CHILDREN’S ENVIRONMENTAL HEALTH BORDER SYMPOSIUM

Children’s Health: Environmental Impacts & Social Determinants

U.S. Environmental Protection Agency
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How much disease could be prevented by modifying the environment?

Existing evidence - conservative estimate 24%

Source: Preventing disease through healthy environments, WHO, 2006
Child Chronic Diseases & Developmental Disabilities are Increasing

Industrialization
Urbanization
Poverty and inequity

Climate change
Desertification
Deforestation

ENVIRONMENTAL DEGRADATION

Children are disproportionately vulnerable, suffering most of the effects now...and in the future

Source: Preventing disease through healthy environments, WHO, 2006
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

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

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...
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

The symptoms of Zika are:
- Slight fever
- Conjunctivitis
- Headaches and joint pains
- Skin rash
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 repellant 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 mosquitoes.**

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.

[Image: zika_combateaedes.png]
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
Life Expectancy and Zip Code

SAN JOAQUIN VALLEY, CALIFORNIA
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.

- **National Average (9.4%)**
  - 16.5% of Puerto Rican children
  - 10.7% of American Indian or Alaska Native children
  - 6.8% of Asian children
  - 8.2% of Non-Hispanic White children
  - 16.0% of Non-Hispanic Black children

**Children with asthma living in poverty**
- 12.2% < 100% Poverty Level
- 9.9% 100-199% Poverty Level
- 8.2% ≥ 200% Poverty Level

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

- Poverty
- Employment
- Housing
- Language
- Access to Care
- Education
- Legal Status

Social Determinants of Health
Depiction of children
Egypt – 3300 years ago
Akhenaten, Nefertiti and Their 3 Daughters
CHILDREN = LITTLE ADULTS

~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

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

*Raphael, National Gallery of Art, Washington, DC*
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.

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

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

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

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

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

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

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

SAFE FOOD
WATER LAWS
CLASSIFICATION & LABELLING
BIOCIDES
FOOD CONTACT MATERIALS
COSMETICS
E-CIGS
INDOOR AIR
PESTICIDES
WORKER PROTECTION
ACTION AGAINST CANCER
OUTDOOR AIR QUALITY LAWS
TOYS
TOYS DIRECTIVE
MEDICAL DEVICES
POLLUTION PREVENTION & CONTROL
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.
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

Seattle
Northwest PEHSU
University of Washington

San Francisco
Western States PEHSU
University of California (UC) at San Francisco

El Paso
Southwest Center PEHSU
Texas Tech University

Denver
Rocky Mountain PEHSU
University of Colorado

Kansas City
Mid-America PEHSU
University of Missouri

Chicago
Great Lakes Centers’ PEHSU
University of Illinois

Atlanta
Southeast PEHSU
Emory University

Washington DC
Mid-Atlantic Center PEHSU
Georgetown University

Boston
New England PEHSU
Harvard University

New York City
Region 2 PEHSU
Mount Sinai School of Medicine

PEHSU Satellite
University of Cincinnati

PEHSU Satellite
UC at Irvine
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/
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