How Does the Environment Affect Your Health?

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Janet E Hall, MD (Principal Investigator)
Alison Motsinger-Reif, PhD (Principal Investigator)

Adapted from:
Vermeulen et al., Science, 2020

PEGS Data Collection

- From 2013-2020, three (3) surveys were used to collect health and exposure data in the cohort

- Information from approximately 9,400 participants was collected

- Types of information collected:

  o General Demographics

  o Family Medical History

  o Lifestyle Factors

  o Occupational Exposure

  o Address histories

- Whole genome sequencing (WGS) for over 4,700 participants

PEGS
Health & Exposure Survey
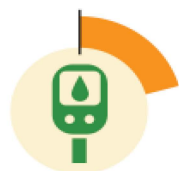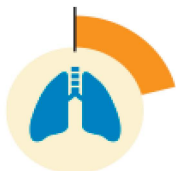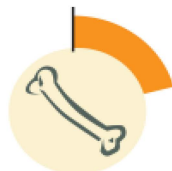
Participants: 9,414 | Questions: 496

Self-Reported Diseases or Conditions | Number: 122

12% Diabetes
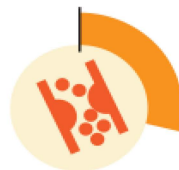
13% Asthma

13% Bone Loss
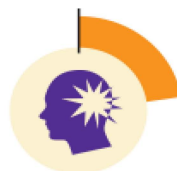
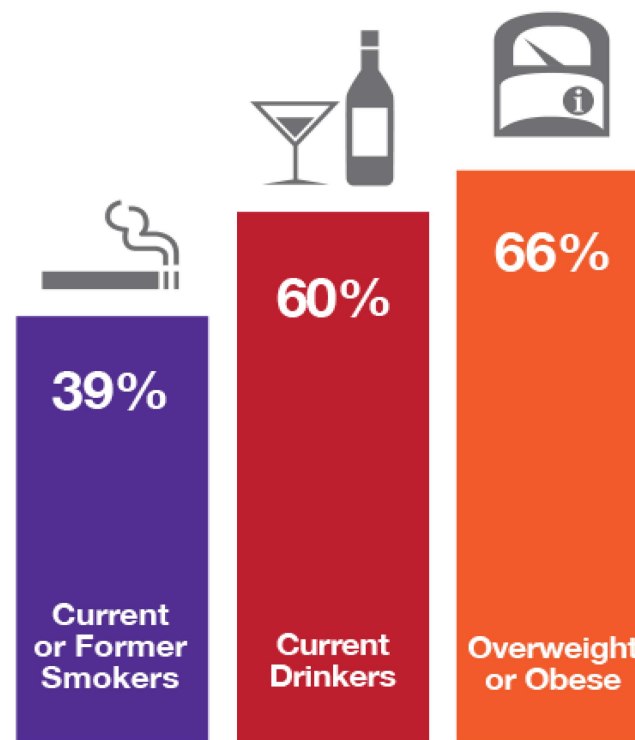**17%** Migraine Headaches

33% High Cholesterol

37% High Blood Pressure

40% Seasonal Allergies

75% Pregnancy (Women)

39% Current or Former Smokers

60% Current Drinkers

66% Overweight or Obese

Lifestyle Factors

Internal and External Exposome Survey

PEGS — External Exposome Survey

Participants: 3,618 | Questions: 607

- 15% of respondents have been exposed to solvents and degreasers.
- 42% of respondents report that their home has been regularly treated with insecticides or pesticides.
- 44% of respondents live within one mile of a gas station.
- 21% of respondents live within one mile of high-tension power lines.
- 23% of respondents live within one mile of a farm.
- 66% of respondents have pets.
- 14% of respondents have been exposed to occupational carcinogens.

Rev 10/12/2023

PEGS — Internal Exposome Survey

Participants: 3,071 | Questions: 719

- 25% of respondents report getting eight or more hours of sleep per night during the week.
- 41% of respondents report doing moderate exercise three or more times per week.
- 33% of respondents report going to fast food restaurants one or more times per week.
- 29% of respondents report their blood type as O positive.

Percentage of respondents taking medications for:

- High cholesterol = 18%
- Anxiety = 13%
- High blood pressure = 25%
- Depression = 15%
- Diabetes = 8%
- Asthma = 7%

Rev 10/12/2023

Geospatial Information Systems (GIS)

Environment
Global Air Quality Models
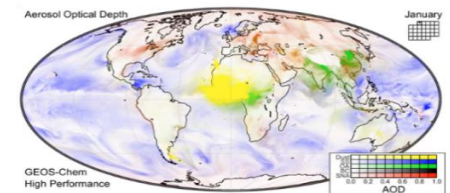
Climate
Daily Weather
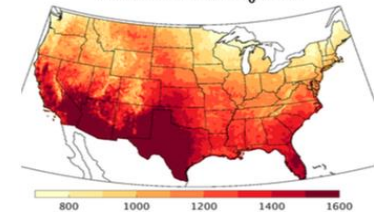
Social
CDC Social Vulnerability Index
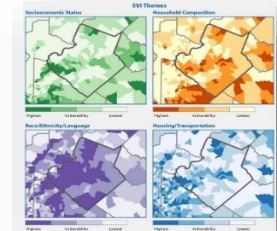
Precision Environmental Health

- To understand <u>individual</u> risk by integrating multi-level factors that measure exposures (exposomics) or provide evidence of their effects (epigenetics, metabolomics, microbiome) in combination with genetics (Genetics x Environment x Disease)

- To create precision interventions to:

    o   Reduce exposures or ameliorate their effects (absence of disease)

    o   Screen for, block or slow progression (subclinical disease)

    o   Reduce disease morbidity and mortality (known disease)

Integrating the Environment into Precision Medicine and Health
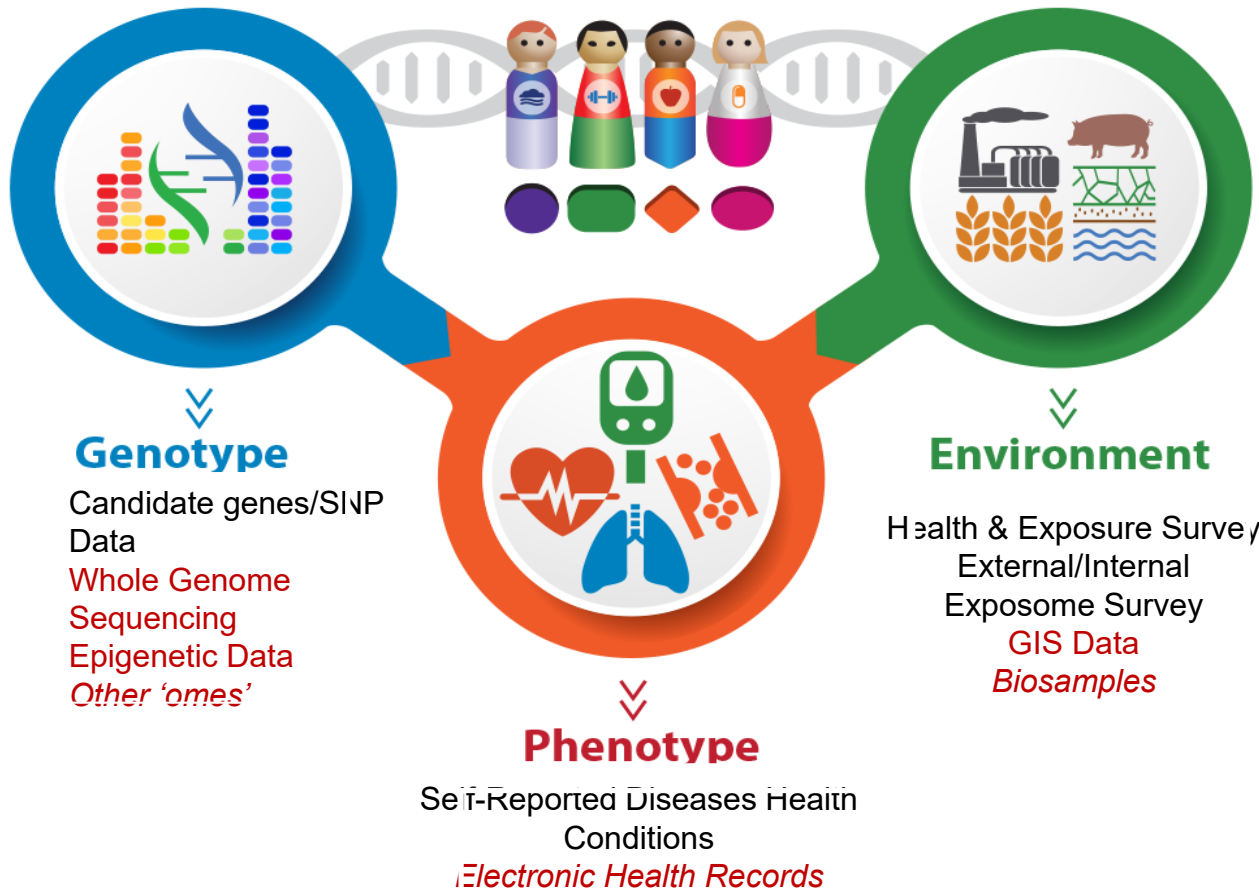
Genotype

Candidate genes/SNP Data
Whole Genome Sequencing
Epigenetic Data
Other 'omes'

Phenotype

Self-Reported Diseases Health Conditions
Electronic Health Records

Environment

Health & Exposure Survey
External/Internal Exposome Survey
GIS Data
Biosamples

Counties with >100 swine CAFOs

- CAFOs
- No participants (excluded)
- Urban area
- Rural area
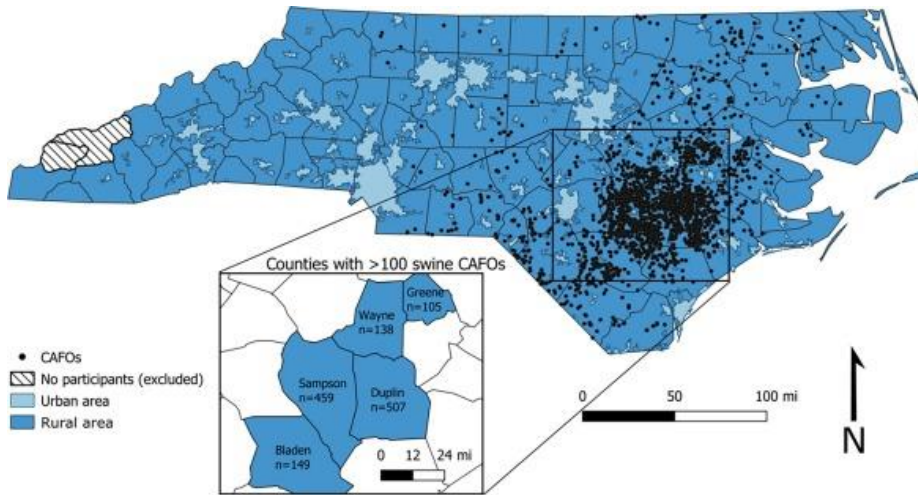
> Immune-mediated diseases are increased with proximity to commercial animal feeding operations (particulate matter, volatile organic compounds, aerosols, gasses)
> Potential role of ARH-ARHNT pathway
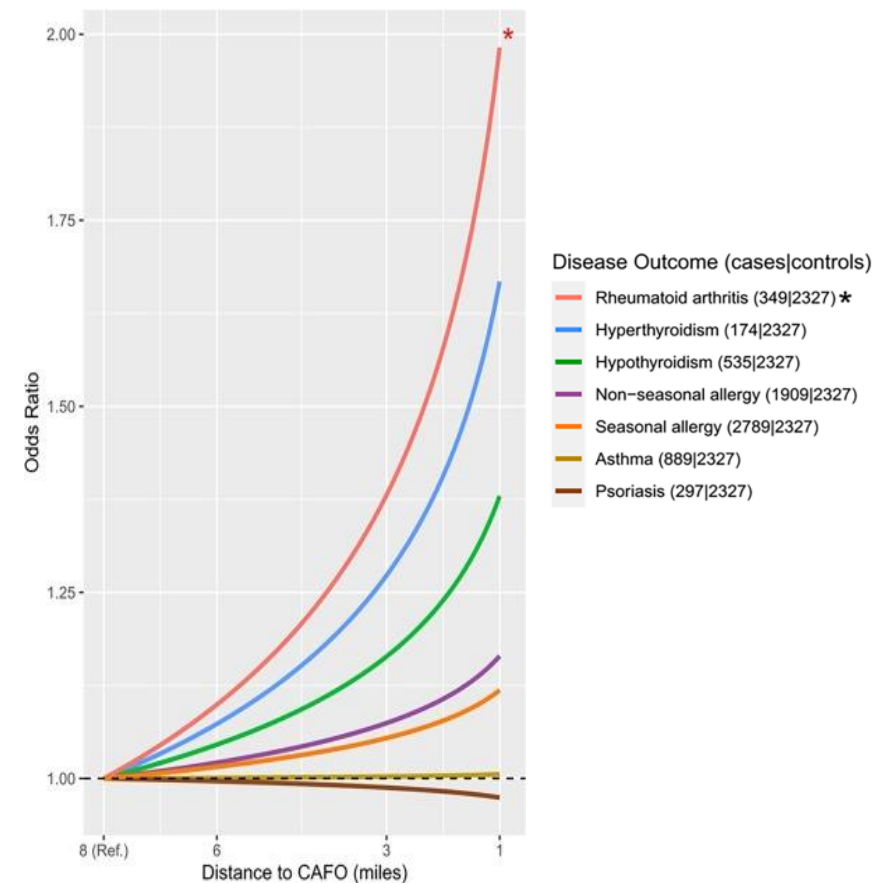
(Ayala-Ramirez et al., 2023)

Disease Outcome (cases|controls)
- Rheumatoid arthritis (349|2327) *
- Hyperthyroidism (174|2327)
- Hypothyroidism (535|2327)
- Non−seasonal allergy (1909|2327)
- Seasonal allergy (2789|2327)
- Asthma (889|2327)
- Psoriasis (297|2327)

Diabetes is an extremely common disease in the PEGS population as it is across the US

- there are a number of genes that increase the risk of diabetes
- in a study using our data from PEGS,
  - ➤ a composite score for exposures identified in our questionnaires was even better at predicting the risk of diabetes than a similar composite score for genetic risk (*Akhtari et al., 2022*)

Psoriasis and Eczema

- The air that surrounds us does not contain just one pollutant but a mixture of different potential toxins
- In a study using data from PEGS that included air composition obtained from approximate address
  - ➤ mixtures of xx in air were associated with self-reported psoriasis or eczema *(Lowe et al., 2022)*

Your Preferences

What type of information would you like to receive from PEGS?

a) **Information on publications and presentations made using PEGS data**

b) **Environmental health issues**

c) **Health education topics (i.e., fitness, diet, etc.)**

d) **Upcoming events**

Of the following list, what types of communications or items would you be interested in receiving from PEGS?

a) Video messages with study updates

b) Newsletters

c) Social media posts

d) Holiday cards/birthday cards

e) Not interested in additional communications

DID YOU KNOW ???

Pesticides
Parkinson's Disease
Birth defects
Reproductive disorders

Non-stick Pots and Pans
Testicular Cancer
Thyroid Cancer
Kidney Cancer

Mold
Allergies
Asthma
Other respiratory illnesses

Lead Pipes
Cardiovascular disease
Cognitive decline
Kidney failure

Plastics
Impaired immunity
Endocrine disruption
Insulin resistance

Reported Exposome Survey Data

➢ **14% of respondents report mold in their residence in the past year**

➢ **16% of respondents report that they apply pest control chemicals every 2 or 3 months**

➢ **16% of respondents report that they do not know if they have been occupationally exposed to the plastic production compound BPA**

Common environmental exposures and how to minimize your risk

Lead

- Minimize your risk by running water from the tap before drinking or cooking to flush pipes

- Keep painted surfaces in good condition to minimize deterioration. (If your home was built before 1978, it may contain lead-based paint.)

Mold

- Ventilate shower, laundry, and cooking areas to control humidity levels

- Use a dehumidifier if humidity levels remain high

- Fix leaky roofs, windows and pipes

Pesticides/Insecticides

- Close windows and doors when spraying pesticides outdoors

- Read and follow instructions on product label, don't use more than needed

- Store out of reach of children

Endocrine Disrupting Chemicals (EDCs)

Natural or man-made chemicals that can interfere with your hormones

– Per- and polyfluoroalkyl substances (PFAS), also known as ***Forever Chemicals***, found in fire fighting foam, nonstick pans, paper, textile

– Phthalates (plasticizers), found in food packaging, cosmetics and are present everywhere

– Bisphenol A (BPA), used to make plastics and epoxy resins

– Polybrominated diphenyl ethers (PBDE), flame retardants in furniture and carpet

– You contact them in the air, water, and food

Endocrine Disrupting Chemicals (EDCs)

How to minimize exposure?

- Avoid heating foods in plastic containers
- Use metal or glass water bottles
- Use water filters (activated carbon or reverse osmosis)
- Use fragrance free cosmetics and soaps
- Open your windows! Household dust can contain EDCs. Use HEPA air filters
- Instead of paper receipts, ask for digital receipts
- Avoid vinyl products such as flooring or shower curtains

PEGS Participant Advisory Board (PAB)

How YOU can help … PEGS Participant Advisory Board

The PEGS Participant Advisory Board (PAB) was created to work collaboratively with the study team with specific purposes in mind:

1. To serve as a liaison between the study team and their cohort by sharing research needs expressed by the participants and to offer suggestions for future research to the study team

2. To assist with developing goals and objectives centered around PEGS that will positively impact participants through study participation and to advance science

3. To provide feedback on study materials and activities

4. To provide ideas for how best to inform participants of PEGS-related news and scientific advances

How YOU can help … PEGS Participant Advisory Board

Solicitation and Criteria

- The study team is actively seeking persons to become a part of the PAB.

- Selection criteria:

  – Express an interest! Be available!

  – Be willing to share and interact with others about the study!

- Email us at niehs-pegs-info@nih.gov if you're interested!

- If you have already contacted us, look for information later this year about the PAB first meeting.

Evaluation Questions

- **Did this Town Hall session help you identify ways that you can limit environmental exposures in your home? Yes/No**

- **Would you recommend this presentation to others? Yes/No**

Questions??

PEGS NIEHS Website