



Memphis Socioeconomic Vulnerability Index

METHODOLOGY

04.29.2020

Research Question

Where are the households most vulnerable to the larger economic impacts of COVID-19 and how stable are the families' housing situations?

STEP 1 | Methodology Creation

- Desk research and review of National Neighborhood Indicator Partnership (NNIP) partners, think tanks, and research institutions COVID vulnerability analyses
- Modeled Memphis' methodology on two key studies to represent the two specific aspects of this research question: housing and economics

Housing Methodology

- Modeled after NYU Furman Center's Housing Vulnerability analysis, using same variables: Median Gross Rent, Median household income, Rentership rate, Race, and Cost burden
- See Method outline for more details

Economic Methodology

- Used Urban Institute's Low-Income Job Loss analysis at the Census Tract level
- See method outline for more details

Mapping Approach

- Worked with partner LandGrid to develop an interactive map on their platform to allow for easy sharing
- Vulnerability Index created at Census Tract Level, overlaying Foreclosure notices (2020) and Eviction filings (2016-2019) on top of Vulnerability at the parcel level



STEP 2 | Download and Clean Data

Primary Datasets

1. NHGIS IPUMS ACS 2018 5-Year Data
 - Includes Race, Median Household Income, Housing Tenure, and Median Gross Rent
2. Urban Institute's Job Loss by CT
 - Uses LEHD LODES, BLS, and Post-COVID Unemployment filings from Washington State and NY State to estimate Low-Income Job Loss
3. Shelby County General Sessions – Civil Court
 - Downloaded FEDs from public-facing website
4. Memphis Daily News
 - Recent Foreclosure notices pulled from their custom list builder

Cleaning Process

- Extracted just Shelby County Tracts (n = 222) from both datasets
- For NHGIS data, manually created Census Tract ID by concatenating the State, County, and Tract IDs
- Removed unnecessary 0s
- Converted Total to percent for following variables:
 - Race
 - Rentership
- Calculated Cost Burden
 - Divided Median Household Income by 12
 - Divided Gross Rent with that total
 - Result is Cost Burden Rate at Tract Level
- Job Loss Data Cleaning
 - Deleted all variables except total job loss
- Merging two datasets

- Using QGIS joined the NHGIS data and the Urban data by Tract ID
- Keeping Missing Data
 - The following tracts had significant missing data and will be coded "0" in the final index

4715798010
4715798020
4715798030
4715798040

STEP 3 | Cluster Analysis

- Using STATA we conducted a K-Means cluster analysis using the following six variables, grouping into 7 clusters to get a closer look at a larger scale of vulnerability
 - Low-Income Job Loss
 - Percent Minority (Hispanic, Asian, Black, Other)
 - Median Household Income
 - Rentership Rate
 - Cost Burden
- USED THE FOLLOWING CODE IN STATA

```
### IMPORT CSV WITH JUST VARIABLES NEEDED ###
import delimited "C:\Users\AYUSER\Downloads\mem_COVID_vul.csv",
numericcols(_all) clear
(6 vars, 221 obs)

### CLUSTER THESE VARIABLES INTO 7 GROUPS ###
cluster kmeans li_job_loss mino_pct med_hs_inc rent_rate
cost_burden, k(7)
cluster name: _clus_1

### SORT VARIABLES TO DOUBLE CHECK RESULTS IN DATA VIEWER ###
sort li_job_loss
```

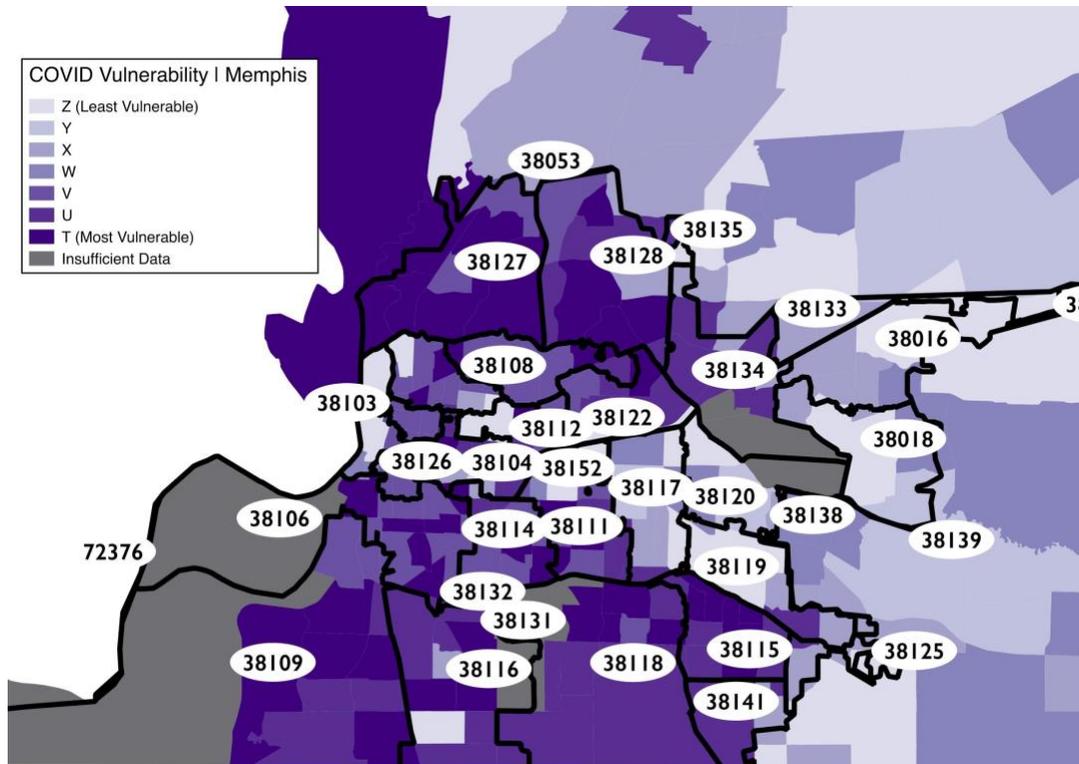
```
### EXPORT CSV WITH CLUSTERS ###
export delimited using
"C:\Users\AYUSER\Downloads\mem_COVID_vul2.csv", replace
(note: file C:\Users\AYUSER\Downloads\mem_COVID_vul2.csv not
found)
file C:\Users\AYUSER\Downloads\mem_COVID_vul2.csv saved
```

STEP 4 | Mapping Results

- Displayed in two ways: interactive maps on LandGrid & rough proof-of-concept maps for internal review

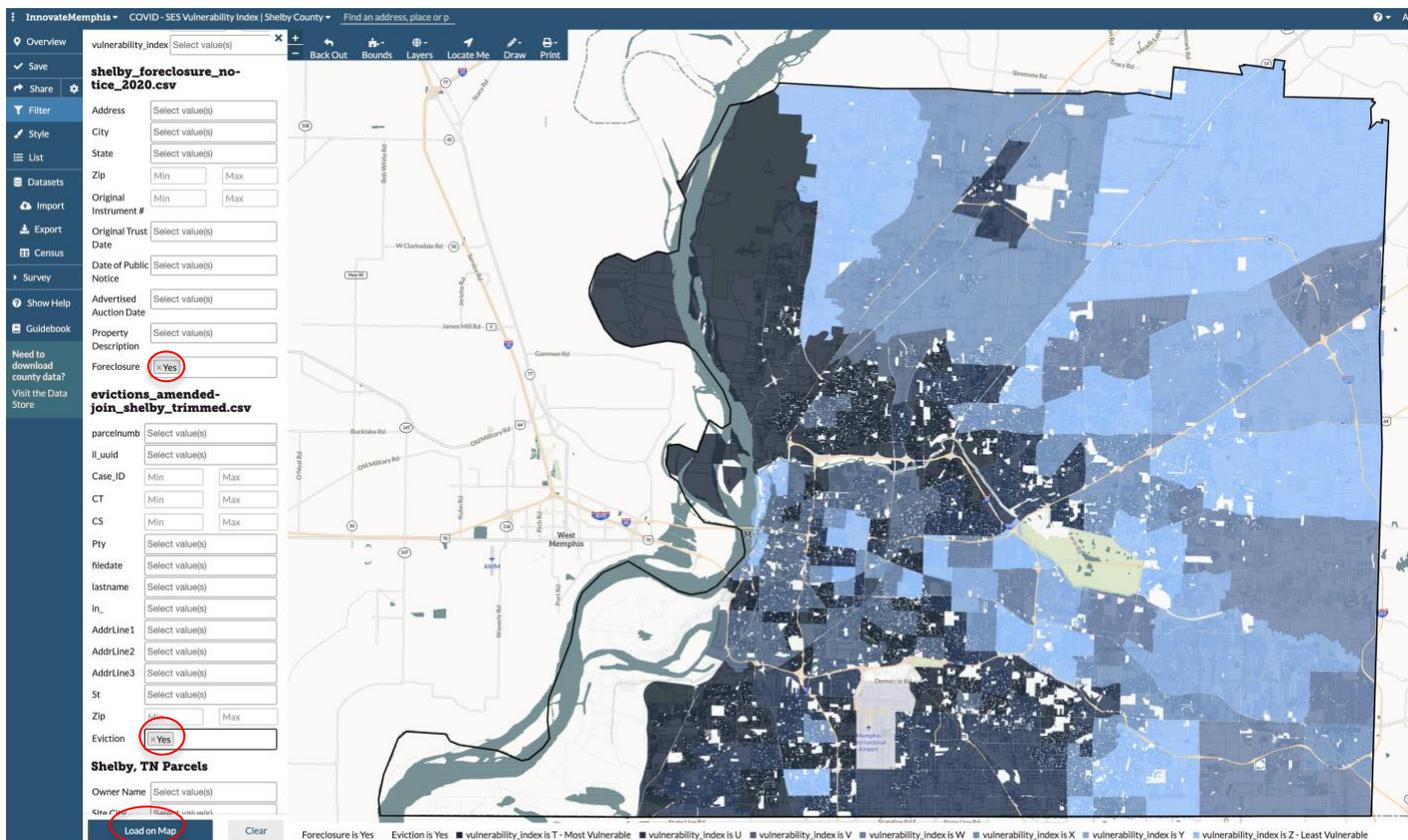
Proof-Of-Concept Maps

- Using QGIS, dropped in 2018 Tiger Census Tract Data and 2019 Zip Code Tabulation (as a geographic reference for viewers)
- Joined Tract Level Vulnerability measure to Census Tract Shapefile with GEOID



LandGrid Maps

- Vulnerability Rating is the base layer
- Foreclosure Notices and Eviction Filings are both coded at the parcel level
- The geocoding of eviction filings had an 85% accuracy rate for latitude/longitude to parcel, so know these are not exact but will be close to the exact parcel the eviction was filed against. Please consult Innovate Memphis or General Sessions court filings if acting on a specific case.
 - To see just foreclosures or just eviction filings:
 - Go to the filter section as shown below in the screenshot and select “Eviction = Yes” or “Foreclosure = Yes” in the menu on the right side of your screen
 - Select the “Load on Map” option to see just evictions or foreclosures highlighted





STEP 5 | Provide Feedback

- This project will remain a work in progress and we are always seeking improvements and suggestions.
- Please submit ideas for improvements and future additions to the tool by emailing us at info@innovatememphis.com