



MAP Talk

"A Profile-Based Approach to Indexing
Housing Vulnerability in Tucson:
A Case Study of Manufactured Housing"

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Manufactured Housing Gap

PROMISE

MH is not an inherently marginal form of housing

{ **MH Gap** }

REALITY

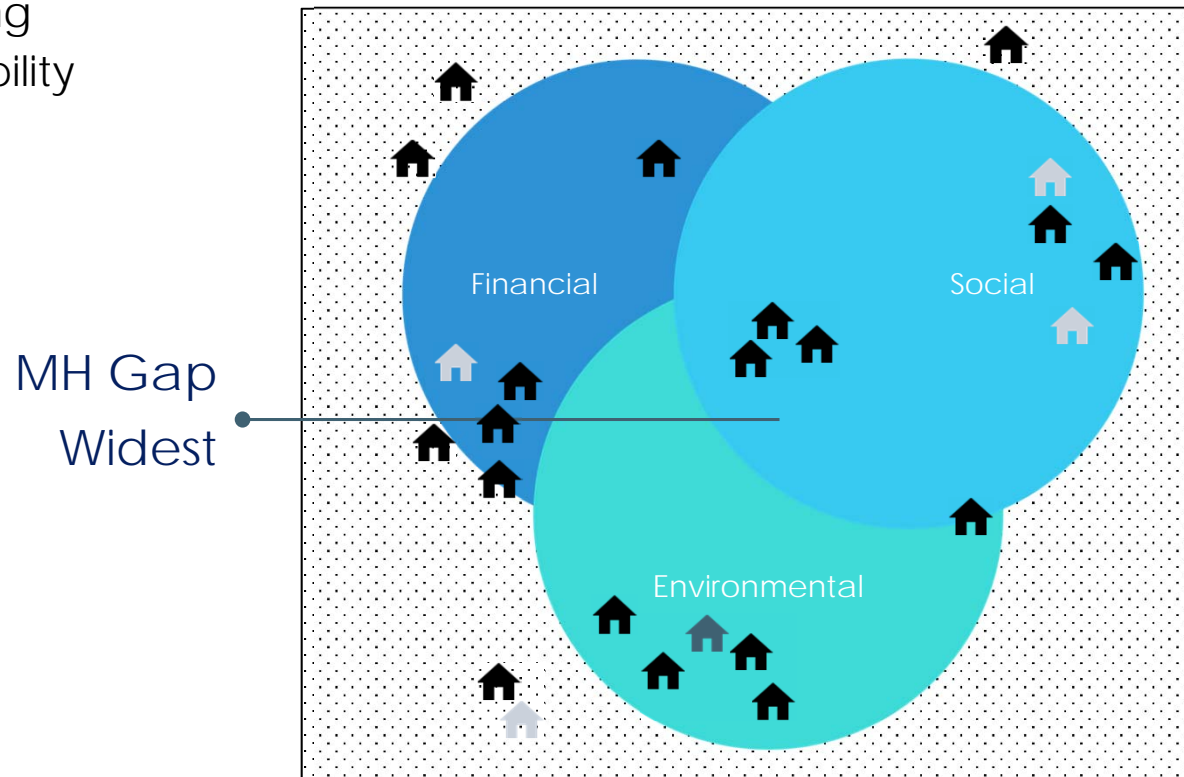
MH is often the nexus of social, financial, health and environmental insecurities



Conceptual Map

Coupled and intersecting geographies of vulnerability

Intersectional Vulnerability



Legend

- Urban Space
- Vulnerability
- MH



Research Objectives

Unpacking vulnerability for MH residents

- Identifying the geography of MH in Tucson
- Identifying variation in residents' vulnerabilities
- Understanding spatial patterns of vulnerability in Tucson



Measuring Vulnerability

- **Indices** are a common technique for capturing drivers of vulnerability
 - Due to the high correlation among variables, we **cannot easily consider the influence of specific variables**
 - Indices help us analyze the **specific influence of highly correlated variables**
 - Social vulnerability indices
 - MAP neighborhood vulnerability study
 - Our own bivariate map series

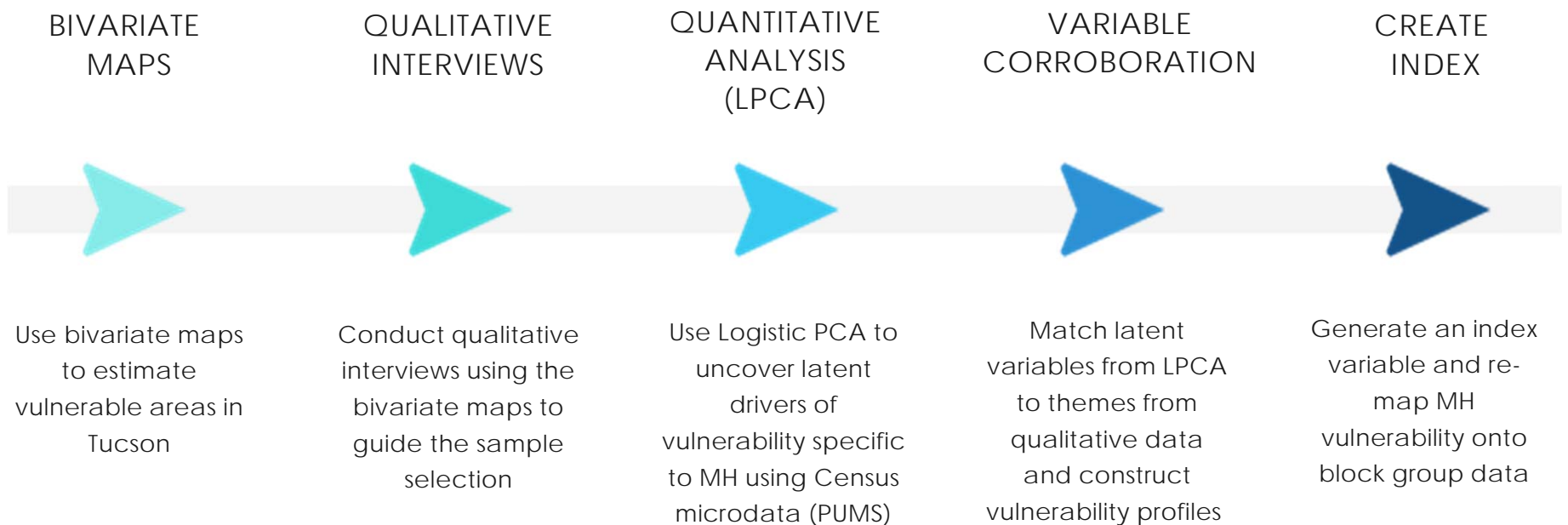


Creating a vulnerability index

- While helpful, conventional indices can still be problematic
 - Using the mean shifts the focus from marginal groups
 - Equivalent weighting implies that all variables are equally important
 - Categorical variables are often left out
- We create our own index using Logistic PCA, which pares down a large set of variables into more manageable components
- We then compare our resulting components to our qualitative interview data and generate vulnerability "profiles" to better capture resident vulnerability

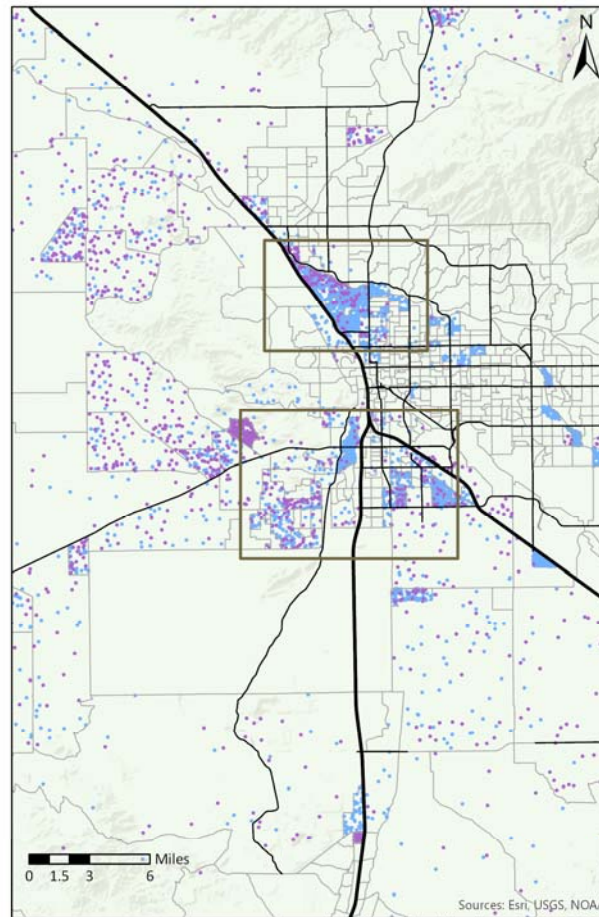
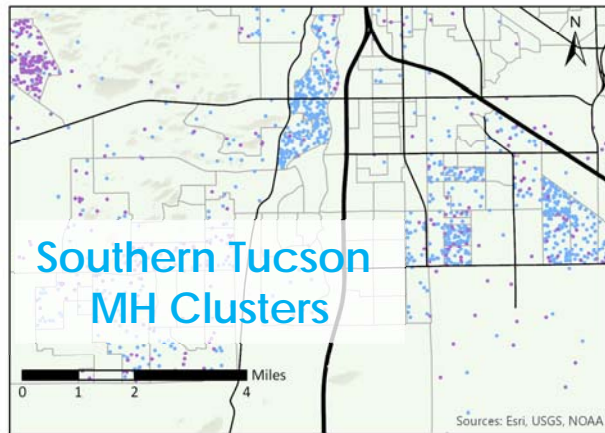
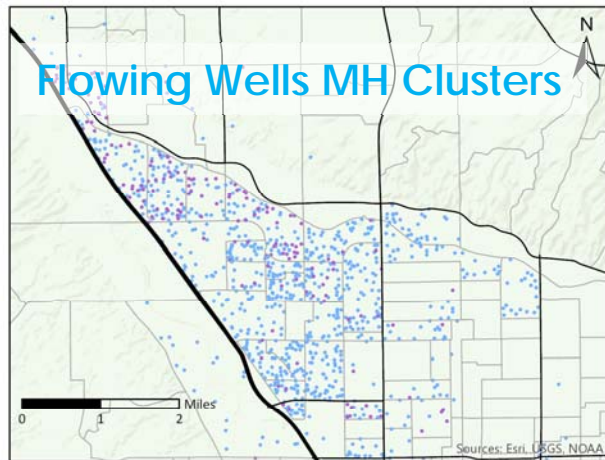


Iterative Research Design





What is the geography of MH in Pima County?



1 Dot = 10 MHU

- MHU Real Property
- MHU Personal Property



Qualitative Data Themes



RELATIONSHIP WITH MANAGEMENT



UTILITIES



FINANCIAL STABILITY



MOBILITY AND ACCESS



BUILDING/STRUCTURAL ISSUES



NEIGHBORHOOD



CONNECTIONS WITH OTHERS



LENDING/BORROWING/FINANCING

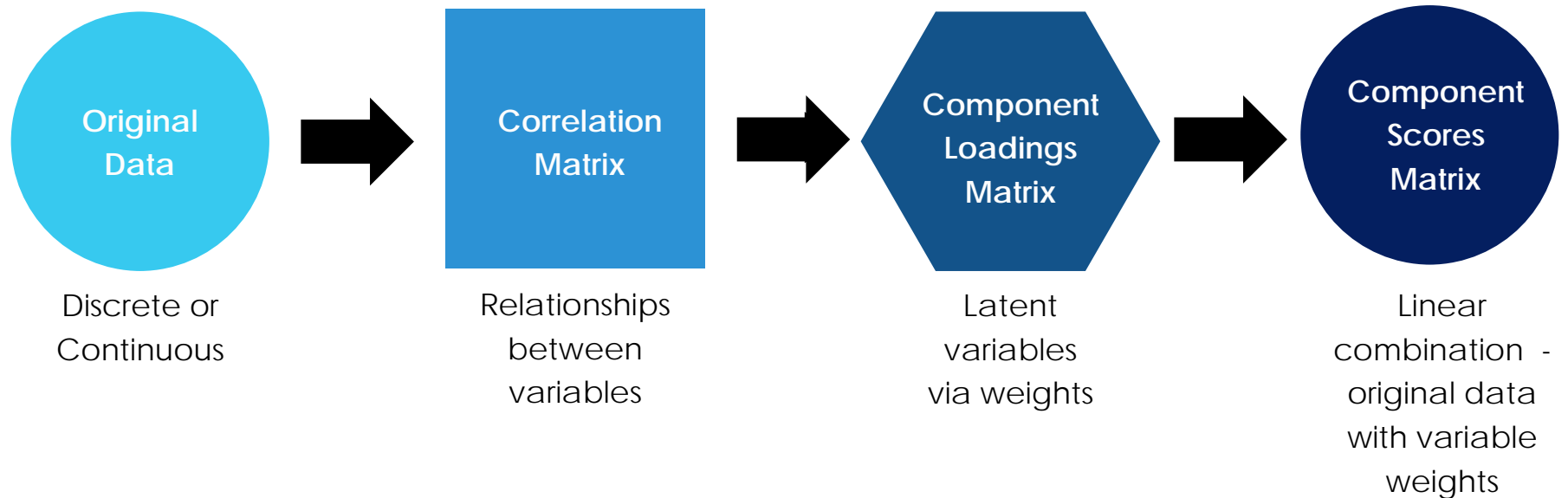


THERMAL CONDITIONS



Using Logistic Principal Component Analysis (LPCA)

IDENTIFY LATENT VARIABLES VIA RELATIONSHIPS BETWEEN ORIGINAL VARIABLES





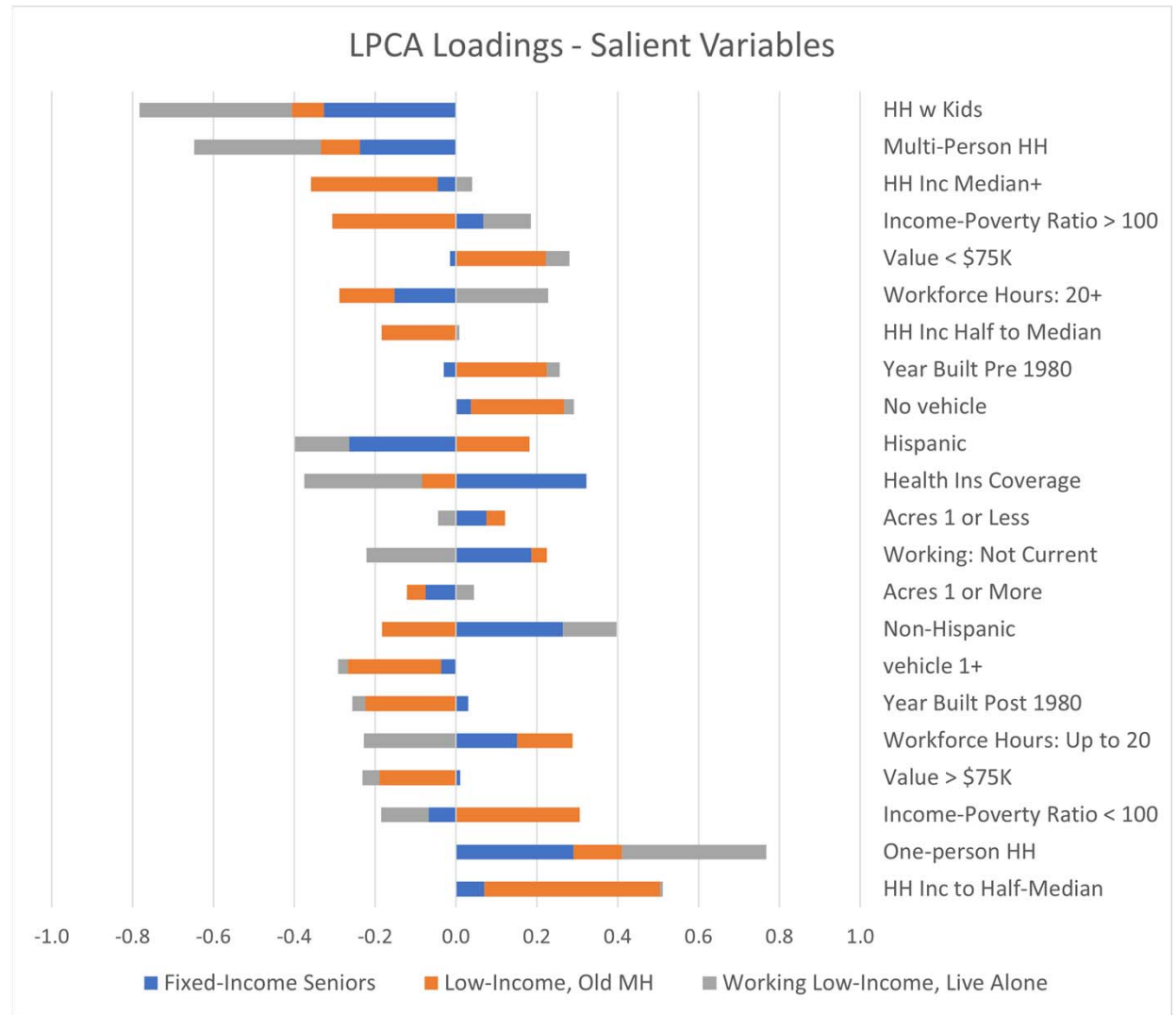
Logistic Principal Component Analysis (LPCA)

- Each **new variable** (component) a combination of weighted variables.
- Components' **descriptive names** are based upon original variables with highest loadings (weights).
- Components identified demographic profiles in MH.
- **Vulnerable profiles** found:
 - **Fixed-Income Seniors**
 - **Low Income, Old MH**
- These profiles were corroborated by our MH **interview findings**.



LPCA Loadings: Salient Variables

- Fixed-Income Seniors
- Low-income, old (pre-1980) MH
- Working Low-Income Singles





Fixed Income Seniors (FIS)

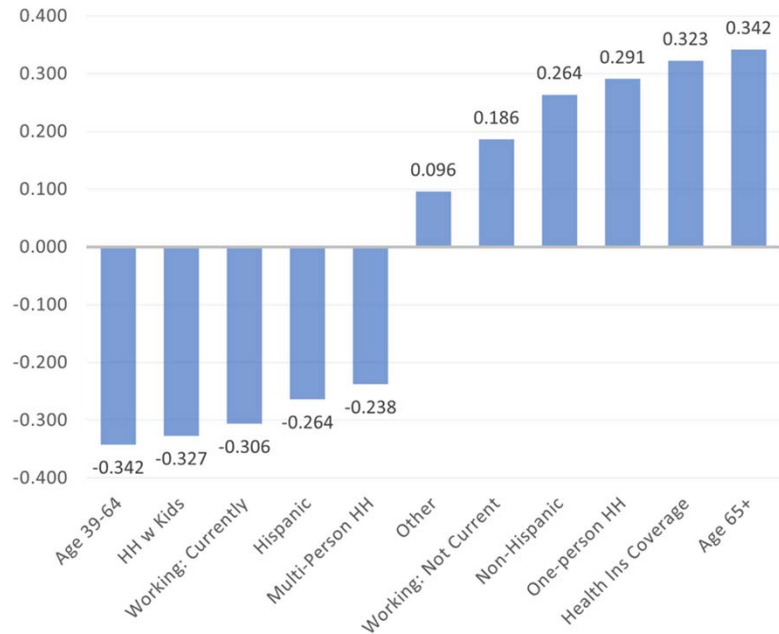
Characteristics

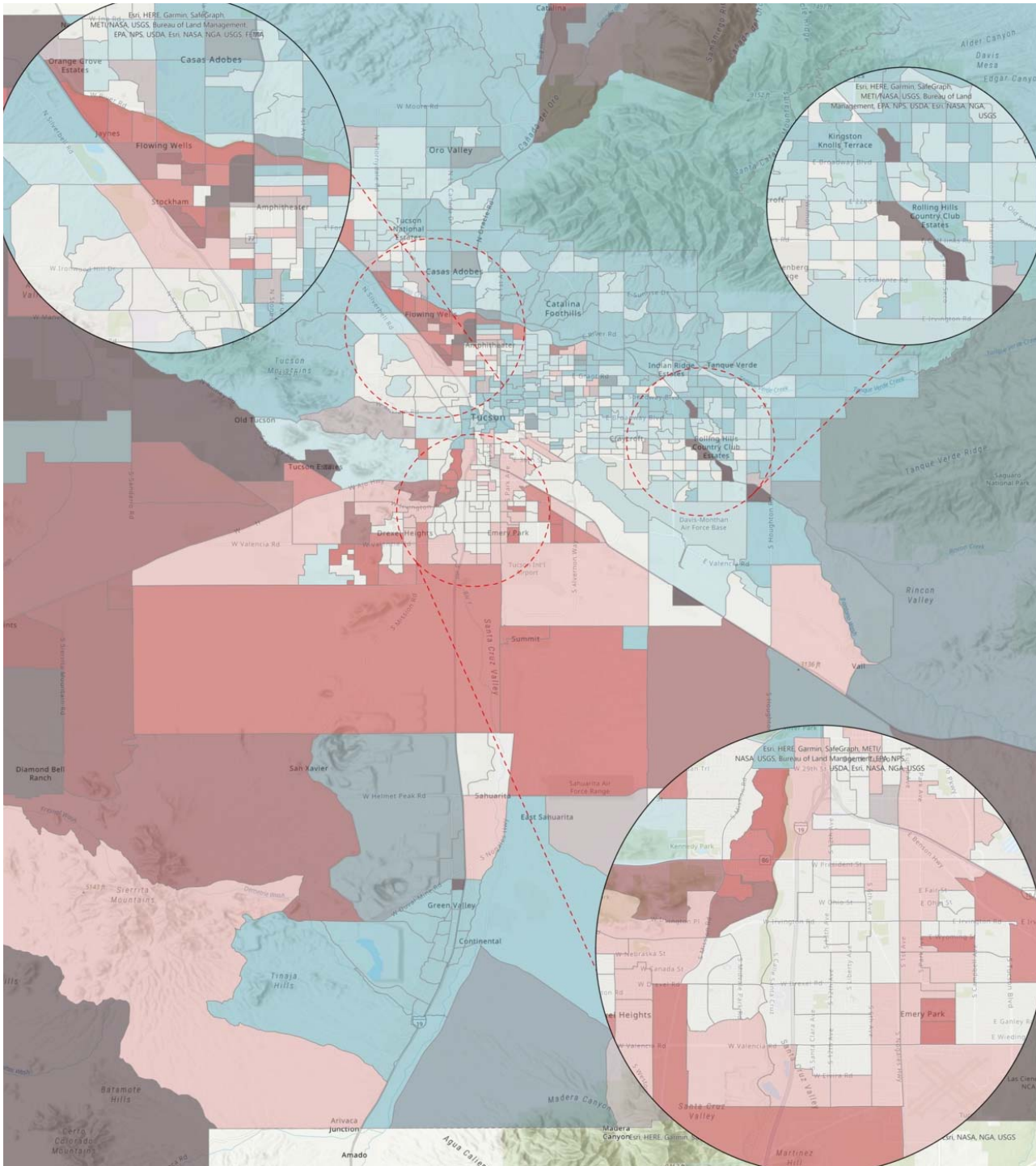
Retirees, seasonal migrants

Unique vulnerabilities

Health care & mobility, susceptibility to heat

Fixed-Income Seniors





Fixed-Income Seniors

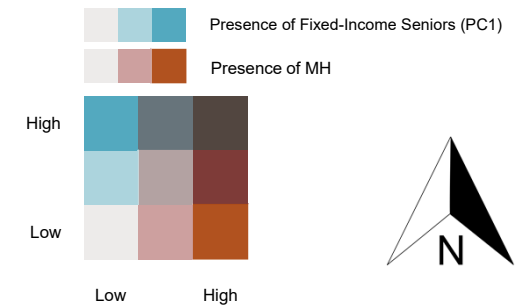
- Bivariate Map: PC Scores x MH Ratio of Total Housing
- ACS Block Group Data Weighted by PC Loadings

Characteristics

- Retirees, seasonal migrants
- Unique vulnerabilities
 - e.g., health care & mobility

Spatial patterns

- Non-MH in NE Tucson, Green Valley and downtown
- MH in Flowing Wells, SW Tucson, rural areas

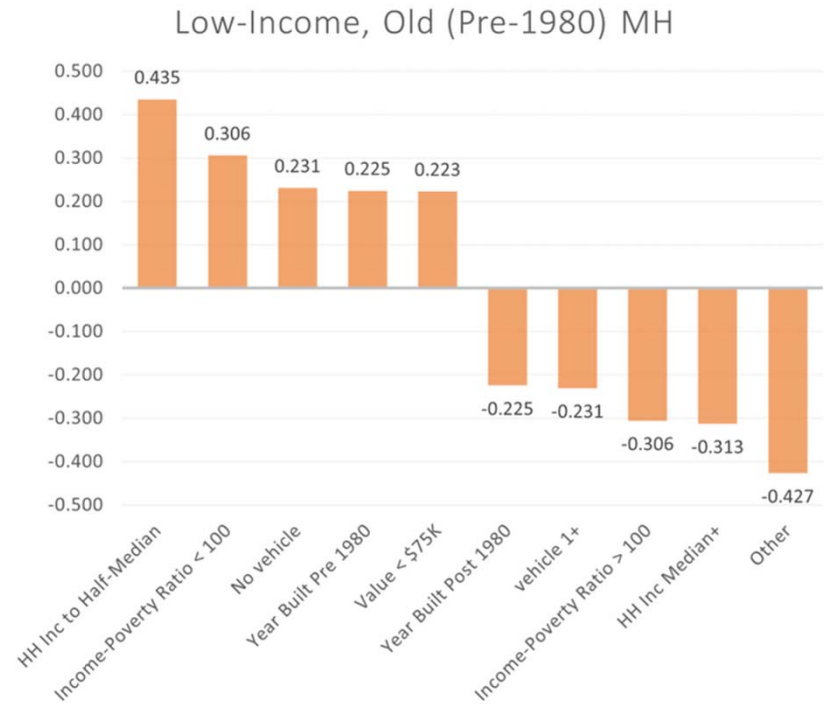


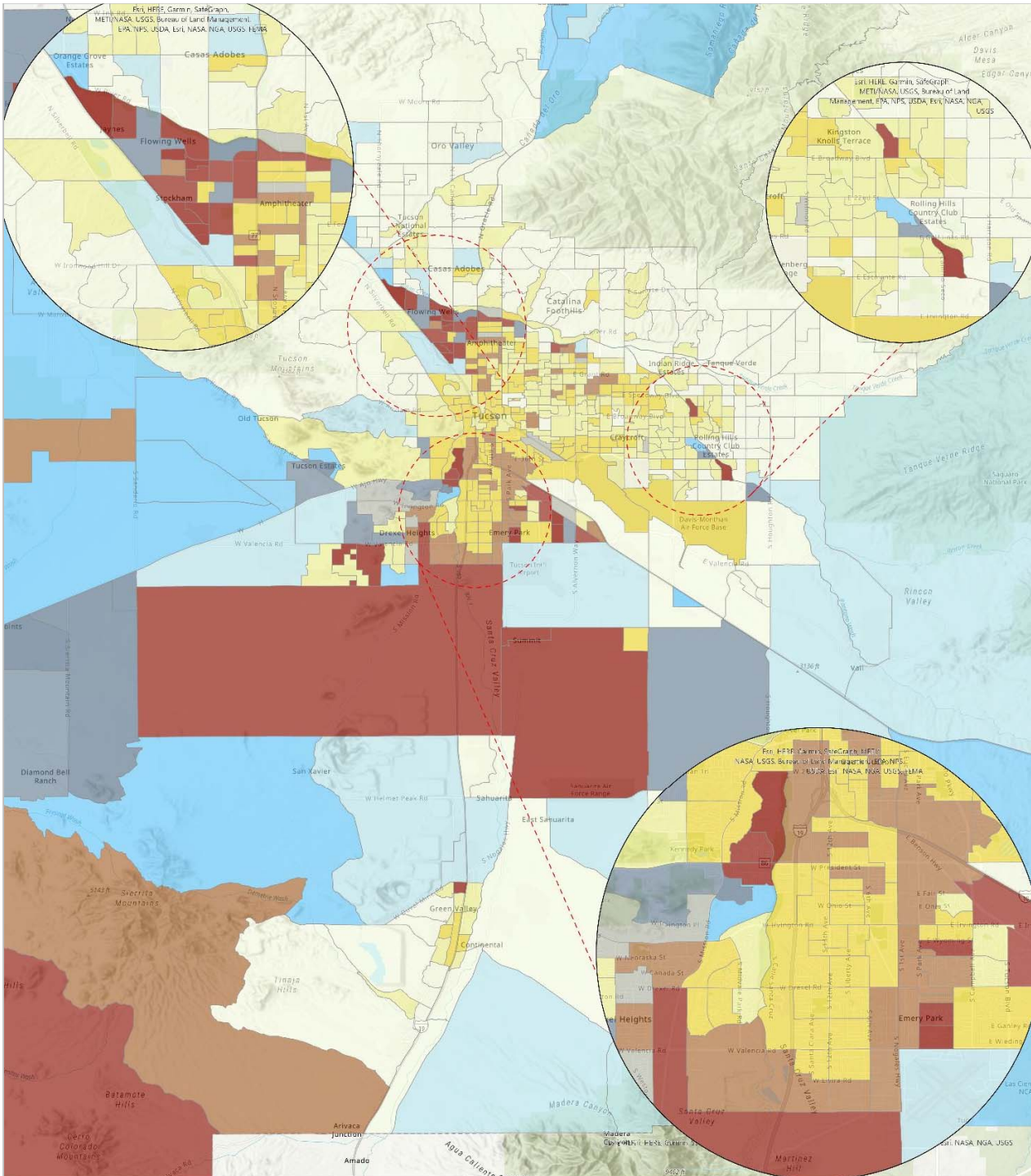


Low-income,
Older MH
(110)

Characteristics

- Problems related to old MH: heat, etc.
- Households in rural areas may have mobility challenges





LIO: Low Income, Older MH

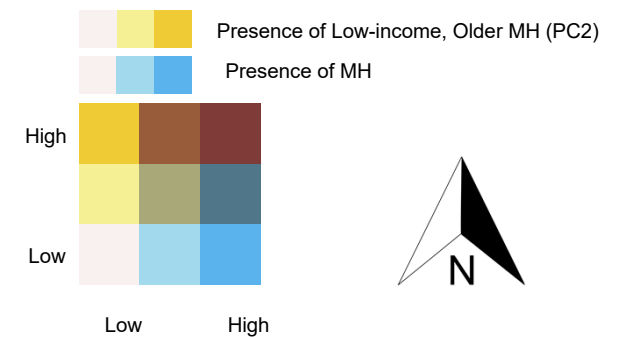
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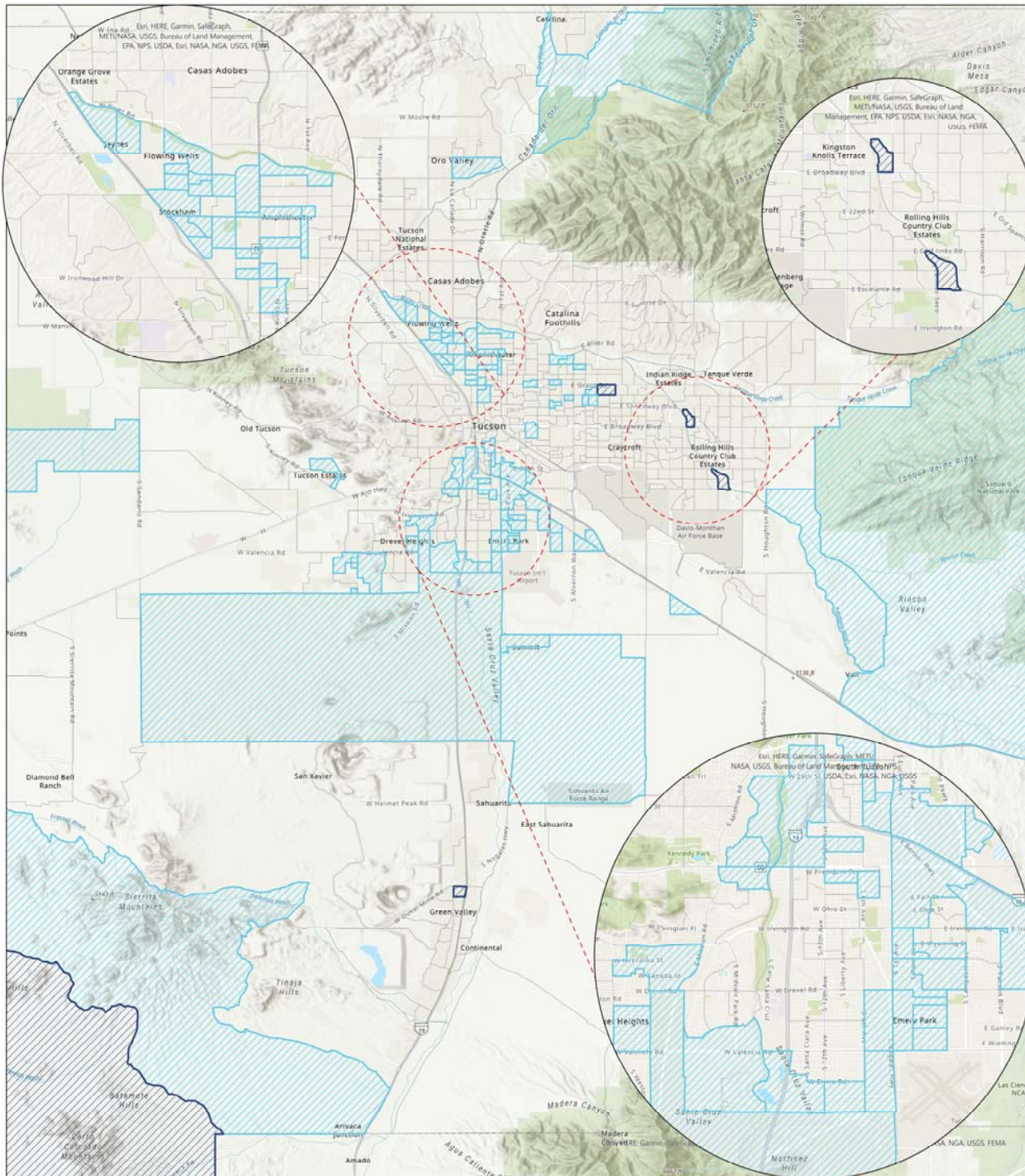
Characteristics

- Problems related to old MH: heat, etc.
- Households in rural areas may have mobility challenges

Spatial patterns

- Non-MH in downtown and South Tucson.
- MH in peripheral areas, accessibility challenges





MH: "Most Vulnerable"

- Bivariate Map: Statistically significant relationship between vulnerable group and MH

Characteristics

- High transportation costs
- Single, working full time + Spatial Patterns
- MH highly spatially concentrated
- Low-access and rural areas

Most Vulnerable CBGs for FIS and LIO





Conclusions

- ▶ Mixed methods allow for a **resident-driven** research design
- ▶ Most vulnerable profile groups are **Fixed-Income Seniors (FIS)** and **Low-Income, Old MH (LIO)** households
- ▶ The most **geographically widespread** MH vulnerability profile in Tucson is **Low-Income Older MH (LIO)**
- ▶ **Vulnerability profiles rarely spatially overlap**: FIS and LIO vulnerability profiles only overlap in five census block groups
- ▶ Identifying different subsets of MH residents will help create **specialized policy** interventions that benefit target groups

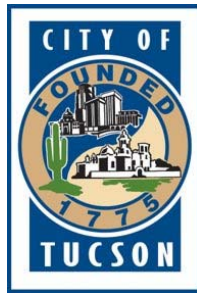


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COMMUNITY PARTNERS



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Thank you!

Please reach out if you have any questions.

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