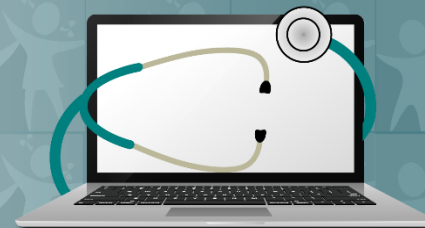




PEHSU NATIONAL CLASSROOM

Pediatric Environmental
Health Specialty Units



www.pehsu.net/nationalclassroom.html



Webinars

Series of scientific webinars that provide a forum for discourse on scientific issues.

Live and On-Demand

Case Conferences
Journal Clubs
Grand Rounds

CE Available



Online Courses

Evidence-based online courses on a variety of children's environmental health topics.

Interactive and Self-Paced

CE Available



Resource Catalog

Fact sheets, journal publications, reports, and other resources for parents, community members, patients and healthcare professionals

Topics included:
Air Quality, Pesticides,
Natural Disasters, BPA,
Mold, Lead, Mercury



Introduction to Pediatric Environmental Health and Prenatal Exposures

16TH ANNUAL RED DE PROMOTORAS CONFERENCE
OCTOBER 12, 2018

Acknowledgement:

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Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications.

Objectives

- 1. Define Pediatric Environmental Health.**
- 2. Identify how, where, and when children are exposed to environmental hazards.**
- 3. Understand unique characteristics that make children more susceptible and vulnerable than adults to environmental hazards.**
- 4. Understand the importance of the prenatal environment and of educating women and mothers.**

Every year, approximately 3 million children worldwide under the age of 5 die from preventable environmental related causes and conditions.

In addition, chronic conditions such as *asthma*, *obesity*, *childhood leukemia*, and *developmental disabilities* continue to rise and the environment is likely playing a role.



8.4 % of children in the United States have asthma.

(National Center for Health Statistics)

Childhood obesity has tripled in prevalence since the 1970s. (Textbook of Children's Environmental Health, 1st Ed.)

Approx. 1 in 6 children (17%) in the U.S. has a diagnosis of a developmental disorder. (CDC and HRSA 2011)

Prevalence of autism has increased from 1 in 5,000 in 1975 to 1 in 68 in 2014. (CDC's Autism & Dev. Disabilities Monitoring Network)

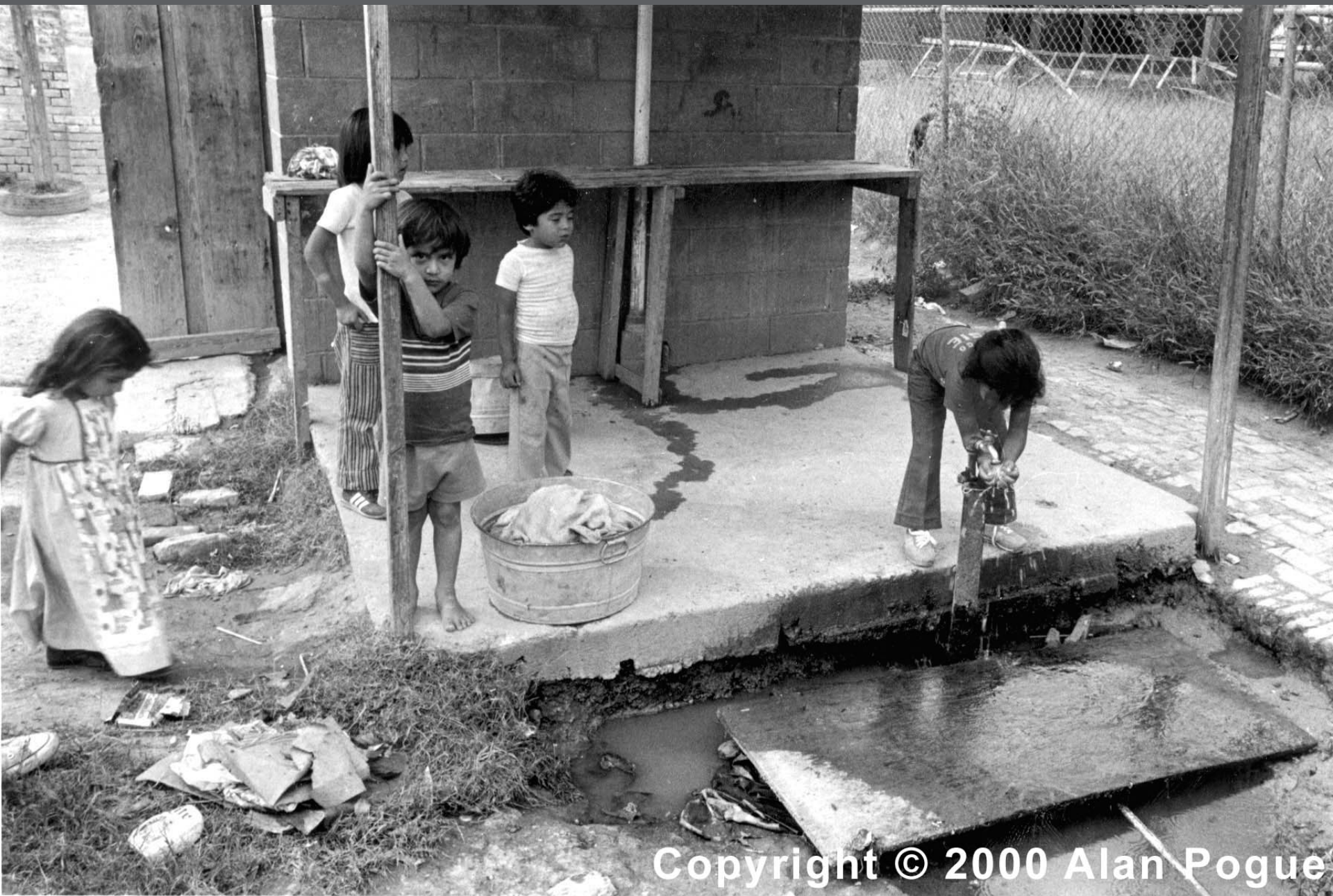
Childhood leukemia increased by 55% between 1975 and 2011. (National Cancer Institute)

Significant disparities in environmental exposures exist, with the poor and those living in racial or ethnic communities often bearing the brunt of environmental degradation, exposures, and injustices. *WHO and CEHN*



Alvaro Leiva/Panos Pictures

Children living in a *colonia* in Hidalgo, TX



Copyright © 2000 Alan Pogue

Children's environments are complex and they are exposed to risks that can seriously harm their health.

Environmental hazards are among parents' top health concerns for their children, yet most doctors & other caregivers receive little training and are not adequately prepared to recognize, prevent, and treat environmentally-related illnesses and injuries in children.

Pediatric Environmental Health



An academic discipline that studies how environmental exposures in early life – chemical, nutritional, and social – influence health and development in the prenatal period, in childhood, and across the entire human lifespan.

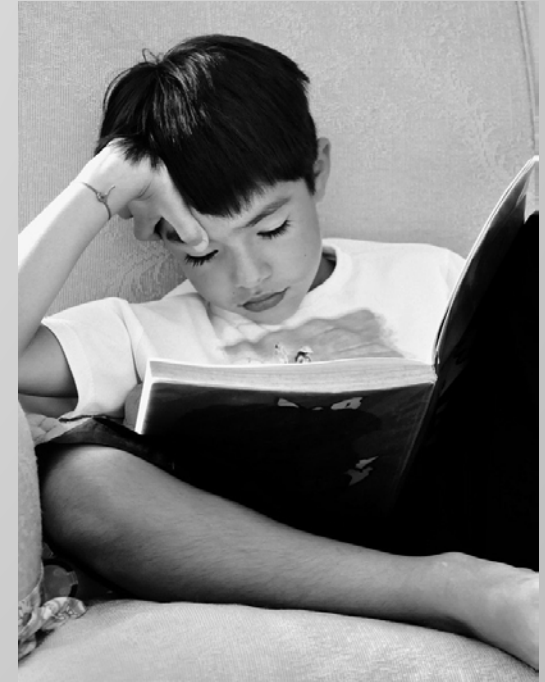
The focus of children's environmental health is on discovery, diagnosis, treatment, and prevention of diseases in children that are associated with harmful exposures in the environment.



Photo courtesy OK State Department of Health



Pediatric environmental health also studies how healthy environments protect children and nurture growth and development.





Types of exposures

- **Physical** - Radiation, noise, temperature, unsafe buildings, sidewalks, traffic...
- **Chemical** - Pesticides, solvents, lead, mercury, air pollutants...
- **Biological** – Disease carriers, mold, venom...
- **Social** - education, economics, employment, housing, food security, culture, access to healthcare...



To properly grow, develop, and thrive, children need:

- **Clean air to breathe**
- **Clean water to drink**
- **Safe food to eat**
- **Healthy places to live, learn, and play**
- **Nurturing social environment**

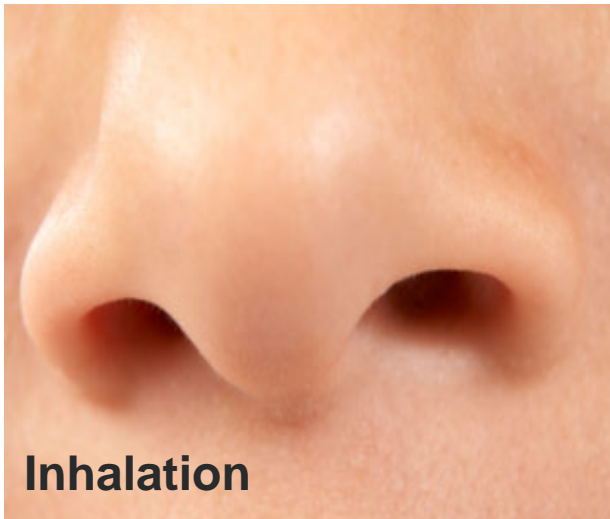
How exposures occur:



Ingestion



Parenteral



Inhalation



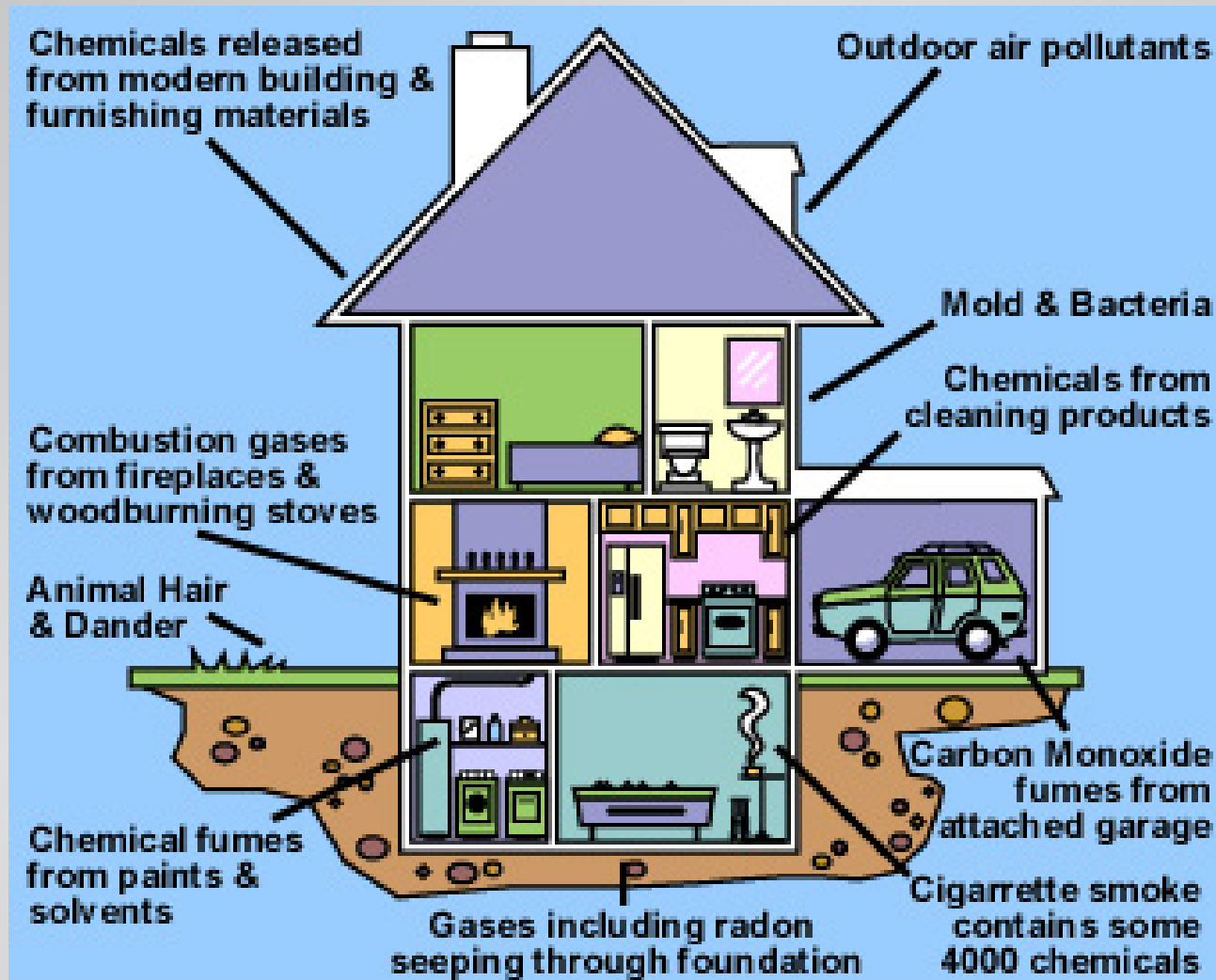
Dermal



In utero

Where exposures occur:

In and around the home







In the neighborhood



In or around a vehicle



In the community



At school or daycare



At work or from a parent's job



Through hobbies or cultural practices





What makes children more vulnerable?



**I'm not just
a little
adult!!!**



Children's unique vulnerabilities to environmental hazards

- Dynamic growth, with cells multiplying at a rapid rate and nervous, immune, digestive, and other bodily systems still not fully developed
- Higher metabolic rate for growth and development - Breathe more air, drink more water, eat more food / kg of body weight than adults
- Solely dependent on care-taker for food source when young and breast-feeding infants may be exposed to contaminants in breast milk
- Limited food preferences and dietary deficiency (esp. toddlers)



Children's unique vulnerabilities to environmental hazards

- Increased skin surface area-to-body mass ratio → increased skin exposure/absorption
- Play closer to the ground, eat nonfood items (pica), explore with mouth, hand-mouth behavior, poor hand washing
- Immobility in the very young
- Risk studies are typically based on occupational exposures and/or studies in lab animals

Approx. 75% of the > 80,000 chemicals in commerce have never undergone safety / toxicity testing



Children have more years to live

- Many toxicants have a long latency (silent) period before adverse effects may manifest
- Early life exposures may lead to behavioral and developmental problems not appreciated until problems arise in school or later in life
- Early exposure to carcinogens may increase the risk of adulthood cancer (Ex: arsenic and bladder cancer)



Susceptibilities based on social factors

- Economic stability – poverty, employment, food, housing
- Education
- Social and Community Context
- Health and Health Care – access, coverage, quality, literacy
- Neighborhood and Built Environment



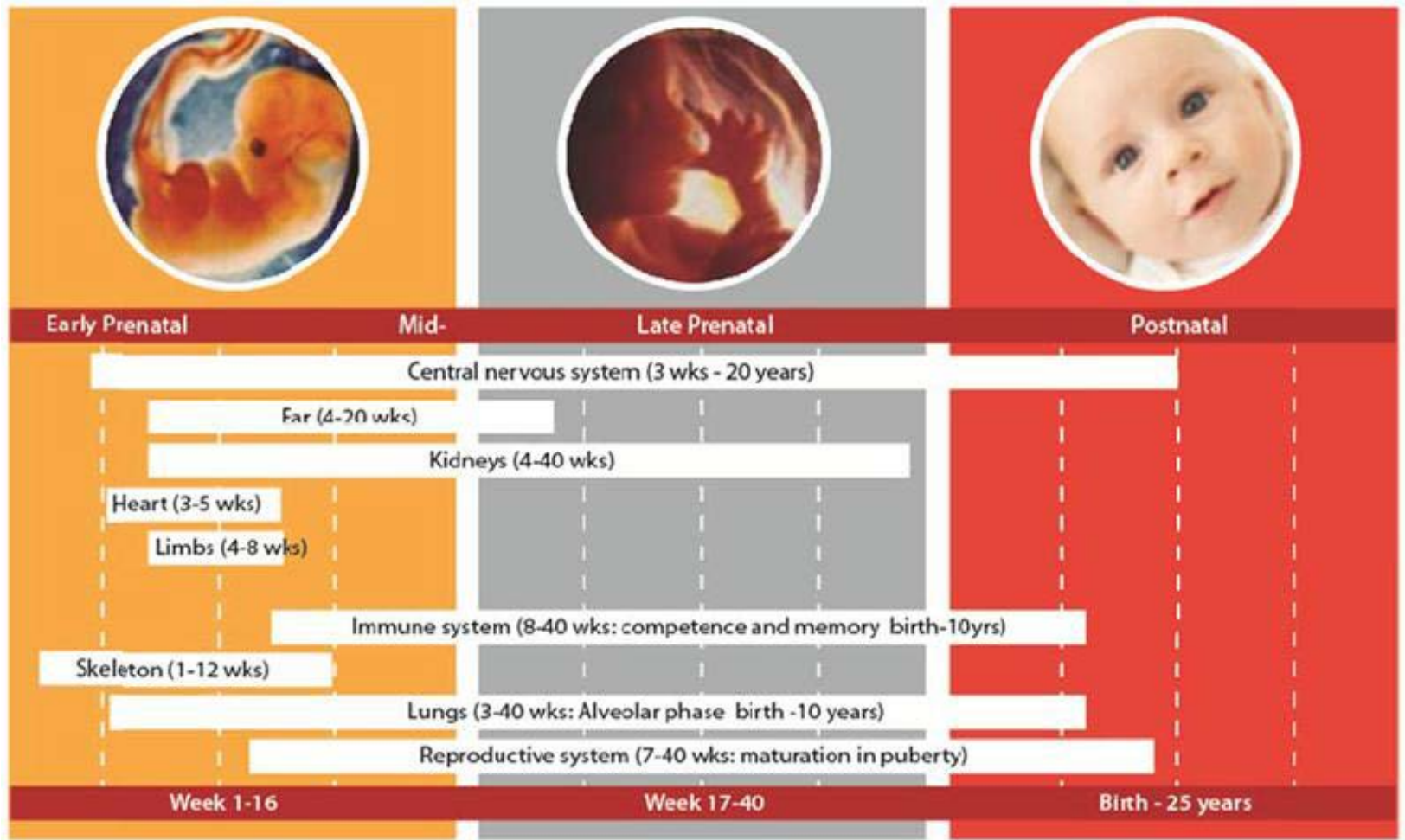
When exposures occur:

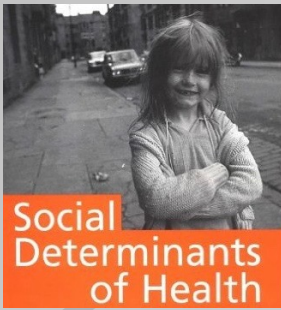
- **Preconception**
- **Fetus**
- **Newborns**
- **Infants**
- **Toddlers (1-2 yrs)**
- **Young Child (2-6)**
- **School Aged (6-12)**
- **Adolescents (12-18)**
- **Adults**

Variations in Susceptibility with Developmental Stages

Prenatal Environment - Critical Windows of Vulnerability

Source: **Stages of Human Development** (courtesy of Dr Jerrold Heindel, US National Institute of Environmental Health Sciences)





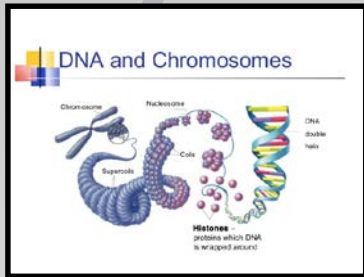
Social environment



Outdoor Environment



Personal Care Products



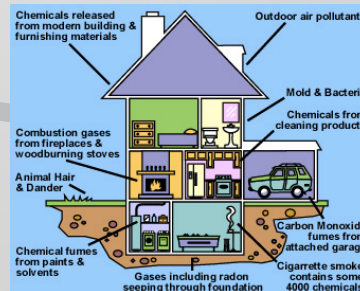
Genetics



Work environment



Built Environment



Indoor Environment



Nutrition / diet

CHEMICALS KNOWN TO DISRUPT BRAIN DEVELOPMENT

90%

OF PREGNANT U.S. WOMEN:

have detectable levels of **62 chemicals**
in their bodies out of 163 screened

SOURCE: DOI: 10.1289/EHP1002727



Lead



Mercury



Organophosphate
pesticides



Phthalates

Polybrominated
diphenyl ethers
(PBDEs)



Polychlorinated
biphenyls (PCBs)



Polycyclic
aromatic
hydrocarbons
(PAHs)



PROJECT **TENDR**:
TARGETING ENVIRONMENTAL NEURODEVELOPMENTAL RISKS



Can contribute to learning, behavioral, or intellectual impairment, as well as specific neurodevelopmental disorders such as ADHD or autism spectrum disorder

Prenatal exposure and some health effects

Table 1. Prenatal Exposures to Major Environmental Toxicants

Toxicant	Sources	Potential impact on fetal/infant/child health
Heavy Metals		
Mercury	Eating contaminated fish or shellfish; breathing vapors from spills or incinerated materials; skin contact with mercury in the workplace.	Brain damage, mental retardation, poor coordination, blindness, seizures, nervous and digestive system problems, kidney damage.
Lead	Lead paint, contaminated soil, contaminated dust (breathed in or eaten), water.	Increased risk of miscarriage and still birth, low birth weight and preterm birth; neurodevelopmental effects.
Arsenic	Contaminated food, water, or air; occupational exposure, inhaling sawdust or smoke from arsenic-treated wood; exposure to high-levels of arsenic in soil.	Increased risk of miscarriage, congenital malformations.
Air pollutants		
Sulfur dioxide	Polluted air.	Increased risk of low birth weight and preterm birth.
Particulate matter	Polluted air.	Increased risk of low birth weight.
Pesticides		
Polychlorinated biphenyls (PCBs)	Drinking water, breathing air or eating foods, or exposure to soil that are contaminated; via older electrical equipment or transformers.	Lower birth weight; decreased motor skills; depressed immune system.
DDT	Exposure via agricultural work prior to coming to U.S. (banned in U.S.), accidental exposure (spills).	Increased risk of miscarriage, preterm birth, small for gestational age.

Neonate and early infancy: a vulnerable time



- Lack of full development of the blood brain barrier
- Nerve cells are still developing
- Immature immune system and detoxifying mechanisms
- Increased skin surface area and absorbs agents more readily
- Increased respiratory rate
- Dependence on breast milk or formula as sole source of nutrition
- Unable to move independently



Breast Feeding

- Lipid solubility influences final concentration of a toxin in breast milk
- Some pesticides and other chemicals can concentrate in the fat content of breast milk
- Lead and methylmercury can also be secreted into breast milk

**ADVANTAGES OF BREASTFEEDING
OUTWEIGH RISKS MOST OF THE TIME!**



Toddlers and Young Children

- Nearer the ground
- Explore with their mouths
- Growth and development of body systems
- Picky eaters



School Aged Children

- Increased number of environments and less supervised play
- Potential exposures through hobbies, school, crafts, playgrounds



Adolescents



- Work / School
- Trade School exposures
- Substance abuse
- Cosmetics
- Increase risk taking



Adolescents



Samples of Crema Aguamary face cream contained mercury at levels from 56,000 to 131,000 parts per million.
(US FDA < 1ppm)

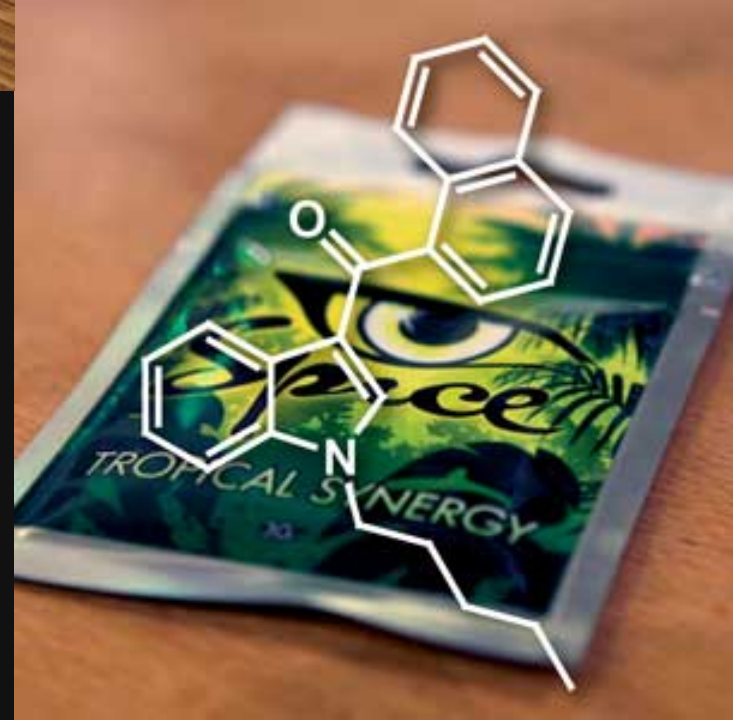


Synthetic stimulants -- mephedrone, MDPV, and methylone -- commonly called "bath salts" or "plant food" and marketed under such names as "Ivory Wave", "Purple Wave", "Vanilla Sky," and "Bliss"

Caffeine containing substances



herbal-and-chemical compound simulates the effects of the tetrahydrocannabinol (THC)







The importance of educating mothers and women who may become pregnant

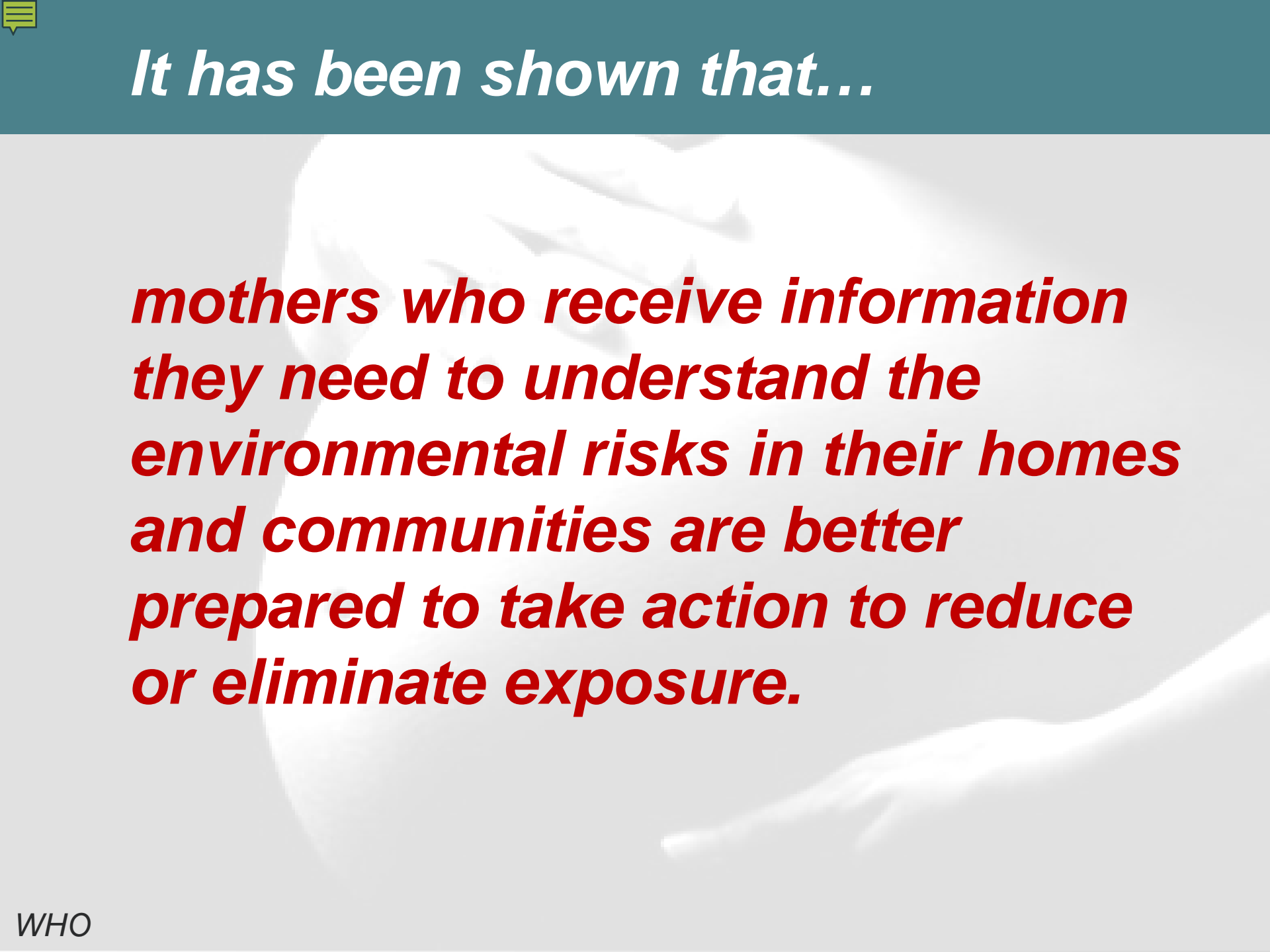
- **Exposure to environmental risks can begin before birth and may affect the health of the unborn baby**
- **Some chemicals can result in long-term, irreversible effects, such as infertility, miscarriage, and birth defects**
- **Health of the newborn may be affected by high levels of contaminants in breast milk**
- **Mothers spend twice as much time with their children than fathers do**

Pregnant women living and working in hazardous environments and poor mothers and their children...

- **are at higher risk of exposure to hazards**
- **may be exposed to the most degraded environments**
- **often don't know the health risks**
- **often lack access to information for potential solutions**



It has been shown that...



*mothers who receive information
they need to understand the
environmental risks in their homes
and communities are better
prepared to take action to reduce
or eliminate exposure.*



Thank you



Resources

Pediatric Environmental Health Specialty Units: <http://www.pehsu.net>

Southwest Center for Pediatric Environmental Health: <http://www.swcpeh.org/>

American Academy of Pediatrics: <http://www2.aap.org/visit/cmte16.htm>; <http://www2.aap.org/visit/cmte16.htm>

Texas Department of State Health Services: <http://www.dshs.state.tx.us>

New Mexico Department of Health, Environmental Health Epidemiology Bureau: <https://nmhealth.org/about/erd/eheb/>

Texas Commission on Environmental Quality: <http://www.tceq.state.tx.us/>

Children's Environmental Health Network: <http://cehn.org>

NIEHS Center for Children's Environmental Health and Disease Prevention Research:

<http://www.niehs.nih.gov/research/supported/centers/prevention>

National Environmental Education Foundation: <http://www.neefusa.org>

*Cuestionario de Historia Ambiental para el Paciente con Asma Pediátrica

*Historia Pediátrica Ambiental (0-18 Años de Edad)

Physicians for Social Responsibility: <http://www.psr.org/resources/pediatric-toolkit.html>

CDC National Center for Environmental Health: <http://www.cdc.gov/nceh> and <https://www.cdc.gov/features/pehsu>

ATSDR: https://www.atsdr.cdc.gov/emes/health_professionals/pediatrics.html

EPA Children's Health Protection: <http://www2.epa.gov/children> and <http://epa.gov/ncer/childrenscenters>

World Health Organization: <http://www.who.int/ceh/en>

EPA Toxic Release Inventory: <https://www.epa.gov/toxics-release-inventory-tri-program>

Environmental Working Group: <http://www.ewg.org/>

US National Library of Medicine, Household Products Database: <https://householdproducts.nlm.nih.gov/>

UCSF Program on Reproductive Health and the Environment, Toxic Matters: <https://prhe.ucsf.edu/cuestiones-de-salud-enlaces>



PEHSU
Pediatric Environmental
Health Specialty Units



A NETWORK OF EXPERTS ON **Reproductive and Children's Environmental Health**



Community Education and Outreach

- Raising awareness about environmental conditions that may harm women of reproductive age and children
- Offering guidance on preventing or reducing harmful environmental exposures in everyday situations
- Providing practical advice on helping children cope and recover during and after environmental crises

Consultation and Referral

- Evaluating suspected toxic exposures
- Identifying and interpreting appropriate diagnostic tests
- Medical management
- Providing referrals to specialty care

Training Health Professionals

- Conducting seminars and conferences
- Providing patient education tools and patient care guidance
- Publishing peer-reviewed articles that raise environmental health literacy
- Translating health care research



Southwest Center for Pediatric Environmental Health



TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER™
EL PASO

HOME ABOUT US ▾ EVENTS RESOURCES ▾ EN ESPAÑOL ▾ SCHOOLS ▾ PROVIDERS ▾



SWCPEH



Welcome

Mission

What is pediatric
environmental health?

Events

Services

PEHSU Program

Faculty

Partners

Contact Information



CONTACT US

Call Us Toll-Free!
(AR, LA, NM, OK, and TX
only)
Tel: 888-901-5665

Outside the region:
Tel: 915-534-3807
Fax: 915-534-3809
swcpeh@ttuhsc.edu ✉



WELCOME



**FACTSHEETS FOR
PROVIDERS**



TOPICS FOR PARENTS



Program on Reproductive Health and the Environment

UCSF Program on Reproductive Health and the Environment (PRHE)

Mailstop 0132

550 16th Street, 7th Floor

San Francisco, CA 94143

E-mail: prhe@obgyn.ucsf.edu

Phone: 415-476-3224

5 Things To Do

Prevent exposure at home

Prevent exposure at work

Prevent exposure in your community

Become a smart consumer

Make the government work for you



Toxic Matters

Protecting Our Families from Toxic Substances



<https://prhe.ucsf.edu/cuestiones-de-salud-enlaces>

CUESTIONES DE SALUD

5 COSAS QUE PUEDE HACER

EVITE LAS SUSTANCIAS TÓXICAS EN EL HOGAR



EVITE LAS SUSTANCIAS TÓXICAS EN EL TRABAJO



EVITE LAS SUSTANCIAS TÓXICAS EN SU COMUNIDAD



COMPRA CON INTELIGENCIA Y RESPONSABILIDAD



HAGA QUE EL GOBIERNO TRABAJE PARA USTED



Recomendaciones prácticas sobre cómo evitar la exposición a sustancias comunes encontradas en la vida cotidiana que pueden ser perjudiciales para la salud reproductiva.

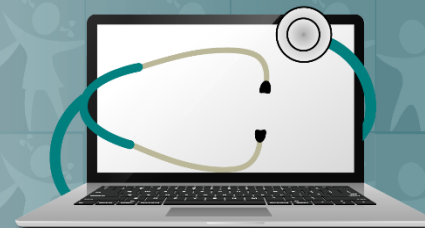
Estos consejos se centran en cinco áreas clave:

- Prevención en casa
- Prevención en el trabajo
- Prevención en la comunidad
- **Convertirse en un consumidor inteligente**
- **Involucrarse en el proceso legislativo.**



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