Projecting Food Insecurity in Southwest Virginia

VIRGINIA TECH
Data Science *for the* Public Good

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Background

- Food insecurity is a socioeconomic condition in which a household does not have access to enough nutritious food to sustain a healthy lifestyle for all its members.
- The Current Population Survey's Food Security Supplement offers statistics based on a questionnaire given to U.S. households, which acts as a measure of food insecurity at the state-level.
- Food insecurity causes negative mental and physical health effects, such as higher risk of depression, unhealthy eating and drinking habits, and substance use (Pourmotabbed et al., 2020; Larson et al., 2020).
- Southwest Virginia has overall higher food insecurity rates than the rest of Virginia due to lower income levels, lower educational attainment, and higher poverty rates (American Community Survey data).

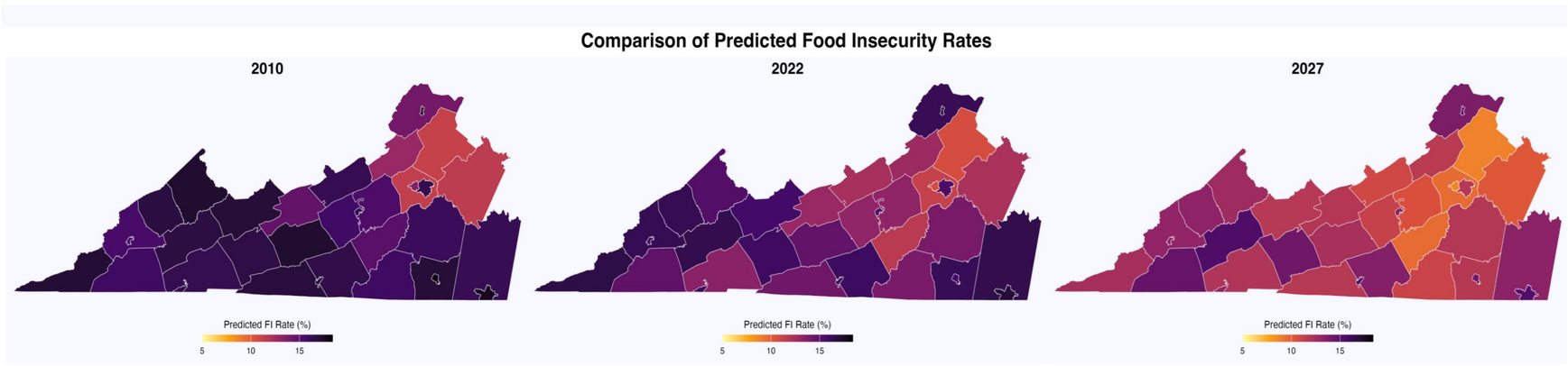
Research Questions

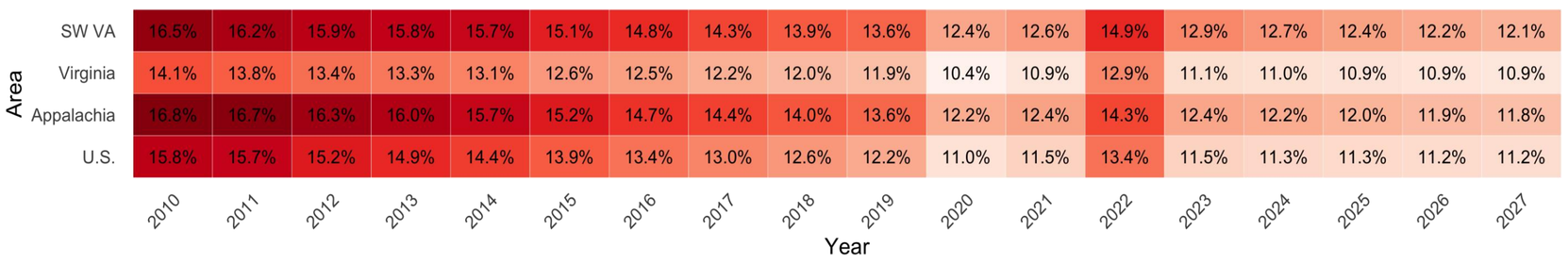
- What determinants of food insecurity best predict future rates?
- How will predicted changes in key socioeconomic factors affect food insecurity rates in Southwest Virginia counties and cities through 2027?
- How does the predicted trend of food insecurity in Southwest Virginia compare to the predictions for all of Virginia, Appalachia, and the rest of the continental U.S.?

Methodology

- Utilized data from the American Community Survey, Bureau of Labor Statistics, and the Current Population Survey.
- Developed and fine-tuned an XGBoost machine learning model that used training and testing datasets, optimizing variable selection and parameters to predict state-level food insecurity rates.
- Applied an ARIMA model to project future values of individual variables at the county-level.
- Employed our model to forecast county-level food insecurity rates, which used the projected variable values for the years 2010 to 2027.

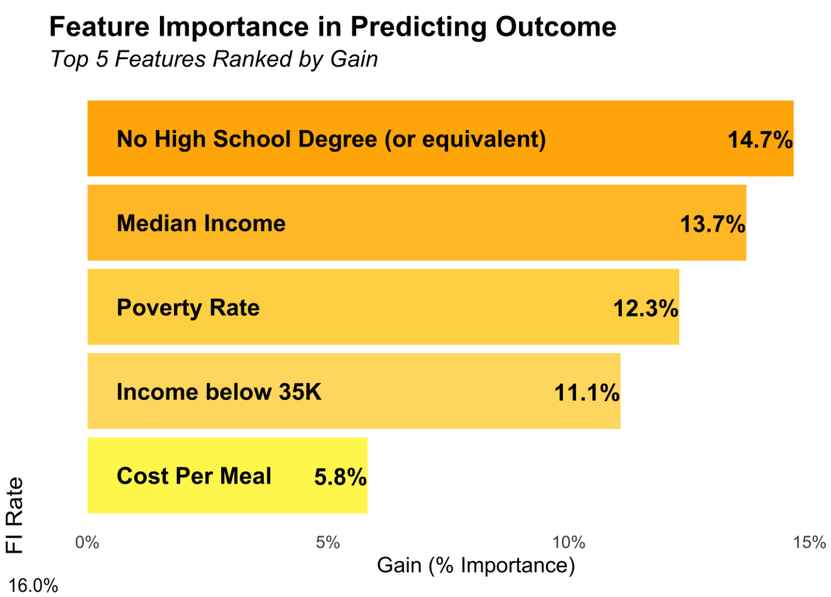
Results





2023-2027 is based on our ARIMA model predicted factors

Feature Importance



- Our predictive model identified these five key variables, out of 90 total variables, to have the strongest association with food insecurity.

Conclusion

- Despite a nationwide increase in food insecurity around 2022 due to the COVID-19 pandemic, Southwest Virginia has experienced an overall decrease in food insecurity since 2010, which is expected to continue based on our current projections.
- Food insecurity rates in Southwest Virginia remain higher than the rest of Virginia, aligning with the elevated rates observed across the Appalachian region.
- Our projections indicate that if Southwest Virginia's food insecurity rate was to decrease to match the rest of Virginia's rate by 2027, it would result in 15,252 fewer food insecure individuals in the region.

References

- Data Sources: American Community Survey, Bureau of Labor Statistics, Feeding America, Current Population Survey
- Larson, N., Laska, M. N., & Neumark-Sztainer, D. (2020). Food insecurity, diet quality, home food availability, and health risk behaviors among emerging adults: Findings From the EAT 2010-2018 Study. *American Journal of Public Health*, 110(9), 1422–1428. https://doi.org/10.2105/AJPH.2020.305783
- Pourmotabbed, A., Moradi, S., Babaei, A., Ghavami, A., Mohammadi, H., Jalili, C., Symonds, M. E., & Miraghajani, M. (2020). Food insecurity and mental health: A systematic review and meta-analysis. *Public Health Nutrition*, 23(10), 1778–1790. https://doi.org/10.1017/S136898001900435X