

CHILDREN'S ENVIRONMENTAL HEALTH BORDER SYMPOSIUM

Children's Health: Environmental Impacts & Social Determinants

U.S. Environmental Protection Agency

Presented by Ruth Etzel, M.D., Ph.D.

Director | Office of Children's Health Protection

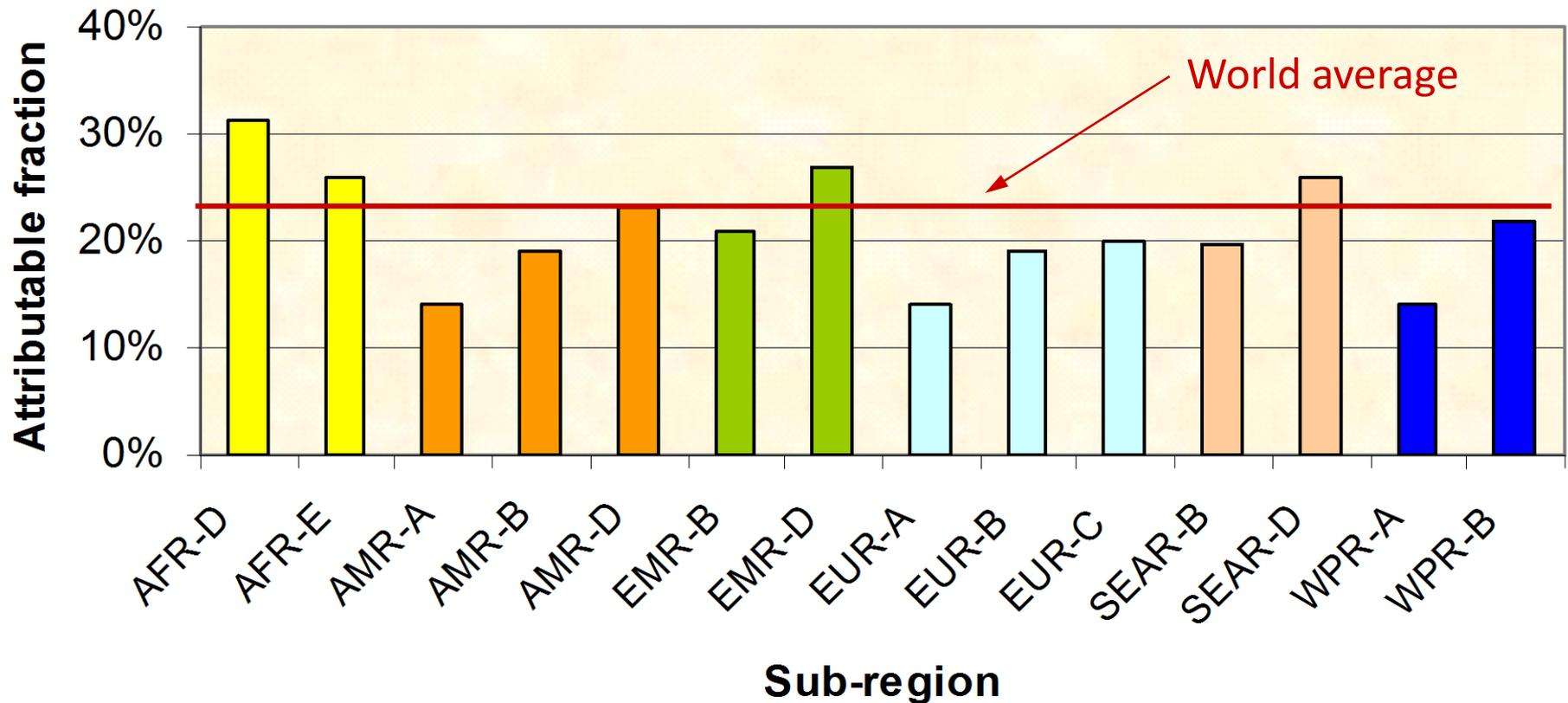




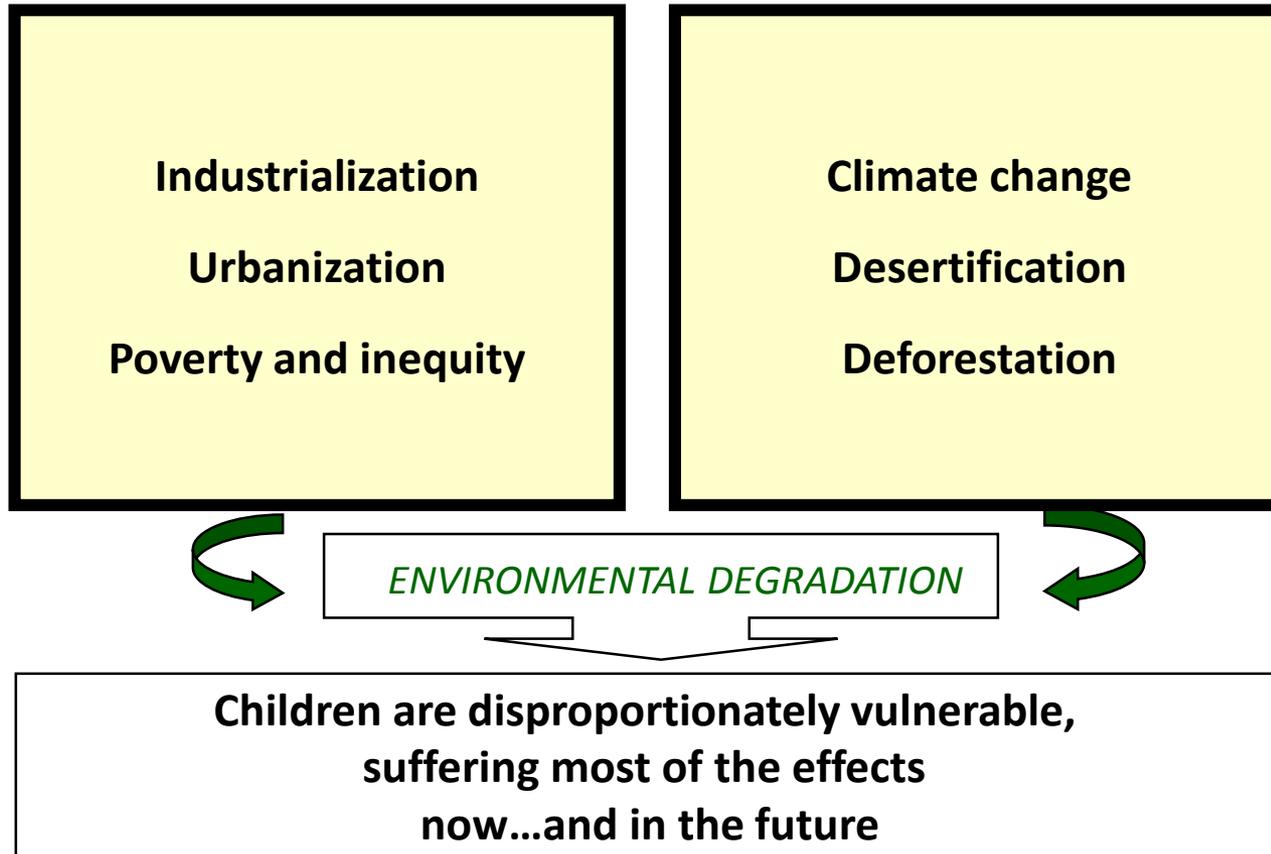


How much disease could be prevented by modifying the environment ?

Existing evidence - conservative estimate 24%



Child Chronic Diseases & Developmental Disabilities are Increasing

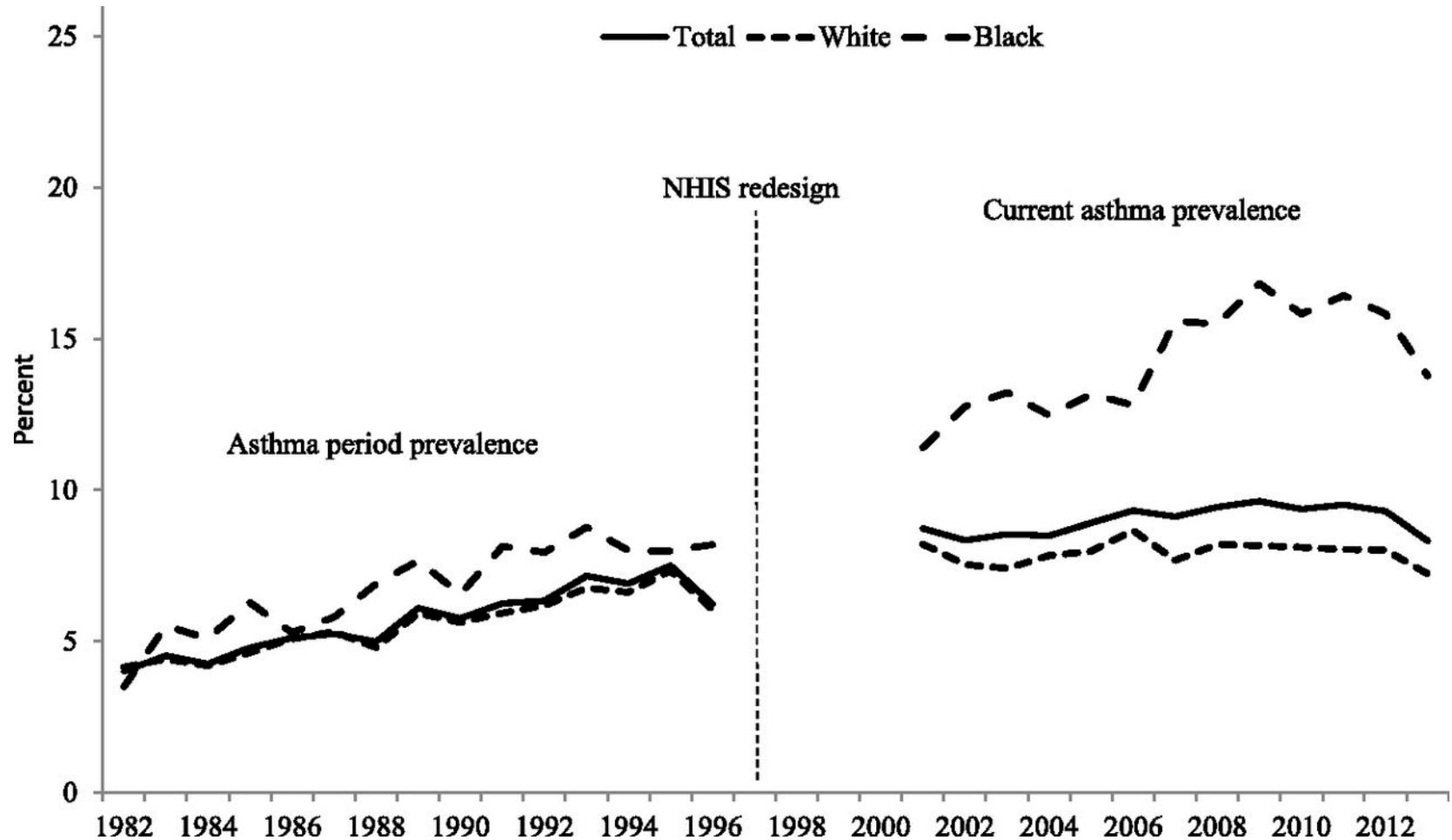


Overweight and Obesity

- Prevalence has nearly quadrupled in American children
- 2.5-fold increased risk of overall mortality
- 4-fold risk of cardiovascular mortality
- 5-fold risk of diabetes
- Risk of hypertension, gall bladder disease, and some cancers



Trend in asthma prevalence by race: United States, 1982–2013



Lara J. Akinbami et al. Pediatrics 2016;137:1-7

Need to Know About Emerging Issues

New or "re-emerging" threats to children's health and development

- Persistent organic pollutants
- Endocrine disruption
- Global climate change
- Mycotoxins
- Ozone depletion
- Zika virus
- Others...



WHO



WHO

Zika Virus

What is Zika?

Zika is a virus transmitted by the *Aedes* mosquito, the same that transmits dengue and chikungunya.



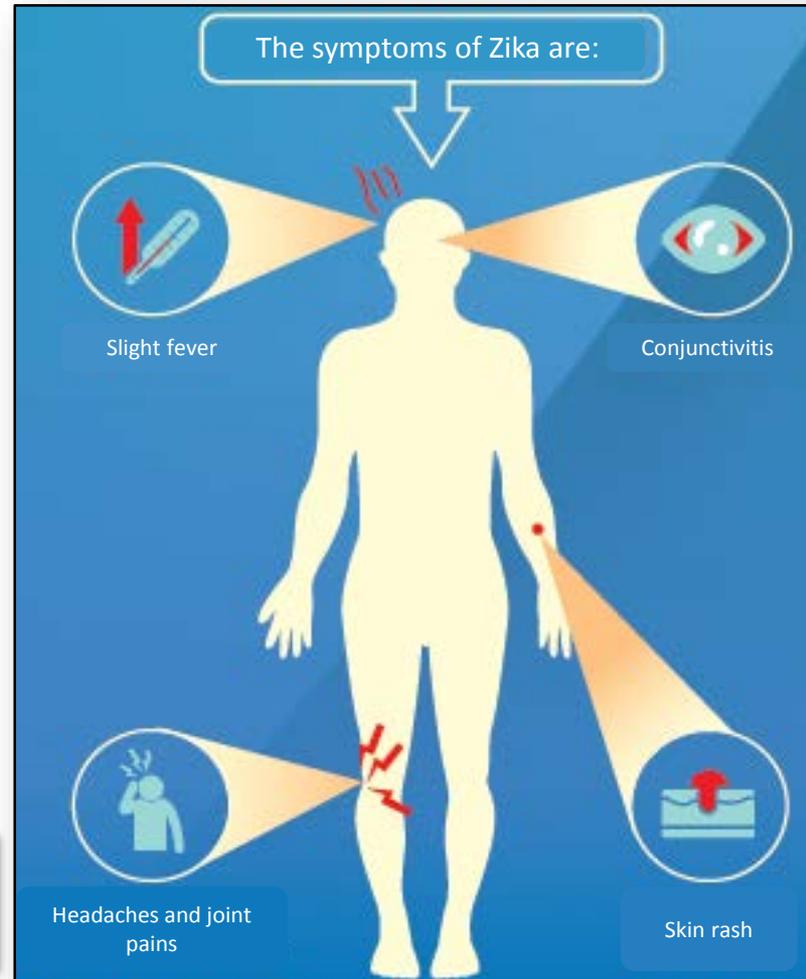
Symptoms can appear between 2 and 7 days after mosquito bites



1 in 4 with Zika develop symptoms



A very small number of people may encounter complications after contracting the virus



How can Zika be prevented?

The following is recommended to avoid mosquito bites that transmit Zika:



Cover the skin with long sleeve shirts, pants, and hat



Use repellent recommended by health authorities



Sleep in places protected with mosquito nets



Once per week, empty and clean, turn over, cover, or throw away any container that can hold water, such as tires/wheels, buckets, pots, inside and outside of the house, to eliminate mosquito breeding places.



Use screen/mosquito nets in windows and doors to reduce contact with mosquitos.

If you control the breeding locations of the *Aedes* mosquito, you can reduce the possibility of Zika, chikungunya, and dengue transmission.

What is the treatment?

There is no vaccine nor a specific medication against this virus. It is possible only to treat the aches and fever.

Patients with symptoms of Zika should:

Rest

Drink fluids

Treat yourself with pain and fever medicine

Sleep under a mosquito net

Wear clothes that cover the limbs

If the symptoms worsen or other complications appear, you should consult your doctor immediately



Environmentally-related illnesses of children have high social & economic costs

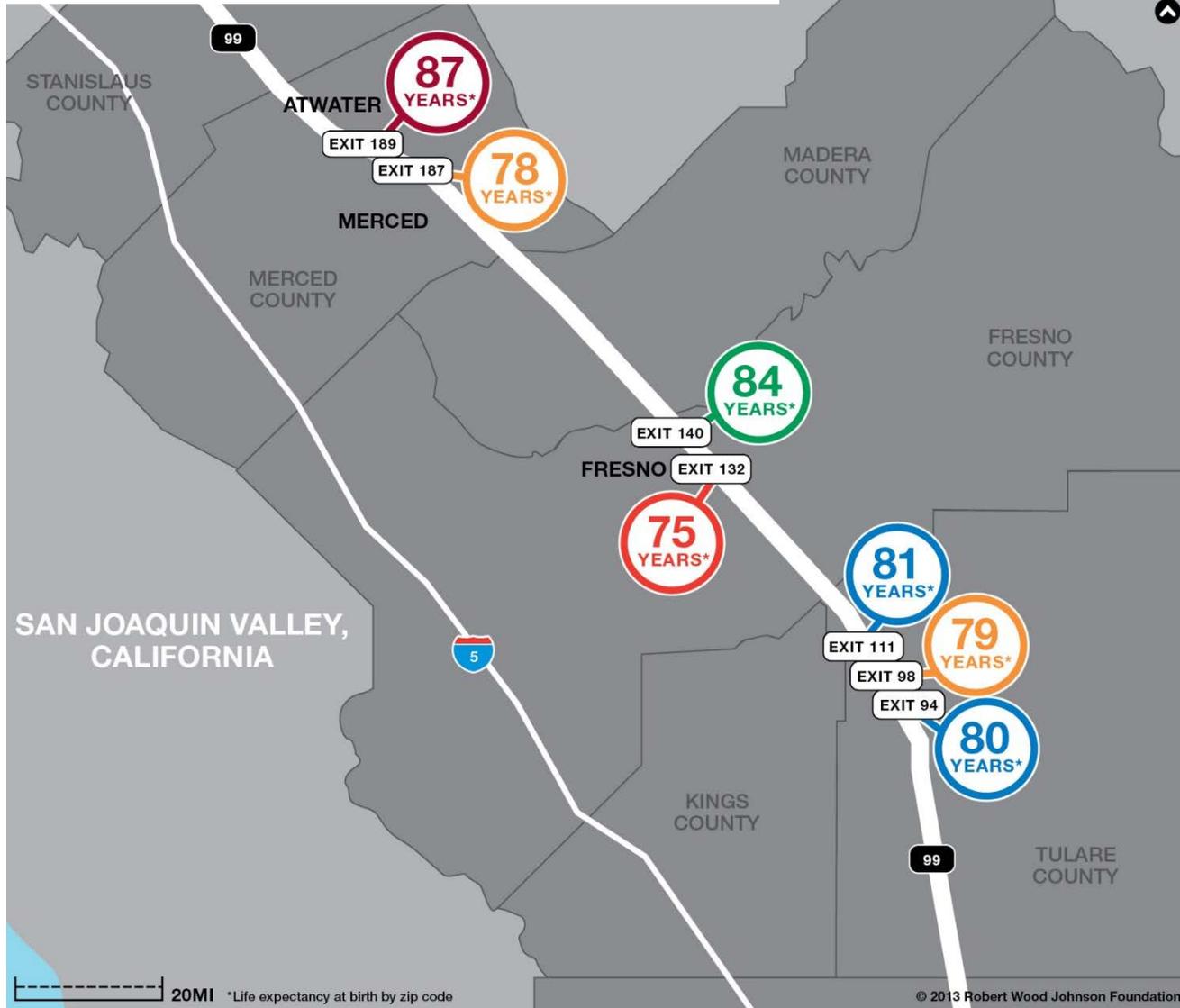
- **Sickness, disability and death**
- **Sick days away from school**
- **Increased medical expenses**
- **Productivity lost by parents away from work**
- **Personal agony of families and communities**
- **Reduced long-term productivity of the country**



WHO

Life Expectancy and Zip Code

Robert Wood Johnson Foundation



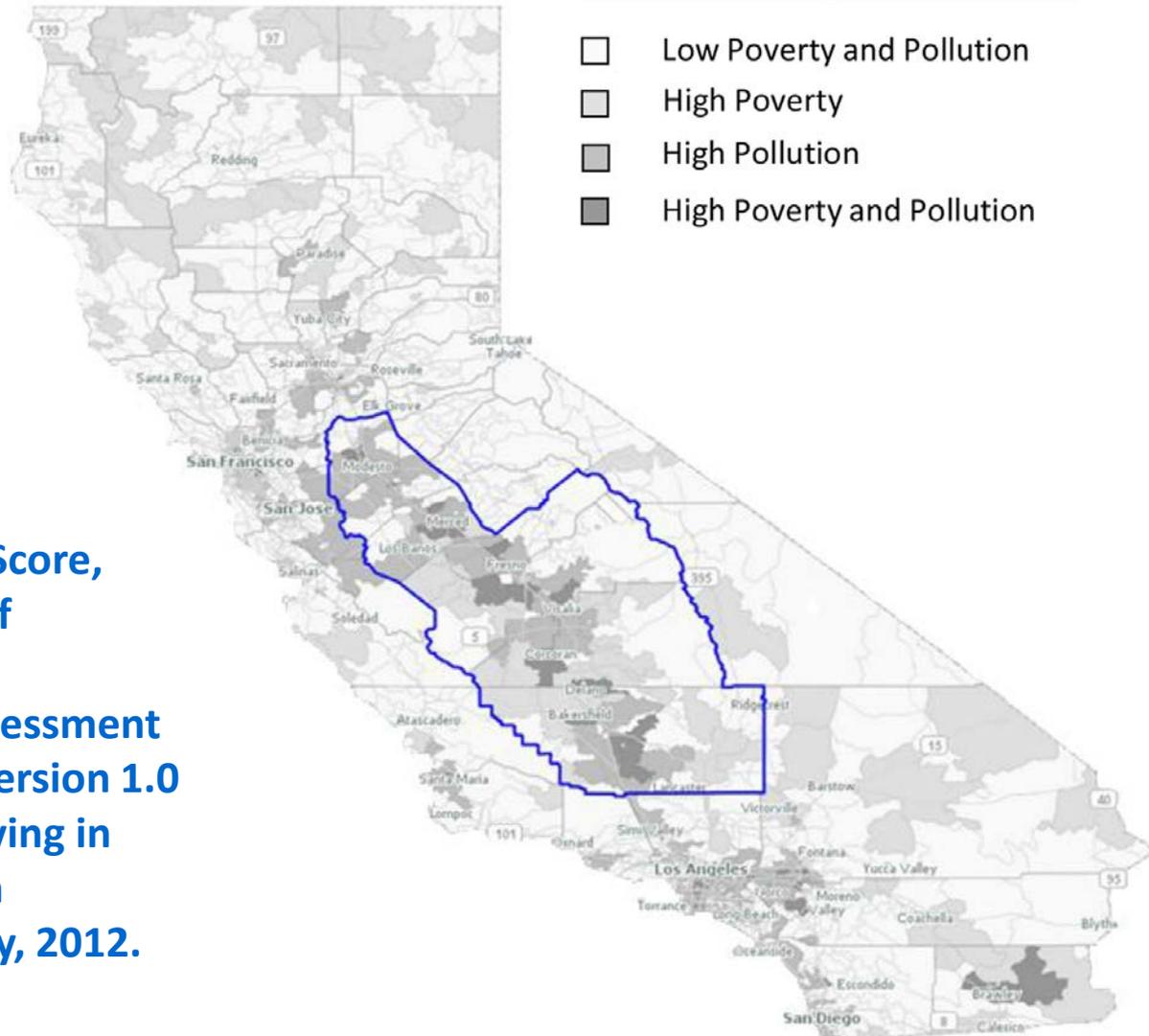
20MI *Life expectancy at birth by zip code

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WHO Working Definition of Social Determinants of Health

“...conditions in which people are born, grow, live, work and age...The social determinants of health are mostly responsible for health inequities.”

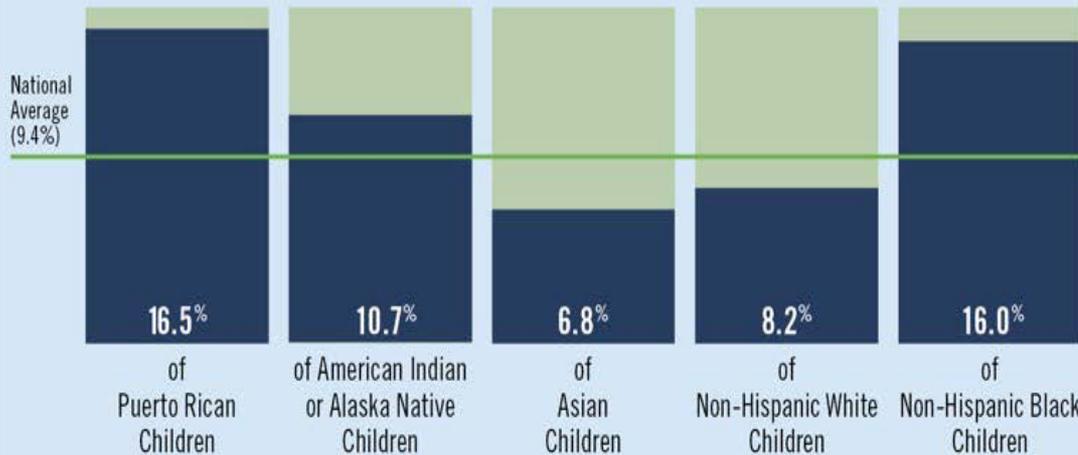
Top quintile of poverty and pollution in California's SJV



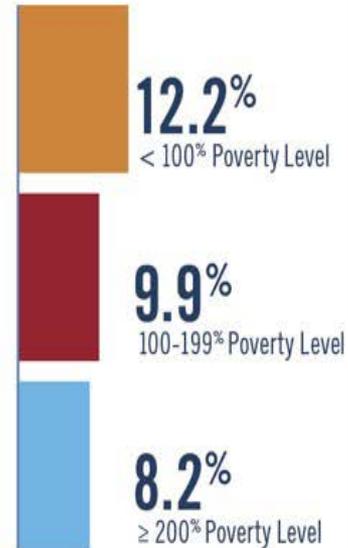
**Pollution Burden Score,
California Office of
Environmental
Health Hazard Assessment
CalEnviroScreen version 1.0
and Individuals Living in
Poverty, American
Community Survey, 2012.**

POOR AND MINORITY CHILDREN HAVE A GREATER ASTHMA BURDEN

1 in **11** children has **ASTHMA**



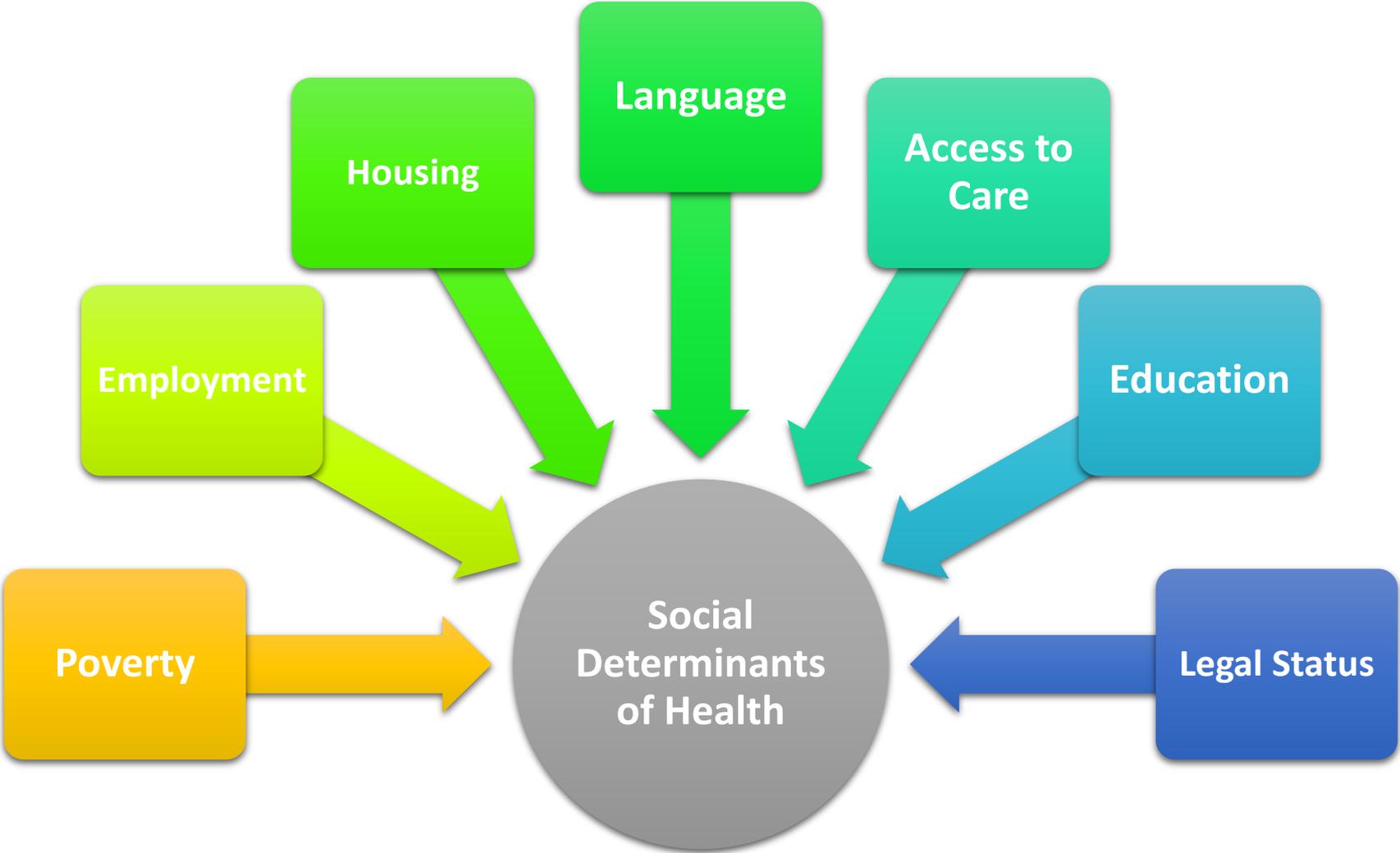
CHILDREN WITH ASTHMA LIVING IN POVERTY



NEARLY **7 MILLION** children ages 0 to 17 in the United States have asthma, with poor and minority children suffering a greater burden of the disease.

OVER **\$50 BILLION** in medical expenses associated with asthma annually.

Social Drivers of Health Inequalities



Depiction of children Egypt – 3300 years ago



Akhenaten, Nefertiti and Their 3 Daughters



CHILDREN = LITTLE ADULTS



Giotto, National Gallery, Washington DC

~600 years ago, children were still thought of as “little adults”

CHILDREN ARE NOT LITTLE ADULTS



Giotto, National Gallery, Washington DC



Raphael, National Gallery of Art, Washington, DC

CHILDREN HAVE **DIFFERENT RISKS** FROM ADULTS



Raphael, National Gallery of Art, Washington, DC

1. Different and unique exposures
2. Dynamic developmental physiology
3. Longer life expectancy
4. Politically powerless

Children Are Not Little Adults!

Physiological Difference and Vulnerability During Development

Lungs continue to develop for the first 18 years. Children also consume proportionately more air.

Lungs

Children's immature **liver** enzymes may not break down contaminants as quickly as adults.

Liver

Children have slower excretion from the **kidneys** than adults.

Kidneys

A child's **gastrointestinal tract** has increased permeability and absorption, especially in early infancy.

GI tract

Brain

The **brain** attains 90% of its adult size in the first 3 years; rapid growth makes the nervous system vulnerable.

Children have fewer **plasma** proteins, which help bind certain chemicals.

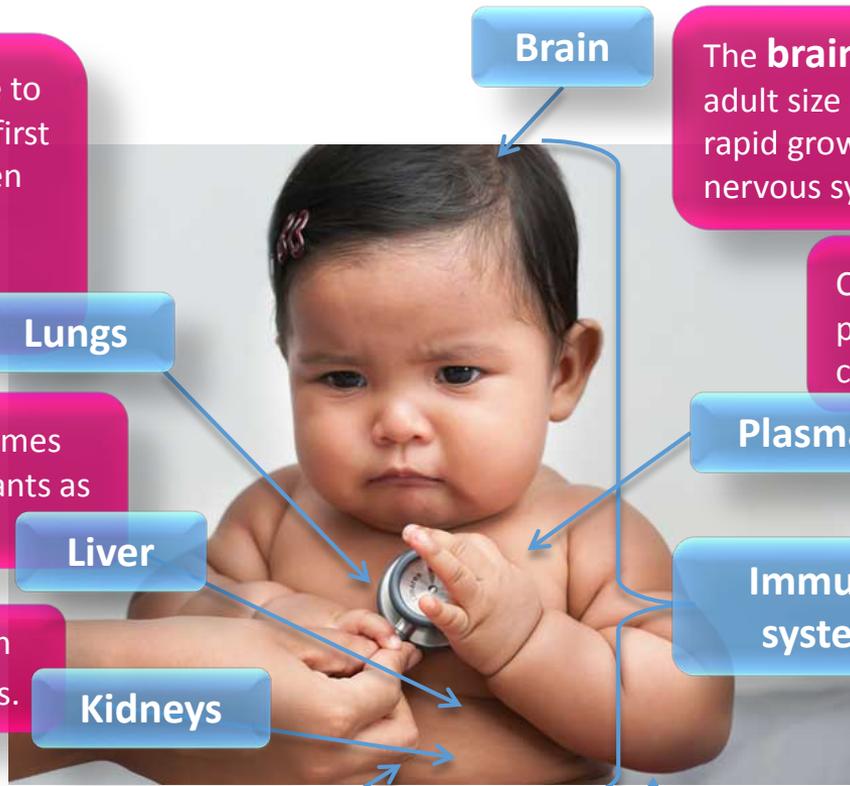
Plasma

Immune system

Children under 3 have immature **immune systems**, lacking the variety and quantity of an adult's antibodies.

The **skin** is more permeable than an adult's. Children also have a higher surface area to mass ratio.

Skin

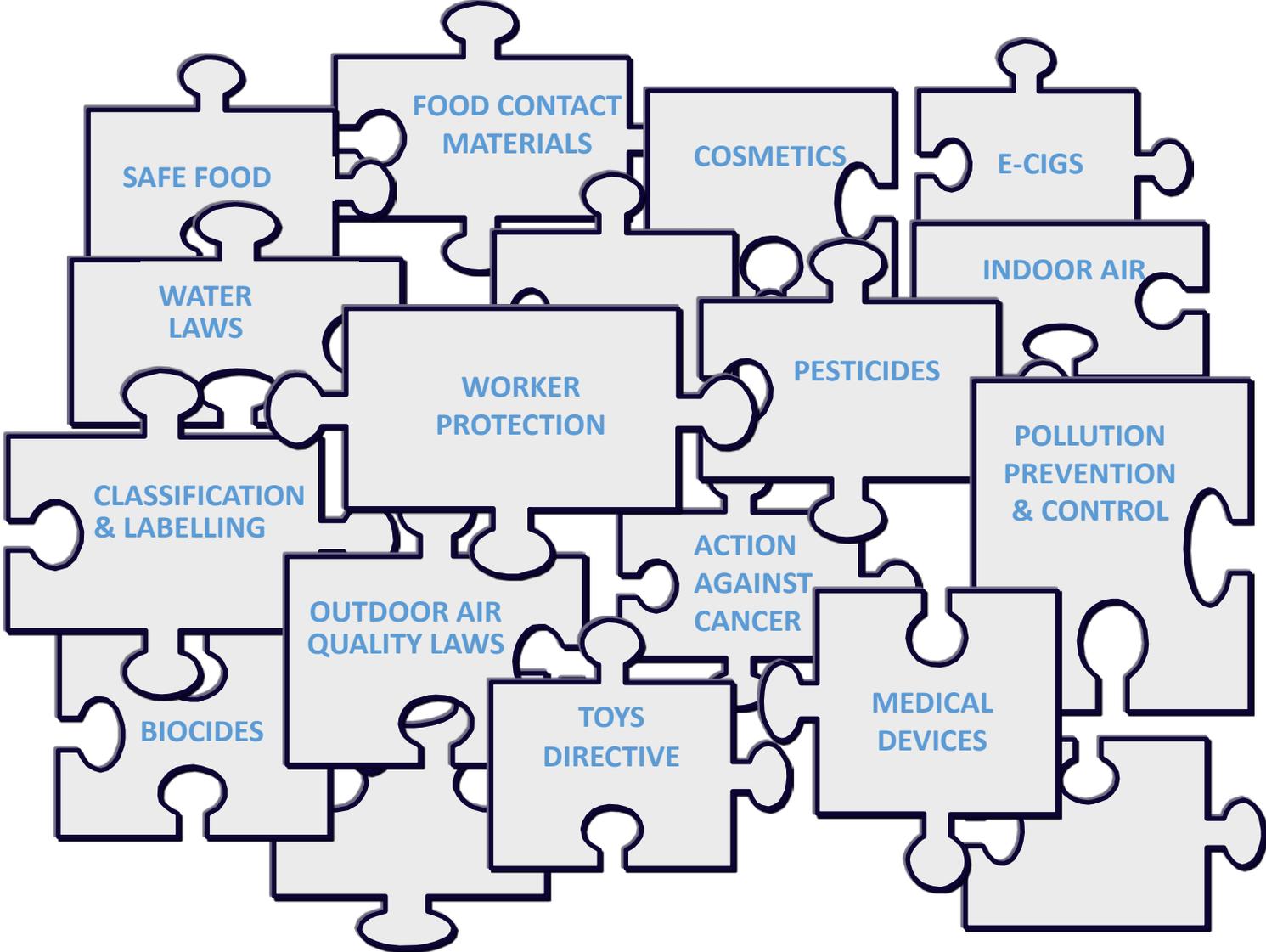


There is now recognition of:

- special vulnerability of children and developing fetuses to toxicants and physical agents
- effects depend upon: toxicity, dose, timing and amount of exposure
- effects are exacerbated by:
 - poverty
 - malnutrition
 - degraded environments
 - stressful circumstances

Policies Relevant to Child Health

Part of the solution



Networks and Resources

Pediatric Environmental Health Specialty Units (PEHSUs) were created to ensure that children and communities have access to, usually at no cost, special medical knowledge and resources for children faced with a health risk due to a natural or human-made environmental hazard.

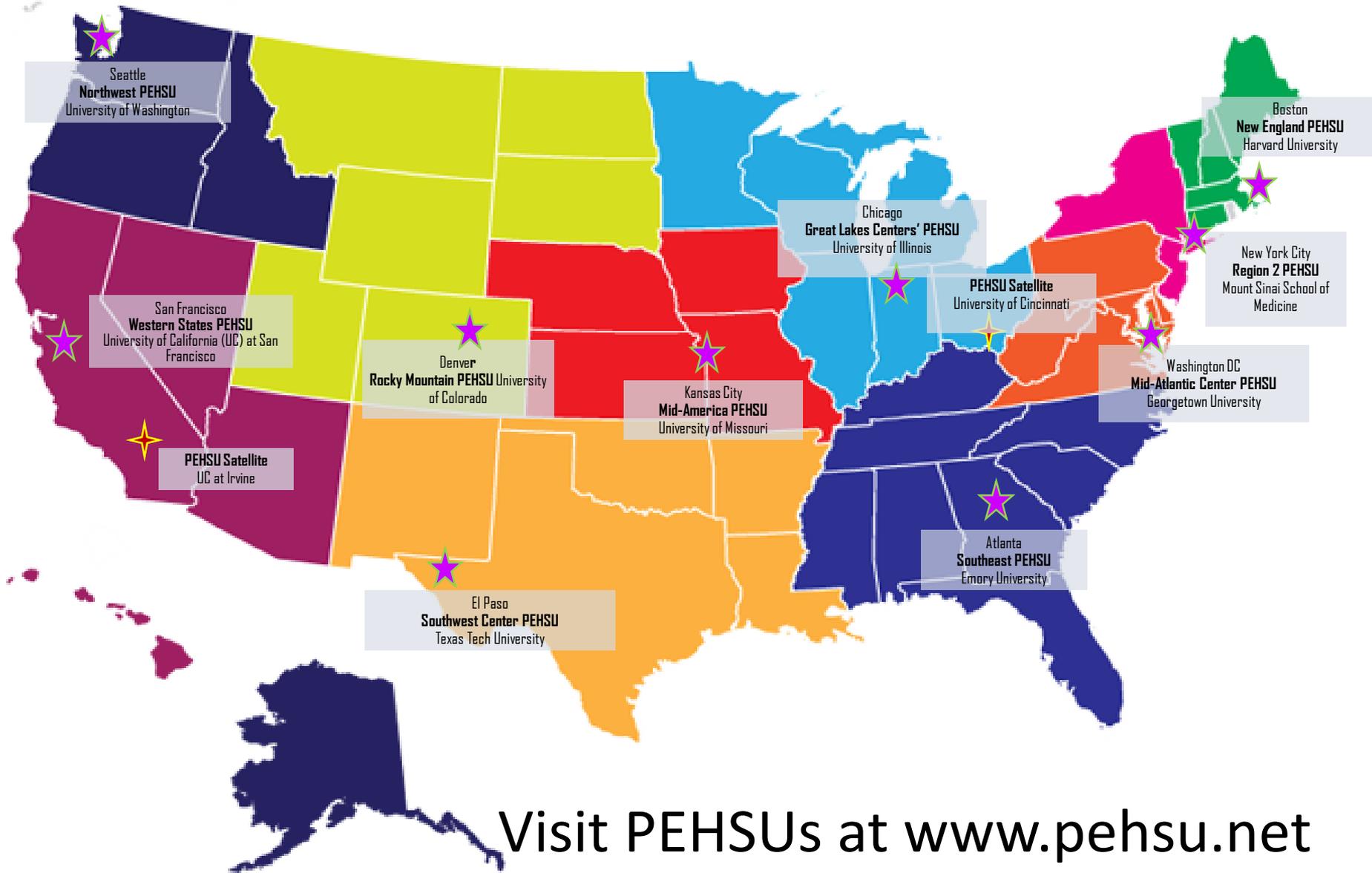
- Educate physicians during grand rounds.
- Organize conferences and seminars to provide trainings.
- Prepare the next generation of health professionals.

PEHSU Specialties

Because children's environmental health covers a wide variety of issues, the PEHSU network has experts in:

- Pediatrics
- Allergy/Immunology
- Neurodevelopment
- Toxicology and medical toxicology
- Occupational and environmental medicine
- Nursing
- Other specialties

PEHSU Academic Affiliations



Visit PEHSUs at www.pehsu.net

Networks and Resources

Migrant Clinicians Network's (MCN) Environmental and Occupational Health Program Initiatives.

Educational tools for farmworkers and their families that includes both resources to help reinforce the messages and support changes in behavior as well resources to conduct trainings and carry out a broader intervention.

<http://www.migrantclinician.org/services/initiatives/occupational-health.html>

Networks and Resources: MCN

Promotor de Salud Curricula and Resources:

- [Aunque Cerca... Sano Pesticide Training Manual](#)- step-by-step training manual is designed to equip promotores with information and exercises to conduct pesticide safety trainings and reduce work-to-home exposure pathways that put families at risk to exposure.
- [Poco Veneno... ¿No mata?Pesticide Education Manual](#)- reinforces the relevant pesticide safety information and community outreach strategies that promotores need to know when conducting pesticide education activities.

Networks and Resources: MCN

Patient Education Materials:

- [Aunque Cerca... Sano](#): a full color Spanish language comic book that targets farmworker families to educate parents about children's risks to pesticide exposure and ways to protect their children.
- [Lo que bien empieza... bien acaba](#): a full color Spanish language comic book that addresses pesticide exposure in women of reproductive age.
- [Spanish Radio Novela 4](#)- These radio novelas were developed as part of MCN regional EPA project that we did on the Eastern Shore of Virginia to educate families about environmental health concerns.

Additional Information

- Children's health and air quality: <http://www2.epa.gov/children>
- Progress under the Clean Air Act: <http://epa.gov/airtrends/>
- Actions EPA is taking to address outdoor and indoor air pollution
 - Ozone: <http://www.epa.gov/air/ozonepollution/>
 - Particle pollution: <http://www.epa.gov/particles/>
 - Mercury: <http://epa.gov/mercury/>
 - Lead: <http://www2.epa.gov/lead>
 - Asthma and indoor air triggers: <http://epa.gov/asthma/>
 - Radon: <http://epa.gov/radon/>
 - Clean Power Plan: <http://www2.epa.gov/carbon-pollution-standards>
- Climate Adaptation and Resilience: <http://epa.gov/climatechange/impacts-adaptation/>

Contact

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[HTTP://WWW2.EPA.GOV/CHILDREN](http://www2.epa.gov/children)

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