Housing and Rate of Removal:

TAG Master Modelers

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Rakesh Arwini | Sri Harsha Pinninti | Samaksh Gulati | Cassidy Gasteiger

Outline

Problem Statement

Children who are removed from their homes experience worse social and economic outcomes than their peers

Thousands of children are removed each year at least in part due to inadequate housing

GOAL: Understand drivers of rate of removal of children from their homes into foster care, especially the relationship between rate of removal for inadequate housing, community housing data, and agency behavior, to help agencies identify what types of housing support could keep children in their homes.

Literature Review

47%

Of families who have a child removed from their home have trouble paying for basic necessities

10%

Of removals nationwide are at least partly attributable to inadequate housing

30%

Of failed reunifications are due at least in part to a lack of safe housing

Key Takeaways

- Poverty and economic disadvantage make families more vulnerable to child protection intervention
- Black, Hispanic, and Native families are at higher risk of interaction with the child welfare system than their white and Asian peers
- Past regression analyses show clear links between supportive social welfare measures and improved child outcomes, including higher rates of reunification and lower rates of interaction and removal
- Housing is a critical piece of that social welfare puzzle – right now, the foster care system is bearing the burden of America's affordable housing crisis
- Beyond easy-to-measure variables, individual agency behavior has a huge impact on child outcomes

Potential for Impact

Identify highest-impact factors on rate of removal to target interventions

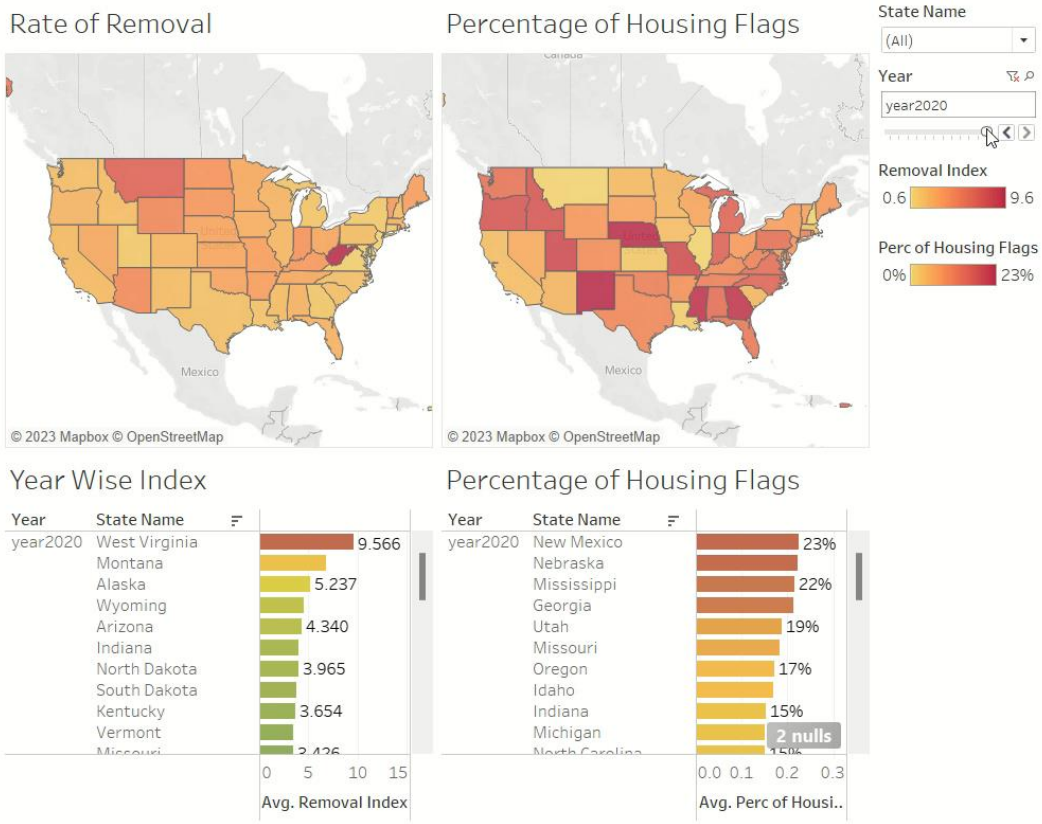
Identify regions with highest housing-related removal rates to target interventions

Reduce taxpayer costs by reallocating funding from foster care to housing support

Keep more families together and help more children thrive

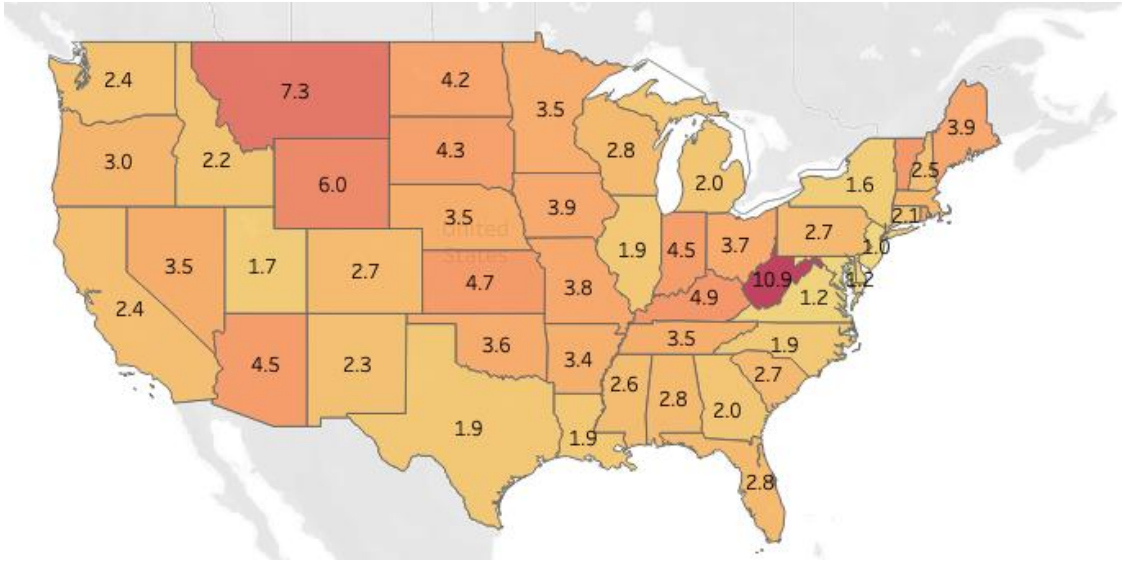
Outline

AFCARS Data Dashboard



Source:
2010 - 2020 AFCARS data
US Census data

2019 Rate of Removal by State

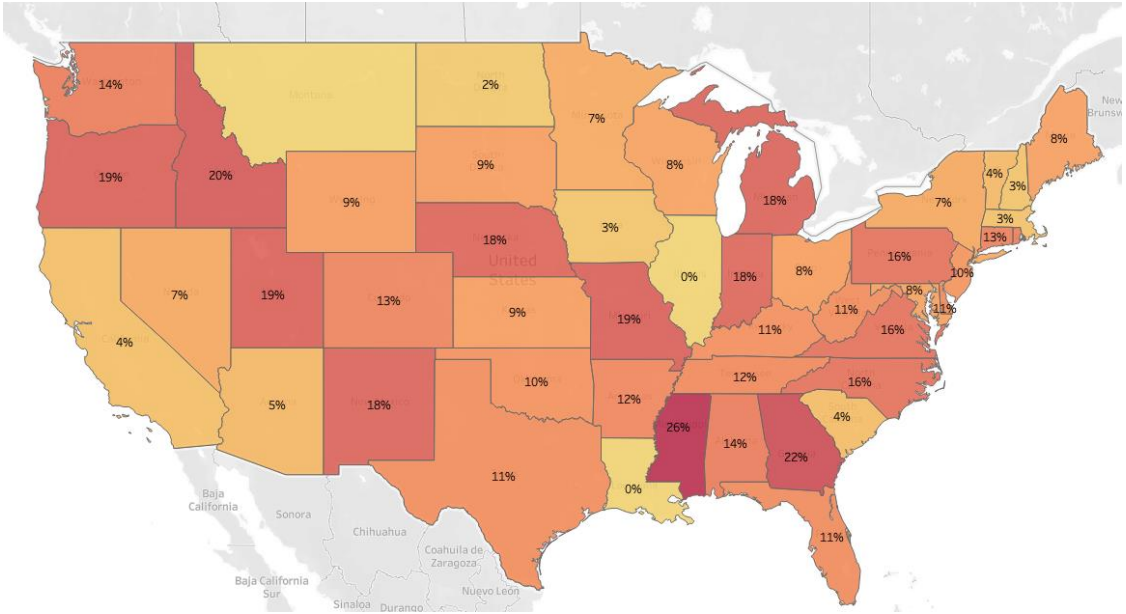


Initial Insights

- Wealthier states like New Jersey and New York tend to have lower rates of removal, while poorer states like Kentucky, Wyoming, and West Virginia have high rates
- There are exceptions (Louisiana, Georgia) that are ripe for deeper exploration

Source:
2019 AFCARS data
2019 US Census data

Percentage of Removals with Housing as a Factor in 2019



Initial Insights

- Housing is rarely the only flag associated with removals
- States with high rates of removal don't necessarily have high rates of housing-related removals (West Virginia, Wyoming)
- Some states have no housing-associated removals at all: we can explore what housing-supportive mechanisms they have available

Source:
2019 AFCARS data

Rates of Removal and Housing Flag

	High % of Housing Flags	Low % of Housing Flags
High Rate of Removal	West Virginia, Wyoming, Kentucky, Kansas, Indiana, South Dakota	Hawaii, North Dakota, Massachusetts, Iowa, Arizona, Vermont, Minnesota
Low Rate of Removal	Georgia, Utah, Michigan, Idaho, New Mexico, Washington, Mississippi, Colorado	Louisiana, Illinois, California, South Carolina, New York, Wisconsin, Maryland

Removal Flags that Appear Most Often with Inadequate Housing

Neglect
71.5%

Drug Abuse
51.6%

Inability to Cope
19.3%

Parent in Jail
11%

Initial Insights

- Housing appears as the only flag for removal in only 7.8% of housing-related cases
- However, alleviating the housing burden for families living in poverty has the potential to alleviate other stressors like access to food and monetary and emotional stress, thereby reducing incidents of other removal flags like neglect and inability to cope

Source:
2019 AFCARS data

Housing-Related Removals and Rent Burden

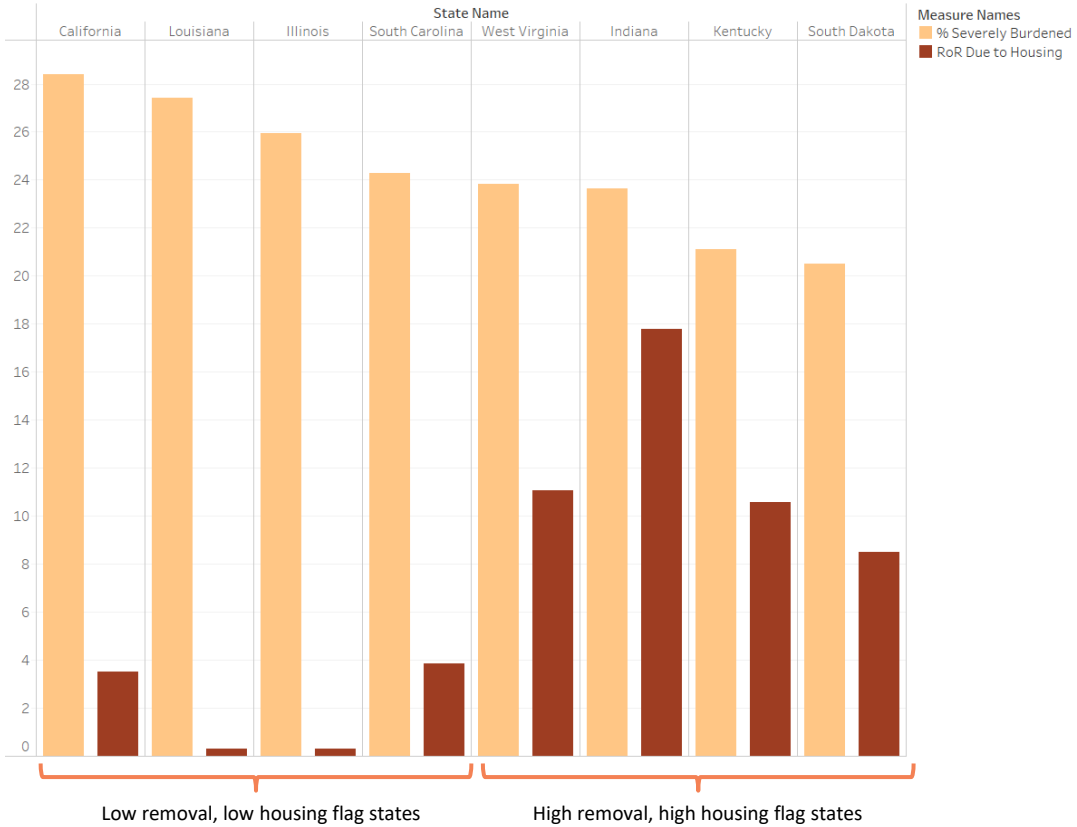


Chart Explanation

Percent of severely burdened renters by state (defined as spending more than 50% of income on rent) against percent of housing-linked removals in 2019

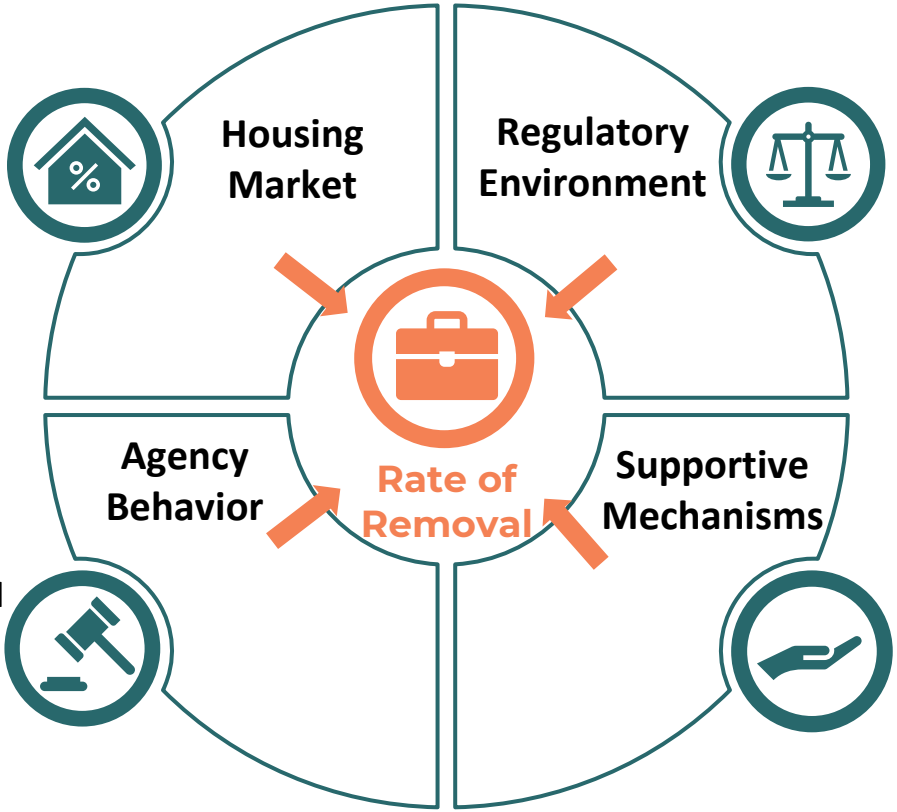
Initial Insights

- There is not a clear and obvious link between housing-linked removals and high rent burden; states with low removal have higher housing burdens than all of the high-removal states
- This confirms the importance of external factors in rate of removal that may be more difficult to measure that we'll need to explore in our modeling and analysis

Source:
2019 AFCARS data
Harvard Joint Center for Housing Studies

Housing Impacts on Rate of Removal

- Eviction rate
- Housing Affordability Index
- Price to income ratio



- Standards for adequate housing
- Regulations on removal for housing-related reasons

- Agency philosophy
- Caseworker approach and recommendations
- Court system behavior

- Availability of housing resources
- Accessibility of those resources

Outline

Level of Analysis

Cross Cutting: At every level of analysis, we will test both population-wide metrics and metrics by race to understand how long-standing biases in child welfare and housing systems impact our findings

Preferred Approach

Our preference is to conduct a nation-wide, county-level analysis of Rate of Removal and associated factors to provide **more granular recommendations** and account for **wide variability in housing markets across states**

Data Availability

However, AFCARS data we accessed for exploratory analysis does not include county FIPS codes for counties with less than 1,000 cases to preserve child and family anonymity (only ~150 counties were explicitly listed)

Our Plan

If we have access to county-level data in Round 2, we will conduct a county-level analysis; otherwise, we'll aggregate at the state level and include more detailed analysis for the ~150 counties with available data

Methodology Selection

Data Cleaning and Feature Engineering

- Remove missing values and outliers
- Remove variables with high collinearity
- Combine relevant internal and external features to capture demographic and housing data
- Split into training and testing sets

Modeling

- Regression models identify linear relationship between dependent and independent variables, and can determine factors driving removal rate
- Random forest models identify non-linear relationships and provide feature importance for factors driving rate of removal
- ARIMA models track trends over time and test for significant changes

Evaluation

- Evaluate performance using metrics like mean squared error and R-squared
- Compare results of both models to identify factors driving rate of removal in each area
- Apply results to inform advocacy and policy development strategies

Modeling Pipeline

Variable Importance	Trend Analysis	Clustering Analysis	Case Studies
Determine contribution of key variables to housing-linked Rate of Removal	Assess if and how variable importance has changed over time	Assess what we're missing: how much can't we explain with the easy-to-measure variables?	Do a deeper dive into counties with low and high housing-linked RoRs to understand differences

Variable Importance Analysis

Goal

Understand which variables are most predictive for housing-linked Rates of Removal

Significance

Identify easily-explainable variation between counties

Understand impacts of the local housing market on housing-linked removals

Data

- AFCARS data
- Eviction rates
- Housing Affordability Index
- Rates of owner and rental burden
- Housing-to-income ratios
- Presence of regulations forbidding removal based on inadequate housing
- Funding allocated for supportive housing

Method

- Identify the top variables using Regression and Random Forest models
- For instance, a model may find that the number of evictions, median household income, and the percentage of homes with lead-based paint are critical factors

Trend Analysis

Goal

Understand how variable importance has changed across years

Significance

COVID-19 impacts may be significant

Many agencies have changed their approach to removal for housing in recent years: data is just catching up

Data

AFCARS data

Variable importance findings

Method

- An ARIMA model can be used to examine how the importance of different variables changes over time
- By analyzing the trend of variable importance over several years, policymakers can identify emerging patterns and make adjustments to policies and interventions accordingly.

Clustering Analysis

Goal

Cluster counties based on their similarity

Ex: Low-removal, Medium-removal, High-removal with high population density, High-removal with low population density

Significance

By identifying clusters, we can begin to explore the underlying factors that may be contributing to high removal rates in certain areas. For example, we might investigate the impact of housing policies, poverty rates, or job opportunities in each cluster of states to identify strategies for reducing removal rates

Data

AFCARS data

Socio-Economic Factors from US Census Bureau

Method

- Preprocess data to calculate the removal rate per 1,000 people for each state
- Apply k-means clustering algorithm, specifying that we want four clusters
- The algorithm assigns each state/county to one cluster based one to other states in the cluster, and repeats until it converges on a set of clusters that maximizes similarity within each cluster and minimizes similarity between clusters

Case Studies

Goal

Understand supportive factors in place in counties with low affordability and low housing-linked Rates of Removal; and understand possible reasons for counties with the highest housing-linked RoRs

Significance

Provide models for future advocacy

Identify counties and/or states most in need of supportive housing resources and additional advocacy

Data

Findings from Steps 1 – 3

Availability of housing-supportive resources (i.e., vouchers, presence of local housing agencies, funding allocations)

Accessibility scores of those housing-supportive resources (i.e., how easy they are to navigate and access)

Method

Since data is unlikely to be readily available in tabular form, we will explore county- and state-level web sites and conduct interviews with selected county officials. If tabular data is available, we will include housing resource features in our regression modeling.

Outline

Deployment

Refreshed Model

The variable importance and clustering analysis can be easily refreshed to add new years of data by updating the database and re-running the code

Future Additions

NCHCW will have full control over the database and its password to share with other researchers who can easily add and explore additional variables

Initial Findings

We will share initial findings and relevant code files to re-run models with client, including ReadMe file with instructions to reproduce results

Database Storage

We will combine all features in open-source, password-protected database that's easy to update and query (rather than static csv files)

Application of Results

Analytical Outputs	Use Case
Ranking of most impactful variables for RoR	Understand **where to focus advocacy** to invest resources by understanding which variables have the greatest impact on keeping families together
Trend analysis and graphs of how these variables have changed over time	Understand if and how housing-linked removals have changed with changes in local housing markets to **predict and recognize** the market changes that are most likely to impact rates of removal before they get worse
Cluster results for most-similarly-behaved counties (and/or states)	Understand **which counties** are most likely to have highly supportive housing mechanisms and which counties most need additional supports
Results of latent variable analysis via case studies	Understand what housing-supportive mechanisms are **working** in places with challenging housing markets but low housing-linked removal rates to **promote them** in struggling counties or states

Conclusions

Our methodology will provide a flexible, customizable set of models to support the National Center for Housing and Child Welfare in its mission to ensure children are never placed into foster care because their parents can’t access decent housing

An analytical approach will help prove what we already know: supportive housing mechanisms can help keep more families together

References

Child Welfare References

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