



Climate Informed Pediatric Environmental Health: Tools for Prevention

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Outline

- The what and why of Climate and Environmental Health
- Healthcare Worker Resource: Pediatric Environmental Health Toolkit
- Patient Resource: Prescriptions for Prevention

Unique Vulnerability of Children

1. Behaviors and preferences that increase ***exposure***
2. Differences in physiology such as ***metabolism and excretion*** that increase dose
3. Unique windows of development meaning they have ***differential susceptibility*** and ***a longer life span***



Air Pollution & Increasing Allergens

Asthma, allergies, cardiovascular and respiratory diseases

Extreme Heat

Heat-related illness and death, cardiovascular failure

Drought

Water supply impacts, dust storms, Valley Fever

Environmental Degradation

Forced migration, civil conflict, loss of jobs and income

Wildfires & Wildfire Smoke

Injuries, fatalities, loss of homes, cardiovascular and respiratory diseases

Degraded Living Conditions & Social Inequities

Exacerbation of racial and health inequities and vulnerabilities, loss of employment

Changes In Vector Ecology

Lyme disease, West Nile Virus, hantavirus, malaria, encephalitis

Food System Impacts

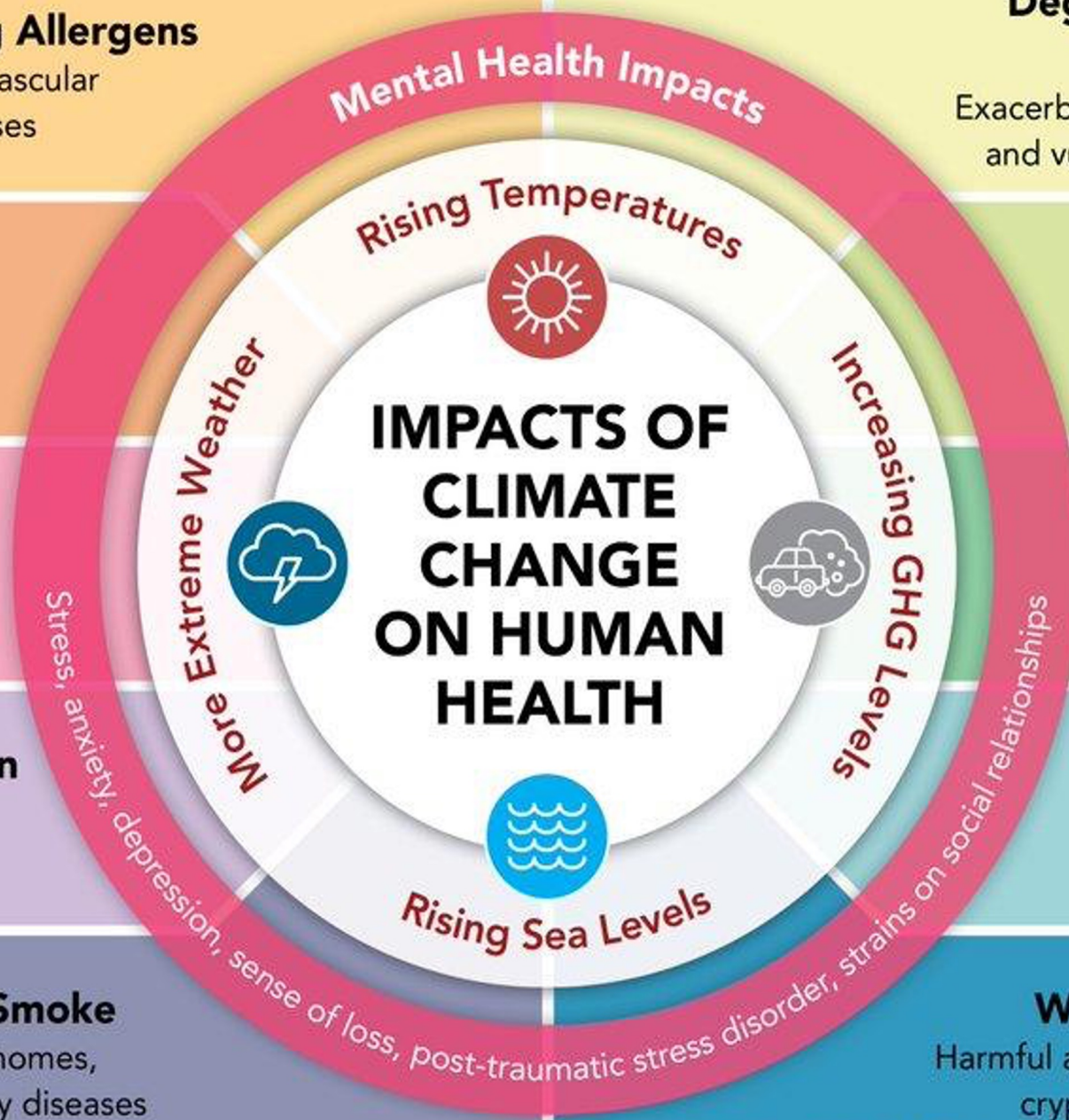
Malnutrition, food insecurity, higher food prices, foodborne illness

Severe Weather & Floods

Injuries, fatalities, loss of homes, indoor fungi and mold

Water Quality Impacts

Harmful algal blooms, campylobacteriosis, cryptosporidiosis, leptospirosis



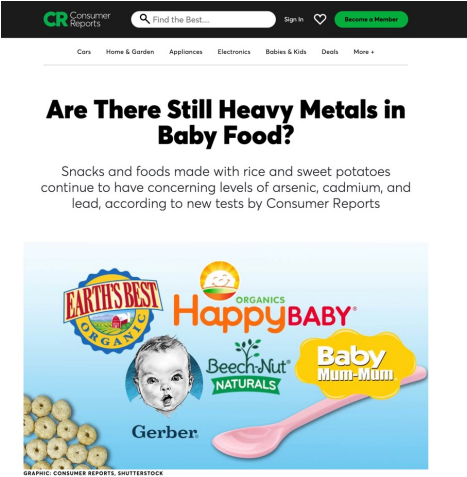
Children's Environmental Health in the News



Wildfire Disaster
Lahaina, Maui, Hawaii
August 2023



Tropical Storm Hilary
Los Angeles, CA
August 2023



July 2023



Wildfire Smoke from Canada
June 2023



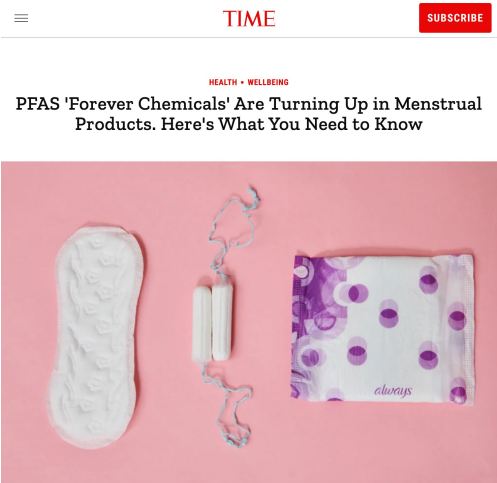
January 2023



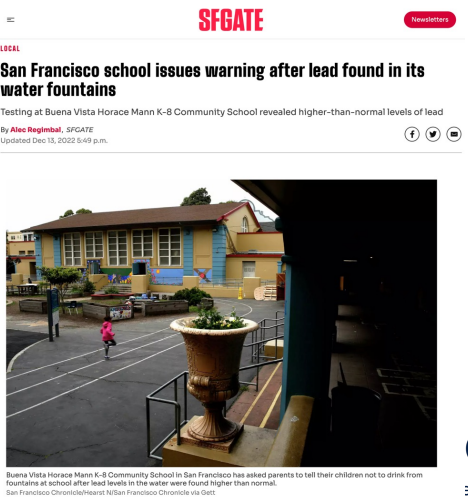
March 2023



East Palestine, Ohio
February 2023



February 2023



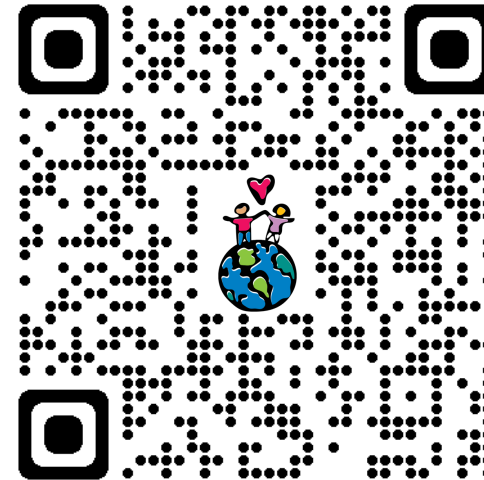
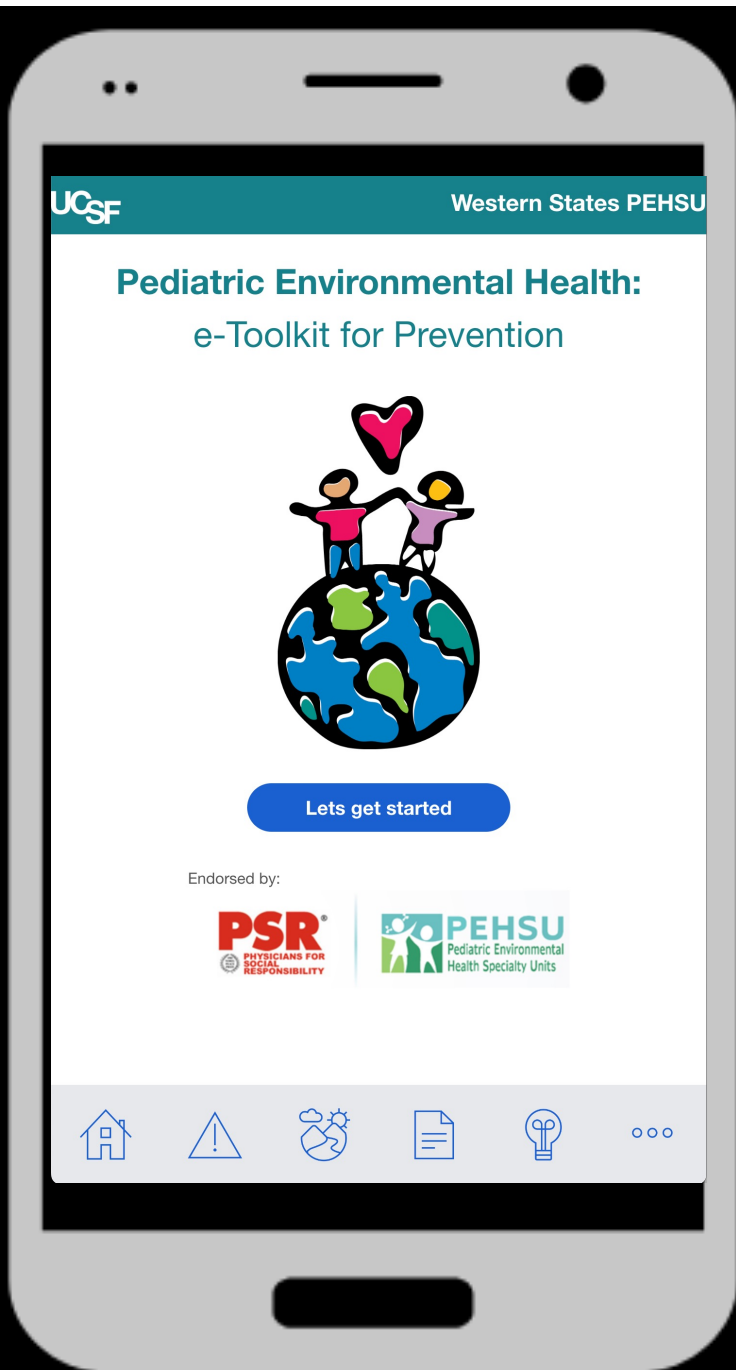
December 2022

PEHSU Consultations

- Each federal region (n=10) has a Pediatric Environmental Health Specialty Unit (PEHSU)
- Each PEHSU takes consult calls from healthcare providers & families
- Need for cohesive materials that span a broad array of topics to respond to major events
- Need to train HCPs on key materials prior to event occurrence
- Need to integrate key materials into everyday common practice

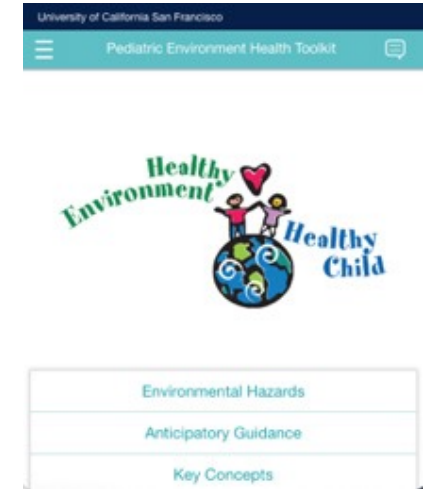
Pediatric Environmental Health Toolkit

peht.ucsf.edu



National Effort

- 37 content sections (18 hazards, 11 sources, 7 key concepts, Anticipatory Guidance)
- 14 different content section authors (from 5 different PEHSUs)
- 18 peer reviewers (from all 10 PEHSUs)
- Key support from Physicians for Social Responsibility
- 3rd edition
 - First edition (2006) was printed and included (paper!) prescriptions for prevention.
 - Second edition (2016) moved online
- Regional Projects that have been influenced by/grown out of the PEHT include the prescriptions for prevention (both NY and national)





Environmental Hazards

Specific toxic chemicals that a child might be exposed to (e.g., lead).



Anticipatory Guidance

Age-based guidance for improved pediatric environmental health



Exposure Sources

The substances that children are exposed to, which contain toxic chemicals (e.g., water).



Key Concepts

Foundational information for pediatric environmental health



Climate Change



Environmental Justice



The Chemical Environment



The Built Environment



Exposure Pathways



Unique Vulnerabilities during Pregnancy





Are There Still Heavy Metals in Baby Food?

Snacks and food products with rice and sweet potatoes continue to contain lead, and...

The New York Times

Account

Lead-Tainted Applesauce Sailed Through Gaps in Food-Safety System

Hundreds of American children were poisoned last year. Records show how, time and again, the contamination went unnoticed.



Gerber

GRAPHIC: CONSUMER REPORTS, SHUTTERSTOCK

Pediatric Environmental Health: e-Toolkit for Prevention



Exposure Sources

Baby Foods

Many common baby foods and fruit juices contain small amounts of toxic chemicals, including pesticides, heavy metals such as lead and arsenic, and plastic-related chemicals from packaging such as BPA and phthalates.

To minimize pesticide exposures from baby foods, purchase organic when possible, but not at the expense of a diet rich in a variety of fruits and vegetables.

Heavy metals can occur naturally in soil used to grow food, or can get into food through pesticides, industrial processing, and storage. The low levels of metals found in food are likely a small part of a child's overall exposure to metals; however, a child's total metal exposure from all sources can pose a risk to health- particularly brain development. The FDA does not currently set strict enforceable guidelines to limit levels of heavy metals in baby food, though they have ongoing plans to decrease these exposures.

Plastic-related chemicals such as BPA and phthalates can leach into food during the production process or from the food packaging. These chemicals can interfere with the body's endocrine system. Families can choose to store food in non-plastic containers (including glass, stainless steel, or food-grade silicone) and can avoid heating food in plastic containers.

Parents can reduce all of these toxic exposures in their child's diet by providing a diet rich in a variety of whole (wash thoroughly with cold water first) or pureed fruits and vegetables, lean proteins, and a variety of grains.

Need a Patient Handout?

Check out the [baby foods handout](#) from the WSPEHSU's Prescription for Prevention series

For heavy metals questions specifically, try this [handout on Heavy Metals in Baby Foods](#), from the NY children's environmental health network, or [this one](#) from the AAP

Some specific hazards that may be found in Baby Foods:



No plans for nationwide ban of gas stoves, CPSC says following report, backlash



Jordan Mendoza
USA TODAY

Published 11:59 a.m. ET Jan. 11, 2023 | Updated 4:20 p.m. ET Jan. 11, 2023



US Consumer Product Safety Commission to consider banning gas stoves

Gas stoves have been found to emit toxic chemicals that have been linked to cancer and childhood asthma. *Anthony Jackson, Getty Images*

The head of the Consumer Product Safety Commission announced he has no plans to ban gas stoves days after a report said officials with the agency were considering putting a stop to the use of them.



Pediatric Environmental Health: e-Toolkit for Prevention



Environmental Hazards

Particles and Nitrogen oxides

Topic

Health Effects

Exposure Sources

Prevention

Overview

Particulate Matter (PM) and Nitrogen Oxides (NO_x) are common air pollutants that are created during combustion. Particles are defined by their size (such as PM_{2.5} which is less than 2.5 microns in diameter) rather than a specific chemical structure. Particles less than 10 microns in diameter pose a greater risk to human health than larger inhaled particles. Particles are produced when anything burns, can result from airborne dust, and from reactions of other pollutants in the atmosphere. Nitrogen oxides have one nitrogen molecule with one or more oxygens. The two most common nitrogen oxides are nitric oxide and nitrogen dioxide. Nitrogen oxides are created when carbonaceous fuels are burned.

Many of the processes that produce particles and nitrogen oxides also produce greenhouse gases, which contribute to [climate change](#). In addition, climate change is contributing to increases in natural disasters, such as large wildfires, which can increase particulate matter pollution substantially.

Outdoor exposures to these pollutants are often much higher in communities with [environmental justice](#) concerns, many of which are situated near major roadways and/or industrial sites, including in urban industry as well as large agricultural operations in rural areas.

References/Additional Resources ▾



Search Anticipatory Guidance

Environmental Health Guidance

These are suggestions of intervals when environmental health guidance could be given, but incorporate these as appropriate for your individual patient. These are meant as a supplement to the anticipatory guidance given in Bright Futures and further detail on suggested environmental health anticipatory guidance can be found in the chapter titled "Taking an Environmental Health History and Giving Anticipatory Guidance" in AAP's Pediatric Environmental Health (often called "the green book").

Applicable to Every Visit

- Parents and adult caregivers should avoid using tobacco/e-cigarettes. Keep car/home free of tobacco smoke/e-cigarette vapor. Call 800-QUIT-NOW (800-784-8669) for help to quit smoking. As the child gets older, they should also be encouraged to avoid smoking or vaping.

Prenatal Visit
Newborn Visit
First Week Visit (3-5 Days)
1 Month Visit
2 Month Visit
4 Month Visit
6 Month Visit
9 Month Visit
12 Month Visit
15 Month Visit
18 Month Visit
2 Year Visit
2 ½ Year Visit
3 Year Visit
4 Year Visit
5 and 6 Year Visits
7 and 8 Year Visits

Supplement to Bright Futures



Bright Futures™
prevention and health promotion for infants,
children, adolescents, and their families™

PRESCRIPTIONS FOR PREVENTION



Prescriptions for PREVENTION

Guidance from the Western States
Pediatric Environmental Health Specialty Unit

How and where we live, eat, sleep, work, and play, can have huge impacts on our health! These factors have especially large impacts during pregnancy and in early child years, but continue to be vital throughout our lives. We created Prescriptions for Prevention to guide parents and caregivers in the best actions they can take to protect children's environmental health and prevent future harm. These materials are based off of our clinician facing [Pediatric Environmental Health Toolkit \(PEHT\)](#), featuring evidence-based overviews on health hazards related to air, water, food and consumer products. Two key groups of concern are Hazards, and Sources. Hazards are the different kinds of harms we are concerned about, like groups of toxic chemicals. Sources are where harms may come from, like our food or water. Click each below to learn more about how to protect your child! [Be sure to scroll down further to check out our animated video series too!](#)

[ENVIRONMENTAL HAZARDS](#)



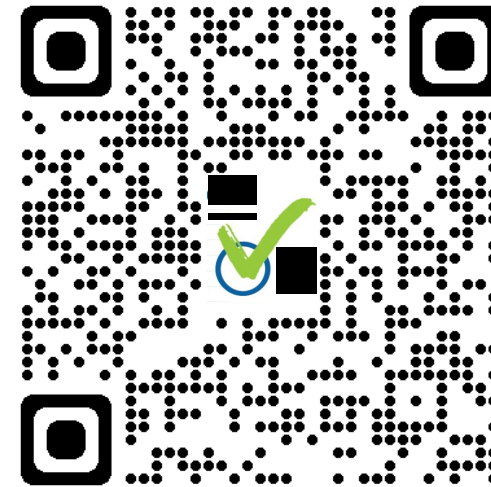
[EXPOSURE SOURCES](#)



Companion Resources for Families

wspehsu.ucsf.edu/prescriptions-for-prevention

Free, online, available in English & Spanish



Prescriptions for Prevention

- Based on PEHT
- Powered by support from EaRTH
 - Funding, engaged ESPs & med students in initial drafts
- Doctor, healthcare professional & public health specialist reviewers
- 30 key environmental health topics
- Simple overviews w/ easy & actionable low/no-cost do's & don'ts
- National level resources w/ space for regional ones
- English & Spanish



Prescriptions for PREVENTION

Guidance from the Western States
Pediatric Environmental Health Specialty Unit



Climate Change



Did you know?

Climate change is causing more extreme temperatures and weather. It is also causing more frequent and severe natural disasters such as wildfires, droughts, flooding and hurricanes. Climate change is expanding the habitats and lengthening seasons of ticks, mosquitos, and other pests that can carry disease. Children depend on adults to keep them healthy and protect them from the physical and psychological effects of climate change.



Do

To protect your family's health:

- ✓ **Prepare your home for natural disasters** in your area (such as wildfires, hurricanes and flooding):
 - ✓ Prepare a "go bag" with medications and supplies that you can grab quickly if a disaster threatens your home. Make a plan to access and store medications during disasters.
- ✓ **Monitor the Air Quality and temperature** and take actions such as staying indoors when air quality is bad.



Don't

- ✗ **Don't smoke or vape**, especially indoors.
- ✗ **Don't open windows**, play, or exercise outside on high pollution days.
- ✗ **Never leave children alone in a car** especially when it is hot outside.
- ✗ **Don't let pools of water collect:** dump out buckets, vases, birdbaths and trash containers weekly to reduce mosquitos.



Prescriptions for PREVENTION

Guidance from the Western States
Pediatric Environmental Health Specialty Unit



Natural Disasters



Did you know?

Natural disasters including floods, hurricanes and wildfires pose immediate danger and can also have lasting impacts including exposures to toxic chemicals in our streets, yards and homes. Disruptions from disasters can sometimes limit our access to key resources like healthy food, safe water, medications, and power, putting families in dangerous situations.



Do

During a disaster:

- ✓ **Have an [emergency evacuation plan](#)** and a “go bag” with necessities to help keep your family safe.
- ✓ **Check out [ready.gov](#)** for helpful information before, during and after many different kinds of disasters (like floods, wildfires, winter storms and many others).
- ✓ **Monitor [local air quality](#):**
 - ✓ **Stay inside** if outdoor air quality is poor;
 - ✓ **When outdoors on bad air days**, wear an [NIOSH-certified N95 mask](#)



Don't

- ✗ **Do not use any gas or diesel-powered appliances (like grills or generators) indoors.** [Use generators safely](#) to prevent carbon monoxide build up.
- ✗ **Do not return to your home after a disaster until it is safe to do so:**
 - **Key cleanup** should have been done;
 - **Power lines** must be secured;
 - **Safe water, sanitation, and**



Prescriptions for PREVENTION

Guidance from the Western States
Pediatric Environmental Health Specialty Unit



Outdoor Air Pollution



Did you know?

Outdoor air pollution exposure is associated with health issues such as asthma, heart disease, and cancer. Highways, ports, wildfires, volcanoes, power plants, refineries, and factories are major sources of pollution. **Some communities**, such as low income communities and communities of color, are more impacted by air pollution than others.

✓ Do	✗ Don't
<ul style="list-style-type: none">✓ Check the EPA's AirNow.gov for guidance on outdoor activities.✓ Consider wearing a N95 mask when the air quality is unhealthy.✓ Create a clean indoor air space that your family can use when air pollution is unhealthy. <p>To help improve outdoor air quality:</p> <ul style="list-style-type: none">✓ Drive less, walk, carpool, bike, or use public transport if available.✓ Choose energy-efficient appliances and light bulbs.✓ Limit the use of gasoline-powered lawn mowers and leaf blowers. Invest in electric alternatives if possible.	<ul style="list-style-type: none">✗ Don't rely solely on masks. Use your clean indoor air space as needed.✗ Don't leave doors and windows open on severe air pollution days.✗ Don't idle your car unnecessarily.✗ Don't burn wood or other materials in your fireplace or stove. Consider using space heaters or converting to a gas fireplace if needed. Follow the EPA's Best Wood-Burning Practices.



Prescriptions for PREVENTION

Guidance from the Western States
Pediatric Environmental Health Specialty Unit



Plastics



Did you know?

Our modern world uses a lot of plastic and most of it does not get recycled. Instead, it pollutes our environment and water. Children are exposed to plastics and harmful compounds in plastics through their baby bottles, toys, and personal care products (like lotions, shampoos, etc). When plastics break down, they can even form "microplastics," tiny particles that can be eaten or inhaled.



Do

- ✓ **Use or purchase products** packaged in materials such as glass or metal instead of plastics.
- ✓ **If you need to use plastics** look for those with recycling codes 1, 2, 4, and 5. These are safer.
- ✓ **Microplastics can get dislodged** from synthetic clothing in the wash:
 - ✓ **Avoid fabrics** such as "polyester," "nylon," "acrylic," and "spandex."



Don't

- ✗ **Avoid plastics** with recycling codes 3 (phthalates), 6 (styrenes), and 7 (bisphenol A, or BPA) unless labeled "biobased" or "greenware".
- ✗ **Do not microwave food** or beverages (including infant formula) in plastic.
- ✗ **Do not microwave or heat plastic cling wraps.** If you must use plastic wrap in the microwave, ensure it does



Home



Shorts



Subscriptions



Library



Prescriptions for Prevention

Western States PEHSU

3 videos 6 views Last updated on Aug 3...



This video is brought to you by the Western States Pediatric Environmental Health Specialty Unit (WS ...More



Play all



Shuffle

1



Keep Kids Healthy by Preparing for Natural Disasters

Western States PEHSU • 20 views • 11 days ago

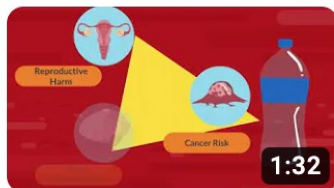
2



Climate Change, Heat Stress and Health

Western States PEHSU • 41 views • 11 days ago

3



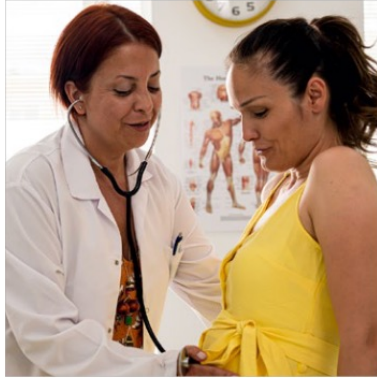
Children's Health and the Impacts of Plastics

Western States PEHSU • 55 views • 11 days ago



EMS Integration

- Initiative initialized by Dr. Marya Zlatnic
- Integration allows for ease of review in clinical encounters, & integration into aftercare summaries etc
- Climate Change & Pregnancy factsheet (5pgs) and Wildfires were first two priorities
- Reviewing & integrating entire Prescriptions for Prevention Series
 - Monthly reviews w/ UCSF Patient Education Committee
 - Quarterly uploads into EMS (Epic)
 - 24 reviewed and approved to date



Guidance from the Western States Pediatric Environmental Health Specialty Unit

Climate Change and Pregnancy



wspehsu.ucsf.edu



twitter.com/wspehsu

Climate change is resulting in more extreme temperatures and weather, rising sea levels, more natural disasters (e.g., wildfires, hurricanes, droughts, and flooding), and population displacement. Pregnant people are especially vulnerable to the health harms resulting from climate change, with increased risks of adverse pregnancy complications, including preterm birth, small for gestational age, and hypertensive disorders of pregnancy.

Strategies to minimize harms include

- ▶ **mitigation** (steps to decrease CO2 and other greenhouse gas levels to minimize the change in climate),
- ▶ **adaptation** (strategies to deal with a climate that is hotter and stormier), and
- ▶ **resilience** (sustainability).

Clinicians are in a unique position to protect the health of pregnant people and children by:

- ▶ advocating for policy changes that address climate change and
- ▶ providing clinical recommendations for patients to protect themselves from the

- ▶ more sensitivity to air pollutants due to immature lung & immune function, more outdoor activities, higher ventilation rate, and frequent mouth breathing
- ▶ more frequent serious complications from infectious diseases, including vector-, water-, and food-borne diseases, which increase with extreme weather
- ▶ dependence on caregivers for basic health needs and safety



Air pollution increases risks to reproductive



WESTERN
STATES

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Additional Educational Materials:

Story of Health, free, online, asynchronous continuing medical education modules

- Modules include: wildfires, asthma, children's cancer, cognitive decline, infertility & developmental disability

A Story of Health • Sofia's Story

WILDFIRE HEALTH IMPACTS Sofia's Story

Help Page | Free Continuing Education | References | Go Back

POLICY RECOMMENDATIONS

Although we have seen favorable decreases in particulate matter levels from industrial sources in recent years, our nation's increase in wildfires has made wildfire smoke a substantial contributor to overall particulate matter exposure. The National Bureau of Economic Research estimates that wildfires have accounted for up to 25% of PM_{2.5} in recent years across the US, and up to half in some Western regions (Burke et al., 2020).

Some policy considerations for wildfire smoke prevention and mitigation are:

Climate Change

Decrease greenhouse gas (GHG) emissions

- Local, federal and multinational initiatives (e.g., [The Paris Agreement](#))
- Renewable energy (e.g., solar, wind)
- Economic strategies: (e.g., emissions tax)
- Increased funding for research to best predict high-risk areas and better understand how climate change is affecting wildfire behavior

For further information on climate change and policy by the American Academy of Pediatrics please follow the links below:

- [AAP Policy Statement on Global Climate Change and Children's Health](#)
- [How Climate Change Affects Children: AAP Policy Explained](#)

Health and Infrastructure Assessment & Response

- Development of guidelines for school administrators for air quality recommendations (e.g., [doh.wa.gov](#))
- Air filtration standards for public buildings and schools
- Funding for state and local efforts for infrastructure hardening
- Funding and research on indoor air pollution monitoring and standards (e.g., low cost sensor initiatives)
- Funding for schools for maintenance and improvements to improve indoor air quality (e.g., filtration)
- Health experts utilized as air resource advisors on fire incident teams

Forest Management

- Forest maintenance initiatives (federal and state), including mechanical clearing and prescribed burns
- Allocation of funding to allow for more focus on prevention (e.g., ["The Fire Funding Fix"](#) beginning in FY 2020)
- Reduction of building expansion adjacent to wooded areas (Wildland-Urban Interface)

Prescribed Burns

Cultural Burns

Listen: NPR: To Manage Wildfire, California Looks To What Tribes Have Known All Along

4-Minute Listen



Cultural Burns

What are Cultural Burns?

Indigenous tribes have used intentional burns ("cultural burns") for centuries to control overgrowth, restore resources, and keep forest wildlands healthy. Policy with a primary focus on suppression has led to many tribes struggling to maintain their way of life. To learn more about Indigenous cultural burns and growing California partnerships to work with tribes to learn and work together for healthier and more resilient forests please take a moment to listen the NPR story ([link at left](#)).

Above photo: Diana Almendariz of the Maidu/Patwin tribes sets fire to a redbud pile, a plant used in Native American basketry, during the Tending and Gathering Garden Indigenous Fire Workshop in Woodland. Credit: Alysha Beck/UC Davis.

Close window

'Good Fires' graphic: [Pacific Northwest Research Station](#)

WESTERN STATES
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<https://wspehsu.ucsf.edu/main-resources/training/a-story-of-health-a-multi-media-ebook/>

UCSF EARTH Center
Environmental Research and
Translation for Health

Resilience Module: 25 minute video on childhood development, resilience & the environment

Resilience Module

