

LIVING IN RISK

Public Health and Socioeconomic
Indicators in NYC Housing Insecurity



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DSAN 5100 CAR BARN

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38.9% of renters

Are classified as **rent burdened** (*i.e. 30% of their income is spent on rent*) in NYC

330,118 residents

live in New York City Housing Authority **public housing**, including Section 8 & 9

Source
New York State Office of the State Comptroller. "DiNapoli: Housing Cost Burdens for New Yorkers Among Nation's Highest." OSC Press Releases, 2 Feb. 2024

New York City Housing Authority. NYCHA Fact Sheet 2023. NYC.gov, 2023

She qualified for the voucher because she has two minor children and receives cash assistance as her only source of income. Otherwise, she said, she and her children would be homeless.

"It's a lifesaver," Alladoumngue said. "I worked two jobs, but for now, I deal with financial stress, physical stress, because I'm in pain."

DiNapoli: Unsafe Conditions, Questionable Spending Found at Affordable NYC Housing Complexes

Audit Finds NYC HPD Isn't Providing Adequate Oversight

A Hell's Kitchen pizza parlor is facing imminent eviction after 24 years — all because of sudden "vibrations" felt by an upstairs apartment that might just be from the subway, The Post has learned.

The Slice of New York pizza shop was given a 15-day notice from their landlord to fix the reported issue by Thanksgiving Day or be subject to eviction, court documents show.

The New York Times

THE HOUSING CRUNCH

Why 'Affordable Housing' in New York City Can Still Cost \$3,500 a Month

Soaring rents and few options have made it hard for average people to live in the city. Even "affordable" units often cost too much.

NEWS

LeFrak City has the most evictions in NYC. The landlord is suing to speed up the process.

OUR RESEARCH Q:

What are the key factors that contribute to high housing risk across boroughs, and how do public health and socioeconomic indicators correlate with these risks?

Housing Risk Chart 2023

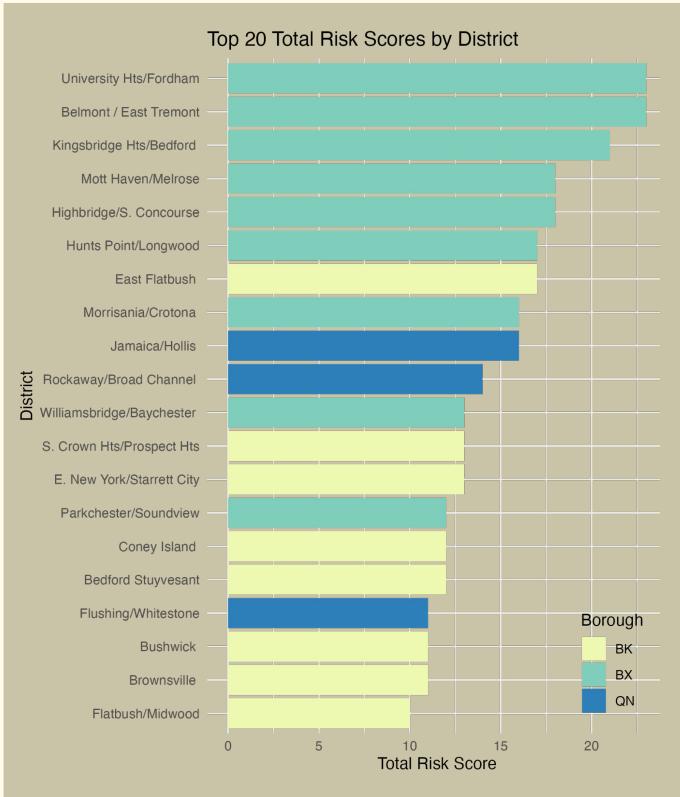
Collection Method:

- NYC Department of Health and Mental Hygiene (DOHMH).
- Census American Community Survey (ACS) 2021 5-Year Estimates.
- U.S. Department of Housing and Urban Development (HUD).
- New York State Office of Court Administration (OCA).
- NYC HPD Housing Maintenance Code Violations.
- Housing Data Coalition and Development Data Book.
- ^ aggregated by the Association for Neighborhood & Housing Development (ANHD).

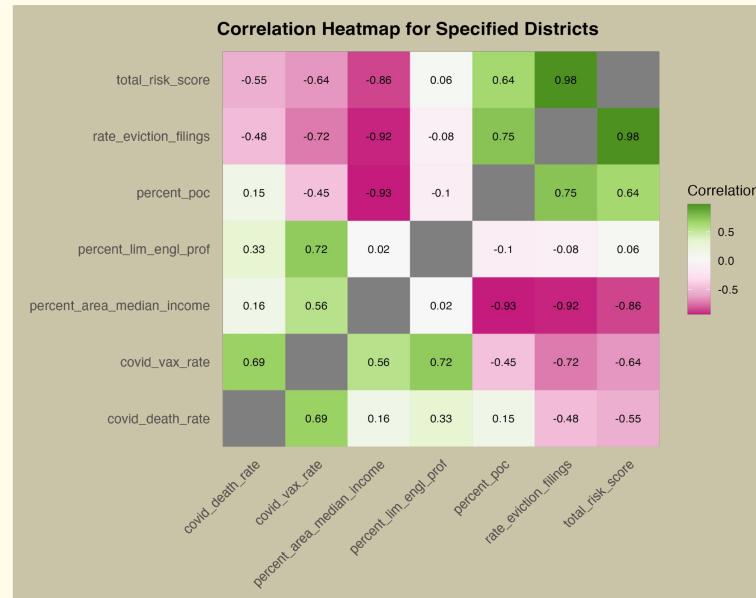
Features:

- Community district: borough, neighborhood.
- COVID-19 risk & impact: vax rate, death rate, uninsured, severe crowding.
- Demographics: AMI, PoC, limited English proficiency.
- Housing risk: rent burden, eviction filings, tenant-initiated cases, hazardous housing code violations, unplanned service outages, median gross rent, sale price, non-affordable units, expiring units, foreclosure filings, home purchase loans.

METHODOLOGY

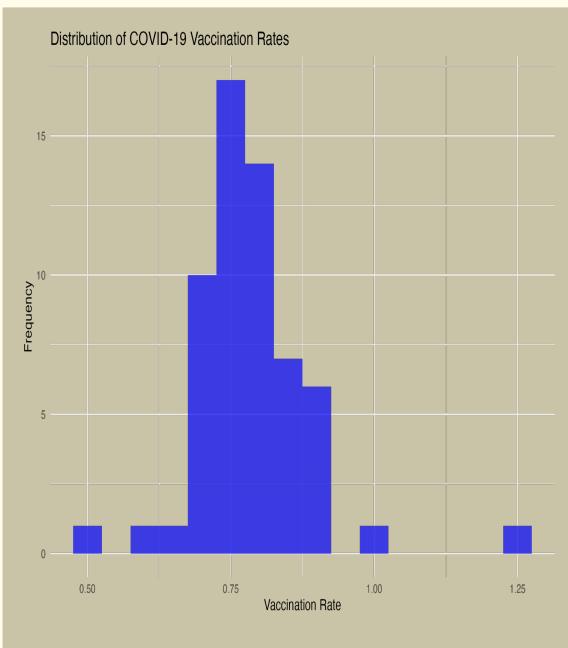


- Basic categorical and numerical transformations
- Contextualized continuous variables (percent AMI, severe crowding, percent rent burden)



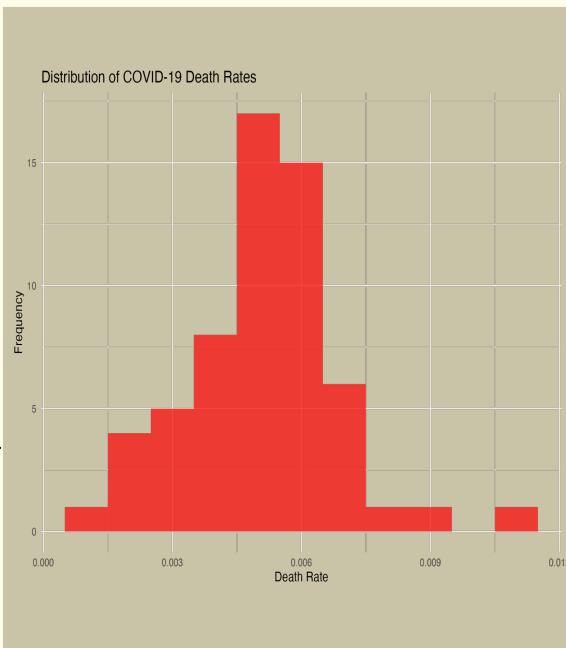
Top Districts and Housing Risk: Key Public Health and Socioeconomic Insights

Overview of Public Health Metrics

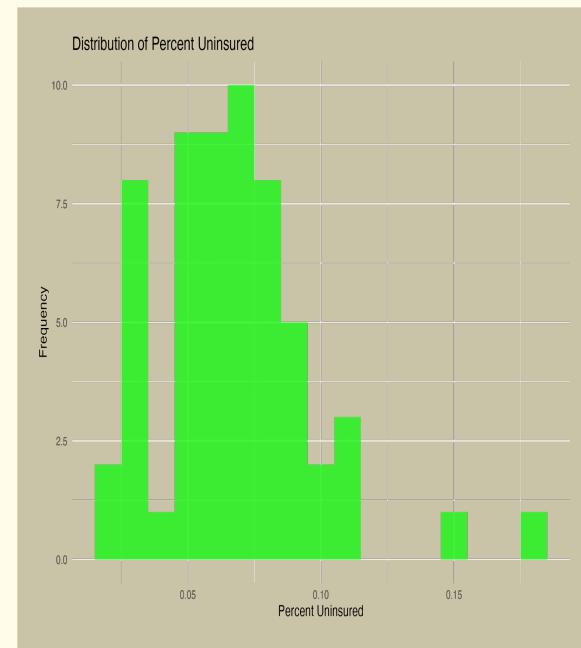


**VACCINATION
RATE DISTRIBUTION**

DEATH RATE DISTRIBUTION



**UNINSURED
PERCENT
DISTRIBUTION**



Differences in Housing Risk Scores by Vaccination Rates¹⁰

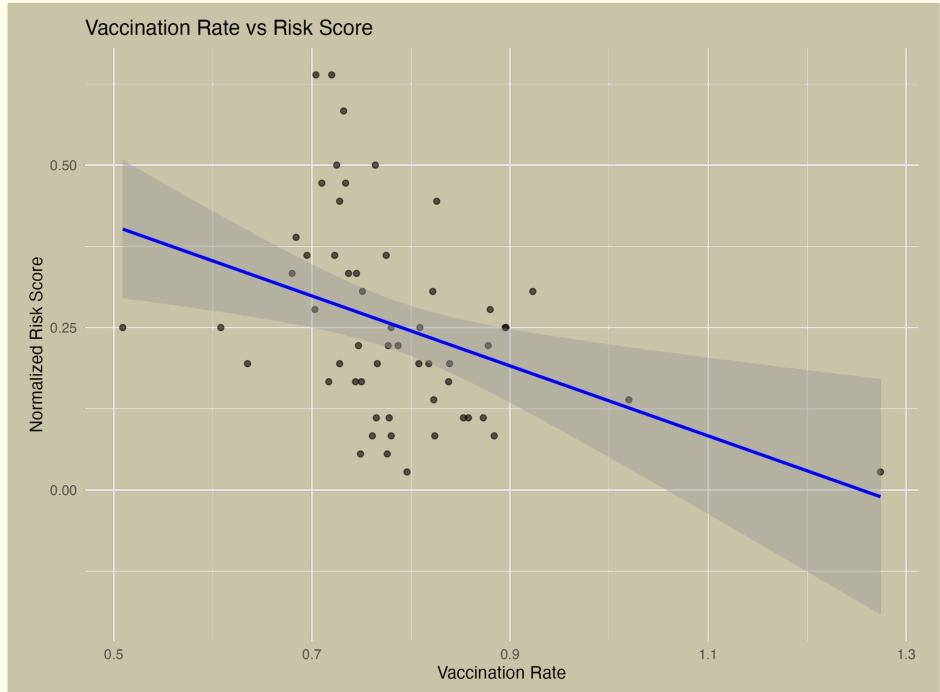
A Welch Two Sample T-Test indicates a **significant difference** between the two groups.

- **t-value:** -4.0846
- **p-value:** 0.0001712
 - (significant at $p < 0.05$)
- **Confidence Interval:** [-0.2146, -0.0730]

Mean Risk Scores:

- Above Median Vaccination Rate: **0.179**
- Below Median Vaccination Rate: **0.323**

Districts with higher vaccination rates have **significantly lower housing risk scores**



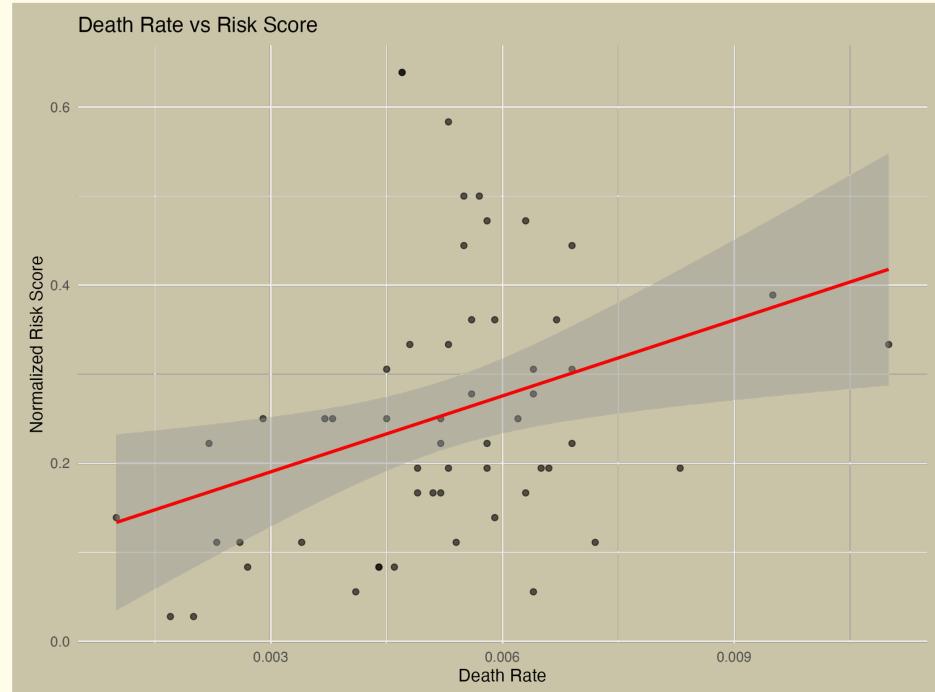
Differences in Housing Risk Scores by COVID-19 Death Rates¹¹

Correlation: Positive trend observed between death rates and risk scores.

- Higher death rates correlate with higher housing risk scores.
- Indicates vulnerabilities tied to socioeconomic factors or healthcare disparities.

Statistical Insights:

- Areas with poor healthcare outcomes (e.g., high death rates) often overlap with housing-related challenges.



Differences in Risk Scores by Uninsured Percent Groups¹²

Degrees of Freedom (Df):

- Between Groups: 2
- Residuals: 53

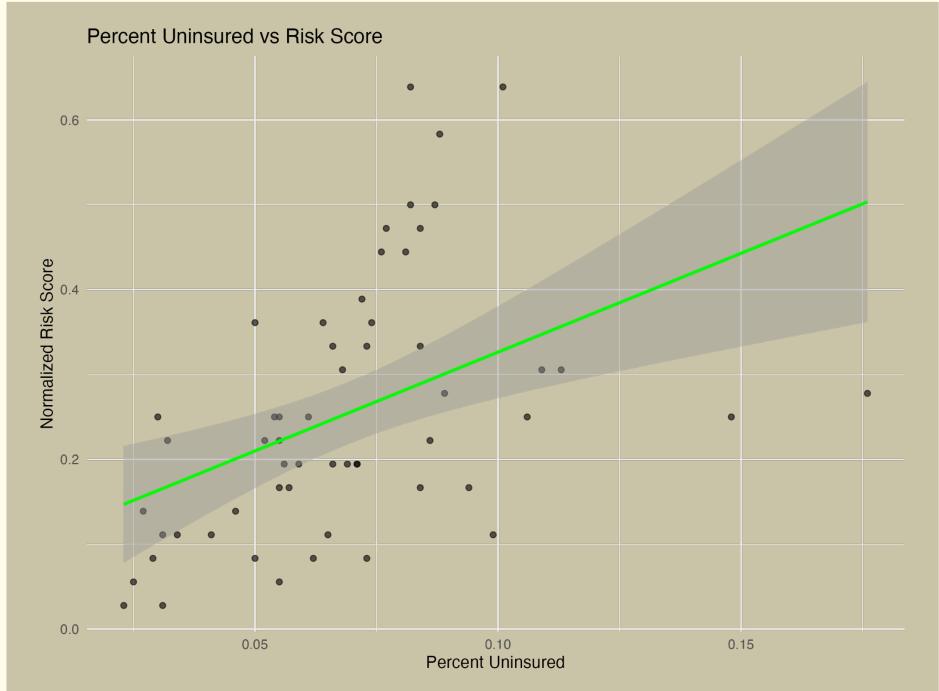
F-value: 13.92

p-value: 1.39e-05 (significant at $p < 0.001$)

Variance Explained:

- Between Groups: 0.4326
- Residuals: 0.8237

ANOVA results showed districts with higher vaccination rates have **significantly lower housing risk scores.**



Vulnerable Districts with High Housing Risk Scores

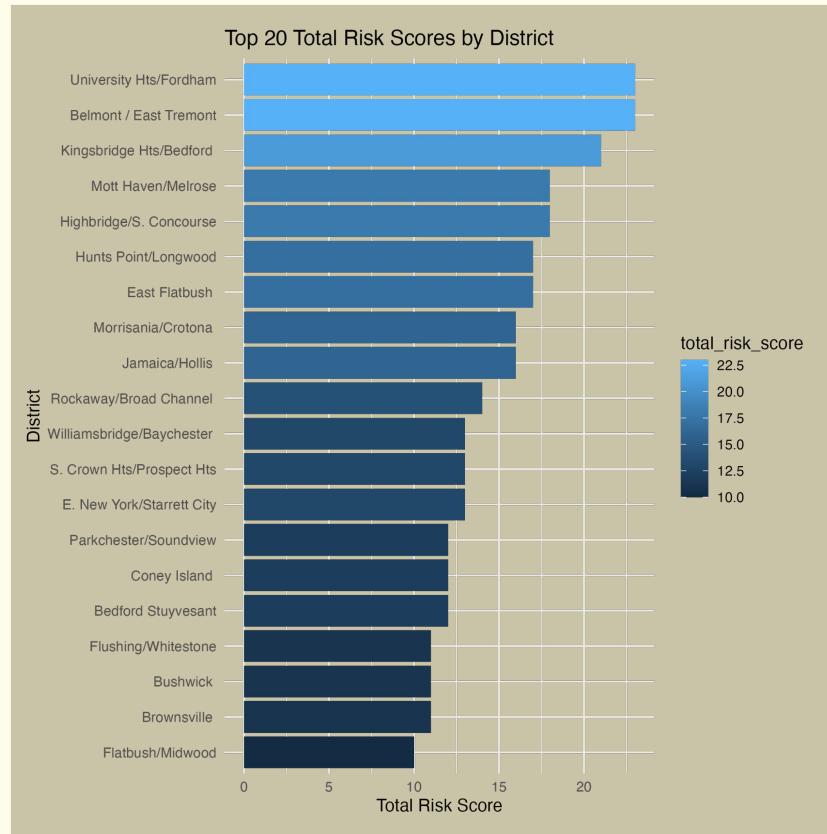
13

- **Top 5 Most Vulnerable Districts:**

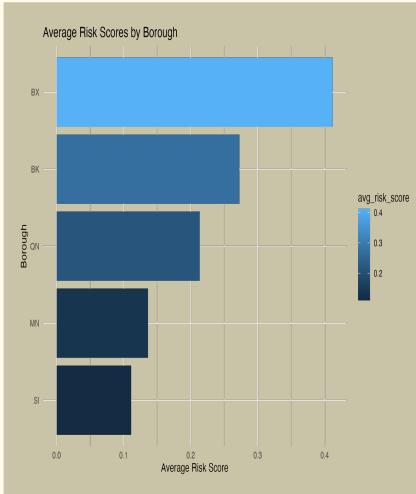
- University Heights/Fordham
- Belmont/East Tremont
- Kingsbridge Heights/Bedford
- Mott Haven/Melrose
- Highbridge/S. Concourse

- **Commonalities Among Top Districts:**

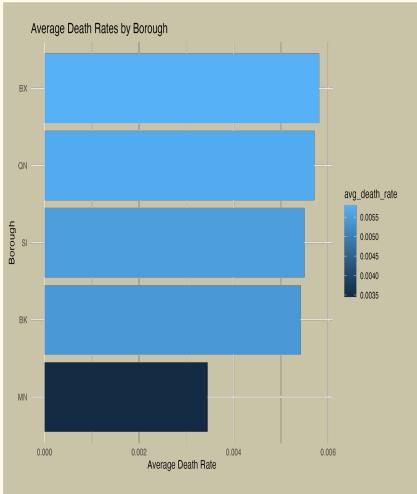
- Higher percentages of uninsured individuals.
- Lower vaccination rates and higher death rates.
- Concentrated in boroughs like the Bronx.



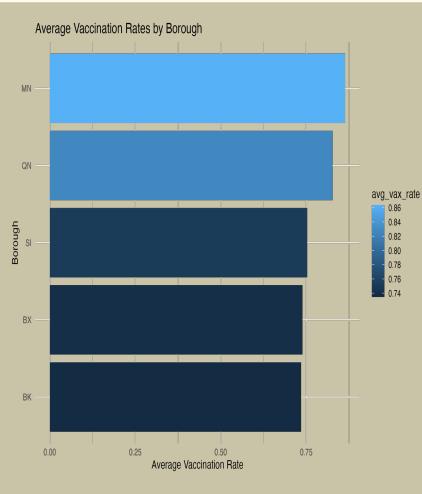
Borough-Level Public Health Trends



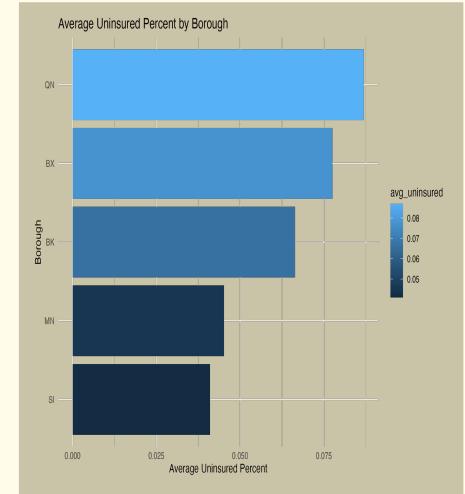
Risk Scores by Borough



Death Rates by Borough



Vaccination Rates by Borough



Uninsured Percent by Borough

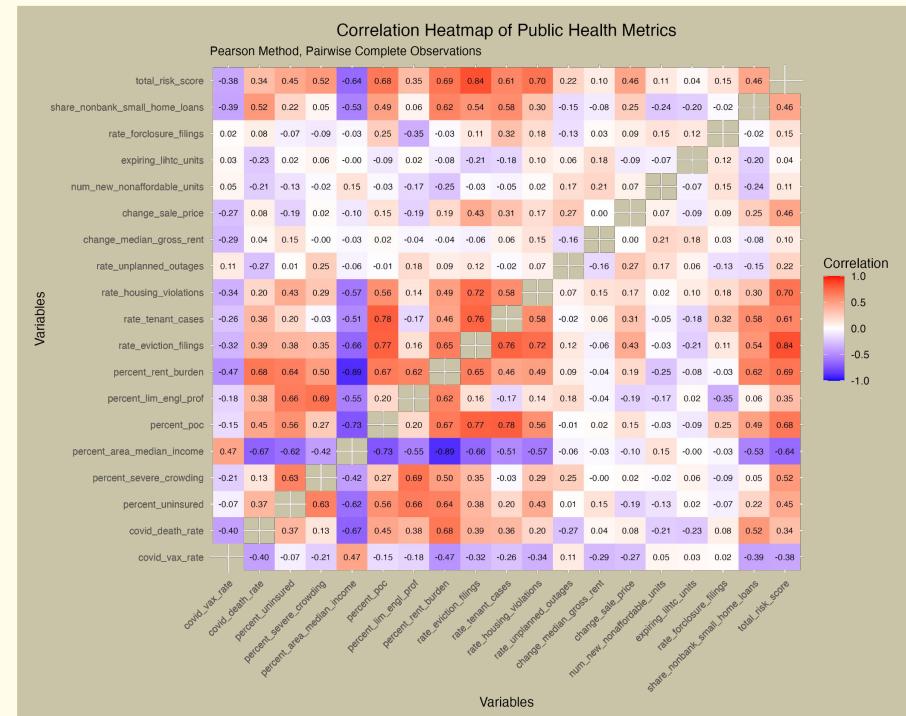
Correlation Analysis of Housing Risk and Public Health Metrics

Positive Correlations:

- Crowding and Rent Burden ($r \approx 0.69$):**
Higher crowding aligns with greater rent burdens.
- Limited English Proficiency and Housing Violations ($r \approx 0.56$):** Language barriers correlate with housing code violations.

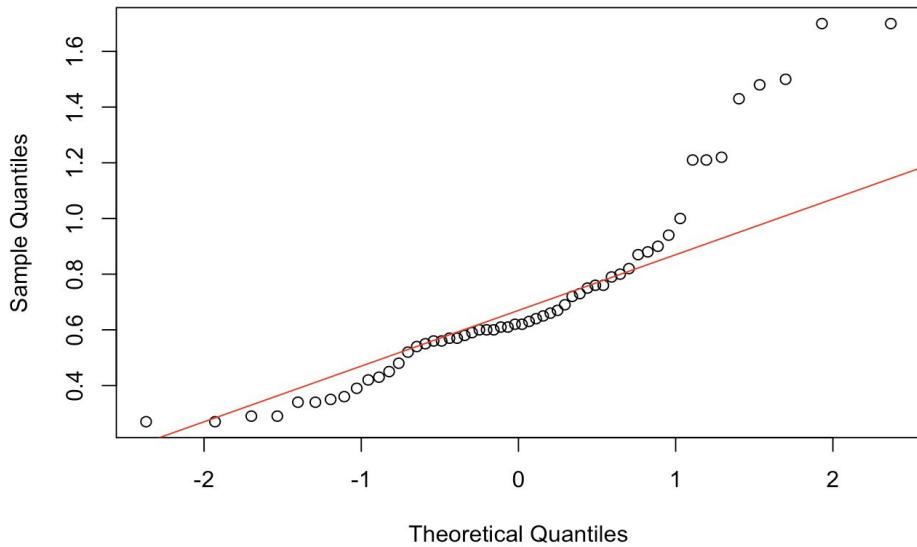
Negative Correlations:

- Vaccination Rate and Housing Risk ($r \approx -0.38$):** Higher vaccination rates relate to reduced risk scores.
- Crowding and Rent Burden ($r \approx -0.73$):**
Higher rent burden areas show less crowding.

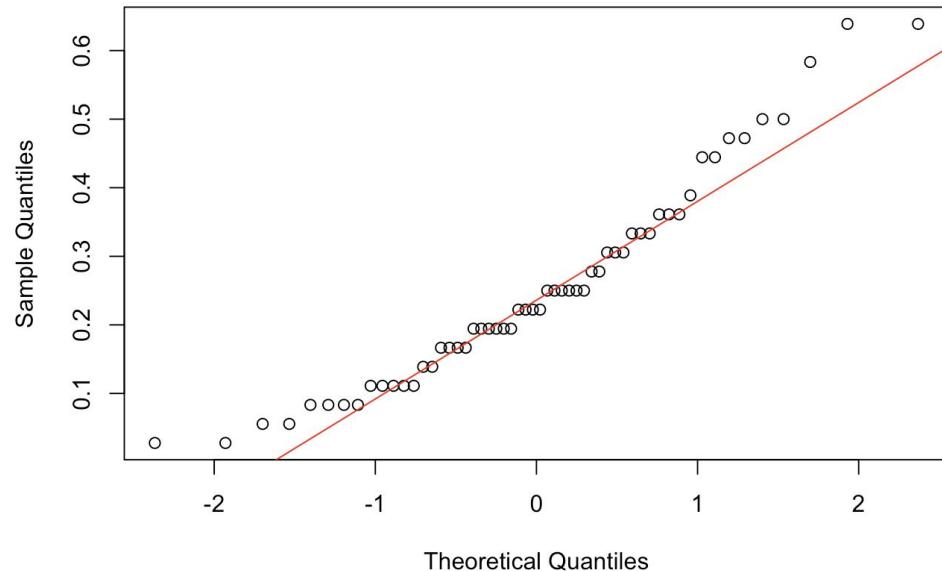


Area Median Income & English Proficiency & POC Rate vs. Housing Risk

Q-Q Plot of Area Median Income



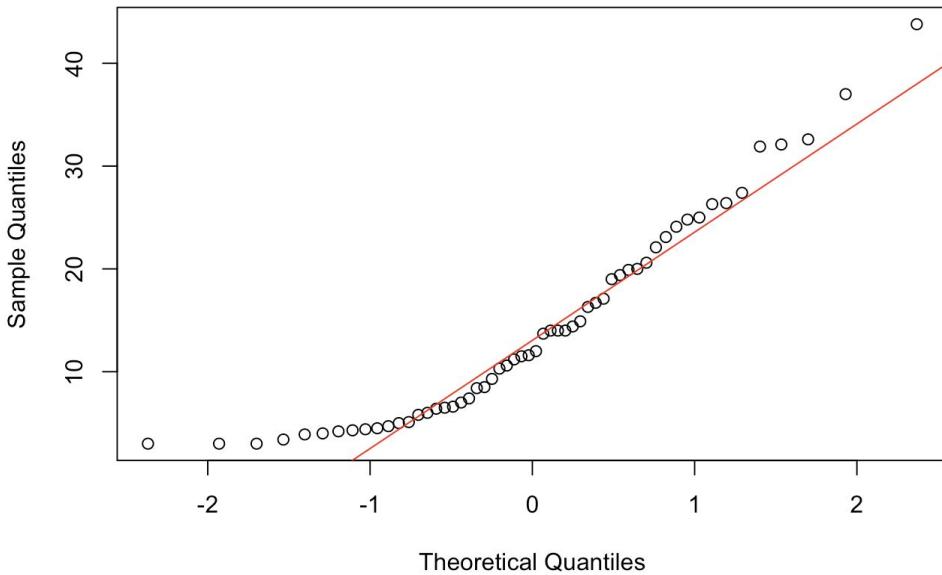
Q-Q Plot of Housing Risk



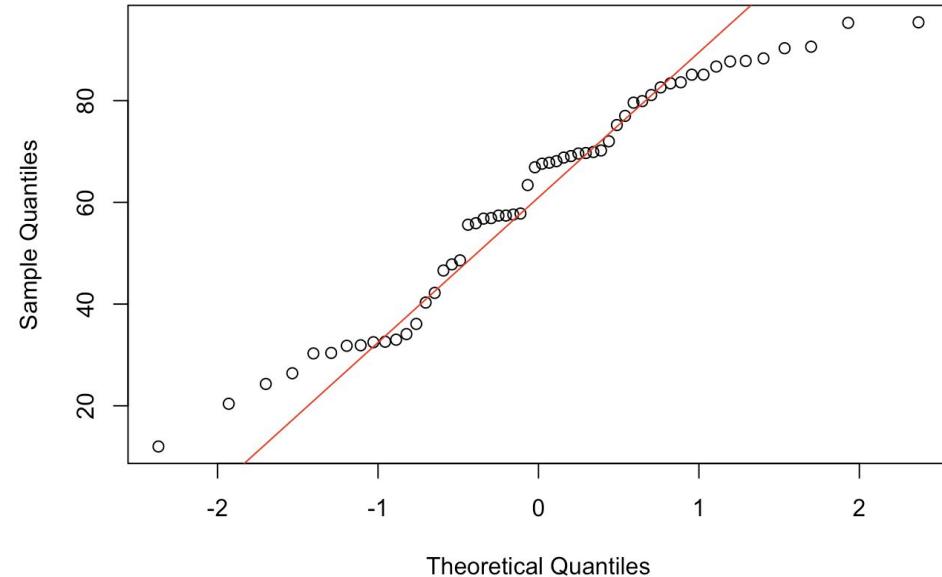
Shapiro-Wilk Normality Test
 $p = 2.272e-05$

Shapiro-Wilk Normality Test
 $p = 0.009323$

Q-Q Plot of English Proficiency Rate



Q-Q Plot of People of Color



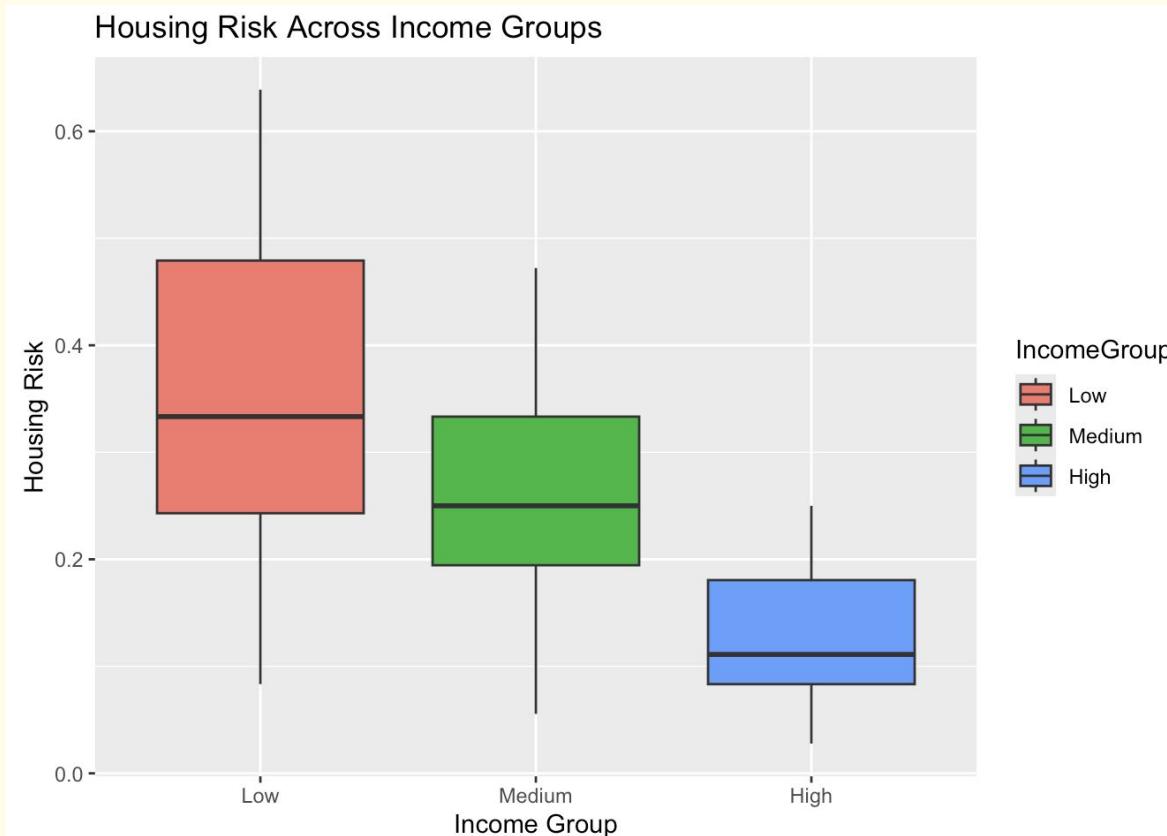
Shapiro-Wilk Normality Test
 $p = 0.0004641$

Shapiro-Wilk Normality Test
 $p = 0.01567$

Area Median Income vs. Housing Risk
English Proficiency vs. Housing Risk
People of Colour (%) vs. Housing Risk

- **Null Hypothesis:** The housing risk is the same across varying factor levels.
- **Alternative Hypothesis:** The housing risk differs among varying factor levels.

Area Median Income vs. Housing Risk



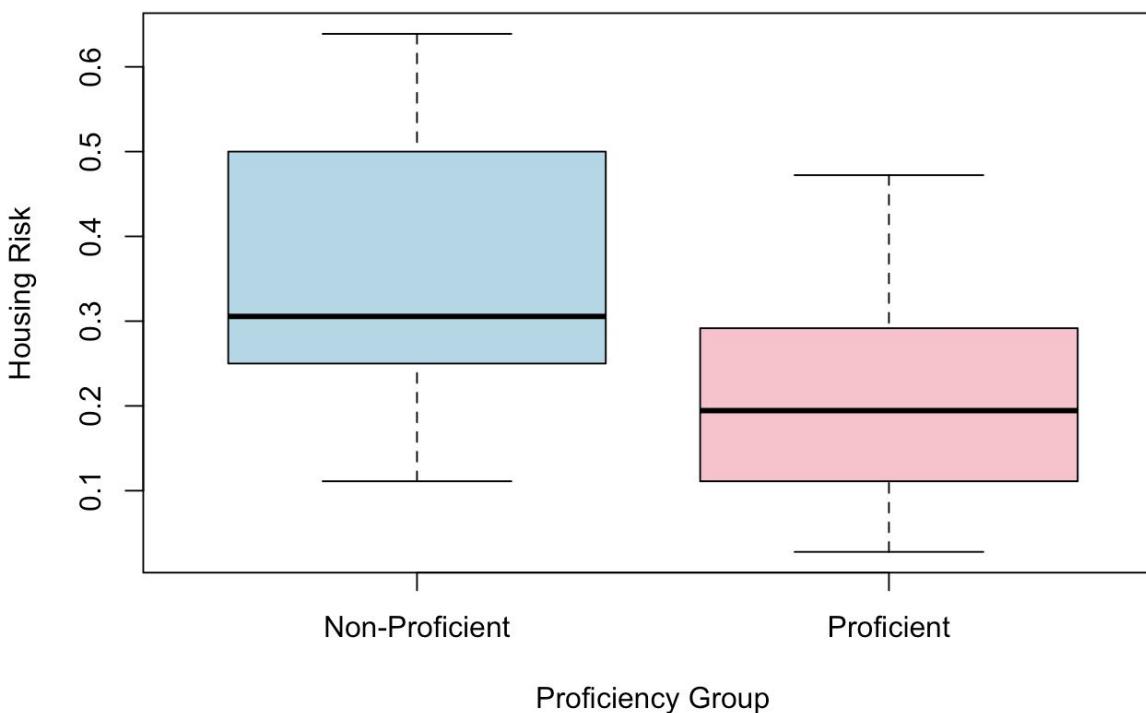
Spearman Test:

Rank Correlation
(rho) = -0.7218774

P = 3.425e-10

English Proficiency vs. Housing Risk

Housing Risk by English Proficiency Group

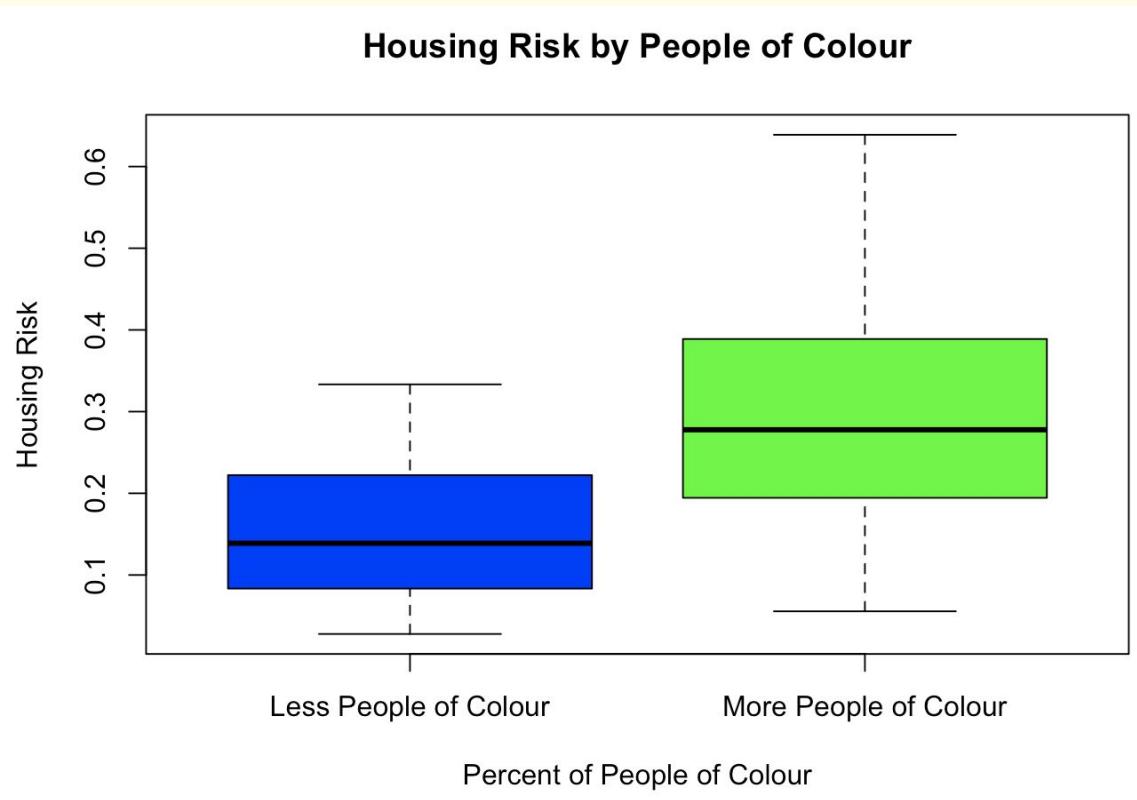


Spearman Test:

**Rank Correlation
(rho) = 0.3628804**

P = 0.005984

People of Colour (%) vs. Housing Risk



Spearman Test:

Rank Correlation
(rho) = 0.6938078

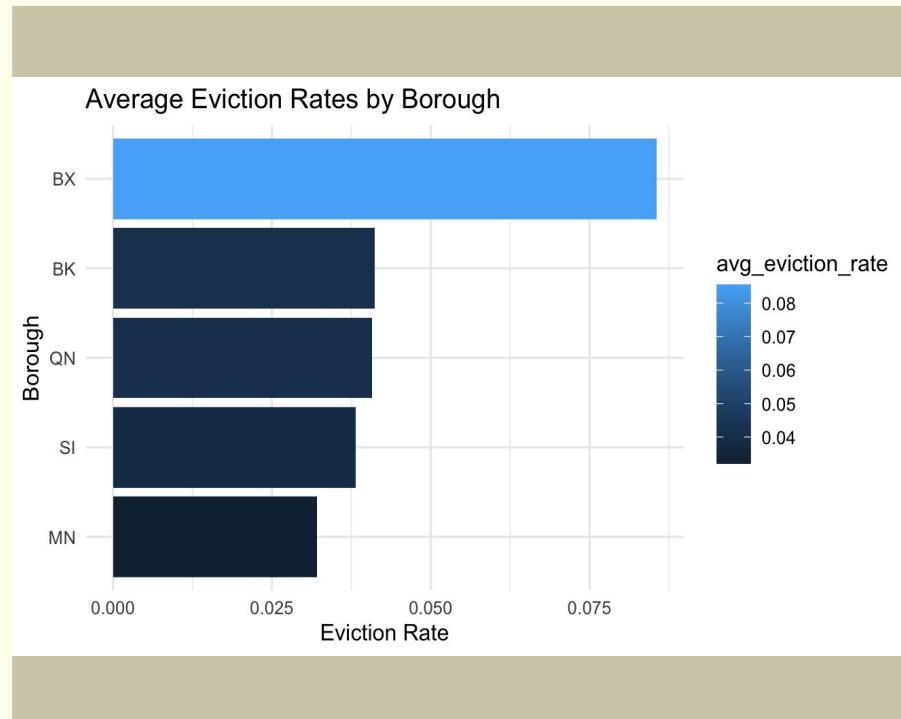
P = 3.06e-09

Unstable Housing - Evictions

Chi Square Test:
 $P = 0.0005828$

Statistically significant association
 between eviction rate categories
 and boroughs.

	BK	BX	MN	QN	SI
Low	3	0	5	0	0
Medium	10	1	4	10	2
High	5	11	3	4	1

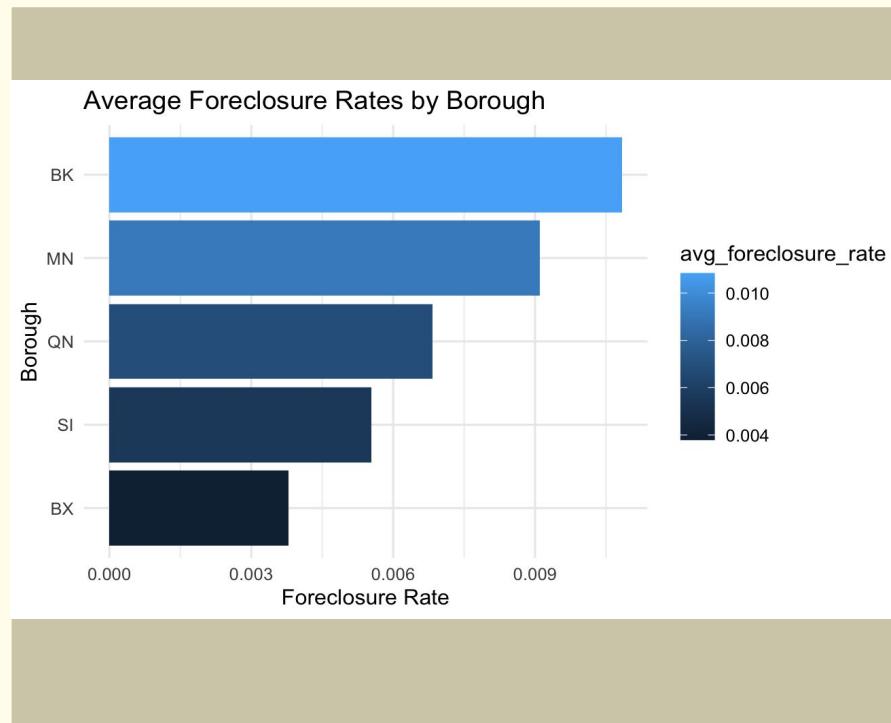


Unstable Housing - Foreclosures

Chi Square Test:
 $P = 0.04619$

Fisher Test:
 $P = 0.0264$

Category	BK (Brooklyn)	BX (Bronx)	MN (Manhattan)	QN (Queens)	SI (Staten Island)
Low	4	9	3	6	2
Medium	5	3	2	5	1
High	9	0	6	3	0



Next Steps

Incorporating code violations and complaints features through a NYC housing database on [github](#) & [eviction lab](#)

Impacts of gentrification and increase rent and property costs

Incorporating an map visualization with key statistics by borough

Conclusion

Interdependence of Risk Factors

Risk factors contributing to housing insecurity are interconnected, making it challenging to address them in isolation.

Geographic Concentration of High-Risk Areas

Boroughs such as the Bronx, Queens, and Staten Island consistently exhibit elevated risk levels

Systemic Complexity of Housing Insecurity

Addressing housing insecurity requires a systemic approach.

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Any Questions?

All data processing and statistical analysis code,
in-depth interpretations and figures can be
found in this projects' [github](#)