American Lung Association.

Development of a Radon Testing Disparity Metric

AARST International Radon and Vapor Intrusion Symposium
CRCPD National Radon Training Event
Bellevue, WA
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Director, Environmental Health

Acknowledgments

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Disclaimer: Summaries and text not endorsed by EPA, CDC, or Census Bureau.

Acknowledgments

- Specifically, the following coauthors:
  - **Grant D. Brown, PhD** and
  - **Jacob Seedorff, MS**

    both of Department of Biostatistics, College of Public Health, University of Iowa
  - **R. William Field, PhD** of College of Public Health, University of Iowa and Vagelos College of Physicians and Surgeons, Columbia University

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- My work on behalf of the Lung Association was overseen by **Katherine Pruitt,** National Senior Director for Policy.

Starting Points

Paramount Context

- *Everyone deserves clean air.*

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- *The only way to know one's radon exposure is to test.*

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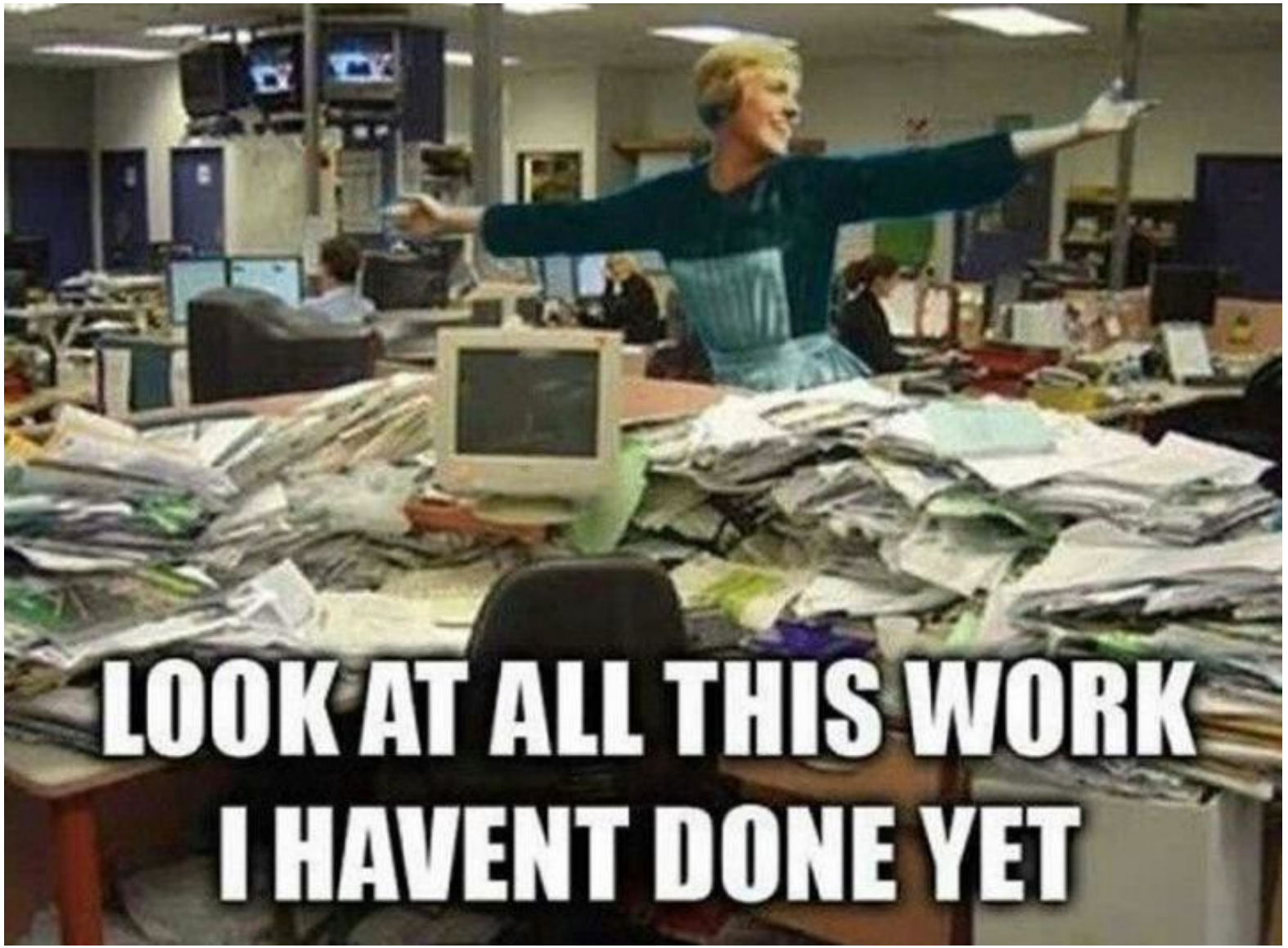
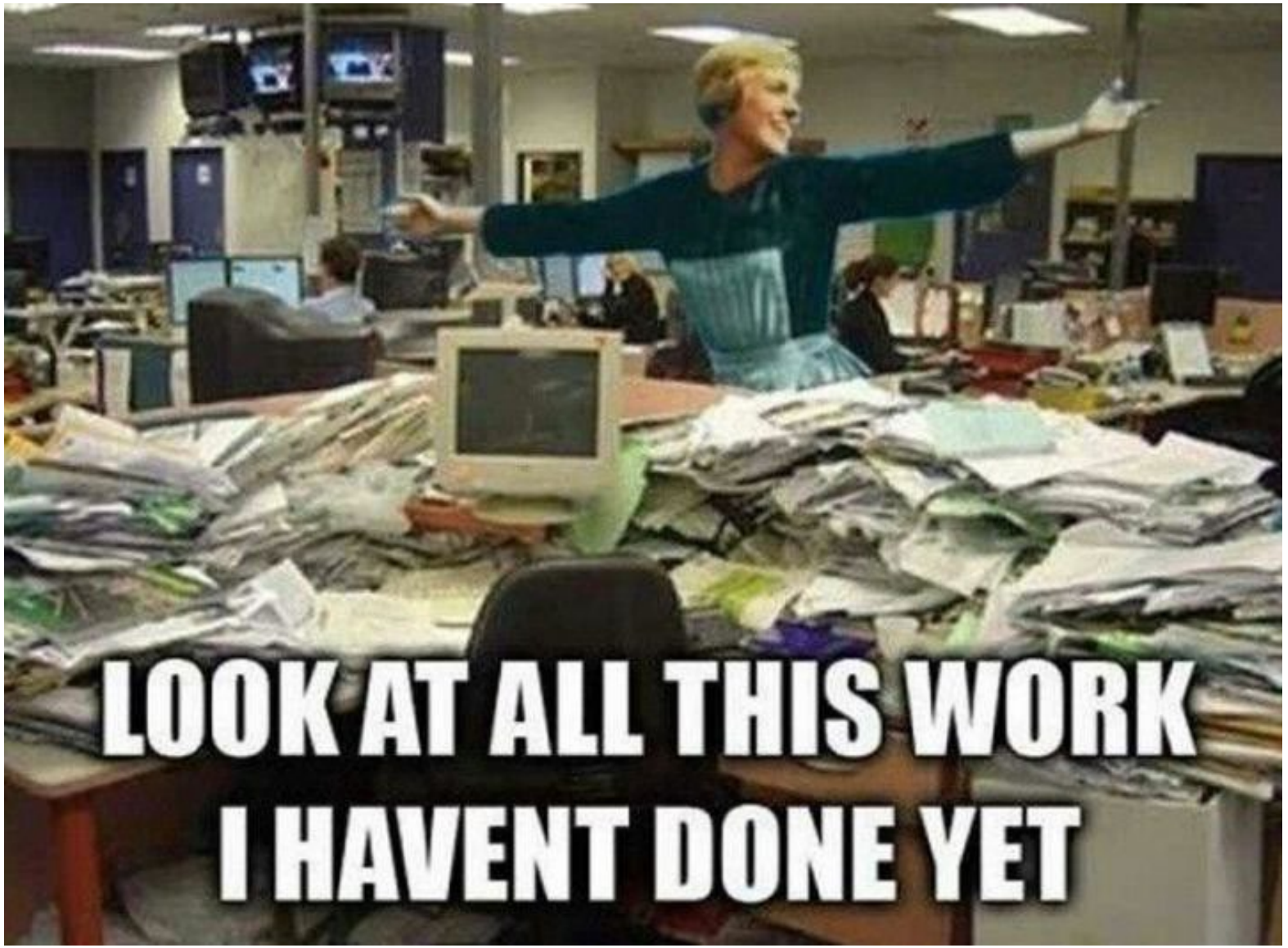
- *Everyone deserves clean air.*
- *The only way to know one's radon exposure is to test.*
- *Therefore, all indoor environments should be tested, and fixed as needed.*

The Problem of Resources



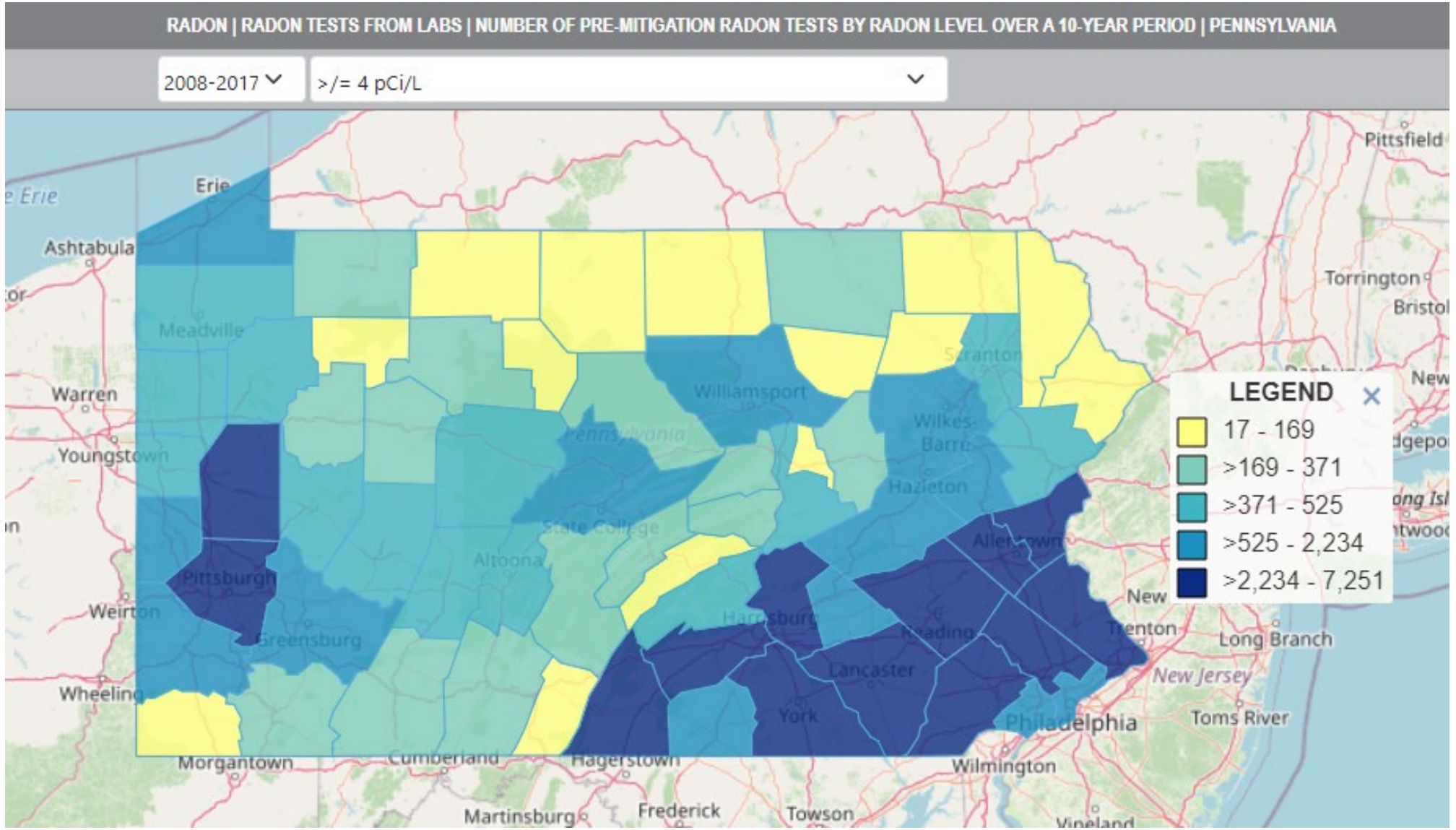
The Problem of Resources

STAFFING?



FUNDING?

For Countrywide Use, CDC NEPHT Network



Many Ways to Use the Data

- One set of approaches has been to look for areas with
  - highest radon results,
  - highest averages,
  - highest fraction of results at least 4 pCi/L.

Many Ways to Use the Data

- Another way has been to pay attention to areas with
  - poor testing counts
  - lower rates of testing
    - by population
    - by housing.

Observations

- Limitations to looking at these data sets separately:
  - Focusing on radon-level statistics risks ignoring areas with poor testing rates.
  - Focusing on testing rates risks missing areas with worse radon.

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- Limitations to looking at these data sets separately:
  - Focusing on radon-level statistics risks ignoring areas with poor testing rates.
  - Focusing on testing rates risks missing areas with worse radon.
- Apparent that there are disparities in testing rates vs. expected average radon levels.

Suggesting an Additional Tool

Proposing a Solution

- Taking both radon levels and radon testing rates into account *with a single measure*.

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- *Add* a tool to the toolbox.

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- Taking both radon levels and radon testing rates into account *with a single measure*.
- *Add* a tool to the toolbox.
- CDC system architecture very helpful.

Basis for Alternatives

- In each county:
  - R = mean pre-mitigation radon level
  - H = number of housing units
  - N = number of radon tests (using CDC's 10-year period)

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  - N/H is a measure of the testing rate
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- We'll set
  - D = Radon Testing Disparity Metric

Some Proposed Alternatives

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- Experimented with some forms:
  - First attempt was **D = R * H/N**.

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    D = R * (H – N) / H = **R * (1 – N/H)**.

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  - Also looked at a strict "undertesting ratio":
    D = R * (H – N) / H = R * (1 – N/H) → Since N/H is almost always very small, **the value simply strongly reflected R.**

The Alternative Selected

- Basis for the new metric: $$D = R * log_{10}(\frac{H}{N})$$

  In each county:

  - D = Radon Testing Disparity Metric
  - R = mean pre-mitigation radon level
  - H = number of housing units
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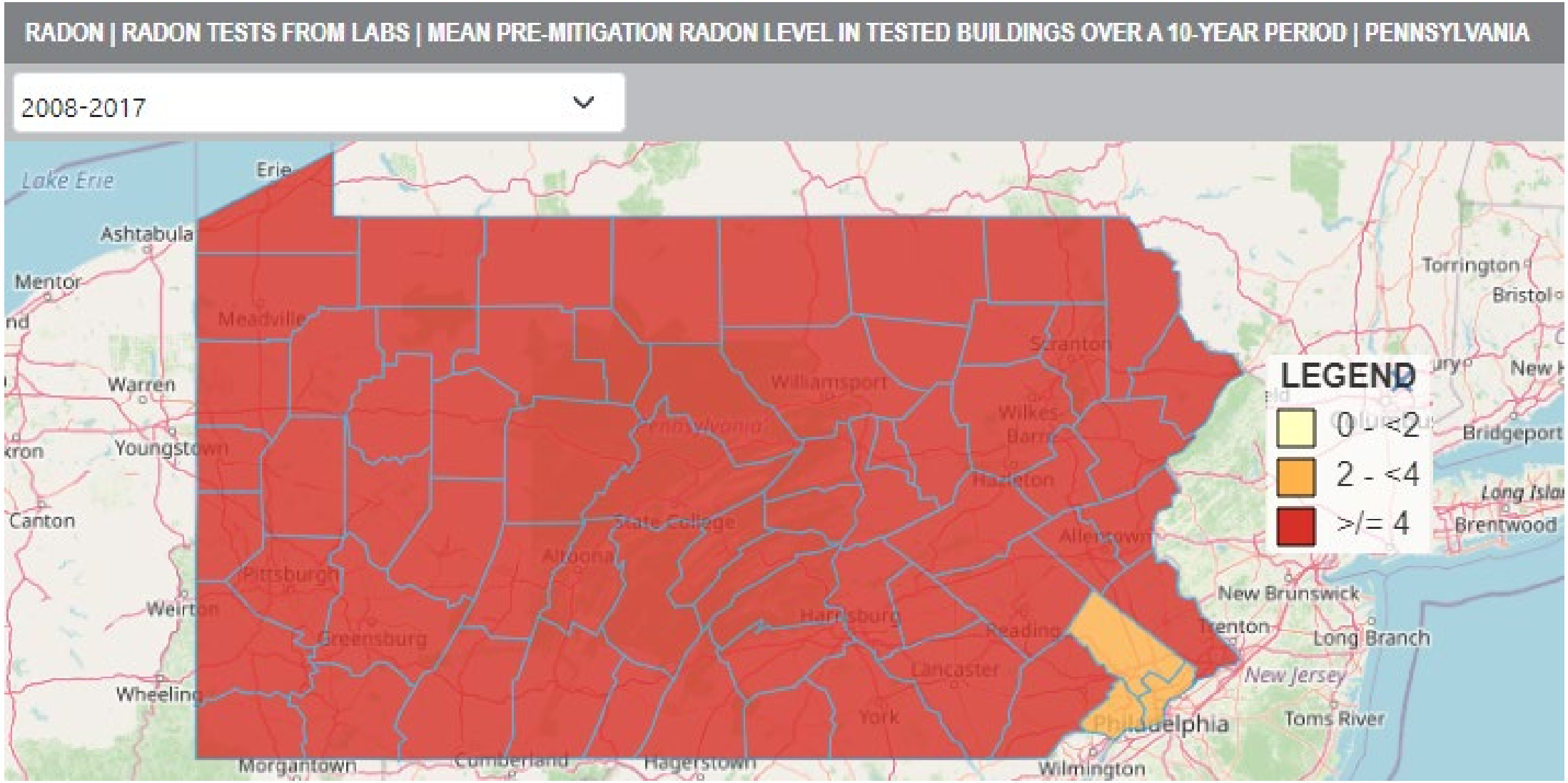
Important Caveat

- The purpose here is to show how such a metric might provide inspiration for further or different public outreach efforts.
- It is NOT to disparage any state's work to address radon, often under very difficult circumstances.

Sample Cases

CDC NEPHT Data (PA County Radon Averages)



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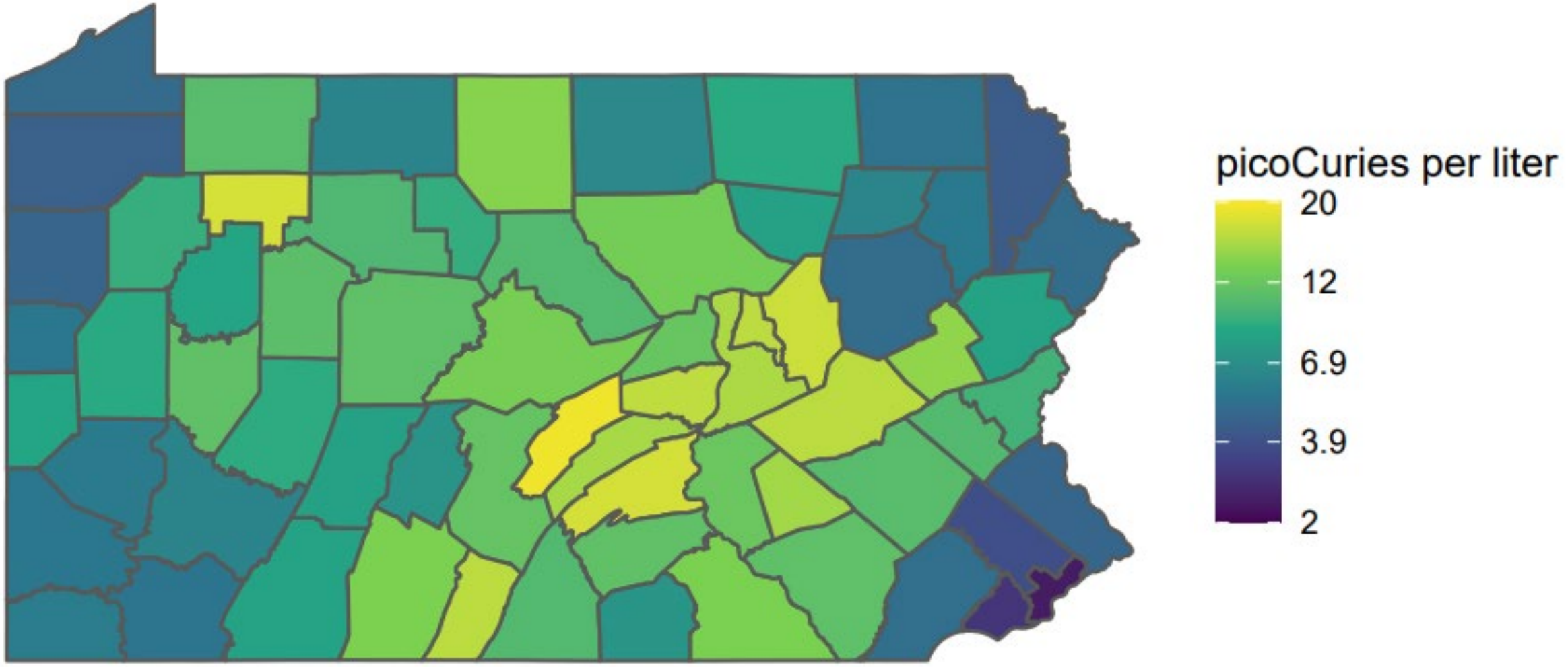

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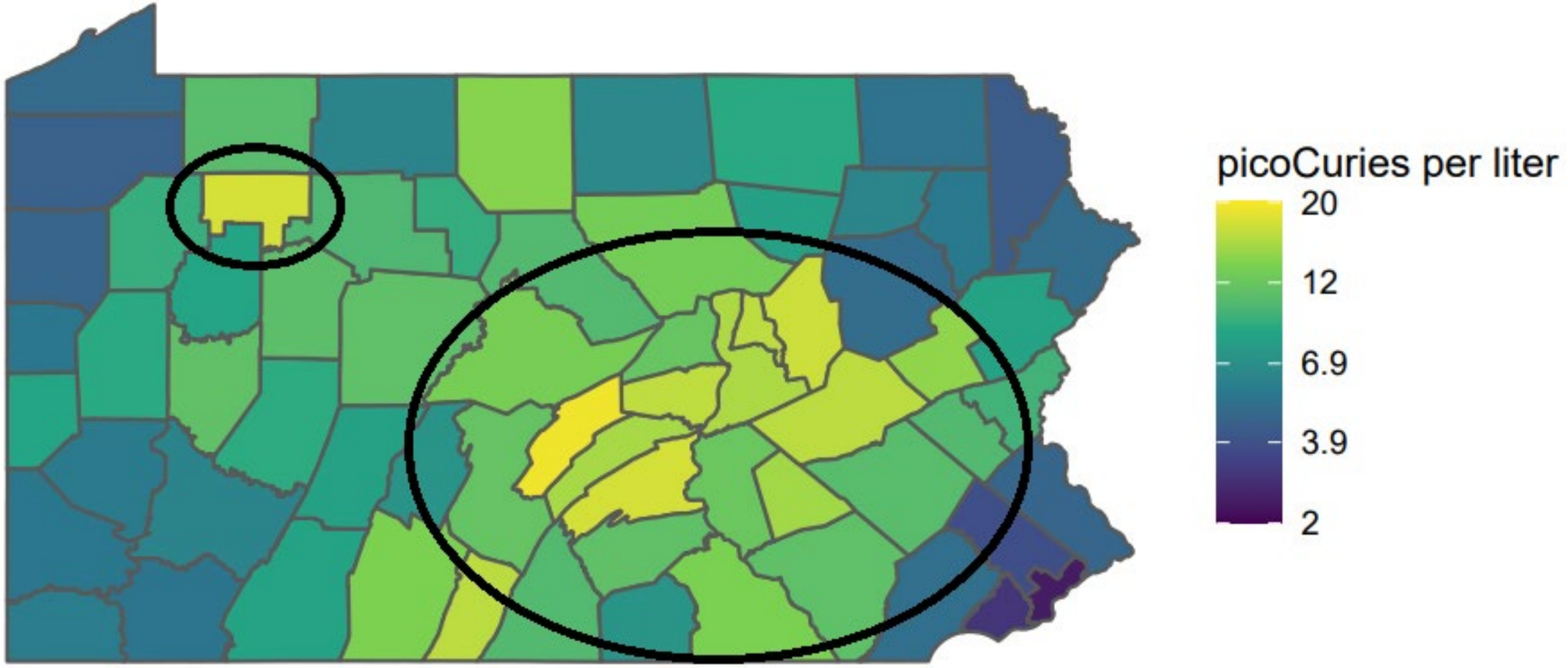

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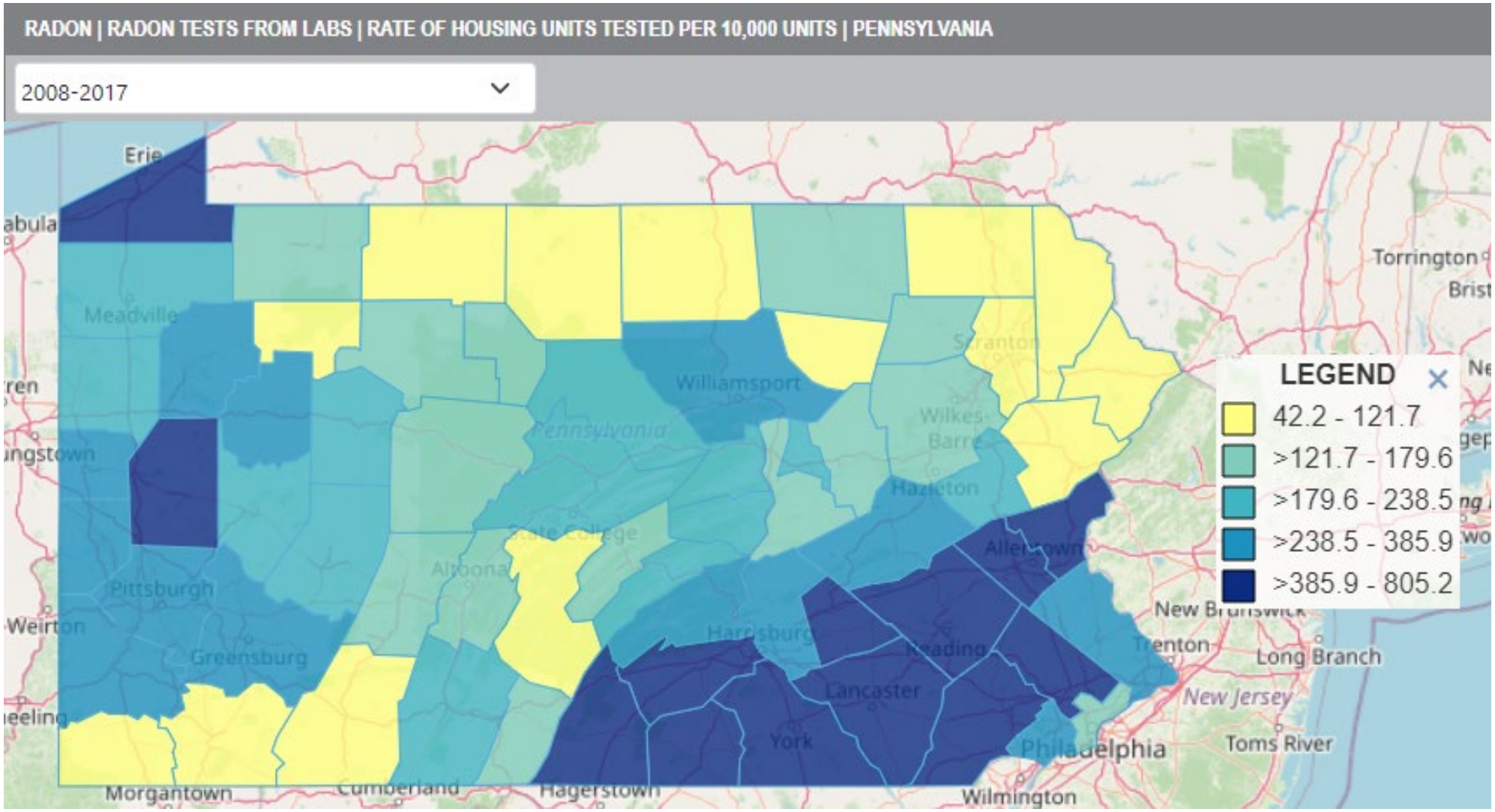

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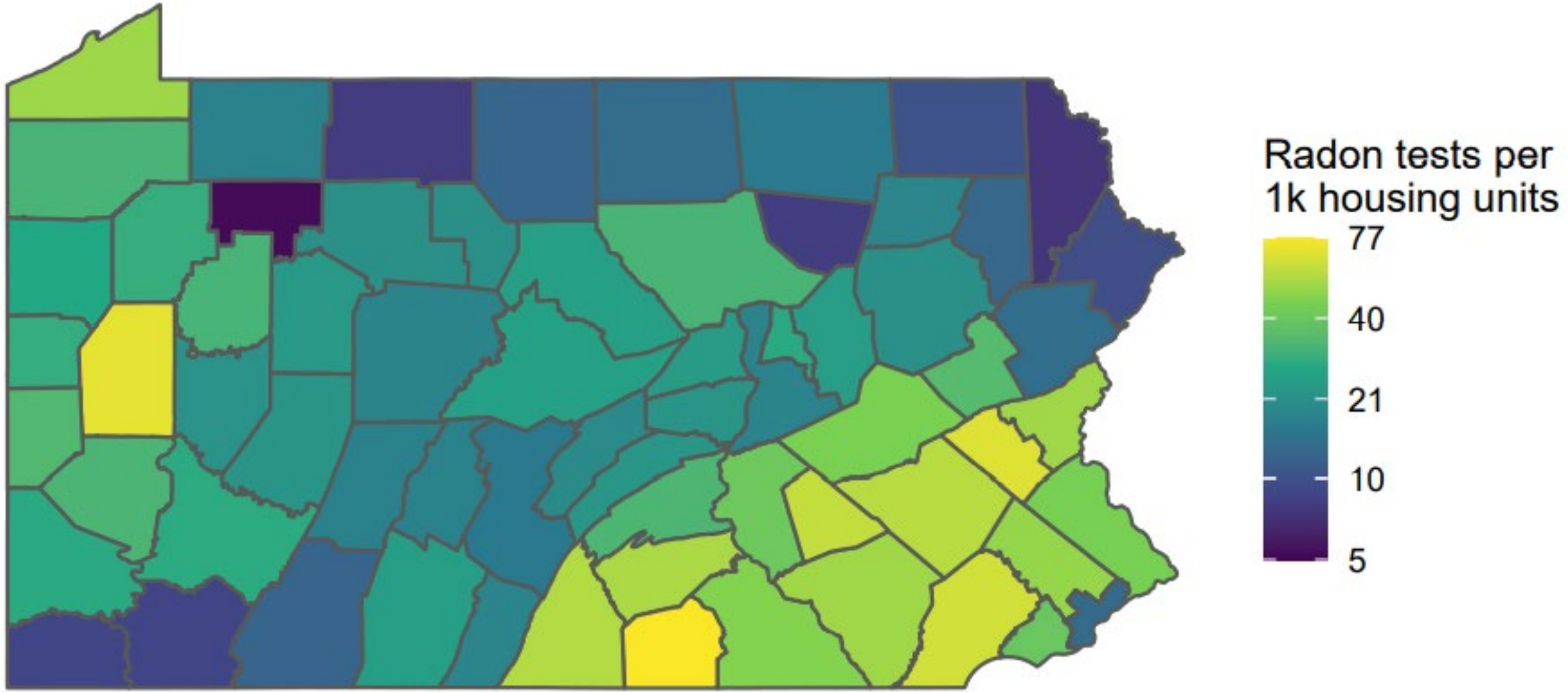

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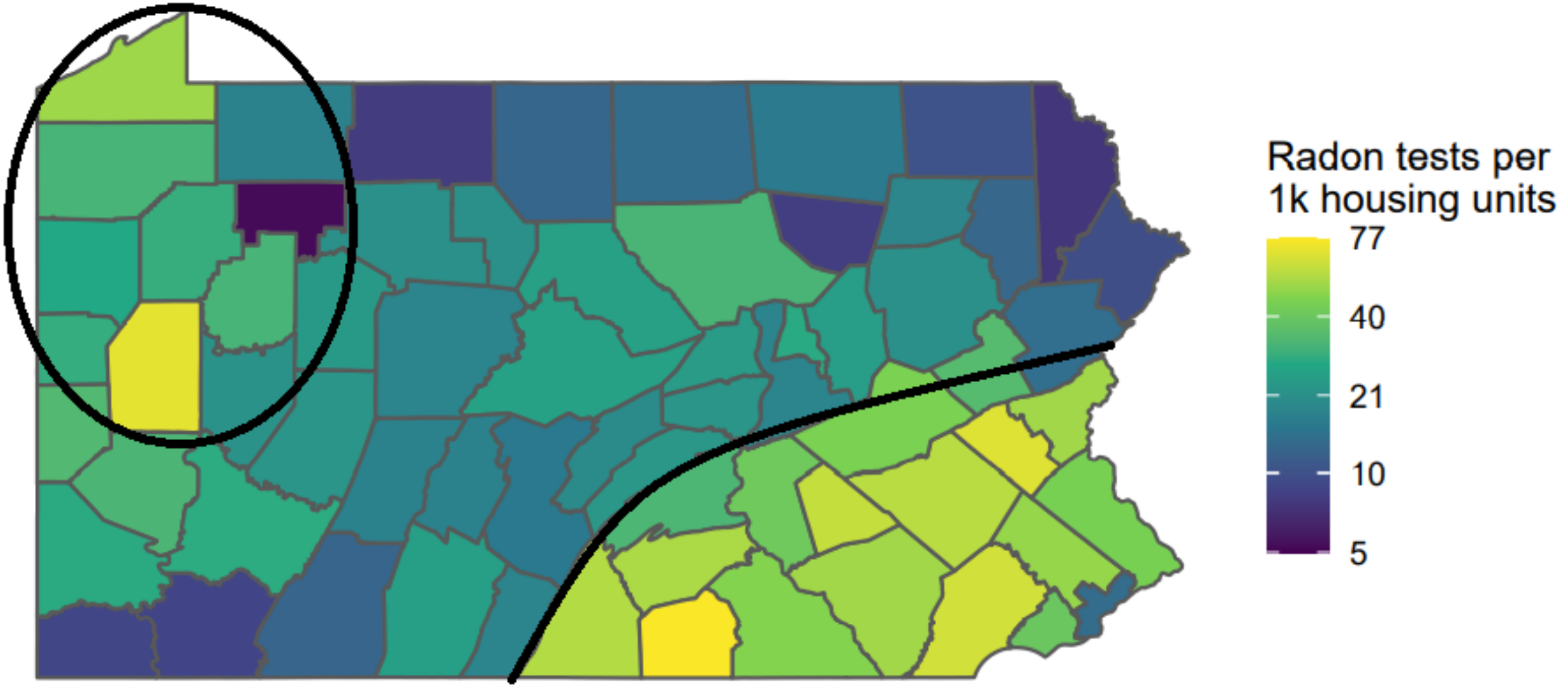
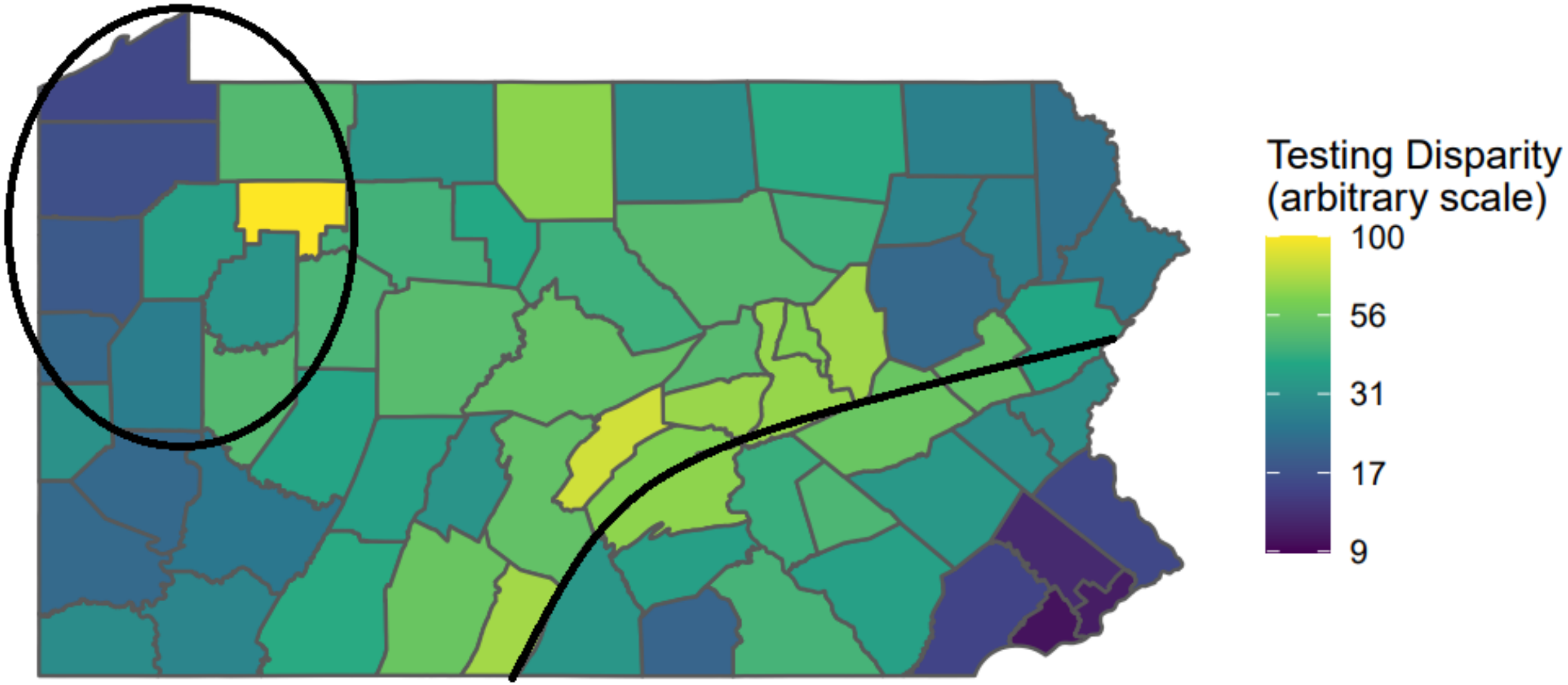


Combined Metric (PA Radon Testing Disparity)



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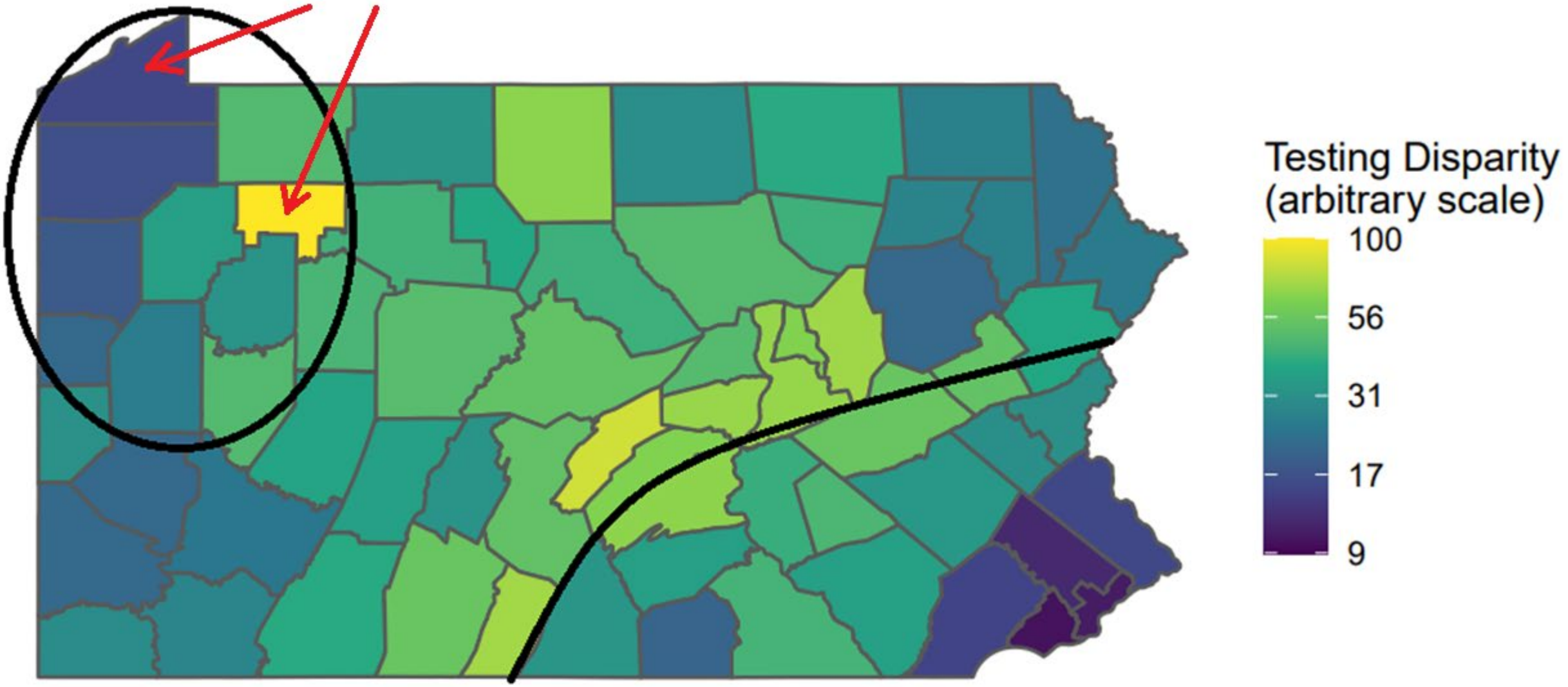

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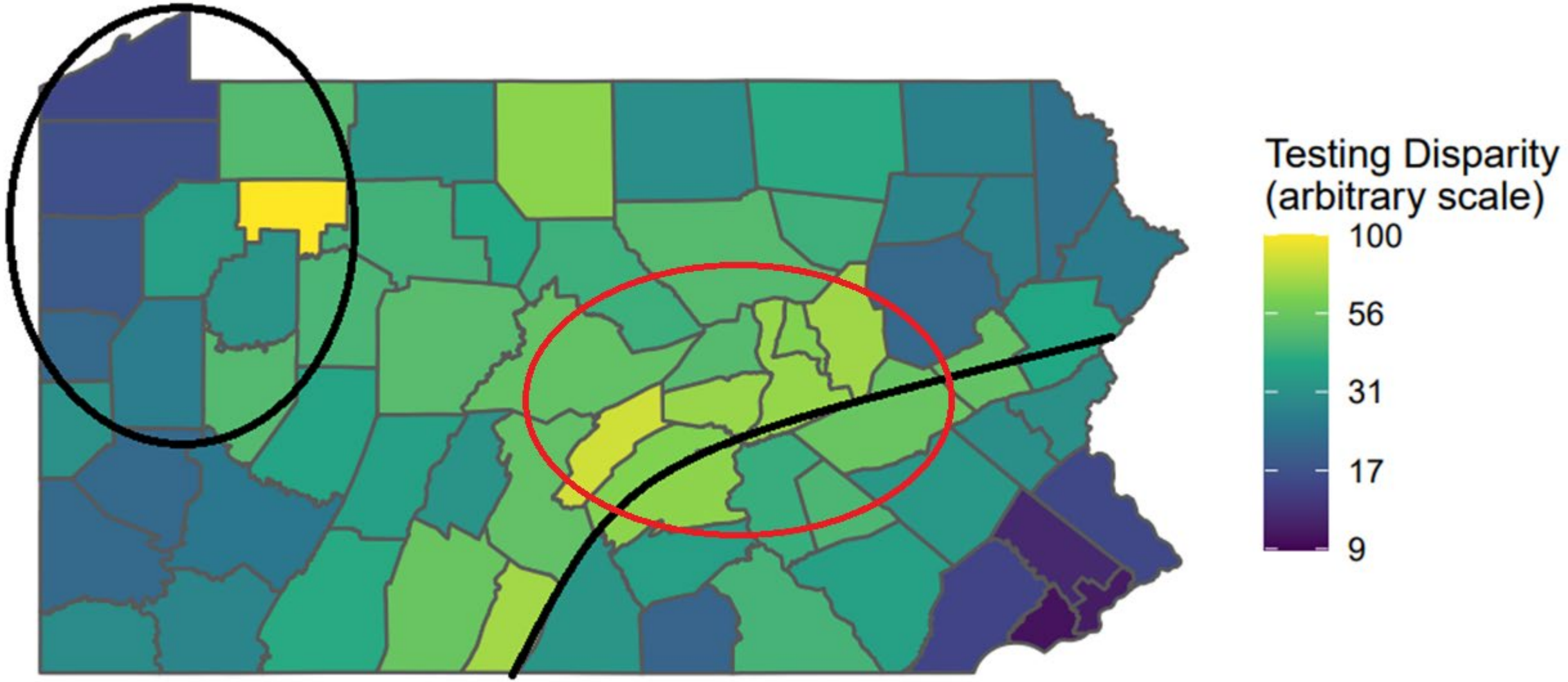
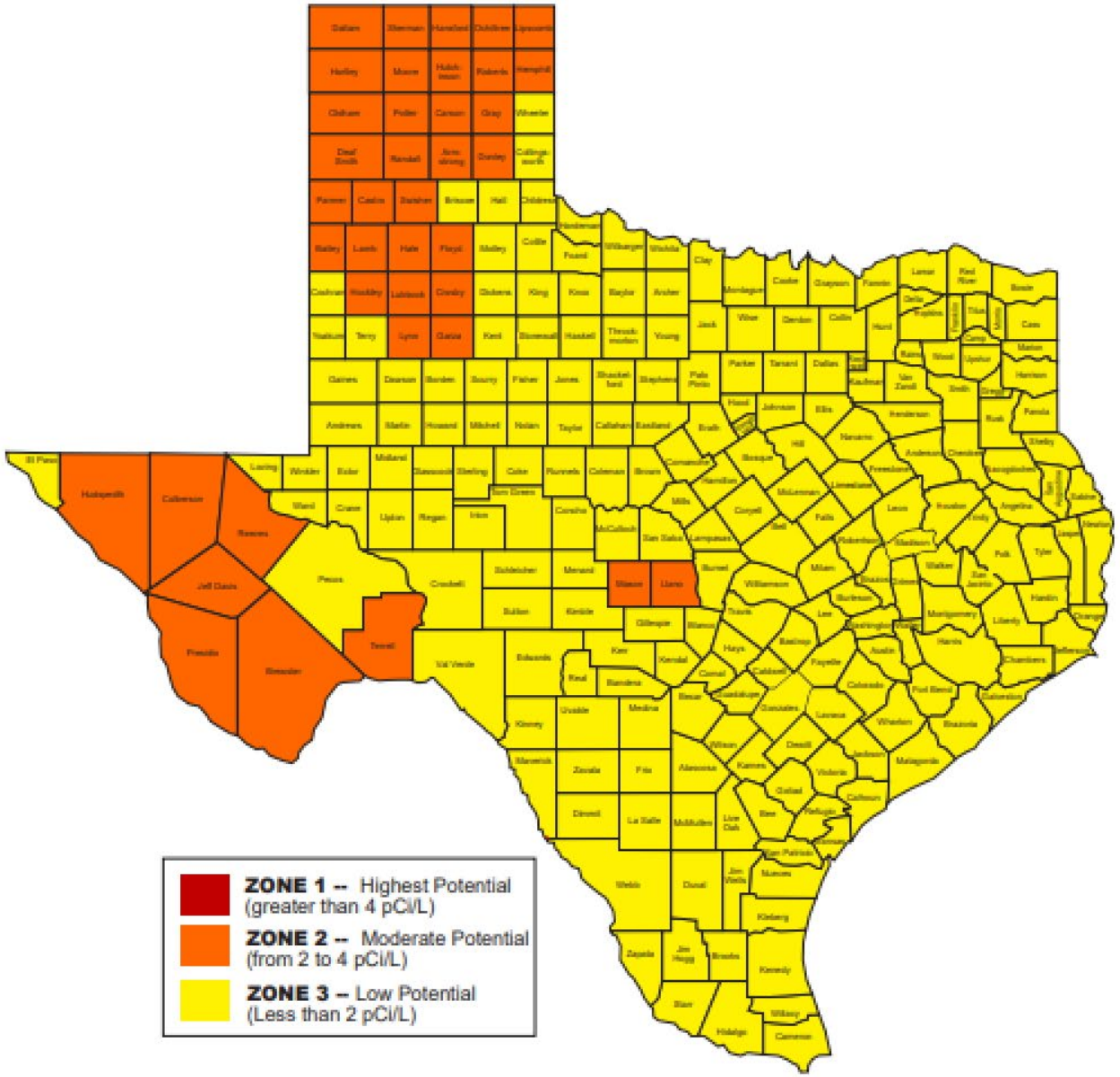
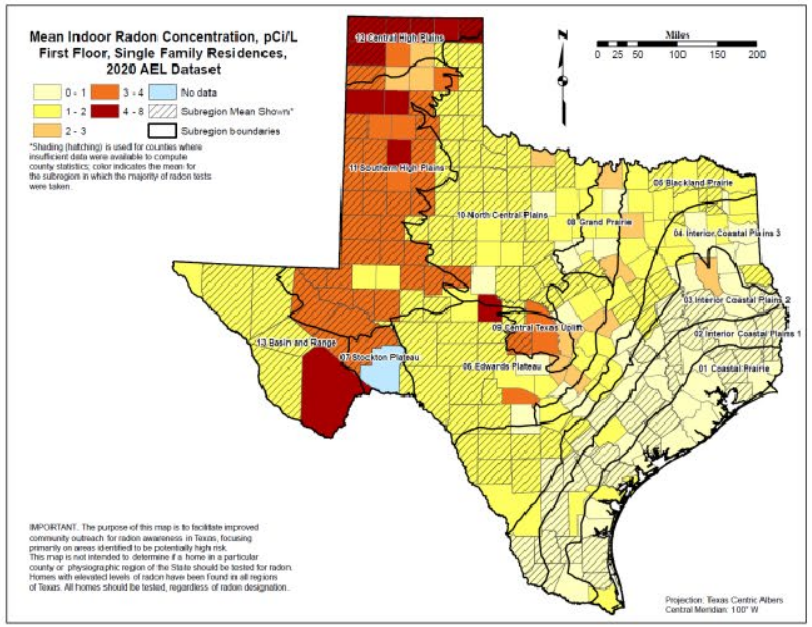
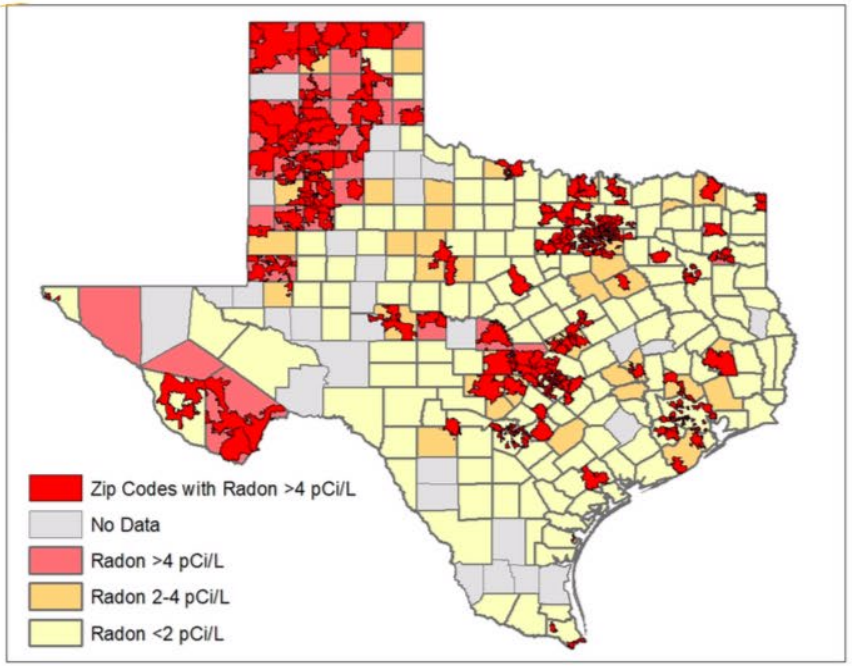


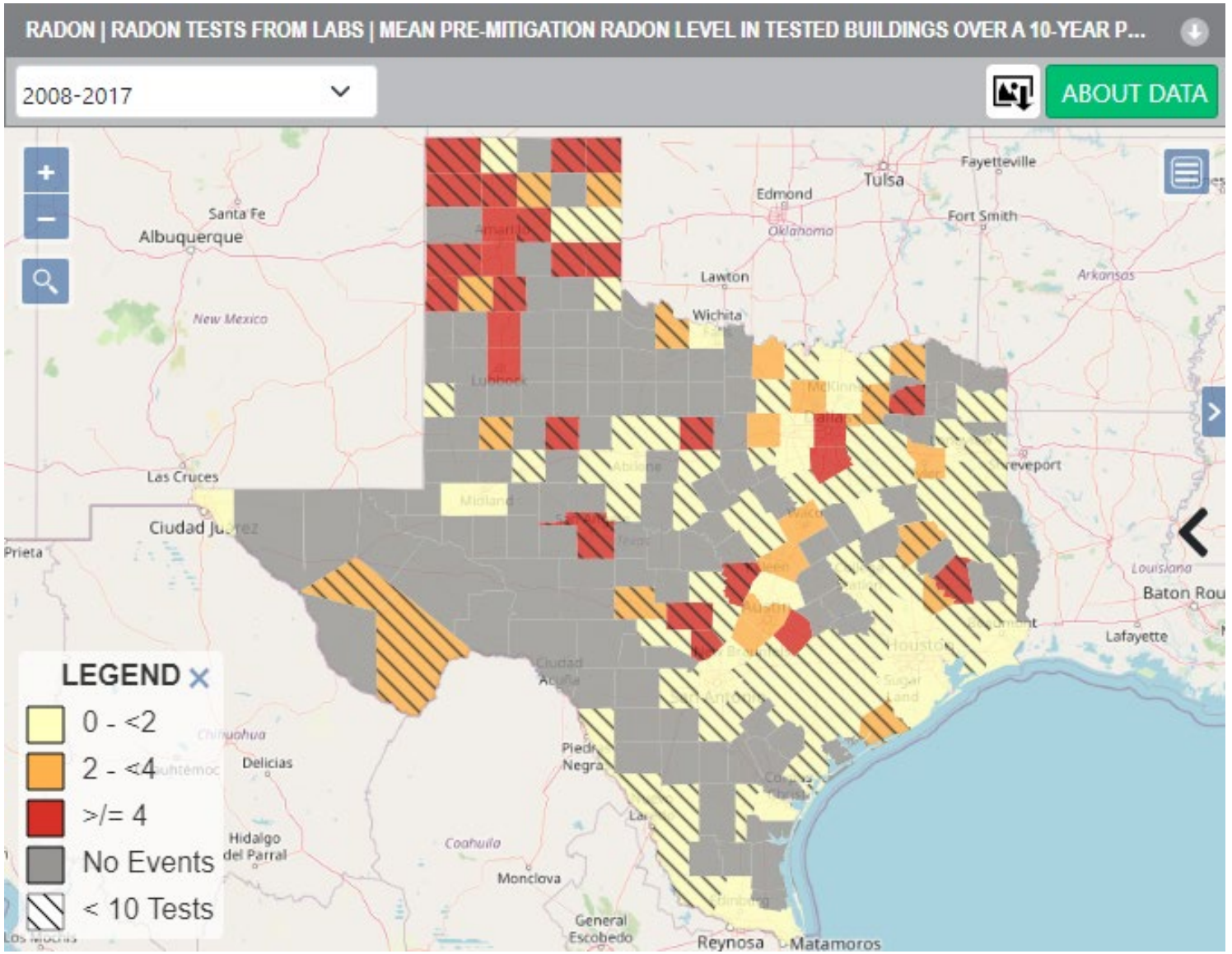
TEXAS MAP OF RADON ZONES







CDC Data (TX County Radon Averages)



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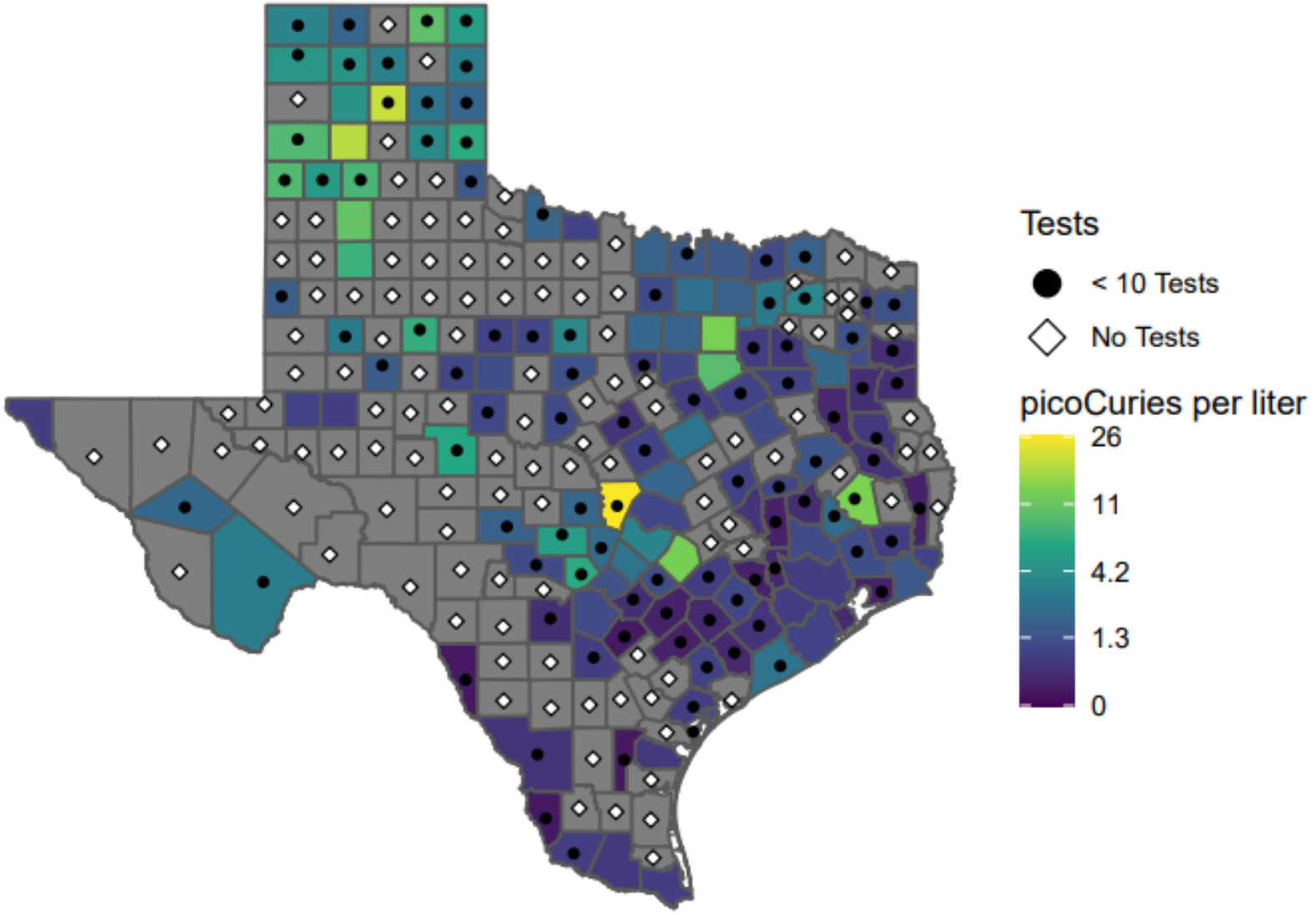

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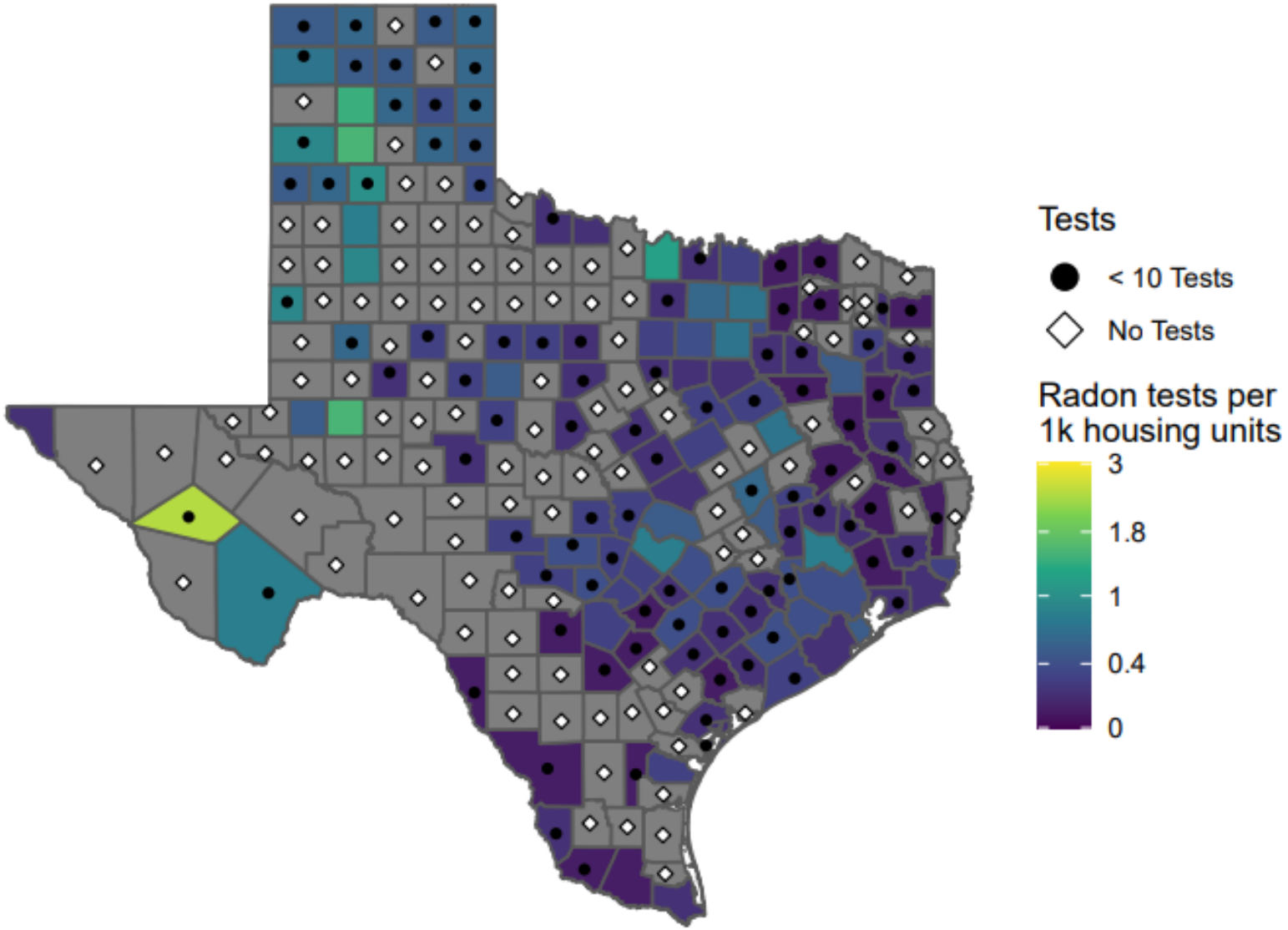

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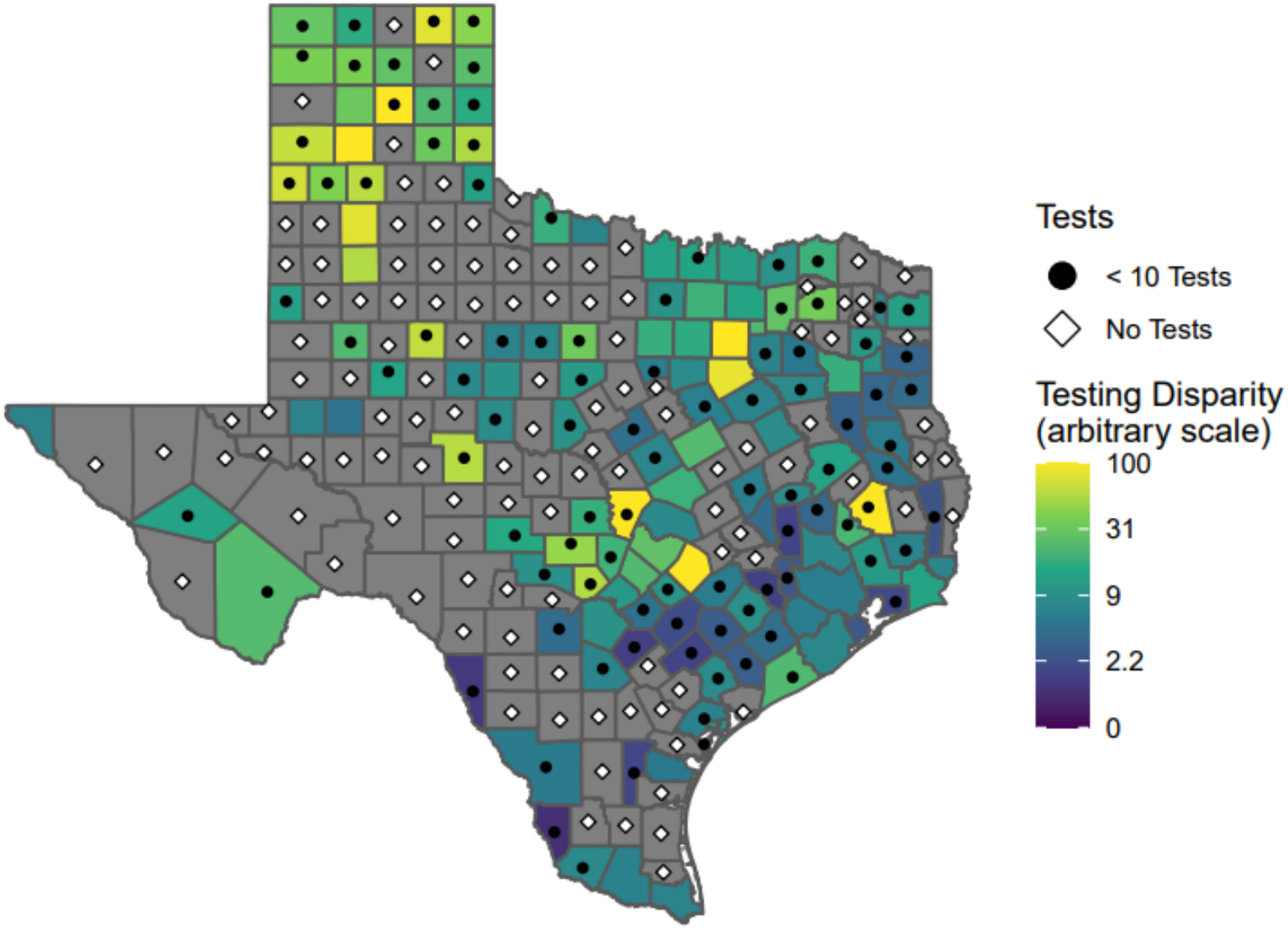

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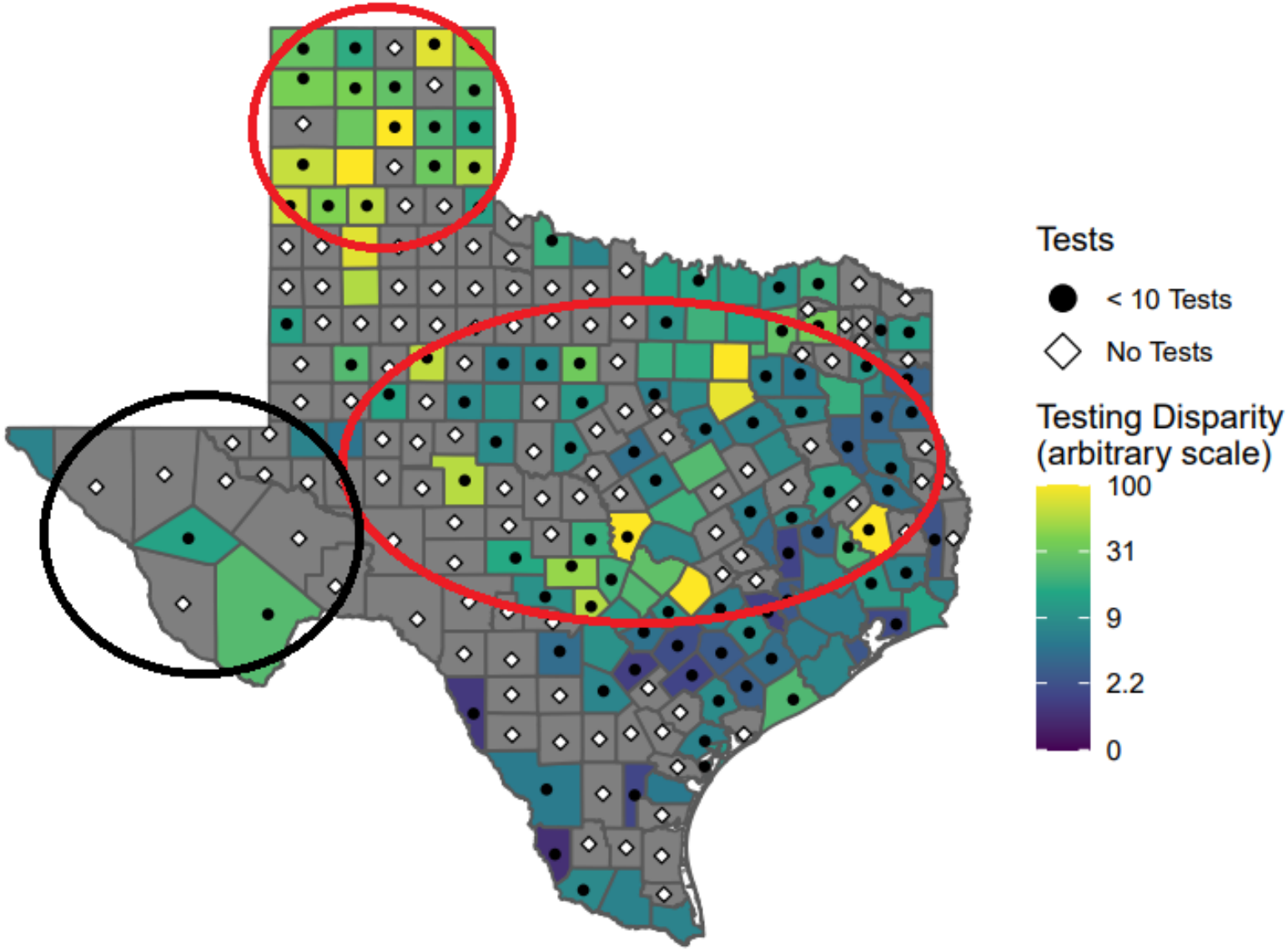
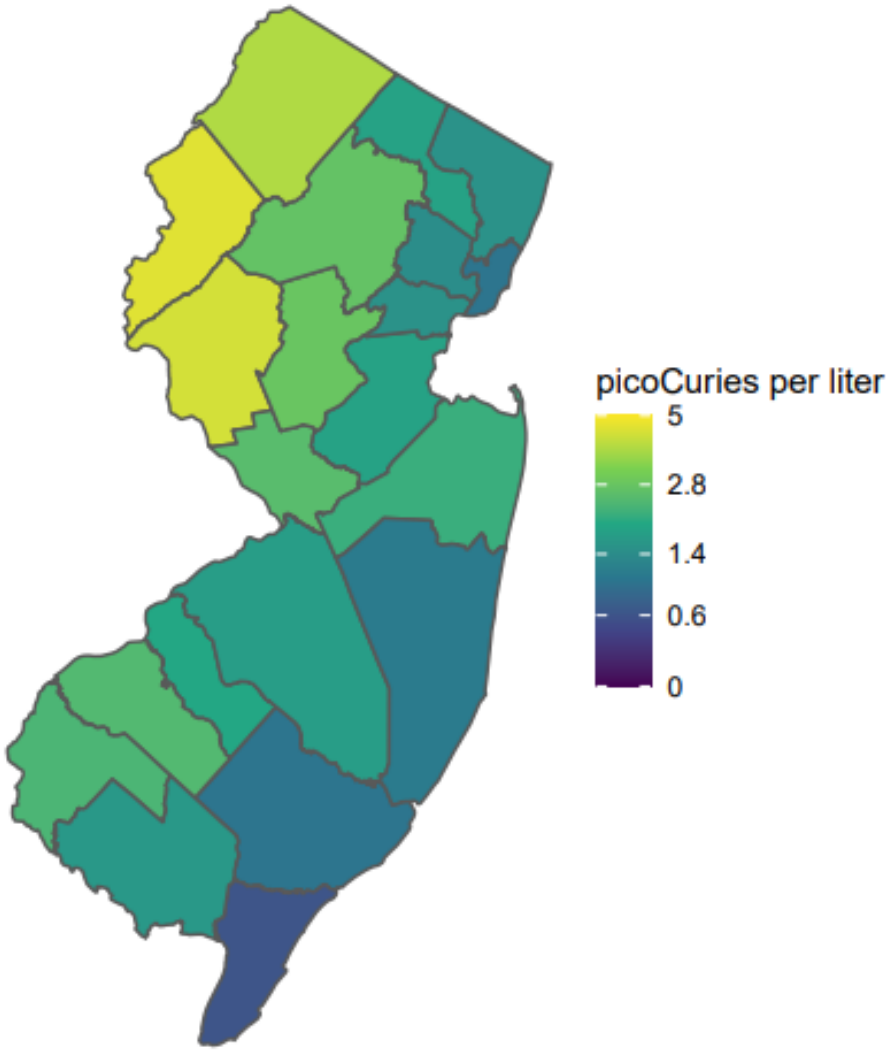
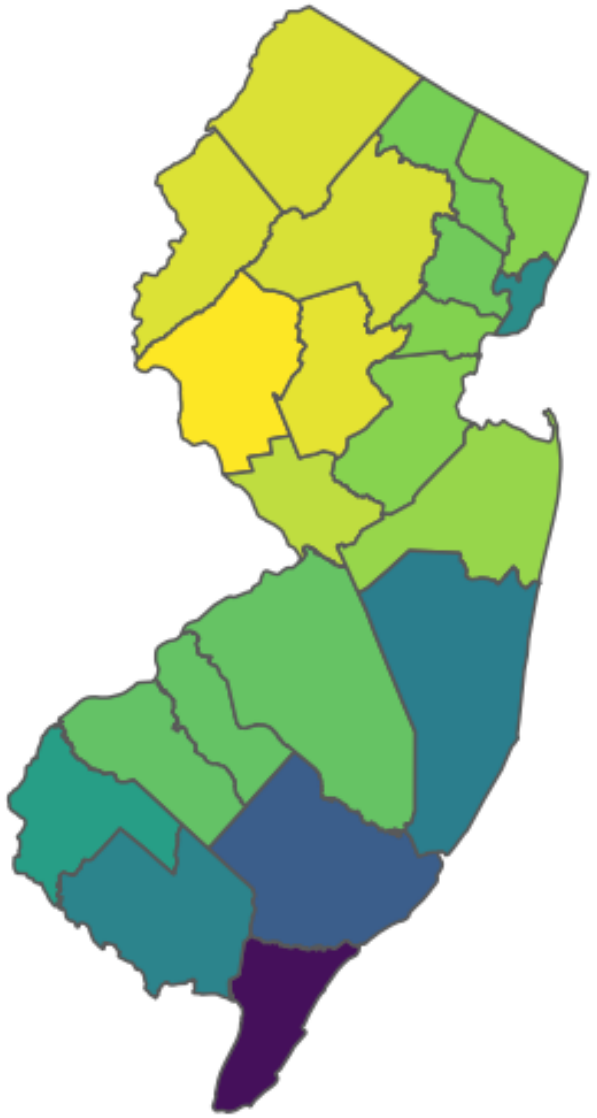


CDC Data (NJ County Averages and Testing Rates)



picoCuries per liter
5
2.8
1.4
0.6
0



Radon tests per
1k housing units
590
194
63
20
6

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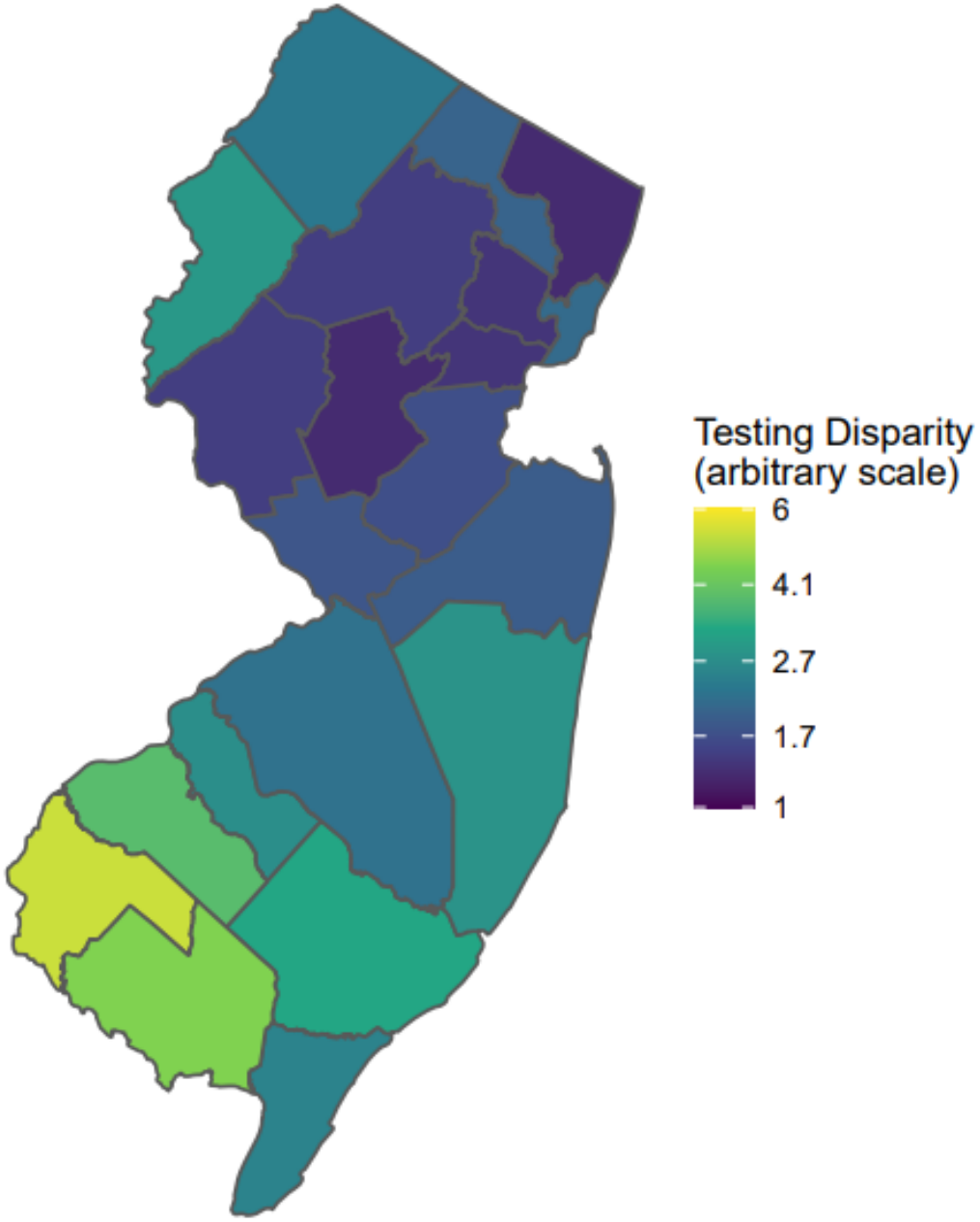

Next Steps

Essential Perspectives

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- Users can access the background information at GitHub links in the reports.

State TEXAS	County Name	Housing Units	Raw Testing Disparity	Smoothed Testing Disparity	Raw Mean Radon Level	Smoothed Mean Radon Level	Raw Test Count	Smoothed Test Count
	Blanco County	5866	0.69346241	18.7342725	0.2	2.183099403	2	1.965531733
	Borden County	394	NA	27.13505697	NA	3.186041841	NA	0.163037647
	Bosque County	9805	NA	9.057347201	NA	1.055026417	NA	2.177463085
	Bowie County	40202	NA	13.8963929	NA	1.466141899	NA	5.021883693
	Brazoria County	142608	3.28409452	7.50761877	0.9	0.900492388	32	32.85137984
	Brazos County	94330	1.98153119	4.194048446	0.6	0.603830883	47	45.62980332
	Brewster County	5575	10.6902286	23.24416655	3.4	3.025676836	4	4.468507242
	Briscoe County	957	NA	42.0332954	NA	5.207812394	NA	0.627873043
	Brooks County	3237	NA	4.676589319	NA	0.54556996	NA	0.299721591
	Brown County	19355	3.98576318	9.484602616	1	1.068648344	2	3.328863636
	Burleson County	9315	NA	6.575574766	NA	0.868941726	NA	3.933742998
	Burnet County	23943	132.881428	235.5797226	37.6	25.7020152	7	6.775578078
	Caldwell County	15671	4.28347339	10.08468156	1.1	1.163663086	2	3.396400392
	Calhoun County	12151	NA	9.098825494	NA	1.040868572	NA	2.225487062
	Callahan County	6792	NA	10.18688947	NA	1.222420637	NA	1.82903386
	Cameron County	154019	3.00496843	6.821538842	0.8	0.798712098	27	25.86094322

Opportunities for Refinement

- The architecture of this report has been designed to be readily used
  - As is;
  - With updated data;
  - With modified calculation methodology.

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- The architecture of this report has been designed to be readily used
  - As is;
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  - With modified calculation methodology.
- The Lung Association is open to learn of suggestions, recommendations for improvements.

Implications for Decision-makers

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- Radon service providers as well as local interested parties can also learn where they might pay additional attention.

Available Now

- Available via www.Lung.org/radon

  Go to Radon Resources for Professionals,

  then under For State and Local Policy Makers.

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- 49 individual reports (DC & all states except HI and MS)

Calls to Action

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- States and laboratories: ***Provide better data, more of it and more recent, to CDC. (Tools ensure confidentiality.)***


Questions?

For more information

- www.Lung.org/Radon
- 1-800-LUNG-USA

- Kevin.Stewart@Lung.org

American Lung Association.