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ESTIMATING IDAHO COUNTY LEVEL HEALTH INDICATORS USING SPATIAL MICROSIMULATION

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IMCI
Institute for Modeling Collaboration and Innovation

SUMMARY

- Overview of UI funded project for BRFSS modeling from the State of Idaho
- Brief description of our modeling approach
- Project 1: Modeling COVID-19 health disparities – results
- Project 2 (upcoming): Modeling health disparities in association with COVID-19 outcomes

www.modelingidahohealth.org

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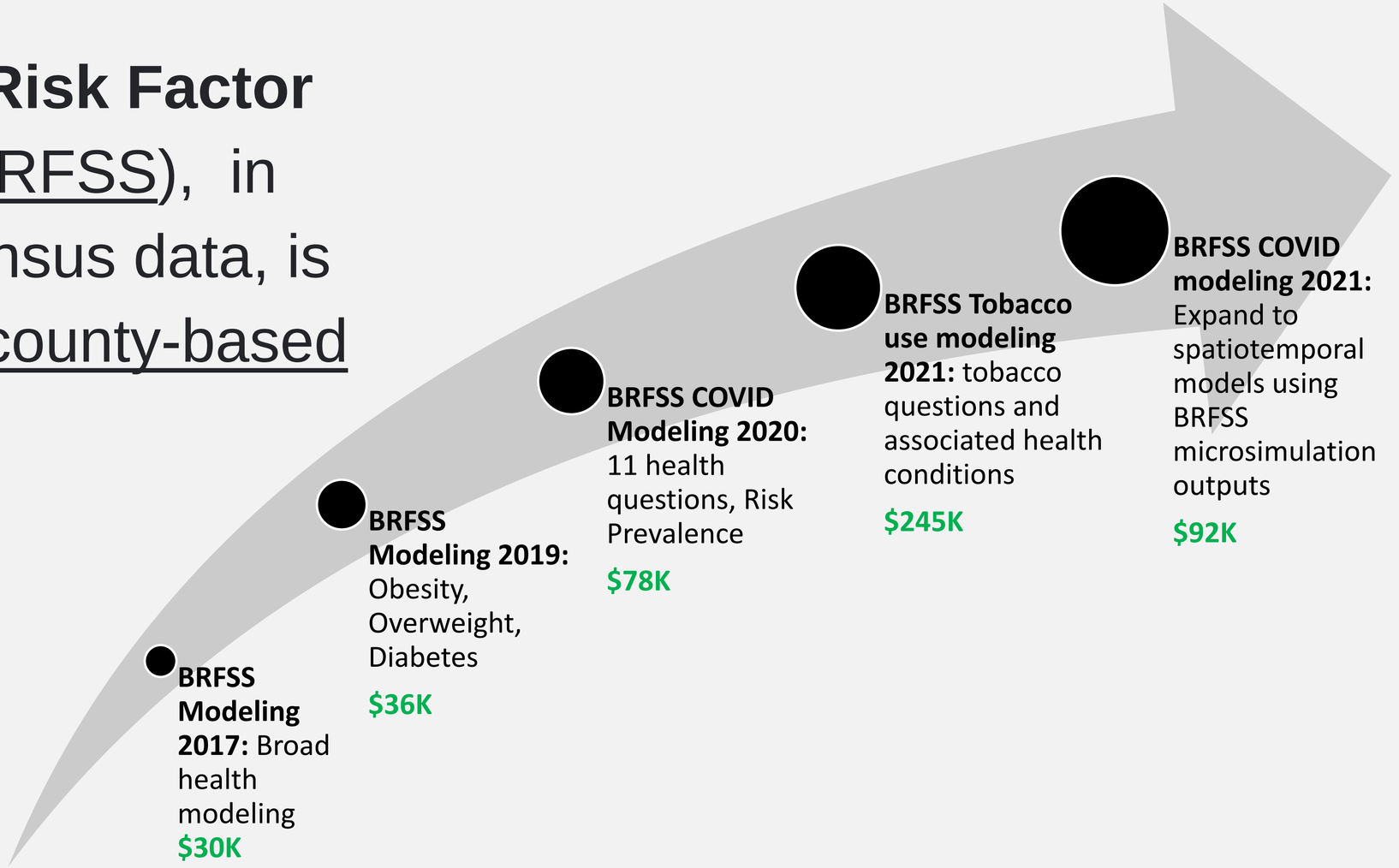
PROJECT OVERVIEW

The CDC's **Behavioral Risk Factor Surveillance Survey** (BRFSS), in combination with US Census data, is used to generate Idaho county-based prevalence estimates.



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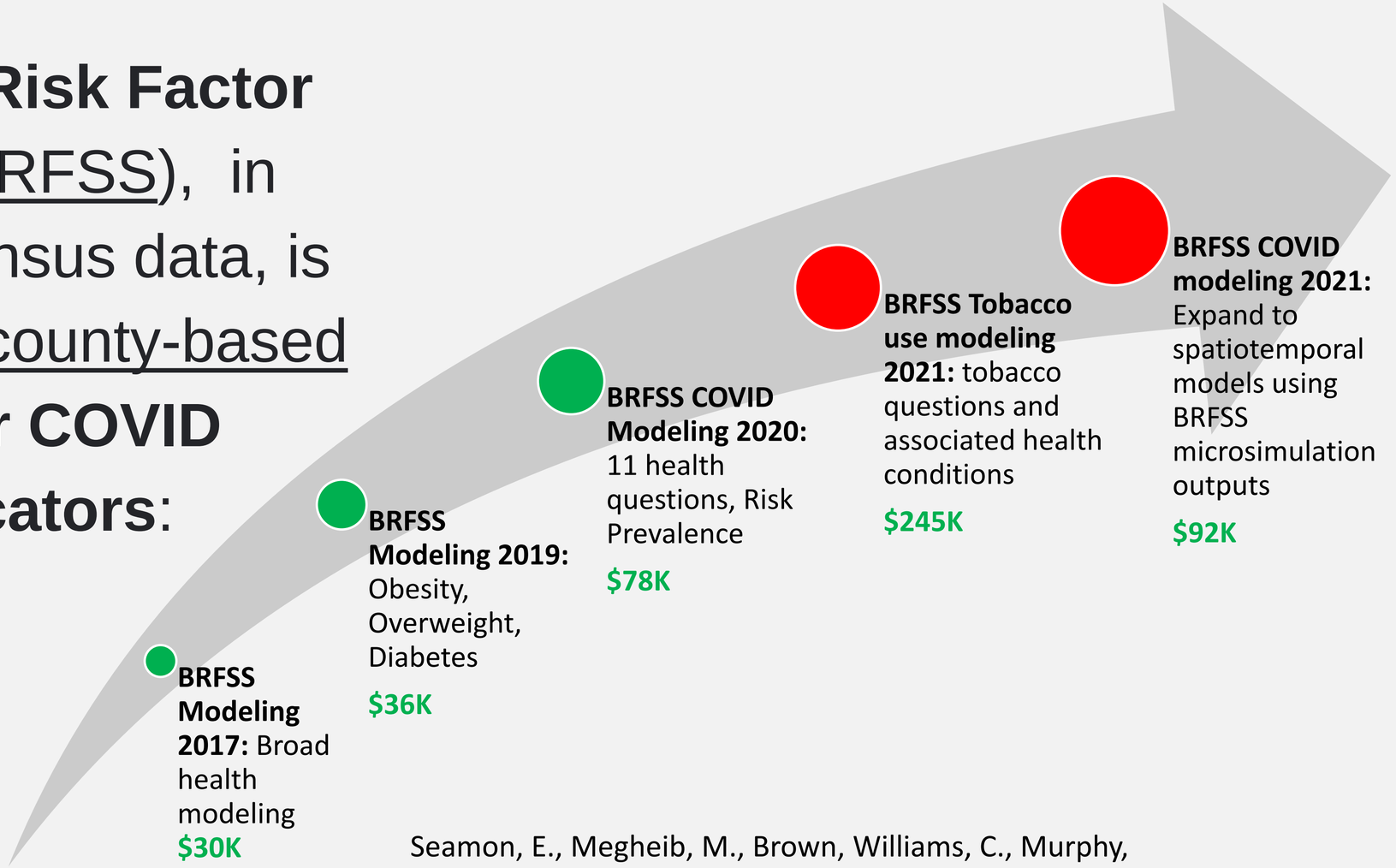

Seamon, E., Megheib, M., Brown, Williams, C., Murphy, C., Brown, H. "Estimating County Level Health Indicators Using Spatial Microsimulation" 2022. *Population, Space and Place.* Under Invited Review

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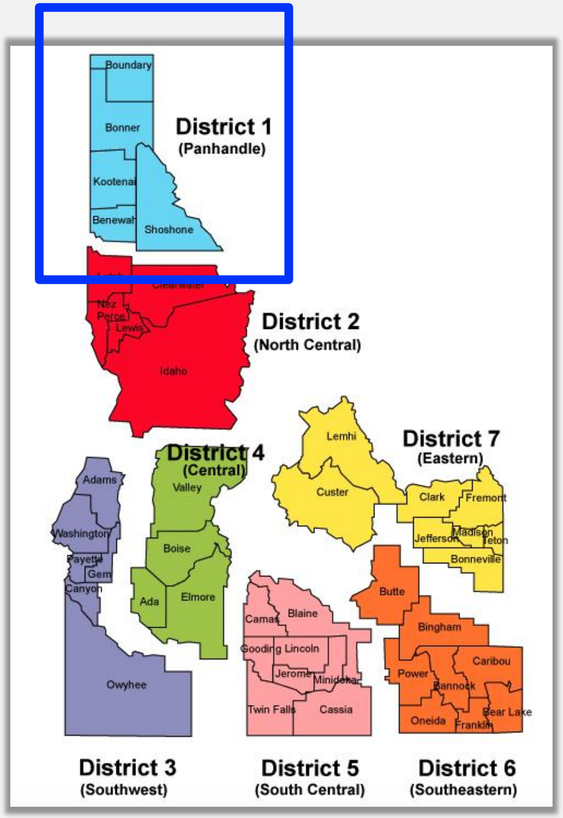

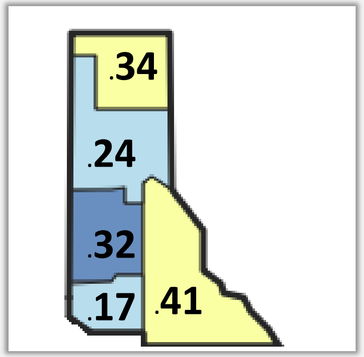

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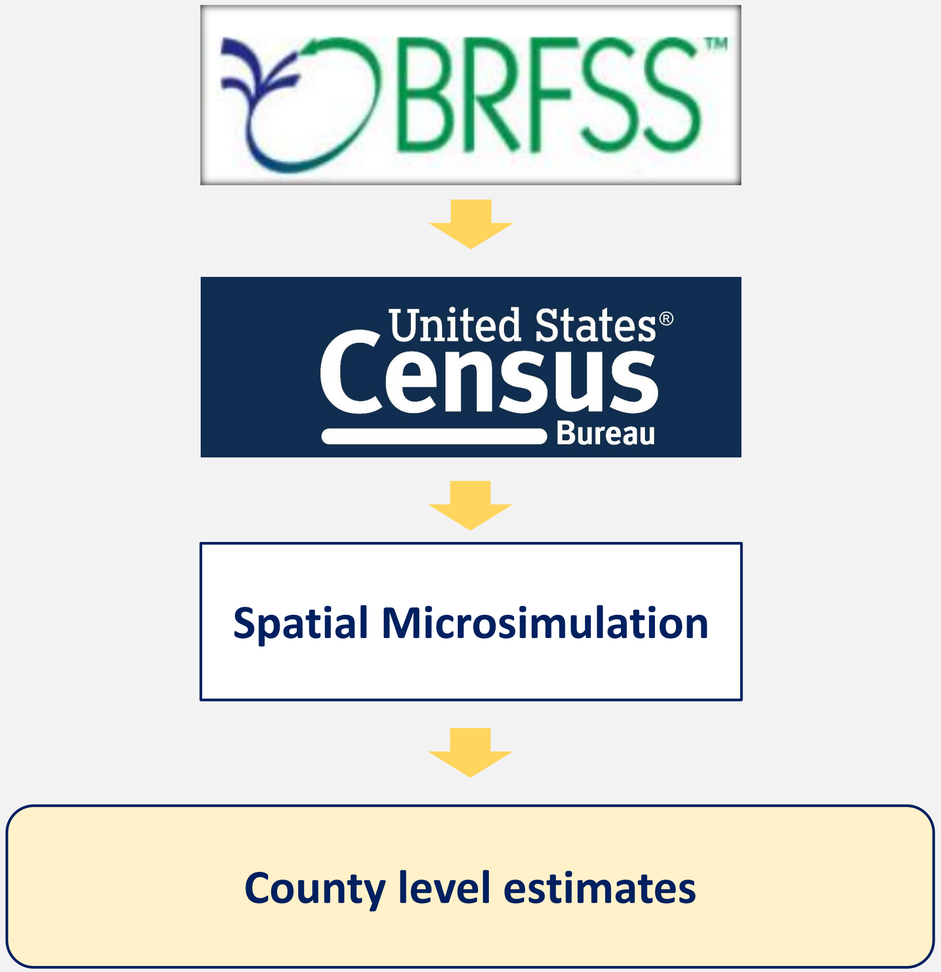
PROJECT OVERVIEW

The CDC's **Behavioral Risk Factor Surveillance Survey** (BRFSS), in combination with US Census data, is used to generate Idaho county-based prevalence estimates **for COVID associated health indicators**:

- Heart Disease
- Angina
- Heart Attack
- Obesity
- Kidney Disease
- Smoking
- Pulmonary Disease
- Diabetes
- Hypertension
- Depression



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Imputation

Static Base

Static Grouped

Dynamic Base

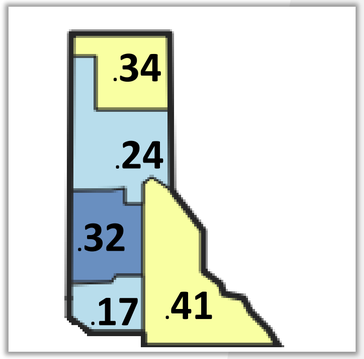
Dynamic Grouped

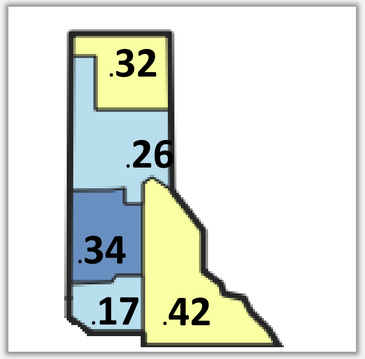
Constraints: age, education, race, sex

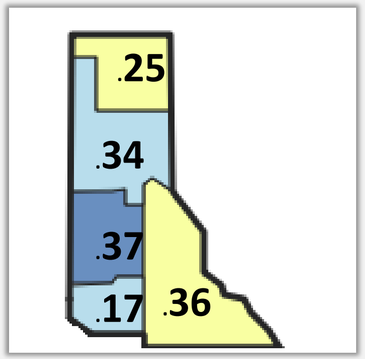
Logistic Regression

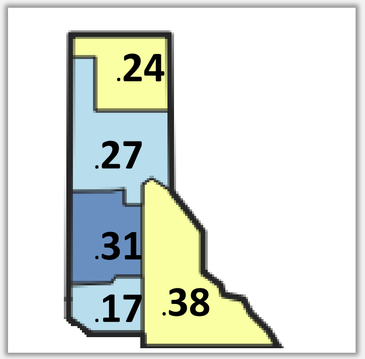
Iterative Proportional Fitting

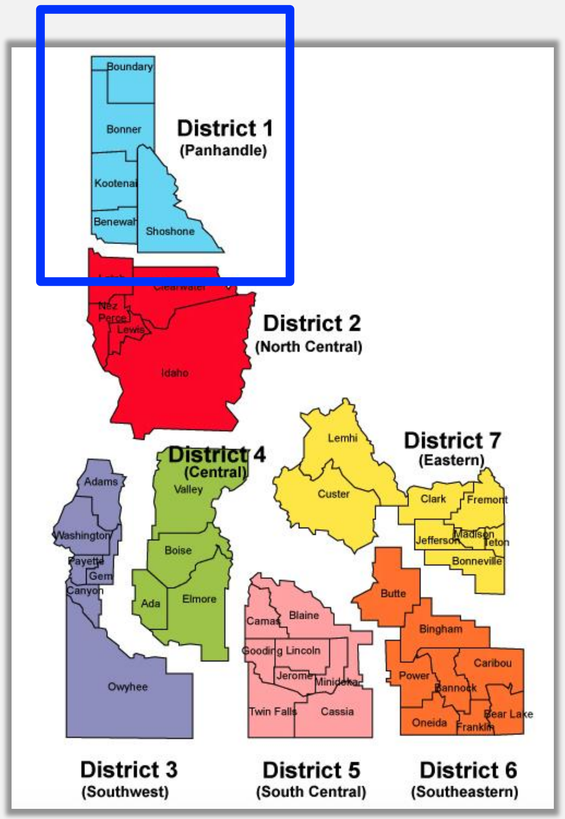
$$w(i,z,t+1) = w(i,z,t) \times \frac{cons\_t(z,c,brfss(i,c))}{\sum_{j=1}^{n_{brfss}} w(j,z,t) \times I(brfss(j,c) = brfss(i,c))}$$

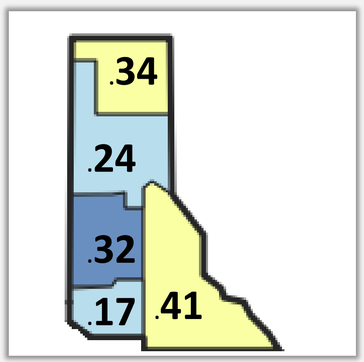


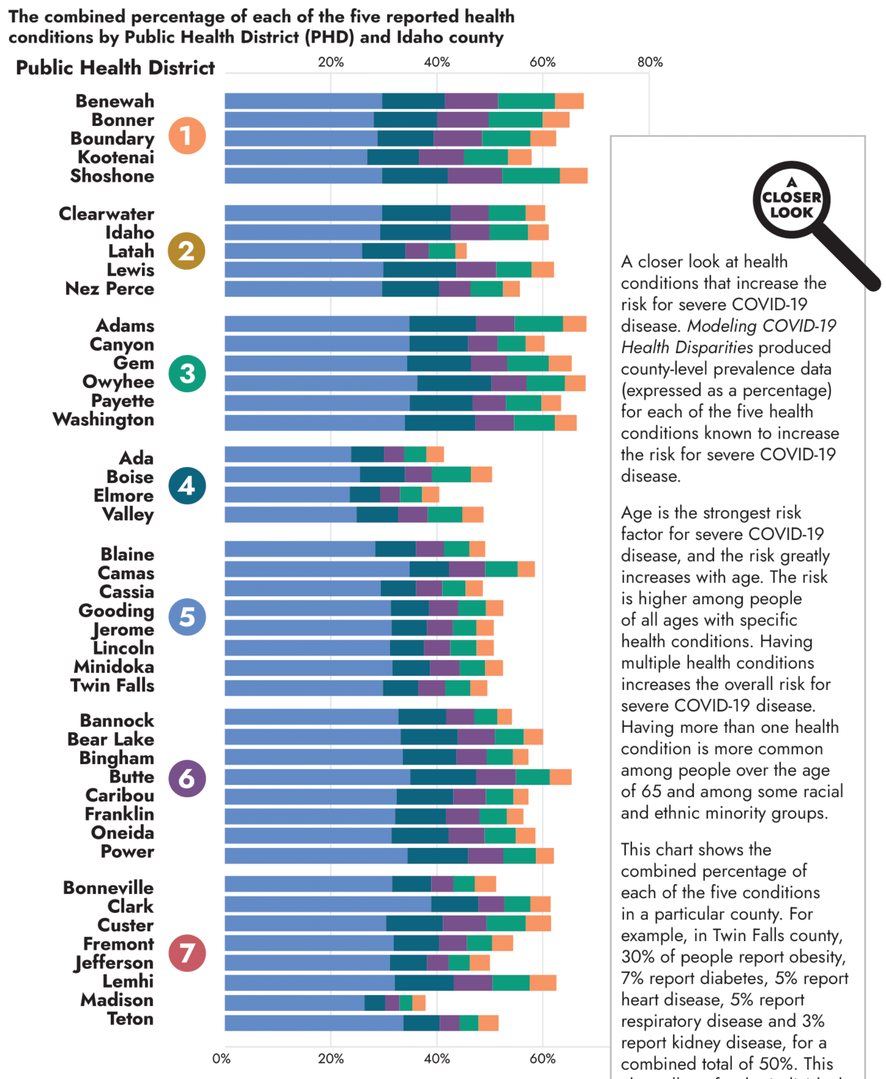










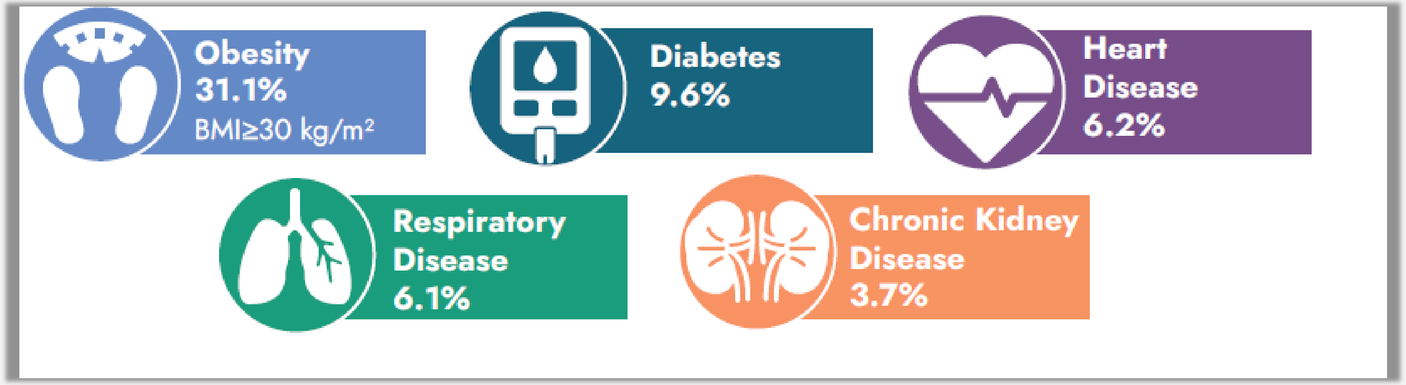


A CLOSER LOOK

A closer look at health conditions that increase the risk for severe COVID-19 disease. *Modeling COVID-19 Health Disparities* produced county-level prevalence data (expressed as a percentage) for each of the five health conditions known to increase the risk for severe COVID-19 disease.

Age is the strongest risk factor for severe COVID-19 disease, and the risk greatly increases with age. The risk is higher among people of all ages with specific health conditions. Having multiple health conditions increases the overall risk for severe COVID-19 disease. Having more than one health condition is more common among people over the age of 65 and among some racial and ethnic minority groups.

This chart shows the combined percentage of each of the five conditions in a particular county. For example, in Twin Falls county, 30% of people report obesity, 7% report diabetes, 5% report heart disease, 5% report respiratory disease and 3% report kidney disease, for a combined total of 50%. This chart allows for the individual county comparison of specific health conditions.



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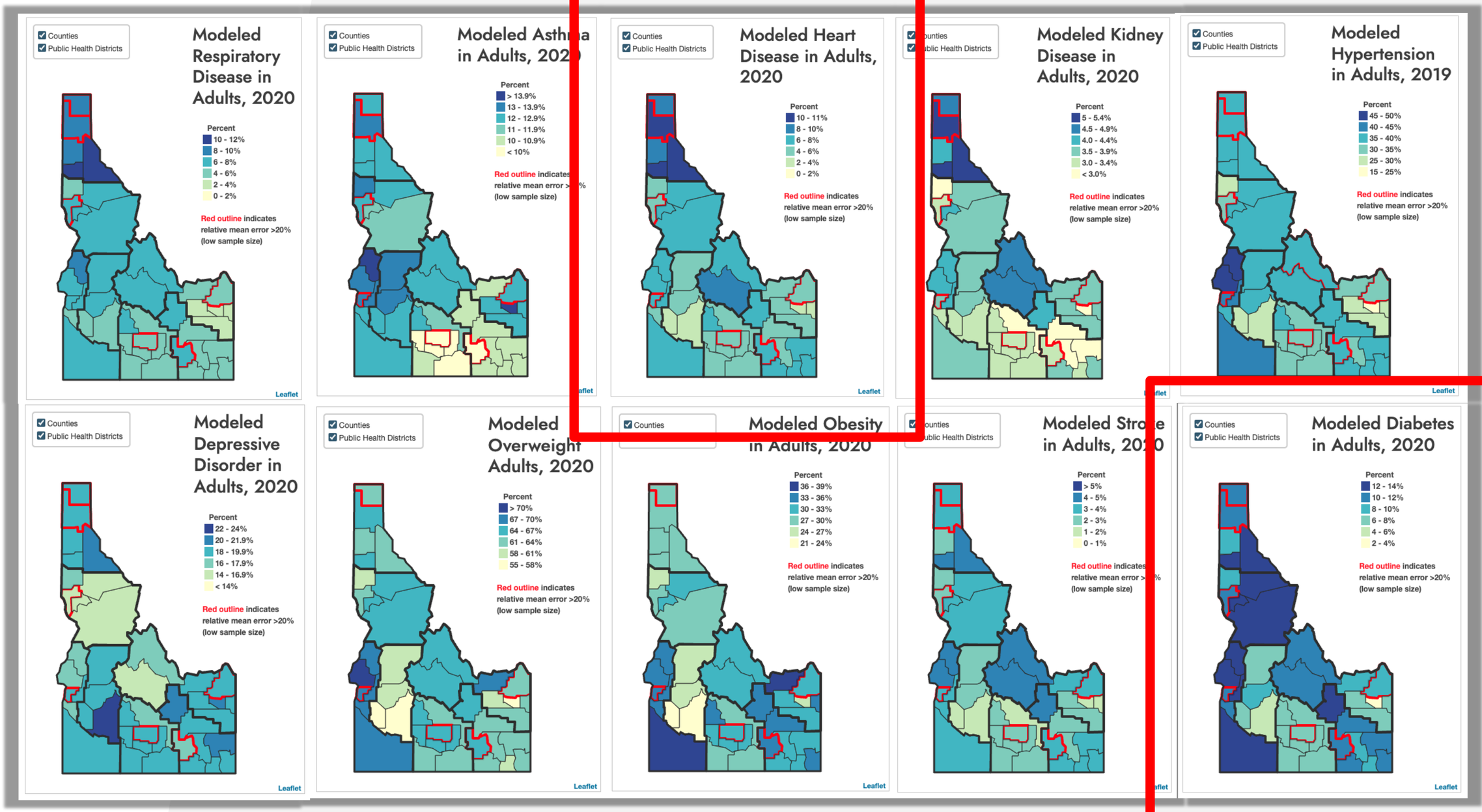
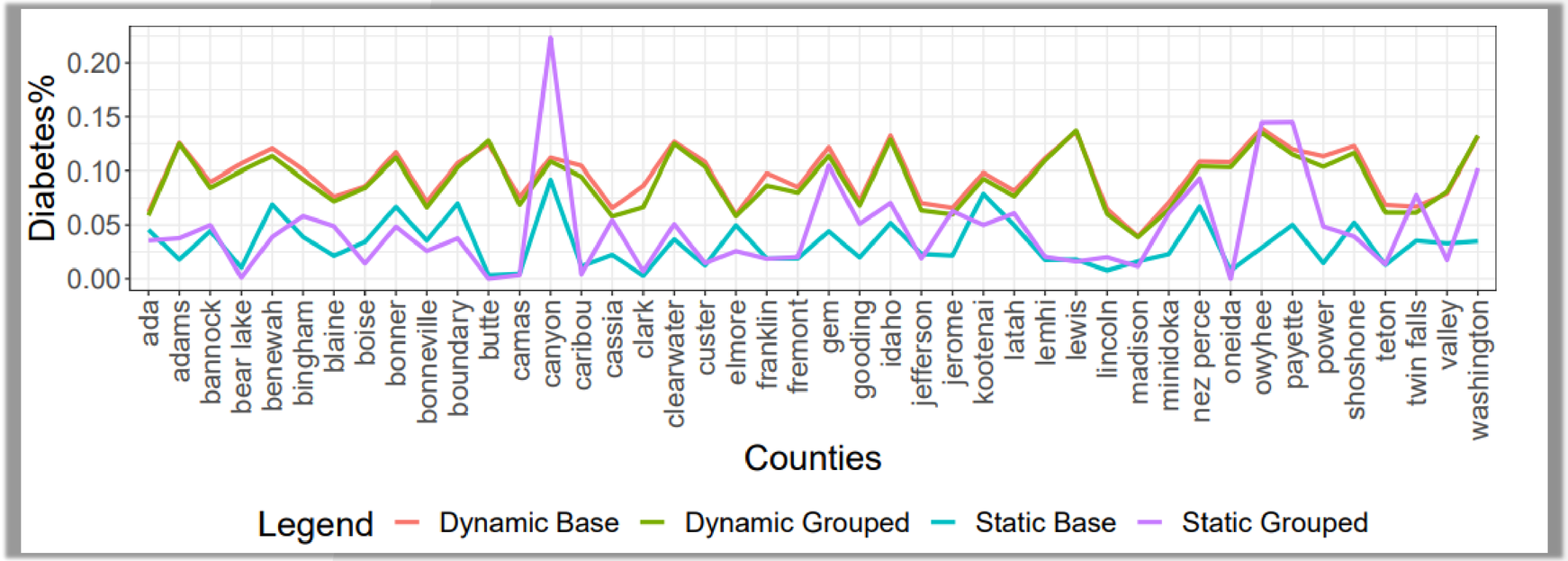
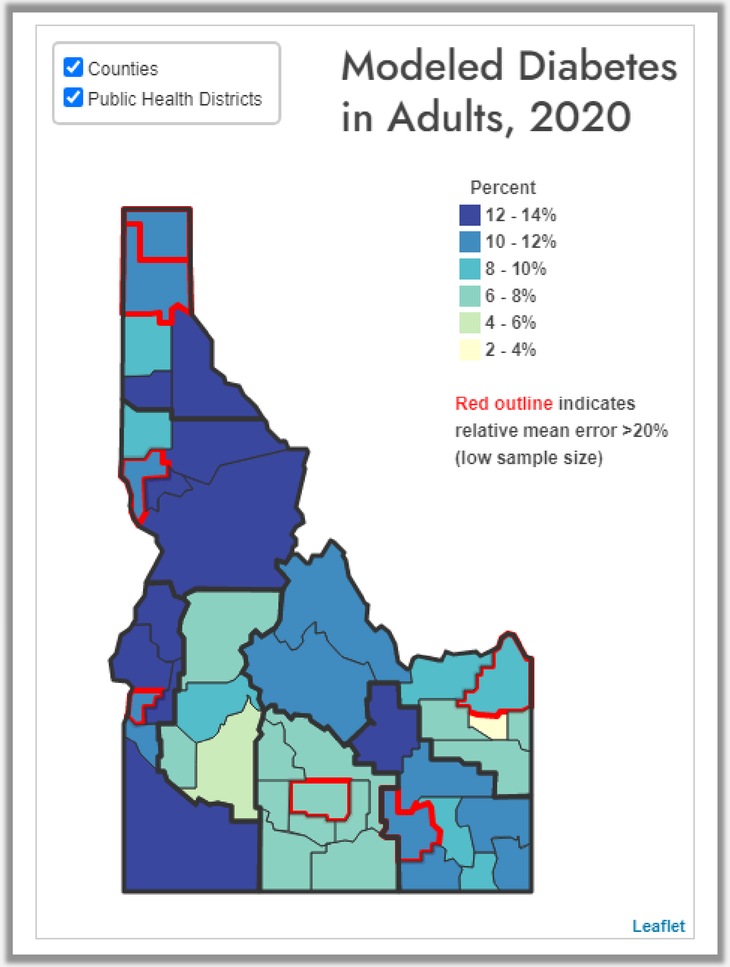


https://modelingidahohealth.org



Model Results: Diabetes



Dynamic base

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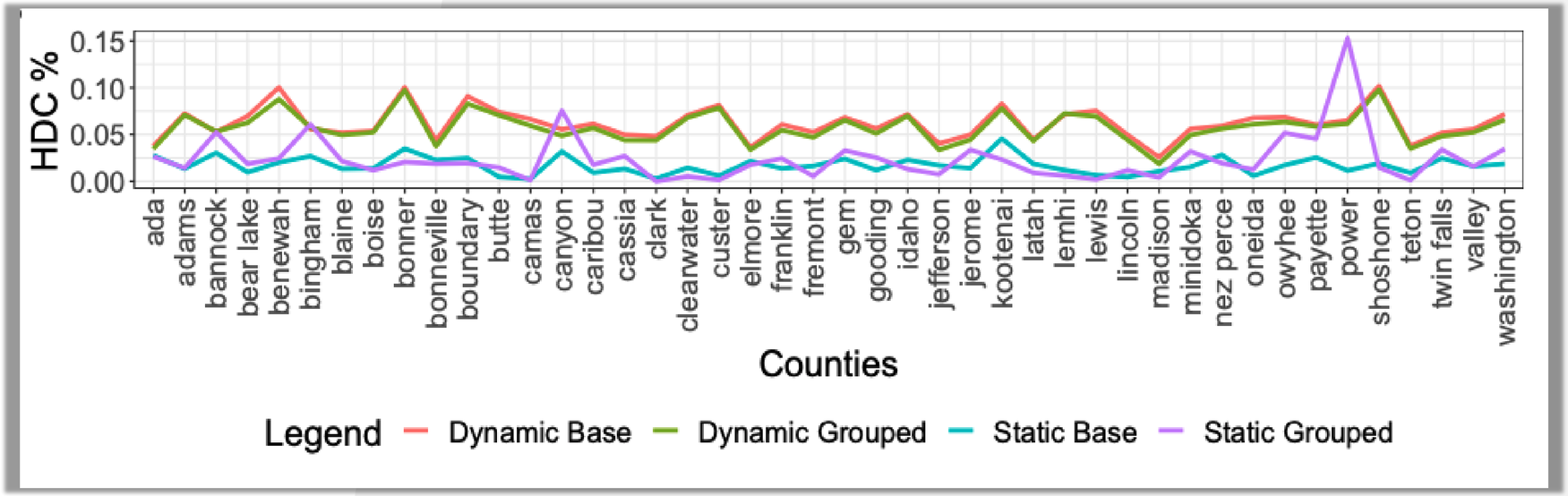
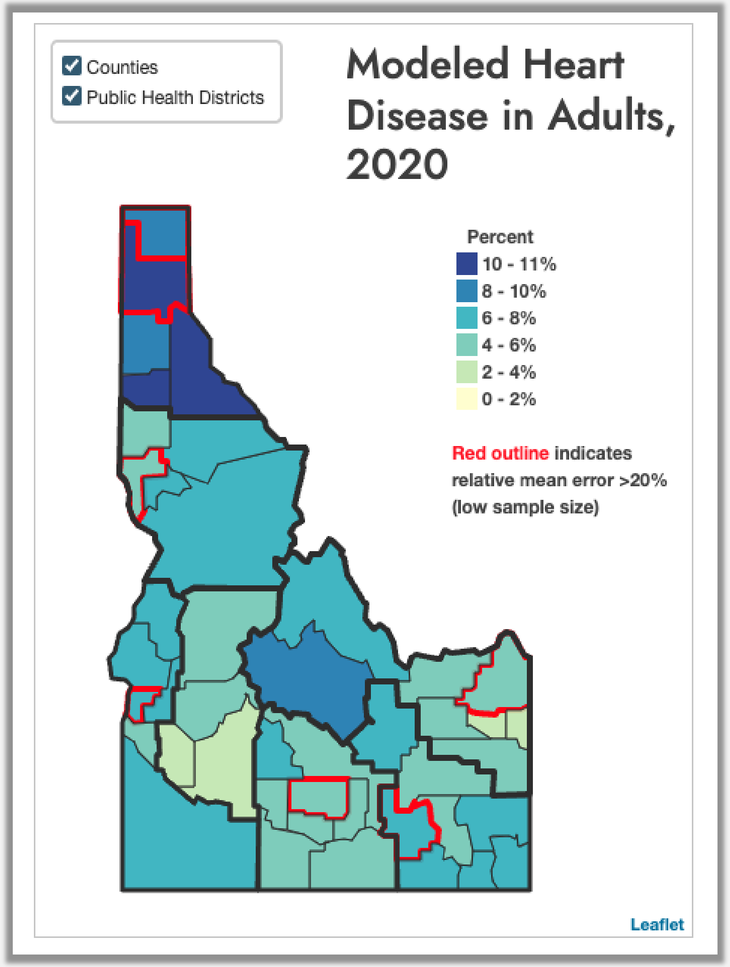


Model Results: Heart Disease



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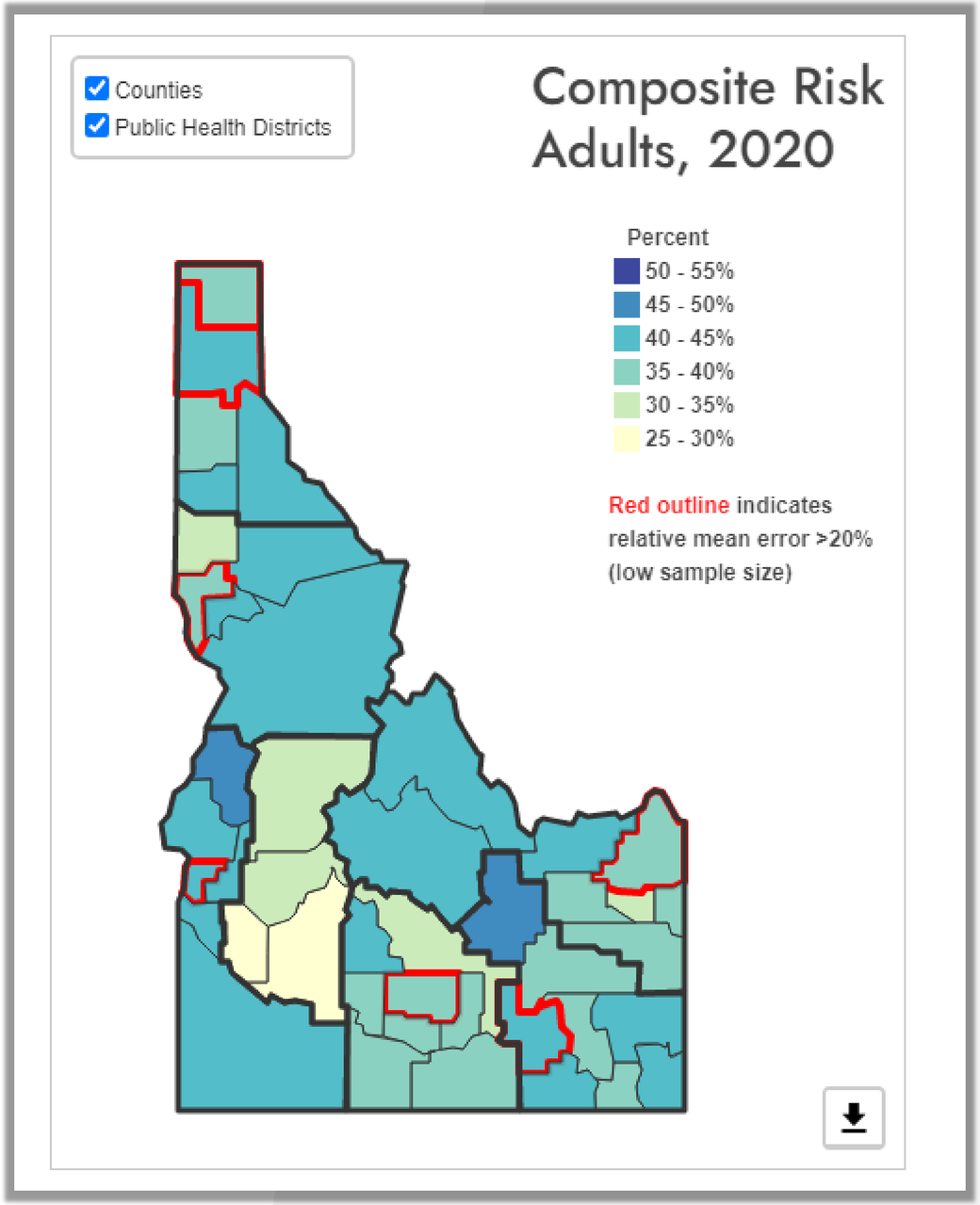
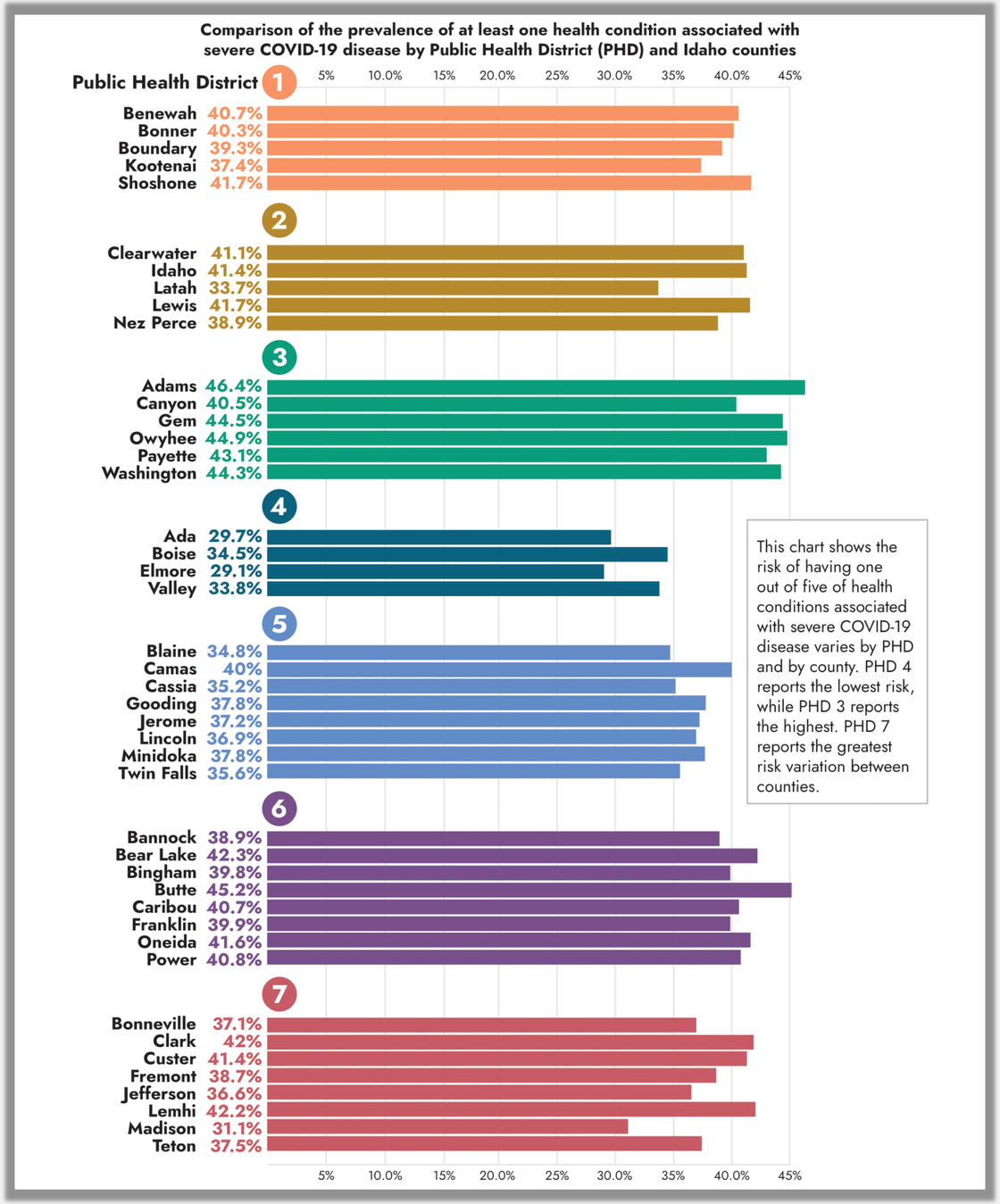
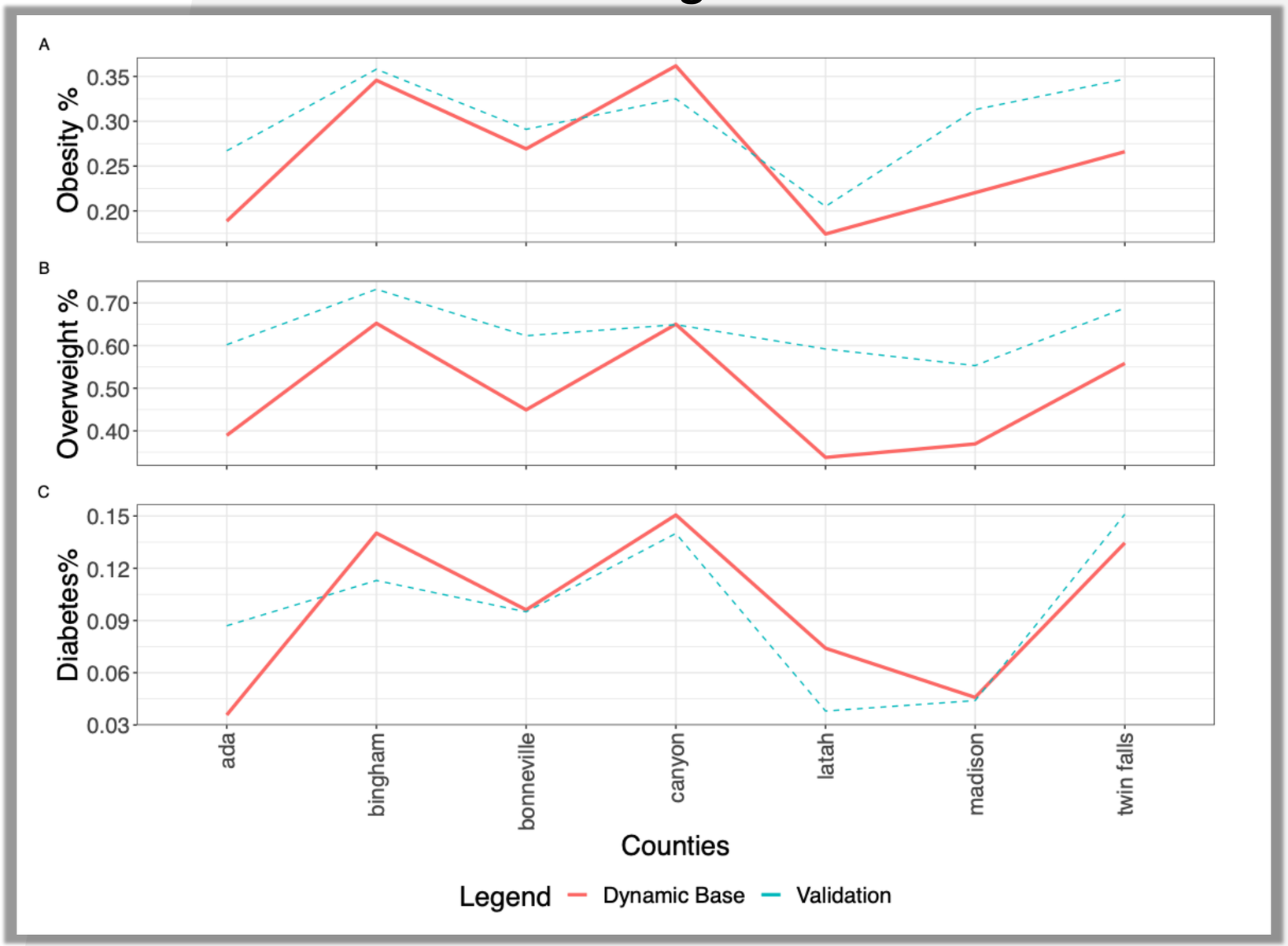




COVID Risk Prevalence 1 out of 5 health conditions

External Validation using CDC PLACES data



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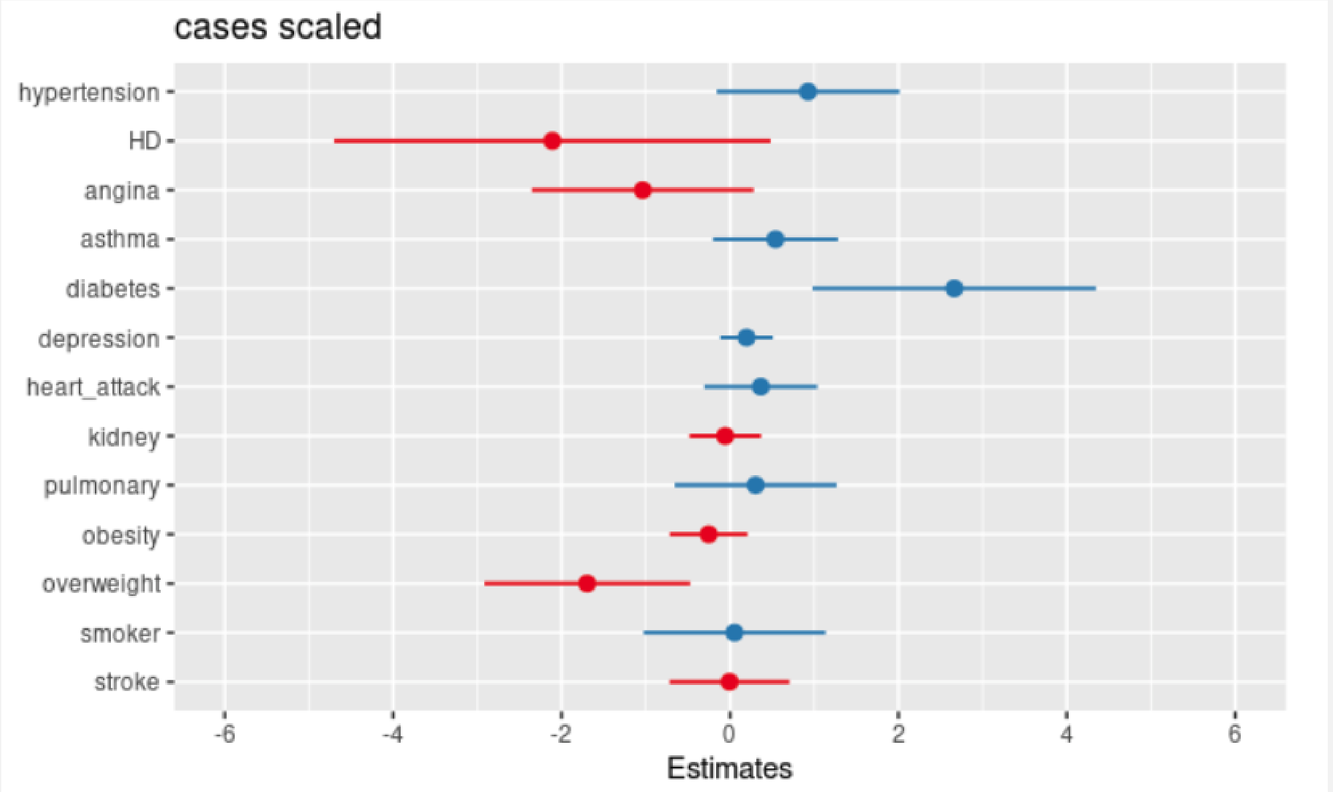
UPCOMING PROJECT: MODELING COVID SEVERITY

- Expand to 20+ covid related questions
- Will explore multi-directional models/predictability (e.g. Long COVID)
- Ensembled algorithmic models
- Spatial heterogeneity
- Deterministic vs. probabilistic



Omicron time window – cases: R2 = .49

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SUMMARY AND CONCLUSIONS

- Established an effective spatial microsimulation strategy for BRFSS data (region to county)
- Ready to apply differing secondary models to evaluate health parameters etc. with COVID outcomes (deaths, cases, hospitalizations)
- Can flip the models (are health parameters effected by Long COVID?)
- Provide data/models @ http://modelingidahohealth.org

Amenable to collaborate with regional health orgs to extend our modeling approach

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THANK YOU

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WEB SITE REVIEW

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