JUNE 2024

THE NATIONAL RISK INDEX

AND RACIAL EQUITY FOR RENTERS

A joint report by

NATIONAL LOW INCOME HOUSING COALITION

PAHRC℠
Public and Affordable Housing Research Corporation

The National Risk Index and Racial Equity for Renters

A joint report by the National Low Income Housing Coalition and the Public and Affordable Housing Research Corporation

Dan Emmanuel

Research Manager, NLIHC

Kelly McElwain

Manager of Research and Industry Intelligence, PAHRC

Andrew Aurand

Senior Vice President for Research, NLIHC

Cate Asp

Research Analyst, PAHRC

About NLIHC

The National Low Income Housing Coalition is dedicated to achieving racially and socially equitable public policy that ensures people with the lowest incomes have quality homes that are accessible and affordable in the communities of their choice.

The National Low Income Housing Coalition
1000 Vermont Avenue, NW Suite 500
Washington, DC 20005
202-662-1530
nlihc.org

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Public and Affordable Housing Research Corporation
189 Commerce Court
PO Box 189 Cheshire, CT 06410
203-272-8220
pahrc.org

The research included in this report was made possible by the Walmart Foundation. The findings, conclusions and recommendations presented in this report are those of the National Low Income Housing Coalition and Public and Affordable Housing Research Corporation and do not necessarily reflect the opinions of the Walmart Foundation.

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Introduction

The severity and frequency of natural hazards continue to grow. In 2023, the U.S. experienced a record-breaking 28 disasters for which damages exceeded $1 billion (NOAA, 2024). A substantial body of research indicates that natural hazards disproportionately affect people of color and renters, while federal funding to prepare for and prevent the negative impacts of disasters tends to benefit economically advantaged white homeowners and their communities. Therefore, metrics used to guide mitigation and planning must adequately capture existing disparities in natural hazard risk for renters of color. Absent equitable mitigation investments and recovery planning, climate-related disasters will increasingly reinforce or exacerbate existing racial disparities.

The Federal Emergency Management Agency's (FEMA) National Risk Index (NRI) is a relatively new tool for assessing natural hazard risks faced by communities. The NRI is well-positioned to guide the allocation of resources for mitigation and recovery planning since it provides relative assessments of risk for 18 different natural hazards at the census tract-level covering nearly every community in the U.S. The NRI assesses census tracts' risk relative to all tracts nationally, as well as to tracts within the same state. Whether the NRI captures disparities in natural hazard risk for renters of color, however, remains unclear.

In this report, we review empirical research on disparities in natural hazard exposure, impacts, and mitigations for people of color and renters, evaluate whether the NRI might reflect such disparities for renters of color, and examine how the NRI is informing the implementation of two new federal programs: FEMA's Community Disaster Resilience Zones (CDRZ) program and HUD's Green Resilient Retrofit Program (GRRP). To be clear: this report does not evaluate the racial equity of outcomes in the CDRZ program or GRRP but rather examines how the NRI might influence the prioritization of resources in programs. An evaluation of racial equity in program outcomes is outside the scope of this report.

Metrics used to guide mitigation and planning must adequately capture existing disparities in natural hazard risk for renters of color.

Our findings suggest that the NRI may insufficiently capture racial and ethnic disparities in risk within states for renters, particularly for Black and Hispanic households. FEMA's incorporation of both the NRI and the Climate and Economic Screening Tool in its designation of zones for the CDRZ program, however, resulted in Black households being better represented in CDRZs than they would have been using only the NRI criteria specified in the CDRZ program's legislative statute. Regarding GRRP, HUD's partial use of NRI scores in identifying properties competitive for awards likely influences who applies for and receives these awards, though other factors play a significant role in shaping program outcomes. There is no baseline with which to assess the racial equity of these outcomes. A gap in the research literature regarding racial disparities in natural hazard risks among HUD-assisted renters precludes both an evaluation of whether the NRI adequately reflects risks for these households and whether outcomes in GRRP are racially equitable.

Caution is warranted when using the NRI to prioritize communities when allocating resources for mitigation and recovery planning for renters. Planners and policymakers should consider avoiding the use of statewide NRI risk scores or supplementing the NRI with other metrics that better capture racial inequities when deciding how to prioritize these resources. Alternative metrics available through the NRI data, like the expected rate of annual loss rather than expected total dollar value of annual loss, might better reflect racial disparities in risk among renters. In the longer term, the NRI may need to be revised to better reflect racial disparities in natural hazard risks. However, more research is needed to fully quantify the extent to which the NRI might underestimate risks for renters and communities of color and to confirm which specific components of the NRI might need to be improved.

Background

Racial Inequities in Natural Hazard Exposure, Impacts, and Mitigations

Disasters disproportionately impact people of color and their communities. Evidence from storms Harvey, Uri, and Katrina indicates that Black households and communities of color experienced more severe damage to their homes (Chakraborty, 2019; Lee, 2022; Fussel et al., 2010). Communities of color also tend to recover more slowly and have higher displacement rates (Zhang, 2009; Patrascu, 2024; Finch et al., 2010; Fussel et al., 2010; van de Lindt et al., 2020). Raker (2020) found that block groups impacted by severe tornados between 1980 and 2010 were more likely to become whiter and more socioeconomically advantaged, suggesting that people of color are displaced in the wake of disaster. Compounding these challenges, people of color are also more likely to experience physical and mental health impacts during and after disasters (Ndugga & Artiga, 2023; Sastry et al., 2009; Flores et al., 2020; Flores et al., 2021; Zahran et al., 2008; Perilla et al., 2005). Relative to white non-Hispanic people, extreme weather mortality rates in the U.S. between 1999 and 2018 were 7.3 times higher for Native American people and 1.9 times higher for Black people (Sharpe & Wolkin, 2021).

These racial disparities in disaster impacts are partially the result of differences in exposure to natural hazards, social vulnerability, and community resiliency. Across 169 of the 175 largest urban areas, people of color are more likely to live in census tracts with higher relative heat intensities (Hsu et al., 2021). One driver for these differences is redlining policies, which prevented people of color from buying and moving into certain neighborhoods before the 1968 “Fair Housing Act” outlawed this practice. Redling policies are linked to disproportionate exposure to extreme heat and flooding that persist to this day (Hoffman et al., 2020; Katz, 2021; Conzelmann et al., 2023). Counties with large Black populations are also more likely to experience more considerable damage from tornados,

even after controlling for tornado risk (Kashian et al., 2022). People of color also live in inland flood zones at higher rates in multiple cities, including Miami, FL; Los Angeles, CA; Houston, TX; and Austin, TX (Sanders et al., 2023; Chakraborty et al., 2014; Zoll, 2021). While white non-Hispanic households are overrepresented in amenity-rich

areas exposed to coastal flood and wildfire risk, people of color more frequently live in communities prone to wildfires and floods that also have lower adaptive capacity (Davies et al., 2018; Ueland & Warf, 2006; Messager et al., 2021). At the same time, people of color have less economic, social, and cultural capital to prepare and respond to a disaster (Fothergill et al., 1999; Hanks et al., 2018).

Despite having a greater need, people of color are less likely to benefit from federal investments in preparedness and mitigation strategies (Rivera & Miller, 2007). Federal funding for flood-mitigation projects is typically based on a cost-benefit analysis that emphasizes risk to property values, which tend to be higher in affluent white communities, over harder-to-measure indirect costs, like job loss and displacement, that impact communities of color at higher rates. As a result, people of color are less likely to benefit from federally funded flood mitigation projects, even after controlling

for flood risk (McGee, 2021; Tyler et al., 2023). Black and Hispanic homeowners who benefit from flood mitigation investments receive smaller flood buyouts relative to the value of their property driven by systemic racism in the application process, which could make it more challenging to relocate before the next disaster (Jowers et al., 2023). When disaster strikes, communities of color are less likely to receive short-term disaster assistance, making recovery potentially more difficult (Craemer, 2010; Drakes et al., 2021). Communities of color also experience longer and more frequent power outages after storms, further impeding their recovery (Rodríguez, 2022; Nejat, 2022; Sotolongo et al., 2021; Lee, 2022).

These racial and ethnic inequities in exposure, impact, and investments in recovery and mitigation can further compound wealth disparities, especially as the frequency and severity of natural hazards rise. Between 1999 and 2013, Black, Asian, and Latino people living in counties experiencing high disaster damages lost wealth, while white people gained wealth, on average. The more federal aid a county received, the larger the wealth inequalities post-disaster (Howell & Elliot, 2018). Future investments in natural hazard preparedness, mitigation, and recovery must be equitable to protect and promote the well-being of people most at risk.

Inequities for Renters in Natural Hazard Exposure, Impacts, and Mitigations

People of color live in federally assisted and renter-occupied homes at a higher rate than white people (Hermann, 2023; Howell et al., 2023). Research finds that households living in rental homes are more vulnerable to natural hazards (Lee & Van Zandt, 2018; Ma & Smith, 2020). Compared to owner-occupied homes, rental homes experience greater damage, take longer to repair, and recover more slowly (Hamideh et al., 2021; Peacock et al., 2014; Zhang & Peacock, 2009). Contributing to these disparities, renters and landlords have fewer resources and incentives to invest in long-term mitigations to protect their properties (Collins, 2008). Renters are at a disadvantage when applying for short-term disaster assistance programs, like FEMA's Individuals and Households Program (IHP). While homeowners are more likely to receive higher IHP awards as

the dollar value of their damage increases, renters are not (Collins, 2008). Compared to owner-occupied households, rental households are also less likely to benefit from Community Development Block Grant-Disaster Recovery (CDBG-DR) funds (Fair Share Housing Center, 2015; GAO, 2010; Spader & Turnham, 2014).

Natural hazard risk is amplified for lower-cost rental homes, including federally assisted homes. Lower-cost rental homes tend to be older, of lower physical quality, and overrepresented in risk-prone areas (Lee & Van Zandt, 2019). These homes are more likely to be built to less stringent codes and have outdated systems and building materials, which could make them more susceptible to disasters compared to newer properties (FEMA, 2020; Fothergill & Peek, 2004). Owners of low-cost rental homes and federally assisted homes impacted by Superstorm Sandy reported having limited rental income, which made it difficult to rebuild and meet current mitigation standards (Aurand & Emmanuel, 2019).

While a strong body of research demonstrates that renters, low-cost rental housing, and people of color face disparities in natural hazard risks, racial and ethnic inequities in natural hazard risk specifically among HUD-assisted renters is a significant gap in the research literature.

Assessing Risk Using the NRI

Assessment tools may underestimate risk for communities of color. Most earthquake, flood, and hurricane risk assessments examine direct economic losses rather than indirect losses (Wu & Koh, 2023).

These tools can underrepresent risks for people of color, who are more likely to experience indirect costs after a disaster, such as displacement, job loss, and mental and physical health impacts (Raker, 2020; van de Lindt et al., 2020; Shaganti & Waddell, 2015; Flores et al., 2020; Flores et al., 2021). Additionally, Black people and their communities are bearing the brunt of extreme heat, hurricane damage, and flood risk caused by climate change (Bruick et al., 2023; Wing et al., 2022; EPA, 2021). For example, Black, Asian, and Hispanic neighborhoods in Houston, TX, are more likely to have high flood risk but not be classified as 100-year floodplains by FEMA

(Flores et al., 2022). Driven by flooding occurring outside of 100-year floodplains, neighborhoods with a higher proportion of Black and Hispanic households experienced more flooding than majority white neighborhoods during Hurricane Harvey (Smiley, 2020). Properties with high flood risk outside of 100-year flood plains may not be prioritized as highly for flood mitigation projects and residents may be less informed and prepared to respond to floods.

Ensuring that natural hazard assessment tools adequately capture past impacts and future risks to people of color is essential to effectively and equitably target resources to prepare and protect

These tools can underrepresent risks for people of color, who are more likely to experience indirect costs after a disaster, such as displacement, job loss, and mental and physical health impacts.

their communities. FEMA developed the NRI to assess overall natural hazard risk more holistically. The NRI is used to establish preferences and competitively award funding to communities and properties most at risk for natural hazards to make them more resilient when the next disaster strikes. FEMA and HUD currently use the NRI to allocate funding through the Building Resilient Infrastructure Communities (BRIC) program, Flood Mitigation Assistance program, Regional Catastrophic Preparedness Grant Program, and GRRP.

The NRI estimates the overall potential for negative impacts from 18 natural hazards for each census tract. The overall risk for each census tract is ranked based on the percentile score from 0 to 100 within the nation and the census tract's state. This score is based on an assessment of each census tract's expected annual loss, social vulnerability, and county's community resiliency. Expected annual loss represents the average economic loss from natural hazards each year and is determined by the monetary value of buildings, agriculture, and people exposed to each hazard, the annualized frequency of the hazard occurring, and the amount of previous damage. Social vulnerability assesses the degree households in a community could be disproportionately impacted by natural hazards and is measured by 16 socioeconomic characteristics, including the portion of the population earning low incomes, living with a disability, having no access to a vehicle, and living in housing types more susceptible to natural hazards. Community resiliency represents the extent to which counties are prepared to respond to and recover from natural hazards and is based on 49 measures that quantify community capital, housing, institutional capacity, and environmental conditions.

Despite factoring in community resiliency and social vulnerability, the NRI may fail to capture racial inequities in natural hazard risk. The index is most strongly correlated to expected annual losses, which could bias risk towards communities with higher property values (Aurand et al., 2023). Clancy et al. (2022) concluded that most risk assessment tools, including the NRI, consider asset damage as the primary metric and do not capture the true hazard risk for socially vulnerable populations. In addition, the NRI is based on a narrow window of historic events and does not predict future natural hazard impacts (Zuzak et al., 2022). Researchers using alternative assessment tools that model future natural hazard risks predict that Black communities will experience more rapidly rising flood, hurricane, and heat risks compared to white communities (Wing et al., 2022; EPA, 2021; Bruick et al., 2023). The NRI also understates risk for low-probability events that have a high impact, such as hurricanes or tsunamis. The index, for example, underestimates tsunami risk for tribal nations located along the coasts of Washington, Oregon, and Northern California (Scigliano, 2023).

This report follows recommendations from Clancy et al. (2022) to validate NRI metrics. We assess whether the overall NRI scores are appropriate risk assessments for equitable disaster mitigation allocations. Focusing on FEMA's NRI, this report examines across race and ethnicity the extent to which renters and residents of HUD-assisted project-based housing are in communities at the greatest risk of negative impact of natural hazard. The report also explores the

race and ethnicity of renters in census tracts eligible for CDRZs and discusses how HUD is using the NRI to award GRRP funds to HUD-assisted multi-family properties. The report concludes with policy and research recommendations for improving outcomes for residents and equitably mitigating the impact of natural hazards and disasters on rental housing and on federally assisted housing.

Methodology

The goal of this report is to assess whether the NRI is an appropriate tool to equitably allocate natural hazard mitigation investments for renters. To answer this question, we examine whether racial disparities in natural hazard risk observed using the NRI align with prior research that finds that renters of color are more likely to be

negatively impacted by natural hazards compared to white renters. We also explore whether these trends persist for HUD-assisted renters of color.

The National Housing Preservation Database (NHPD) was used to identify the location of HUD-assisted project-based properties. These properties charge rents affordable to low-income households in exchange for subsidies. The subsidies in this report include Public Housing, Section 8 Project-Based Rental Assistance (PBRA), Section 202, and Section 811. HUD's Picture of Subsidized Households (POSH) (HUD, 2022) was used to estimate demographic characteristics for households living at these properties. The number of HUD-assisted project-based rental homes by their occupants' race and ethnicity were aggregated to 2020 census tracts. The number of all renters by race and ethnicity for census tracts was taken from HUD's 2016-2020 (5-yr) Comprehensive Housing Affordability Strategy (CHAS) data. Based on the March 2023 edition of FEMA's NRI (FEMA, 2023), we identified census tracts that ranked in the top quintile of risk relative to all tracts in the nation and relative to all tracts in their respective states. We then compared the potential for negative impacts according to the NRI by race and ethnicity of renters and HUD-assisted project-based renters. Throughout this report, we present race and ethnicity identities as reported by POSH and CHAS. HUD combines Asian, Pacific Islander, and Native Hawaiian headed households, so we were unable to assess disparities in natural hazard risk for these groups separately.

We also examine whether federally funded programs that use the NRI to prioritize eligibility or competitiveness for disaster mitigation investments favor renters of color, who face elevated risks for natural hazards according to a large and reliable body of research. We assessed the racial and ethnic diversity of renters in census tracts selected to be CDRZs by FEMA and in census tracts eligible to be CDRZs based solely on NRI scores. CDRZs and their selection criteria are described in the Applications of the NRI section.

Does the NRI Capture Expected Racial Inequities in Natural Hazard Risks for Renters?

Given well-documented racial disparities in natural hazard risks and impacts, it is important to assess whether the NRI, one of the federal government's primary tools for assessing natural hazard risks, reflects such inequities. Doing so is especially important in

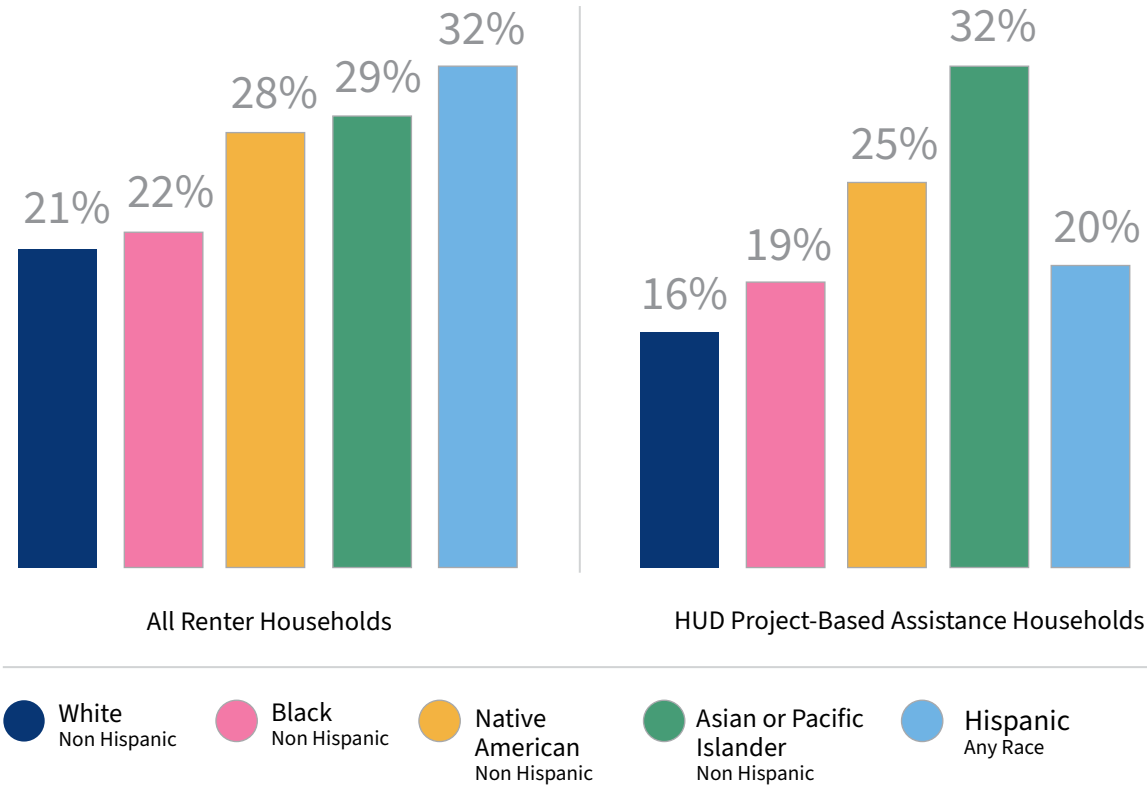
contexts where the NRI might be used to allocate federal resources for disaster mitigation and recovery, since there are known inequities in the allocation of these resources. Planners and policymakers seek to understand risks and allocate mitigation and recovery resources at the national, state, and local levels, making it critical that the NRI reflect known racial inequities within these contexts. In what follows, we assess the extent to which the NRI captures racial disparities in risk among all renters relative to the U.S. and within states. We also examine whether these trends persist for HUD-assisted project-based renters.

Assessing Risk for Renters Nationally

Nationally, renters of color are more likely than their white, non-Hispanic counterparts to live in census tracts with the highest potential for negative impacts from natural hazards within the U.S. The risks appear most acute for Native American, Asian or Pacific Islander, and Hispanic renter households and for Native American and Asian or Pacific Islander renter households receiving HUD project-based assistance (Figure 1). Both for all renter households and renter households receiving HUD project-based rental assistance, Black, non-Hispanic renters appear to have the smallest disparity in risk relative to their white, non-Hispanic peers.

FIGURE 1

Share of Renters in Census Tracts with Highest Risk of Negative Hazard Impacts Relative to the U.S.



Source: National Risk Index (March 2023), National Housing Preservation Database (January 2023), and HUD Picture of Subsidized Households (2022) data.

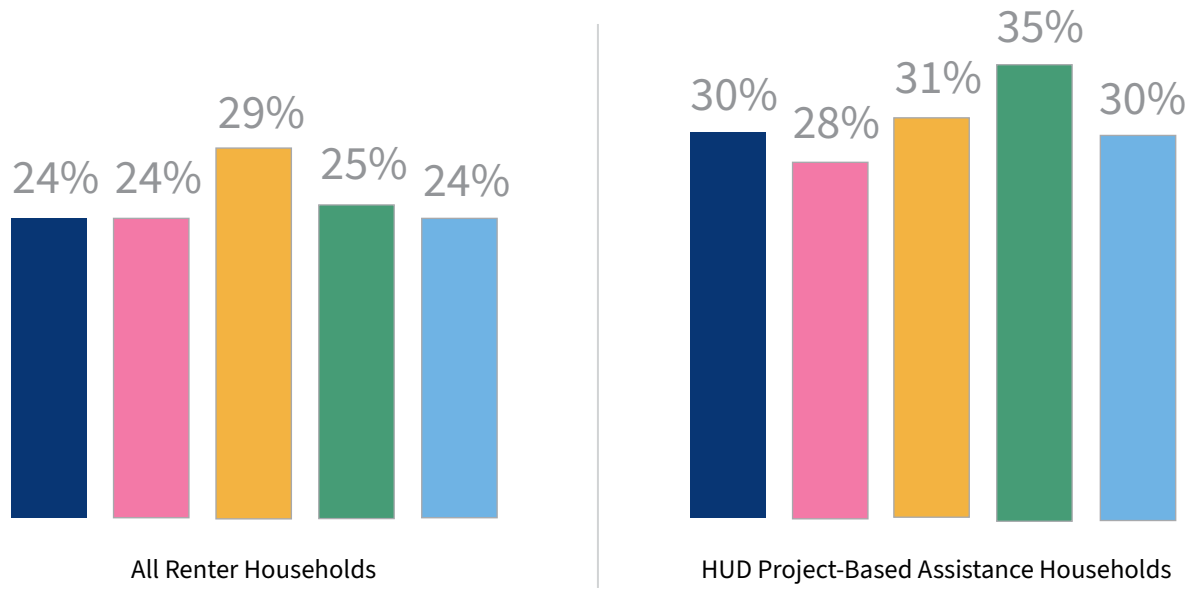
Note: HUD project-based assistance includes public housing, Section 8 PBRA, Section 202, and Section 811.

Assessing Risk for Renters within States

Racial and ethnic disparities in risk are less pronounced, and even nonexistent, when overall NRI risk scores are relative to other tracts within the same state (Figure 2). No disparities are detected between Black, Hispanic, and white non-Hispanic renters. Only Native American and Asian or Pacific Islander households are more likely to be in the highest risk census tracts within their state compared to white, non-Hispanic households. Even then, the disparities appear smaller than when risk is measured relative to the U.S. overall. For renter households receiving HUD project-based assistance, Black, non-Hispanic households are two percentage points less likely to live in the highest risk census tracts than their white, non-Hispanic counterparts.

FIGURE 2

Share of Renters in Census Tracts with Highest Risk of Negative Hazard Impacts Relative to the U.S.



Source: National Risk Index (March 2023), National Housing Preservation Database (January 2023), and HUD Picture of Subsidized Households (2022) data.

Note: HUD project-based assistance includes public housing, Section 8 PBRA, Section 202, and Section 811.

We find that racial and ethnic disparities are obscured or reversed when disaggregating the same analysis by state. White, non-Hispanic renter households are as likely or more likely to live in the highest risk census tracts as Black renter households in 34 states, Asian or Pacific Islander renter households in 33 states, Hispanic renter households of any race in 26 states, and Native American renter households in 23 states. For example, white, non-Hispanic renter households are more likely than Black renter households to live in the highest-risk census tracts in Florida (26% vs. 23%), Georgia (27% vs. 21%), Illinois (27% vs. 20%), Louisiana (28% vs. 20%), and South Carolina (28% vs. 23%). See Appendix A for other states and races or ethnicities.

White, non-Hispanic renter households receiving HUD project-based assistance are as likely or more likely to live in the highest risk census tracts as Hispanic renters of any race receiving HUD project-based assistance in 37 states, and Black renters receiving HUD project-based assistance in 34 states. For example, white, non-Hispanic HUD-assisted renter households are more likely than Black renter households to live in the highest-risk census tracts in Florida (32% vs. 24%), Louisiana (31% vs. 15%), Georgia (43% vs 38%), Illinois (38% vs. 14%), and Mississippi (37% vs. 25%).

These findings suggest that NRI scores relative to other census tracts within states might not sufficiently capture existing racial and ethnic disparities in risk among renters. Using these NRI risk scores to allocate housing resources for mitigation and recovery planning could result in an inequitable allocation of resources relative to the risks that renters of color face.

Assessing Risks for Renters Locally

The NRI does not provide measures of risk ranking census tracts relative to areas smaller than their state (e.g. metropolitan areas or counties), which is likely due to the fact that the resilience component of the NRI and some natural hazards are only available at the county level. This lack of granularity means the NRI might not capture meaningful differences in natural hazard risks within communities that stem from spatial inequities, such as patterns of residential segregation, that are local in nature. For example, it could be misleading to assume the same degree of resilience for all areas within a county where historical patterns of segregation have led to disinvestment and declining housing quality in certain neighborhoods.

NRI risk scores do not appear to reflect known racial disparities within metro areas. Researchers have consistently found that people of color are disproportionately exposed to or impacted by natural hazards in Austin, TX, New Orleans, LA, Los Angeles, CA, Houston, TX, Miami, FL, and Lumberton, NC. In contradiction to this research, however, the NRI suggests that in most of these metro areas white non-Hispanic renters are more likely than renters of color to live in census tracts facing the greatest potential for negative impacts from natural hazards within their state, according to our findings. In New Orleans, LA, for example, only 13% of Black renters live in census tracts with the highest risk scores within Louisiana compared to 22% of white, non-Hispanic renters. In Los Angeles, CA, only 21% of Hispanic renters live in census tracts with the highest NRI scores within California compared to 39% of white, non-Hispanic renters.

Applications of the NRI

Community Disaster Resiliency Zones

The “Community Disaster Resilient Zones (CDRZ) Act” requires FEMA to identify communities at the greatest risk of climate change and natural hazards. The act designates census tracts with natural hazard risk ratings in the top 50 nationally or in the top 1% in their state as eligible for CDRZ. FEMA uses the NRI as its risk assessment tool to designate CDRZs. Disaster mitigation projects in CDRZs are

eligible for additional financial and technical assistance to support community resilience. For instance, Building Resilient Infrastructure Communities (BRIC) projects in CDRZs receive higher federal cost shares and prioritized technical assistance and have fewer application submission requirements (FEMA, 2023).

FEMA further restricts CDRZs to census tracts identified as disadvantaged communities under the Justice40 Initiative. The Justice40 Initiative directs federal agencies to award 40% of certain federal investments to disadvantaged communities. These communities receive additional preference for select federal grants to mitigate and prepare for natural hazard risks, including FEMA's BRIC, Flood Mitigation Assistance, Risk Mapping, Assessment and Planning, and Regional Catastrophic Preparedness Grant programs (FEMA, 2022).

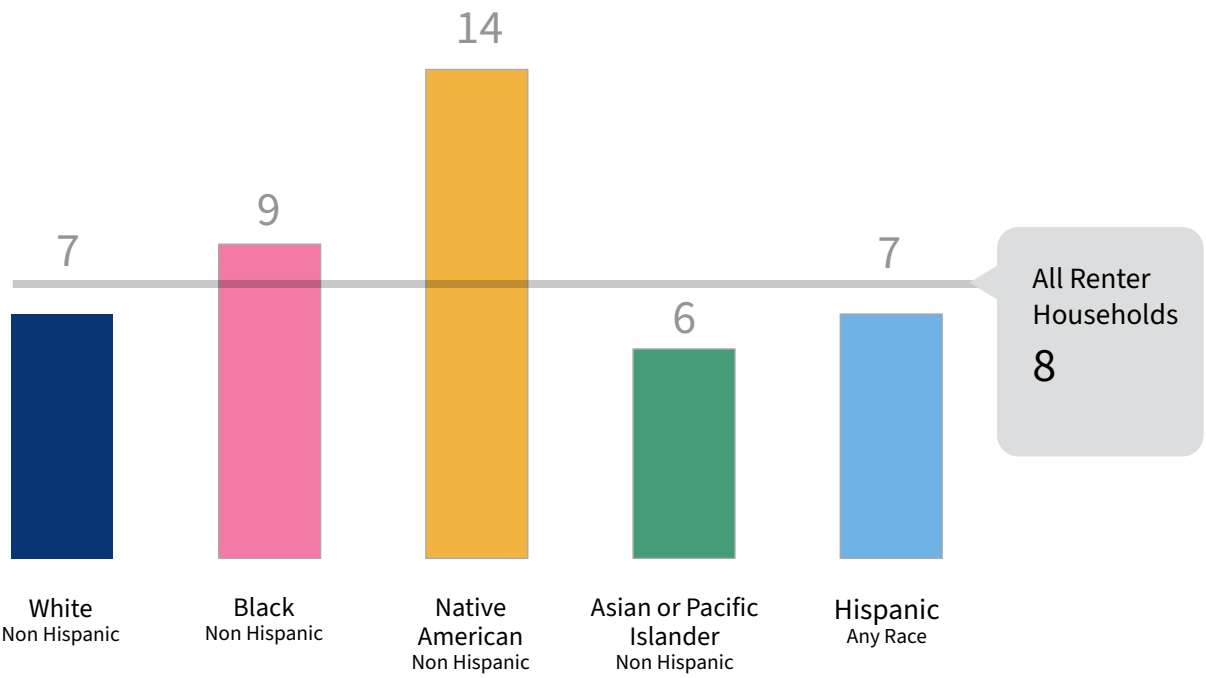
To implement Justice40, census tracts are considered disadvantaged if they have high socioeconomic burden and are overburdened by pollution and climate change or are underserved by investments in energy efficiency, water infrastructure, transportation, housing, or workforce development. Census tracts are considered to have high socioeconomic burden if they exceed the 64th percentile for the percent of the population not enrolled in higher education institutions and earning below 200% of the poverty-line. The tool also classifies federally recognized tribes as disadvantaged communities. If no census tracts with eligible NRI scores are classified as disadvantaged communities within a state, the disadvantaged census tract with the highest NRI score in the state was selected and designated as a CDRZ.

Only 565,385 renters, representing 0.8% of renters in the U.S., live in CDRZs. Aligning with past research from Rumbach et al. (2023), we find that renters in CDRZs are slightly more diverse than renters in general. Native American and Black renters are more likely to reside in tracts designated as CDRZs than white, non-Hispanic renters. On the other hand, Hispanic renters are equally likely and Asian or Pacific Islander renters are less likely to live in CDRZ- designated

census tracts compared to white, non-Hispanic renters. (Figure 3). Hispanic renter households are as likely as white non-Hispanic renters to live in CDRZs, despite research suggesting they are more negatively impacted by natural hazards.

FIGURE 3

Renter Households in CDRZs per 1,000 by Race and Ethnicity

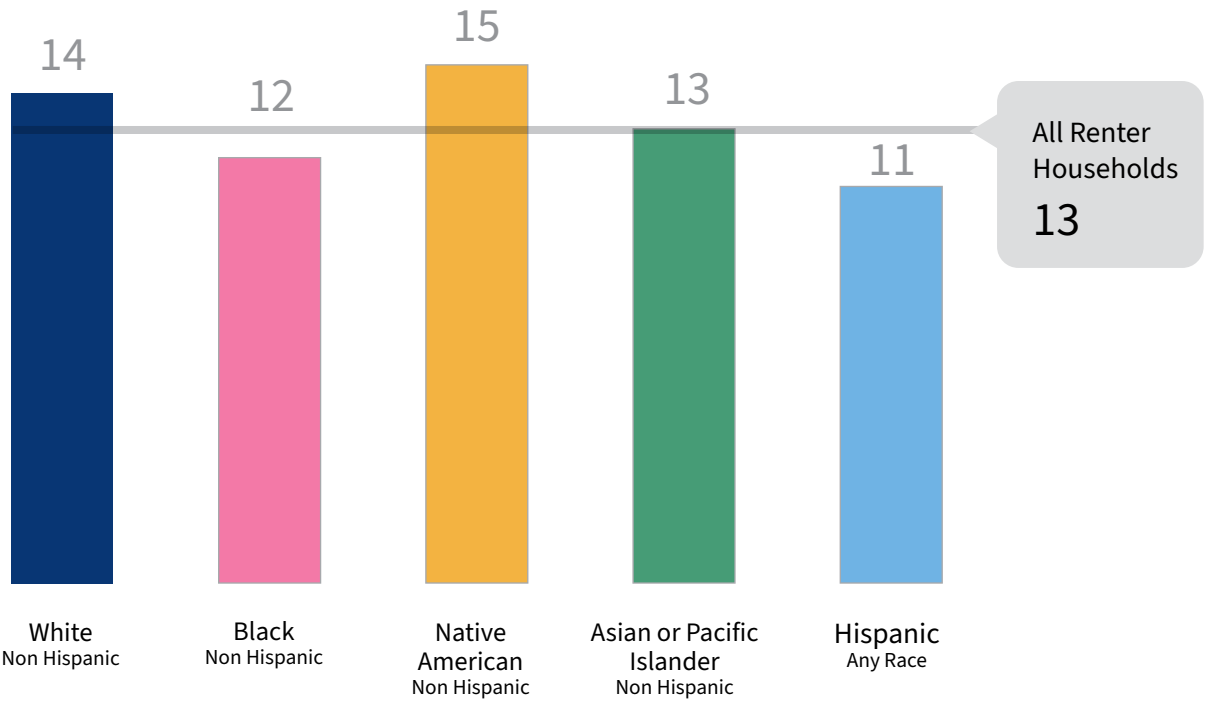


Source: CDRZ 2023 and Comprehensive Housing Affordability Strategy (CHAS) 2016-2020.

Had CDRZs been selected solely based on NRI scores and not in any way by factors related to the Justice40 initiative, Black- and Hispanic-headed renter households would have been less likely than white renter households to reside in a CDRZ, unlike the actual designations (Figure 4). Asian or Pacific Island-headed renter households would have been less likely, as well.

FIGURE 4

Renter Households in Tracts Eligible (by Statute) for CDRZ per 1,000 by Race and Ethnicity



Source: National Risk Index (March 2023 Version) and Comprehensive Housing Affordability Strategy (CHAS) 2016-2020.

Whether FEMA's current approach to designating CDRZs fully reflects racial and ethnic disparities in natural hazard risk for renters remains unknown. Our findings make clear, however, that CDRZ designations would not reflect racial disparities in natural hazard risks for renters if FEMA did not take the step of incorporating the Climate and Economic Screening Tool into its designation process under the Justice40 Initiative. Should future administrations choose to forgo this step and rely solely on the NRI to make CDRZ designations, future prioritization of resources for renters will fail to reflect racial disparities that exist.

Green Resilient Retrofit Program

GRRP is a new competitive grant program that provides funding for HUD-assisted multifamily properties to improve their energy efficiency and climate resilience. GRRP includes three competitive cohorts, or subprograms, with different selection criteria, funding levels, and use cases. The elements cohort provides up to $40,000 per unit to owners of eligible properties undergoing a preservation transaction to fund climate resilience and energy efficiency features. The leading edge cohort provides up to $60,000 per unit to owners to retrofit eligible properties to achieve advanced green certification. The comprehensive cohort provides up to $80,000 per unit and is targeted to owners with properties that have the greatest need for climate resiliency and energy efficiency improvements. The comprehensive cohort is the most competitive GRRP cohort and the only cohort that partially relies on the NRI to competitively award applicants. As of March 2024, HUD has awarded 44 properties, comprising 3,624 households, comprehensive GRRP awards.

HUD selects proposals for the comprehensive cohort based on properties' energy efficiency need, measured by EPA's Energy Star Score or the Multifamily Building Energy Efficiency Screening Tool (MBEST), and their climate risk hazard score. HUD uses natural hazard risk as measured by the NRI as a proxy for climate risk. The natural hazard risk score is calculated by taking the average NRI score relative to the U.S. and relative to the state.

To rank GRRP applicants, HUD calculates a total score by adding the efficiency and natural hazard risk scores. Properties can score up to 100 in both categories. To be eligible, properties must have a total score of at least 100 or an efficiency or risk score of at least 75. Eligible properties with the highest total scores are selected with consideration to HUD's set asides. For instance, at least 5% of properties must be in each HUD region and at least 15% must be in non-metropolitan areas. Properties scoring 75 or higher in each category are the highest ranked, suggesting properties with NRI scores ranking in the 75th percentile are more competitive for the comprehensive cohort of GRRP.

It is reasonable to infer that HUD's partial use of NRI scores in identifying properties competitive for the award influences who applies for and receives these awards, though other factors play a significant role in shaping program outcomes. The average GRRP awardee to date has a natural hazard risk score of 85, suggesting the NRI is an important factor. On the other hand, 27% of awardees have risk scores below 75, suggesting the influence of other factors. Other factors beyond the NRI that might shape program outcomes include who chooses to apply to the program, additional selection criteria like energy efficiency needs, and HUD's set asides to promote geographic diversity among awardees. Perhaps most importantly, research has yet to examine potential racial disparities in natural hazard risks among HUD-assisted renters, so there is no baseline with which NRI-based measures of racial differences in hazard risk for HUD-assisted renters and the racial distribution of GRRP awards can be compared. Future research should seek to address this knowledge gap so that the racial equity of outcomes in mitigation programs serving HUD-assisted renters can be evaluated.

Discussion

Our findings suggest that NRI risk scores, specifically when used to compare census tracts within states, likely fail to sufficiently capture known disparities in natural hazard risk for renters of color. These findings suggest that caution is warranted when using the NRI to guide allocations of resources for mitigation or recovery planning. Indeed, our findings suggest that other factors in addition to NRI scores should be used in assessing risk among renters.

Our findings, however, should not dissuade policymakers or planners from consulting the NRI in prioritizing resources. Rather, our findings suggest the need to consult alternative metrics within the NRI or supplement the NRI with metrics that might better capture racial disparities underlying natural hazard risks in communities. While our report focused on federal programs, state and local policymakers and planners might also use the NRI to prioritize the allocation of resources in state and local contexts. Relying on statewide NRI scores alone to prioritize mitigation and recovery planning resources for renters clearly has the potential to reinforce or exacerbate existing

racial inequities in natural hazard risk. Overall NRI risk scores, especially when they are relative to risk within a state, appear ill-suited to detecting racial disparities in natural hazards among renters.

It is not within the scope of this report to determine the underlying factors within the NRI that appear to obscure racial inequities in natural hazard risks for renters of color or quantify the extent to which the NRI might be falling short of capturing such inequities.

Our findings should not dissuade policymakers or planners from consulting the NRI in prioritizing resources. Rather, our findings suggest the need to consult alternative metrics within the NRI or supplement the NRI with metrics that might better capture racial disparities underlying natural hazard risks in communities.

However, NRI risk scores weigh expected annual losses (EAL) more heavily than community resiliency and social vulnerability in assessing risk (Aurand et al., 2023). Census tracts' overall risk scores in the NRI are strongly correlated to EAL (r=.965) and less correlated to social vulnerability (r=.279) and community resiliency (r=-.263). This suggests the NRI's assessment of risk more closely corresponds to total monetary losses, potentially biasing the NRI's assessment of risk toward wealthier, white communities where property values tend to be higher, while potentially underestimating risk in communities of color that have experienced disinvestment. At the same time, the NRI lacks the granularity needed to accurately assess

relative risks within a local context. The resilience component of the NRI and indicators for multiple natural hazards are only available at the county level. This lack of granularity means the NRI might not capture meaningful differences in natural hazard risks within communities that stem from spatial inequities, such as patterns of residential segregation and disinvestment, that are local in nature and a direct manifestation of racist land use and housing policies.

One alternative metric available is EAL Rate, which represents EAL as the proportion of the total value of people, property, and agriculture in a census tract as opposed to the expected total dollar value of those losses. Using EAL Rate may help mitigate a bias in risk towards communities where property values are higher, although additional research is needed to validate this. The NRI can also be used with other, external metrics intended to capture racial inequities. FEMA's incorporation of the Climate and Economic Screening Tool in designating CDRZs is one example of such an approach.

Following recommendations from Clancy et al. (2022), policymakers and planners might also consider creating set-asides for underrepresented communities to help ensure racial equity in the allocation of resources in mitigation programs. To help communities of color successfully access mitigation programs, FEMA can waive or reduce the cost share requirement for applicants from underserved communities. For instance, FEMA reduced the applicant cost share from 25% to 10% for BRIC applicants in CDRZs or economically disadvantaged rural communities. Only a small subset of communities with high socioeconomic risk are eligible for these increased federal cost shares, however. To help overcome barriers in community capacity, funding for technical assistance could be targeted to communities of color to assist in identifying mitigation needs and applying for resources to address them. For example, HUD's GRRP program has a simple application process and includes extensive funding to reduce barriers for applicants.

Conclusion

Studies consistently find that people of color are disproportionately impacted by natural hazards partly due to disparities in social vulnerability and community resiliency that are the product of structural racism. Evidence also suggests that communities of color have benefited less from federal investments in disaster preparedness and mitigation. If risk assessment tools such as the NRI do not sufficiently capture the risks and impacts that natural hazards present to communities of color, these tools could reinforce or exacerbate existing racial disparities when used to allocate resources for mitigation and recovery planning. Capturing these disparities in measurements of natural hazard risk and addressing them through equitable allocations of mitigation and recovery planning resources is all the more important in the context of increasingly severe and frequent climate-related disasters.

Our analysis suggests that caution is warranted when using the NRI, on its own, to prioritize communities in the allocation of resources for mitigation and recovery planning for renters. In the short term, planners and policymakers prioritizing resources for renters should consider avoiding the use of statewide NRI risk scores or supplementing the NRI with other metrics intended to capture racial inequities. Planners and policymakers might also consider the use of alternative metrics within the NRI such as EAL Rate. In the longer term, if the NRI is found to broadly underestimate risk for communities of color, then it should be revised to better reflect racial disparities in natural hazard risks. More research, however, is needed to fully quantify the extent to which the NRI might underestimate risks for communities of color and to confirm which specific NRI components might need to be improved.

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Appendix A

State	White Non-Hispanic	Black Non-Hispanic	Native American Non-Hispanic	Asian or Pacific Islander Non-Hispanic	Hispanic Any Race
AK	25%	7%	11%	25%	18%
AL	26%	23%	50%	18%	28%
AR	26%	31%	18%	11%	21%
AZ	16%	6%	34%	11%	17%
CA	23%	23%	31%	26%	24%
CO	20%	18%	25%	17%	23%
CT	27%	23%	26%	26%	20%
DC	22%	25%	19%	32%	15%
DE	23%	18%	14%	14%	24%
FL	26%	23%	32%	22%	21%
GA	27%	21%	28%	10%	22%
HI	29%	20%	37%	23%	29%
IA	22%	17%	13%	26%	24%
ID	17%	19%	27%	10%	21%
IL	27%	20%	35%	23%	23%
IN	27%	15%	19%	24%	23%
KS	21%	7%	24%	8%	21%
KY	26%	26%	36%	16%	25%
LA	28%	20%	34%	29%	31%
MA	24%	16%	22%	26%	18%
MD	31%	25%	22%	21%	18%
ME	28%	29%	24%	35%	36%
MI	31%	21%	20%	31%	26%
MN	24%	16%	11%	20%	26%
MO	24%	30%	35%	28%	22%
MS	26%	24%	36%	32%	40%
MT	18%	12%	29%	28%	18%
NC	21%	24%	50%	9%	18%

State	White Non-Hispanic	Black Non-Hispanic	Native American Non-Hispanic	Asian or Pacific Islander Non-Hispanic	Hispanic Any Race
ND	20%	12%	24%	21%	28%
NE	20%	11%	37%	11%	22%
NH	28%	29%	28%	22%	33%
NJ	23%	17%	19%	19%	17%
NM	20%	22%	15%	14%	21%
NV	24%	19%	41%	18%	23%
NY	26%	27%	22%	33%	35%
OH	27%	17%	21%	21%	21%
OK	26%	16%	42%	15%	23%
OR	25%	26%	32%	24%	26%
PA	22%	45%	40%	36%	38%
RI	27%	15%	27%	28%	16%
SC	28%	23%	26%	25%	31%
SD	23%	14%	26%	20%	26%
TN	22%	44%	23%	23%	27%
TX	20%	23%	23%	23%	24%
UT	26%	35%	21%	29%	30%
VA	20%	33%	16%	13%	20%
VT	31%	9%	34%	15%	23%
WA	27%	33%	33%	37%	29%
WI	27%	8%	13%	13%	16%
WV	23%	19%	38%	21%	14%
WY	20%	33%	27%	11%	21%
TOTAL	24%	24%	29%	25%	24%

Source: National Risk Index (March 2023) and HUD CHAS data (2016-2020).

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