public Health*, *31*(5), 358-368.

Mykyta, L., & Macartney, S. (2011). *The Effects of Recession on Household Composition: "Doubling Up" and Economic Well-Being (SEHSD Working Paper Number 2011–4)*. Washington, DC: Social, Economic, & Housing Statistics Division (SEHSD) of U.S. Census Bureau.

National Alliance to End Homelessness. (2020). *State of Homelessness*. Author. https://endhomelessness.org/homelessness-in-america/homelessness-statistics/state-of-homelessness-2020/

Pindus, N., et al. (2017). *Housing needs of American Indians and Alaska Natives in tribal areas: A report from the assessment of American Indian, Alaska Native, and Native Hawaiian housing needs*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Rao, J. N., & Scott, A. J. (1981). The analysis of categorical data from complex sample surveys: Chi-squared tests for goodness of fit and independence in two-way tables. *Journal of the American statistical association*, *76*(374), 221-230.

Renwick T. (2011). *Geographic adjustments of supplemental poverty measure thresholds: Using the American Community Survey five-year data on housing costs (SEHSD Working Paper Number 2011-21).* Washington, DC: Social, Economic, & Housing Statistics Division (SEHSD) of U.S. Census Bureau.

Ruggles, S., Flood, S., Goeken, R., Grover, J., Meyer, E., Pacas, J., and Sobek, M. *IPUMS USA: Version 8.0 [dataset].* Minneapolis, MN: IPUMS, 2018.

Skobba, K., & Goetz, E. G. (2015). Doubling up and the erosion of social capital among very low income households. *International Journal of Housing Policy*, *15*(2), 127–147.

U.S. Census Bureau. (2018a*). Public Use Microdata Sample (PUMS) accuracy of the data (2018a).* Washington, DC: U.S. Government Printing Office. https://www2.census.gov/programs-surveys/acs/tech_docs/pums/accuracy/2018AccuracyPUMS.pdf

U.S. Census Bureau. (2018b). *Understanding and using American Community Survey data: What all data users need to know*. Washington, DC: U.S. Government Printing Office. https://www.census.gov/programs-surveys/acs/guidance/handbooks/general.html

U.S. Census Bureau. (2020). *American Community Survey 2018 5-year estimates.* Retrieved from *Census Reporter Profile page for Lakota Region PUMA, SD*. http://censusreporter.org/profiles/79500US4600200-lakota-region-puma-sd/

U.S. Department of Commerce (2018). *The American Community Survey.* Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census

Bureau. Retrieved from https://www2.census.gov/programs-
surveys/acs/methodology/questionnaires/2017/quest17.pdf

U.S. Department of Education. (2001). *McKinney-Vento Homeless Education Assistance*
Improvements Act of 2001 (42 U.S.C. 11431 et seq.). Washington, DC: Author. Retrieved
from https://www2.ed.gov/policy/elsec/leg/esea02/pg116.html#sec725

U.S. Department of Education. (2020). EDFacts Data Files. 2020
https://www2.ed.gov/about/inits/ed/edfacts/data-files/school-status-data.html

U.S. Department of Housing and Urban Development (HUD). (2009). *Homeless Emergency*
Assistance and Rapid Transition to Housing Act of 2009 (P.L. 111-22, Section 1003).
Washington, DC: Author.

U.S. Department of Housing and Urban Development (HUD). (2020a, December). *The 2019*
Annual Homeless Assessment Report to Congress Part 1. Washington, DC: Author.

U.S. Department of Housing and Urban Development (HUD). (2020b, September). *The 2018*
Annual Homeless Assessment Report to Congress Part 2. Washington, DC: Author.

Vacha, E. F.; Marin, M. V. (1993). Doubling up: Low income households sheltering the hidden
homeless. *Journal of Sociology and Social Welfare, 20*(3), 25-42.

Supplemental Tables

Table A. 2019 State Doubled-Up, Sheltered, and Unsheltered Homelessness Rates and Rank

STATE	Point-in-Time Count of Sheltered and Unsheltered Homelessness		ACS 1-Year Estimates of Doubled Up Homelessness		
	Persons per 10,000	State Rank	Persons per 10,000	Margin of Error 90% Confidence Level	State Rank
Alabama	7	3	137	+/- 21	42
Alaska	26	44	152	+/- 53	45
Arizona	14	37	136	+/- 16	41
Arkansas	9	19	104	+/- 19	32
California	38	48	195	+/- 8	48
Colorado	17	41	74	+/- 11	19
Connecticut	9	13	75	+/- 17	21
Delaware	9	21	81	+/- 39	24
District of Columbia	92	51	235	+/- 65	51
Florida	13	36	166	+/- 11	47
Georgia	10	23	139	+/- 14	44
Hawaii	45	49	134	+/- 36	39
Idaho	13	35	96	+/- 40	31
Illinois	8	9	84	+/- 8	25
Indiana	8	11	72	+/- 12	17
Iowa	7	6	41	+/- 10	4
Kansas	8	12	47	+/- 14	8
Kentucky	9	20	109	+/- 16	35
Louisiana	6	2	158	+/- 21	46
Maine	16	40	35	+/- 18	3
Maryland	11	30	114	+/- 20	36
Massachusetts	27	45	71	+/- 12	15
Michigan	9	14	77	+/- 11	22
Minnesota	14	38	74	+/- 19	18
Mississippi	4	1	199	+/- 26	49
Missouri	10	27	71	+/- 11	16
Montana	13	34	84	+/- 25	27
Nebraska	12	33	44	+/- 13	5
Nevada	23	43	107	+/- 23	34
New Hampshire	10	28	56	+/- 28	10
New Jersey	10	26	105	+/- 13	33
New Mexico	15	39	201	+/- 34	50

New York	47	50	135	+/-	9	40
North Carolina	9	17	89	+/-	9	28
North Dakota	7	5	33	+/-	16	2
Ohio	9	16	68	+/-	8	13
Oklahoma	10	25	96	+/-	18	30
Oregon	38	47	66	+/-	15	12
Pennsylvania	10	29	94	+/-	13	29
Rhode Island	10	24	75	+/-	33	20
South Carolina	8	10	129	+/-	17	38
South Dakota	11	32	79	+/-	27	23
Tennessee	11	31	121	+/-	13	37
Texas	9	18	137	+/-	7	43
Utah	9	15	45	+/-	13	7
Vermont	17	42	53	+/-	34	9
Virginia	7	4	69	+/-	10	14
Washington	28	46	65	+/-	12	11
West Virginia	8	8	84	+/-	19	26
Wisconsin	8	7	44	+/-	10	6
Wyoming	9	22	26	+/-	18	1
TOTAL	17		116	+/-	2	

State population estimates for calculating homelessness rates come from the Census Bureau's Annual Estimates of the Resident Population for the United States (NST-EST2019-01)

Table B. 2019 American Community Survey 1-Year Estimates of Doubled Up Homelessness, 50 Public Use Micro-Areas (PUMA) with Highest Rates

State	PUMA Name	Persons per 10,000	Margin of Error 90% Confidence Level	
Pennsylvania	Philadelphia City (East) PUMA	923	+/-	355
California	Los Angeles County (South)--Long Beach City (Southwest & Port) PUMA	823	+/-	373
Texas	Houston City (North) & Aldine--Between Loop I-610 & Beltway TX-8 PUMA	771	+/-	504
California	Los Angeles County (South Central)--LA City (South Central/Watts) PUMA	764	+/-	194
Texas	Cameron County (East)--Brownsville City (North) PUMA	743	+/-	360
California	Los Angeles County (Central)--Bell Gardens, Bell, Maywood, Cudahy & Commerce Cities PUMA	719	+/-	222
New York	NYC-Bronx Community District 5--Morris Heights, Fordham South & Mount Hope PUMA	689	+/-	224
New Mexico	Northwest New Mexico--Navajo Nation PUMA	678	+/-	261
California	Los Angeles County--LA City (Central/Univ. of Southern California & Exposition Park) PUMA	676	+/-	318
California	Los Angeles County (North/Unincorporated)--Castaic PUMA	629	+/-	359
California	Los Angeles County (Central)--LA City (Southeast/East Vernon) PUMA	626	+/-	218
California	Los Angeles County (Central)--East Los Angeles PUMA	593	+/-	256
California	Los Angeles County (East Central)--La Puente & Industry Cities PUMA	587	+/-	241
California	Fresno County (Central)--Fresno City (East Central) PUMA	586	+/-	307
Florida	Miami-Dade County (Northeast)--Hialeah City (North Central) PUMA	584	+/-	416
California	Los Angeles County (Central)--El Monte & South El Monte Cities PUMA	582	+/-	233
Florida	Miami-Dade County (Northeast Central)--Miami City (North) PUMA	564	+/-	373
Texas	South Texas Development Council (North)--Webb County--Laredo City (Central) PUMA	557	+/-	173
California	Los Angeles County (Central)--Huntington Park City, Florence-Graham & Walnut Park PUMA	556	+/-	204
California	Contra Costa County (Northeast)--Antioch City PUMA	551	+/-	287
California	Kern County (Central)--Bakersfield City (Southeast) PUMA	550	+/-	280
New Jersey	Mercer County (West Central)--Trenton City PUMA	550	+/-	326
New Mexico	North Central New Mexico PUMA	534	+/-	238
Florida	Miami-Dade County (Northeast)--Hialeah City (South Central) PUMA	529	+/-	201
Florida	Miami-Dade County (North Central)--Miami Gardens City (North & West) PUMA	516	+/-	272

New York	NYC-Bronx Community District 4--Concourse, Highbridge & Mount Eden PUMA	510	+/-	202
Arizona	Pinal County (Central)--Florence Town, Eloy (Northeast) & Coolidge Cities PUMA	504	+/-	350
Tennessee	Memphis (East), Lakeland Cities & Arlington Town (South) PUMA	504	+/-	421
California	Imperial County--El Centro City PUMA	499	+/-	247
Connecticut	Waterbury Town PUMA	493	+/-	365
Maryland	Baltimore City--Inner Harbor, Canton & Bayview PUMA	492	+/-	386
Texas	Dallas County (Northeast)--Garland (Northwest) & Richardson (East) Cities PUMA	484	+/-	432
Pennsylvania	Allentown City PUMA	483	+/-	287
Texas	San Antonio City (Southwest)--Inside Loop I-410 PUMA	479	+/-	256
Maryland	Baltimore County--Randallstown (East), Owings Mills, Milford Mill & Reisterstown PUMA	475	+/-	541
Arizona	Phoenix City--Maryvale (West) PUMA	474	+/-	240
California	Los Angeles County (South Central)--LA City (South Central/Westmont) PUMA	471	+/-	175
California	Los Angeles County (South)--South Gate & Lynwood Cities PUMA	467	+/-	209
South Dakota	Lakota Region PUMA	467	+/-	172
Pennsylvania	Philadelphia City (Southwest) PUMA	465	+/-	269
New York	NYC-Bronx Community District 1 & 2--Hunts Point, Longwood & Melrose PUMA	464	+/-	183
South Carolina	Georgetown, Marion & Dillon Counties PUMA	461	+/-	239
Florida	Orange County (Central)--Orlando City (West Downtown) & Pine Hills (Southeast) PUMA	460	+/-	362
Arizona	Navajo & Apache Counties PUMA	459	+/-	129
California	Riverside County (Northwest)--Riverside City (East) PUMA	457	+/-	282
California	Orange County (Central)--Santa Ana City (East) PUMA	453	+/-	162
Texas	Fort Worth City (East Central)--South of I-30, East of I-35W & Inside Loop I-820 PUMA	452	+/-	212
Florida	Palm Beach County (West)--Glades & Western Communities PUMA	451	+/-	302
California	Los Angeles County--LA (North Central/Arleta & Pacoima) & San Fernando Cities PUMA	450	+/-	165
Mississippi	North Central Region PUMA	450	+/-	195