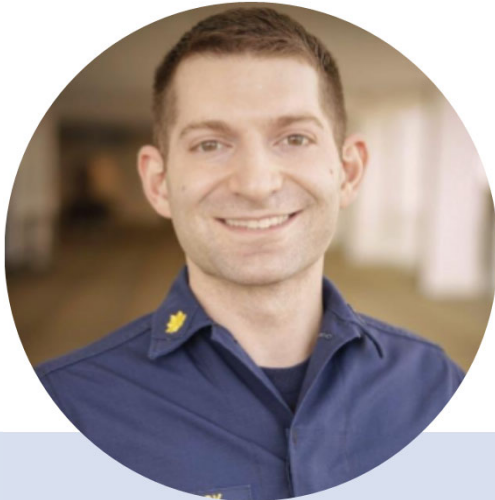




Promoting Safe Flood Cleanup and Indoor Air Quality

June 16, 2023
California Healthy Housing Coalition
2023 Annual meeting

Introductions



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U.S. EPA, Indoor Environments Division



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Disclaimer

The views expressed in this presentation are those of the authors and do not necessarily reflect the official policy or position of the U.S. Environmental Protection Agency, or the U.S. Government.

The Indoor Environment

About 90% of Americans' time is spent indoors

Pollution concentration levels indoors can be higher than outdoors

Indoor air pollution can come from

- **Outdoor pollutants migrating indoors from sources near or far**
- **Indoor sources emitting or forming pollutants**



Emergencies and Indoor Air Quality

Hurricanes and Stormy Weather:

- Flooding and water damage can lead to mold growth

Wildfires, Volcanic Eruptions, Dust Storms:

- Smoke and dust in outdoor air can make its way indoors

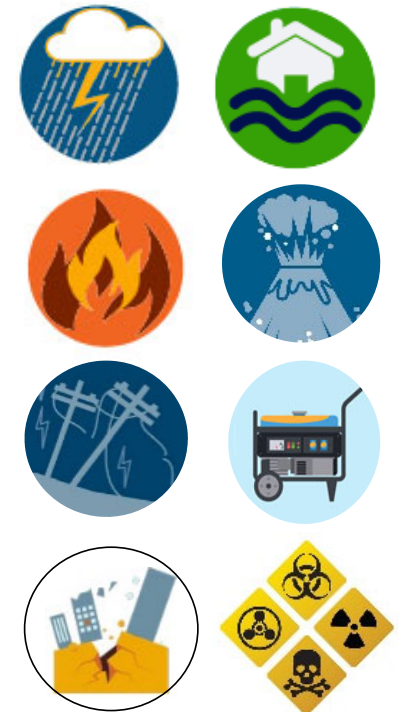
Power Outages and Carbon Monoxide (CO):

- Improper use of portable generators and other combustion devices can lead to harmful CO levels in poorly ventilated spaces

Biological Threats:

- Certain bacteria and viruses can become airborne, necessitating strategies to reduce potential spread indoors

Climate change is increasing the frequency and severity of weather disasters.



Flooding and the Indoor Environment: Impacts to IAQ and Health

Flooding and the Indoor Environment



Flooding and the Indoor Environment

Floodwaters

- Can make the air in your home unhealthy
- Can carry sewage and harmful substances
- Create conditions favorable for viruses, bacteria, and mold
 - Trigger and/or exacerbate asthma and allergies



Flooding and the Indoor Environment

- **Emergencies and disasters often coincide with power outages**
 - **Increased use of portable generators**
 - **Improper use of portable generators and carbon monoxide poisonings**



85 people die in the U.S. each year from CO poisoning caused by gasoline-powered portable generators

Most generator deaths (81%) occur in residential locations

Flooding and the Indoor Environment

- **Safely cleaning up a flooded home**
 - **Avoiding harmful exposures**
 - **Chemicals distributed by flood**
 - **Pesticides**
 - **Lead and Asbestos**
 - **Properly cleaning and maintaining materials, belongings, etc.**
 - **Safety engaging in repair and maintenance**



Vulnerable Populations and Lifestages

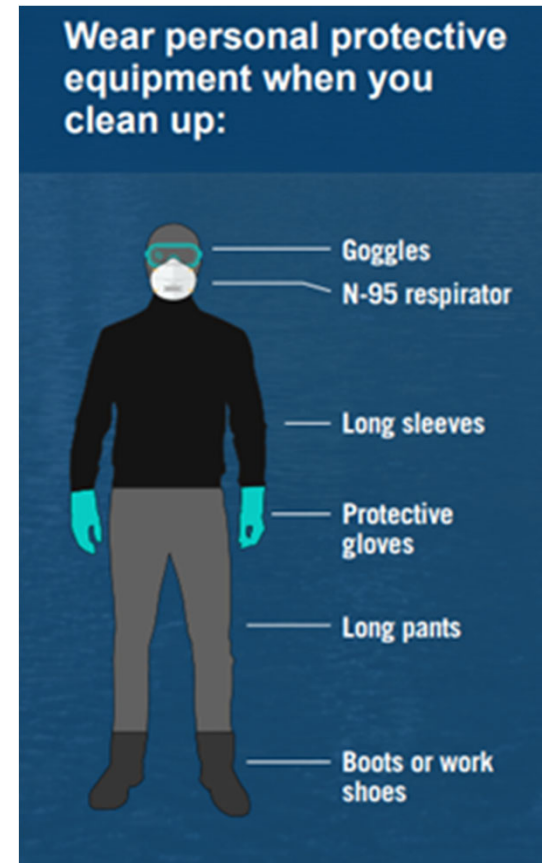
- **Children**
- **Pregnant people**
- **Elderly**
- **Those with preexisting conditions**



Flooding and the Indoor Environment: Overview of Key Strategies for Safe Flood Recovery

Preparing for Flood Events

- **Gather protective equipment and other supplies for safe flood cleanup and recovery**
- **Plan ahead by adding these items to your preparedness supplies:**
 - **N-95 respirators,**
 - **goggles,**
 - **long pants,**
 - **long-sleeve shirts, and**
 - **gloves.**



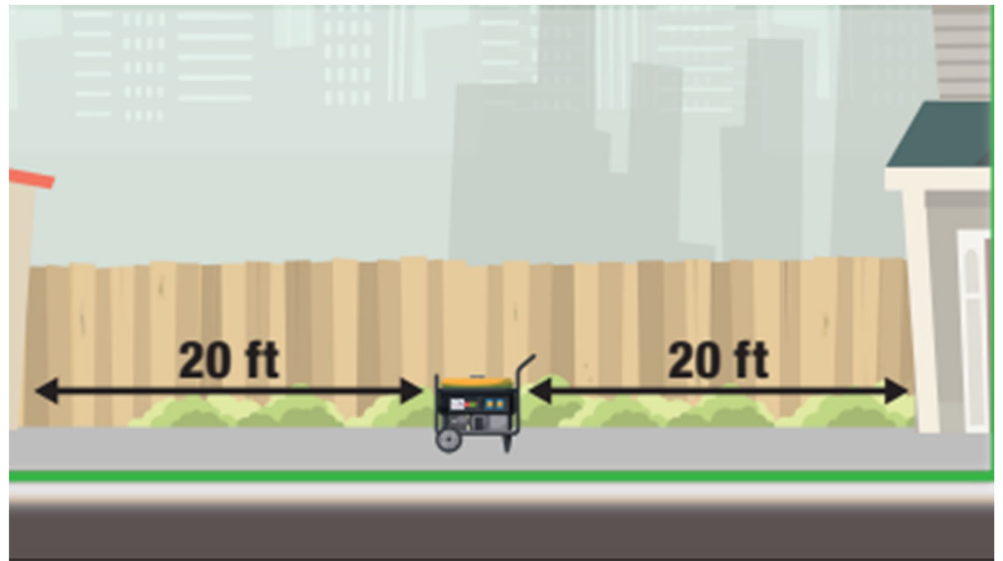
Stay Safe as You Clean Up

- **Some people should not help**
 - Children, pregnant people, and people with weakened immune systems or chronic breathing problems like asthma.
- **Wear personal protective equipment**
- **Be aware of the risk of electrocution.**
 - Do not touch electrical equipment if it is wet or if you are standing in water. If it is safe to do so, turn off the electricity to prevent electric shock.



Operate Portable Generators Safely

- **NEVER** use a fuel-powered portable generator inside your home, garage, shed, or any enclosed areas.
- **Always** use generators outside and at least 20 feet away from buildings.
- **Generator exhaust** contains deadly carbon monoxide (CO) and other pollutants.



Clean and Dry the House and Everything In It

- **Sort materials and throw away anything you cannot clean and dry.**
- **Clean hard surfaces with detergent and water.**
- **Do not mix cleaning products together or add bleach to other chemicals.**
- **Dry the house and everything in it within 24-48 hours if you can.**
- **While cleaning, ventilate and dry your home using fans and dehumidifiers, and by opening doors and windows, if possible**




Flooding and the Indoor Environment: EPA Resources and Guidance

Webpages and Guidance

Emergencies and IAQ Webpage:

- Guidance and resources for preparing for and responding to IAQ impacts from multiple emergencies and disasters
- Available in 10 languages



The screenshot shows the EPA website's navigation bar with options like 'Environmental Topics', 'Laws & Regulations', 'Report a Violation', and 'About EPA'. The main heading is 'Indoor Air Quality (IAQ)'. Below it, there's a sidebar with links to 'Indoor Air Quality Home', 'Learn about Indoor Air Quality', 'Introduction to IAQ', and 'Air Cleaners and Filters'. The main content area features the title 'Emergencies and Indoor Air Quality (IAQ)' and a language selection menu with options for Arabic, English, Spanish, Haitian Creole, Korean, Russian, Simplified Chinese, and Vietnamese. A 'Subscribe' button is also visible.

On this page:

- [Emergencies, IAQ and Health](#)
- [How Do Emergencies Affect the Indoor Environment?](#)
 - [Wildfires, Volcanic Eruptions, and Dust Storms](#)
 - [Power Outages](#)
 - [Hurricanes and Flooding](#)
 - [Extreme Heat](#)
 - [Snow and Ice](#)
 - [Earthquakes](#)
 - [Chemical, Biological, Radiological and Nuclear \(CBRN\) Threats](#)
- [General Tips & Safety Practices](#)
- [Additional Resources](#)

Webpages and Guidance

Flood Cleanup to Protect Indoor Air and Your Health

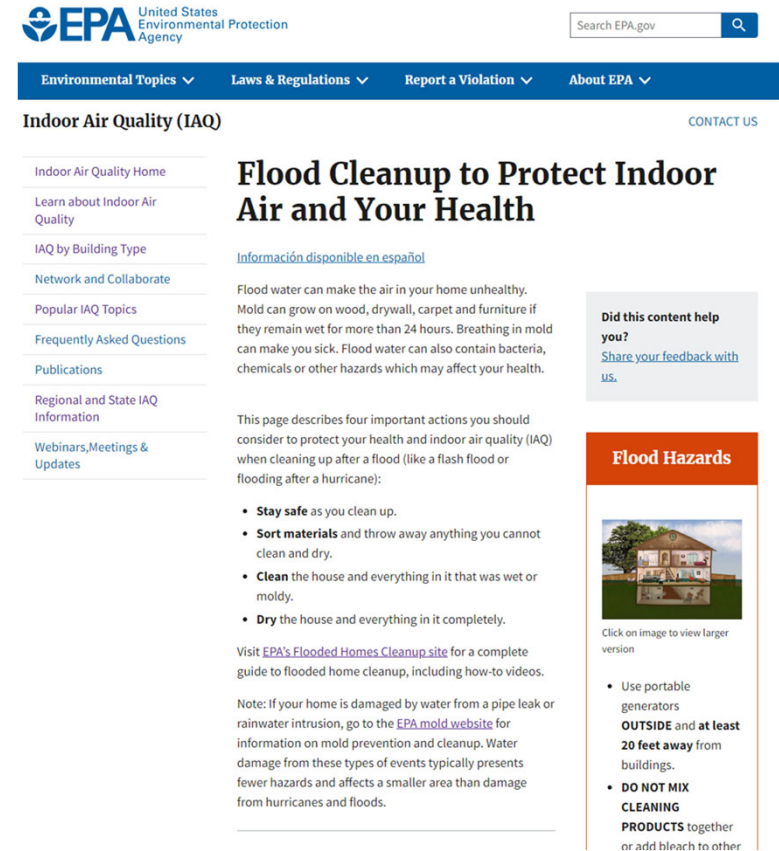
This page describes important actions to consider to protect health and indoor air quality when cleaning up after a flood



English



Spanish

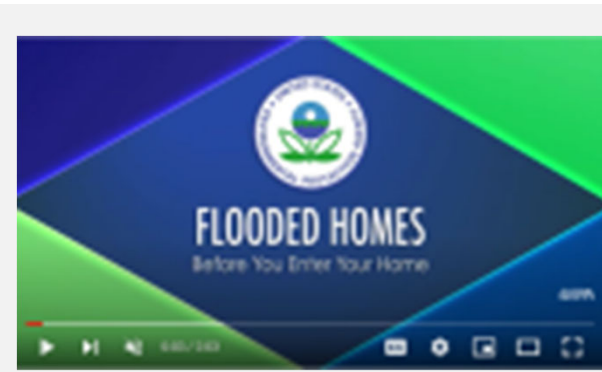


The screenshot shows the EPA website interface. At the top is the EPA logo and navigation menu. The main heading is "Indoor Air Quality (IAQ)". The article title is "Flood Cleanup to Protect Indoor Air and Your Health". The text describes the health risks of mold and provides a list of four key actions: stay safe, sort materials, clean the house, and dry the house. It also includes a link to a flooded homes cleanup site and a note about mold prevention. A sidebar on the right features a "Flood Hazards" section with an image of a flooded house and a list of safety instructions, including using portable generators outside and not mixing cleaning products.

Webpages and Guidance

Flooded Homes Cleanup Guidance

Video series aiming to educate the public on strategies for performing safe flood cleanup in homes, and general guidance for reducing flood related health and safety risks.



Video Series Topics:

- Mold and Moisture Basics
- What to Wear?
- Generator Safety
- Entering a Flooded Home
- Lead and Asbestos
- Floor and Wall Cleanup
- ...and more!

CONTACT US

Flooded Homes Cleanup Guidance



Coming Home



- [Before You Enter](#)
- [Entering Your Home](#)
- [What to Wear](#)
- [Tools Needed for Repair](#)
- [Renter Specific Information](#)

Protecting Your Health



Doing it Yourself



- [Roof, Window, and Door Tarps](#)
- [Removing Standing Water](#)
- [Wall Cleanup and Removal](#)
- [Floor Cleanup and Removal](#)
- [Drying Everything Out](#)

Additional Resources & Help



Search Flooded Homes

Enter topic or word:

Current Declared Disasters

[FEMA](#)

Related Links

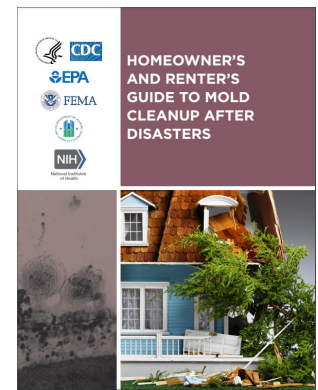
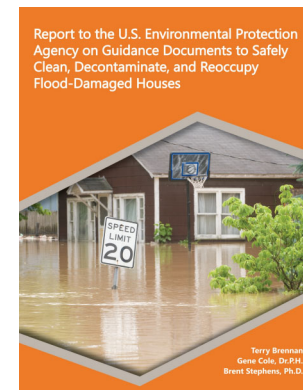
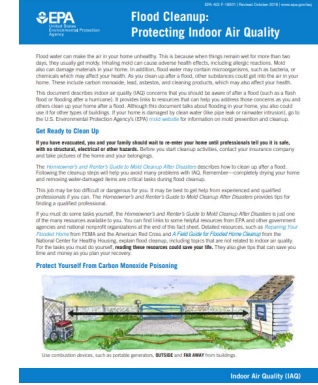
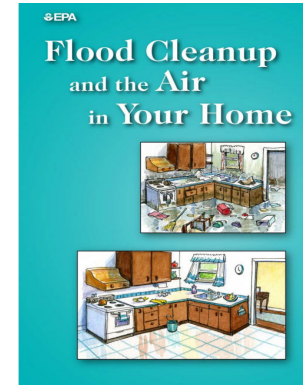
- [Disaster Financial Assistance](#)

Webpages and Guidance

Resources for Flood Cleanup and IAQ

Guidance and Technical Resources:

- Safe and effective flood cleanup
- Post-flooding mold remediation
 - homeowners and renters
- Worker and employee safety



Webpages & Guidance

Power Outages and Indoor Air Quality



Tips to prevent CO poisoning and control temperature in buildings without power, with emphasis on homes.



The screenshot shows the EPA website's page for "Power Outages and Indoor Air Quality (IAQ)". At the top, the EPA logo and "United States Environmental Protection Agency" are visible, along with a search bar and navigation links for "Environmental Topics", "Laws & Regulations", "Report a Violation", and "About EPA". The page title is "Indoor Air Quality (IAQ)" with a "CONTACT US" link. A sidebar on the left lists various IAQ resources. The main content area features the title "Power Outages and Indoor Air Quality (IAQ)" and a globe icon indicating language options: Arabic, English, Spanish, Haitian Creole, Korean, Russian, Portuguese, Simplified Chinese, Traditional Chinese, Tagalog, and Vietnamese. The text explains that U.S. buildings are designed for power, and outages can impact indoor air quality. It lists resources on this page, such as CO alarm installation and ventilation tips, and other pages like emergencies and flood cleanup.

Infographics

Where to Safely Use a Fuel-Powered Portable Generator

20 FT FROM ALL HOMES

DO

20 ft 20 ft

✗ DON'T

ON BALCONIES, DECKS OR PORCHES

✗ DON'T

NEAR HOMES OR WINDOWS

✗ DON'T

IN BASEMENTS

✗ DON'T

IN LIVING SPACES


✗ DON'T

IN GARAGES

FLOOD CLEANUP: TIPS FOR A HEALTHY HOME



Flood Water Can Make the Air in Your Home Unhealthy



Flood waters can carry sewage and other harmful substances. After a flood, standing water and wet materials can become a breeding ground for viruses, bacteria and mold.




Children, pregnant people, and people with weakened immune systems or chronic breathing problems like asthma should not take part in flood cleanup.

⚠️ Be aware of the risk of electrocution. Do not touch electrical equipment if it is wet or if you are standing in water. If it is safe to do so, turn off the electricity to prevent electric shock.

⚠️ Operate portable generators safely. If you lose power, a portable generator can be used for temporary power. Only use generators outside and at least 20 feet away from buildings.

Wear personal protective equipment when you clean up:




- Goggles
- N-95 respirator
- Long sleeves
- Protective gloves
- Long pants
- Boots or work shoes

Clean and dry your home and everything in it within 24 to 48 hours, if you can.



Clean hard surfaces with detergent and water. Do not mix cleaning products together or add bleach to other chemicals. Throw away anything that cannot be cleaned and dried.



While cleaning, ventilate and dry your home by using fans and dehumidifiers and by opening doors and windows, if possible. If you already can see mold, do not use fans because fans may spread the mold.

⚠️ This job may be too difficult or dangerous for you. It may be best to get help from experienced and qualified professionals, if you can.

Scan this QR code with your smartphone camera, or visit this link for more information:
www.epa.gov/indoor-air-quality/iaq/resources/flood-cleanup-and-indoor-air-quality

Infographics

What Can I Keep?

Keep it & Clean it

 Metal Furniture	 China Dishware Ceramics	 Silverware & Kitchen Utensils
 Plastic Furniture	 Jewelry	 Glass

What Can I Keep?

Keep it & Clean it

 Metal Furniture	 China Dishware Ceramics	 Silverware & Kitchen Utensils
 Plastic Furniture	 Jewelry	 Glass

It's a Maybe

 Photos & Books	 Bedding & Blankets	 Rugs
 Solid Wood Furniture	 Clothing	 Appliances & Electronic Devices

Best to Remove It

 Mattresses	 Leather Furniture	 Medicine
 Cloth Upholstered Furniture	 Cushions & Pillows	 Wood Veneer Furniture

Learn more on how to treat and clean different material at epa.gov/flooded-homes



Infographics



Resource Summaries

 **Flood Cleanup and Indoor Air Quality** www.epa.gov/iaq

Floodwaters may contain many hazards, including biological and chemical contaminants. Following a flood or hurricane event, standing water and wet materials can become a breeding ground for microorganisms, such as viruses, bacteria and mold. Exposure to these contaminants can cause disease, trigger allergic reactions and continue to damage materials long after the flood.

Scan the QR Codes below to access each resource, or scan the code to the right to explore EPA's Resources for Flood Cleanup to Protect Indoor Air Quality webpage.

Flood Cleanup: Tips for a Healthy Home
This document includes tips for safely and effectively cleaning up a home after a flood. It is available in several languages.



Flooded Homes Cleanup Guidance
This website has a series of short how-to videos, infographics and more resources on cleaning up a home after a flood.



Homeowner's and Renter's Guide to Mold Cleanup After Disasters
This guide summarizes basic procedures for mold remediation after flooding and other disasters.



Flood Cleanup: Protecting Indoor Air Quality
This five-page brochure contains basic information on flood cleanup with illustrations and links to more detailed information.



For more information about protecting indoor air quality during emergencies and disasters, visit EPA's **Emergencies and Indoor Air Quality webpage** by scanning the QR code to the right.





Resource Summaries

 **EPA**
United States
Environmental Protection
Agency

www.epa.gov/mold

Mold Publications

Molds are part of the natural environment and can be found everywhere, indoors and outdoors. Mold is not usually a problem unless it begins growing indoors. The best way to control mold growth is to control moisture. The U.S. Environmental Protection Agency (EPA) has several publications to help people better understand mold and its health risks.



Scan here to visit www.epa.gov/mold

Scan the QR Codes below to access the publications, or scan the code to the right to explore EPA's mold website.

A Brief Guide to Mold, Moisture, and Your Home

This guide provides information and guidance for homeowners and renters on how to clean up residential mold problems and how to prevent mold growth.



Mold Remediation in Schools and Commercial Buildings

This document presents recommendations for the remediation/cleanup of mold and moisture problems intended for building managers, custodians and others responsible for maintenance in schools and commercial buildings.



The Key to Mold Control is Moisture Control - Infographic

This infographic shows how to take steps to control mold and moisture indoors.



These publications address water damage from sources such as a pipe leak or rainwater intrusion. For guidance on cleaning up after a flood, visit EPA's Resources for Flood Cleanup and Indoor Air Quality webpage by scanning the QR code to the right.



Resource Summaries

 **Asthma Awareness** www.epa.gov/asthma


Asthma is a serious chronic respiratory disease that affects the quality of life of more than 25 million Americans, including an estimated 4 million children. Although there is no cure for asthma yet, asthma can be controlled through medical treatment and management of environmental triggers.

Scan the QR Codes below to access each EPA Asthma resource, or scan the code to the right to explore EPA's Asthma website.

Asthma Community Network
This network provides an interactive space for community-based asthma programs and the organizations that sponsor them to exchange best practices and lessons learned.



Strategies for Addressing Asthma in Homes
Using this home assessment tool, a trained home visitor can help find common asthma triggers in homes and discuss ways to reduce and remove triggers to make homes healthier.



Help Your Child Gain Control Over Asthma
This brochure offers tips on how to manage asthma and follow simple steps to minimize exposure to asthma triggers found indoors and out.



Dusty the Goldfish and His Asthma Triggers Funbook
This educational activity book helps children learn more about asthma triggers.



Asthma Triggers Infographics
This collection of infographics provides a brief overview of different asthma triggers and ways to reduce exposure.

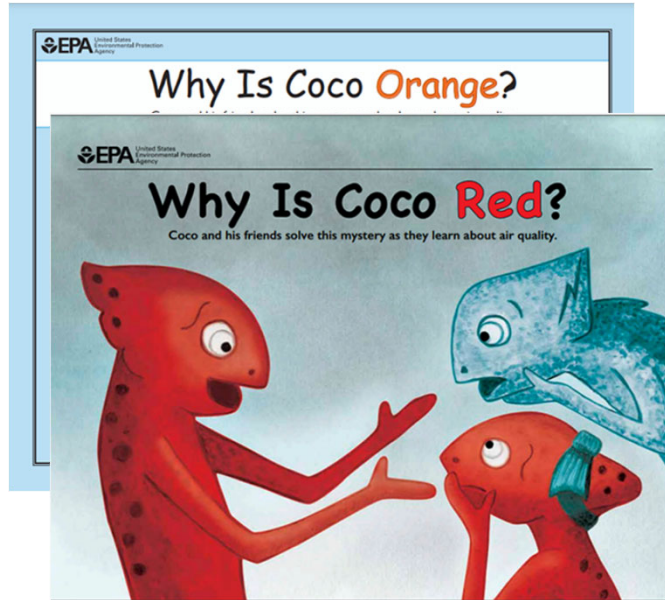
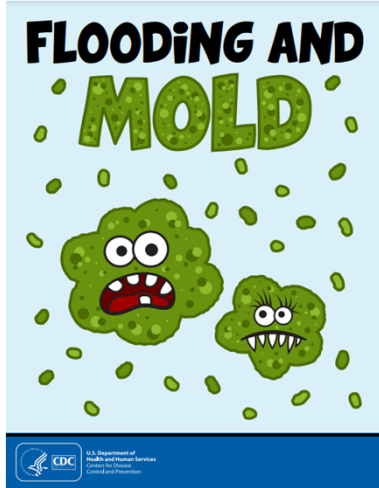
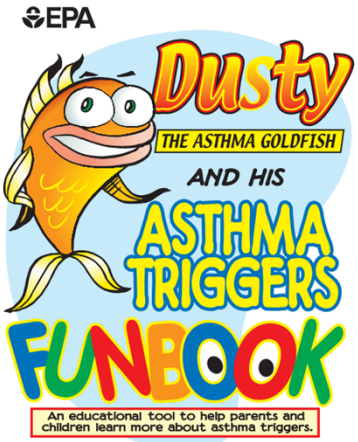


Climate change poses many threats to human health and well-being, including increasing the risk of asthma attacks. To learn more, visit EPA's [Understanding the Connections Between Climate Change and Human Health](#) webpage.



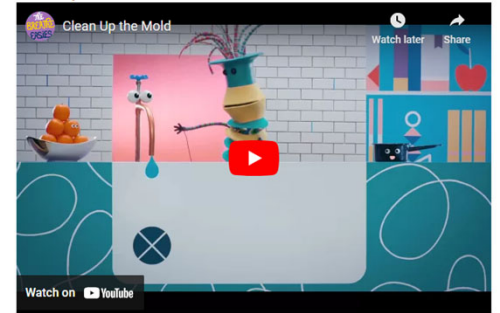


Children's Resources



The Breathe Easies

Clean Up the Mold



Additional Resources - PEHSU

Pediatric Environmental Health Specialty Units (PEHSU)

EPA and the Agency for Toxic Substances and Disease Registry jointly support the PEHSUs, which is a network of experts in pediatric environmental health located throughout North America.

The PEHSU network has resources on many topics related to children's health, including flooding and mold.

The Western States PEHSU is available to answer questions from healthcare professionals, parents, care givers, and others about children's symptoms that may be related to environmental exposures.

WSPEHSU Service Area:
Arizona, California, Hawaii, Nevada, Pacific Islands, and Tribal Nations

The Western States PEHSU
can be reached:
by email at pehsu@ucsf.edu
or by phone at
(415) 206-4083 or
(866) 827-3478 (toll free).



Emergencies and IAQ Subscriber List and GovDelivery

Updates and information on IAQ and disasters

English:



Spanish:



Be Prepared for Extreme Heat

Use Ventilation and Shading to Help Control Indoor Temperatures



It means that [extreme heat](#) is on the way. Using fans and home ventilation are ways to keep cool in summer months, but did you know that shading can help control indoor temperatures?

How can you shade your home and conserve energy during extreme heat by:

• Using shades that receive morning and afternoon sun with shades to help control indoor temperatures.

• Using awnings, roller shades, awnings, or louvers to cover your windows.



New Video from EPA!

Wildfire Smoke and Indoor Air Quality: How to Create a Clean Room at Home

Social Media



Twitter:

@EPAair
@eparegion9
@EPAespanol



Facebook:

facebook.com/EPA
facebook.com/EPAregion9



Instagram:

@epagov

The screenshot shows a Twitter thread from the account EPAair (@EPAair). The thread title is "Thread". The tweet text reads: "If your area is affected by #wildfire smoke, check your HVAC filter every few days and change it if needed. A clean filter will remove particles more effectively to protect your indoor air. Use a higher-efficiency filter (ideally MERV 13) if you can!". Below the text is a green graphic with the EPA logo in the top right corner. The graphic title is "Wildfire smoke in your area?" and the subtitle is "You may need to change your HVAC filter more often!". The graphic contains two images of HVAC filters. The left image is labeled "BEFORE" and "New, unused HVAC filter" and shows a clean, white filter. The right image is labeled "AFTER" and "HVAC filter used for 15 days during a wildfire smoke event" and shows a dark, heavily soiled filter. The graphic also includes an "ALT" label and the URL "www.epa.gov/iaq". Below the graphic, the tweet metadata shows "9:00 AM · Jun 9, 2023 · 6,083 Views". At the bottom, the engagement statistics are "26 Retweets", "3 Quotes", and "23 Likes". The bottom of the screenshot shows the standard Twitter interaction icons: reply, retweet, like, bookmark, and share.

Thank you!