JAMA Network Open

Original Investigation | Public Health

Association of Promoting Housing Affordability and Stability With Improved Health Outcomes
A Systematic Review

Katherine L. Chen, MD; Isomi M. Miake-Lye, PhD; Meron M. Begashaw, MPH; Frederick J. Zimmerman, PhD; Jody Larkin, MS; Emily L. McGrath, MBA; Paul G. Shekelle, MD, PhD

Abstract

IMPORTANCE Housing insecurity—that is, difficulty with housing affordability and stability—is prevalent and results in increased risk for both homelessness and poor health. However, whether interventions that prevent housing insecurity upstream of homelessness improve health remains uncertain.

OBJECTIVE To review evidence characterizing associations of primary prevention strategies for housing insecurity with adult physical health, mental health, health-related behaviors, health care use, and health care access.

EVIDENCE REVIEW Pairs of independent reviewers systematically searched PubMed, Web of Science, EconLit, and the Social Interventions Research and Evaluation Network for quantitative studies published from 2005 to 2021 that evaluated interventions intended to directly improve housing affordability and/or stability either by supporting at-risk households (targeted primary prevention) or by enhancing community-level housing supply and affordability in partnership with the health sector (structural primary prevention). Risk of bias was appraised using validated tools, and the evidence was synthesized using modified Grading of Recommendations Assessment, Development, and Evaluation criteria.

FINDINGS A total of 26 articles describing 3 randomized trials and 20 observational studies (16 longitudinal designs and 4 cross-sectional quasi–waiting list control designs) were included. Existing interventions have focused primarily on mitigating housing insecurity for the most vulnerable individuals rather than preventing housing insecurity outright. Moderate-certainty evidence was found that eviction moratoriums were associated with reduced COVID-19 cases and deaths. Certainty of evidence was low or very low for health associations of other targeted primary prevention interventions, including emergency rent assistance, legal assistance with waiting list priority for public housing, long-term rent subsidies, and homeownership assistance. No studies evaluated health system–partnered structural primary prevention strategies.

CONCLUSIONS AND RELEVANCE This systematic review found mixed and mostly low-certainty evidence that interventions that promote housing affordability and stability were associated with improved adult health outcomes. Existing interventions may need to be paired with other efforts to address the structural determinants of health. As health care systems and insurers respond to increasing opportunities to invest in housing as a determinant of health, further research is needed to clarify where along the housing insecurity pathway interventions should focus for the most effective and equitable health impact.

JAMA Network Open. 2022;5(11):e2239860. doi:10.1001/jamanetworkopen.2022.39860

Key Points

Question Are interventions to prevent housing insecurity by promoting housing affordability and stability associated with improved health outcomes?

Findings This systematic review of 26 randomized trials and observational studies found mixed and mostly low-certainty evidence that interventions to prevent housing insecurity were associated with improved health outcomes, with the highest-certainty evidence suggesting that eviction moratoriums were associated with improved COVID-19 outcomes.

Meaning This study suggests that because current data provide only limited-certainty evidence that preventing housing insecurity is associated with measureable health gains, payers and policy makers should consider pairing housing insecurity interventions with other efforts to improve the structural factors associated with improved health.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Introduction

Keeping people stably and affordably housed is increasingly recognized as a priority for both public health[1] and health care.[2] Historically, most efforts to jointly improve housing security and health have focused on preventing existing housing crises from worsening (secondary prevention) or housing chronically homeless individuals to avoid further complications (tertiary prevention).[2,3] In contrast, primary prevention of housing insecurity aims to improve housing affordability and stability and avert displacement and homelessness for the 37 million households living in unaffordable housing[4] and the 2 million households facing eviction summonses[5] annually. Like homelessness, these less severe but more prevalent dimensions of housing insecurity are associated with less access to health care, worse mental and physical health, and increased mortality.[6-10]

Recognizing the health implications of housing insecurity, health systems have begun to invest in housing,[2,11,12] and Medicare Advantage plans can now provide rental assistance to eligible enrollees if there is a reasonable expectation of health improvement.[13] Prior reviews have evaluated the association of primary prevention interventions for housing insecurity with health outcomes, but decades-old data,[14] pediatric focus,[15] and inconclusive findings[14,15] limit their utility for stakeholders deciding where in the prevention pathway to target housing investments to improve adult health in a contemporary context. To address these gaps, we systematically reviewed adult health outcomes associated with primary prevention interventions that directly promote housing affordability and stability. In addition, given the role of racist housing policies in entrenching housing insecurity in minoritized communities,[16] we examined how studies of primary prevention interventions for housing insecurity addressed concepts associated with race and racism.

Conceptual Framework

We based our review strategy on a conceptual framework positing that (1) housing is associated with health via multiple pathways, including affordability and stability,[17] and that (2) health can be improved by targeting housing affordability and stability problems (housing insecurity) via multiple levels of prevention, akin to approaches used to address homelessness (**Figure 1**).[3,17-19] Affordability and stability are associated with both structural, population-level factors (including housing supply and demand factors, which may influence market prices and may shape—and may be shaped by—broader societal conditions) and individual-level factors (including household income and expenses).[19] To generate findings relevant to the health care sector, we considered associations of health outcomes with (1) health system–partnered, structural primary prevention to promote housing affordability and stability as contextual conditions associated with the distribution of population risk[20] and (2) targeted primary prevention to help at-risk households remain stably and affordably housed via short-term (<1 year) and long-term (≥1 year) interventions. Key intervention examples, informed by the public health and urban planning literature,[11,12,21,22] are defined in **Table 1**.

Methods

We performed a systematic review following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) reporting guideline. Our protocol was registered in PROSPERO (CRD42021279431) and deemed exempt by the institutional review board at the University of California, Los Angeles, because the study analyzed only previously published results and did not meet Regulations for the Protection of Human Subjects (45 CFR §46) criteria.

Data Sources and Searches

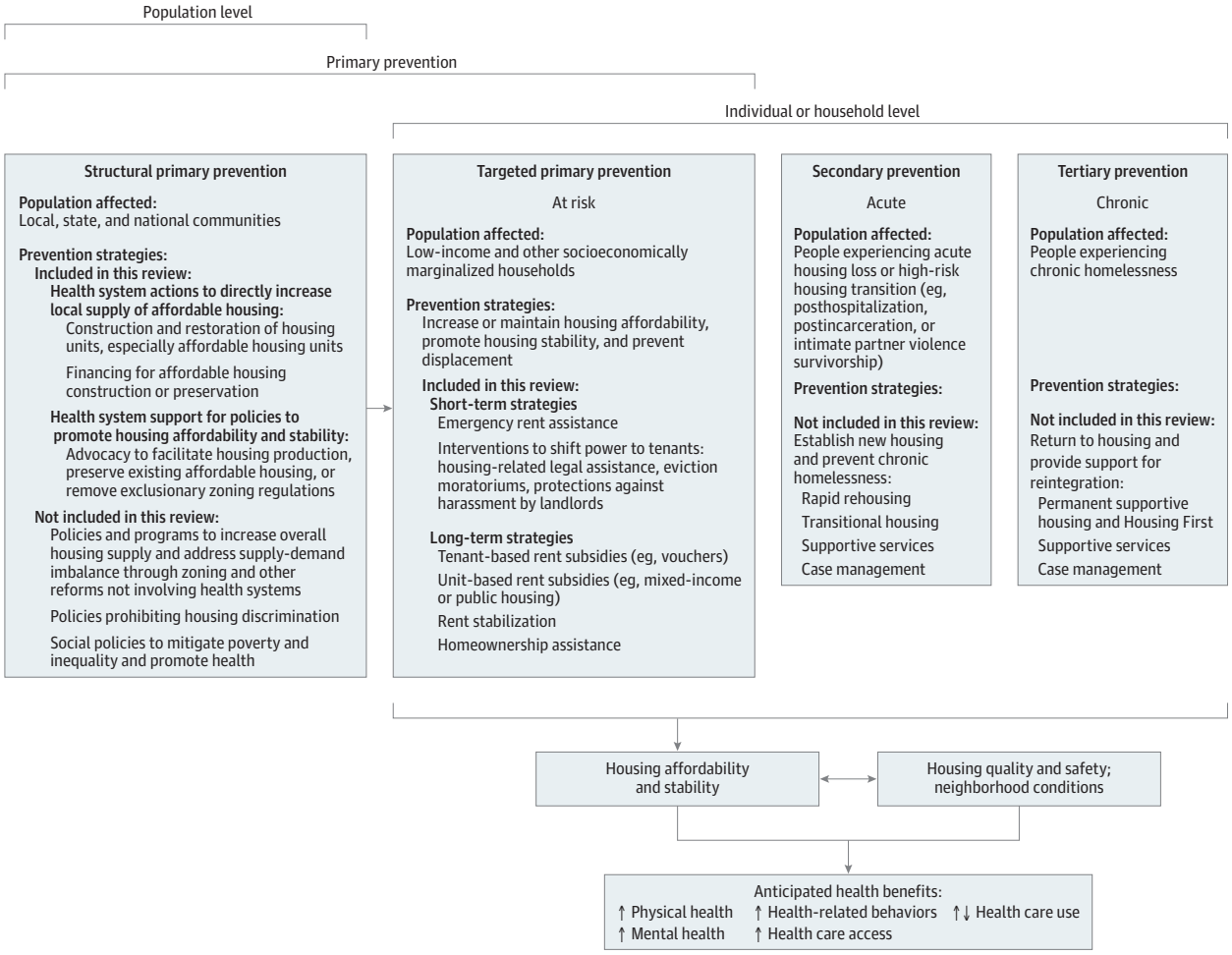
Search strategy details and excluded studies are described in eAppendix 1 and eAppendix 2 in the Supplement. In brief, we searched PubMed, Web of Science, and EconLit for English-language articles from 2005 to 2021 using terms related to health and affordable housing, housing services, rental assistance, rent stabilization, legal assistance, tenant protections, evictions, and foreclosure. We added terms for

COVID-19 because the Centers for Disease Control and Prevention's moratorium on evictions during the pandemic heightened attention to housing security as a factor associated with health outcomes.[23] Next, we searched the Social Interventions Research and Evaluation Network database for studies related to housing stability and then performed a search of the gray literature via Google. Finally, we screened studies identified via reference mining and expert consultation, with no restriction on publication date.

Study Selection

Two of us (K.L.C. and P.G.S.) independently screened titles, abstracts, and full texts, reconciling disagreements through team discussion (eAppendix 3 in the Supplement). We included studies evaluating health-related outcomes of interventions to improve housing affordability or stability at the household level (targeted primary prevention) or population level (structural primary

Figure 1. Conceptual Model of Housing Insecurity Prevention to Improve Health Outcomes



This framework for the levels of prevention of housing insecurity (defined as problems with housing affordability and stability) is informed by models of homelessness prevention.[3,18] Housing affordability and stability are associated with both structural, population-level factors (including housing supply and demand factors, which may influence market prices and may shape—and may be shaped by—broader societal conditions) and individual-level factors (including household income and expenses).[19] Interventions to prevent housing insecurity are posited to be associated with health via their direct and indirect associations with 4 intersecting pathways described by Taylor[17]: housing affordability and stability (the focus of this review) as well as quality, safety, and neighborhood conditions. Preventing housing insecurity is hypothesized to be associated with improved physical health, mental health, health-related behaviors, and health care access. Up and down arrows represent anticipated associations with positive and negative health outcomes, respectively. The direction of association with health care use is uncertain because, by enhancing health care access, improved housing affordability and stability could be associated with increased use of appropriate services and/or decreased need for services for costly and preventable conditions. Our systematic review focuses on measuring health-related outcomes associated with targeted primary prevention of housing insecurity and with structural primary prevention that involves the health system. Prevention strategies shown in the figure represent key examples within each category but are not exhaustive. Secondary and tertiary prevention interventions, reviewed elsewhere, are outside the scope of this review.

prevention), so long as the latter was conducted by or with health sector stakeholders. Because some interventions, such as eviction moratoriums, are essentially impossible to implement randomly, we included both randomized clinical trials (RCTs) and rigorous quantitative observational designs aimed at reducing selection bias (eAppendix 3 in the Supplement). Given the potentially vague boundary between precarious housing and acute homelessness,[24,25] we included studies that enrolled participants with shorter-term homelessness, but we excluded studies focused on adults with chronic homelessness. We excluded evaluations of the Moving to Opportunity study, described in detail elsewhere,[26] because interventions in that trial were intended to assess the effect of improved neighborhood conditions, rather than of improved housing affordability or stability.

Table 1. Definitions of Key Interventions for Primary Prevention of Housing Insecurity

Level and type of intervention	Definition and comments[a,b]
Structural primary prevention: health-system-involved strategies[a]	
Construction and restoration of housing units, especially affordable housing	Health systems can address housing shortages by donating land and/or investing capital to build new housing or renovate existing housing, often in partnership with housing developers. Affordable housing is defined as housing for which the occupant spends ≤30% of household income, but even the production of more market-rate housing can help address housing supply needs across the income spectrum.
Financing for affordable housing construction or preservation	Health systems can offer low-cost or no-cost loans or grant writing assistance to help nonprofit developers build or renovate affordable housing. They can help preserve affordable housing through financing the purchase of older, privately owned housing stock to prevent conversion to condominiums or upmarket housing that displaces low-income tenants.
Advocacy to facilitate housing production, preserve existing affordable housing, and/or remove exclusionary housing regulations	Health systems can use their political capital to lobby for policy changes that make it easier to address housing shortages and affordability, such as by removing restrictions that make housing construction prohibitively slow or costly, allocating public funds to rehabilitate or preserve affordable housing, reducing density limits on housing development or making density limits more equitable across neighborhoods, and enhancing tenants' rights.
Targeted primary prevention: short-term strategies[c]	
Emergency rent assistance	Temporary aid to help renters experiencing financial hardship pay for rent as well as utility bills or other housing costs.
Housing-related legal assistance	Help from a lawyer to address housing-related legal issues. Includes programs that offer or guarantee free or low-cost legal representation to tenants facing eviction or landlord conflicts. Sometimes provided via medical-legal partnerships.
Eviction moratoriums	Policies, such as those enacted during the COVID-19 pandemic, temporarily prohibiting various stages of the eviction process, from notice of intent to file eviction, to actual court filings, eviction hearings, judgments, or enforcement.
Protections against harassment by landlords	Laws prohibiting landlords from exhibiting behaviors that create a hostile living environment or force a tenant to vacate rental housing.
Targeted primary prevention: long-term strategies[c]	
Tenant-based rent subsidies (vouchers)	Subsidies to help low-income households rent in the private housing market. Subsidies provided by HUD are currently called housing choice vouchers but previously have been termed Section 8 certificates or vouchers. Tenants receiving housing choice vouchers pay 30% of their income toward rent, with the remainder subsidized by HUD, within constraints of fair-market rent standards set by housing authorities. Tenant-based rent subsidies follow tenants between homes so long as regulatory requirements are met.
Unit-based rent subsidies (public housing or multifamily or mixed-income housing)	Housing whose production and maintenance costs are subsidized by HUD such that tenants pay discounted rent. Includes public housing (owned and operated by the local public housing authority; rent typically calculated as a percentage of household income) and multifamily or mixed-income housing (privately owned and operated but publicly subsidized, often through tax credits; rent charged as a flat rate or percentage of household income, depending on program). Unit-based rent subsidies are restricted to use by the current occupant of the subsidized housing unit; they transfer between subsequent tenants in that unit but do not follow tenants after they leave the unit. Also called project-based subsidies or project-based vouchers.
Rent stabilization	Restriction on the amount by which landlords may increase rent annually for established tenants. Rents may reset to market rates when a tenant vacates the unit.
Homeownership assistance	Programs to help low-income renters purchase homes. Includes zero-interest-down payment assistance loans, subsidies to help renters buy their homes, and rent-to-own contracts that give renters an option to buy their home after a period of renting.

Abbreviation: HUD, US Department of Housing and Urban Development.

[a] "Health systems" refers broadly to health care professionals, hospitals, and insurers. Examples of health system–involved structural prevention strategies were informed by Reynolds et al[12] and Tuller.[11]

[b] Details regarding housing regulation, construction, and financing were informed by Collinson et al[21] and Phillips.[22]

[c] We defined targeted primary prevention strategies as short-term if they generally acted over a period of less than 1 year and long-term if they generally acted over 1 year or more.

Data Extraction and Quality Assessment

Data elements extracted in duplicate included study design, intervention, population, sample size, follow-up, outcomes, and reporting on race and ethnicity (eAppendix 3 in the Supplement). We assessed risk of bias using the Cochrane risk-of-bias tool[27] and the Risk of Bias in Non-Randomized Studies of Interventions tool.[28]

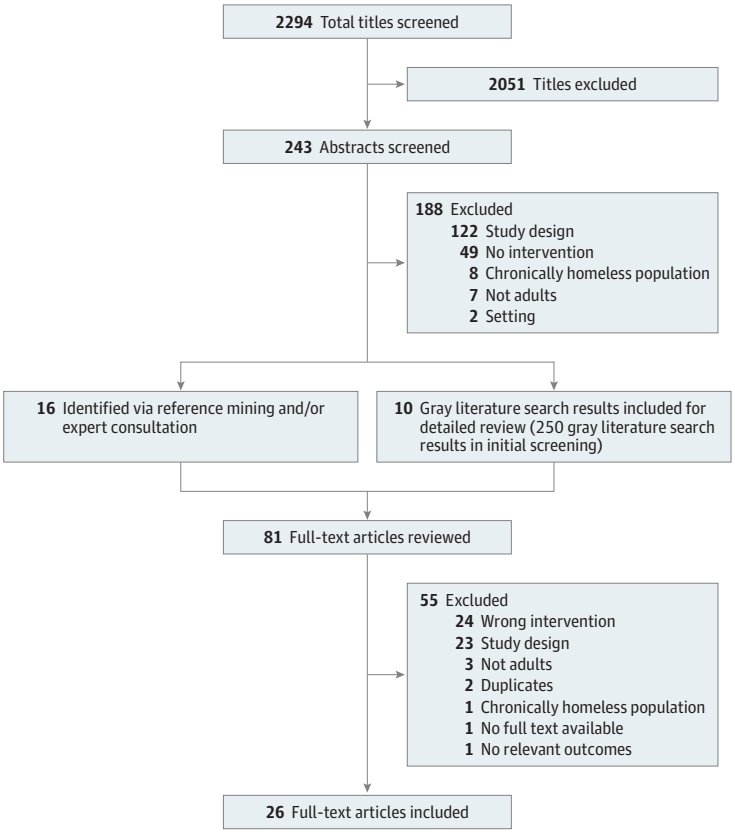
Data Synthesis and Grading

We narratively synthesized findings by intervention level and outcome category (physical health, mental health, health-related behaviors, health care use, or health care access). Study heterogeneity precluded meta-analysis. We rated certainty of the evidence using a modified version of the Grading of Recommendations Assessment, Development, and Evaluation system[29,30] as adopted by a committee of the National Academies of Sciences, Engineering, and Medicine for evaluating complex public health interventions[31] (see eAppendix 3 in the Supplement for details and worked examples).

Results

After screening 2294 titles, 243 abstracts, and 81 full texts, 26 articles met criteria for inclusion (**Figure 2**), comprising 3 RCTs described in 6 articles[32-37] and 20 observational studies (16 longitudinal designs[38-53] and 4 cross-sectional quasi–waiting list control designs comparing current vs future recipients of an intervention[54-57]) (**Figure 3**; eTable 1 in the Supplement). Most studies selected participants based on medical or social vulnerability. All studies were conducted in the US except 2 in Canada[47,48] and 1 in the United Kingdom.[53] Although interventions were assigned in RCTs, observational

Figure 2. Study Flow Diagram



Flow diagram summarizing number of articles identified, included, and excluded, along with reasons for exclusion at abstract and full-text screening stages.

studies used a range of self-reported and administrative measures to ascertain intervention participation. Study outcomes included both self-reported and administrative measures.

Risk-of-Bias Assessment

Because of the nature of most housing interventions, all RCTs had a high risk of bias owing to nonblinding of participants and personnel; we did not emphasize this domain when assessing a study's limitations. Risk of selective reporting was low for all RCTs, whereas blinding of outcome assessment was high-risk for most RCTs (eTable 2 in the Supplement). About half of the observational studies had a high risk of bias owing to confounding, and most had an uncertain risk of bias in selection of reported results (eTable 3 in the Supplement).

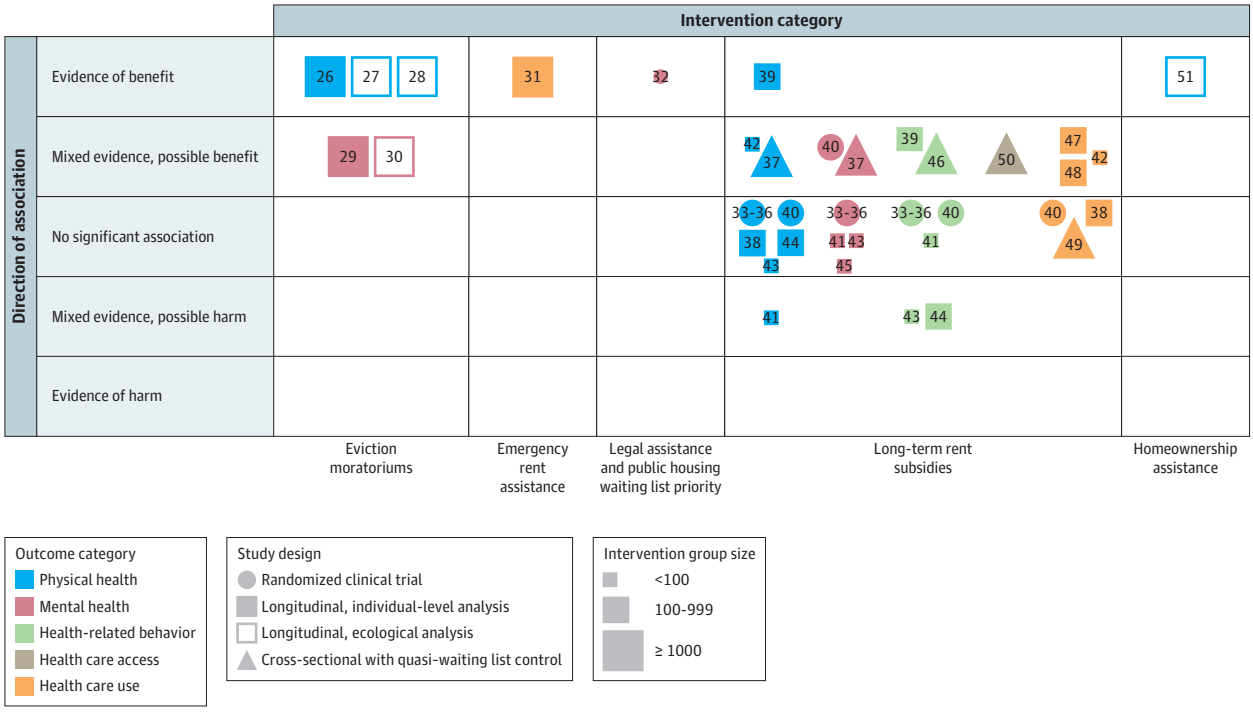
Targeted Primary Prevention: Short-term Strategies

One RCT[37] and 6 observational studies[38-43] assessed health associations of short-term interventions for targeted primary prevention, including eviction moratoriums, emergency rent assistance, and housing-related legal assistance. No studies evaluated protections against landlord harassment.

Eviction Moratoriums

Three observational difference-in-differences studies showed an association between eviction moratoriums and improved COVID-19 outcomes.[38-40] Moratoriums were associated with a 2.4 percentage point reduction in the cumulative hazard of COVID-19 infection at 12 weeks,[40] a 2-fold decrease in COVID-19 cases and a 5-fold decrease in COVID-19 mortality at 16 weeks,[39] and up to 0.03 fewer cases and 0.001 fewer deaths per capita at 8 months.[38] One observational study demonstrated an association between stronger eviction moratorium protections and lower risk of psychological distress,

Figure 3. Summary of Studies of Primary Prevention of Housing Insecurity to Improve Health



Numerals refer to reference numbers corresponding to studies included in this review. We considered the Family Options Study, designated by "32-35," as a single study described in 4 articles.[32-35] The horizontal lines distinguish studies finding evidence of benefit, mixed or no evidence of association, and evidence of harm. A study was deemed to have mixed evidence for a given outcome category if the direction and/or significance of the findings differed among outcomes within the same outcome category. For the health care use category, associations with reduced use are depicted in the figure as evidence of benefit, although in some cases more use could reflect a positive change in access to health care. Magnitude of association is not depicted. Please see eTable 1 in the Supplement for additional details about key features and findings of each included study.

especially for the Hispanic subgroup,[42] whereas another found that eviction moratoriums were associated with reduced anxiety and depression symptoms for Black subpopulations only.[41]

Emergency Rent Assistance

One observational study involved provision of temporary financial assistance for housing-related expenses, such as rent, utilities, and security deposits, to veterans at imminent risk of homelessness. It was associated with $219 per quarter in total health care cost savings.[43]

Housing-Related Legal Assistance With Public Housing Waiting List Priority

A small RCT (n = 78) offered housing-related legal assistance and/or public housing waiting list priority to parents in medically vulnerable families with unstable housing. It found that the intervention group exhibited greater improvement in anxiety and depression symptom scores after 6 months.[37]

Targeted Primary Prevention: Long-term Strategies

Nineteen articles[32-36,44-57] evaluated long-term, targeted primary prevention strategies. Besides 1 study assessing homeownership assistance, all focused on long-term rent subsidies. In the US, such subsidies are mostly sponsored by the Department of Housing and Urban Development and can be tenant based (ie, vouchers) or unit based (ie, public or multifamily housing) (Table 1).[11,12,21,22] Four of 15 articles comparing long-term subsidies with usual care described the Family Options Study (FOS), a multisite, multigroup trial that randomized families in emergency shelters to receive long-term subsidies or usual care (rapid rehousing and transitional housing study groups were excluded from this review).[32-35] No studies evaluated health associations of rent stabilization.

Long-term Rent Subsidies

Physical Health Outcomes | Among studies assessing physical health outcomes, the FOS and 2 observational studies showed no significant association between long-term rent subsidies and self-rated health or quality of life.[32-35,51,54] Four other studies found mixed results.[36,46,50,54] Tenant-based subsidies were associated with improved quality of life in 1 observational study of veterans experiencing homelessness.[50] In contrast, in an RCT of adults with HIV with homelessness or severe housing insecurity, Wolitski et al[36] reported results suggesting that people randomized to receive long-term subsidies vs usual care experienced slower improvement in physical health scores, although statistical analyses did not test this finding directly. Public housing was associated with improved self-rated health in one observational study[54] and worse self-rated health in another.[46]

Associations between long-term rent subsidies and chronic disease outcomes were also inconclusive. Observational data suggested that these subsidies might be associated with a modest improvement in HIV viral load and CD4 cell count among people living with HIV,[52] but the RCT by Wolitski et al[36] found no evidence of an association with trends in HIV outcomes. Two other observational studies found no significant associations between long-term subsidies and chronic conditions[49] or body mass index and obesity,[44,49] whereas 1 study found that moving into public housing was associated with increased risk of obesity.[46]

Mental Health Outcomes | Long-term subsidies, and vouchers in particular, were associated with, at best, a small mental health benefit. The FOS demonstrated a modest reduction in psychological distress at 20 months,[32,35] but this association lost statistical significance at 37 months.[33,34] The RCT by Wolitski et al[36] found that long-term tenant-based subsidies significantly modified time trends in stress and depression symptoms, with point estimates suggesting—but not directly confirming—earlier improvements in both compared with usual care. One observational study found that public housing, but not vouchers or multifamily housing, was associated with decreased psychological distress.[54] Three additional observational studies demonstrated no evidence of an association between long-term subsidies and mental health.[45,46,49]

Health-Related Behaviors | There was no evidence of an association between long-term rent subsidies and drug or alcohol use in the FOS,[32-35] nor in 3 observational studies.[44,46,49] One observational study of previously homeless veterans found that subsidies were associated with small improvements in alcohol- and drug-related addiction severity measures but were not significantly associated with frequency of alcohol or drug use.[50] Two observational studies estimated that long-term rent subsidies were associated with increased smoking,[44,49] whereas a third observational study found no significant association.[46] Of 2 studies analyzing physical activity among nonelderly adults who obtained long-term rent subsidies, 1 found a positive association,[56] whereas the other found no significant association.[44] Finally, 1 RCT found no significant evidence that subsidies were associated with trends in risky sexual behavior among people with HIV.[36]

Health Care Use and Access | Among people with HIV, long-term subsidies did not significantly modify temporal patterns in health care use or treatment adherence in an RCT,[36] but they were associated with modest increases in the receipt of HIV surveillance tests in an observational study.[52] A pair of observational studies from Canada found that although hospitalizations, general practitioner visits, and prescriptions decreased slightly after people moved into public housing,[47] these changes largely paralleled those of matched controls.[48] Other observational studies found no significant association between long-term subsidies and health care spending[51] or age-appropriate cancer screening.[57] One observational study found that long-term rent subsidies were associated with lower rates of uninsurance and fewer cost-related unmet medical needs, especially among public housing recipients.[55]

Homeownership Assistance

One ecological study compared sizes of subsidies to help renters buy their homes. It was found that larger subsidies were associated with lower prevalence of longstanding health conditions and fewer health problems.[53]

Structural Primary Prevention

No included studies evaluated health system–involved structural primary prevention interventions for housing insecurity.

Certainty of Evidence

The strongest (moderate-certainty) evidence supported an association between eviction moratoriums and improved COVID-19 outcomes (**Table 2**). Certainty of evidence was overall low for health associations of the remaining interventions owing to small numbers of studies, study design limitations, and indirectness.

Reporting on Race and Ethnicity

Five articles (19%) reported race and ethnicity in descriptive tables but did not include it in regression models (eTable 4 in the Supplement). Sixteen articles (62%) controlled for race and ethnicity as a confounder, and 3 (12%) analyzed race and ethnicity as a moderator. Of 5 articles (19%) that did not report on or control for race and ethnicity, 1 noted the absence of this information as a data limitation. Five articles (19%) included text describing the conceptual significance of race and ethnicity or racism to housing insecurity and/or health.

Discussion

In this systematic review of interventions to improve health outcomes by promoting housing affordability and stability to prevent housing insecurity, we found moderate-certainty evidence that that eviction moratoriums are associated with reduced COVID-19 cases and deaths. Associations of long-term rent subsidies, emergency rent assistance, legal assistance, and homeownership

Table 2. Certainty of Evidence by Intervention Category, Type, and Outcome

Category, intervention or outcome	No. of studies[a]	Study limitations (risk of bias)	Indirectness	Consistency	Precision	Other considerations	Overall certainty of evidence
Short-term interventions for primary prevention of housing insecurity							
Association of eviction moratoriums with health-related outcomes							
Fewer COVID-19 cases and deaths	3 Observational[38-40]	Serious	No serious indirectness	Consistent	No serious imprecision	NA	Moderate
Improved mental health	2 Observational[41,42]	Serious	No serious indirectness	Inconsistent	Serious imprecision	Parallel evidence[58-60]	Low
Association of emergency rent assistance with reduced health care costs	1 Observational[43]	No serious limitations	Serious indirectness	NA	Serious imprecision	NA	Very low
Association of legal assistance and waiting list priority for public housing with improved mental health	1 RCT[37]	No serious limitations	Serious indirectness	NA	No serious imprecision	NA	Low
Long-term interventions for primary prevention of housing insecurity							
Association between long-term rent subsidies and health-related outcomes							
No association with health status or quality of life	2 RCTs[32-36]; 4 observational[46,50,51,54]	Serious	Serious indirectness	Inconsistent	Serious imprecision	NA	Very low
No association with chronic disease outcomes	1 RCT[36]; 4 observational[44,46,49,52]	Serious	No serious indirectness	Inconsistent	Serious imprecision	NA	Very low
Small to no association with improved mental health	2 RCTs[32-36]; 4 observational[45,46,49,54]	Serious	Serious indirectness	Consistent	Serious imprecision	NA	Low
No association with drug and alcohol use	1 RCT[32-35]; 4 observational[44,46,49,50]	Serious	Serious indirectness	Consistent	Serious imprecision	NA	Low
Increased smoking	3 Observational[44,46,49]	Serious	No serious indirectness	Inconsistent	No serious imprecision	NA	Low
Increased physical activity among nonelderly adults	2 Observational[44,56]	Serious	No serious indirectness	Inconsistent	Serious imprecision	NA	Very low
No association with risky sexual behaviors	1 RCT[36]	Very serious	Serious indirectness	NA	Serious imprecision	NA	Very low
No association with health care use	1 RCT[36]; 5 observational[47,48,51,52,57]	Serious	Serious indirectness	Inconsistent	Serious imprecision	NA	Very low
Improved health care access with receipt of public housing	1 Observational[55]	No serious limitations	No serious indirectness	NA	No serious imprecision	Parallel evidence[6,61]	Low
Association of rent-to-own subsidy and fewer chronic health conditions	1 Observational[53]	Serious	Serious indirectness	NA	No serious imprecision	NA	Low

Abbreviations: NA, not applicable; RCT, randomized clinical trial.

[a] Although results were reported in multiple articles,[32-35] we counted the Family Options Study as 1 RCT.

assistance with health outcomes were inconclusive, largely owing to serious methodological issues. We could not assess the association of health outcomes with health system–partnered, structural primary prevention owing to a lack of relevant studies. Attention to the role of racism in housing and health outcomes was largely limited to controlling for race and ethnicity without conceptual justification. Although our review updates and expands on prior reviews,[14,15] substantive knowledge gaps remain around the potential for preventive strategies in housing to improve health outcomes and health equity.

There are several potential explanations for why studies aimed at preventing housing insecurity have demonstrated limited evidence of an association with health benefits, despite evidence linking housing insecurity to poor health.[6-10] Probably the most consistent explanation is that household-level interventions, which comprised all included studies, have only a limited association with health outcomes, because they do not modify the overall supply of housing nor the structural causes of economic segregation and health disparities, such as barriers in access to education, wealth, childcare, or employment, thus leaving other basic needs unmet.[62] This finding is consistent with prior findings that although long-term rent subsidies are highly effective at promoting housing affordability and preventing displacement and homelessness,[24,33,63,64] alone they have little to no association with poverty,[63,65] and they should likely be combined with other social interventions plus case management to connect people with resources. Another possibility is that the health benefits associated with preventing housing insecurity are too diffuse to measure and/or manifest on longer time scales than those in the included studies. This possibility may explain why the strongest signal came from studies of eviction moratoriums, which, compared with long-term rent subsidies, target a short and direct causal pathway, from blocking imminent eviction to preventing household crowding or homelessness, which is directly associated with COVID-19 risk.[23] A third possible explanation is that interventions were not adequately targeted to populations. Interventions may have been too narrow or too far downstream to meaningfully benefit socially and medically vulnerable study populations, which included people who had already lost their homes. A measurable association with health outcomes might require targeting existing long-term rent subsidy programs (which often require burdensome waiting periods[66] and impose restrictions based on criminal records, immigration status, substance use, or eviction history[67]) to tenants with more modest levels of need while dedicating more comprehensive and flexible supports to people with greater needs.[68] A fourth possibility, supported by the 3 studies that explored moderation by race and ethnicity,[41,42,54] is that some interventions had heterogeneous associations with health outcomes. If a housing intervention's association with outcomes is influenced by structural racism, such as through housing discrimination and segregation of neighborhood opportunities, failure to disaggregate associations of treatment with outcomes could produce ambiguous results and obscure insights into opportunities to combat structural racism through housing policy. Fifth, we cannot exclude the possibility that adverse effects offset potential benefits. For example, subsidies might concentrate renters in lower-opportunity neighborhoods, which are associated with worse health.[64] Last, regression to the mean is possible, given that low-income populations, and applicants for housing assistance in particular, tend to have relatively poor health at baseline[69] that might be expected to improve over time without specific intervention. Although this is a potentially plausible explanation for some of the observational results, it would be less likely to occur in RCTs. Because we did not see a marked difference in results based on study design, we judge regression to the mean as an unlikely explanation for these results.

Findings from this review have implications for practice, policy, and research. Our review suggests that payers or policy makers who aim to improve health by addressing housing insecurity could be disappointed if they focus narrowly on household-level housing interventions, which might achieve the goal of helping prevent homelessness but might not, on their own, produce measurable health benefits. As officials overseeing Medicare[13] (and, increasingly, Medicaid[70]) consider whether housing interventions merit coverage as health care benefits, research to identify ways to make subsidies and other primary prevention strategies more effective at improving population health—

whether by modifying existing interventions or better linking them to additional social supports—would be particularly helpful. In addition, as more nonprofit hospitals seek designation as community anchor organizations,[71] research to quantify health outcomes of health-system efforts to improve housing at the population level would fill a timely research gap. In future investigations of structural interventions, it may also be prudent to consider the community-level social impact[72] in addition to individual health outcomes. Finally, our study highlights openings for research on the health outcomes of policies guaranteeing legal counsel to low-income tenants in eviction courts, stabilizing rents, and reforming municipal zoning.[22]

Limitations

This study has some limitations; principal among them was the limited scope and quality of existing evidence. Several of the primary prevention interventions identified in our conceptual framework were entirely lacking from the health literature, and most studies relied on observational data and/or small sample sizes. Second, many studies enrolled participants experiencing homelessness, contributing only indirect evidence on how the interventions of interest would work as primary prevention. Relatedly, although evidence from studies on narrowly focused populations, such as those defined in the included RCTs, can yield higher internal validity, generalizability to the broader adult population may be limited. Third, residual confounding may have biased the observational findings, as most housing assistance is assigned nonrandomly.[21] Fourth, statistically significant findings from the FOS, which measured hundreds of outcomes, should be interpreted cautiously given the risk of type I error. Fifth, few studies outside of the FOS considered sustained program engagement. Sixth, although most studies were conducted in the US, our review may mask regional differences in social structure and safety-net program availability, which could influence the association between housing interventions and health; similarly, findings from international contexts might not apply to the US setting and vice versa. Seventh, by focusing on adults, we may have missed long-term health outcomes associated with interventions delivered in childhood. Eighth, our search criteria excluded studies addressing socioeconomic interventions that did not directly involve housing and/or that addressed multiple social needs, which nonetheless might have improved housing security.

Conclusions

This systematic review found mixed and mostly low-certainty evidence that interventions to increase housing affordability and stability and prevent housing insecurity were associated with health outcomes, with the strongest evidence suggesting that eviction moratoriums reduced COVID-19 cases and deaths. Multiple hypotheses can explain our findings, but results are probably most compatible with the conclusion that existing strategies to prevent housing insecurity, while necessary, are not sufficient to achieve long-term health gains for vulnerable populations and may need to be both modified and partnered with other policies to redress social inequity, including racism in housing. Future research exploring population-health outcomes associated with other interventions to increase housing affordability and stability at both the population and household levels can help health care stakeholders identify win-win opportunities to improve health outcomes by preventing housing insecurity.

ARTICLE INFORMATION

Accepted for Publication: September 18, 2022.

Published: November 2, 2022. doi:10.1001/jamanetworkopen.2022.39860

Corresponding Author: Katherine L. Chen, MD, Division of General Internal Medicine and Health Services Research, Department of Medicine, David Geffen School of Medicine at University of California, Los Angeles, 1100 Glendon Ave, Ste 900, Los Angeles, CA 90024 (klchen@mednet.ucla.edu).

Author Affiliations: Division of General Internal Medicine and Health Services Research, Department of Medicine, David Geffen School of Medicine, University of California, Los Angeles (Chen, Shekelle); Fielding School of Public Health, University of California, Los Angeles (Chen, Miake-Lye, Zimmerman); Greater Los Angeles Veterans Affairs Healthcare System, Los Angeles, California (Miake-Lye, Begashaw, Shekelle); RAND Corporation, Southern California Evidence-Based Practice Center, Santa Monica, California (Larkin); Health Equity and Population Health, Humana Inc, Louisville, Kentucky (McGrath).

Author Contributions: Drs Chen and Shekelle had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Chen, Miake-Lye, Zimmerman, McGrath, Shekelle.

Acquisition, analysis, or interpretation of data: All authors.

Drafting of the manuscript: Chen, Miake-Lye, Begashaw, Larkin, Shekelle.

Critical revision of the manuscript for important intellectual content: Chen, Miake-Lye, Begashaw, Zimmerman, McGrath, Shekelle.

Statistical analysis: Chen.

Obtained funding: Shekelle.

Administrative, technical, or material support: Chen, Miake-Lye, Begashaw, Zimmerman.

Supervision: Shekelle.

Conflict of Interest Disclosures: Drs Shekelle and Miake-Lye and Mss Begshaw and Larkin were supported in part by a grant from Humana to University of California, Los Angeles (UCLA). Dr Chen reported receiving support from the Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services (HHS) via the National Research Services Award T32 Primary Care Research Fellowship at UCLA. Ms. McGrath is a Humana employee. No other disclosures were reported.

Funding/Support: This study was sponsored by Humana Inc (award 1529619).

Role of the Funder/Sponsor: The funder participated in design and conduct of the study (specifically, in setting the scope of the review) and in interpretation of the data via author Ms McGrath. The funder had no role in collection, management, or analysis of the data.

Disclaimer: The contents are those of the authors and do not necessarily represent the official views of, nor an endorsement by, the HRSA, HHS or the US government.

Additional Contributions: The authors wish to thank Kathryn Leifheit, PhD, MSPH, UCLA, Lillian Gelberg, MD, UCLA, Teryl Nuckols, MD, MSHS, Cedars Sinai Medical Center, and Paul Ong, PhD, UCLA, for their feedback on the conceptual framework. They were not compensated for their contributions.

REFERENCES

1. US Department of Health and Human Services. Healthy People 2030 framework. Published 2020. Accessed May 5, 2022. https://health.gov/healthypeople/about/healthy-people-2030-framework

2. Koeman J, Mehdipanah R. Prescribing housing: a scoping review of health system efforts to address housing as a social determinant of health. *Popul Health Manag*. 2021;24(3):316-321. doi:10.1089/pop.2020.0154

3. Dej E, Gaetz S, Schwan K. Turning off the tap: a typology for homelessness prevention. *J Prim Prev*. 2020;41(5):397-412. doi:10.1007/s10935-020-00607-y

4. Joint Center for Housing Studies. *The State of the Nation's Housing 2021*. Harvard University; 2021.

5. The Eviction Lab. National estimates: eviction in America. Published May 11, 2018. Accessed July 14, 2021. https://evictionlab.org/national-estimates/

6. Kushel MB, Gupta R, Gee L, Haas JS. Housing instability and food insecurity as barriers to health care among low-income Americans. *J Gen Intern Med*. 2006;21(1):71-77. doi:10.1111/j.1525-1497.2005.00278.x

7. Pollack CE, Griffin BA, Lynch J. Housing affordability and health among homeowners and renters. *Am J Prev Med*. 2010;39(6):515-521. doi:10.1016/j.amepre.2010.08.002

8. Baker E, Lester L, Mason K, Bentley R. Mental health and prolonged exposure to unaffordable housing: a longitudinal analysis. *Soc Psychiatry Psychiatr Epidemiol*. 2020;55(6):715-721. doi:10.1007/s00127-020-01849-1

9. Burgard SA, Seefeldt KS, Zelner S. Housing instability and health: findings from the Michigan Recession and Recovery Study. *Soc Sci Med*. 2012;75(12):2215-2224. doi:10.1016/j.socscimed.2012.08.020

10. Bradford AC, Bradford WD. The effect of evictions on accidental drug and alcohol mortality. *Health Serv Res*. 2020;55(1):9-17. doi:10.1111/1475-6773.13256

11. Tuller D. To improve outcomes, health systems invest in affordable housing. *Health Aff (Millwood)*. 2019;38(7):1068-1072. doi:10.1377/hlthaff.2019.00676

12. Reynolds K, Allen EH, Fedorowicz M, Ovalle J. *Affordable Housing Investment: A Guide for Nonprofit Hospitals and Health Systems*. Urban Institute; 2019.

13. US Department of Health & Human Services. Implementing supplemental benefits for chronically ill enrollees. Published April 24, 2019. Accessed June 6, 2022. https://www.cms.gov/Medicare/Health-Plans/HealthPlansGenInfo/Downloads/Supplemental_Benefits_Chronically_Ill_HPMS_042419.pdf

14. Anderson LM, Charles JS, Fullilove MT, Scrimshaw SC, Fielding JE, Normand J; Task Force on Community Preventive Services. Providing affordable family housing and reducing residential segregation by income: a systematic review. *Am J Prev Med*. 2003;24(3)(suppl):47-67. doi:10.1016/S0749-3797(02)00656-6

15. Slopen N, Fenelon A, Newman S, Boudreaux M. Housing assistance and child health: a systematic review. *Pediatrics*. 2018;141(6):e20172742. doi:10.1542/peds.2017-2742

16. Rothstein R. *The Color of Law*. Liveright Publishing Corporation; 2017.

17. Taylor L. Housing and health: an overview of the literature. Health Affairs. 2018. Accessed March 1, 2020. https://www.healthaffairs.org/do/10.1377/hpb20180313.396577/full/

18. Nicholas WC, Henwood BF. Applying a prevention framework to address homelessness as a population health issue. *J Public Health Policy*. 2018;39(3):283-293. doi:10.1057/s41271-018-0137-9

19. Scheutz J. *Fixer-Upper: How to Repair America's Broken Housing Systems*. Brookings Institution Press; 2022.

20. Frohlich KL, Potvin L. Transcending the known in public health practice: the inequality paradox: the population approach and vulnerable populations. *Am J Public Health*. 2008;98(2):216-221. doi:10.2105/AJPH.2007.114777

21. Collinson R, Ellen IG, Ludwig J. Low-income housing policy. In: Moffitt RA, ed. *Economics of Means-Tested Transfer Programs in the United States*. Vol 2. University of Chicago Press; 2016:59-126. doi:10.7208/chicago/9780226392523.003.0002

22. Phillips S. *The Affordable City: Strategies for Putting Housing Within Reach (and Keeping It There)*. Island Press; 2020.

23. National Academies of Sciences, Engineering, and Medicine. *Rental Eviction and the COVID-19 Pandemic: Averting a Looming Crisis*. National Academies Press; 2021.

24. Shinn M, Khadduri J. *In the Midst of Plenty: Homelessness and What to Do About It*. Wiley-Blackwell; 2019.

25. Pilkauskas NV, Garfinkel I, McLanahan SS. The prevalence and economic value of doubling up. *Demography*. 2014;51(5):1667-1676. doi:10.1007/s13524-014-0327-4

26. Sanbonmatsu L, Ludwig J, Katz LF, et al. Moving to opportunity for fair housing demonstration program: final impacts evaluation. US Department of Housing and Urban Development. 2011. Accessed February 3, 2022. https://www.huduser.gov/publications/pdf/mtofhd_fullreport_v2.pdf

27. The Cochrane Collection. RoB 2: a revised Cochrane risk-of-bias tool for randomized trials. Accessed November 30, 2021. https://methods.cochrane.org/bias/resources/rob-2-revised-cochrane-risk-bias-tool-randomized-trials

28. Sterne JA, Hernán MA, Reeves BC, et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ*. 2016;355:i4919. doi:10.1136/bmj.i4919

29. Guyatt GH, Oxman AD, Vist GE, et al; GRADE Working Group. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008;336(7650):924-926. doi:10.1136/bmj.39489.470347.AD

30. Howick J, Glasziou P, Aronson JK. The evolution of evidence hierarchies: what can Bradford Hill's "guidelines for causation" contribute? *J R Soc Med*. 2009;102(5):186-194. doi:10.1258/jrsm.2009.090020

31. Calonge N, Shekelle PG, Owens DK, et al. A framework for synthesizing intervention evidence from multiple sources into a single certainty of evidence rating: methodological developments from a US National Academies of Sciences, Engineering, and Medicine Committee. *Res Synth Methods*. Published online June 20, 2022. doi:10.1002/jrsm.1582

32. Gubits D, Shinn M, Bell S, et al. Family Options Study: short-term impacts of housing and services interventions for homeless families. U.S. Department of Housing and Urban Development, Office of Policy Development and Research; July 2015. Accessed February 23, 2022. https://www.ssrn.com/abstract=3055272

33. Gubits D, Shinn M, Wood M, et al. Family Options Study: 3-year impacts of housing and services interventions for homeless families. U.S. Department of Housing and Urban Development, Office of Policy Development and Research; October 2016. Accessed March 25, 2020. https://www.ssrn.com/abstract=3055295

34. Gubits D, Shinn M, Wood M, Brown SR, Dastrup SR, Bell SH. What interventions work best for families who experience homelessness? impact estimates from the Family Options Study. *J Policy Anal Manage*. 2018;37(4):735-766. doi:10.1002/pam.22071

35. Shinn M, Brown SR, Wood M, Gubits D. Housing and service interventions for families experiencing homelessness in the United States: an experimental evaluation. *Eur J Homelessness*. 2016;10(1):13-30.

36. Wolitski RJ, Kidder DP, Pals SL, et al; Housing and Health Study Team. Randomized trial of the effects of housing assistance on the health and risk behaviors of homeless and unstably housed people living with HIV. *AIDS Behav*. 2010;14(3):493-503. doi:10.1007/s10461-009-9643-x

37. Bovell-Ammon A, Mansilla C, Poblacion A, et al. Housing intervention for medically complex families associated with improved family health: pilot randomized trial. *Health Aff (Millwood)*. 2020;39(4):613-621. doi:10.1377/hlthaff.2019.01569

38. Jowers K, Timmins C, Bhavsar N, Hu Q, Marshall J. *Housing Precarity & the COVID-19 Pandemic: Impacts of Utility Disconnection and Eviction Moratoria on Infections and Deaths Across US Counties*. National Bureau of Economic Research; 2021.

39. Leifheit KM, Linton SL, Raifman J, et al. Expiring eviction moratoriums and COVID-19 incidence and mortality. *Am J Epidemiol*. 2021;190(12):2503-2510. doi:10.1093/aje/kwab196

40. Sandoval-Olascoaga S, Venkataramani AS, Arcaya MC. Eviction moratoria expiration and COVID-19 infection risk across strata of health and socioeconomic status in the United States. *JAMA Netw Open*. 2021;4(8):e2129041. doi:10.1001/jamanetworkopen.2021.29041

41. An X, Gabriel SA, Tzur-Ilan N. More than shelter: the effects of rental eviction moratoria on household well-being. *SSRN*. Preprint posted online March 10, 2021. doi:10.21799/frbp.wp

42. Leifheit KM, Pollack CE, Raifman J, et al. Variation in state-level eviction moratorium protections and mental health among US adults during the COVID-19 pandemic. *JAMA Netw Open*. 2021;4(12):e2139585. doi:10.1001/jamanetworkopen.2021.39585

43. Nelson RE, Montgomery AE, Suo Y, et al. Temporary financial assistance decreased health care costs for veterans experiencing housing instability. *Health Aff (Millwood)*. 2021;40(5):820-828. doi:10.1377/hlthaff.2020.01796

44. Antonakos CL, Colabianchi N. Impact of rental assistance on modifiable health risk factors and behaviors in adults. *Cityscape*. 2018;20(2):133-144.

45. Denary W, Fenelon A, Schlesinger P, Purtle J, Blankenship KM, Keene DE. Does rental assistance improve mental health? insights from a longitudinal cohort study. *Soc Sci Med*. 2021;282:114100. doi:10.1016/j.socscimed.2021.114100

46. Fertig AR, Reingold DA. Public housing, health and health behaviors: is there a connection? *J Policy Anal Manage*. 2007;26(4):831-859. doi:10.1002/pam.20288

47. Hinds AM, Bechtel B, Distasio J, Roos LL, Lix LM. Changes in healthcare use among individuals who move into public housing: a population-based investigation. *BMC Health Serv Res*. 2018;18(1):411. doi:10.1186/s12913-018-3109-7

48. Hinds AM, Bechtel B, Distasio J, Roos LL, Lix LM. Public housing and healthcare use: an investigation using linked administrative data. *Can J Public Health*. 2019;110(2):127-138. doi:10.17269/s41997-018-0162-2

49. Kalousová L, Evangelist M. Rent assistance and health: findings from Detroit. *Hous Stud*. 2019;34(1):111-141. doi:10.1080/02673037.2018.1441977

50. O'Connell MJ, Kasprow W, Rosenheck RA. Rates and risk factors for homelessness after successful housing in a sample of formerly homeless veterans. *Psychiatr Serv*. 2008;59(3):268-275. doi:10.1176/ps.2008.59.3.268

51. Pfeiffer D. Rental housing assistance and health: evidence from the Survey of Income and Program Participation. *Hous Policy Debate*. 2018;28(4):515-533. doi:10.1080/10511482.2017.1404480

52. Zhong Y, Beattie CM, Rojas J, Farquhar XP, Brown PA, Wiewel EW. Enrollment length, service category, and HIV health outcomes among low-income HIV-positive persons newly enrolled in a housing program, New York City, 2014-2017. *Am J Public Health*. 2020;110(7):1068-1075. doi:10.2105/AJPH.2020.305660

53. Munford LA, Fichera E, Sutton M. Is owning your home good for your health? evidence from exogenous variations in subsidies in England. *Econ Hum Biol*. 2020;39:100903. doi:10.1016/j.ehb.2020.100903

54. Fenelon A, Mayne P, Simon AE, et al. Housing assistance programs and adult health in the United States. *Am J Public Health*. 2017;107(4):571-578. doi:10.2105/AJPH.2016.303649

55. Simon AE, Fenelon A, Helms V, Lloyd PC, Rossen LM. HUD housing assistance associated with lower uninsurance rates and unmet medical need. *Health Aff (Millwood)*. 2017;36(6):1016-1023. doi:10.1377/hlthaff.2016.1152

56. Wong MS, Roberts ET, Arnold CM, Pollack CE. HUD housing assistance and levels of physical activity among low-income adults. *Prev Chronic Dis*. 2018;15:E94. doi:10.5888/pcd15.170517

57. Wong MS, Arnold CM, Roberts ET, Pollack CE. The relationship between federal housing assistance and uptake of cancer screening among low-income adults. *J Gen Intern Med*. 2019;34(12):2714-2716. doi:10.1007/s11606-019-05037-z

58. Vásquez-Vera H, Palència L, Magna I, Mena C, Neira J, Borrell C. The threat of home eviction and its effects on health through the equity lens: a systematic review. *Soc Sci Med*. 2017;175:199-208. doi:10.1016/j.socscimed.2017.01.010

59. Hoke MK, Boen CE. The health impacts of eviction: evidence from the National Longitudinal Study of Adolescent to Adult Health. *Soc Sci Med*. 2021;273:113742. doi:10.1016/j.socscimed.2021.113742

60. Rojas Y, Stenberg SÅ. Evictions and suicide: a follow-up study of almost 22,000 Swedish households in the wake of the global financial crisis. *J Epidemiol Community Health*. 2016;70(4):409-413. doi:10.1136/jech-2015-206419

61. Schwartz GL, Feldman JM, Wang SS, Glied SA. Eviction, healthcare utilization, and disenrollment among New York City Medicaid patients. *Am J Prev Med*. 2022;62(2):157-164. doi:10.1016/j.amepre.2021.07.018

62. 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. doi:10.1146/annurev-publhealth-040617-013553

63. Wood M, Turnham J, Mills G. Housing affordability and family well-being: results from the housing voucher evaluation. *Hous Policy Debate*. 2008;19(2):367-412. doi:10.1080/10511482.2008.9521639

64. Ellen IG. What do we know about housing choice vouchers? *Reg Sci Urban Econ*. 2020;80:103380. doi:10.1016/j.regsciurbeco.2018.07.003

65. Mills G, Gubits D, Orr L, et al. Effects of housing vouchers on welfare families. U.S. Department of Housing and Urban Development; 2006. Accessed March 3, 2022. https://www.huduser.gov/publications/pdf/hsgvouchers_1_2011.pdf

66. Kim H. Failing the least advantaged: an unintended consequence of local implementation of the Housing Choice Voucher Program. *Hous Policy Debate*. 2022;32(2):369-385. doi:10.1080/10511482.2020.1834429

67. US Department of Housing and Urban Development. Housing choice voucher program guidebook: eligibility determination and denial of assistance. Published November 2019. Accessed May 17, 2022. https://www.hud.gov/sites/dfiles/PIH/documents/HCV_Guidebook_Eligibility_Determination_and_Denial_of_Assistance.pdf

68. Rose G. Sick individuals and sick populations. *Int J Epidemiol*. 2001;30(3):427-432. doi:10.1093/ije/30.3.427

69. Ruel E, Oakley D, Wilson GE, Maddox R. Is public housing the cause of poor health or a safety net for the unhealthy poor? *J Urban Health*. 2010;87(5):827-838. doi:10.1007/s11524-010-9484-y

70. Philip S, Cunningham J, Stemnock MP, Reichel R. *Assisting Medicaid Beneficiaries to Achieve Housing Stability*. Milliman, Inc; 2020.

71. Koh HK, Bantham A, Geller AC, et al. Anchor institutions: best practices to address social needs and social determinants of health. *Am J Public Health*. 2020;110(3):309-316. doi:10.2105/AJPH.2019.305472

72. Drabo EF, Eckel G, Ross SL, et al. A social-return-on-investment analysis of Bon Secours Hospital's "Housing For Health" affordable housing program. *Health Aff (Millwood)*. 2021;40(3):513-520. doi:10.1377/hlthaff.2020.00998

SUPPLEMENT.

eTable 1. Details of Studies of Primary Prevention of Housing Insecurity to Improve Health
eTable 2. Cochrane Risk of Bias for Randomized Controlled Trials
eTable 3. Risk of Bias in Non-Randomized Studies of Intervention (ROBINS-I)
eTable 4. Reporting on Race/Ethnicity
eAppendix 1. Detailed Search Strategy
eAppendix 2. Studies Excluded After Full-Text Review, by Reason for Exclusion
eAppendix 3. Detailed Description of Methods
eReferences.