

Screening Discordance and Characteristics of
Patients With Housing-Related Social Risks

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Introduction: Healthcare systems are increasingly interested in identifying patients' housing-related risks, but minimal information exists to inform screening question selection. The primary study aim is to evaluate discordance among 5 housing-related screening questions used in health care.

Methods: This was a cross-sectional multisite survey of social risks used in a convenience sample of adults seeking care for themselves or their child at 7 primary care clinics and 4 emergency departments across 9 states (2018–2019). Housing-related risks were measured using 2 questions from the Accountable Health Communities screening tool (current/anticipated housing instability, current housing quality problems) and 3 from the Children's HealthWatch recommended housing instability screening measures (prior 12-month: rent/mortgage strain, number of moves, current/recent homelessness). The 2-sided Fisher's exact tests analyzed housing-related risks and participant characteristics; logistic regression explored associations with reported health (2019–2020).

Results: Of 835 participants, 52% screened positive for ≥ 1 housing-related risk ($n=430$). Comparing the tools, 32.8% ($n=274$) screened discordant: 11.9% ($n=99$) screened positive by Children's HealthWatch questions but negative by Accountable Health Communities, and 21.0% ($n=175$) screened positive by the Accountable Health Communities tool but negative by Children's HealthWatch ($p<0.001$). Worse health was associated with screening positive for current/anticipated housing instability (AOR=0.56, 95% CI=0.32, 0.96) or current/recent homelessness (AOR=0.57, 95% CI=0.34, 0.96).

Conclusions: The 5 housing questions captured different housing-related risks, contributed to different health consequences, and were relevant to different subpopulations. Before implementing housing-related screening initiatives, health systems should understand how specific measures surface distinct housing-related barriers. Measure selection should depend on program goals and intervention resources.

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INTRODUCTION

Housing has long been acknowledged as a core social determinant of health.^{1,2} A stable home is the foundation for health across the lifespan. Robust evidence demonstrates the strong association of housing instability, housing quality problems, and homelessness with poor health outcomes,^{3–11} including asthma and overall mental and physical health.^{6,12–16} Therefore, healthcare systems are increasingly interested in addressing housing and other socioeconomic risk factors.^{13,17–19} The coronavirus disease 2019 (COVID-19) pandemic has lent new urgency to assessing housing instability in healthcare settings^{20–23} and the need for questions that capture housing instability's multidimensionality.^{11,24} The virus disproportionately affects patients experiencing homelessness,²⁵ and the related economic downturn has contributed to increased housing instability.^{26,27}

Wide variation exists in the approach that healthcare organizations and researchers have used to develop, validate, and implement processes to identify and address housing risks.^{28,29} In contrast to food insecurity screening tools,^{30–34} no gold standard screening tool or even universally accepted definition for housing-related social risks exists.^{35–39} Definitions of homelessness vary among U.S. government agencies, complicating evaluations.^{40–43} The problem of measure validity is not exclusive to housing measures; the validity of existing social risk screening tools more generally has emerged as a barrier to both implementation and evaluation of healthcare-based screening and intervention initiatives.^{29,44} For health systems interested in addressing housing-related and other social risks, question selection requires a clear understanding of who and how the health system intends to help.

Given the lack of gold standard housing measures, the goal of this study is to examine 2 of the most commonly used screening tools for housing-related social risks to better understand the specific housing concerns identified by each. The screening tools include housing-related social risk questions nested in a multi-domain social risk screening tool published by the Center for Medicare & Medicaid Innovation as part of its Accountable Health Communities (AHC) demonstration project,⁴⁵ and the Children's HealthWatch (CHW) Housing Stability Vital Sign questions.⁶ The study's primary aims are to compare 5 housing-related social risk questions and examine associations with participant characteristics. Secondary aims are to examine associations with interest in housing assistance and with self-reported health.

METHODS

Study Sample

This was a cross-sectional study of a convenience sample of adult patients and adult caregivers of pediatric patients from 7 primary care and 4 emergency department settings serving $\geq 30\%$ publicly insured or uninsured patients across 9 states. Study site recruitment and eligibility have been published previously.^{46,47} English- or Spanish-speaking/reading participants were recruited during medical visits to self-complete a 32-item survey via electronic tablet.⁴⁶ Recruitment occurred from July 2018 to February 2019. The study followed STROBE reporting guidelines.⁴⁸ This study was approved by the University of California San Francisco IRB.

Measures

The study survey given to all participants included the 10-item AHC social risk screening tool, which, in addition to housing-related social risks, also screens for food insecurity, transportation access, utilities security, and interpersonal violence.⁴⁵ The first of 2 housing questions on the AHC tool was adapted from the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences tool, and identifies current housing status—patients experiencing homelessness or at risk of losing their housing for any reason, including inability to pay their mortgage or rent.⁴⁹ The second housing question was adapted from a question by Nuruzzaman et al.⁵⁰ to identify housing quality conditions (Table 1).

A CHW study identified 3 different adverse housing circumstances related to caregiver and child health and household material hardship: being behind on rent or mortgage payments in the previous 12 months, ≥ 2 moves in the previous 12 months (multiple moves), and history of homelessness in the child's lifetime. This study survey also included an adaptation of these questions⁶; history of homelessness was limited to the previous 12 months. The AHC social risk screening tool includes 2 housing questions, one about current/future housing instability and a second about current housing quality; the CHW tool contains 3 questions that assess current/recent housing instability and homelessness.

Additional study survey questions asked about interest in assistance with all screened social risk factors, participant demographics, trust in clinicians,⁵¹ experience of discrimination in a healthcare setting,^{52,53} and self-reported health or caregiver report of child's health (reported health). Interest in assistance with social risks was assessed by: *Would you like to receive assistance with any of the issues below (check all that apply)?* Response options included housing and the other 4 assessed social risks (Appendix 1, available online). Based on respondent type (adult participant versus caregiver answering for child), general health status was assessed with either: *In general, would you say your health is . . .* or *In general, would you say your child's health is . . .* with a 5-point Likert-type scale response of *excellent/very good/good/fair/poor*.^{54,55} Reported health was dichotomized as *excellent/very good/good* versus *fair/poor*, as per published literature.^{6,56,57} Adult and child health measures were pooled for the health outcome analyses to increase sample size.

Statistical Analysis

Descriptive statistics using chi-square with 2-sided Fisher's exact tests explored associations between housing-related social risks

Table 1. Housing-Related Social Risk Questions and Answer Options From the AHC Screening Tool and CHW Measures

AHC screening tool	CHW Housing Stability Vital Sign
Current housing quality Question: Think about the place you live. Do you have problems with any of the following? (Check all that apply). Answers: (a) Pests such as bugs, ants, or mice (b) Mold (c) Lead paint or pipes (d) Lack of heat (e) Oven or stove not working (f) Smoke detectors missing or not working (g) Water leaks (h) None of the above	Being behind on rent or mortgage in the last 12 months Question: In the past 12 months, was there a time when you were not able to pay the mortgage or rent on time? Answers: (a) Yes (b) No
Current/anticipated housing instability* Question: What is your housing situation today? Answers: (a) I have a steady place to live (b) I have a place to live today, but I am worried about losing it in the future (c) I do not have a steady place to live (I am temporarily staying with others, in a hotel, in a shelter, living outside on the street, on a beach, in a car, abandoned building, bus or train station, or in a park)	Multiple moves in the last 12 months Question: In the past 12 months, how many times have you moved where you were living? Answer: # of moves (Positive screen if answer is 2 or more moves in the last 12 months)
	Current or recent homelessness in the last 12 months ^a Question: At any time in the past 12 months, were you homeless or living in shelter (including now)? Answers: (a) Yes (b) No

*Positive screen if answer is b or c.

^aOriginal CHW Housing Stability Vital Sign question asks about history of homelessness in the child's lifetime, not restricted to previous 12 months. AHC, Accountable Health Communities; CHW, Children's HealthWatch.

and participant characteristics and interest in housing assistance. Correlations among the 5 housing questions were evaluated by Pearson correlations. Bivariate and multivariable logistic regression analyses evaluated associations between each housing-related social risk and reported health status. Robust SEs accounted for clustering by site. Models adjusted for participant age, sex, race/ethnicity, educational attainment, language preference, income, participant type (adult patient or adult caregiver of pediatric patient), nonhousing social risks (food insecurity, difficulty paying for utilities, transportation difficulty, interpersonal violence), interest in assistance with housing, interest in assistance with nonhousing social risks, trust in clinicians, and experience with discrimination in health care.

All variables were categorical. With the exception of income, participants with complete data after list-wise deletion were included in regression models to ensure a sample with as fully comparable data as possible. For income, which had the most missing data ($n=103$, 12.3%), a separate category of missing was created to better preserve sample size.^{47,58} Multiple imputations were not conducted because income data were presumed not to be missing at random.^{47,59,60} No other variable had >5% missingness.

A sensitivity analysis evaluated the impact of stratifying by adult participants and adult caregivers of pediatric patients. Given that the included health variable was reported by either an adult participant about their own health or an adult participant about a

child in their care's health, analyses were stratified to evaluate for possible confounding related to participant type. All analyses were conducted in Stata/SE, version 15.1 in 2019–2020.

RESULTS

Of 1,771 adults approached to participate in this study, 1,090 (61.5%) agreed to participate; 1,054 of 1,090 participants (96.7%) answered at least $\geq 50\%$ of the survey, the threshold considered complete (Appendix Figure 1, available online). Of these 1,054 participants, 835 (79.2%) answered all housing and health questions (71.1% [$n=587$] female, 56.9% [$n=472$] aged 18–44 years). This analytic sample was slightly younger, more likely to be non-Hispanic White, and had higher education and income levels than the full sample. Table 2 contains full demographics. Appendix Table 1 (available online) compares the 835 study participants with 219 participants excluded from analyses.

More than half of the participants screened positive on ≥ 1 housing-related social risk question ($n=430$, 52%). In bivariate analyses (Table 2), answers to the 5 housing-related social risk questions did not differ by

Table 2. Participant and Healthcare System Characteristics by Responses to 5 Housing Questions

Variables	Total, n (%)	Current/anticipated housing instability (AHC ^a)		Current problems with housing quality (AHC)		Difficulty paying rent/mortgage in past 12 months (CHW ^b)		Number of moves in past 12 months (CHW)		Experience of homelessness currently/previous 12 months (CHW)	
		Yes (n=47; 17%), n (%)	Fisher's exact p-value	>1 problem (n=250; 30%), n (%)	Fisher's exact p-value	Yes (n=190; 23%), n (%)	Fisher's exact p-value	≥2 moves (n=86; 10%), n (%)	Fisher's exact p-value	Yes (n=66; 8%), n (%)	Fisher's exact p-value
Participant demographics ^c											
Age, years (n=830)			0.08		0.02		<0.001		<0.001		0.006
18–44	472 (56.9)	82 (17.4)		151 (32.0)		118 (25.0)		67 (14.2)		47 (10.0)	
45–64	242 (29.2)	44 (18.2)		74 (30.6)		60 (24.8)		16 (6.6)		17 (7.0)	
≥65	116 (14.0)	11 (9.5)		22 (19.0)		11 (9.5)		2 (1.7)		2 (1.7)	
Sex (n=826)			0.26		0.75		0.32		0.69		0.03
Female	587 (71.1)	91 (15.5)		176 (30.0)		139 (23.7)		62 (10.6)		39 (6.6)	
Male	239 (28.9)	45 (18.8)		69 (28.9)		49 (20.5)		23 (9.6)		27 (11.3)	
Race/ethnicity (n=805)			0.002		0.03		0.004		0.007		0.001
Non-Hispanic White	320 (39.8)	34 (10.6)		76 (23.8)		57 (17.8)		20 (6.3)		12 (3.8)	
Non-Hispanic Black	175 (21.7)	34 (19.4)		57 (32.6)		50 (28.6)		27 (15.4)		24 (13.7)	
Hispanic	240 (29.8)	52 (21.7)		77 (32.1)		67 (27.9)		28 (11.7)		20 (8.3)	
Non-Hispanic other/multiple	70 (8.7)	11 (15.7)		26 (37.1)		11 (15.7)		9 (12.9)		6 (8.6)	
Education, years (n=832)			0.007		0.18		0.81		0.03		0.003
<12	107 (12.9)	28 (26.2)		38 (35.5)		23 (21.5)		18 (16.8)		17 (15.9)	
≥12	725 (87.1)	109 (15.0)		219 (29.0)		166 (22.9)		67 (9.2)		49 (6.8)	
Income (n=835)			<0.001		<0.001		<0.001		<0.001		<0.001
Missing, \$	103 (12.3)	18 (17.5)		29 (28.2)		16 (15.5)		6 (5.8)		8 (7.8)	
0–10,000	1,742 (20.8)	54 (31.0)		72 (41.4)		54 (31.0)		43 (24.7)		35 (20.1)	
10,001–25,000	152 (18.2)	34 (22.4)		43 (28.3)		46 (30.3)		16 (10.5)		10 (6.6)	
25,001–50,000	163 (19.5)	28 (17.2)		58 (35.6)		52 (31.9)		11 (6.7)		11 (6.8)	
50,001–75,000	75 (9.0)	1 (1.3)		20 (26.7)		11 (14.7)		2 (2.7)		1 (1.3)	
≥75,001	168 (20.1)	3 (1.8)		28 (16.7)		11 (6.5)		8 (4.8)		1 (0.6)	
Preferred language (n=835)			0.03		0.19		1.00		0.41		0.007
English	722 (86.5)	111 (15.4)		210 (29.1)		164 (22.7)		72 (10.0)		64 (8.9)	
Spanish	113 (13.5)	27 (23.9)		40 (35.4)		26 (23.0)		14 (12.4)		2 (1.8)	
Reported health status (n=835)			<0.001		0.02		0.02		0.69		0.005
Excellent/very good/good	644 (77.1)	82 (12.7)		179 (27.8)		134 (20.8)		65 (10.1)		41 (6.4)	
Fair/poor	191	56 (29.3)		71 (37.2)		56 (29.3)		21 (11.0)		25 (13.1)	
Participant type (n=835)			0.51		0.66		0.001		0.007		<0.001
Adult patient	636 (76.2)	102 (16.0)		188 (29.6)		127 (20.0)		55 (8.7)		35 (5.5)	
Adult caregiver of pediatric patient	199 (23.8)	36 (18.1)		62 (31.2)		63 (31.7)		31 (15.6)		31 (15.6)	

(continued on next page)

Table 2. Participant and Healthcare System Characteristics by Responses to 5 Housing Questions (*continued*)

Variables	Total, n (%)	Current/anticipated housing instability (AHC ^a)		Current problems with housing quality (AHC)		Difficulty paying rent/ mortgage in past 12 months (CHW ^b)		Number of moves in past 12 months (CHW)		Experience of homelessness currently/previous 12 months (CHW)	
		Yes (n=47; 17%), n (%)	Fisher's exact p-value	>1 problem (n=250; 30%), n (%)	Fisher's exact p-value	Yes (n=190; 23%), n (%)	Fisher's exact p-value	≥2 moves (n=86; 10%), n (%)	Fisher's exact p-value	Yes (n=66; 8%), n (%)	Fisher's exact p-value
Any experience of prior discrimination within health care (n=829)			0.03		0.005		0.01		0.01		0.02
Yes	222 (26.8)	47 (21.2)		83 (37.4)		64 (28.8)		32 (14.4)		26 (11.7)	
No	607 (73.2)	88 (14.5)		164 (27.0)		123 (20.3)		51 (8.4)		39 (6.4)	
Social risk screening											
Food insecurity (n=832)			<0.001		<0.001		<0.001		<0.001		<0.001
Yes	317 (38.1)	108 (34.1)		144 (45.4)		135 (57.4)		63 (19.9)		52 (16.4)	
No	515 (61.9)	28 (5.4)		105 (20.4)		54 (10.5)		22 (4.3)		14 (2.7)	
Utilities problems (n=829)			0.02		<0.001		<0.001		0.29		0.42
Yes	100 (12.1)	25 (25.0)		48 (48.0)		59 (59.0)		13 (13.0)		10 (10.0)	
No	729 (87.9)	110 (15.1)		198 (27.2)		128 (17.6)		70 (9.6)		54 (7.4)	
Transportation problems (n=829)			<0.001		<0.001		<0.001		<0.001		<0.001
Yes	158 (19.1)	63 (39.9)		77 (48.7)		65 (41.1)		41 (26.0)		42 (26.6)	
No	671 (80.9)	74 (11.0)		169 (25.2)		125 (18.6)		44 (6.6)		24 (3.6)	
Safety concern (n=814)			0.002		0.03		0.003		0.003		0.032
Yes	16 (2.0)	8 (50.0)		9 (56.3)		9 (56.3)		6 (37.5)		4 (25.0)	
No	798 (98.0)	125 (15.7)		233 (29.2)		175 (21.9)		78 (9.8)		61 (7.6)	
Positive for ≥1 nonhousing social risk: 4 domains (n=835)			<0.001		<0.001		<0.001		<0.001		<0.001
No risk factors	438 (52.5)	18 (4.1)		81 (18.5)		31 (7.1)		17 (3.9)		5 (1.1)	
1 risk factor	77 (9.2)	11 (14.3)		24 (31.2)		23 (29.9)		5 (6.5)		9 (11.7)	
2–4 risk factors	320 (38.3)	109 (34.1)		145 (45.3)		136 (42.5)		64 (20.0)		52 (16.3)	
Any interest in assistance with housing (n=835)			<0.001		<0.001		<0.001		<0.001		<0.001
Yes	183 (21.9)	89 (48.6)		86 (47.0)		73 (39.9)		38 (20.8)		36 (19.7)	
No	652 (78.1)	49 (7.5)		164 (25.2)		117 (17.9)		48 (7.4)		30 (4.6)	
Any interest in assistance with nonhousing social risks (4 domains) (n=835)			<0.001		<0.001		<0.001		0.004		<0.001
Yes	219 (26.2)	68 (31.1)		104 (47.5)		91 (41.6)		34 (15.5)		36 (16.4)	
No	616 (73.8)	70 (11.4)		146 (23.7)		99 (16.1)		52 (8.4)		30 (4.9)	

Note: Boldface indicates statistical significance ($p < 0.05$).

^aAHC=Question from the Center for Medicare & Medicaid Innovation's AHC Social Risk Screening Tool.

^bCHW=Question from CHW Housing Stability Vital Sign Tool.

^cAppendix Table 2 (available online) shows additional participant and healthcare system characteristics.

AHC, Accountable Health Communities; CHW, Children's HealthWatch.

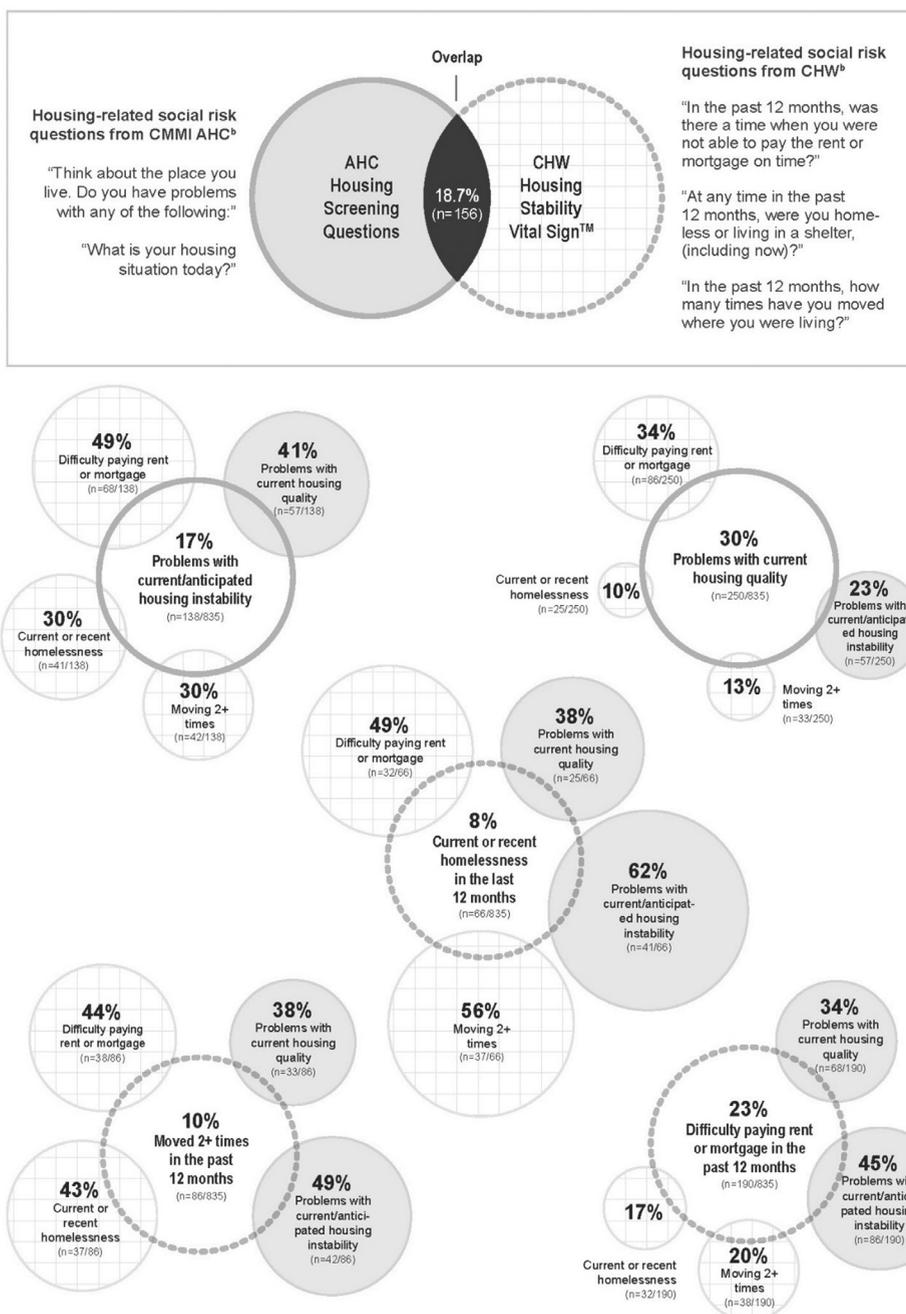


Figure 1. Overlap between housing-related social risk questions from the AHC screening tool and the CHW Housing Stability Vital Sign.

^aThe 5 groupings of circles in the bottom portion of the figure put each of the 5 housing-related social risk questions in the middle and show the positive overlap with the other 4.

^bTable 1 shows the full text of AHC and CHW screening questions.

AHC, Accountable Health Communities; CHW, Children’s HealthWatch; CMMI, Centers for Medicare & Medicaid Innovation.

language preference or participant sex. There were fewer positive housing-related social risk screens across all questions in older participants and those with higher income. Multiple moves and problems with housing quality were most frequently reported among younger participants. Compared with the generally older adult patient participants,

a higher proportion of caregivers of pediatric patients reported multiple moves, difficulty paying rent/mortgage, or current/recent homelessness. Rates of the most extreme forms of housing-related social risk (current/anticipated housing instability or current/recent homelessness) were highest among those with lowest income and with <12 years of education. Participants identifying

as non-Hispanic Black and Hispanic and those who reported experiencing discrimination within health care had significantly higher rates of screening positive for current/anticipated housing instability, multiple moves, and current/recent homelessness.

Other social risks co-occurred with affirmative responses to housing-related social risk measures (Table 2). The proportion of participants who screened positive for food insecurity, transportation, and safety concerns was uniformly higher among those who also screened positive for any of the 5 housing-related social risks. Participants were more likely to screen positive for difficulty paying for utilities if they reported housing quality problems or being behind on rent/mortgage.

Comparing the 2 screening tools, 11.8% ($n=99$) of participants screened positive for ≥ 1 of the 3 CHW housing-related social risks but negative for both AHC questions, and 21.0% ($n=175$) screened positive for ≥ 1 AHC question but negative for all CHW questions. This resulted in a total of 32.8% screening discordant by AHC versus CHW screening questions. Only 18.7% ($n=156$) of all participants screened positive by both tools (answered ≥ 1 each of AHC and CHW questions affirmatively). Discordance between the 2 tools (screening positive on one tool and negative on another or vice versa) was statistically significant ($p<0.001$). Figure 1 shows further details on housing question overlap. Comparing the 5 individual housing questions, there was moderate correlation between current/anticipated housing instability (AHC tool) and current/recent homelessness (CHW tool; $\rho=0.36$) and between multiple moves (CHW tool) and current/recent homelessness (CHW tool; $\rho=0.44$); all other correlations were <0.3 .

Among the participants screening positive for housing-related social risk, interest in assistance with housing was highest for those who screened positive for current/anticipated housing instability (AHC tool; 64.5%, $n=89$), or current/recent homelessness (CHW tool; 54.6%, $n=36$) and lowest for problems with housing quality (AHC tool; 34.4%, $n=86$). Among the participants who screened negative for all 5 housing-related social risks, 7.7% ($n=31$) were still interested in assistance with housing. There was a nonlinear increase in interest in assistance as the number of housing questions for which participants screened positive increased, from 21.9% ($n=54$) of participants who screened positive for 1 housing question being interested in assistance, up to 80.0% ($n=4$) of participants screening positive for all 5 questions (Appendix Table 4, available online).

In adjusted analyses, screening positive for current/anticipated housing instability (AOR=0.53, 95% CI=0.31, 0.92) and current/recent homelessness (AOR=0.50, 95% CI=0.26, 0.95) were both

independently associated with significantly decreased odds of reporting excellent/very good/good health (Table 3). Reported health was not associated with any other housing-related social risks.

Stratifying analyses by participant type did not alter the direction of association between health and current/anticipated housing instability or current/recent homelessness but did alter statistical significance. For adult patients ($n=585$), current/anticipated housing instability remained significantly associated with decreased odds of excellent/very good/good health (AOR=0.49, 95% CI=0.26, 0.90), but current/recent homelessness was no longer significant (AOR=0.50, 95% CI=0.18, 1.39). No housing domains were significantly associated with child health reported by adult caregivers of pediatric patients ($n=163$) (Appendix Table 5, available online).

DISCUSSION

This study examined 5 housing-related social risk questions derived from 2 screening tools commonly used in healthcare settings. More than half of the participants screened positive on ≥ 1 of these housing-related questions, consistent with existing literature.^{6,61–66} The questions captured different dimensions of housing-related risk, and the high rate of reported housing risk seen likely relates at least in part to the breadth of questions asked. More than 20% of participants facing housing-related social risk would not have been detected if answering only the 3 CHW housing questions. More than 10% of participants at risk would not have been detected if answering only the AHC questions. The AHC tool's housing quality question, not reflected in the CHW measures, partially explains these differences. Additionally, question wording (current and future worry versus experience) and timeframes reflected across the 2 tools likely contribute to differences in results.

As expected, there were higher rates of housing-related social risks in participant populations facing greater socioeconomic adversity. Number of moves or ability to pay rent or mortgage did not vary by educational attainment, but there were more extreme forms of housing-related social risks in participants with <12 years of education. Housing-related social risks co-occurred with other social risk domains; participants with a higher cumulative number of nonhousing social risk factors experienced higher rates of housing-related risks. This is consistent with other literature demonstrating the co-occurrence of poverty-related social risks.⁶⁷ Participants who identified as non-Hispanic Black or Hispanic or who reported prior discrimination within health care screened positive at higher rates for all forms

Table 3. Associations Between Housing-Related Social Risk Screening Questions and Reported Health Status (n=780)

Variables	Reported health (good/very good/excellent versus fair/poor)			
	Unadjusted OR ^a (95% CI)	p-value	AOR (95% CI)	p-value
Housing-related social risk screening questions				
Current housing quality problems (AHC ^b)				
Yes	0.64 (0.46, 0.91)	0.012	0.89 (0.64, 1.24)	0.490
No	ref		ref	
Current housing instability/stability concerns (AHC)				
Yes	0.32 (0.18, 0.57)	<0.001	0.53 (0.31, 0.92)	0.023
No	ref		ref	
Difficulty paying rent/mortgage past 12 months (CHW ^c)				
Yes	0.63 (0.39, 1.03)	0.064	1.02 (0.57, 1.81)	0.950
No	ref		ref	
Moving housing ≥2 times in past 12 months (CHW)				
Yes	0.88 (0.52, 1.49)	0.623	1.78 (0.86, 3.68)	0.119
No	ref		ref	
Experiencing homelessness/living in shelter in past 12 months (CHW)				
Yes	0.48 (0.25, 0.92)	0.027	0.50 (0.26, 0.95)	0.034
No	ref		ref	

Note: Boldface indicates statistical significance ($p < 0.05$).

There were significantly more participants included in the multivariable model after list-wise deletion (n=780) who were younger, healthier, caregiver participant type, screened positive for less current housing instability, and recruited more from emergency departments compared with the 55 (6.6%) excluded from the multivariable model. Appendix Table 3 (available online) provides more details. Model adjusted for participant age, sex, race/ethnicity, educational attainment, language preference, income, participant type (adult patient or adult caregiver of pediatric patient), presence of nonhousing social risks (food insecurity, difficulty paying for utilities, difficulty with medical or nonmedical transportation, interpersonal violence), interest in assistance with housing, interest in assistance with nonhousing social risks, trust in clinicians, and experience with discrimination in health care. Appendix Table 5 (available online) provides full output.

^aORs >1=associated with good/very good/excellent health; ORs <1=associated with poor/fair health.

^bAHC=Question from the Center for Medicare & Medicaid Innovation's Accountable Health Communities Social Risk Screening Tool.

^cCHW=Question from Children's HealthWatch Housing Stability Vital Sign Tool.

AHC, Accountable Health Communities; CHW, Children's HealthWatch.

of housing-related social risks. Systemic racism and discrimination likely contribute to these findings.^{68–70}

These findings highlight what housing advocates have long known—patients experiencing housing-related social risks face complex challenges. The COVID-19 pandemic has made these issues all the more relevant by exacerbating existing racial inequities and increasing unemployment (with accompanying health insurance and income loss).^{22,71,72} These factors are expected to worsen health outcomes and equity.^{73,74} Financial strain because of the pandemic is likely to impact all forms of housing-related social risk.^{75–77} Ability to pay rent or mortgage may be one of the most common or first housing-related risks adversely affected and will likely result in worse housing quality (housing maintenance and financial tradeoffs) and evictions. Although federal and state legislation temporarily staved off evictions during the early COVID-19 epidemic, these are time-limited interventions, and most people will be expected to pay back rent owed, potentially leading to a mass eviction crisis of millions of people.⁷⁸

When identifying housing-related social risks, efforts should be made to provide resource linkages when

available and to help understand broader community needs. Interest in housing assistance increased as participants screened positive for a greater number of housing risks, but some participants who screened negative on all 5 screening questions also expressed interest in housing assistance. The latter may represent participants who either felt uncomfortable responding to the screening questions or were worried about other needs and future housing-related risks not identified. This group of participants who screened negative but still wanted help with housing may reflect lower sensitivity of screening questions when compared with directly assessing patients' desire for help.⁷⁹ Given the evidence for homelessness prevention services,^{80,81} future research should explore ways to identify patients who will maximally benefit from housing-related risk interventions, additional services that may be needed in combination with housing support, and how to distribute housing-related support services in resource-limited settings.²⁰

In this study, worse health was associated with more extreme forms of housing-related social risks (current/anticipated housing instability and current/recent homelessness) but not less extreme forms such as difficulty

paying for rent/mortgage or multiple moves. This contrasts with findings from a prior study by Sandel and colleagues⁶ in which a sample of >20,000 dyads of caregivers and their children showed that these theoretically less extreme housing-related social risks were nevertheless associated with significantly increased odds of worse caregiver and child health, on par with those of families reporting current/recent homelessness. The lack of association in this study may be a limitation of pooling the 2 measures of health (adult patient self-reported health versus adult caregiver–reported child health), although there was no association in separate sensitivity analyses, and the much smaller sample size.

Health systems can use this study's findings when selecting screening tools. Recognizing that not all health systems can include all 5 measures of housing-related social risk, it is important to be mindful of the consequences of measure selection. In settings with less capacity for intervening on housing stability, it may make sense to prioritize questions about more extreme forms of housing-related risk to identify patients at most immediate risk of negative health consequences and most interested in housing-related assistance. These findings can also help health systems to better understand benefits of including other measures of housing instability and quality concerns. Given that housing risks do not occur in isolation, multidomain screening tools may provide a more accurate picture of the level of social adversity patients face and resources they may need.

Limitations

First, as a cross-sectional study, adjusted analyses show associations, not causation. The study is based on participant self-report and thus subject to both self-selection bias (e.g., participants may choose to participate because they want help) and social desirability bias (e.g., participants may fear that disclosure of housing instability will lead to involvement of child protective services). Second, this study was not designed or powered to comprehensively assess the validity or psychometric properties of the housing screening questions. The CHW housing questions have been examined in other studies,⁶ but this is the first time these 5 questions have been examined and compared in diverse healthcare settings and populations. Third, the study sample was limited to those participants with complete responses to the 5 housing and the general health status questions, excluding >200 survey participants because of nonresponse. Although this may have biased the sample, the team believed that multiple imputation also would have introduced bias and opted to proceed with the smaller sample. Fourth, the AHC question about current/anticipated housing instability was dichotomized, as per AHC's guidance,⁴⁵ but

current experience of homelessness and concerns about future housing instability are distinct experiences. Combining the 2 conditions may have made it more difficult to detect differences in reported health. Fifth, a single validated item was used as a proxy for health, which has been shown to reflect health and mortality risk,⁵⁶ but it is possible it inadequately reflects all participants' health. Moreover, adult and child health status were pooled for analyses owing to sample size, and this may have reduced the findings' precision. Finally, the sample included only those who could speak/read English or Spanish and, although the survey was administered in diverse settings, the final sample is not representative of all adult patients/caregivers.

CONCLUSIONS

Different housing-related screening questions identify distinct subpopulations experiencing housing-related social risks. Therefore, using any 1 item or limited combination may fail to identify patients likely to experience negative health consequences from housing adversity or patients most likely interested in housing assistance. As efforts to address housing quality and stability expand in healthcare settings, health systems should be aware that housing-related screening tools are not interchangeable. For health providers and systems interested in addressing housing-related social risks, clarity of purpose—including knowing what target actions will be based on the gathered information—should inform question selection.

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SUPPLEMENTAL MATERIAL

Supplemental materials associated with this article can be found in the online version at <https://doi.org/10.1016/j.amepre.2021.01.027>.

REFERENCES

- National Academies of Sciences, Engineering, and Medicine. Permanent Supportive Housing: Evaluating the Evidence for Improving Health Outcomes Among People Experiencing Chronic Homelessness. Washington, DC: The National Academies Press, 2018. <https://doi.org/10.17226/25133>.
- Office of Disease Prevention and Health Promotion, Office of the Assistant Secretary for Health, Office of the Secretary, U.S. Department of Health and Human Services. Healthy People 2030: Housing and Homes. <https://health.gov/healthypeople/objectives-and-data/browse-objectives/housing-and-homes>. Accessed March 16, 2021.
- Doran KM, Kunzler NM, Mijanovich T, et al. Homelessness and other social determinants of health among emergency department patients. *J Soc Distress Homeless*. 2016;25(2):71–77. <https://doi.org/10.1080/10530789.2016.1237699>.
- Robertson MJ, Winkleby MA. Mental health problems of homeless women and differences across subgroups. *Annu Rev Public Health*. 1996;17(1):311–336. <https://doi.org/10.1146/annurev.pu.17.050196.001523>.
- Sandel M, Sheward R, Ettinger de Cuba S, et al. Timing and duration of pre- and postnatal homelessness and the health of young children. *Pediatrics*. 2018;142(4):e20174254. <https://doi.org/10.1542/peds.2017-4254>.
- Sandel M, Sheward R, Ettinger de Cuba S, et al. Unstable housing and caregiver and child health in renter families. *Pediatrics*. 2018;141(2):e20172199. <https://doi.org/10.1542/peds.2017-2199>.
- Jelleyman T, Spencer N. Residential mobility in childhood and health outcomes: a systematic review. *J Epidemiol Community Health*. 2008;62(7):584–592. <https://doi.org/10.1136/jech.2007.060103>.
- Dong M, Anda RF, Felitti VJ, et al. Childhood residential mobility and multiple health risks during adolescence and adulthood: the hidden role of adverse childhood experiences. *Arch Pediatr Adolesc Med*. 2005;159(12):1104–1110. <https://doi.org/10.1001/archpedi.159.12.1104>.
- Baker E, Lester LH, Bentley R, Beer A. Poor housing quality: prevalence and health effects. *J Prev Interv Community*. 2016;44(4):219–232. <https://doi.org/10.1080/10852352.2016.1197714>.
- Thomson H, Thomas S, Sellstrom E, Petticrew M. Housing improvements for health and associated socio-economic outcomes. *Cochrane Database Syst Rev*. 2013(2):CD008657. <https://doi.org/10.1002/14651858.CD008657.pub2>.
- Montgomery AE, Byrne TH, Cusack MC, et al. Patients' perspectives on elements of stable housing and threats to housing stability. *J Soc Soc Work Res*. 2020;11(4):545–567. <https://doi.org/10.1086/712238>.
- Hughes HK, Matsui EC, Tschudy MM, Pollack CE, Keet CA. Pediatric asthma health disparities: race, hardship, housing, and asthma in a national survey. *Acad Pediatr*. 2017;17(2):127–134. <https://doi.org/10.1016/j.acap.2016.11.011>.
- Boudreaux M, Fenelon A, Slopen N, Newman SJ. Association of childhood asthma with federal rental assistance. *JAMA Pediatr*. 2020;174(6):592–598. <https://doi.org/10.1001/jamapediatrics.2019.6242>.
- Bovell-Ammon A, Yentel D, Koprowski M, Wilkinson C, Sandel M. Housing is health: a renewed call for federal housing investments in affordable housing for families with children. *Acad Pediatr*. 2021;21(1):19–23. <https://doi.org/10.1016/j.acap.2020.06.141>.
- Shah SN, Fossa A, Steiner AS, et al. Housing quality and mental health: the association between pest infestation and depressive symptoms among public housing residents. *J Urban Health*. 2018;95(5):691–702. <https://doi.org/10.1007/s11524-018-0298-7>.
- Taylor L. *Housing and health: an overview of the literature*. Bethesda, MD: Health Affairs, Published June 7, 2018. <https://doi.org/10.1377/hpb20180313.396577>.
- Rios S. *Why Boston Medical Center is investing in housing*. Boston, MA: WBUR. <https://www.wbur.org/commonhealth/2018/06/27/boston-medical-center-affordable-housing>. Published June 27, 2018. Accessed February 18, 2021.
- Peters A. This healthcare giant invests millions in affordable housing to keep people healthy. *Fast Company*. January 15, 2019. <https://www.fast-company.com/90291860/this-healthcare-giant-invests-millions-in-affordable-housing-to-keep-people-healthy>. Accessed February 18, 2021.
- Jaspen B. UnitedHealth group increases housing investments to \$500M to address social determinants. *Forbes*. June 4, 2020. <https://www.forbes.com/sites/brucejaspen/2020/06/04/unitedhealth-group-boosts-housing-investments-to-500m-to-address-social-determinants/?sh=41e31f732815>. Accessed February 18, 2021.
- Bovell-Ammon A, Sandel M, James T. *Housing as a prescription for health, now and in the future*. Bethesda, MD: HealthAffairs, Published April 21, 2020. <https://www.healthaffairs.org/doi/10.1377/hblog20200420.92256/full/>. Accessed April 21, 2020.
- Benfer EA, Wiley LF. *Health justice strategies to combat COVID-19: protecting vulnerable communities during a pandemic*. Bethesda, MD: HealthAffairs, Published March 19, 2020. <https://www.healthaffairs.org/doi/10.1377/hblog20200319.757883/full/>. Accessed April 21, 2020.
- Williams C, Bracken M. Half of low-income adults would use up savings within 3 months without a job. *Morning Consult*. April 2,

- 2020 <https://morningconsult.com/2020/04/02/coronavirus-recession-unemployment-poll/>. Accessed July 9, 2020.
23. Peretz PJ, Islam N, Matiz LA. Community health workers and COVID-19—addressing social determinants of health in times of crisis and beyond. *N Engl J Med*. 2020;383(19):e108. <https://doi.org/10.1056/NEJMp2022641>.
 24. Mehdiapanah R. Housing as a determinant of COVID-19 inequities. *Am J Public Health*. 2020;110(9):1369–1370. <https://doi.org/10.2105/AJPH.2020.305845>.
 25. Ellis EG. For homeless people, COVID-19 is horror on top of horror. *Wired*. <https://www.wired.com/story/coronavirus-covid-19-homeless/>. Accessed February 18, 2021.
 26. Levin S, Ho V. ‘This is about survival’: California tenants plan rent strikes as COVID-19 relief falls short. *The Guardian*. March 31, 2020 <https://www.theguardian.com/us-news/2020/mar/31/california-rent-strike-coronavirus-eviction>. Accessed February 18, 2021.
 27. Andrew S, Bahnay A. New data shows more Americans are having trouble paying their rent. *CNN Business*. April 11, 2020. <https://www.cnn.com/2020/04/09/business/americans-rent-payment-trnd/index.html>. Accessed February 18, 2021.
 28. LaForge K, Gold R, Cottrell E, et al. How 6 organizations developed tools and processes for social determinants of health screening in primary care: an overview. *J Ambul Care Manage*. 2018;41(1):2–14. <https://doi.org/10.1097/JAC.0000000000000221>.
 29. Henrikson NB, Blasi PR, Dorsey CN, et al. Psychometric and pragmatic properties of social risk screening tools: a systematic review. *Am J Prev Med*. 2019;57(6 suppl 1):S13–S24. <https://doi.org/10.1016/j.amepre.2019.07.012>.
 30. The hunger vital sign. Children’s HealthWatch. <http://www.childrenshealthwatch.org/public-policy/hunger-vital-sign/>. Accessed February 18, 2021.
 31. Hager ER, Quigg AM, Black MM, et al. Development and validity of a 2-item screen to identify families at risk for food insecurity. *Pediatrics*. 2010;126(1):e26–e32. <https://doi.org/10.1542/peds.2009-3146>.
 32. Survey tools. U.S. Department of Agriculture, Economic Research service. <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools/>. Updated September 9, 2020. Accessed October 12, 2020.
 33. Makelarski JA, Abramsohn E, Benjamin JH, Du S, Lindau ST. Diagnostic accuracy of two food insecurity screeners recommended for use in health care settings. *Am J Public Health*. 2017;107(11):1812–1817. <https://doi.org/10.2105/AJPH.2017.304033>.
 34. Gundersen C, Engelhard EE, Crumbaugh AS, Seligman HK. Brief assessment of food insecurity accurately identifies high-risk U.S. adults. *Public Health Nutr*. 2017;20(8):1367–1371. <https://doi.org/10.1017/S1368980017000180>.
 35. Sheward R, Bovell-Ammon A, Ahmad N, Preer G, Ettinger de Cuba S, Sandel M. Promoting caregiver and child health through housing and stability screening in clinical settings. *Zero Three*. 2019;39(4):52–59. <https://www.zerotothree.org/resources/3199-promoting-caregiver-and-child-health-through-housing-stability-screening-in-clinical-settings>. Accessed July 9, 2020.
 36. Cutts DB, Meyers AF, Black MM, et al. U.S. housing insecurity and the health of very young children. *Am J Public Health*. 2011;101(8):1508–1514. <https://doi.org/10.2105/AJPH.2011.300139>.
 37. Johnson A, Meckstroth A. *Ancillary services to support welfare to work*. Washington, DC: HHS, Office of the Assistant Secretary for Planning and Evaluation. <https://aspe.hhs.gov/report/ancillary-services-support-welfare-work>. Published June 22, 1998. Accessed February 18, 2021.
 38. Satcher D. Include a social determinants of health approach to reduce health inequities. *Public Health Rep*. 2010;125(suppl 4):6–7. <https://doi.org/10.1177/003335491012505402>.
 39. Suglia SF, Duarte CS, Chambers EC, Boynton-Jarrett R. Social and behavioral risk factors for obesity in early childhood. *J Dev Behav Pediatr*. 2013;34(8):549–556. <https://doi.org/10.1097/DBP.0b013e3182a509c0>.
 40. HUD’s definition of homelessness: resources and guidance. HUD Exchange. March 8, 2019 <https://www.hudexchange.info/news/huds-definition-of-homelessness-resources-and-guidance/>. Accessed July 9, 2020.
 41. U.S. Department of Agriculture, Food and Nutrition Service. Updated guidance for homeless children in the school nutrition programs. Washington, DC: U.S. Department of Agriculture, Food and Nutrition Service. <https://www.fns.usda.gov/updated-guidance-homeless-children-school-nutrition-programs>. Published April 4, 2002. Accessed July 9, 2020.
 42. United States Department of Agriculture. Are you homeless? You might be able to get food help from SNAP! Washington, DC: United States Department of Agriculture. https://fns-prod.azureedge.net/sites/default/files/Homeless_QA_0.pdf. Accessed July 9, 2020.
 43. Strategic action plan on homelessness. HHS. <https://www.hhs.gov/programs/social-services/homelessness/research/strategic-action-plan-on-homelessness/index.html>. Updated March 2007. Accessed July 9, 2020.
 44. Adler NE, Stead WW. Patients in context—EHR capture of social and behavioral determinants of health. *N Engl J Med*. 2015;372(8):698–701. <https://doi.org/10.1056/NEJMp1413945>.
 45. Center for Medicare and Medicaid Innovation, Centers for Medicare & Medicaid Services. The Accountable Health Communities health-related social needs screening tool. Baltimore, MD: Center for Medicare and Medicaid Innovation, Centers for Medicare & Medicaid Services. <https://innovation.cms.gov/files/worksheets/ahcm-screeningtool.pdf>. Published 2018. Accessed March 18, 2019.
 46. De Marchis EH, Hessler D, Fichtenberg C, et al. Part I: a quantitative study of social risk screening acceptability in patients and caregivers. *Am J Prev Med*. 2019;57(6 suppl 1):S25–S37. <https://doi.org/10.1016/j.amepre.2019.07.010>.
 47. De Marchis EH, Hessler D, Fichtenberg CM, et al. Assessment of social risk factors and interest in receiving health care-based social assistance among adult patients and adult caregivers of pediatric patients. *JAMA Netw Open*. 2020;3(10):e2021201. <https://doi.org/10.1001/jamanetworkopen.2020.21201>.
 48. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening of Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Equator Network*. <https://www.equator-network.org/reporting-guidelines/strobe/>. Updated October 22, 2019. Accessed December 2, 2019.
 49. National Association of Community Health Centers. PRAPARE®: protocol for responding to and assessing patient assets, risks, and experiences. Bethesda, MD: National Association of Community Health Centers. <https://www.nachc.org/wp-content/uploads/2020/04/PRAPARE-One-Pager-9-2-16-with-logo-and-trademark.pdf>. Published 2016. Accessed December 2, 2019.
 50. Nuruzzaman N, Broadwin M, Kourouma K, Olson DP. Making the social determinants of health a routine part of medical care. *J Health Care Poor Underserved*. 2015;26(2):321–327. <https://doi.org/10.1353/hpu.2015.0036>.
 51. Patient experience measures from the CAHPS® Health Plan Survey. Agency for Healthcare Research and Quality. https://www.ahrq.gov/sites/default/files/wysiwyg/cahps/surveys-guidance/hp/about/measures_hp50_2109.pdf. Updated October 20, 2015. Accessed February 18, 2021.
 52. Hausmann LR, Kressin NR, Hanusa BH, Ibrahim SA. Perceived racial discrimination in health care and its association with patients’ health-care experiences: does the measure matter? *Ethn Dis*. 2010;20(1):40–47. Accessed March 24, 2021. <https://www.ethndis.org/priorarchives/ethn-20-01-40.pdf>.

53. Bird ST, Bogart LM. Perceived race-based and socioeconomic status (SES)-based discrimination in interactions with health care providers. *Ethn Dis*. 2001;11(3):554–563. <https://doi.org/10.5888/pcd11.130304>.
54. DeSalvo KB, Fan VS, McDonell MB, Fihn SD. Predicting mortality and healthcare utilization with a single question. *Health Serv Res*. 2005;40(4):1234–1246. <https://doi.org/10.1111/j.1475-6773.2005.00404.x>.
55. Ware J Jr, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Med Care*. 1996;34(3):220–233. <https://doi.org/10.1097/00005650-199603000-00003>.
56. Marshall GL, Tucker-Seeley R. The association between hardship and self-rated health: does the choice of indicator matter? *Ann Epidemiol*. 2018;28(7):462–467. <https://doi.org/10.1016/j.annepidem.2018.03.013>.
57. Zajacova A, Dowd JB. Reliability of self-rated health in U.S. adults. *Am J Epidemiol*. 2011;174(8):977–983. <https://doi.org/10.1093/aje/kwr204>.
58. Park S, Pan L, Sherry B, Blanck HM. Consumption of sugar-sweetened beverages among U.S. adults in 6 states: behavioral Risk Factor Surveillance System, 2011. *Prev Chronic Dis*. 2014;11:E65. <https://doi.org/10.5888/pcd11.130304>.
59. Giusti C, Little RJA. An analysis of nonignorable nonresponse to income in a survey with a rotating panel design. *J Off Stat*. 2011;27(2):211–229. Accessed July 21, 2020. <https://www.scb.se/contentassets/ca21efb41fee47d293bbe5bf7be7fb3/an-analysis-of-nonignorable-nonresponse-to-income-in-a-survey-with-a-rotating-panel-design.pdf>.
60. King G, Honaker J, Joseph A, Scheve K. Analyzing incomplete political science data: an alternative algorithm for multiple imputation. *Am Polit Sci Rev*. 2001;95(1):49–69. <https://doi.org/10.1017/S0003055401000235>.
61. Fleegler EW, Lieu TA, Wise PH, Muret-Wagstaff S. Families' health-related social problems and missed referral opportunities. *Pediatrics*. 2007;119(6):e1332–e1341. <https://doi.org/10.1542/peds.2006-1505>.
62. Hassan A, Scherer EA, Pikcilings A, et al. Improving social determinants of health: effectiveness of a web-based intervention. *Am J Prev Med*. 2015;49(6):822–831. <https://doi.org/10.1016/j.amepre.2015.04.023>.
63. Wylie SA, Hassan A, Krull EG, et al. Assessing and referring adolescents' health-related social problems: qualitative validation of a novel web-based approach. *J Telemed Telecare*. 2012;18(7):392–398. <https://doi.org/10.1258/jtt.2012.120214>.
64. Baggett TP, Berkowitz SA, Fung V, Gaeta JM. Prevalence of housing problems among community health center patients. *JAMA*. 2018;319(7):717–719. <https://doi.org/10.1001/jama.2017.19869>.
65. Charkhchi P, Fazeli Dehkordy S, Carlos RC. Housing and food insecurity, care access, and health status among the chronically ill: an analysis of the Behavioral Risk Factor Surveillance System. *J Gen Intern Med*. 2018;33(5):644–650. <https://doi.org/10.1007/s11606-017-4255-z>.
66. Gold R, Bunce A, Cowburn S, et al. Adoption of social determinants of health EHR tools by community health centers. *Ann Fam Med*. 2018;16(5):399–407. <https://doi.org/10.1370/afm.2275>.
67. Frank DA, Casey PH, Black MM, et al. Cumulative hardship and wellness of low-income, young children: multisite surveillance study. *Pediatrics*. 2010;125(5):e1115–e1123. <https://doi.org/10.1542/peds.2009-1078>.
68. Pager D, Shepherd H. The sociology of discrimination: racial discrimination in employment, housing, credit, and consumer markets. *Annu Rev Sociol*. 2008;34(1):181–209. <https://doi.org/10.1146/annurev.soc.33.040406.131740>.
69. Williams DR, Collins C. Racial residential segregation: a fundamental cause of racial disparities in health. *Public Health Rep*. 2001;116(5):404–416. <https://doi.org/10.1093/phr/116.5.404>.
70. Rothstein R. *The Color of Law: A Forgotten History of How Our Government Segregated America*. New York, NY: Liveright Publishing Company, 2017.
71. National Low Income Housing Coalition. NLIHC releases interactive “housing instability and COVID-19 map”. Washington, DC: National Low Income Housing Coalition. <https://nlihc.org/resource/nlihc-releases-interactive-housing-instability-and-covid-19-map>. Published March 30, 2020. Accessed July 9, 2020.
72. “The future is shared”: why supporting renters during COVID-19 is critical for housing market stability. *Housing Matters: An Urban Institute Initiative*. April 14, 2020 <https://housingmatters.urban.org/feature/future-shared-why-supporting-renters-during-covid-19-critical-housing-market-stability>. Accessed July 9, 2020.
73. Chung RY, Dong D, Li MM. Socioeconomic gradient in health and the COVID-19 outbreak. *BMJ*. 2020;369:m1329. <https://doi.org/10.1136/bmj.m1329>.
74. Wang Z, Tang K. Combating COVID-19: health equity matters. *Nat Med*. 2020;26(4):458. <https://doi.org/10.1038/s41591-020-0823-6>.
75. Figueroa JF, Wadhwa RK, Lee D, Yeh RW, Sommers BD. Community-level factors associated with racial and ethnic disparities in COVID-19 rates in Massachusetts. *Health Aff (Millwood)*. 2020;39(11):1984–1992. <https://doi.org/10.1377/hlthaff.2020.01040>.
76. Tracking the COVID-19 recession's effects on food, housing, and employment hardships. Center on Budget and Policy Priorities. <https://www.cbpp.org/research/poverty-and-inequality/tracking-the-covid-19-recessions-effects-on-food-housing-and-employment-hardships>. Updated September 29, 2020. Accessed September 30, 2020.
77. Greene S, McCargo A. New data suggest COVID-19 is widening housing disparities by race and income. *Urban Institute*. May 29, 2020 <https://www.urban.org/urban-wire/new-data-suggest-covid-19-widening-housing-disparities-race-and-income>. Accessed September 30, 2020.
78. Nova A. The CDC banned evictions. Tens of thousands have still occurred. *CNBC*. December 5, 2020. <https://www.cnbc.com/2020/12/05/why-home-evictions-are-still-happening-despite-cdc-ban.html>. Accessed December 30, 2020.
79. Bottino CJ, Rhodes ET, Kreatsoulas C, Cox JE, Fleegler EW. Food insecurity screening in pediatric primary care: can offering referrals help identify families in need? *Acad Pediatr*. 2017;17(5):497–503. <https://doi.org/10.1016/j.acap.2016.10.006>.
80. Shinn M, Cohen RC. Homelessness prevention: a review of the literature. Rockville, MD: Center for Evidence-based Solutions to Homelessness. http://www.evidenceonhomelessness.com/wp-content/uploads/2019/02/Homelessness_Prevention_Literature_Synthesis.pdf. Published January 2019. Accessed February 18, 2021.
81. Fowler PJ, Hovmand PS, Marcal KE, Das S. Solving homelessness from a complex systems perspective: insights for prevention responses. *Annu Rev Public Health*. 2019;40:465–486. <https://doi.org/10.1146/annurev-publhealth-040617-013553>.