

Environmental Health Literacy: Reaching the Clinical Audience

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PEPH Webinar, December 7 2018

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UC Berkeley

President, International Society for Children's Health and the Environment

Director, California EPA Children's Environmental Health Office

(comments do not reflect California EPA)

y



MARK D. MILLER, M.D.
PEDIATRICS

**SOLVE AN ENVIRONMENTAL
PROBLEM - SHOOT AN
ENVIRONMENTALIST**

**TURN
IN POACHERS**

**SOLVE AN ENVIRONMENTAL
PROBLEM - SHOOT AN
ENVIRONMENTALIST**

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I ♥ my 

FIRST

Policy of the
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of Pediatrics

Pediatric Environmental Health

3rd Edition

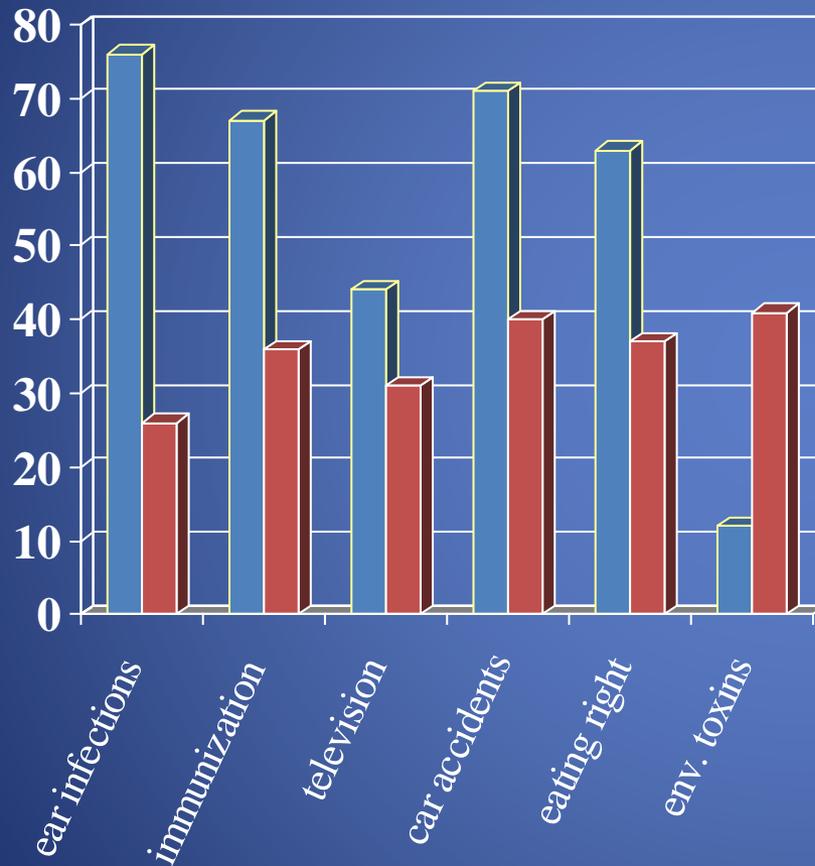


American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

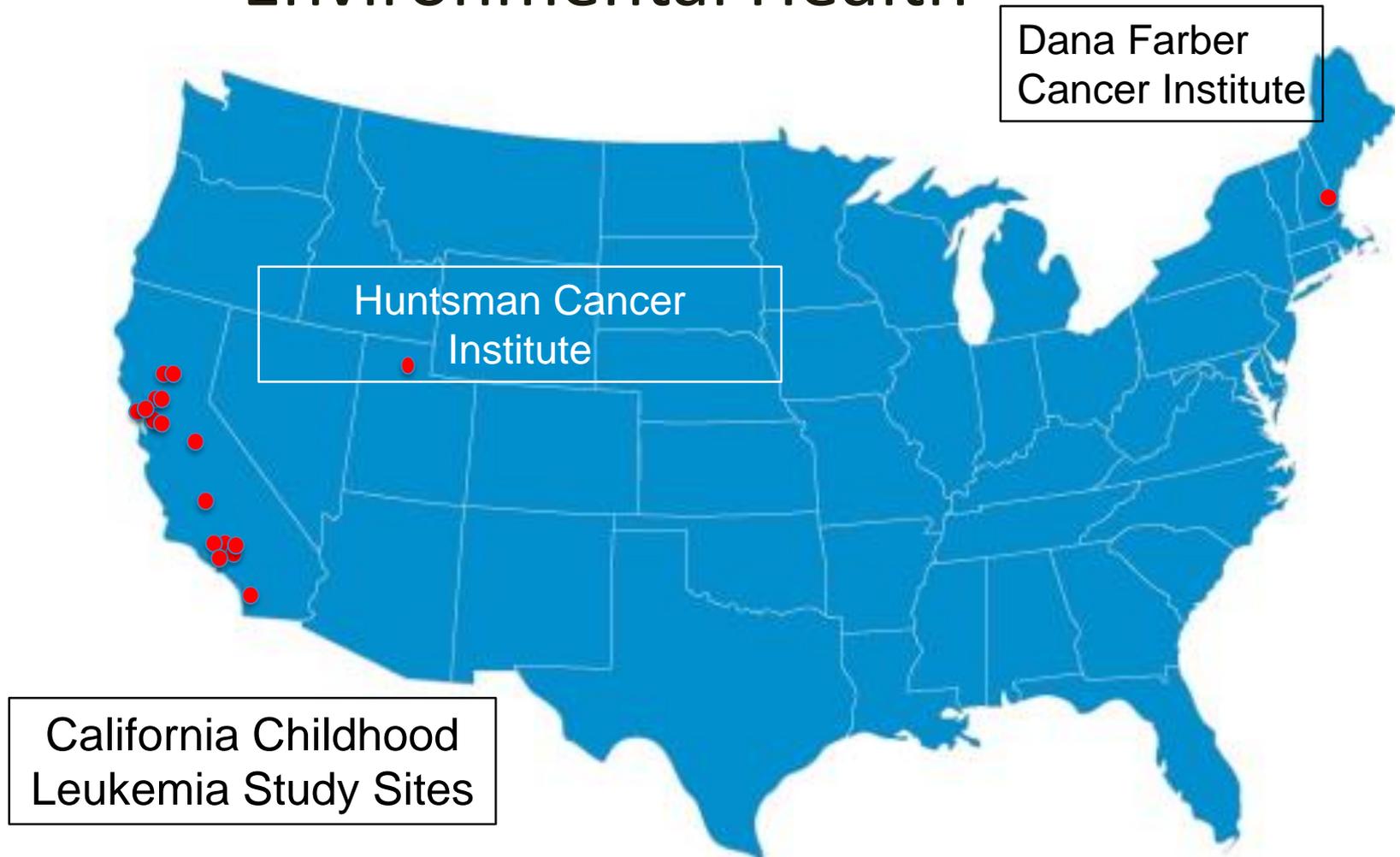


Parental Concern vs. Pediatrician Advice



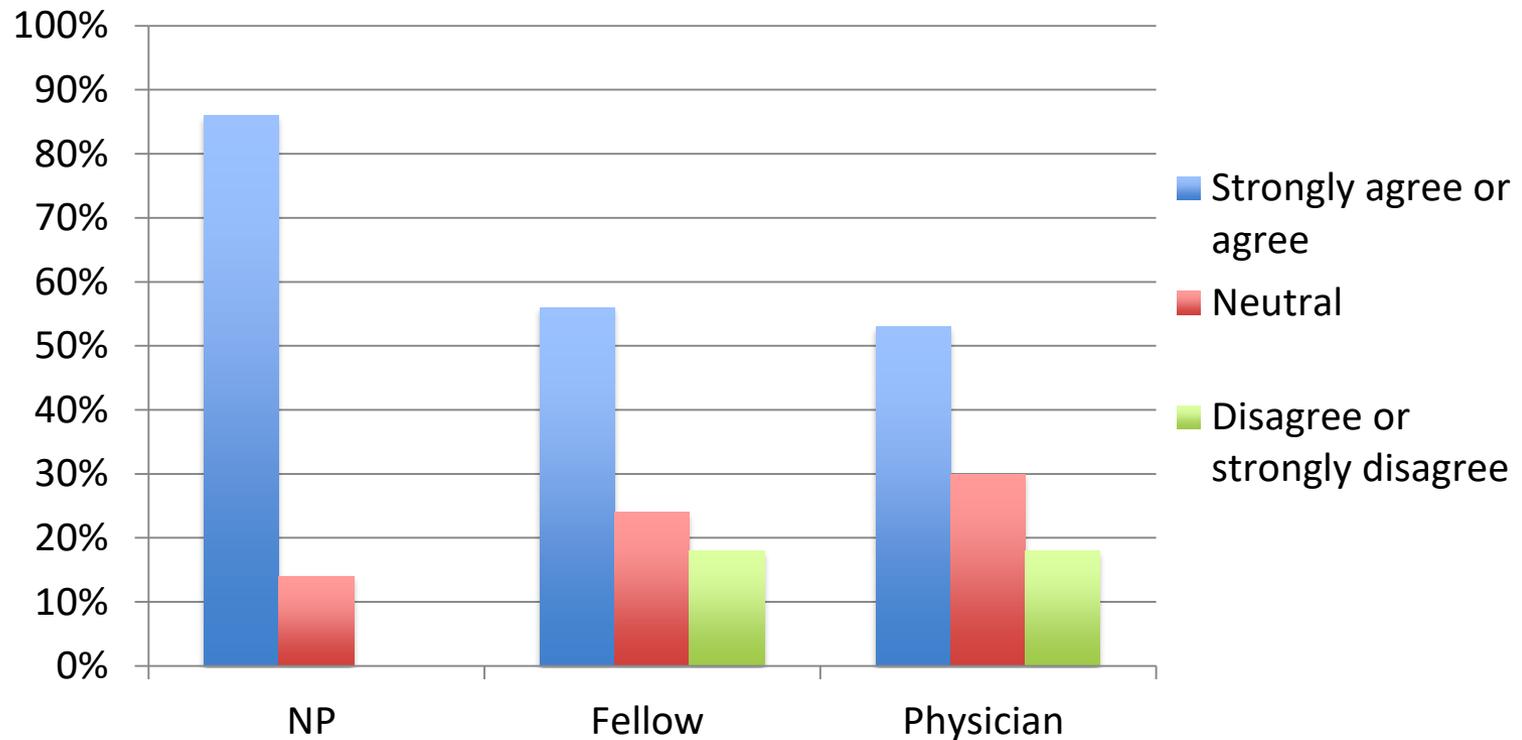
■ pediatrician advises often
■ parents worry "a lot"

Providers Attitudes and Practice on Environmental Health

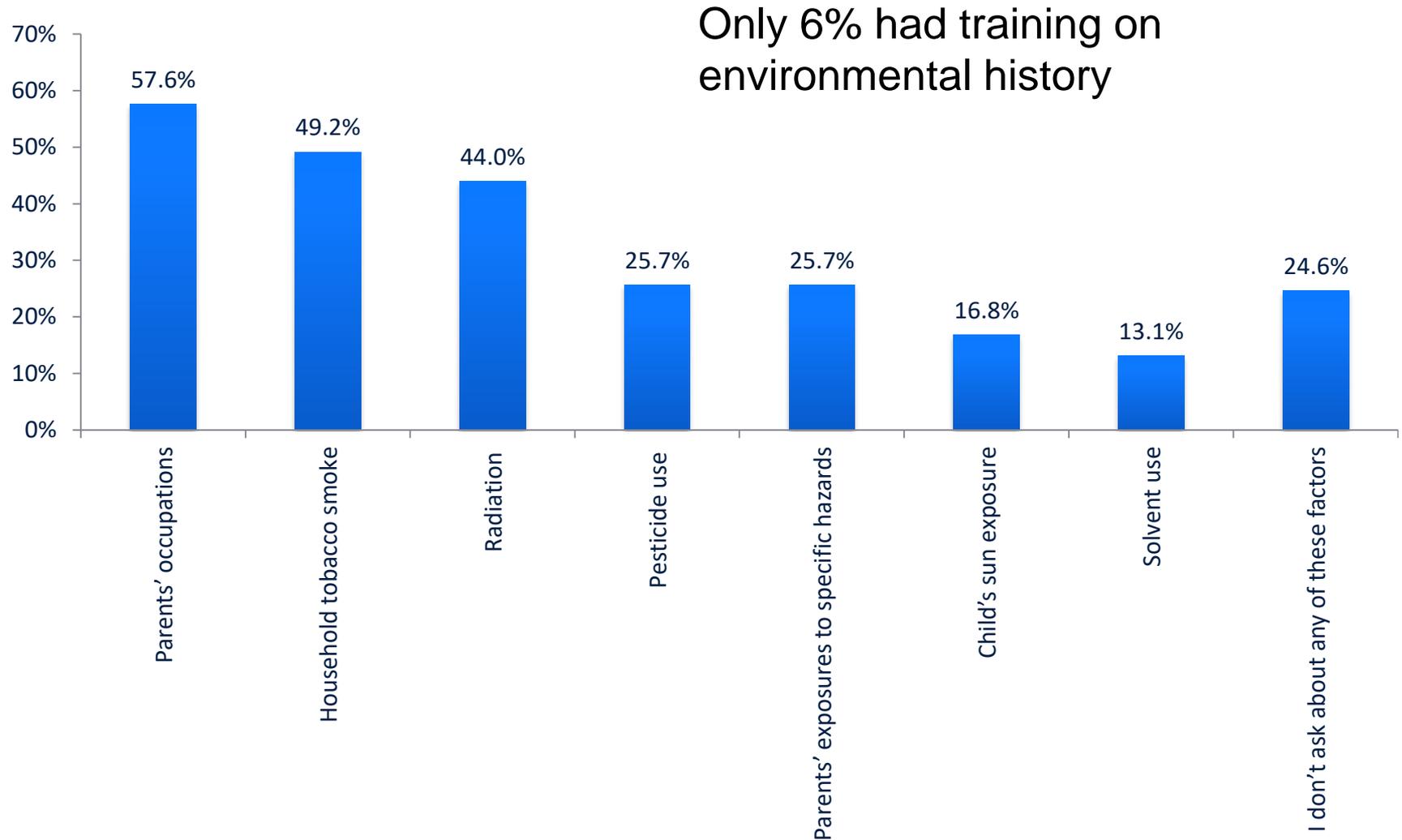


Environmental Exposures as Contributors

In your opinion, are environmental exposures important contributors to childhood cancer?



As part of your patient's history, do you collect information on potential exposures to any of the following external factors?



Knowledge Gap

- 89% report getting questions from families
- ~ 1/2 uncomfortable discussing environmental exposures
- 92% would find it helpful to have information about environmental exposures



Publications don't reach the clinical community

- Two-year review of American Society of Pediatric Hematology/Oncology Annual Meeting abstracts
- 569 abstracts reviewed
 - 8.1% dealt with causation
 - Only 1% mentioned environmental risk factors
- Overall literature: 57 papers published
 - *Environmental Health Perspectives, American Journal of Epidemiology, Cancer Epidemiology, Cancer Causes & Control, etc.*

A Story of Health

<https://wspehsu.ucsf.edu>



Story of Health
with permission

INTRODUCTION Ecological Health Framework

The ecological framework can include multiple levels from sub-cellular to societal.

It is not hierarchical in the sense that one level is more important than another, but rather in the sense that individual biology is progressively nested within the person, family, community, society and ecosystem.

The interactions and feedback loops within, across, and among these levels are complex and variable. They exert their influences on health across time.



The ecological health framework also extends to the sub-cellular level.

A FAMILY REUNION Six Stories

This page is your portal to six stories of health. It is recommended that you read through the [introduction](#) first and then choose stories in the order you wish.



Health professionals can receive CE credits for completing *A Story of Health*. Click [here](#) for more details.



Choose stories in the order you wish. Select a disease term to highlight the affected person. Click the arrow button to read his or her fictional story of health.

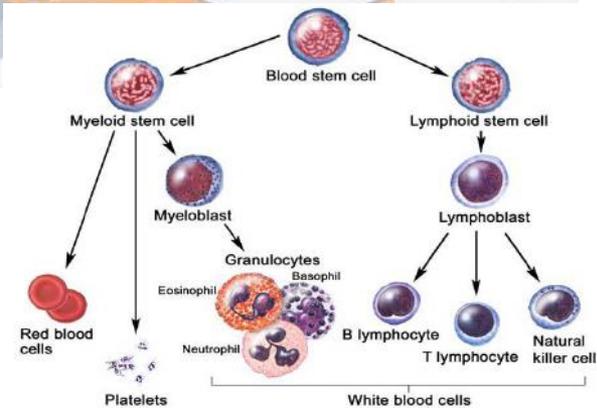
Asthma | Cancer | Learning/Developmental Disabilities | Diabetes | Infertility | Cognitive Decline

A very high white blood count results in referral to specialist/hospitalization



"Diagnosing the Leukaemic Cells"
by Susan Macfarlane,
reproduced with permission.

About this painting, with words of
the artist in *italics* >



Paintings by Susan Macfarlane used with permission. Special thanks to Dr. Geoffrey Farrer Brown and Euan MacKay

CHILDHOOD LEUKEMIA Stephen's Story

PESTICIDES

Tricia mentions to Dr. Baker that other families in the neighborhood have regular pesticide applications to the perimeter of their house and some have lawn service, but they do not.

Tricia thought that Stephen's daycare might occasionally use pesticides to spray for ants and flying insects. Dr. Baker consulted the pediatrician at his regional Pediatric Environmental Health Specialty Unit, who confirmed that many studies from around the world have found statistically significant associations between pesticide exposure and childhood leukemia.

+ How to read and interpret the figure at right. What is a meta-analysis?

+ Pesticide Regulation

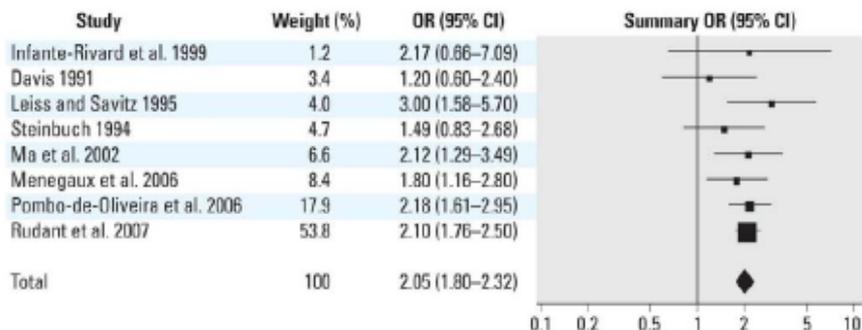
+ Find a local Pediatric Environmental Health Specialty Unit ([PEHSU](#)): A respected network of experts in children's environmental health.

Watch: Dr. Catherine Metayer discusses insecticides and herbicides (4:15 mins.)



Catherine Metayer MD PhD, Associate Adjunct Professor, Epidemiology/Biostatistics and Epidemiology, University of California-Berkeley, Principal Investigator, Center for Integrative Research on Childhood Leukemia and the Environment

Residential Pesticide Exposures



What is a meta-analysis?

A meta-analysis uses statistical methods to combine the results of different studies in order to identify an overall trend in the data. Generally, studies are grouped by a common measurement, and some studies are excluded on the basis of quality or study design.

Certain studies are given more weight in the meta-analysis. Weighting is usually related to the sample size in the individual studies.

This method can have some limitations. It usually relies on published studies, which may exclude studies that show negative or insufficient results that are less likely to be published. Additional bias can also skew the results if studies are cherry-picked using unsound methodology for selecting studies.

A graphic known as a Forest Plot (shown above) is often used to display the results of a meta-analysis. The size of the square is proportional to the weight assigned to the study.

The horizontal line is the study's confidence interval (a measure of how the results might vary due to chance).

The vertical line at 1 represents "no effect." If the confidence intervals for individual studies overlap with this line, it demonstrates that there is no statistically significant effect observed. The diamond represents the summary measure of all studies combined.

+ More information: "5 Key Things to Know about a Meta-Analysis" [Scientific American blog post](#)

ASTHMAGENS: Risk factors for the development of asthma

Some early life environmental risk factors have been identified.

For example, prenatal and early life exposure to social stressors, such as violence, can increase the risk of asthma as well as increase the impacts on respiratory health from allergens, air pollution, and tobacco smoke.

Secondhand smoke alone is a risk factor for new cases of asthma in preschool-aged children.

Karen was surprised to learn that some doctors are even concerned about acetaminophen and its relationship to asthma.

Brett has experienced many of these risk factors in his short life. More details about these can be found as you read his story.



[More Information on acetaminophen](#)



Stress affects our health. [Watch this video by Dr. Rosalind Wright](#) to see how social stressors, along with environmental factors, can be linked to asthma. (5 min.)

Rosalind J. Wright, MD MPH, Horace W. Goldsmith Professor of Pediatrics, Vice-chair, Clinical and Translational Research, Department of Pediatrics, Icahn School of Medicine at Mount Sinai



ASTHMA and Air Pollution

INDUSTRIAL AND TRAFFIC AIR POLLUTION MAKE ASTHMA WORSE

Adverse Effects of Regional and Traffic-Related Air Pollutants on Children with Asthma

Pollutants

- Ozone
- Nitrogen Oxide
- Respirable particulate matter (PM - <10 and <2.5 μm)
- Vehicle exhaust (trucks, cars, trains, ships, etc.)

Health effects in children with asthma

- Respiratory symptoms
- Wheezing (acute)
- Bronchitis (chronic)
- Increased rescue medication use
- Decreased lung function
- Emergency department visits
- Hospitalizations
- School absences

- + Diesel emissions and asthma demographics in southern California
- + Asthma and near roadway exposure to air pollution



Ozone and Particles Make Asthma Worse:

- More symptoms
- More medications used
- More respiratory illnesses
- More clinic visits
- More emergency room visits
- More hospitalizations

(Sarnat JA, Holquin F. Asthma and air quality
[Curr Opin Pulm Med. 2007; 13: 63-6.](#))

INFERTILITY Reiko & Toshio's Story



They discuss a range of other possible environmental exposures including endocrine disruptors. Dr. Patel says she will have the test results in about a week, so they set up another appointment.

Watch: Little Things Matter: The Impact of Toxins on the Developing Brain
Dr. Bruce P. Lanphear, MD MPH
Professor, Simon Fraser University

Little Things Matter
The impact of toxins on the developing brain
Dr. Bruce Lanphear, MD, MPH
Professor, Simon Fraser University

+
Bisphenol A (BPA) and how it can mimic estrogen

+ Example: DES

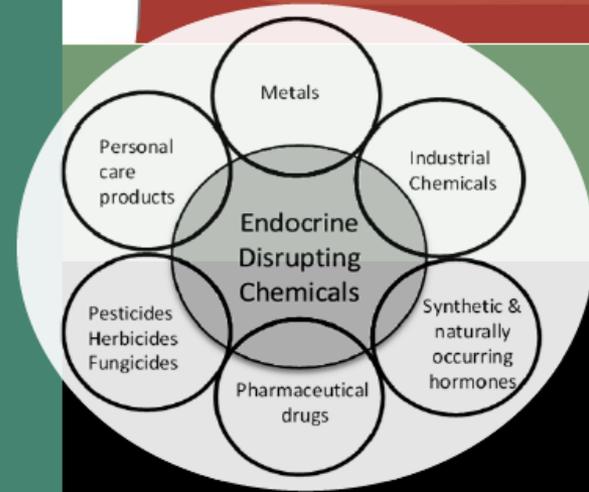
+
Bone disrupting chemicals: Fatty bones and osteoporosis

+
Parabens and reproductive health

Endocrine disruptors and infertility/reproductive health

Endocrine disruptors are chemicals that impact endocrine functions by interfering with the synthesis, secretion, transport, binding, action, or elimination of natural hormones in the body that are responsible for development, behavior, fertility, and maintenance of homeostasis (normal cell metabolism).

These disruptions can cause cancerous tumors, birth defects, and other developmental disorders. As the cells begin to grow and differentiate, there are critical balances of hormones and protein changes that must occur. The Endocrine Society released a statement on Endocrine-Disrupting Chemicals (EDCs) specifically listing obesity, diabetes, female reproduction, male reproduction, hormone-sensitive cancers in females, prostate cancer in males, thyroid, and neurodevelopment and neuroendocrine systems as possible effects of being exposed to EDCs.



PRECONCEPTION AND HEALTHY CHILD DEVELOPMENT

Preconception care for women and men is important for lifetime health as well as healthy child development.



Image: Story of Health
Centers for Disease Control

ACOG encourages preconception care and have supported inclusion of occupational and environmental health education during these visits.

<https://www.rcog.org.uk/globalassets/documents/guidelines/5.6.13chemical exposures.pdf>

Over 7,500 Individuals Registered
Representing over 16,000 hours of CME
CME survey N > 550

I will be able to apply the knowledge gained from this activity to my practice. **87 – 91%**

I will be able to apply the knowledge/skills gained from this activity to develop strategies/provide interventions. **87 – 93%**

I will be able to apply the knowledge gained from this activity to improve performance. **83 – 90%**

Do you anticipate barriers applying this knowledge?
NO = 92 – 98%





IEWS

404

ESTIMATED MINUTES WATCHED

670

Compare metric ▾

Daily ▾

Show growth ⓘ





www.peht.ucsf.edu

Environmental Hazards

Anticipatory Guidance

Key Concepts

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Pediatric Environment Health Toolkit

Environmental Hazards

 Search



Arsenic

Asbestos

BPA

Indoor Air Pollutants

Lead

Mercury

Outdoor Air Pollutants

PBDEs

PCB and Dioxin

Pesticides

Phthalates

Triclosan

VOCs

Water



Environmental Hazards

Pesticides



Topic

Health Effects

Exposure Sources

Prevention

Overview

The EPA defines a pesticide as a substance or mixture of substances intended for preventing, destroying, repelling or mitigating pests. There are over 1,200 active pesticide ingredients and almost 1,200 different pesticide products registered for use in the US.

A pesticide can be categorized by the type of pest it is designed to control, such as an insecticide (e.g., bug spray), herbicide (e.g., weed-killer), or rodenticide (e.g. rat poison), or classified by the chemical class to which it belongs, such as organophosphates, carbamates, chlorophenoxy herbicides, or pyrethroids. Members of a chemical class often share similar modes of action and toxicological properties.

Health Effects Summary:

The mechanism by which some pesticides kill pests include cytotoxic or neurotoxic effects that can also harm humans. Pesticides vary in toxicity and health effects based on their chemical class and unique formulation.

Exposure to high levels of certain pesticides can result in acute poisoning, with symptoms including:

- Rash,
- Nausea, vomiting, diarrhea, lethargy, and flu-like symptoms,
- Abnormal muscular reflexes,
- Seizures, coma, and death.

Organophosphates, n-methyl carbamates and pyrethroids are classes more commonly involved in child pesticide poisonings in the US. For more information on these and other major pesticide classes, including an index of symptoms associated with pesticide related-illnesses, see the EPA's Recognition and Management of Pesticide Poisoning guidebook: (<http://www2.epa.gov/pesticide-worker-safety/recognition-and-management-pesticide-poisonings>).

Assistance in management of poisonings is available through regional poison centers. Information and telephone consultation (during limited hours) is available from the National Pesticide Information Service at: <http://npic.orst.edu> or 1-800 858-7378.

Sources and Routes of Exposure:

Children may be exposed through inhalation, ingestion or dermal absorption, depending on the source and chemical properties of the pesticide involved.

Common sources of exposure include:

- Occupational- children may be involved in work practices or workplaces in which they encounter pesticides, such as agricultural harvesting, gardening, or landscaping.
- Para-occupational- transfer of pesticide from the workplace to the child or home via residues on skin, shoes, vehicles, and clothing.
- Home and school- pesticide use in and outside of homes, schools, or daycares can leave residues in soil, surfaces and air.
 - Stored pesticides pose a risk for unintentional ingestion.
 - Sports played in fields sprayed with pesticides can trigger asthma attacks.
 - Additional sources include flea and tick medications used on pets and treatments for lice [<https://www.epa.gov/safepestcontrol/reduce-your-childs-chances-pesticide-poisoning>].
- Spray drift- unintentional drifts of pesticides from spraying in nearby agricultural fields.
- Diet- residues from foods and contaminated well water.

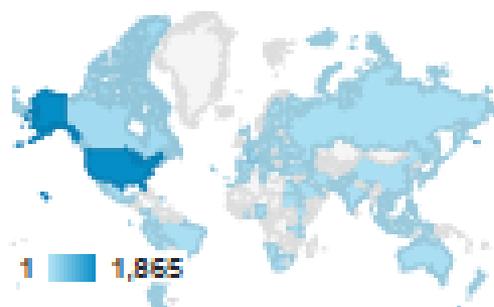
Prevention Strategies:

Pesticides in the Diets of Children

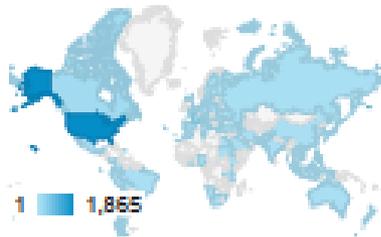
- Advise families to wash and scrub produce with water (cleansers not necessary), throw away the outer leaves of leafy vegetables where residues are highest, and trim the skin and fat from poultry, fish and meats where pesticides can bio-accumulate.
- Purchase organic when possible, but not at the expense of a diet rich in a variety of fresh fruits and vegetables.
- Refer to EWG Shoppers Guide to review which conventionally grown produce have been found to have the highest and lowest levels of pesticide residue. <http://www.ewg.org/foodnews>

Pesticides in and around the Home, School or Daycare

- Encourage and inform parents on how to find non-toxic or least toxic pest control methods. Direct to resources, such as the EPA's Citizens Guide to Pest Control and Pesticides, a comprehensive guide to pest control and pesticide safety. <http://www.epa.gov/safepestcontrol/citizens-guide-pest-control-and-pesticide-safety>
- Keep the home clear of dust and dirt that can contain pesticide residues and practice frequent hand washing with toddlers.
- Never use foggers of “bomb” style pesticide applications. Avoid broadcast spray applications indoors. Read warnings on label and always follow instructions. If applying outside, shut windows and doors to prevent drift indoors. Wash exposed skin and change clothes after applying pesticides or working in a garden that is treated with pesticides.

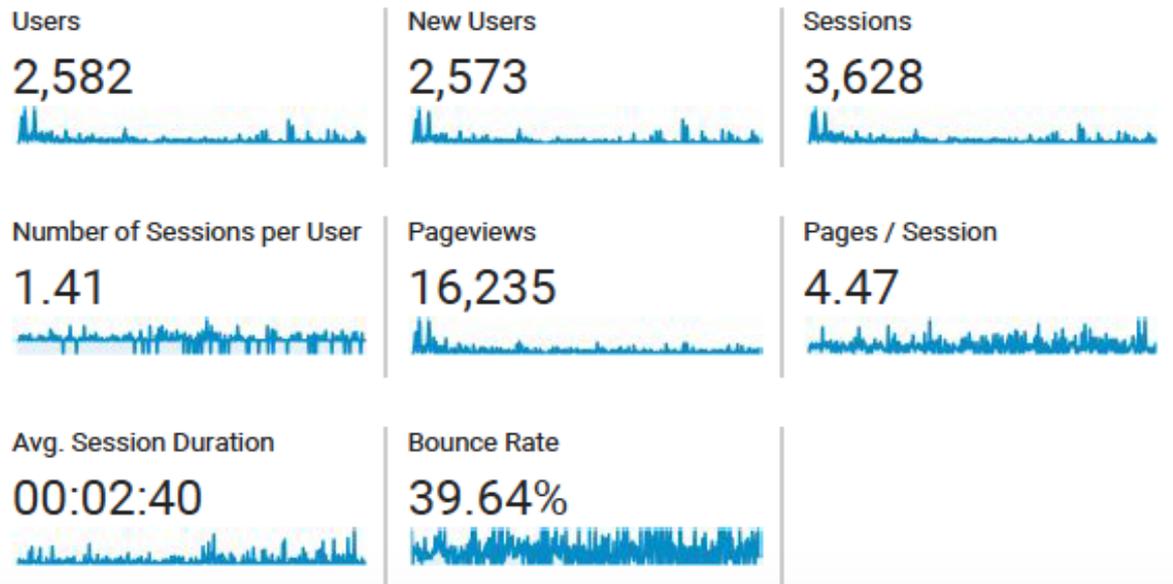
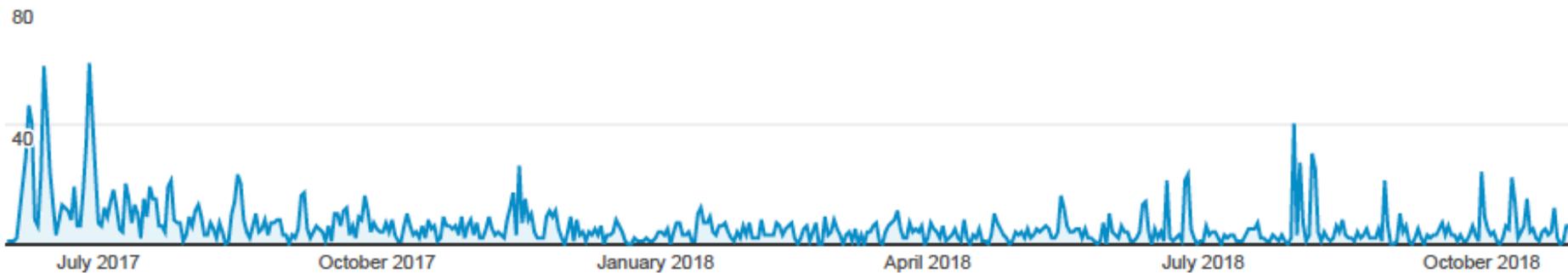


Country		Acquisition
		Users
		2,582 % of Total: 100.00% (2,582)
1.	United States	1,865 (71.62%)
2.	France	214 (8.22%)
3.	Canada	96 (3.69%)
4.	Italy	35 (1.34%)
5.	Spain	31 (1.19%)
6.	Iraq	20 (0.77%)
7.	United Kingdom	18 (0.69%)
8.	Turkey	17 (0.65%)
9.	Australia	16 (0.61%)

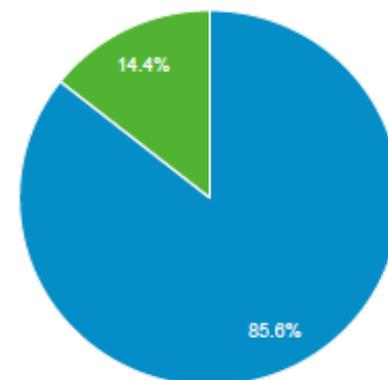


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9. Australia	16 (0.61%)

Source / Medium	Acquisition
	Users
	2,582 % of Total: 100.00% (2,582)
1. (direct) / (none)	1,275 (47.59%)
2. psr.org / referral	345 (12.88%)
3. google / organic	253 (9.44%)
4. pehsu.net / referral	238 (8.88%)
5. m.facebook.com / referral	59 (2.20%)
6. blogs.hcpro.com / referral	54 (2.02%)
7. pephnewsletter / email	33 (1.23%)
8. get-clickle.info / referral	21 (0.78%)
9. dc-tent.com / referral	20 (0.75%)
10. digitaleer.com / referral	20 (0.75%)



■ New Visitor ■ Returning Visitor



What You Eat Before and During Your Pregnancy

Can Help Protect Your Child from

LEUKEMIA

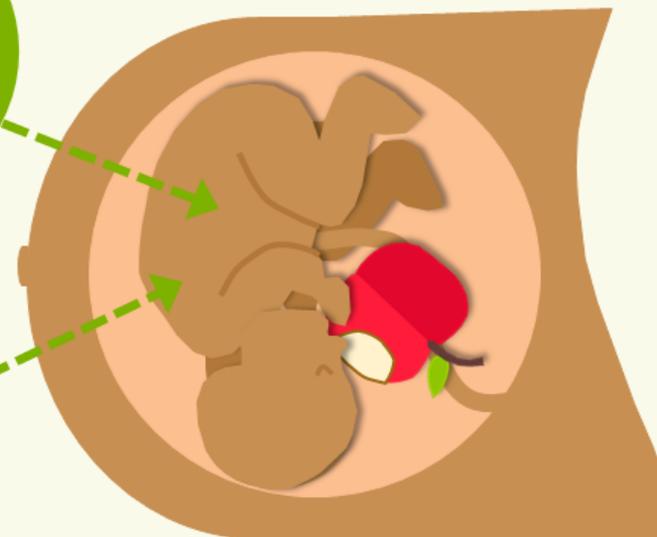
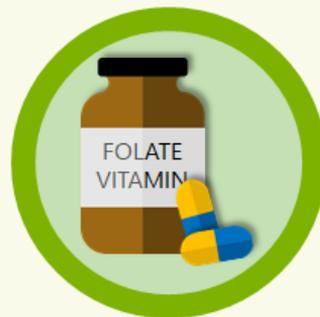
Before and during
your pregnancy,
eat lots of **fruits**
and **vegetables**.



While pregnant,
don't drink **alcohol**
and try to cut back
on **caffeine**.



Before and during your pregnancy,
take a **prenatal vitamin** with folate
as recommended by your doctor.



FUTURE MOTHERS: **Start Protecting Your Children's Health
BEFORE They Are Conceived!**

Rosa and Carlos get Married

INSIDE:
Recipes
Quick 'n
Healthy!



HOLA AMY!
You're due in a couple of months, si? And you're taking the FOLATE?

...So has Rosa been complaining about my ANTI-TOXICANT campaign?



TOXI...
WHAT?!

OH! I hear you with your FRIENDS on the PHONE...

"MAMI says:
No PAINT FUMES in the HOUSE!"
"Use GREEN CLEANING PRODUCTS!"
"NO SMOKING!"



YEAH! And "Make PAPI take off his STINKY WORK CLOTHES outside the HOUSE!" (They DO smell 'BAD!)

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2017 Children's Environmental Health Symposium:
Environmental Justice and Children: View the Videos

CIRCLE at UC Berkeley

Catherine Metayer, Julia Vassey, Todd Whitehead (UC Berkeley), Joe Wiemels (UCSF)

Western States Pediatric Environmental Health Specialty Unit (WSPEHSU at UCSF)

Maria Valenti, Steve Burdick, Vickie Leonard, Sharyle Patton,
Jose Camacho, Richard Carlton

Research was supported with funds from NIH Grant No. 5P50ES018172 and USEPA Grant No. RD83615901 to CIRCLE, P.I. C. Metayer PhD

This material was supported by the American College of Medical Toxicology (ACMT) and funded (in part) by the cooperative agreement FAIN: U61TS000238 from the Agency for Toxic Substances and Disease Registry (ATSDR).

Acknowledgement: The U.S. Environmental Protection Agency (EPA) supports the PEHSU by providing partial funding to ATSDR under Inter-Agency Agreement number DW-75-92301301. Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications

