

# After Maui fires, human health risks linger in the air, water and even surviving buildings

August 14 2023, by Andrew J. Whelton

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People returning to what remains of the beachside town of Lahaina, Hawaii, and other Maui communities after one of the nation's [deadliest wildfire disasters](#) face more dangers, beyond the [2,700 buildings](#)

destroyed or damaged and dozens of lives lost. The fires also left lingering health risks for humans and wildlife.

When fires spread through communities, as we've seen more often in recent years, they burn structures that contain treated wood, plastics, paints and [hazardous household wastes](#). They can burn vehicles and melt plastic water pipes. All of these items release toxic gases and particles.

Many [airborne pollutants](#) fall to the ground, and when debris or dust is stirred up, [hazardous particles](#) can enter the air, where people can easily breathe them in.

Chemicals can also contaminate [water supplies](#). On Aug. 11, 2023, Maui County [issued an "unsafe water" alert](#) for areas of Lahaina and Upper Kula that were affected by wildfires, warning residents to [use only bottled water](#) for drinking and cooking, and not rely on boiling tap water because of the risk of harmful chemicals.

As an [environmental engineer](#), I work with colleagues to help communities respond to and recover from wildfires and other disasters, including the Marshall Fire in Boulder County, Colorado, and the Camp Fire that destroyed Paradise, California. Lahaina and other Maui communities face similar risks ahead.

## **Chemical hazards in fire debris**

Residents returning to their burned neighborhoods will likely find themselves [surrounded by hazards](#). Some are obvious, [such as broken glass](#), nails and damaged natural gas containers. Broken power lines and gas lines may be live or leaking.

Less obvious are the [chemical](#) hazards that can reach well beyond the [fire](#) zone.

Black smoke from a fire is a sign of incomplete combustion that can produce thousands of chemicals when wood and plastics burn.

Chemicals like [benzene](#), lead, [asbestos](#) and [polycyclic aromatic hydrocarbons](#), or PAHs, are common in ash, runoff and sometimes [water systems](#) after fires.

Exposure to high levels of chemicals can sometimes cause immediate harm, such as nausea, vomiting, dizziness, rashes and respiratory issues. For these reasons it is critical to protect people, especially children and people with [health conditions](#), from exposure.

State [health officials recommended](#) that residents wear close-toed shoes, [N95 respirators](#), chemical resistant gloves and other protective equipment while looking through property debris.

When disaster debris is eventually [removed by professionals](#), the [contractors will be wearing Tyvek suits](#) and possibly respirators to protect their health.

## **Buildings that didn't burn can still have hazards**

Even buildings [deemed structurally safe](#) may have pollutants that make them unsafe for human health.

Particles and vapors can enter buildings through cracks, doors, windows and other portals. Some of these pollutants settle onto surfaces, while others penetrate fabrics, stick to walls and enter air ducts.

Often buildings must be professionally cleaned or decontaminated by wildfire remediation companies. Cleaning surfaces and ducts, replacing air filters and installing HEPA filters can also help.

## Drinking water risks and soil testing

Drinking water is another serious concern after urban fires.

Wildfires can make the [plumbing outside or inside the building itself unsafe](#) in a couple of ways. Loss of water pressure can allow pollutants to enter pipes. Maui County cited this risk in issuing its ["unsafe water" alert](#) on Aug. 11. When plastic pipes heat up, [they can also decompose](#) and then [directly leach chemicals](#) into water.

My colleagues and I have documented [benzene levels that exceeded](#) hazardous limits for drinking water after several previous fires. [PAHs can also be present](#), as our research has shown.

These and other chemicals pose an immediate health risk to water users, even if the water smells fine. Simple water flushing [can fail to](#) remove severe contamination. [Proper inspections and testing](#) in buildings and [for private wells](#) and [larger water systems](#) are important.

Outside, the ground can also become contaminated in a fire. Once the debris is removed, testing is necessary to [ensure that the soil](#) where people will replant their gardens, yards and fruit trees is free of hazardous chemicals and safe for humans and pets.

## Protecting waterways and aquatic life

During firefighting and clean-up, and when it rains, pollutants can wash into waterways and end up in the ocean.

Lahaina stretches along Maui's west coast and has long been a popular site for seeing [sea turtles](#) and other marine life. That sea life may now be at risk from pollutants from burned coastal buildings and runoff. The

fire burned to the shoreline, destroying boats, docks and other vehicles, [some of which sank](#).

Debris and sunken boats will need to be removed from the nearshore waters to protect corals. Similar to wildfires near lakes, rivers and streams, [water](#) testing will be necessary.

Communities can avoid more harmful runoff during the cleanup process by placing [pollution-control barriers](#) near storm drains, around properties and near waterways. These can help intercept pollutants flowing toward the ocean.

## **What happens to all the debris?**

How to safely dispose of all the debris as the community is cleaned up and recovers is another question.

After the 2021 Marshall Fire in Colorado, where about 1,200 structures were destroyed, [the cleanup generated 300,000 tons](#) of waste. In Maui, debris may have to be taken off the island for disposal.

Cleanup and recovery from a disaster of this magnitude takes years. In the process, I recommend residents reach out to public health departments for advice to help them stay healthy and safe.

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