



# Associations between inspections for unsafe housing conditions and evictions in New York City public housing buildings\*

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Accepted: 11 June 2022 / Published online: 6 July 2022

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## Abstract

Poor housing conditions and evictions are both associated with poor physical and mental health outcomes, such as increased risks for cardiovascular disease, depression, and injuries. However, the relationship between these two negative housing outcomes has received little quantitative study, including in public housing where exposure to these factors and to negative health outcomes are elevated. We therefore sought to examine the relationship between evictions and formal housing safety inspections triggered by tenant complains about poor conditions. We estimated a hierarchical logistic regression model assessing associations between housing quality inspections and evictions using data from January 2017 and March 2020 on 3,746 residential buildings within 299 New York City Housing Authority (NYCHA) developments, adjusting for development size, funding type, and area-level social vulnerability indicators. The average Social Vulnerability Index percentile for the buildings included in this study was 0.90 (SD=0.12), indicating that these buildings were in areas with greater social vulnerability than 90% of other census tracts in the state. Adjusted predicted probabilities of an eviction increased from 34 to 43% in the presence of a rodent inspection and from 34 to 46% in the presence of an indoor environmental inspection ( $p < 0.001$  for both), indicating that inspections for unsafe housing conditions were associated with evictions at the building level. Substandard housing quality and evictions are important public health concerns. Policies to enhance protections for tenants against both of these social ills simultaneously may be needed to improve community health outcomes.

**Keywords** Housing insecurity · Environmental health · Public housing · Evictions · Community health

Stable, safe, affordable housing is a critical pillar of public health and health equity [1]. For housed individuals in low-income communities, inadequate housing quality stemming from factors such as pest infestations, poor air ventilation, and mold pose daily risks to physical and mental health

outcomes ranging from infections, injuries, and chronic respiratory disease to developmental harms, anxiety, and depression [2]. Layering in instability and the threat of eviction brings further vulnerabilities, as these factors are also linked to poor health outcomes, including cardiovascular disease, psychological distress, and suicide [3, 4]. Unfortunately, exposures to both poor conditions and evictions are highly prevalent, particularly for people living in public housing [5, 6]. However, the relationship between these factors has received minimal quantitative study. The implied warranty of habitability doctrine and regulations governing public housing should in theory afford legal protections against evictions in the presence of unhealthy housing conditions, but the scant evidence available on this topic suggests these rights are rarely realized [7]. This is a particular concern given the potential for landlords to use evictions to retaliate against tenants who file housing quality complaints. We therefore sought to examine the relationship between formal housing safety inspections (almost exclusively

\* Financial support: Rajan A. Sonik was supported by grant number R03HS026317 from the Agency for Healthcare Research and Quality and both Rajan A. Sonik and Ana L. Herrera were supported by grant number R01MD013837 from the National Institute on Minority Health and Health Disparities. The content is solely the responsibility of the authors and does not necessarily represent the official views of the agencies providing financial support.

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triggered by tenant complaints) and evictions, leveraging publically available data covering buildings managed by the New York City Housing Authority (NYCHA), a public development corporation that provides public housing to over 173,000 families and 392,000 residents in New York City [8].

## Methods

### Data

Data on evictions, inspections, NYCHA developments, and area-level factors were merged. We utilized NYC Open Data [9] for information on evictions and housing safety inspections between January 2017 and March 2020 (before COVID-19 eviction moratoriums began). NYC Open Data contains information on all marshal-facilitated evictions, as well as information on inspections regarding housing safety code violations. Eviction and inspection data were merged based on street addresses at the building level (inspection data did not include unit numbers).

Within these data, 299 developments consisting of 3,746 unique residential building-level NYCHA addresses were identified using publicly available NYCHA directory information that included development names and types

**Table 1** Results for hierarchical logistic regression model estimating associations between evictions and housing safety inspections in 3,746 NYCHA public housing buildings

|                                                    | <i>OR</i>   | <i>S.E.</i>      | <i>p-value</i>    | <i>95% CI</i>    |
|----------------------------------------------------|-------------|------------------|-------------------|------------------|
| Indoor environmental complaint                     | <b>2.06</b> | <b>0.35</b>      | <b>&lt; 0.001</b> | <b>1.48–2.88</b> |
| Rodent inspection                                  | <b>1.80</b> | <b>0.26</b>      | <b>&lt; 0.001</b> | <b>1.36–2.38</b> |
| Indoor environmental complaint x rodent inspection | 0.61        | 0.23             | 0.18              | 0.30–1.26        |
| Federally funded development                       | 1.05        | 0.36             | 0.89              | 0.54–2.05        |
| Number of units per development                    | <b>1.00</b> | <b>&lt; 0.01</b> | <b>&lt; 0.001</b> | <b>1.00–1.01</b> |
| <i>SVI Characteristics</i>                         |             |                  |                   |                  |
| Poverty                                            | 1.31        | 0.40             | 0.38              | 0.72–2.39        |
| Unemployment                                       | 0.84        | 0.18             | 0.42              | 0.55–1.29        |
| Per capita income                                  | 1.00        | 0.31             | 0.10              | 0.54–1.85        |
| Persons with no high school diploma                | 1.09        | 0.29             | 0.74              | 0.65–1.83        |
| <b>Persons aged 65 years+</b>                      | <b>2.61</b> | <b>1.19</b>      | <b>0.04</b>       | <b>1.07–6.38</b> |
| Persons aged 17 and younger                        | 0.98        | 0.27             | 0.93              | 0.57–1.67        |
| Persons with a disability                          | 0.93        | 0.24             | 0.77              | 0.56–1.54        |
| Single parent households                           | 1.28        | 0.33             | 0.34              | 0.77–2.11        |
| Minority Status/Language                           | 1.06        | 0.23             | 0.80              | 0.69–1.62        |
| Limited English                                    | 0.68        | 0.22             | 0.24              | 0.36–1.29        |
| Multi-unit housing                                 | 1.50        | 0.37             | 0.10              | 0.92–2.43        |
| Crowded households                                 | 0.79        | 0.29             | 0.53              | 0.39–1.63        |
| No vehicles                                        | 0.89        | 0.21             | 0.62              | 0.55–1.42        |
| Institutionalized group quarters                   | 1.12        | 0.37             | 0.72              | 0.59–2.15        |

(federally funded or not), addresses and address types (residential or not), and the number of units per development (per building numbers were not available). Finally, we geocoded building addresses to identify census tracts and merge in data from the Center for Disease Control and Prevention's Social Vulnerability Index (SVI) [10]. SVI uses 15 variables related to socioeconomic status, household composition and disability, minority status and language use, and housing type and transportation to construct scores by either county or census tract [10]. It creates percentile rankings at either the US or individual state levels—we focused on New York State—where values closer to 1 indicate greater vulnerability. Rather than using the composite ranking, however, we included the individual variables to allow for richer inspection of the individual factors; doing so did not alter findings.

### Measures

Because unit-level data was not available, we used building-level residential addresses as our unit of analysis. Our dependent variable was a binary indicator of the presence of at least one forced, marshal-facilitated eviction during the study period. The independent variables of interest were two binary indicators—the presence of at least one rodent inspection and the presence of at least one indoor environmental inspection during the study period—as well as an interaction of these indicators. Inspections are primarily triggered by tenant complaints, making them a measure of tenant-raised concerns about housing safety conditions.

As covariates, we included a binary indicator of whether the development of which a building was a part was federally funded, the number of units at the development (stratifying addresses into quartiles based on the number of units in developments did not alter findings), and 14 of the 15 SVI variables (the mobile homes factor had a null value across all tracts in our data).

### Statistical Analyses

We used a hierarchical logistic regression model to estimate associations between whether an eviction occurred and whether or not rodent and/or environmental complaints were filed at the building level, adjusting for the covariates described above. We used log-likelihood ratio tests to assess whether accounting for the nesting of addresses within developments and/or developments within census tracts was necessary. We found that accounting for nesting at these two levels significantly improved model fit and therefore included random intercepts for development and census tract. For developments that were split geographically across more than one census tract ( $n = 83$  developments), we treated each subset of buildings within one census tract as a

unique development for the purposes of nesting. All analyses were conducted using Stata (Version 16.0).

## Results

Of the 3,746 buildings in our sample, 94% were in federally funded developments, with an average of 991 units per development ( $SD=656.7$ ). The average SVI percentile for the buildings in this study was 0.90 ( $SD=0.12$ ), indicating that on average these buildings were located in areas with greater social vulnerability than 90% of other census tracts in New York State. During the study period, 19% of buildings had at least one inspection, and 28% had at least one eviction (24% if no inspection, 41% if at least one,  $p<0.001$ ). In fully adjusted models, inspections for both rodents and indoor environmental problems were significantly associated with evictions at the  $p<0.001$  level, but their interaction was not statistically significant (Table 1). The adjusted predicted probability of an eviction occurring in a building increased from 34 to 43% in the presence of a rodent inspection and from 34 to 46% in the presence of an indoor environmental inspection (percentages were above 28% due to effects of nesting on means).

## Discussion

We found that inspections related to unsafe housing conditions in NYCHA public housing were associated with marshal-facilitated evictions at the building level. Analyses of Housing and Urban Development data during this period estimated that 56% of public multifamily housing had urgent health and safety problems [5], nearly three times the 19% of NYCHA buildings we found to have a formal tenant-initiated inspection during this time. This discrepancy between poor conditions and requested inspections to trigger repairs is consistent with prior research showing that low-income renters often lack the resources or access to information to address housing quality issues themselves [11]. Beyond resources and information, however, our present finding that inspections are associated with evictions raises the possibility that at least part of this discrepancy may be driven by a rational view that an inspection may be more likely to lead to an eviction than to repairs [7].

The lack of comprehensive longitudinal data at the individual level was a limitation of these analyses despite using some of the most comprehensive data on legally sanctioned evictions available [12]. Although we can conclude that the evictions measured were not due to renovation-caused relocations (as those would not have resulted in a forced, marshal-facilitated eviction), it is not possible to rule out other

unforeseen causal pathways for the evictions unrelated to our study question. Regardless, future studies with longitudinal data, particularly if linked to health and healthcare outcome data, would significantly enhance our understanding of the phenomena examined here.

## Conclusions

Substandard housing and evictions are independent public health concerns, making possible links between them—particularly if attempts to address one may precipitate the other—a serious concern. Policies that can instead link improvements in both areas, such as having inspection failure data automatically sent to court systems that adjudicate evictions, should be considered not only for their potential to yield better enforcement of existing tenant protections, but also for their importance to community health.

**Authors' contributions** All authors contributed to the conceptualization and design of the study, data analysis, interpretation of findings, and manuscript drafting and revisions. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

**Funding** This manuscript was supported by grants from the Agency for Healthcare Research and Quality and the National Institute on Minority Health and Health Disparities.

**Data Availability** All data analyzed during the current study are publicly available as noted in the manuscript text.

**Code Availability** Stata (Version 16.0) was used to conduct all analyses.

## Declarations

**Conflict of interest** All authors report no conflicts of interest.

**Ethical approval** Not applicable (secondary, publicly available data).

**Consent to participate** Not applicable (secondary, publicly available data).

**Consent for publication** Not applicable (secondary, publicly available data).

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