

An aerial photograph of a suburban neighborhood. The houses are mostly single-story with brown or grey roofs. There are many trees, some with yellow and orange autumn foliage. A road with a few cars is visible in the center-right. The overall scene is a typical residential area.

Contextual & Environmental Data:

Resources for HRS and other aging surveys

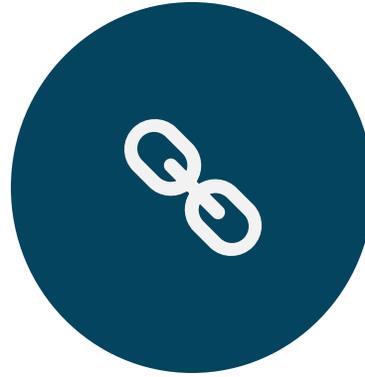
Jennifer Ailshire
University of Southern California

CACHE Workshop
October 24-25, 2025

HRS Contextual Data Activities



Identify projects and
manage data deposits
in virtual data
enclave



Partner with
researchers to
facilitate complex
linkages



Create opportunities
around historical data
and life course

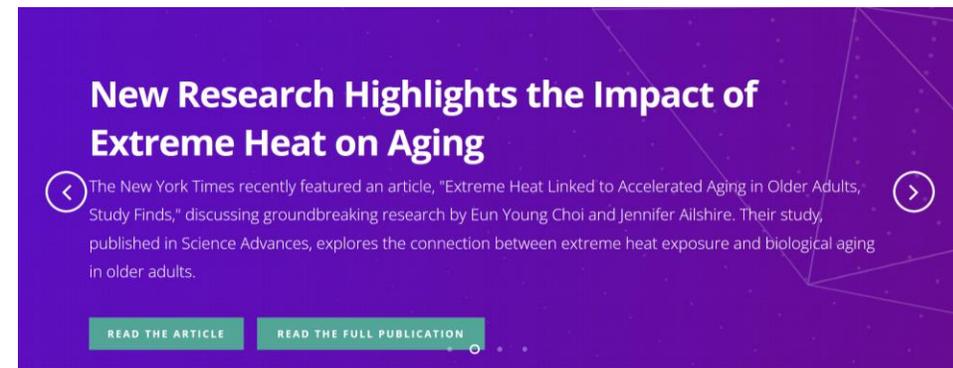
~ Improved user experience via enhanced communication and dissemination ~



The Contextual Data Resource (CDR) is a collection of user-friendly datasets that enable researchers to study the impact of place on health and well-being among older adults. Contextual factors such as neighborhood disadvantage, air pollution, and health care access and quality play an important role in facilitating or hindering older adults' ability to lead healthy, active, independent, and engaged lives.

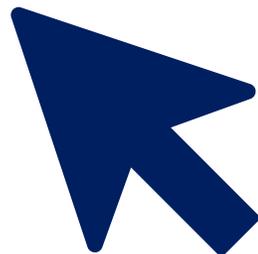
The Contextual Data Resource (CDR) includes measures representing seven key theoretical dimensions of the socioenvironmental context; socioeconomic/demographic structure, economic conditions, social stressors, health care, physical hazards, amenities, and the built environment. Measures are available at various levels of geography (e.g., census tract, county, metro area, state) and include proximity measures constructed using respondent geocoded address information (e.g., buffer density measures and distance measures). Currently measures are available for several years, spanning from 1979-2022. Measure availability varies by CDR data product, with some measures available on an annual basis and others available at fewer time points.

The potential to link this contextual data to aging surveys will increase opportunities to analyze prospective effects of environmental conditions on health and aging, the effects of residential mobility on aging-related outcomes, and the ways environments change around older adults as they age in place.



<https://gero.usc.edu/cbph/cdr/>

NIA Funded P30 Centers on the Demography and Economics of Aging (P30 AG017625)



CDR Data Products by Domain

Social Environment

Race, income, inequality and segregation **Census & American Community Survey**

Crime (assault, burglary, etc.) **Uniform Crime Reporting**

Physical Environment

PM 2.5, O3, NO2, Sulfate, Black Carbon, Nitrate, Sea Salt **EPA FAQSD, ATMOS**

Heat index, Wind chill, Precipitation amounts, Average temperatures **gridMET**

Health Environment

Number of healthcare providers, facilities, and professionals **AHRF**

Distribution of medical resources **Dartmouth Atlas**

Built Environment

Access to grocery stores and restaurants, Food assistance, Food availability **USDA**

Street segments, Links between streets **Street Connectivity**

Environmental quality, Environmental sound **EPA EQI, NPS Noise**

CDR Data Current Products List

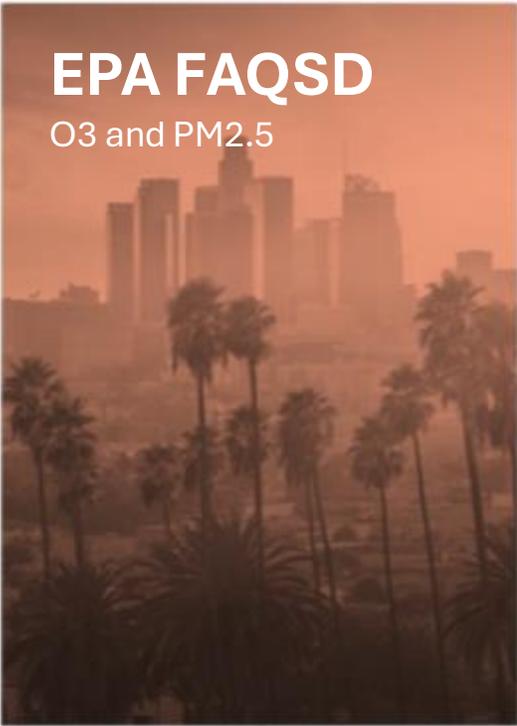
Topic	Data Source	Years	Geography
Sociodemographic Environment	Decennial Census	1990, 2000, 2010	CBSA, Tract, County, State
	American Community Survey	5-year: 2005-2021 1-year: 2006-2021	
Air Pollution	EPA FAQSD (PM2.5 and O3)	2002-2021	Tract
	NO2 LUR Model Estimates	2000-2010	Tract
Weather	gridMET (Heat, Wind Chill, Temperature, Precipitation)	1979-2023	Tract
Crime	Uniform Crime Reporting	1994-2019	County
Food	USDA Food Access and Environment	2010-2019	Tract, County, State
Health	Area Health Resources File	2000-2009	County, State
	Dartmouth Atlas of Care	1992-2011	Hospital, HSA, HRR, County, State
Built Environment	Walkability	2010	Tract
	National Park Service Noise	2013-2015	Tract
	EPA Environmental Quality	2000-2005, 2006-2010	County

CDR data products available via NIA-funded enclaves and studies

Selected CDR Data Products

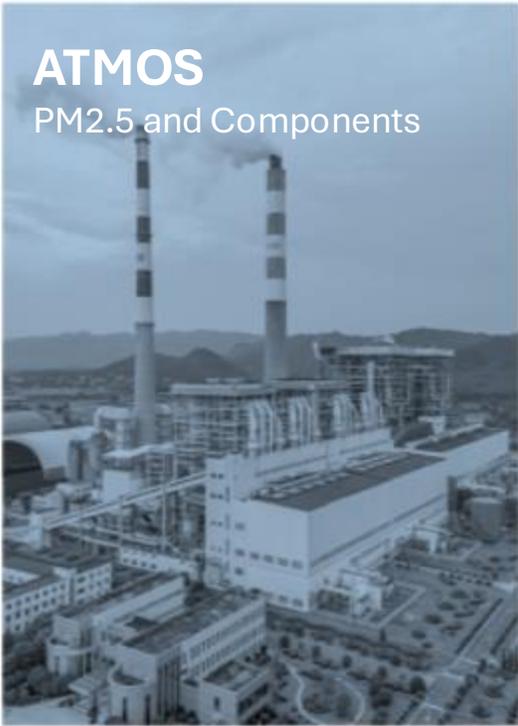
EPA FAQSD

O3 and PM2.5

A photograph of a city skyline with palm trees in the foreground, overlaid with a semi-transparent orange filter.

ATMOS

PM2.5 and Components

An aerial photograph of an industrial facility with several tall smokestacks emitting plumes of smoke.

gridMET

Weather

A photograph of a dramatic sky with large, white, fluffy clouds against a blue background.

Census and American Community Survey

Social environment

An aerial photograph of a city skyline with various buildings and structures.

CDR provides user-friendly data products to study the impact of place on health and well-being.

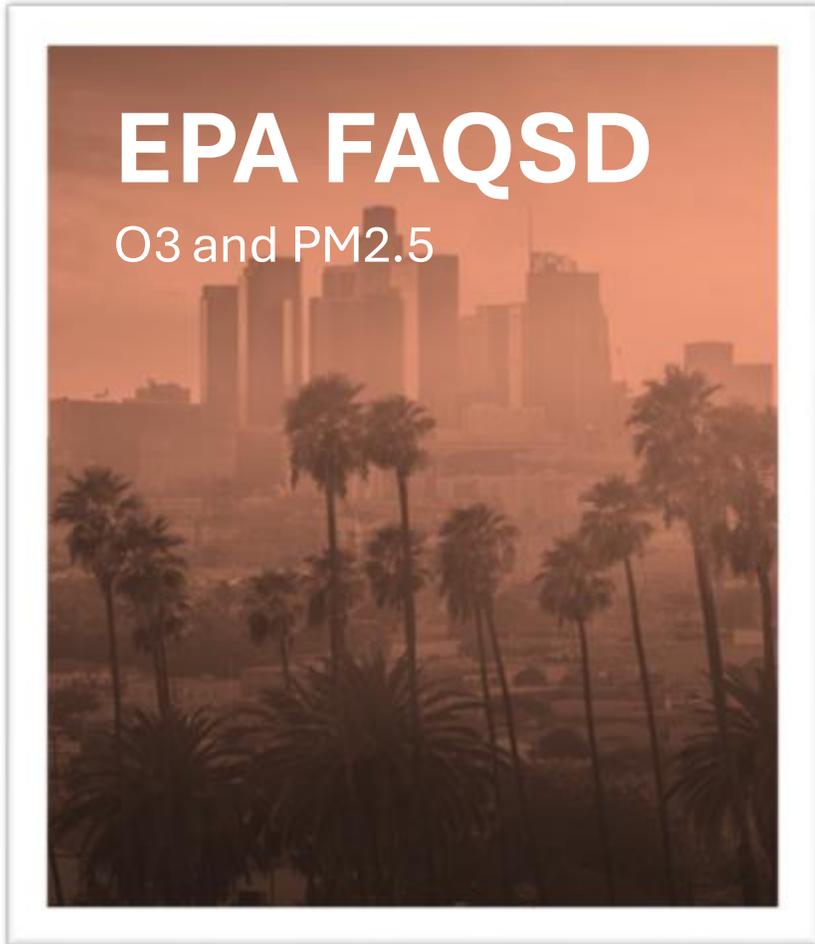
CDR provides:

Geographic identifiers standardized to 2010 boundaries *(currently updating to 2020 boundaries)

Data availability at multiple time points (e.g., daily, weekly, monthly, quarterly, yearly)

Cleaned and processed data for commonly used measures (e.g., heat index, neighborhood SES)

Air Pollution: EPA FAQSD Files



Geographies: Census Tract

Years: 2002-2021

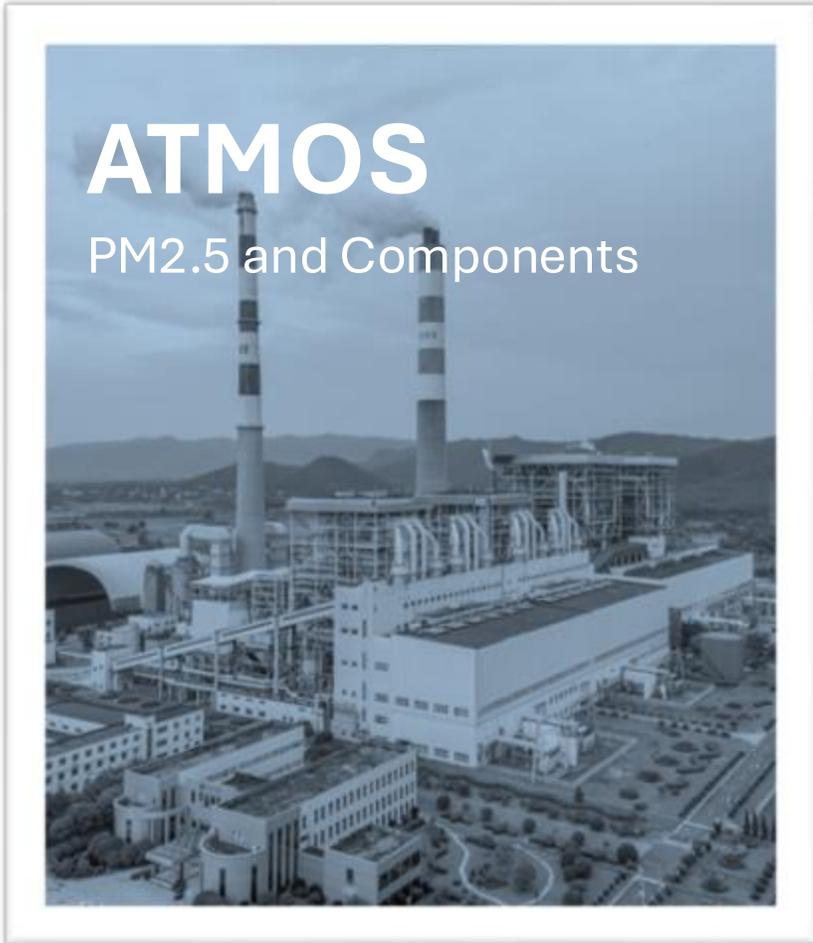
Data Sources: Fused Air Quality Surface Using Downscaling (FAQSD) Files, Environmental Protection Agency

CDR produces aggregated EPA census tract-level (modeled) estimates of PM2.5 and O3 over time

CDR releases mean annual, quarterly, and monthly estimates of PM2.5 and O3 for all census tracts in the contiguous United States

**Future version will add measures of number of days above PM2.5 thresholds*

Air Pollution: ATMOS



Geographies: Census Tract

Years: 2000-2023

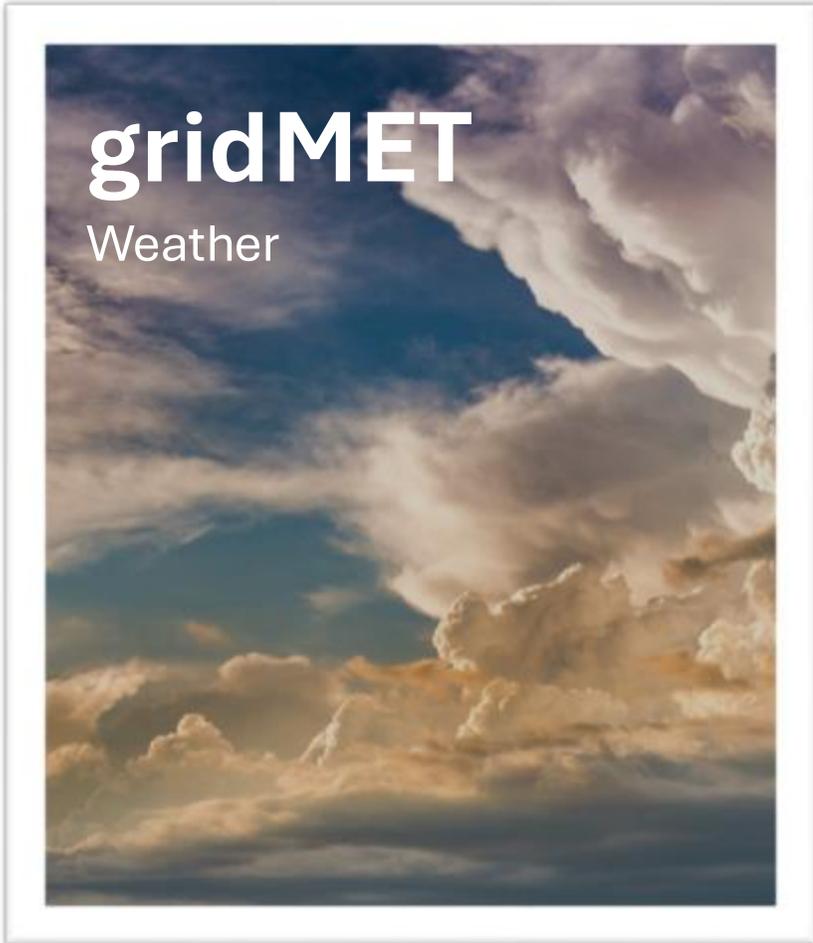
Data Sources: Atmospheric Composition Analysis Group (ACAG),
Washington University in St. Louis

CDR produces estimates that aggregate from ATMOS 1 x 1km raster data to the census tract level. Estimates include:

PM2.5, Sulfate, Nitrate, Ammonium, Organic Matter, Black Carbon,
Mineral Dust, Sea Salt

CDR releases mean annual and monthly estimates for all census tracts in the contiguous United States

Weather: gridMET



Geographies: Census Tract

Years: 1979-2023

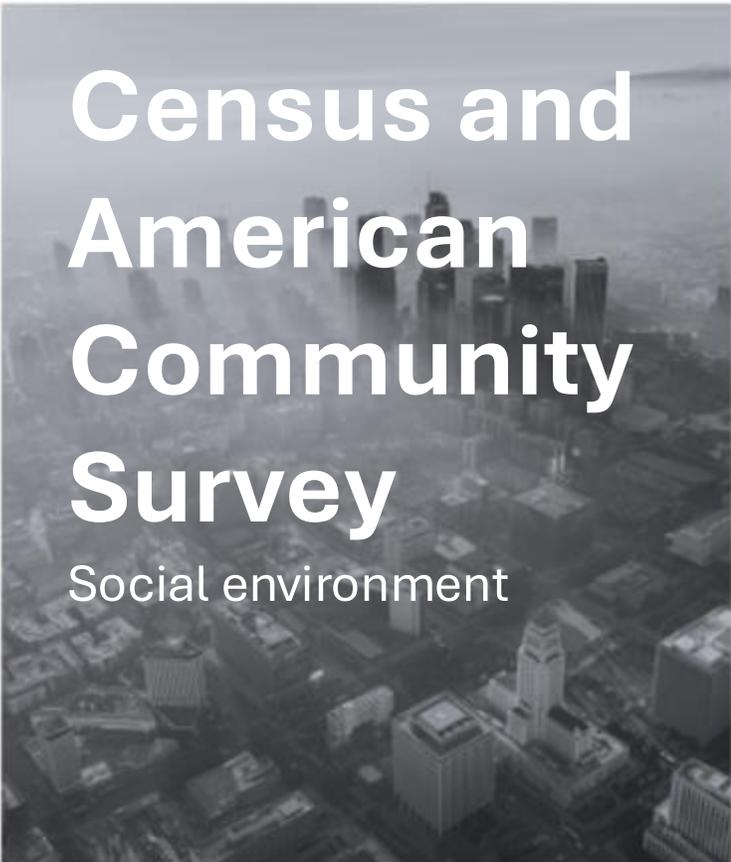
Data Sources: John T. Abatzoglou Climatology Lab, University of California Merced

CDR produces estimates that aggregate daily measures from gridMET's 4 x 4km raster data to the census tract level. Estimates include:

- Number and percent of days at heat index levels,
- Number and percent of days at wind chill levels,
- Number and percent of days with precipitation,
- Average minimum and maximum temperatures

CDR releases mean monthly estimates for all census tracts in the contiguous United States

Social Environment: Census and ACS



Census and American Community Survey

Social environment

Geographies: Census Tract, CBSA, County, State

Years: 1990, 2000, 2010 (Decennial Census)

2005-2009 to 2017-2021 (ACS, 5-year estimates)

2006-2019, 2021 (ACS, 1-year estimates)

Data Sources: United States Census Bureau

CDR produces Census and ACS estimates from curating and processing multiple data tables to match various geographies.

Estimates include:

Demographic information (race and ethnicity, age, language use)

Socioeconomic characteristics (educational attainment, poverty)

Household-related factors (living alone, female-headed households)

Housing information (vacancy, homeownership, home value)

CDR releases Census and ACS data for the contiguous United States, Alaska, and Hawaii

Example: CDR Environmental Quality Index Data Documentation

All CDR products include user-friendly documentation, providing guidance on linking to respondent-level data

Suggested Citation

Jennifer Ailshire, Kate Vavra-Musser, Calley E. Fisk. 2025. Contextual Data Resource (CDR): United States Environmental Protection Agency Environmental Quality Index Files by County, 2000/05 and 2006/10. Los Angeles, CA: USC/UCLA Center on Biodemography and Population Health.

Data Sources

United States Environmental Protection Agency (EPA). Environmental Quality Index (EQI), <https://www.epa.gov/healthresearch/environmental-quality-index-eqi>

Linking CDR Data with Survey Respondent Data

The Contextual Data Resource is designed to be linked with geocoded survey data. All geographic identifiers are in string format, and match US Census Bureau geographic identifiers and boundaries.

- To link county level data, merge using the 5-digit STCTYFIPS10 geographic identifier, which is [the 2-digit state + 3-digit county FIPS code](#). The STCTYFIPS10 geographic identifier has been harmonized to the 2010 census tract boundaries.

Dataset Overview

The US Environmental Protection Agency Environmental Quality Index (EQI) Files provide a snapshot of overall environmental quality using principal component analysis on a set of selected data in five domains: air, water, land, built, and sociodemographic environments. Data are available at the county level and includes an overall EQI value and EQI values for each of the five domains. EQI values are provided as 5-year estimates, and data are available for 2000-2005, and 2006-2010.

Data Summary

Dataset Name: Environmental Quality Index (EQI) Files

Data Source: United States Environmental Protection Agency (EPA)

Data Source URL: <https://www.epa.gov/healthresearch/environmental-quality-index-eqi>

Data Collection Method: Data from multiple primary sources compiled by the EPA.

Years Collected: Final 5-year estimates are provided for 2000-2005 and 2006-2010. Domain-specific measures include measures from specific years between 2000 and 2010.

Geographic Level: County; CDR data uses the 2010 county boundaries to be comparable across the years.

Geographic Coverage: EQI Files cover the contiguous U.S, Alaska, and Hawaii. |

Variable List

Name	Definition	Geography	Years
Geographic Identifiers			
STCTYFIPS10	2010 County FIPS code (5 digits: 1-2 state, 3-5 county)		
Overall EQI County Estimate			
eqco	Overall EQI	County	2000-2005, 2006-2010
Domain-Specific EQI County Estimates			
aiCo	Air EQI	County	2000-2005, 2006-2010
beCo	Built Environment EQI	County	2000-2005, 2006-2010
laCo	Land EQI	County	2000-2005, 2006-2010
seCo	Sociodemographic EQI	County	2000-2005, 2006-2010
waCo	Water EQI	County	2000-2005, 2006-2010

Variable Summary

Variable	Label	Mean	SD	Min	Max	N
STCTYFIPS10	2010 County FIPS code	.	.			3147
eqco20002005	Overall EQI Estimate	0.000	1.000	-6.786419	2.831005	3143
aiCo20002005	Air EQI Estimate	-0.000	1.000	-6.715335	3.712864	3143
waCo20002005	Water EQI Estimate	0.000	1.000	-1.461017	2.047879	3143
laCo20002005	Land EQI Estimate	-0.000	1.000	-4.544748	1.84174	3143
seCo20002005	Sociodemographic EQI Estimate	-0.000	1.000	-5.128991	2.761724	3143
beCo20002005	Built Environment EQI Estimate	0.000	1.000	-4.708277	5.65637	3143
eqco20062010	Overall EQI Estimate	-0.000	1.000	-5.879836	2.84909	3141
aiCo20062010	Air EQI Estimate	0.000	1.000	-3.258012	2.78984	3141
waCo20062010	Water EQI Estimate	-0.000	1.000	-1.641266	1.478177	3141
laCo20062010	Land EQI Estimate	0.000	1.000	-5.209604	2.094526	3141
seCo20062010	Sociodemographic EQI Estimate	0.000	1.000	-4.80999	3.979472	3141
beCo20062010	Built Environment EQI Estimate	0.000	1.000	-6.083963	3.883786	3141



Accessing the Contextual Data Resource

The CDR is a currently available for use with HRS, NHATS, PSID, and UAS (...and others)

- CDR products are linkable to respondent-level data
- Restricted Data Product – (needs approval through individual studies, formal agreements, or enclaves)
- Access via CDR approval may also be available – (priority given to NIA-funded, studies of aging)

HRS HEALTH AND RETIREMENT STUDY

About Documentation Data Products Media & Publications

Data Products / HRS Restricted Data / Available Restricted Data Products

Available Restricted Data Products

HRS Contextual Data Resource Series

- Dartmouth Atlas of Health Care - v1.0
- Decennial Census and American Community Survey (ACS) - v2.0
- COVID-19 US State Policy Database - version date 20220303
- Long-Term Care: Facts on Care in the US (LTCfocus) - v1.0
- NO2 Land-Use Regression Model Estimate Data - v1.0
- O3 Fused Air Quality Surface Using Downscaling (FAQSD) Files - v2.0
- PM 2.5 Fused Air Quality Surface Using Downscaling (FAQSD) Files - v2.0
- Street Connectivity - Census Tract 2010 - v1.0
- Uniform Crime Reporting Program Data - v2.0
- USDA Food Access Information - v2.0



MICHIGAN CENTER ON THE DEMOGRAPHY OF AGING
UNIVERSITY OF MICHIGAN

LINKAGES

Home > Enclave > Linkages

MICDA'S GEOGRAPHIC LINKAGES REPOSITORY (GLR)

MiCDA is partnering with the Health and Retirement Study (HRS), Panel Study of Income Dynamics (PSID) and National Health and Aging Trends Study (NHATS) to make contextual files and related documentation available in the MiCDA Enclave to approved researchers upon request.

The **Geographic Linkages Repository** (GLR) will facilitate linkages at multiple levels of geography (e.g. state, county, tract, zip code) so that res

USC Dornsife
University of Southern California

Home Domains Sources About Us

Understanding America Study Exposome Database

The UAS Exposome Database is a collection of user-friendly datasets that enable researchers to study the impact of physical, social, and policy environments on UAS respondents. UAS data users with access to the UAS enclave can request linkage of selected variables of these datasets to individual UAS respondents. The database is continually updated with new datasets. If you have a dataset you would like to be added, let us know at UAS-L@mailist.usc.edu.

Individual Surveys Curated Data Exposome Data Restricted Data

The LINKAGE Enclave is a secure computing desktop for using UAS survey data linked to restricted CMS or SSA datasets for studying aging, healthcare, and health outcomes. Administered by UAS and the National Institute for Aging (NIA) Data Linkage Program, it may also be used for studies requiring UAS survey data to be linked to external data sources using geolocations more granular than state. Restricted data linked to UAS survey data is available in the LINKAGE Enclave after **obtaining an enclave user account**.

In addition to providing secure data access, the Enclave provides reference materials such as data dictionaries and methodology statements. It uses a top-tier internet service Provider (ISP) to support multiple and concurrent connections. Analytic software packages R, Python, SAS and Stata are available. Please inquire about any other software needs. For more information about the LINKAGE enclave, you can visit the **NIA's LINKAGE website**.

Planned CDR Updates



In order to make more user-friendly data we are:

- **Adding additional data sets that are a compilation of several measures**
 - Examples: EPA Environmental Quality Index; Medical Shortage Areas/Medically Underserved Areas
- **Creating summary indices for high dimensional data sets**
 - Neighborhood socioeconomic status/deprivation
- **Creating longitudinal measures**
 - Neighborhood change over time
- **Creating more spatially refined measures**
 - Air quality and temperature spikes
- **Creating more temporally refined measures**
 - Daily pollution and temperature linked to survey respondents -> *for select studies*

CDR Team Members



Calley Fisk

CDR Product Management: Data collection, management documentation, and design



Eunyoung Choi

CDR Specialist:
American Community Survey, Air Pollution: EPA FAQSD



Jong Woo Nam

CDR Data Scientist



Margarita Osuna

CDR Project Management: Data collection, management, and design



Sung Eun Cho

CDR Research Assistant



Tongyu Gu

CDR Research Assistant



Jacky Hou

CDR Research Assistant

Available Restricted Data Products

Census Data

- [HRS 1940 Census Data - v2](#)

Geographic Linkages Repository (GLR)

- [Historic Redlining Indicator \(HRI\)](#)
- [IPUMS Contextual Determinants of Health \(CDOH\)](#)
- [National Neighborhood Data Archive \(NaNDA\)](#)
- [State Policy and Politics Database \(SPPD\)](#)

HRS Contextual Data Resource Series (HRS-CDR)

- [Dartmouth Atlas of Health Care - v1.0](#)
- [Decennial Census and American Community Survey \(ACS\) - v3.0](#)
- [COVID-19 US State Policy Database - version date 20220303](#)
- [Long-Term Care: Facts on Care in the US \(LTCfocus\) - v1.0](#)
- [NO2 Land-Use Regression Model Estimate Data - v1.0](#)
- [O3 Fused Air Quality Surface Using Downscaling \(FAQSD\) Files - v3.0](#)
- [PM 2.5 Fused Air Quality Surface Using Downscaling \(FAQSD\) Files - v3.0](#)
- [Street Connectivity - Census Tract 2010 - v1.0](#)
- [Uniform Crime Reporting Program Data - v2.0](#)
- [USDA Food Access Information - v2.0](#)

Note: The Geographic Linkages Repository and HRS Contextual Data Resource Series are available only in the [MiCDA Enclave VDI](#), and are only available for use with restricted data geographic information products.

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 hqsquestions@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.

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.

Historical Census Linkages

“Linking 1940 U.S. Census Data to Five Modern Surveys of Health and Aging.”
(R01AG050300, PI: Warren)

Limited number of respondents were linked to 1940s census.

1950s census linkage underway.

Use of new machine-based linking algorithms and enhanced linkage data.

*Final data products available as a restricted HRS geographic data product, accessible via MiCDA enclave.

Data Input Form Tuesday, June 4, 2019 12:11:39 PM

Respondent Information

PSID ID: 1
First Name: COLIN
Last Name: POWELL
Age: 3
State of Birth: NEW YORK
State, Grewup: NEW YORK
State, 1967: NEW YORK
Mom First Name: MAUDE
Mom Age: 39
Mom, St. Birth: WEST INDIES
Mom, St. Grew: WEST INDIES
Dad First Name: LUTHER
Dad Age: 43
Dad, St. Birth: WEST INDIES
Dad, St. Grew: WEST INDIES
Children: 00000000

Potential Matches

Image	First Name	Last Name	Age	Line No
Image 1	COLIN	POWELL	4/3	15
Image 2	GLENN	POWELL	4/3	62
Image 3	CALAN	POWELL	4/3	58
Image 4	POWELL	GLENN J	4/3	25
Image 5	GLENN	POWELL	4/3	24
Image 6	ROY GLENN	POWELL	4/3	74
Image 7	GLEN CHARLES	POWELL	4/3	24
Image 8	GLEEN	POWELL	4/3	18
Image 9	GALEN	POWELL	4/3	12
Image 10	GLENN DALO	POWELL	5/4	51

Notes

Historical Environmental Data

“Historical Social and Environmental Determinants of memory Decline and Dementia among U.S. Older Adults.” (R01AG074359, PI: Casey, Mayeda)

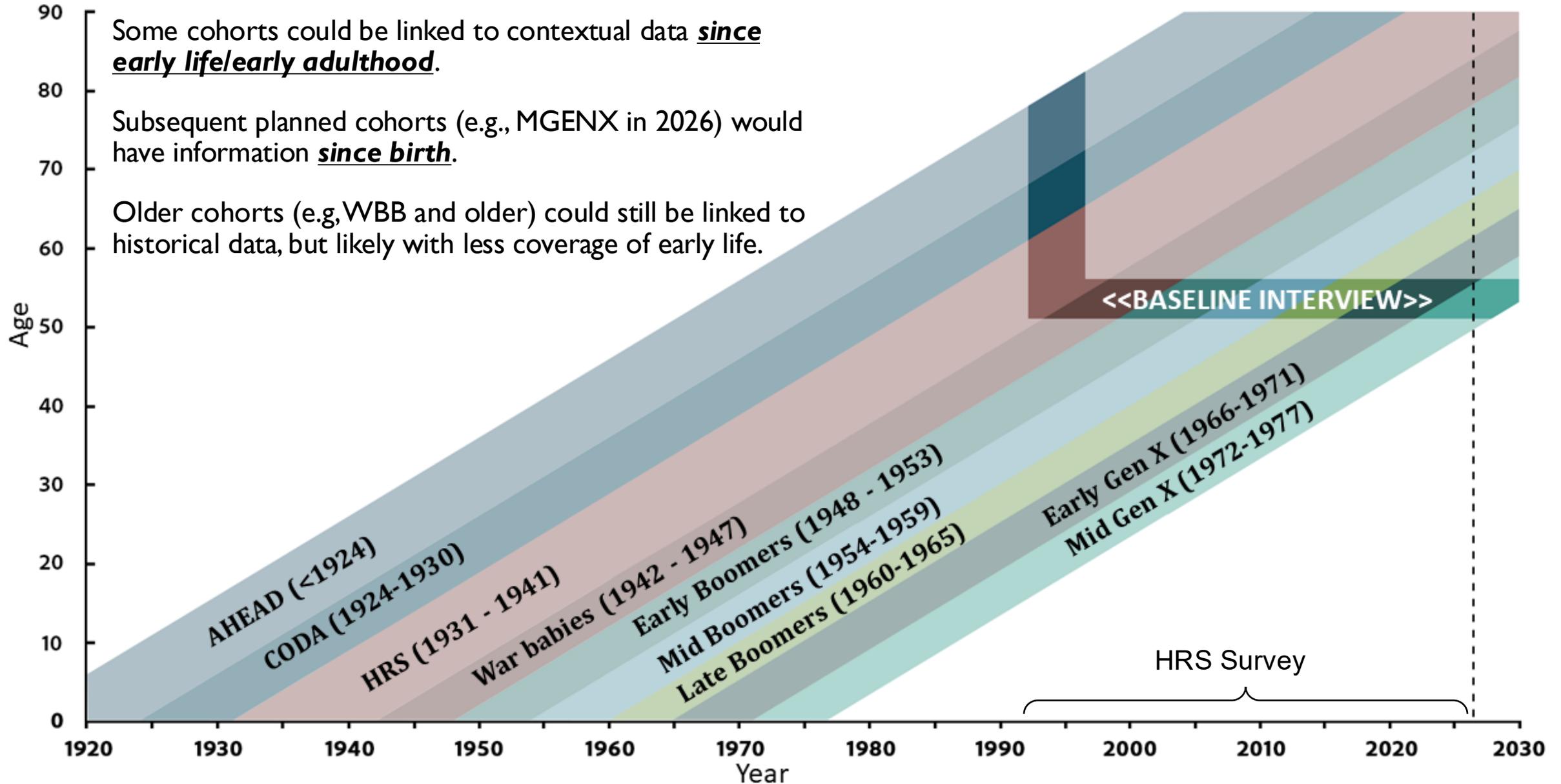


Information from HRS 1940s enumeration districts used to create contextual data from digitized historical maps.

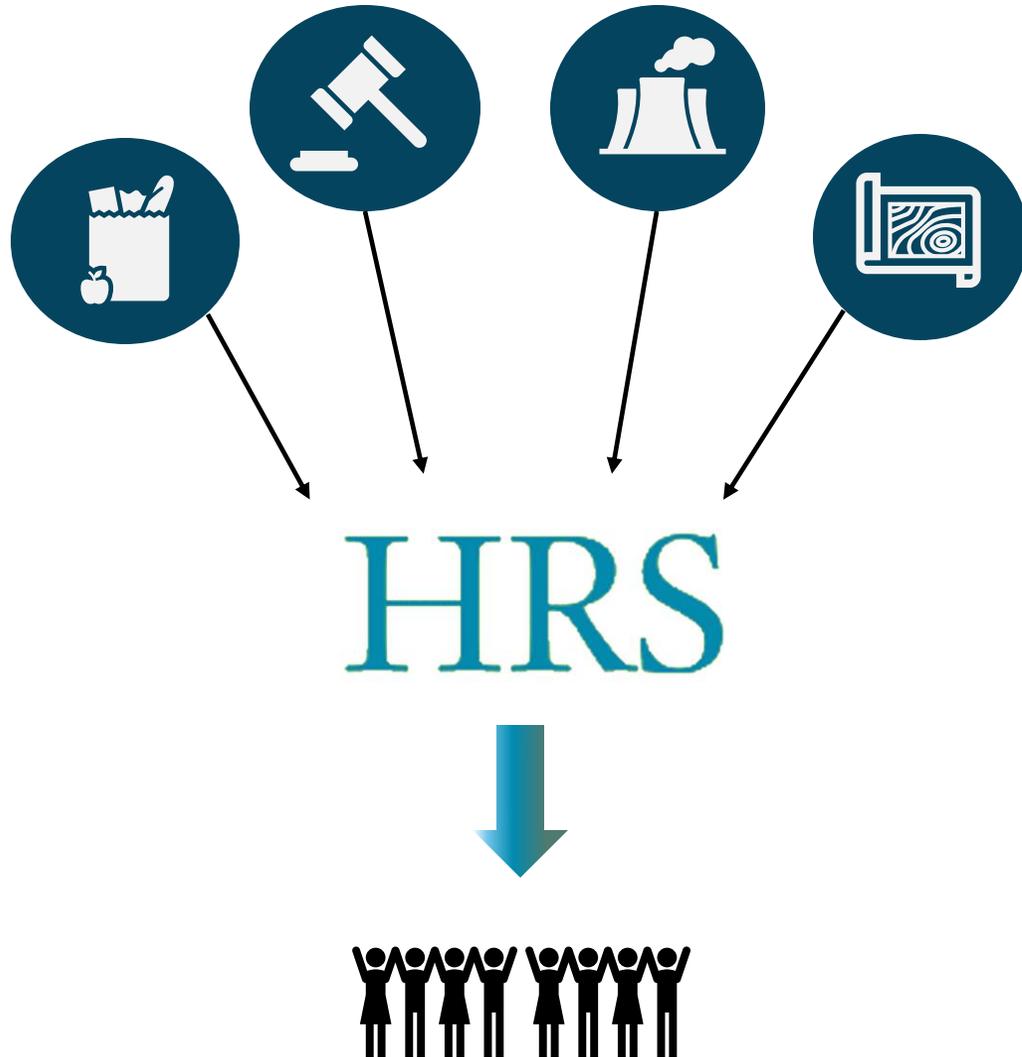
Creating novel air pollution metrics and late-1930s redlining.

*Data linkage under way. Final data products will be available as a restricted HRS geographic data product, accessible via MiCDA enclave.

HRS & Life Course Contextual Data

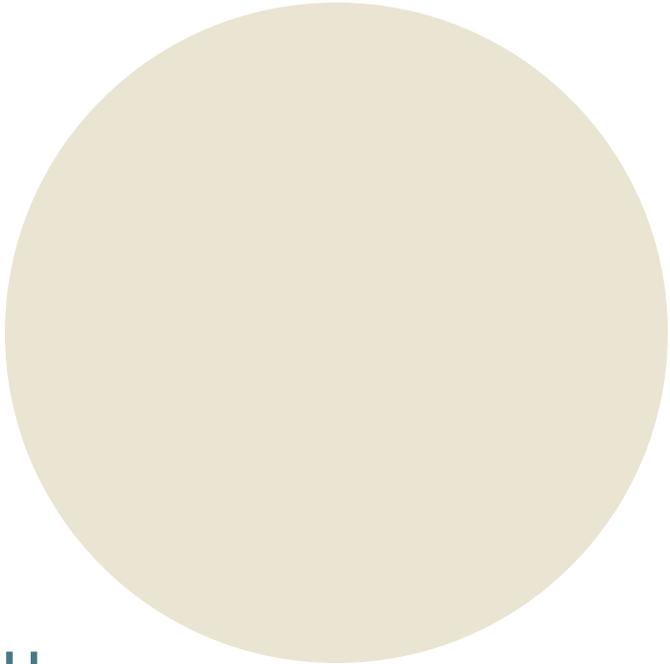


HRS Contextual Data Access



- User Contributed Products via HRS:
 - Users create a contextual data resource (e.g., air pollution, state policies, historical census) using restricted geographic information on respondents
 - HRS provides secure access for data linkages
 - HRS works with contributors on final data product and documentation
 - Data are deposited into the MiCDA virtual enclave
 - User Contributed Products via MiCDA:
 - Data that is at the national level (e.g., all states or all census tracts) - not specifically linked to HRS respondents/HRS not involved - will be available from MiCDA GLR
- ❖ Access to “special” restricted HRS data has a different review and approval process

Questions



HRS Help Desk: hrsquestions@umich.edu

CBPH CDR: cdradmin@usc.edu
