

Eviction and Census Data Analysis in Texas (2020-2023)

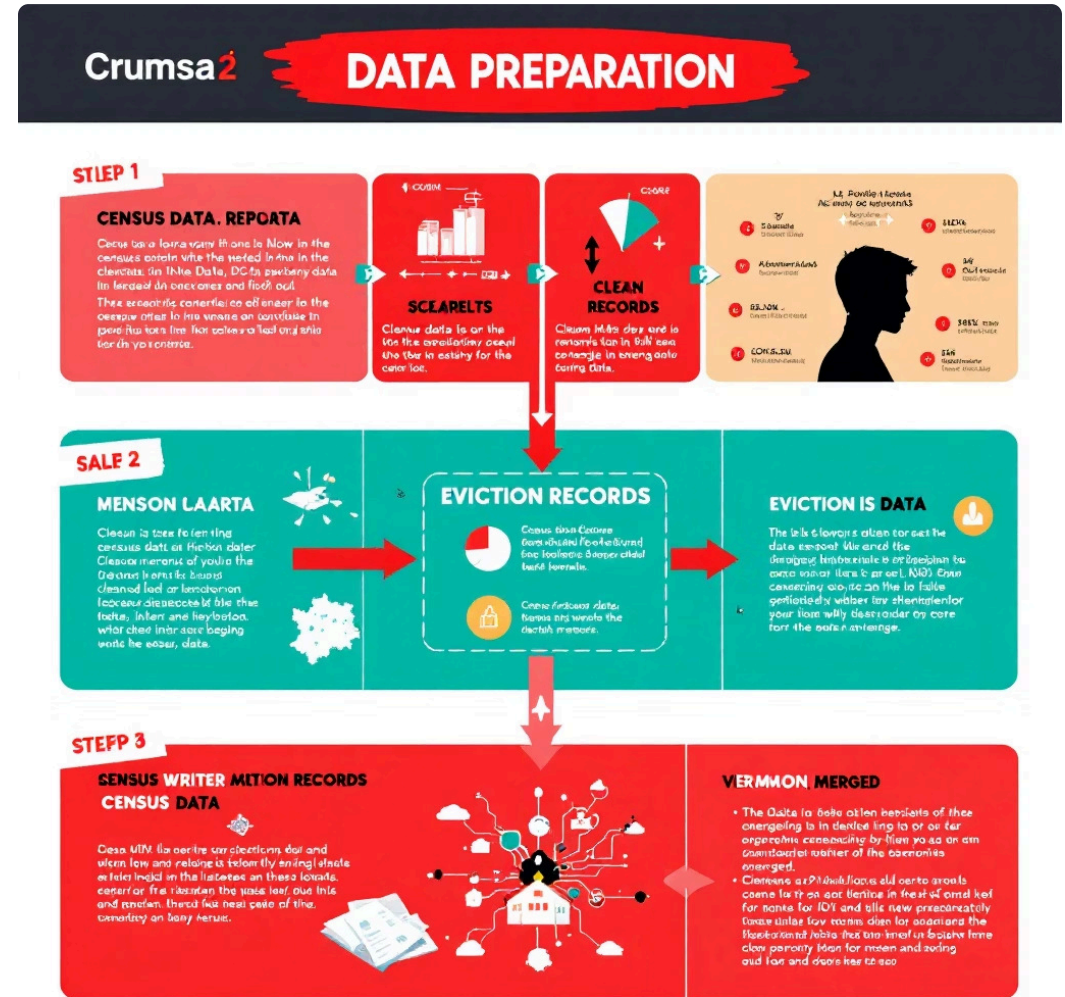
An executive analysis of eviction filings across Texas census tracts, examining socioeconomic and racial disparities using U.S. Census data (2017-2023) and monthly eviction filings (2020-2023).

Data Sources and Preparation

Primary Data Sources

- Census Data (2017-2023): Demographic and socioeconomic indicators at census tract level
- Eviction Data (2020-2023): Monthly filings per census tract
- Shapefile (2021): Texas census tract geometries for mapping

Data were cleaned to remove placeholders (e.g., -888888888) and imputed using medians for fields with <5% missingness. All GEOID fields were converted to strings for proper joins.



Feature Engineering

1

Eviction Rate per 1k Residents

$(\text{filings_avg} / \text{Total Population}) * 1000$

2

Pct Renter x Poverty

$\text{Renter Occupied (\%)} * \text{Poverty Rate (\%)} / 100$

3

Pct Uninsured x HS or Less

$\text{Uninsured (\%)} * \text{HS or Less (\%)} / 100$

4

Poverty to Education Ratio

$\text{Poverty Rate (\%)} / \text{HS or Less (\%)} / 100$

Additional features included Youth Burden (Under 18% / Total Population), Female to Pop Ratio, and High Renter Flag (1 if Renter Occupied > 50% else 0). These features showed moderate to strong correlations with eviction rates.

Bias and Disparity Analysis

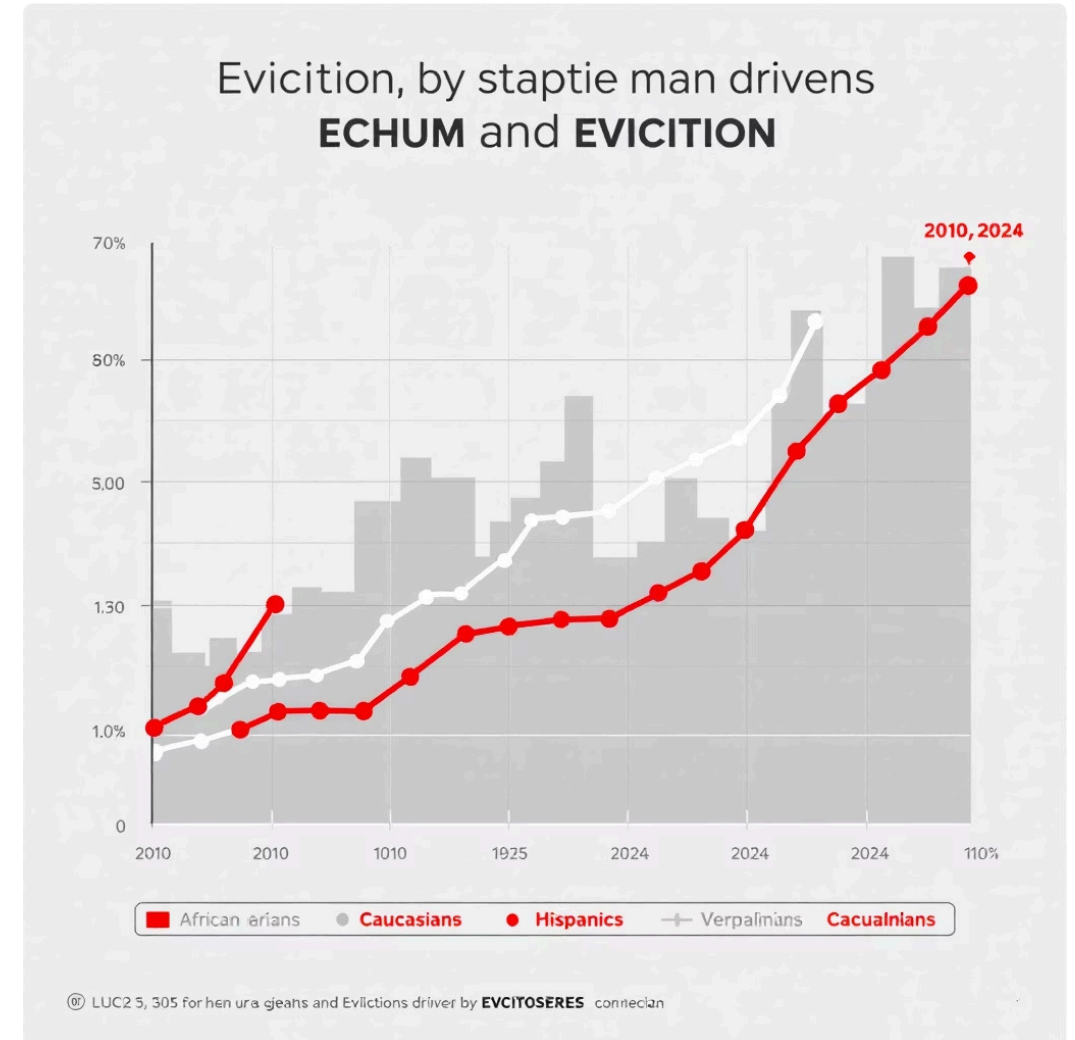
Majority Race	Eviction Rate/1k	Poverty Rate (%)	Uninsured x HS or Less
Black	3.59	22.8	16.68
Hispanic	1.09	21.0	11.81
White	0.86	8.3	5.52

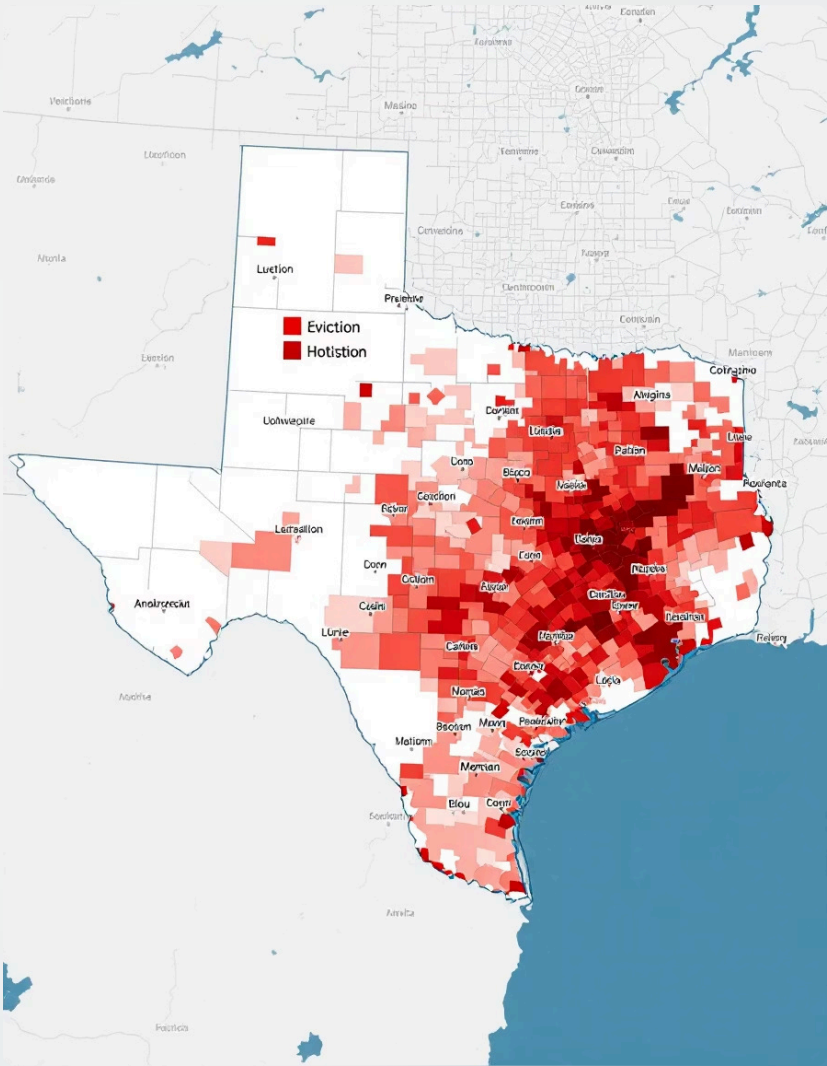
Insight: Eviction risk is disproportionately high in Black-majority tracts. The top census tracts by raw eviction filings exceeded 3,000 filings in 2020 alone. Vulnerability indicators are significantly elevated in Black and Hispanic tracts.

Temporal Trends (2020-2023)

Analysis of eviction rates from 2020 to 2023 revealed:

- Eviction rates peaked in 2022 across all racial groups
- Disparities persisted year-over-year, with Black-majority tracts consistently exhibiting the highest eviction rates
- Some reduction in filings was observed in 2023, possibly due to intervention programs or pandemic policy wind-down





Geospatial Visualization

Using Texas tract shapefiles, we developed:



Choropleth Maps

Visual representation of eviction rates across Texas census tracts



Interactive Maps

Tooltips displaying engineered metrics and racial demographics



County Rankings

2023 eviction rate averages by county

Modeling and Bias Detection

Bias Detection Metrics

- Group Mean Residual: Detects over/underprediction across racial groups
- Group MAE: Quantifies average error burden by group
- Residual Variance by Group: Higher variance → model behaves less reliably
- Disparate Impact: Mean prediction ratio (ideally close to 1)

Example Findings

Disparate Impact between "High Renter = 1" and "High Renter = 0" groups: 1.92

High-Risk Conditional Bias:

- High Renter = 1: +0.84
- High Renter = 0: +0.15

This suggests model underestimates risk for high renter communities in high-eviction tracts.

Drivers of Eviction Risk

Top Predictors (SHAP + Random Forest)

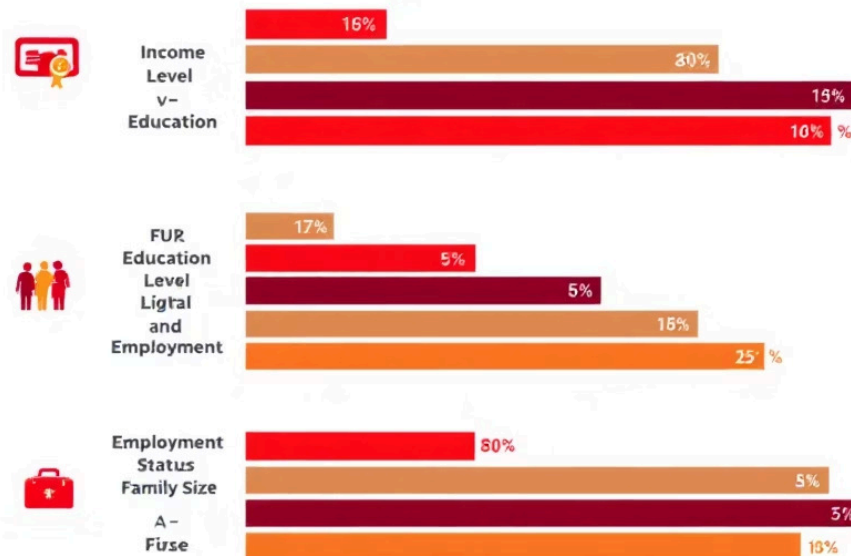
- Youth Burden
- High Renter
- Pct Uninsured x HS or Less
- Pct Renter x Poverty

Key Insights

- PDPs show non-linear effects, with some features acting as sharp thresholds
- SHAP confirms directionality: higher poverty or education burden drives eviction risk up
- These are generalizable, structural markers of vulnerability, not proxies for race

Socioeconomic Factors Influencing Eviction Risk

Socioeconomic factors influence eviction risk on the basis of the overall socioeconomic environment, the overall socioeconomic environment, and the fresh of over the manirind the scusers.



Fairness Evaluation Metrics

Metric	Majority Black	Majority Hispanic	Majority White	Mixed/Other
Mean Residual	+0.5971	-0.2465	-0.2829	-0.0064
Mean Absolute Error	0.9734	0.4545	0.5423	0.5559
Residual Variance	5.77	0.44	10.83	1.33

Additional metrics: Disparate Impact Ratio (Black/White): 4.18, Fairness-Penalized MSE: 3.83 (vs RMSE-only of ~3.33)

Interpretation: The model underestimates eviction risk for White and Hispanic tracts but consistently underperforms for Black-majority areas, both in magnitude and variance.

Conclusions and Next Steps

Key Findings

This analysis reveals systematic disparities in eviction exposure, with structural indicators such as poverty, renter density, and low education interacting strongly with racial composition.

These findings can inform fair housing initiatives, eviction prevention policies, and targeted outreach in vulnerable communities.

Next Steps

- Expand analysis to predictive modeling using temporal and structural features
- Integrate rental assistance and court intervention data
- Evaluate time-lag effects (e.g., 2022 conditions driving 2023 filings)
- Apply similar methodology to other states for comparative insights

Prepared by: Israel Vargas / ITESM - MNA | Date: 07/28/2025