

Pediatric Environmental Health

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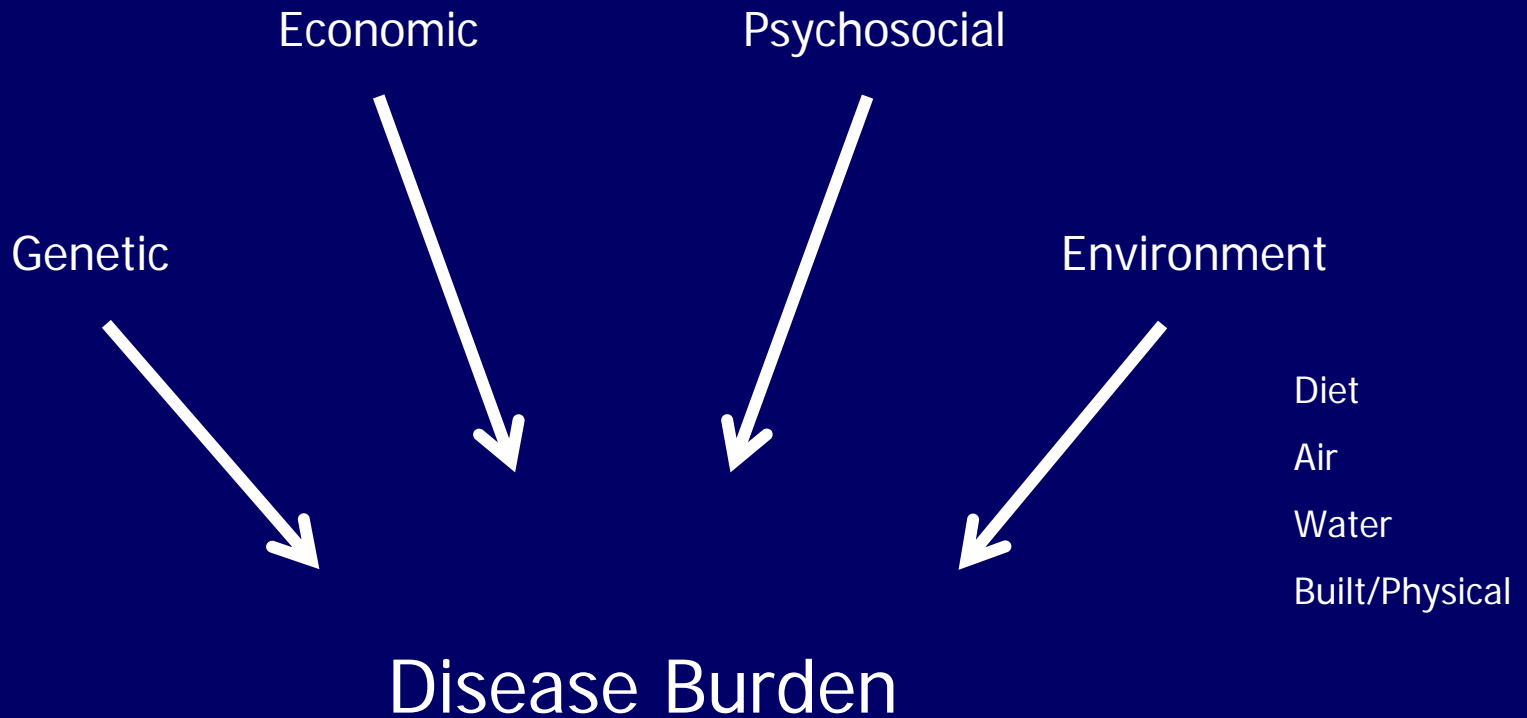
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What is Environmental Health?



Definitions

- PEH – how the environment influences human health and disease
- “Environmental health includes both the direct pathologic effects of chemicals, radiation and some biological agents and the effects on health and wellbeing of the broad physical, psychological, social, and aesthetic environment which includes housing, urban development, land use and transport”
 - *World Health Organization*

Children's Vulnerability

- Children are not little adults
- More susceptible to environmental exposures:
 - increased hand to mouth play
 - on the ground play
 - increased respiratory rate
 - decreased ability to metabolize/excrete as infants
 - increased surface area/body volume
 - unique developmental vulnerabilities

Expanding Evidence Base

- Asthma
 - ETS
 - Outdoor Air pollutants (particulate matter, ozone, etc)
 - Mold
 - Pesticides (Pyrethrins)
- Neurodevelopmental disorders
 - Lead, PCBs, Mercury, Pesticides, CO, Synthetic chemicals
- Obesity
 - Built Environment, Endocrine Disruptors
- Reproductive/Endocrine disorders
 - Perchlorate, DDT, Phthalates, Bisphenol A
- Cancer
 - Pesticides, Radon, EMFs, Solvents, Synthetic Chemicals

Key Components to PEH

- Good environmental history
- Appropriate testing/diagnosis
- Treatment/Education

Pediatric Environmental History (0-18 Years of Age)

The Screening Environmental History

For all of the questions below, most are often asked about the child's primary residence. Although some questions may specify certain locations, one should always consider all places where the child spends time, such as daycare centers, schools, and relative's houses.

Where does your child live and spend most of his/her time? _____

What are the age, condition, and location of your home? _____

Does anyone in the family smoke? Yes No Not sure

Do you have a carbon monoxide detector? Yes No Not sure

Do you have any indoor furry pets? Yes No Not sure

What type of heating/air system does your home have?
 Radiator Forced air Gas stove Wood stove Other _____

What is the source of your drinking water?
 Well water City water Bottled water

Is your child protected from excessive sun exposure? Yes No Not sure

Is your child exposed to any toxic chemicals of which you are aware? Yes No Not sure

What are the occupations of all adults in the household? _____

Have you tested your home for radon? Yes No Not sure

Does your child watch TV, or use a computer or video game system more than two hours a day? Yes No Not sure

How many times a week does your child have unstructured, free play outside for at least 30 minutes? _____

Do you have any other questions or concerns about your child's home environment or symptoms that may be a result of his or her environment? _____

Follow up/ Notes

The Screening Environmental History is taken in part from the following sources:

- American Academy of Pediatrics Committee on Environmental Health. Pediatric Environmental Health 2nd ed. Etzel RA, Balk SJ, Eds. Elk Grove Village, IL: American Academy of Pediatrics; 2003. Chapter 4: How to Take an Environmental History.
- Balk SJ. The environmental history: asking the right questions. *Contemp Pediatr*. 1996;13:19-36.
- Frank A, Balk S, Carter W et al. Case Studies in Environmental Medicine. Agency for Toxic Substances and Disease Registry, Atlanta GA. 1992, rev. 2000. Taking an Exposure History.

This screening environmental history is designed to capture most of the common environmental exposures to children. The screening history can be administered regularly during well-child exams as well as to assess whether an environmental exposure plays a role in a child's symptoms. If a positive response is given to one or more of these screening questions, the primary care provider can consider asking further questions on the topic provided in the Additional Categories and Questions to Supplement the Screening Environmental History.



Case

- MR is a four year old female who comes into the ER. Her parents state that occasionally they notice that her entire back turns blue.
- During these episodes, she is alert with normal activity, and the blue eventually fades away

History/PE

- Family lives in a rural area in a new home supplied with well water
- Dad owns his own organic farm
- Mom stays at home with the kids (ages 4 and 8 years)
- 4yr is otherwise healthy with normal development
- Physical Exam – normal

Nitrate Toxicity

- 14 million homes in the US supplied with well water, estimates of >10,000 wells with nitrate levels above the EPA limit
- Causes methemoglobinemia. Nitrates oxidize hemoglobin to methemoglobin (Fe +2 → Fe +3)
- In infants, NADH/NADPH methemoglobin reductase has 1/2 activity as it does in adults

Symptoms

Table 1. Signs and symptoms of methemoglobinemia.

MethHb concentration (%)	Clinical findings
10–20	Central cyanosis of limbs/trunk
20–45	Central nervous system depression (headache, dizziness, fatigue, lethargy), dyspnea
45–55	Coma, arrhythmias, shock, convulsions
> 60	High risk of mortality

Adapted from Kross et al. (1992).

Work-up/Treatment

- CBC w/ smear, examination of blood color
- Methemoglobin testing
- Treatment:
 - ABC with 100% oxygen
 - if Methemoglobin >20%, IV administration of methylene blue (reduces methemoglobin → hemoglobin)

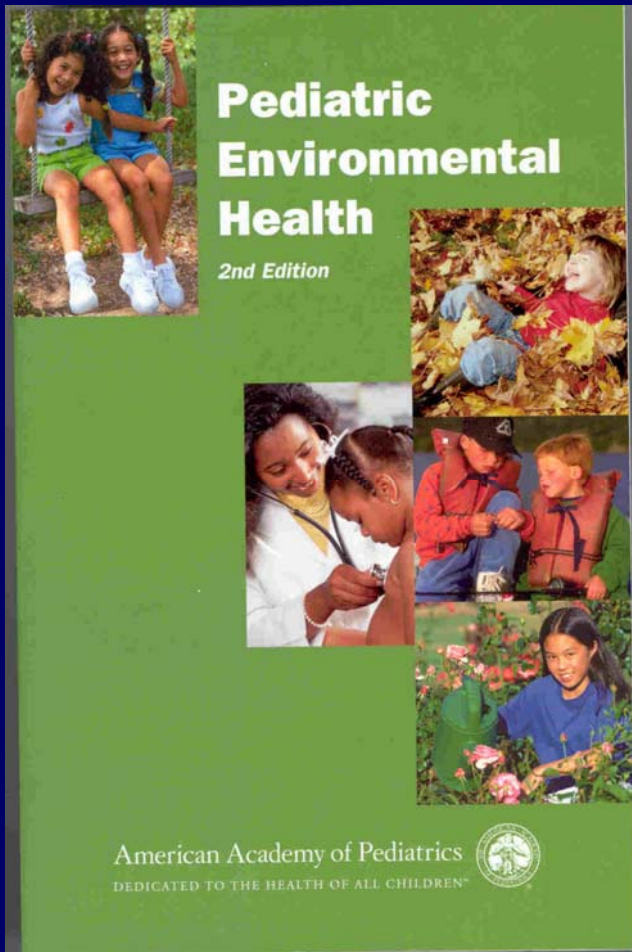
Education



Policy Statement: Drinking Water From Private Wells and Risks to Children


“Drinking water for approximately one sixth of US households is obtained from private wells. These wells can become contaminated by pollutant chemicals or pathogenic organisms and cause illness. Children may also drink well water at child care or when traveling. Illness resulting from children's ingestion of contaminated water can be severe. This policy statement provides recommendations for inspection, testing, and remediation for wells providing drinking water for children.”

AAP Publication



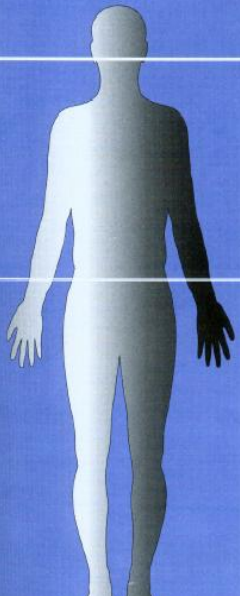
Pediatric Environmental Health, November 2003

ATSDR CASE STUDIES



*Case Studies in
Environmental Medicine*

Course: SS3046
Revision Date: March 2000
Original Date: October 1992
Expiration Date: June 30, 2003



TAKING AN EXPOSURE HISTORY

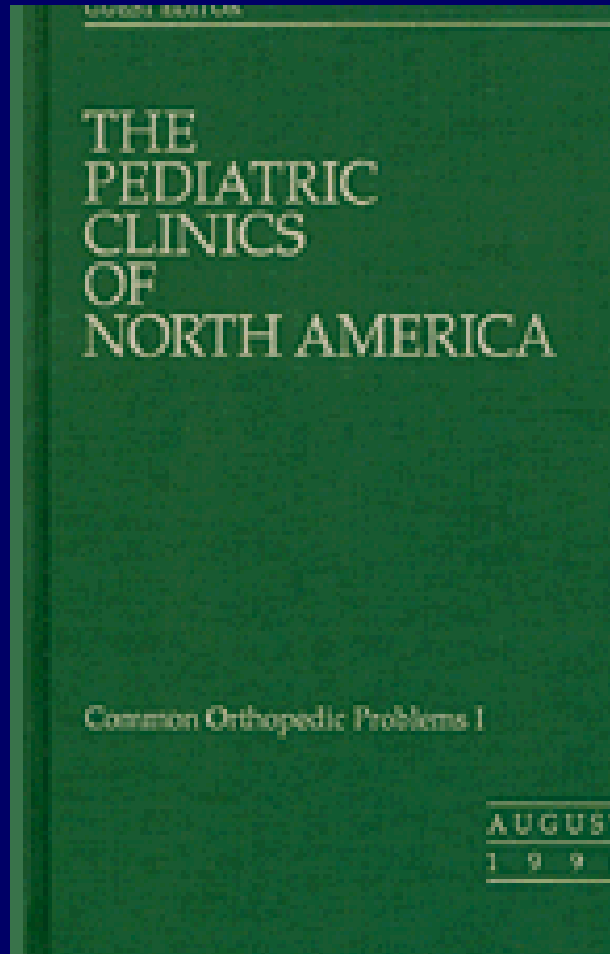
Environmental Alert

- Because many environmental diseases either manifest as common medical problems or have nonspecific symptoms, an exposure history is vital for correct diagnosis. By taking a thorough exposure history, the primary care clinician can play an important role in detecting, treating, and preventing disease due to toxic exposure.

■ *Taking an Exposure History, March 2000*

http://www.atsdr.cdc.gov/HEC/CSEM/exphistory/goals_objectives.html

PEDIATRIC CLINICS OF NORTH AMERICA



- *Environmental Health, October 2001*
- *Jerome Paulson, MD, Editor*