# Environmental Data for HRS (and sister studies)

Sara Adar

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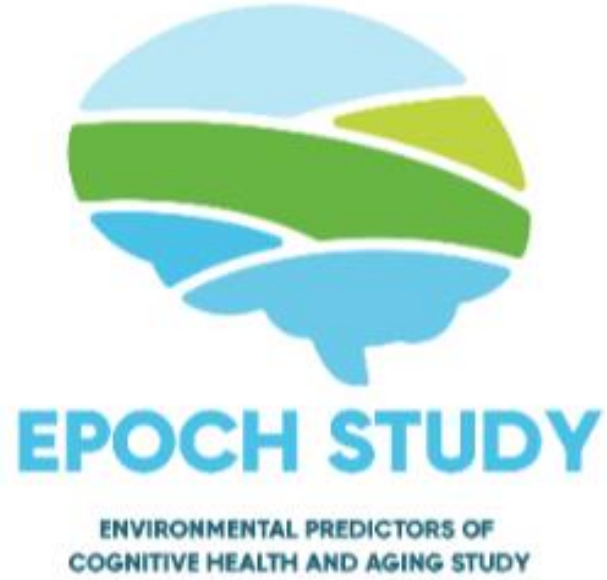
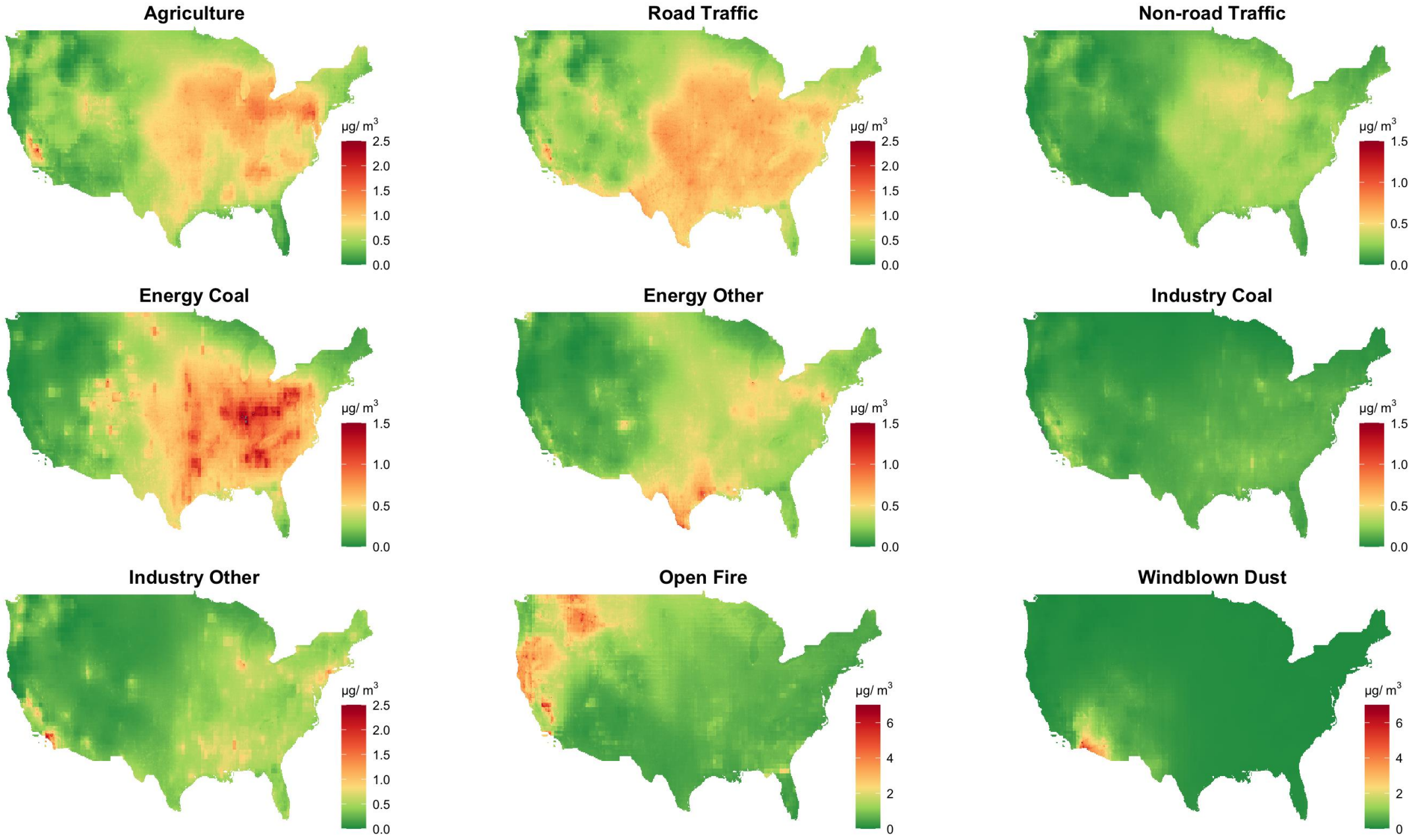
sadar@umich.edu

# Resources to Highlight





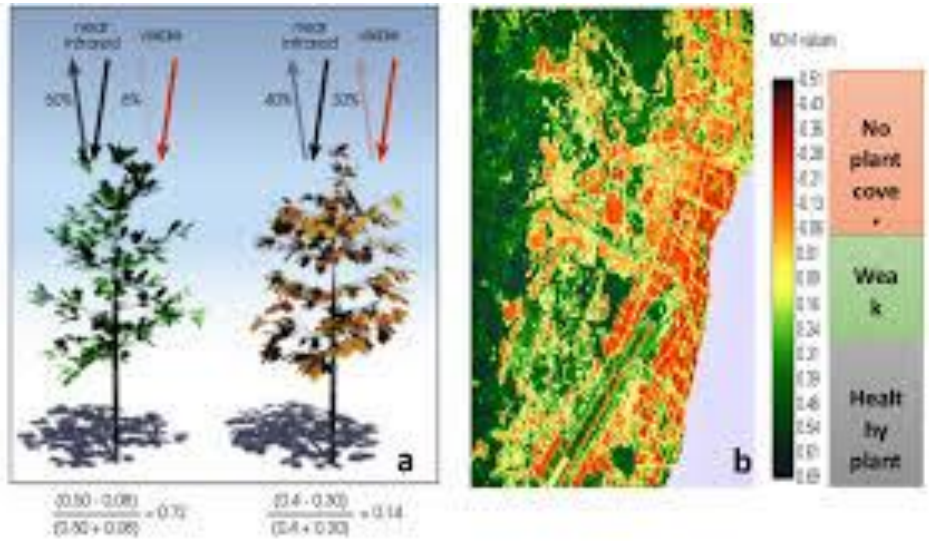

- Primarily air pollution data
  - $PM_{2.5}$ total and source-specific
  - $PM_{10-2.5}$
  - $NO_2$
  - $O_3$
  - Built for the exact location using proprietary models based on measurements, geocovariates, chemical transport models, and spatial and temporal correlation
- Metrics are available at the **address level** incorporating residential history

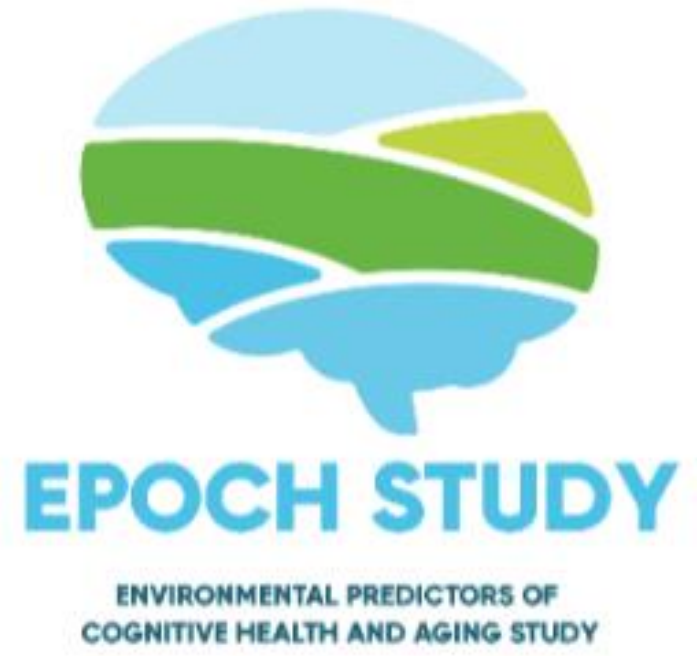

Agriculture
μg/ m3
2.5
2.0
1.5
1.0
0.5
0.0
Road Traffic
μg/ m3
2.5
2.0
1.5
1.0
0.5
0.0
Non-road Traffic
μg/ m3
1.5
1.0
0.5
0.0
Energy Coal
μg/ m3
1.5
1.0
0.5
0.0
Energy Other
μg/ m3
1.5
1.0
0.5
0.0
Industry Coal
μg/ m3
1.5
1.0
0.5
0.0
Industry Other
μg/ m3
2.5
2.0
1.5
1.0
0.5
0.0
Open Fire
μg/ m3
6
4
2
0
Windblown Dust
μg/ m3
6
4
2
0

# Additional Helpful Resources

- Spatial splines to account for confounding by place, derived from census tract

- Greenspace:
  - Satellite based information (Normalized Difference Vegetation  Index, NDVI)
  - Accessible parks and protected natural spaces for recreation near home (PADUS-AR)






https://hrs.isr.umich.edu/data-products/restricted-data

## Contributed Projects

Contributed projects based on HRS restricted data are provided by researchers who want to share their work with the research community. Researchers interested in contributing their own products are invited to contact us at hrsquestions@umich.edu. HRS does not produce or support these products and is not responsible for their content or use. They are provided as a service to the research community.

- Table Data: Pensions in the Health and Retirement Study; A. Gustman, T. Steinmeier, N. Tabatabai - v1.0
- LHMS+HRS Core Jobs History File - v1

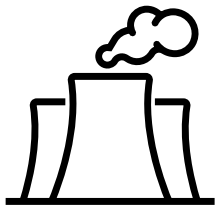
### Environmental Predictors Of Cognitive Health (EPOCH)

- Fine Particulate Matter (PM2.5) - v1.0
- Source-Specific Fine Particulate Matter (PM2.5) - v1.0
- Coarse Particulate Matter (PM10-2.5) - v1.0
- Ozone (O3) - v1.0
- Nitrogen Dioxide (NO2) - v1.0
- Greenspace - v1.0
- Spatial Splines - v1.0

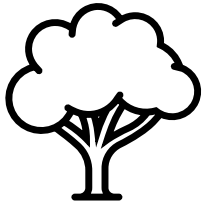
*Note: EPOCH data are only available for use with restricted data geographic information products.*

GATEWAY TO GLOBAL AGING DATA

exposome.g2aging.org



- Fine particulate matter ($PM_{2.5}$), total and source specific
- Nitrogen dioxide ($NO_2$)
- Ozone ($O_3$)



- Greenspace
- Bluespace
- Light at night

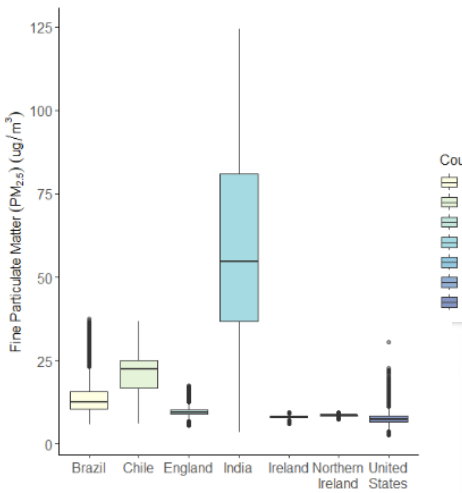
- Temperature
- Heat index
- Precipitation

- Gridded data products to allow for comparability across HRS-International Network of Studies

FINE PARTICULATE MATTER ($PM_{2.5}$) | FINE PARTICULATE MATTER ($PM_{2.5}$) SOURCE FRACTION | NITROGEN DIOXIDE ($NO_2$) | OZONE ($O_3$) | NIGHTTIME LIGHT | GREEN SPACE | BLUE SPACE | TEMPERATURE

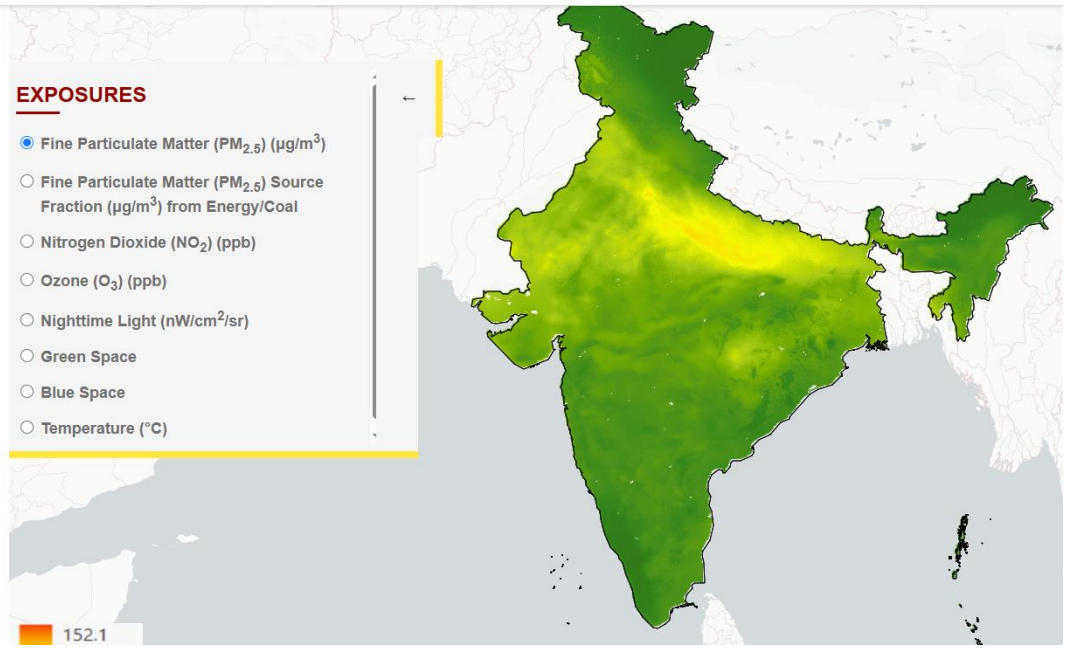
Estimates of monthly predictions of average fine particulate matter ($PM_{2.5}$) are available between 1998 and 2022 from a Geographically Weighted Regression (GWR) model developed for the Institute for Health Metrics and Evaluation Global Burden of Disease Project at a 1 $km^2$ resolution. We have supplemented these estimates with annual averages between 2010 and 2019 using the Data Integration Model for Air Quality (DIMAQ), which was originally developed globally for the World Health Organization at a 100 $km^2$ resolution and later refined to a 1 $km^2$ resolution for the Gateway to Global Aging Data project. Both models leverage satellite data, a chemical transport model, meteorological information, ground-based monitoring data, and local characteristics of place to generate estimates.

| | |
|---|---|
| **Years** | **1998-2021** |
| **Spatial Resolution** | **0.0083° (~1km²)** |
| **Units** | **micrograms per cubic meter of air (µg/m³)** |
| **Countries** | Brazil, Chile, England, India, Ireland, Mexico, Northern Ireland, United States |
| **Reference** | G. Shaddick et al. (2018). Data integration model for air quality: A hierarchical approach to the global estimation of exposures to ambient air pollution. Journal of the Royal Statistical Society Series C: Applied Statistics.<br><br>van Donkelaar A. et al. (2021). Monthly Global Estimates of Fine Particulate Matter and Their Uncertainty. Environmental Science & Technology. |
| **Source** | Atmospheric Composition Analysis Group |

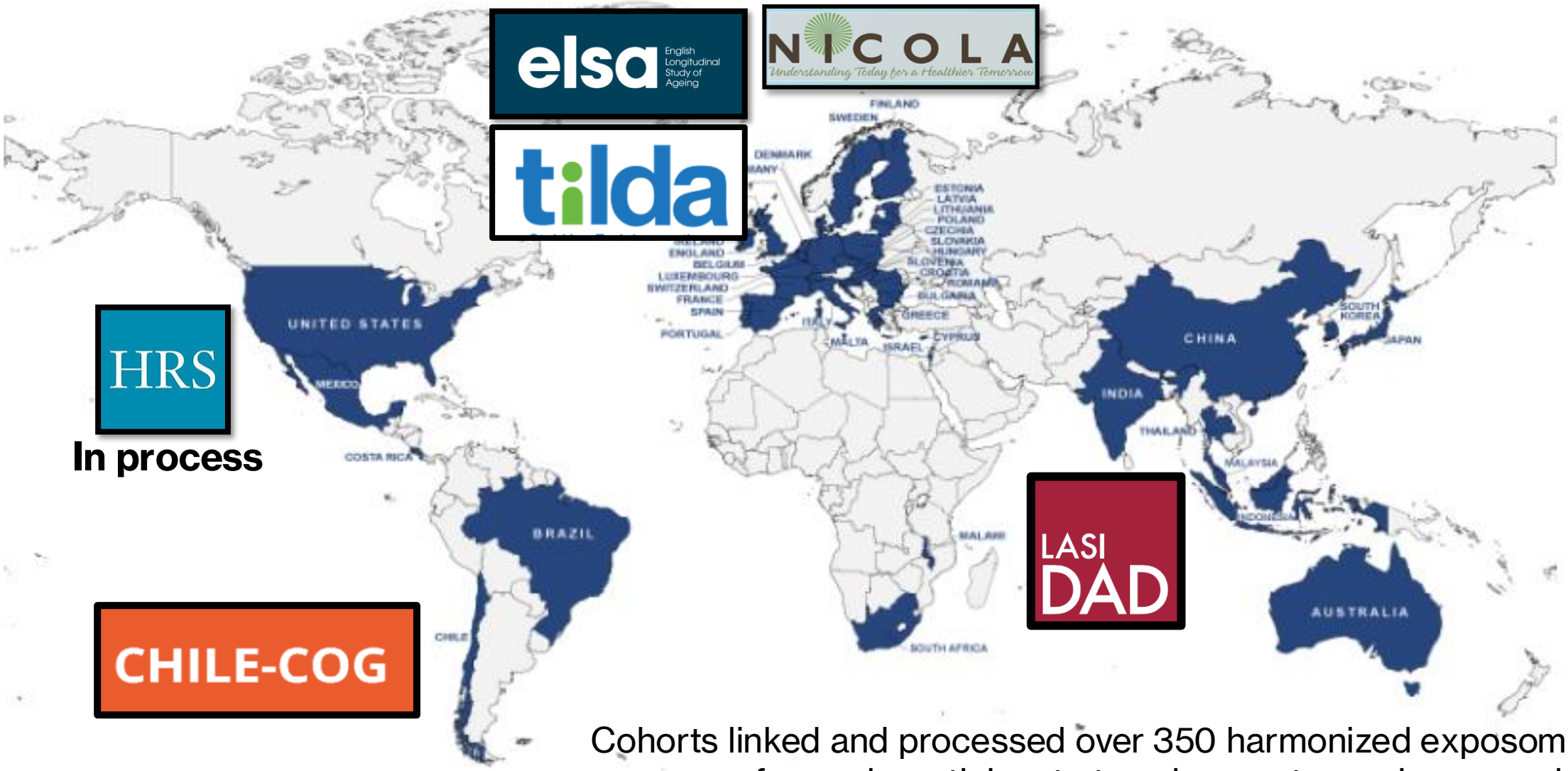



Distribution of PM2.5 by country in 2020

These graphics were generated using a random, population-weighted sample of 10,000 people fr



# Exposome Linkages at Addresses for Six HRS-INS Studies (and Counting)




Cohorts linked and processed over 350 harmonized exposome measures for each participant at each wave to use in research

GECC | GATEWAY EXPOSOME COORDINATING CENTER

- Creating free, curated science-ready data products and guidance for researchers
- Extreme weather domain
  - Overview of gaps and priorities
  - Data products and guidance for:
    - Extreme temperatures
    - Urban heat islands
    - Environmental disasters
    - Droughts
- Cross-domain interests in greenspace, community resources, urban form

ALZHEIMER'S ASSOCIATION | Alzheimer's & Dementia®
THE JOURNAL OF THE ALZHEIMER'S ASSOCIATION

# The Exposome and Alzheimer's Disease and Alzheimer's Disease Related Dementias

*Alzheimer's & Dementia* and the Gateway Exposome Coordinating Center (GECC) invite submissions for a special issue dedicated to interdisciplinary research on the exposome and Alzheimer's Disease (AD) and AD-Related Dementias (ADRD) risk, resilience, and disparities. This special issue will include research articles, short reports, review articles, and policy forums on the emergent, growing field of exposomics, focusing on how an expansive conceptualization of the exposome — the various environmental exposures over the life course — influence brain health and dementia outcomes. Submissions are encouraged to explore sources of risk including, but not limited to, the physical, chemical, natural, social, political, and economic dimensions of the exposome and their interplay with each other. Papers in the special issue will advance and complement the GECC's mission of facilitating collaboration and consensus-building across disciplines, and serving as a hub for interdisciplinary exposome research, deepening our understanding of risk and resilience for AD/ADRD.

**Submissions open July 1, 2025. The submission deadline is December 31, 2025**. All papers will undergo peer review and are subject to the standard author guidelines.

# Thank you to our funders and collaborators!

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Shay Mullineaux
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Anne Nolan
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**Let us know how we can help!**