Choose Safe Places for Early Care and Education

DISASTER RECOVERY SUPPLEMENT

Agency for Toxic Substances and Disease Registry (ATSDR)

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Choose Safe Places
for Early Care and Education
Planning. Guidance. Protection.

U.S. Department of Health and Human Services
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Contents

INTRODUCTION **1**

Environmental Exposures 1
Disaster Recovery 2
Who can benefit from the Disaster Recovery Supplement? 2
Disaster Recovery and the Choose Safe Places for Early Care and Education Guidance Manual 4

PART 1: THE FOUR KEY ELEMENTS OF SAFE SITING DURING DISASTER RECOVERY **5**

Types of Disasters 7

PART 2: ADDITIONAL PLACES WHERE CHILDREN SPEND TIME **11**

Center-Based Early Care and Education 13
Home-Based Child Care 14
License-exempt Early Care and Education 17
Out-of-Home Care for Children/Residential Homes/Group Homes 19
Children's Recreational Spaces 20
Camps 22

PART 3: ADDITIONAL ENVIRONMENTAL HEALTH ISSUES **23**

Floodwater 25
Cisterns and Wells 28
Water Advisories 31
Onsite Wastewater Disposal 34
Air Pollution and Particulate Matter 36
Carbon Monoxide 40
Indoor Air Quality and Ventilation 42
Mold 45
Cleaning and Disinfection Products 47
Pesticide Usage 49
Physical Hazards 52
Disaster Debris 55
Noise 57

APPENDIX A: RESOURCES BY TOPIC **61**

APPENDIX B: ACKNOWLEDGEMENTS **70**

Introduction

In 2017, the Agency for Toxic Substances and Disease Registry (ATSDR) released the Choose Safe Places for Early Care and Education Guidance Manual. The guidance manual helps environmental and public health professionals ensure that early care and education programs are located away from chemical hazards. The Choose Safe Places for Early Care and Education (CSPECE) Disaster Recovery Supplement builds upon the 2017 manual to assist environmental and public health professionals assess places where children spend time to protect children from harmful environmental exposures during disaster recovery.

Disasters disrupt communities. Homes, businesses, child care facilities, early childhood programs, schools, and other critical infrastructure can be damaged or destroyed. After the initial disaster response ends, communities begin the long process of disaster recovery. During this process, places that were once safe for children may no longer be safe. The Supplement can help identify environmental exposures that may be hazardous to children while they are in child care or at other places children spend time such as preschools and recreational facilities. Identifying these hazards can help establish ways to reduce risk.

This Supplement will assist public health professionals during disaster recovery identify potential environmental exposures to children in places where children spend time outside of their homes.

Environmental Exposures

A child's environment has direct consequences on their health and wellbeing. The main focus in this document is to discuss environmental exposures that can affect children during disaster recovery. Environmental exposures come from biological, chemical, or physical (including radiological) hazards in the environment.

Children can be exposed to harmful environmental hazards by

- breathing indoor and outdoor air,
- drinking water,
- eating,
- bathing or swimming,
- playing in or on soil,
- touching objects, and
- placing objects into mouths.

Disasters can cause direct and indirect releases of hazardous materials into the environment. An example of a direct release of hazardous materials is when a forest fire produces dioxins; an example of an indirect release is when pesticides from a storage facility wash into floodwater.[1] Concerns about both direct and indirect hazards have grown because of the increase in the number of disasters (fires, floods, hurricanes, etc.), along with increased population density in disaster-prone areas. This combination increases the chance of harmful environmental exposures from hazardous materials to children.[1]

The following may make children more vulnerable to harmful environmental exposures:

- Physiology—a child breathes more air, drinks more water, and eats more food than an adult does compared to their body size.
- Behaviors—a child may put objects in their mouth, play or crawl on the ground and soil, and not recognize dangers.
- Surroundings—a child may spend up to 60 hours per week in child care and may spend time playing outside or in recreational facilities.

Disaster Recovery

This Supplement provides guidance to protect children from harmful exposures during disaster recovery, a process which starts before disasters happen with the recovery planning stage. The Federal Emergency Management Agency (FEMA), in the National Disaster Recovery Framework, comprehensively describes the disaster recovery process. This recovery process begins in communities as the initial disaster response starts to wind down.[2]

This Supplement complements existing guidance from FEMA, the Administration for Children and Families (ACF), and others on disaster preparedness in early care and education (ECE) settings. Though disaster preparedness is crucial to keeping children safe preceding, during, and immediately after a disaster, disaster recovery guidance is often overlooked. Unintentional exposures can happen when children spend time in places affected by disasters that have not been carefully assessed during the disaster response. Returning to pre-disaster routines, such as attending school or child care, is vital for community members' sense of wellbeing and disaster resiliency. Ensuring environmental exposures are assessed and mitigated can help community members feel secure as they recover and return to pre-disaster routines.

"Recovery includes the restoration and strengthening of key systems and resource assets that are critical to the economic stability, vitality, and long-term sustainability of the communities themselves."

—National Disaster Recovery Framework, Second Edition FEMA

Who can benefit from the Disaster Recovery Supplement?

The Choose Safe Places for Early Care and Education Disaster Recovery Supplement's primary audience is public and environmental health professionals who can help assess and mitigate environmental exposures. However, others, such as early care and education professionals, disaster recovery coordinators, community planners, and local officials can also help protect children by recognizing potential environmental exposures that exist during disaster recovery.

The Supplement is designed as a starting place to consider environmental exposures during disaster recovery. Since all disasters are local disasters, the community often turns to local public and environmental health professionals first for help with environmental exposure concerns. Because knowledge of local and site-specific information is critical in determining if a site may expose children to environmental hazards, this Supplement can be used at the local level to reduce environmental exposures to children during disaster recovery. Depending on the size of the community, local capacity may be limited. When local capacity is exceeded, then state, territory and tribal governments may be able to provide additional support and can also use elements in this Disaster Recovery Supplement to support local or wider spread disaster recovery.

This Supplement was written using as much plain language as possible. While the intended audience is local, state, territory, or tribal public health and environmental health professionals who have some knowledge of environmental health, ATSDR recognizes that not every professional is an expert in every subject. To help make the Supplement as user friendly as possible, some information presented may seem basic to some while providing some helpful background to others.

Table 1 highlights some ways the Choose Safe Places Disaster Supplement may be helpful based on your role.

Although efforts were made to ensure the Disaster Recovery Supplement is extensive, it should not be viewed as all-inclusive. Collaboration between public and environmental health professionals, local authorities, decision makers, disaster recovery coordinators, ECE professionals, parents and families, and others will help ensure the best possible choices are made.

Table 1. How the Supplement helps you

YOUR ROLE	ASSISTANCE PROVIDED BY THE SUPPLEMENT
Public and Environmental Health Professional	Determining local assessment criteria for environmental exposures and mitigation (if any) needed for new or affected ECE sites using the four key elements of safe siting (refer to Part 1)
	Considering places children spend time and determining if assessment is necessary during disaster recovery (refer to Part 2)
	Determining local assessment criteria to limit exposures for other environmental health topics covered (refer to Part 3)
	Actions to limit exposures for environmental health topics covered (refer to Part 3)
	Understanding where to locate additional resources for environmental health topics (refer to Part 3, Appendix A)
Early Care and Education Professional	Understanding potential environmental exposures after disasters (refer to Part 3)
	Considering the key elements of safe siting when considering new ECE locations (refer to Part 1)
	Understanding where to locate additional resources for environmental health topics (refer to Part 3, Appendix A)
Recovery Coordinator	Understanding the importance of assessing environmental health hazards at ECE locations and other places children spend time using the four key elements of safe siting (refer to Part 1)
	Considering all places children spend time and working with public health and environmental health professionals to determine if assessment is necessary during disaster recovery (refer to Part 2)
	Actions to limit exposures for environmental health topics covered (refer to Part 3)
Local Officials	Understanding the importance of assessing ECE locations with the four key elements of safe siting (refer to Part 1)
	Considering all places children spend time and working with public health and environmental health professionals to determine if assessment is necessary during disaster recovery (refer to Part 2)
	Actions to limit exposures for environmental health topics covered (refer to Part 3)
Planners and Zoning officials	Understanding the importance of safe siting to limit children's environmental exposures after disasters by considering the four key elements of safe siting as planning and recovery happens (refer to Part 1)
Policy Makers	Understanding the importance of safe siting as a way to limit children's environmental exposures after disasters by considering the four key elements of safe siting when policy is being created (refer to Part 1)
	Considering all places children spend time when policies are being created (refer to Part 2)
	Understanding where to find additional resources on environmental health topics to consider when policies are being created (refer to Part 3, Appendix A)

Disaster Recovery and the Choose Safe Places for Early Care and Education Guidance Manual

This Supplement enhances the ATSDR Choose Safe Places for Early Care and Education Guidance Manual (the CSP Guidance Manual, available at https://www.atsdr.cdc.gov/safeplacesforECE/cspece_guidance/index.html), by expanding its scope to include analysis of four key safe siting elements in a disaster recovery setting:

- Former use of the site
- Migration of harmful contaminants from adjacent sites and nearby activities
- Presence of naturally occurring contamination
- Access to safe drinking water

This Supplement is separated into 3 Parts and an Appendix:

- Part 1: How to apply the four key elements of safe siting from the CSP Guidance Manual during disaster recovery
- Part 2: How the CSP Guidance Manual concepts can be applied to additional places where children spend time
- Part 3: How to consider additional environmental health issues during disaster recovery in locations where children spend time
- Appendix A: List of all resources by topic

Topics Not Included in this Supplement

During disaster recovery, communities face many challenges beyond what is covered in this Supplement, including the following:

- Economic effects of disasters
- Public safety
- Access to health care after disasters
- Access to education and schools after disasters
- Specific environmental contaminant screening levels
- Permanent and temporary housing
- Behavioral and mental health effects of disasters

The link between health and housing is proven and a home damaged by a disaster may pose some serious health risks. Incorrect restoration methods can worsen or even cause some additional hazards. Presumably when ECE locations and other places children spend time are closed, then children spend more time in their homes or temporary living spaces. Local environmental and public health professionals may struggle to determine if ECE locations and other places children spend time should be open when these locations have environmental exposure conditions that are similar to the conditions where children are living.

The U.S. Department of Housing and Urban Development (HUD) has created disaster recovery materials to assist homeowners and local officials in determining how to make housing safer. Many of their materials, available in English and Spanish, are available at https://www.hud.gov/sites/documents/REBUILD_HEALTHY_HOME.PDF. Additional resources are also included in Appendix A.

Disasters can often cause significant stress for communities and children. Consideration of behavioral and mental health is a critical component of disaster recovery and community resiliency. Worrying about environmental exposures and conditions can cause additional stress, yet mental health guidance is beyond the scope of this document. For more information on mental health resources for disasters please reference information from the Centers for Disease Control and Prevention (CDC) (https://www.cdc.gov/childrenindisasters/helping-children-cope.html) and Substance Abuse and Mental Health Services Administration (SAMHSA) (https://www.samhsa.gov/disaster-preparedness).

Part 1:
The Four Key Elements of Safe Siting During Disaster Recovery

During disaster recovery, the key elements of safe siting from the CSP Guidance Manual can be used to help reassess existing ECE sites or assess new potential ECE sites (Table 2). The assessment may differ depending on the type of disaster and the damage that has occurred. For example, conditions may have changed to allow contamination from an adjacent property to migrate onto the ECE site.

Table 2. Key elements of safe siting during disaster recovery and site assessments

KEY ELEMENT OF SAFE SITING	DISASTER RECOVERY CONSIDERATIONS FOR ASSESSING OR REASSESSING A SITE
1) Former use of the site	▶ Consider past use of the site and possible past contamination. ▶ Consider if the disaster created conditions that could make the contamination more accessible. ▶ Determine if changes in groundwater or groundwater contamination plumes could create vapor intrusion of contaminants. Example: Soil erosion during the disaster allows deeper contaminated soil to be more accessible.
2) Migration of contamination from adjacent sites, nearby infrastructure, or activities	▶ Consider if changes in conditions during or after a disaster could lead to migration of contamination onto a site. ▶ Determine if changes in groundwater or groundwater contamination plumes could create vapor intrusion of contaminants. ▶ Evaluate recovery activities, new businesses, or infrastructure near the site that could create a physical hazard. ▶ Determine if conditions might change if a nearby industry reopens or new industries relocate. Example: Floodwater carried contaminated soil and sediment onsite from an adjacent site.
3) Naturally occurring contaminants	▶ Determine if the disaster created changes that could worsen exposure to naturally occurring contamination. Example: Small cracks in a foundation could allow radon to more rapidly enter a building.
4) Access to safe drinking water	▶ Consider if the disaster caused changes that require re-testing or new additional testing to ensure water quality. Example: Wells or cisterns contaminated with bacteria or chemicals after being inundated with floodwater.

Types of Disasters

During disaster recovery, the four key elements of safe siting can be used to consider potential environmental exposures to children in places where they spend time. Below are examples of the different types of disasters with some considerations for each of the key elements of safe siting. Each disaster has specific, local effects, and this overview provides general examples of how the CSP Guidance Manual concepts may be helpful during disaster recovery.

Wildfires

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Fire may change conditions of buildings, structures, and other site characteristics. Damaged buildings may create debris contaminated with asbestos or lead.
	Loss of ground cover (grass and other plants) could make contamination in soil more accessible.
	Containers storing chemicals could be damaged in a fire, causing chemicals to be released.
	Ash falling onsite can expose children to chemicals in the ash via inhalation, ingestion, or dermal contact.
	Changes in groundwater could affect chemical plumes and the potential vapor intrusion issues.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Ash from nearby sites may migrate onsite. Ash can expose children to chemicals via inhalation, ingestion, or dermal contact.
	Damaged buildings may create debris contaminated with asbestos or lead that could migrate onto the site.
	Runoff after wildfires can carry additional sediment, ash, and debris.
Naturally occurring contaminants	Soil that once had ground cover may now be exposed, and exposure to naturally occurring contaminants in soil may be possible.
Access to safe drinking water	Fires can affect wells and cisterns by burning over them or by burning across the watershed. Water can be contaminated by bacteria or chemicals.
	Depressurized water systems (from water use by residents or firefighters) can allow contaminants into the system.

Flooding Event

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Erosion caused by water could expose contaminated soils.
	Changes in groundwater could affect chemical plumes and the potential vapor intrusion issues.
	Flooding can cause mold growth and affect indoor air quality.
	Flooding may change conditions of buildings and structures. Damaged buildings may create debris contaminated with things such as asbestos or lead.
	Standing water onsite could expose children to bacteria or chemicals in the water if they are in contact with it.
	Sediment left onsite after floodwater recedes and the site dries may have some chemical or bacterial contamination.
	Improper mitigation after flooding can cause mold growth and affect indoor air quality.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Floodwater can carry microorganisms or chemicals from adjacent sites/activities onto the ECE site.
Naturally occurring contaminants	Erosion caused by water could expose naturally occurring contaminants that were previously not accessible.
Access to safe drinking water	Floodwater inundating wells or cisterns can cause contamination with bacteria or chemicals.
	Public drinking water systems can be affected by flooding, making water unsafe to drink.

High Wind/Tornados

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Debris onsite can pose a physical hazard and a potential exposure hazard depending on the type and volume of debris.
	Damaged buildings may create debris contaminated with things such as asbestos or lead.
	Chemicals stored onsite safely before the disaster may be released onsite during the disaster.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Damage to nearby buildings could release contamination that is spread from a wind event.
	Debris left on adjacent or nearby sites could release contaminants.
Naturally occurring contaminants	Damage to building foundations may create ways for vapor intrusion and naturally occurring contaminants like radon to enter the facility.
Access to safe drinking water	Prolonged loss of electricity after the event could increase the chance of water contamination.

Hurricanes

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Erosion caused by flooding could expose contaminated soils that were inaccessible before the disaster.
	Changes in groundwater could affect chemical plumes and create potential vapor intrusion issues.
	Debris onsite can pose physical and exposure hazards, depending on the type and volume of debris.
	Flooding or water damage from things such as leaking roofs can cause mold growth and affect indoor air quality.
	Flooding may change conditions of buildings and structures. Damaged buildings may create debris contaminated with things such as asbestos or lead.
	Standing water onsite could expose children to bacteria or chemicals in the water if they are in contact with it.
	Sediment left onsite after floodwater recedes and the site dries may have some chemical or bacterial contamination.
	Chemicals stored onsite safely before the disaster may be released onsite during the disaster.
	Damaged buildings may create debris contaminated with things such as asbestos or lead.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Floodwater can carry bacteria or chemicals from adjacent sites/activities onto the site.
	Damage to nearby buildings could release contamination, which is spread onto the site.
	Debris left on adjacent or nearby sites can move to the site during high winds.
Naturally occurring contaminants	Erosion caused by flooding could expose naturally occurring contaminants that were previously not accessible.
Access to safe drinking water	Floodwater inundating wells or cisterns can cause contamination with bacteria or chemicals.
	Prolonged loss of electricity could increase the chance of water contamination.

Volcano Eruptions

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Volcanic ash settled onto the site can be stirred up by wind or human activities for years.
	Volcanic ash can get into even the most sealed buildings/facilities as small particles that can be inhaled deeply into lungs.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Acidic volcanic ash settled onto the ground can be stirred up by wind or human activities for years from adjacent sites.
Naturally occurring contaminants	Release of toxic gases from eruptions.
	Volcanic ash can have respirable crystalline silica.
Access to safe drinking water	Volcanic ash can settle into drinking water systems. Effect depends on the volume of ash and the size of drinking water system.

Mudslides

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Erosion caused by mudslides could lead to exposed contaminated soils.
	Damaged buildings may create debris contaminated with things such as asbestos or lead.
	Chemicals stored onsite safely before the disaster may be released onsite during the disaster.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Mudslides can move contaminated soil and materials.
	Damage to nearby buildings could release contamination, which is spread onto the site.
Naturally occurring contaminants	Erosion caused by mudslides could expose naturally occurring contaminants that were previously not accessible.
	Damage to foundations of buildings may create ways for vapor intrusion and naturally occurring contaminants like radon to enter the facility.
Access to safe drinking water	Mudslides can damage vital infrastructure that transport clean water.
	Wells or cisterns may also be a risk for contamination.

Earthquakes

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Earthquakes may change conditions of buildings and structures. Damaged buildings may create debris contaminated with things such as asbestos or lead.
	Debris onsite can pose a physical hazard and a potential exposure hazard depending on the type and volume of debris.
	Chemicals stored onsite safely before the disaster may be released onsite during the disaster.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Earthquakes can damage containment units that could release chemicals near a site.
Naturally occurring contaminants	Damage to building foundations may create ways for vapor intrusion and naturally occurring contaminants like radon to enter the facility.
Access to safe drinking water	Aquifers can shift and release additional lead, arsenic, radium, uranium, or other contaminants to change their composition in water.
	Damage may occur to water system infrastructure.

Droughts

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Loss of ground cover (grass and other plants dying) could make contamination in soil more accessible.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Dust or contaminated soil suspended in the air because of drought conditions may migrate from other sites.
Naturally occurring contaminants	Loss of ground cover could make naturally occurring contamination in soil more accessible.
Access to safe drinking water	Quantity and quality of water can be compromised for public and private water systems.
	Drought may encourage the growth of harmful algae blooms or other harmful microorganisms.

Power Outages/Prolonged Loss of Electricity

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Use of alternative power sources such as large or small generators may cause localized elevations in particulate matter and carbon monoxide hazards.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Use of alternative power sources like generators may cause localized elevations in particulate matter.
Naturally occurring contaminants	Sub slab vapor extraction systems may not work when power is out. This could lead to an increase in indoor air contaminants such as radon during power outage.
Access to safe drinking water	Loss of water pressure from no electricity can lead to contaminated drinking water.

Extreme Heat or Cold Events

KEY ELEMENTS OF SAFE SITING	EXAMPLES OF SITE CONDITIONS TO CONSIDER DURING DISASTER RECOVERY
Former Use of Site	Equipment that provides alternative or supplemental heating or cooling may increase the risk of carbon monoxide or particulate matter exposure.
Migration of contamination from adjacent sites, nearby infrastructure of activities	Increased demand for heating or cooling can create use of alternative power sources such as small generators and cause local elevations in particulate matter.
	Decreased air exchange between indoors and outdoors could lead to build up of indoor air contamination.
Naturally occurring contaminants	Cold outdoor air and warmer heated indoor air can lead to an increase in indoor air concentrations of radon or other chemicals via vapor intrusion.
Access to safe drinking water	Water system damage from freezing pipes may affect water quality.

Part 2:
Additional Places where Children Spend Time

The Choose Safe Places for Early Care and Education Guidance Manual (CSP Guidance Manual) was primarily aimed at preventing larger, center-based ECE programs from being placed on or adjacent to inappropriate sites. There are many other types of programs, facilities, or spaces where children may spend a significant amount of their time where the concepts in the CSP Guidance Manual can be applied. A disaster could make contamination in these places more likely.

This section provides information on how disasters may cause environmental exposures in various places where children spend time:

- Center-based Early Care and Education facilities
- Home-Based or Family Child Care
- License Exempt Early Care and Education
- Out-of-Home Care for Children/Residential Homes/Group Homes
- Children's Recreational Spaces
- Camps

The description of each place contains information that environmental and public health professionals may find useful when beginning to think about disaster recovery:

- Description and population served
- Regulatory and policy considerations
- Disaster recovery considerations

Because each state, territory, or municipality can have its own unique laws and regulations, environmental and public health professionals must understand how local laws and regulations affect disaster recovery.

Each state, territory, or municipality can have its own unique laws and regulations for places children spend time outside of their homes. Environmental health professionals must understand how these laws and regulations affect disaster recovery.

Center-Based Early Care and Education

Description and Population Served

ECE center-based programs care for over 7.5 million children across the United States.[3] Center-based programs can provide care for hundreds of children in one facility and have large staffs. Frequently, infants need to be about 6–8 weeks old to start attending these programs, and they stop attending these programs once they get to be school age. Many families rely on these programs so adults can work, and their children can participate in early education opportunities. In recent years, there has been a trend toward more availability of center-based child care slots than home-based slots.

Regulatory and Policy Considerations

The CSP Guidance Manual has a great deal of information on center-based ECE programs (https://www.atsdr.cdc.gov/safeplacesforECE/cspece_guidance/index.html). Most of these programs are licensed based on state and territory licensing regulations; some local jurisdictions also have child care licensing regulations. Some programs are small, independently operated businesses, and some are part of larger child care businesses. Some programs are operated by non-profit groups, and some may be license-exempt based on state or territory regulations (see license-exempt, Part 2). Environmental and public health officials should work with licensing officials and inspectors to understand any state, territory, or local licensing regulations that affect these ECE programs. Across the United States, site inspections are part of the licensing process.

Disaster Recovery Considerations

Location: Because these programs are often caring for a larger number of children, they need more space than a home-based program. At the local level, ECE programs are often considered "businesses" and are frequently located in spaces that are zoned or designated for businesses within a city or community. Location can make children in these programs more vulnerable to environmental exposures. Areas with a variety of industries or businesses have a greater potential for contamination due to past use of the site or activities on adjacent sites.

Outreach: Larger, licensed, center-based programs may be some of the easiest places to identify during disaster recovery because of their size and their need to be licensed. Information on the location of these facilities is likely available at the local, territory, or state level. Many of these facilities are open between about 7am and 6pm to fit the needs of working parents; however, some may have extended or overnight hours to help parents who work evenings or nights.

Damage and Reopening: Every licensing program requires an inspection of the facility as part of the initial licensing process and to maintain the license. Inspections may take place annually. Inspections may also be required after a disaster to ensure they are still safe and meet licensing requirements. This inspection process may be helpful for identifying disaster damage and any environmental exposure during disaster recovery. Part 1 of this Supplement describes how the four key elements of safe siting can be used to identify potential environmental exposures.

Home-Based Child Care

Description and population served

Many children are cared for by licensed home-based or family child care, sometimes referred to as Family Child Care Homes (FCCH) or Group Child Care Homes (GCCH). FCCHs often have only one provider caring for unrelated children within their home. GCCHs often have more than one provider, yet the number of children cared for is much smaller than a center-based program. The definition of FCCHs and GCCHs varies by state. For this document, the term home-based care is used to cover these types of ECE programs. In the United States, about 7% of children ages 3–5 years old receive home-based, non-relative care as their primary ECE arrangement.[4] However, in some areas home-based care may be the primary child care arrangement for most children. Children who are cared for in these settings can range in age from newborns up to about age 12. Many home-based child care programs are limited to the number of children they can care for at one time.[5]

Because home-based care is operated out of the provider's home, these programs are most frequently located in residential areas. This may offer some protection from environmental exposures, which can occur in areas zoned for business or where current industrial activities are happening. However, relying on zoning alone may not fully protect children. ATSDR has worked on many residential sites where decades-old contamination from industrial or site activities was left onsite. Some examples include homes built over old landfills contaminated with metals (lead, chromium or arsenic), polychlorinated biphenyls (PCBs) or volatile organic compounds (VOCs); and homes built on agricultural land where arsenic-based pesticides contaminated the soil. Using the CSP Guidance Manual can help identify potential environmental exposures.

Regulatory and policy considerations

Licensing regulations for home-based child care vary by state or territory; some local jurisdictions also have child care licensing regulations. Some states do not license home or family-based child care.[5] In 2017, 10 states required home-based providers to be licensed if there was even one child in their care who was not related; however, for many states the threshold for licensing is 3 or 4 children being cared for who are unrelated. The regulations for home-based child care often differ from center-based care.

Understanding differences in local, state, and territory policies and regulations can help to ensure that disaster recovery efforts will be effective. Because child care licensing regulations are so varied and complex, always include ECE licensing professionals in any recovery efforts that involve ECE programs.

Disaster Recovery Considerations

Drinking water—private well or cistern: Home-based child care programs that are served by wells or cisterns may need additional water testing to ensure that drinking water is safe. Private water supplies for residential homes are often not required by state or local regulations to have any routine testing. However, there may be child care licensing regulations which require water testing if child care is based out of a residential home. In some places, the determination of safe drinking water may fall to local authorities. The following excerpt is from a 2015 paper by the Environmental Law Institute, Drinking Water Quality in Child Care Facilities—A Review of State Policy:

> Child care regulations in most states address drinking water quality in some way, though these provisions vary widely in terms of their substantive requirements and the types of facilities and water systems they cover. Drinking water standards in child care laws and regulations may reference or reiterate existing state (or local) drinking water standards, expand the reach of those drinking water standards to cover additional facilities (e.g., smaller facilities using their own wells or other private water systems), or establish drinking water standards of their own. In addition,…state child care regulations may incorporate drinking water standards through requirements for water quality testing.[6]

The many variations in regulations require a critical understanding of state and local water quality rules and regulations. After a disaster, it's important to determine if circumstances require testing, even if water testing isn't required. Appendix A contains additional information on wells and cisterns.

Hours of operation: Families who choose home-based child care may have different needs than families who choose larger center-based care. Home-based child care might offer more flexible hours for care for parents who work nights or weekends. Home-based child care may also be able to take children who may be hard to place in center-based care because of special medical needs. Therefore, the needs of home-based child care programs may differ from center-based care, and outreach in disaster recovery should be targeted to reflect those needs.

Location: Disasters can spread contaminants. Many home-based ECE programs are in residential rather than commercial or industrial areas. While residential neighborhoods may be less likely than other places to have site-related contamination under normal circumstances, a disaster can create changes to normal conditions. Operations using heavy equipment may also occur in residential areas as communities recover, which may expose children to environmental contaminants not present before a disaster.

Damage and Reopening: Although disasters can damage any type of structure, homes that are licensed for child care may need some additional guidance or assistance with determining how best to mitigate the damage during recovery. HUD has created eight principles of healthy housing which may be helpful for home-based child care:

1. Be safe. Protect yourself and others from injury as quickly as possible.
2. Get it dry. Dry out or remove wet materials as quickly as possible.
3. Get it clean. Remove debris, silt, and grime with safe and effective cleaning methods.
4. Get it pest free. Exclude pests, using little or no toxic pesticides.
5. Get it contaminant free. Correctly remove and control the spread of indoor pollutants.
6. Keep it properly ventilated. Exhaust bad air bring in good air, control humidity.
7. Make it easy to maintain. Restore for a more durable, easy-care home.
8. Make it comfortable. Control your indoor climate.

Find steps and tips on these HUD principles in the Rebuild Healthy Homes document, available at https://www.hud.gov/sites/documents/REBUILD_HEALTHY_HOME.PDF. Other HUD resources are available in Appendix A.

Smaller home-based programs and larger center-based programs may not have access to the same resources. Home-based programs may face additional challenges as they try to navigate the process of rebuilding/renovating while also maintaining the ability to care for children in their home.

During disaster recovery, home-based child care programs may be able to re-open sooner than larger center-based child care programs. Some home-based programs may have remained open or closed only very briefly during a disaster.

Staffing: Home-based child care programs often have only a few staff caring for children (some have just one provider), which may limit their ability to seek training or other information about how best to operate during disaster recovery. For many home-based providers, damage from a disaster affects their child care business and their home, which may lead to providers feeling overwhelmed as they work through the recovery efforts. When providing guidance or interacting with these providers, remember that any assessments, guidance, or educational materials must be sensitive to their sense of wellbeing.

Families served: Families who use home-based providers may have some additional challenges such as working nights or weekends and having children with special medical needs or whose first language is not English. Consideration of these challenges will help with planning any outreach or activities which involve home-based programs.

Table 3. Some general differences between licensing regulations for home-based and center-based care

LICENSING REGULATIONS	HOME-BASED	CENTER-BASED
Number of children allowed	Maximum is often limited to 6–10 children.	Maximum often based on size of facility (square footage needed per child) and staffing. Very large centers can have hundreds of children at the center.
Inspections	Often upon licensing and then at some regular interval.	Usually upon licensing and often at least yearly to maintain license.
Children to provider ratios	Often children are mixed-aged, which allows for more children per provider. Some allow for 10 children to 1 provider based on the age of the children and if the provider has their own children in the home.	Often age-based, with the child to provider ratio increasing as children get older. The ratio of infants to providers is often 3 to 1, while preschool age children can be up to 10 children per 1 provider.
Number of providers at program	Often just one provider who is the owner/operator.	Frequently many providers at the program employed by the owner/operator. Some programs have multiple locations owned by a single entity with program directors and providers at each location.
Hours of operation	Hours may be more flexible.	Often Monday–Friday business hours, about 6am to 6pm.

License-exempt Early Care and Education

Description and Population Served

In many states or territories, legal child care can be provided by license-exempt providers. These providers do not need to obtain a license based on child care licensing regulations within their state or territory. Several states have a process for license-exempt providers to be registered or certified with the state or territory. States may provide exemptions to:

- Individual providers who care only for their own family members;
- Individual providers who care for less than 3 children;
- School programs operated by a local education authority;
- Programs run as a parental co-op;
- Summer day camps;
- Programs that are operated by a religious organization;
- Programs that are operated by the Department of Defense;
- Parents are onsite (such as a drop-in program in a gym or shopping mall);
- Temporary child care or respite care set up post-disaster to assist response workers or affected community members.

Children in license-exempt ECE facilities can be a wide range of ages, depending on the program. For example, a provider caring only for related family members might take in newborns to teens, while a church preschool program may care for children ages 3 through 5.

Regulatory and Policy Considerations

Because each state or territory deals with license exemption differently, determining the number of children allowed in these settings can be difficult. Some states and territories have few or no exemptions, while others allow for more. If only licensed programs are included in recovery planning and operations, many programs may be missed for outreach or assessments.

Disaster Recovery Considerations

Nomenclature: "License-exempt" is not the same as "illegal" or "unlicensed" child care. The terms "illegal" and "unlicensed" are commonly used to refer to a child care provider or program that should be licensed but has not obtained the proper licensing to be in operation. Operating without a required license can lead to fines or even criminal charges.

Population served: Some studies have found that parents with special needs children may be more likely to use relative or small family-based providers. These care providers may often be license-exempt. Parents choose these providers because of the challenge of finding child care for children with special medical needs in larger home-based or center-based ECE programs. In *Caring for Our Children Basics* by the Administration for Children and Families, children with special health care needs are defined as "those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally."[7] Some of these children may be more vulnerable to environmental exposures based on their medical or developmental challenges. For example, a child with chronic lung problems may be more sensitive to contaminants in the air. Planning for those needs during disaster recovery is important to keep in mind.

Other studies have shown that relative care or smaller often license-exempt providers may be a more attractive child care option to families who are low-income or who are non-native English speakers. Translate information for providers and families if needed.

New child care needs: After a disaster, temporary child care may be co-located with temporary housing or at work sites to allow community members to return to work. This temporary child care may be license-exempt. Understanding where temporary child care may be located can help ensure that children are in places where potential environmental exposures have been considered.[8]

Location: License-exempt programs could be located where past or adjacent business use makes the chance of environmental contamination more likely. For example, a local educational authority might use

an older building in the community to start a pre-K program in town. Or a religious organization may rent space in a strip mall to provide a child care or preschool program for their members. When a space is being considered as a place where children may spend many hours a week, the CSP Guidance Manual and this Supplement can help ensure the site has been assessed for environmental contaminants that could harm children's health.

When license-exempt ECE programs are operated out of a home, the same disaster recovery considerations for home-based care in the previous section would also likely apply.

Outreach: Depending on how the state or territory keeps track of license-exempt ECE providers, it might be difficult during recovery to know how many are in operation, how many have moved, and how many are still closed. This can make it difficult to get information to these providers and to take steps to determine if the ECE program is in a space with potentially harmful environmental exposures. In states where license-exempt ECE providers are required to register with the state, it may be easier to locate and provide outreach to these providers.

Many states allow license-exempt providers to be paid by the Administration for Children and Families' Child Care Development Fund (CCDF). Although license-exempt providers may not need to meet all the requirements stipulated in the Child Care and Development Block Grant Act of 2014 (CCDBG Act of 2014), they must meet health and safety requirements in 10 topic safety areas if a provider is participating in the Child Care Development Fund subsidy program. This requirement may help provide a way to target outreach to license exempt providers.[9]

Out-of-Home Care for Children/Residential Homes/Group Homes

Description and population served

Out-of-home care in residential or group homes often serves as an alternative to foster care in a family home. Many group homes have between 4–12 children, while other out-of-home care programs may have more children.[10] Children living in group homes are often between the ages of about 6 years old and 18 years old. Most of these programs are licensed by the state or territory. The funding for running group homes can come from different sources.[11] More information on out-of-home care is available at https://www.childwelfare.gov/topics/outofhome/group-residential-care/.

Regulatory and policy considerations

The licensing regulations for out-of-home care vary across states and territories. Frequently, licensing is conducted out of the same offices that provide child care licensing, but the regulations are separate and may include different requirements related to environmental health. Because out-of-home care and group homes are licensed, mechanisms exist to help locate these programs and conduct outreach or inspections.

If these programs are in non-residential areas, there should be increased assessment of the site to be sure that past site use or adjacent site use is compatible with having children on the site. Commercial or business areas often have a greater chance of past or current environmental contaminants than areas which are zoned residential.

Disaster Recovery Considerations

Population served: Although children in out-of-home care are generally older than children who attend ECE programs, these children can still be at risk for harmful environmental exposures. Older children may not exhibit some behaviors of younger children that increase their risk to environmental contaminants, such as mouthing objects, but other behaviors of older children may increase their risks in other ways. For example, abandoned structures or damaged sites might be an attractive place for teenagers to spend time. Some out-of-home care may also provide housing for young mothers and their children, creating a mix of children of different ages including infants and toddlers. Many children who live in out-of-home programs have already experienced extreme stress or disruption in their family lives. These children may require additional care or support and may display behaviors that are not typical for other children their age. Careful consideration of the specific needs of children living in out-of-home programs can help protect them from harmful environmental exposures. This information would need to be gathered from managers or staff who are familiar with the needs of these children.

Time spent at location: The location of an out-of-home care program is important because children are living at these program sites. Their exposure to any environmental contaminants may be greater than if they were only spending part of their day at the program site. For example, if a site has indoor air contamination by vapor intrusion from past use of the site, a child may receive a much larger daily dose of the contaminant if they are living on the site.

Location: Many out-of-home care programs are in residential areas. While residential neighborhoods may be less likely than commercial or industrial areas to have site-related contamination under normal circumstances, a disaster can create changes to normal conditions. Operations, such as use of heavy equipment, may also occur in residential areas as communities recover, which may expose children to environmental contaminants not present before a disaster.

Relocation: In a disaster, children living in out-of-home care and group homes may have been evacuated or forced to relocate. Assessing a new site or re-assessing a former site before children return can help ensure that the site is not likely to expose children to environmental contamination. Disasters can lead to circumstances that increase the need for placement of children and others in these facilities. Facilities may need to reopen quickly or expand during the recovery period.

Children's Recreational Spaces

Description and population served

Children often spend time in a variety of facilities for recreation, such as karate, dance, gymnastics, art classes, and many other types of enrichment activities. These facilities are often in buildings once used for a different purpose. For example, gyms are sometimes in larger re-purposed industrial type buildings where there is ample open space for exercise equipment. Activities which require less space, such as karate or music studios, may be in places such as strip malls or other older buildings. Some children, depending on their level of involvement with a sport or other activity, may spend many hours a week at one of these sites.

Regulatory and Policy Consideration

Many spaces where children spend time are not licensed in the same way that an ECE program is licensed. Often, these places are considered businesses and only need to meet the requirements for any local business, such as meeting fire codes, obtaining business permits, and complying with zoning rules. If food is served onsite, a food inspection is also necessary. If there is a pool, those facilities may also require inspections to be in operation. Often, food and pool inspections fall to local health departments. Depending on the state or territory, if a camp is being operated, the camp portion of the business may need inspections and/or licensing. For example, if a local gymnastics program would like to run a summer day camp for children, they may need to meet requirements for the summer camp that were not necessary when they were providing only gymnastics classes. Find more information on camps in Part 2: Additional Places Where Children Spend Time.

Disaster Recovery Considerations

Exposure and Exercise: Recreational spaces are often places where children exercise and increase their breathing rate. Their inhalation exposure to some contaminants may be greater while exercising than if they were not exercising. For example, ATSDR was once involved in a site for an indoor batting cage where children aged 5 to 18 practiced for up to 10 hours a week in colder weather. The building was an old mill where the soil beneath the building was contaminated with TCE and PCE (trichloroethylene and tetrachloroethylene). Indoor air sampling revealed that TCE and PCE were at a level of health concern for children and pregnant women who spent more than 10 hours a week at the facility. Using the four key elements of the CSP Guidance Manual to assess the site may have prevented this business from being in operation in a facility with indoor air concerns.

Building materials: If spaces are being repaired or renovated during disaster recovery, consider how these activities could create additional environmental exposures. For example, ATSDR has assessed indoor air quality in gyms due to concerns about mercury in gym flooring. From the 1960s through the 1990s, some gym flooring was made with a liquid polyurethane product that created a rubber-like floor. This flooring material may contain mercury. Exposure to mercury at a level of health concern is possible under certain conditions inside the gym such as when the flooring is disturbed. Consider the fact that cleaning, resurfacing, or removing the flooring, which could be done as part of recovery activities, may create additional exposures. This example illustrates that some consideration is needed before renovation to determine if disrupting building materials can lead to harmful exposures to children or others using the space. Find more information on debris and building materials in Appendix A.

Outside spaces: Outdoor recreational spaces such as ball parks, soccer fields, and playgrounds can also be affected by disasters. For example, floodwater can leave bacteria and/or chemicals onsite as the floodwater recedes. Contamination is more severe if sewer systems back up or overflow. Sometimes, attempts to clean up after a flood can also create chemical hazards. For example, hydrated lime may be applied to playing fields or yards after a flood to help destroy bacteria. However, contact with lime could create other health problems such as skin irritation. Inhalation of products could be harmful as well. Use of any products to "clean, disinfect, or sanitize" after a flood event needs to be carefully considered. The Centers for Disease Control and Prevention (CDC) has created some guidance on outdoor cleanup after flooding, listed in Appendix A.

Naturally occurring contamination: Outdoor recreational spaces may also have naturally occurring contamination that should be considered.

For example, naturally occurring asbestos has been documented as a health concern in ball fields where activity-based personal air monitoring occurred. Activity-based sampling mimics activities on the fields, such as children or adults running and playing. Events during the disaster could create conditions where naturally occurring contaminants are more likely to cause exposures. For example, if flooding or drought destroys ground cover, soil is more likely to be disturbed by children playing and could expose children to contaminants in a way they were not exposed before a disaster. During disaster recovery, considering how conditions have changed can help protect children from potential environmental exposures.

Camps

Description and Population Served

Camps can include day camps where children attend for a portion of the day or sleep-away camps where children stay for days to weeks. Though children attending these programs tend to be school age, some day camps do accept children as young as three or four years old. Some camps are small and operate out of facilities such as churches or schools, while others are quite large and may have acres of land.

Regulatory and Policy Considerations

The oversight of camps varies across the states and territories. In some states, the health departments oversee camps, while in others oversight may fall on local authorities. Some states also recognize the American Camp Association (ACA) standards, which includes standards on a variety of topics. ACA also accredits camps, and in 2016 over 2,000 camps were accredited. See the list of the camp regulations by state at https://www.acacamps.org/resource-library/state-laws-regulations.

Although camps are not often considered critical infrastructure, having camps open and operational for children can help communities return to a sense of normalcy after a disaster.

Disaster Recovery Considerations

Applicability of Choose Safe Places: The CSP Guidance Manual was created primarily to help address environmental exposures in ECE centers. The four key elements of safe siting in the CSP Guidance Manual may be adapted for camps that are operated out of facilities like gyms or municipal buildings.

The four key elements of the CSP Guidance Manual can still be applied to camps that operate in larger outdoor settings, but they may need to be adapted slightly. For example, in a large outdoor camp, "past use" may focus on buildings or facilities frequently used by campers rather than the whole site. The site may be mostly forest or undisturbed natural land, but the facilities on the site may have had several iterations of use. Rural, outdoor settings are not safe from environmental contamination, which may occur naturally or migrate from a nearby site. ATSDR worked on a site where a popular summer camp was found to have asbestos at actionable levels from a nearby asbestos mine that had shut down more than a decade before.

Outreach: Because the regulation and types of camps varies greatly, it may be difficult to collect information on where and how many camps are in an area. This may create challenges when trying to work with camps to address environmental hazards. Similarly, camps may only operate for a portion of the year, creating challenges for conducting site visits or working with camp staff who may not always be available. Developing contact lists and camp locations during disaster recovery planning may help.

Water activities: Camps that include swimming or other water activities need to consider bacterial or chemical contamination after a disaster. Inspections of swimming facilities may by required by state or local health departments during routine operations and may be necessary after a disaster as well. The CDC has information on healthy swimming at https://www.cdc.gov/healthywater/swimming/. The Model Aquatic Health Code is a science-based guidance document that can help local and state authorities make swimming and other water activities safer. Find the Model Aquatic Health Code and related documents at https://www.cdc.gov/mahc/index.html.

Location: The location of a camp may change how disasters affect it. For example, camps in an urban setting may sustain more flood damage during a major rain event than camps located in a more rural setting. In urban areas, major rain events may flood parts of the city because the water has fewer natural ways to dissipate. More rural camps may be affected more heavily by disasters such as wildfires.

For day camps located at a facility where children engage in other activities, such as a gymnastics camp, information in the section on Children's Recreational Spaces may also apply.

Part 3:
Additional Environmental Health Issues

Disasters can create environmental exposures that were not addressed in the original Choose Safe Places Guidance Manual. This Supplement contains additional information about environmental exposures that can happen as the result of a disaster. This section can be used as a starting point and supplemented as necessary with knowledge of local conditions.

When applicable, standards from the Administration for Children and Families' best practice document *Caring for Our Children Basics,* and the Food and Drug Administration's Food Code are presented.[12,13] Many states, territories, and local jurisdictions consult both resources to develop and implement their child care requirements.

Additionally, standards from Eco-Healthy Child Care® and the National Resource Center for Health and Safety in Child Care and Early Education (NRC) may be helpful. Eco-Healthy Child Care® worked with the NRC to create an Environmental Health Standards collection in 2014. The collection, entitled *Caring for Our Children: Environmental Health in Early Care and Education,* includes 123 nationally recognized health and safety standards that have the greatest impact on environmental health in early care and education settings. Many of the standards align with the best practices developed by the Eco-Healthy Child Care.® The NRC Environmental Health Standards and Eco-Healthy Child Care® links are available in Appendix A.

This Supplement contains additional information about environmental exposures from:

- Floodwater
- Cisterns and Wells
- Carbon Monoxide
- Indoor Air Quality and Ventilation
- Physical Hazards
- Disaster Debris
- Water Advisories
- Mold
- Noise
- Cleaning and Disinfection Products
- Onsite Waste Water Systems
- Pesticides
- Particulate Matter

Floodwater

Floodwater and standing water pose various risks, including infectious diseases, chemical hazards, injuries, and drownings. When wastewater treatment plants, residential septic systems, municipal sanitary sewer systems, and agricultural operations are flooded, microbial exposure is a concern. Glass or metal fragments in floodwater may cause injury and lead to infection.

Floodwater may also move hazardous household or industrial chemicals from their storage places. The types and amounts of chemicals released depends on the type of facilities in the area, type of chemicals produced or kept at affected facilities and homes, structural damage to facilities and homes, weather conditions, and the extent of flooding.

Flooded areas are often attractive places for children to play, but children should not contact floodwater or its deposited sediments. Children can be exposed through direct contact with their skin, by breathing in dust particles or fumes, or by putting their hands in their mouths.[14] Determining when to allow use of previously flooded areas requires analyzing and considering many variables, including whether contaminants were present in the water.[15] Appendix A and the information on floodwater below show areas where children play outside, guidance on potential hazards, and cleaning those areas after a flood.

For indoor spaces, drying and ventilating flooded areas is often the first step in cleanup, and is best done as soon as possible after the flood. Guidance exists from the Centers for Disease Control and Prevention and other organizations on what types of materials may be salvaged and which types are best discarded after floods. In general, hard non-porous surfaces (tile, hard plastics, etc.) are easier to clean and keep than soft, porous materials (fabric, pressboard, paper).

Professionals may perform the clean-up after a flood; however, more often homeowners, ECE facility owners, operators, and staff do the work. Cleanup activities can expose people to mold, dust, microorganisms, and chemicals. All participants cleaning up after a flood must understand potential risks and follow protective measures, including the proper wear of personal protective equipment (PPE). Some readily available respiratory protection, such as N95 respirators, are not designed for children to use. Guidance from the Pediatric Environmental Health Specialty Units (PEHSU) recommends pregnant

women and children, including adolescents, not participate in clean-up projects.[14]

In many cases, household cleaning products are used to clean up. Following manufacturer's instructions and using adequate ventilation will reduce exposure to harmful chemicals in cleaning products. Fans may also be used to help dry out the facility and increase ventilation. The section on Mold and on Cleaning Products provides more information.

Clothing and shoes can track contamination from one area to another during cleanup. Children may be exposed to harmful substances after adults track contamination home, into cars, into ECE facilities, or other places. Any clothing, PPE, shoes, and tools used during cleanup need to be handled carefully to help prevent the transport of contamination.

Actionable Items for Local Officials

- Collect information on ECE facilities and other places children spend time that are in the flood zone, as they could be adversely affected and may require later inspection.
- Determine what action is necessary for ECE facilities and other places children spend time to safely continue or begin operations after a flood.
- Disseminate information on how to safely clean up indoor and outdoor areas and how to handle debris after a flood.
- Disseminate information on how those involved in cleanup activities can prevent tracking contamination into homes or other places where children spend time.
- Communicate to the public the need to carefully consider the credentials of those who are hired to do cleanup or repair work.
- Disseminate information on swimming pool/spa clean up and recreational water safety, including beach closures due to contamination.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  5.1.1.5 Environmental Audit of Site Location

  An environmental audit should be conducted before construction of a new building; renovation or occupation of an older building; or after a natural disaster to properly evaluate and, where necessary, remediate or avoid sites where children's health could be compromised. A written report that includes any remedial action taken should be kept on file. The audit should include assessments of

  a. potential air, soil, and water contamination on program sites and outdoor play spaces;
  b. potential toxic or hazardous materials in building construction, such as lead and asbestos; and
  c. potential safety hazards in the community surrounding the site.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

Resources

- CDC, *Guidance on Microbial Contamination in Previously Flooded Outdoor Areas*
  https://www.cdc.gov/nceh/ehs/publications/guidance_flooding.htm
- State of Rhode Island Department of Public Health, Flooding: *About Cleaning up Yards and Public Spaces*
  http://www.health.ri.gov/emergency/flooding/about/outdoorcleaning/
- CDC, *Household Cleaning & Sanitizing*
  https://www.cdc.gov/healthywater/emergency/cleaning-sanitizing/household-cleaning-sanitizing.html
- CDC, *Protect Yourself from Chemicals Released During a Natural Disaster*
  https://www.cdc.gov/disasters/chemicals.html
- FEMA, *Initial Building Restoration for Flooded Buildings*
  https://www.fema.gov/media-library-data/20130726-1604-20490-7953/fema549_apndx_e_ra2.pdf
- Pediatric Environmental Health Specialty Units (PEHSU), *Children's Health in the Aftermath of Floods*
  https://www.pehsu.net/Hurricane_and_Flooding_Resources.html#Items
- PEHSU, *Clinical Recommendations Regarding Return of Children to Areas after Floods or Hurricanes*
  https://www.pehsu.net/_Library/facts/flood_hurricane_2011.pdf
- State of Massachusetts, *Flooding and Sewage Back-ups*
  https://www.mass.gov/guides/flooding-and-sewage-back-ups-home-care-guide
- Environmental Protection Agency (EPA), *Naturally Occurring Asbestos*
  https://archive.epa.gov/region9/toxic/web/html/hazard6.html
- National Weather Service (NWS), *Interactive Flood Information Map*
  https://www.weather.gov/safety/flood-map
- NWS, *National Weather Service Weather Safety Tips*
  https://www.weather.gov/safety/
- Food and Drug Administration (FDA), *Masks and N95 Respirators*
  https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/masks-and-n95-respirators
- CDC, *Model Aquatic Health Code: An All-inclusive Model Public Swimming Pool and Spa Code*
  https://www.cdc.gov/mahc/index.html
- HUD, *Rehabbing Flooded Houses*
  https://www.huduser.gov/portal/Publications/pdf/Rehab_FloodedHouses.pdf

Cisterns and Wells

One of the key elements of safe siting is access to safe drinking water. The section on access to safe drinking water in the Choose Safe Places Guidance Manual focuses on smaller drinking water systems like private wells. The use of cisterns as a drinking water system was not covered in depth. In the continental United States, cisterns are less frequently used than public water or private wells for supplying drinking water. However, cisterns are very common in some portions of the United States.[16] Some water supply systems use surfaces such as rooftops to capture and channel water to a cistern.

Cisterns can become contaminated after a disaster. Even when these systems are constructed and used properly, they can be contaminated with microorganisms that can cause sickness if they are inundated with flood or rain water. Sometimes visual debris is visible in a cistern; other times the cistern may be contaminated in a way that is hard to see.

Resources are available for how to clean or disinfect a cistern. Though cleaning will remove bacterial contamination, it may not remove chemical contamination. Cleaning and disinfection must be done properly to avoid introducing or adding to chemical contamination of the water. Carefully follow cleaning and disinfection processes to ensure the water is safe after the cistern has been cleaned. If chemical contamination of a cistern is suspected, local, state, or territory health and environmental officials need to assess the situation to determine the appropriate testing and next steps.

Wells can become contaminated with microorganisms and chemicals if the well is inundated with floodwater or if there is a change to the groundwater that supplies the wells. Consider testing wells after a disaster. Like cisterns, care must be taken to properly disinfect wells after an inundation event to avoid chemical contamination. An example of chemical contamination after a flooding event is increased nitrate levels in well water, particularly in areas with shallow wells.[17]

After an earthquake, newly formed cracks in bedrock could allow contaminants to enter well water. Some areas of the country have high levels of naturally occurring groundwater contaminants like arsenic or uranium. Changes in hydrogeology could potentially create a situation where contamination increases. Flooding events or droughts can cause changes in groundwater conditions, and plume migration could contaminate a well that was previously safe.

Assume that cisterns and wells may be contaminated after a disaster and that the water needs to be tested to ensure it's safe for children. Health and environmental professionals are key to determining what type of water testing is necessary to ensure safe drinking water. Although testing for bacteria (total coliforms and fecal coliforms) is most common, testing for chemical or radiological contamination should be considered depending on the type of disaster and known history of the area. Until testing confirms water is safe to drink, bottled water should be used for all drinking, cooking, and infant formula preparation. Provide information to affected communities about whether untested well or cistern water can be used for washing hands or dishes, cleaning objects that children may encounter (baby bottles, pacifiers, toys), brushing teeth, or cleaning surfaces such as tables.

Actionable Items for Local Officials

- Understand how local community members obtain their drinking water and what percent may be using wells or cisterns during disaster recovery.
- Broadcast information about how cistern or well water may be affected post disaster.
- Encourage use of bottled water until well or cistern testing indicates water is safe to use for drinking.
- Provide information on whether water from wells or cisterns can be used for things other than drinking such as washing hands or dishes, cleaning objects children come in contact with, and brushing teeth.
- Distribute educational materials on cistern/well disinfection (when necessary) and how to obtain water testing.
- Obtain information on operational status of state approved water quality laboratories to ensure they are open and able to accept water samples.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  4.2.0.6 Availability of Drinking Water

  Clean, sanitary drinking water should be readily accessible in indoor and outdoor areas, throughout the day. On hot days, infants receiving human milk in a bottle may be given additional human milk, and those receiving formula mixed with water may be given additional formula mixed with water. Infants should not be given water, especially in the first six months of life.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  4.9.0.1 Compliance with U.S. Food and Drug Administration (FDA) Food Code and State and Local Rules

  The program should conform to applicable portions of the FDA Food Code and all applicable state and local food service rules and regulations for centers and family child care homes regarding safe food protection and sanitation practices.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **Food Code—Food and Drug Administration 2017**

  Sections 5-101.11, 5-101.12, 5-101.13 and 5-104.12 on safe drinking water availability and testing.

  https://www.fda.gov/food/fda-food-code/food-code-2017

Resources

- CDC, *Well Testing*
  https://www.cdc.gov/healthywater/drinking/private/wells/testing.html
- CDC, *Cisterns and other Rain Catchment Systems* (with links to printable fact sheets)
  https://www.cdc.gov/healthywater/emergency/drinking/disinfection-cisterns.html
- CDC, *When Every Drop Counts: Protecting Public Health During Drought Conditions*
  https://www.cdc.gov/nceh/ehs/docs/when_every_drop_counts.pdf
- CDC, *Water, Sanitation, & Hygiene (WASH)-related Emergencies & Outbreaks*
  https://www.cdc.gov/healthywater/emergency/index.html
- CDC, *Drinking Water Advisory Communication Toolbox*
  https://www.cdc.gov/healthywater/emergency/dwa-comm-toolbox/index.html
- EPA, *Drinking Water Emergency Response*
  https://www.epa.gov/ground-water-and-drinking-water/drinking-water-emergency-response
- New Hampshire Department of Environmental Services, *Disinfecting Public Water Systems*
  https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm
- Environmental Law Institute, *Drinking Water Quality in Child Care Facilities: A Review of State Policy*
  https://www.eli.org/sites/default/files/eli-pubs/drinking-water-cc-final-posting-sept-4-2015.pdf

Water Advisories

Water advisories may be issued during or after a disaster to address microbial or chemical contamination. Contamination can be due to equipment failure, leaking/broken pipes, insufficient disinfectant in the water supply, surface water runoff, low water pressure, or other issues. Microbes could be in the water, including bacterial contamination like fecal coliforms and shigella, viruses like norovirus, and parasites like *Cryptosporidium.* Chemicals in water can also come from fuel spills, burn products from wild fires, and other disasters.[18]

Three types of water advisories may be issued. Information about each type is provided below. Always defer to local water authorities for specific water advisory instructions.

During a water advisory, explain if water should be used for activities such as washing hands or dishes, cleaning objects that children may encounter (toys or pacifiers), brushing teeth, or cleaning surfaces such as tables. Communicating information on how to safely prepare infant formula is also important.

Actionable Items for Local Officials

- Communicate specific and clear information on water consumption during any water advisory.
- Communicate clear instructions on how to boil water, if a "Boil Water" advisory is in effect.
- Provide information on if water can be used for things such as washing hands or dishes, cleaning other objects children come in contact with, and brushing teeth during either a "Do Not Use" or "Boil Water" advisory.

TYPE OF WATER ADVISORY	WHAT IT MEANS	CONSIDERATIONS
Do Not Use	Water should not be used. Any contact with eyes, skin, or lungs could be harmful. Use bottled water.	Water cannot be made safe by boiling. If water is contaminated with chemicals such as nitrates or cyanotoxins (from blue/green algae) boiling may actually increase the concentration of those chemicals in the water.
Do Not Drink	Water should not be used for drinking or cooking or brushing teeth. Use bottled water instead. Using water for bathing may also be restricted, especially for children who may swallow water.	
Boil Water	Boiled water should be used for any water consumption such as drinking, cooking or brushing teeth. Using water for other things such a bathing may be restricted for children who may swallow water.	Boiling water will make water safe for use. A rolling boil for one to three minutes will kill disease causing microorganisms.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  4.2.0.6 Availability of Drinking Water

  Clean, sanitary drinking water should be readily accessible in indoor and outdoor areas, throughout the day. On hot days, infants receiving human milk in a bottle may be given additional human milk, and those receiving formula mixed with water may be given additional formula mixed with water. Infants should not be given water, especially in the first six months of life.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  4.9.0.1 Compliance with U.S. Food and Drug Administration (FDA) Food Code and State and Local Rules

  The program should conform to applicable portions of the FDA Food Code and all applicable state and local food service rules and regulations for centers and family child care homes regarding safe food protection and sanitation practices.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **Food Code—Food and Drug Administration 2017**

  Sections 5-101.11, 5-101.12, 5-101.13 and 5-104.12 on water source and quality

  https://www.fda.gov/food/fda-food-code/food-code-2017

Resources

- CDC, *Making Water Safe in an Emergency*
  https://www.cdc.gov/healthywater/emergency/drinking/making-water-safe.html
- CDC, *Water Sanitation and Hygiene (WASH)-related Emergencies and Outbreaks*
  https://www.cdc.gov/healthywater/emergency/index.html
- FEMA, *Fact Sheet: How to Make Your Water Safe to Drink*
  https://www.fema.gov/news-release/2017/10/08/fact-sheet-how-make-your-water-safe-drink
- CDC, *Drinking Water Advisory Communication Toolbox*
  https://www.cdc.gov/healthywater/emergency/dwa-comm-toolbox/index.html

EXAMPLE OF BOIL WATER INFORMATION AND FACT SHEETS

- State of Massachusetts, *Drinking Water Boil Orders and Public-Health Orders*
  https://www.mass.gov/service-details/boil-water-order-faqs
- Rhode Island Department of Health, *Questions and Answers about* E. Coli *and Fecal Coliform Bacteria in the Water Supply and Boil Water Advisory*
  http://health.ri.gov/publications/instructions/HouseholdBoilWaterGuidance.pdf
- New Hampshire Department of Environmental Services, *Frequently Asked Questions about Boil Orders*
  https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-4-12.pdf

EXAMPLE OF BOIL WATER FACT SHEET FOR CHILD CARE

- Leeds, Grenville & Lanark District Health, *Guidelines for Child Care Centers During a Boil Water Advisory*
  http://healthunit.org/wp-content/uploads/Guidelines_for_Child_Care_Centres_During_a_Boil_Water_Advisory.pdf

EXAMPLE DO NOT DRINK—CYANOTOXINS

- EPA, *Drinking Water Advisory example*
  https://www.epa.gov/sites/production/files/2017-06/documents/003_drinking_water_advisory_everyone.pdf
- CDC, *One Health Harmful Algal Bloom System*
  https://www.cdc.gov/habs/ohhabs.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fhabs%2Fohhabs%2Findex.html
- Government Technology, *Polluted Water from Camp Fire*
  https://www.govtech.com/em/disaster/Rare-Toxic-Cocktail-From-Camp-Fire-is-Poisoning-Paradise-Calif--Water.html
- CDC, *When Every Drop Counts: Protecting Public Health During Drought Conditions*
  https://www.cdc.gov/nceh/ehs/docs/when_every_drop_counts.pdf
- Great Lakes Center for Children's Environmental Health, University of Illinois at Chicago School of Public Health, *Investigating Environmental Contamination: A Guide for Communities*
  https://great-lakes.uic.edu/wp-content/uploads/sites/480/2019/07/print_comm-resource-guide_62619-min.pdf

Onsite Wastewater Disposal

ECE facilities and other places children spend time may be serviced by onsite wastewater disposal systems, also known as septic systems, to treat and dispose of sanitary waste. A well-maintained and constructed system may withstand the stresses of heavy rains and flooding. However, during some disasters the ground can become saturated, preventing proper operation of the waste water systems. Septic tanks and pump chambers can fill with silt and debris.

Problems with wastewater disposal systems can lead to the contamination of ground or surface water. Many factors influence whether a malfunctioning system will contaminate drinking water wells or other water sources. If drinking water could be contaminated, use alternative water supplies until the drinking water source is safe.

Onsite wastewater system regulations are frequently part of state ECE licensing. It's important to understand any state or local regulations that dictate how these systems must be inspected or operated.

Actionable Items for Local Officials

- Understand types of water disposal systems that are used within your communities.
- Identify any overlap between disaster affected areas and sites with known, permitted onsite wastewater disposal systems to understand the potential scope of the problem.
- Distribute information to help recognize signs an onsite wastewater disposal or septic system is not working properly and steps to take.
- Distribute information on how wastewater disposal systems can contaminate water sources including nearby wells or cisterns.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  4.9.0.1 Compliance with U.S. Food and Drug Administration (FDA) Food Code and State and Local Rules

  The program should conform to applicable portions of the FDA Food Code and all applicable state and local food service rules and regulations for centers and family child care homes regarding safe food protection and sanitation practices.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **Food Code—Food and Drug Administration 2017**

  Subparts 5-403.11 Approved Sewage Disposal System

Resources

- CDC, *Guidance for Reducing Health Risks to Workers Handling Human Waste or Sewage*
  https://www.cdc.gov/healthywater/emergency/sanitation-wastewater/workers_handlingwaste.html
- CDC, *Water, Sanitation, & Hygiene (WASH)-related Emergencies & Outbreaks*
  https://www.cdc.gov/healthywater/emergency/index.html
- EPA, *Septic Systems—What to Do After the Flood*
  https://www.epa.gov/ground-water-and-drinking-water/septic-systems-what-do-after-flood
- EPA, *Managing Septic Systems to Prevent Contamination of Drinking Water*
  http://www.nesc.wvu.edu/pdf/ww/septic/epa_septicwater_protection.pdf
- Florida Department of Health, *Environmental Health Preparedness Guide for Onsite Sewage Treatment Systems*
  http://www.floridahealth.gov/environmental-health/eh-preparedness/_documents/ostdspreparednesstoolkit.pdf
- EPA, *How Your Septic System Can Impact Nearby Water Sources*
  https://www.epa.gov/septic/how-your-septic-system-can-impact-nearby-water-sources

Air Pollution and Particulate Matter

Particulate matter (PM) is indoor or outdoor air pollution made up of tiny pieces of dust, dirt, smoke, or drops of liquid. Sometimes PM can be seen in the air; sometimes it's invisible. PM is often created during combustion, such as from wood fires or fuel from running engines.

The size of PM determines how far into the body it can travel; PM is often categorized and measured by size. The two most common PM measurements are PM10 (particulate matter <10 micrometers) and PM2.5 (particulate matter <2.5 micrometers). Both PM10 and PM2.5 can travel deep into lungs and cause health effects. Particle pollution can affect anyone, but some are more susceptible than others. People most likely to experience health effects caused by particle pollution are people with asthma and other respiratory conditions, older adults, babies, and children.

When PM levels increase outdoors, indoor concentrations of PM also increase. This is particularly true for leaky buildings, those without air filtration systems, or those that use only low-efficiency filtration (see also section on Indoor Air Quality and Ventilation). Closing doors and windows can reduce the amount of PM that comes indoors. However, indoor air temperatures must remain cool. Use fans or air conditioning and avoid activities that create more fine indoor air particles, such as burning wood.

Disasters can create an increase in PM. For example, an extreme drought can cause very dry, dusty conditions that extend over many square miles and that last for many months. Forest fires and volcanic activity can also elevate PM over a large area. Generators powering buildings may decrease air quality locally for short periods of time while the generator is needed. In some situations, air quality will vary throughout the day. Open windows during periods of improved air quality to remove some of the PM that has built up indoors.

Air Now provides information on air quality: https://www.airnow.gov/. It displays the Air Quality Index in

an easy-to-use and easy-to-understand web-based format. The data in Air Now show current air quality and predicted air quality over the next day. Although Air Now information can be very helpful when air conditions are unhealthy over a larger (city or state) area, it's not very useful for predicting smaller, very localized air quality issues that can occur during disaster recovery.

During disaster recovery, many smaller activities could affect the PM in local air quality:

- portable generators;
- diesel machinery (back hoes, cranes, etc.) for cleanup operations;
- additional trucks for recovery operations such as debris removal, electrical line work, etc.;
- smaller single stroke engine tools (weed whackers, blowers, lawn mowers, pressure washers, etc.);
- changes to traffic patterns;
- idling trucks, buses, or cars;
- refrigeration units;
- burning of debris;
- wood burning stoves/outdoor boilers.

Localized elevated PM generated by these activities can create problems for ECE programs and other places children spend time. For example, a large generator supplying electricity for a building that contains a child care center may need to run for months and could create increased PM near the building. If cleanup work is also happening near the building with heavy equipment, it could create localized conditions of poor air quality and PM high enough to be a concern for young children.

During disaster recovery, consider how the air quality in and around places children spend time can be affected by increased PM. When considering a space for children, determine if there are nearby sources of PM. The following techniques can reduce exposure:

- decreasing time children spend outdoors when air quality is a concern;
- using high-efficiency filtration on portable indoor air cleaners to keep inside air safer;
- creating a "clean room," (a room where air pollutants are kept out or decreased);
- keeping windows and vents closed when in vehicles and if possible running air conditioning on "recirculate;"
- locating generators away from where children spend time outside or play;
- raising vent stacks away from windows, doors and outdoor air intakes to help keep PM from lingering closer to children's breathing levels;
- conducting cleanup activities when children are not present;
- preventing idling of trucks, buses, and cars;
- discouraging burning of debris or other materials.

Appendix A lists additional information on mitigation strategies.

Because knowledge of local conditions and site-specific information is essential to implementing mitigation strategies, this Supplement can only encourage local professionals to start considering these issues. Consulting with environmental health professionals who can assess site-specific conditions and provide recommendations can be helpful to best protect children from environmental exposures.

Actionable Items for Local Officials

- Utilize federal resources (such as Air Now) to track air quality and communicate high risk/priority areas.
- Communicate information on activities that can create smaller, localized air quality problems, and ways to mitigate exposures.
- If necessary, consider conducting air testing to determine PM in a localized area of concern.
- Communicate strategies to mitigate or reduce exposures to PM to help protect children (such as limiting time outdoors).
- Communicate information on how adult respirators are not made for and will not protect children.

Resources

- Air Now, *to check local air quality*
  https://www.airnow.gov/
- CDC, *Particle Pollution*
  https://www.cdc.gov/air/particulate_matter.html
- California Air Resources Board, *Overview: Diesel Exhaust & Health*
  https://www.arb.ca.gov/research/diesel/diesel-health.htm
- World Health Organization, *Air Pollution (including guideline values)*
  http://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health
- EPA and CDC, *Air Quality and Outdoor Activity Guidance for Schools*
  https://www3.epa.gov/airnow/flag/school-chart-2014.pdf
- CDC, *Air Quality and Emergencies*
  https://www.cdc.gov/air/air_events.htm
- Environmental Research, *Volatile Organic Compounds and Particulate Matter in Child Care Facilities in the District of Columbia: Results from a pilot study*
  https://www.sciencedirect.com/science/article/pii/S0013935115301687
- NWS, *Volcanic Ash and Ashfall*
  https://www.weather.gov/safety/airquality-volcanic-ash
- Wisconsin Department of Health Services, *Trash and Wood Burning*
  https://www.dhs.wisconsin.gov/air/burning.htm
- Great Lakes Center for Children's Environmental Health, University of Illinois at Chicago School of Public Health, *Investigating Environmental Contamination: A Guide for Communities*
  https://great-lakes.uic.edu/wp-content/uploads/sites/480/2019/07/print_comm-resource-guide_62619-min.pdf

MITIGATION STRATEGIES

- EPA, *Indoor Particulate Matter*
  https://www.epa.gov/indoor-air-quality-iaq/indoor-particulate-matter
- EPA, *Air Cleaners and Air Filters in the Home*
  https://www.epa.gov/indoor-air-quality-iaq/air-cleaners-and-air-filters-home-0
- California Environmental Protection Agency, *Reducing Your Exposure to Particle Pollution*
  https://www.arb.ca.gov/research/indoor/pmfactsheet.pdf
- Air Now, *Extremely High Levels of PM2.5: Steps to Reduce Your Exposure*
  https://www.airnow.gov/aqi/aqi-basics/extremely-high-levels-of-pm25/
- U.S. Geological Survey (USGS), *Volcanic Ash Impacts and Mitigation*
  https://volcanoes.usgs.gov/volcanic_ash/

WILDFIRES

- CDC, *Protecting Yourself from Wildfire Smoke*
  https://www.cdc.gov/features/wildfires/
- EPA, *Wildfire Smoke: A Guide for Public Health Officials revised 2019*
  https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf
- EPA and PEHSU, *Protecting Children from Wild Fire Smoke and Ash*
  https://www3.epa.gov/airnow/smoke_fires/protecting-children-from-wildfire-smoke-and-ash.pdf
- EPA, *Wildfire and Indoor Air Quality*
  https://www.epa.gov/indoor-air-quality-iaq/wildfires-and-indoor-air-quality-iaq

- Washington State Department of Health, *Smoke from Fires Toolkit*
  https://www.doh.wa.gov/CommunityandEnvironment/AirQuality/SmokeFromFires/SmokefromFiresToolkits
- EPA, *Create a Clean Room to Protect Indoor Air Quality During a Wildfire*
  https://www.epa.gov/indoor-air-quality-iaq/create-clean-room-protect-indoor-air-quality-during-wildfire

DROUGHT

- CDC, *Drought and Health*
  https://www.cdc.gov/nceh/drought/default.htm

The term *carbon monoxide detector* and *carbon monoxide alarm* are both frequently used by the public. For this document, the term *carbon monoxide detector* is used, but additional resources may use the term *carbon monoxide alarm.*

Carbon Monoxide

Carbon monoxide (CO) is an odorless, colorless gas. When power outages occur during emergencies, the use of alternative sources of fuel or electricity for heating or cooking can cause CO to build up indoors and poison people. Generators, grills, camp stoves, power equipment, or other gasoline, propane, natural gas, or charcoal-burning devices should never be used indoors or even outside near a window, door, or window air conditioner. Place portable generators outdoors as far from buildings as possible. Exposure to CO can cause loss of consciousness and death. The most common symptoms of CO poisoning are headache, dizziness, weakness, nausea, vomiting, chest pain, pale skin, and confusion.

Because of their higher metabolic rates, infants and children have increased susceptibility of CO toxicity.[19] Children often become symptomatic earlier than adults because of their lower blood volume and faster breathing rate. Unfortunately, after nearly every major disaster, there are reports of CO poisonings and deaths. These events are preventable.

Many states have licensing regulations requiring CO detectors in certain ECE settings. *Caring for Our Children Basics* also states that ECE programs should meet state and local laws for CO detectors. In some states, the regulations for CO alarms only applies to home- or center-based child care. According to the Environmental Law Institute:

> At least 40 percent of all states have requirements related to CO alarms in their child care licensing laws and regulations. Around the same number of states have separate laws or regulations (e.g., statewide fire codes) implemented by other states agencies, which apply CO alarm requirements to child care facilities or to buildings in which child care facilities may be located. There is some overlap in these two categories several states include CO alarm requirements in their child care regulations and in other areas of state law and regulation. These policies may apply to center based child care, to home based child care, or to both types of facilities.[20]

It's important to understand the state and local regulations for CO detectors, and to know that places children spend time may or may not have CO detectors. For example, many states do not require CO detectors in public buildings or schools.[21] After a disaster, when more CO generating equipment is being used, identify places children spend time (ECEs, recreational spaces, camps, etc.). Implement mitigation strategies–like the use of CO detectors—in spaces with a risk for CO poisoning.

Actionable Items for Local Officials

- Understand state, territory, or local laws that govern where CO detectors are required and identify places children spend time during disaster recovery where CO poisoning is a risk, but CO detectors may not be present.
- Distribute information on preventing carbon monoxide poisoning.
- Conduct inspections to be sure CO generating equipment is being properly used and CO detectors are functioning.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  5.2.9.5 Carbon Monoxide Detectors
  Programs should meet state or local laws regarding carbon monoxide detectors, including circumstances when detectors are necessary. Detectors should be tested monthly, and testing should be documented. Batteries should be changed at least yearly. Detectors should be replaced according to the manufacturer's instructions.
  https://eclkc.ohs.acf.hhs.gov/health-services-management/caring-our-children-basics/carbon-monoxide-detectors

- **State Regulations**

  Many states have licensing regulations about carbon monoxide detectors for ECE programs. A summary of some of the regulations can be found in Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy:
  https://www.eli.org/sites/default/files/eli-pubs/reducing-environmental-exposures-child-care_6.pdf

  Other places children spend time may also have requirements for carbon monoxide detectors. A summary of state laws can be found at:
  http://www.ncsl.org/research/environment-and-natural-resources/carbon-monoxide-detectors-state-statutes.aspx

Resources

- CDC, *Carbon Monoxide Poising after a Disaster* https://www.cdc.gov/disasters/carbonmonoxide.html
- FEMA, *Carbon Monoxide Safety Outreach Materials*
  https://www.usfa.fema.gov/prevention/outreach/carbon_monoxide.html
- FEMA *Carbon Monoxide Safety Sheet*
  https://www.usfa.fema.gov/downloads/pdf/publications/co_safety_flyer.pdf
- PEHSU, *Carbon Monoxide Poisoning in Children: Guidance for Disaster Events*
  https://www.pehsu.net/_Library/facts/carbon_monoxide_poisoning_in_children_guidance_for_disaster_events_July2013_mmiller.pdf
- Environmental Law Institute (ELI), *Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy*
  https://www.eli.org/research-report/reducing-environmental-exposures-child-care-facilities-review-state-policy
- ACF, *Caring for Our Children Basics, Carbon Monoxide Detectors*
  https://eclkc.ohs.acf.hhs.gov/health-services-management/caring-our-children-basics/carbon-monoxide-detectors
- EPA, *Emergencies and IAQ: Power Outages*
  https://www.epa.gov/indoor-air-quality-iaq/emergencies-and-iaq#power%20outages

Indoor Air Quality and Ventilation

Children spend most of their time indoors, and the air quality of those spaces can have consequences on children's health. Indoor air quality can be affected by outdoor pollution, heating, cooking, humidity, moisture, demolition and construction activities, building materials and furnishings, and the use of personal and cleaning products. Children with asthma or other illnesses may be more sensitive to poor indoor air quality. The most effective ways to improve indoor air quality are to reduce sources of pollutants and ventilate with clean outdoor air.

Proper ventilation of indoor spaces is important to help maintain safe air quality.[22] The presence of moisture and lack of ventilation may cause mold, odor buildup, or accumulation of other contaminants. After a disaster, providing adequate ventilation while keeping occupants comfortable can become challenging if there is damage to doors, windows, and heating, ventilation, and air conditioning (HVAC) systems. Open windows and doors may improve ventilation, but may also allow in heat, cold, or pests like mosquitos or animals if screens are damaged or missing. Boarding up broken windows or doors may keep out the elements and pests, but may lead to problems with indoor air quality.

HVAC systems may be damaged, and mold may grow on HVAC system components, including duct work, that were submerged in floodwaters or exposed to high moisture. HVAC systems may also need maintenance or inspection after events such as wildfires.[23] Have HVAC systems, including duct work, inspected and cleaned appropriately by a qualified professional following disaster damage to help ensure the system is functioning properly.

Indoor air quality may be worse during cleanup and reconstruction.[22] Cleanup activities can create conditions where mold, dust, or other chemicals are suspended in the air. Children should be kept away from these activities to help prevent exposure to these hazards.

Returning buildings to pre-disaster status with functioning windows, doors, and HVAC systems can help ensure indoor air quality is safe for children. Nearly all states have some ECE licensing regulations that mention ventilation. Some states specify the

number of windows and proper screens, while others have more general standards.[20] Other standards such as the FDA Food Code also have ventilation requirements that may apply to places children spend time. Know these regulations to prevent the communication of conflicting information during disaster recovery.

Research shows that filtering the air can be an effective supplement to source control and ventilation. Use a portable air cleaner and/or upgrade the air filter in a furnace or central HVAC system to help improve indoor air quality. Portable air cleaners, also known as air purifiers, are designed to filter the air in a single room or area. Central furnace or HVAC filters are designed to filter air throughout a home. Portable air cleaners and HVAC filters can reduce indoor air pollution; however, they cannot remove all pollutants from the air.

Another indoor air hazard is radon. Radon comes from the natural (radioactive) breakdown of uranium in soil, rock, and water and gets into the air you breathe. Radon can be found all over the U.S. It can get into any type of building—homes, offices, and schools—and result in a high indoor radon level. Testing for radon is the only way to know if radon is present. Testing is inexpensive and easy and should be performed in accordance with EPA guidance listed below.

Actionable Items for Local Officials

- Encourage replacing damaged screens, windows, and doors to allow for ventilation while keeping out pests.
- Ensure that HVAC inspections and clean-ups have occurred prior to re-opening an ECE or other place children spend time.
- Encourage keeping children away from cleanup, demolition, remodeling, or reconstruction activities.
- Disseminate information on source control, ventilation, and supplemental filtration and air cleaning to improve indoor air quality in spaces where children spend time.
- Encourage radon testing after disasters that may result in increased radon levels in buildings.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  5.1.1.5 Environmental Audit of Site Location

  An environmental audit should be conducted before construction of a new building, renovation, or occupation of an older building; or after a natural disaster to properly evaluate and, where necessary, remediate or avoid sites where children's health could be compromised. A written report that includes any remedial action taken should be kept on file. The audit should include assessments of

  a. potential air, soil, and water contamination on program sites and outdoor play spaces,
  b. potential toxic or hazardous materials in building construction, such as lead and asbestos, and
  c. potential safety hazards in the community surrounding the site.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **Food Code—Food and Drug Administration 2017**

  6-304 Ventilation

  6-501.11 Repairing

  https://www.fda.gov/food/fda-food-code/food-code-2017

- **State/Local/Territory/Tribal regulations**

  Many states have licensing regulations for ventilation in ECE programs. A summary of some of the regulations can be found in Environmental Law Institute's Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy

  https://www.eli.org/sites/default/files/eli-pubs/reducing-environmental-exposures-child-care_6.pdf

  Environmental Law Institute has a database that includes laws that address a variety of pollutants, practices, and building types

  https://www.eli.org/buildings/database-state-indoor-air-quality-laws

Resources

- CDC, NIOSH, *Recommendations for Cleaning and Remediation of Flood-Contaminated HVAC Systems* https://www.cdc.gov/niosh/topics/emres/cleaning-flood-hvac.html
- CDC, *Indoor Air Quality Information by State* https://www.cdc.gov/nceh/airpollution/pdfs/iaq_contacts.pdf
- EPA, *Emergencies and Indoor Air Quality* https://www.epa.gov/indoor-air-quality-iaq/emergencies-and-iaq#dust
- EPA, *Radon Information* https://www.epa.gov/radon
- EPA, FEMA, HUD, and NIH, *Homeowner's and Renter's Guide to Reducing Radon After Disasters* https://www.hud.gov/sites/documents/IEPWG_RADON_FAMILY.PDF
- EPA, FEMA, HUD, and NIH, *Homeowner's and Renter's Guide to Asbestos Cleanup After Disasters* https://www.hud.gov/sites/documents/IEPWG_ASBESTOS_FAMILY.PDF
- EPA, *Wildfire Smoke: A Guide for Public Health Officials revised 2019* https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf
- Washington State Department of Health, *Smoke from Fires Toolkit* https://www.doh.wa.gov/CommunityandEnvironment/AirQuality/SmokeFromFires/SmokefromFiresToolkits
- EPA, *Create a Clean Room to Protect Indoor Air Quality During a Wildfire* https://www.epa.gov/indoor-air-quality-iaq/create-clean-room-protect-indoor-air-quality-during-wildfire
- ELI, *Database of State indoor air quality laws* https://www.eli.org/buildings/database-state-indoor-air-quality-laws
- ELI, *Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy* https://www.eli.org/research-report/reducing-environmental-exposures-child-care-facilities-review-state-policy
- Occupational Safety and Health Administration, *Indoor Air Quality* https://www.osha.gov/SLTC/indoorairquality/building_ops.html
- FDA, *Masks and N95 Respirators* https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/masks-and-n95-respirators

Mold

Water damage and mold is often a challenge after a disaster. Moisture problems in buildings can be caused by a variety of conditions, including floodwater, roof and plumbing leaks, condensation, and excess humidity. Mold can grow on wet materials and exposure to mold can lead to serious illnesses for some people. Breathing or touching mold can cause allergic reactions in sensitive individuals. The allergic responses can include hay fever-type symptoms, such as sneezing, runny nose, red eyes, skin rash (dermatitis), asthma attacks in sensitive individuals, and irritation to the eyes, skin, nose, throat, and lungs. Reactions can be immediate or delayed. Mold can also cause asthma attacks in people with asthma who are allergic to mold. Children may be more sensitive to mold exposure and less able to describe any symptoms.

Some materials tend to absorb and keep water more than others. In general, materials that are wet and cannot be thoroughly cleaned and dried within 24–48 hours should be discarded, as they can remain a source of microbial growth. In addition, fiberboard, fibrous insulation, and disposable filters should be replaced if they are present in heating and air conditioning systems and have contacted water.

About half the states have some ECE licensing regulations that address mold or dampness, while others have voluntary programs.[20] Understanding these regulations can help when planning any interventions for ECE facilities and other places children spend time to address mold during disaster recovery.

The general cleanup process for mold involves drying out and cleaning. This includes washing items which can be washed and discarding items which cannot be washed. In most cases, common household cleaning products and disinfectants are used for this task; however, strictly follow the label instructions and provide fresh air by opening windows and doors. Federal guidance on how to safely clean up moisture and mold is widely available.

Wearing an N95 respirator, goggles, protective gloves, waterproof boots, and long shirts and pants to protect from mold exposure is also recommended when entering a home or business with mold. N95 respirators can usually be found at hardware stores and online. If it's safe to use electricity, use fans to dry the home both during and after the use of disinfectants, cleaning, and sanitizing products. This will reduce the potential for harmful exposure to chemicals in these household products.

If children are present, special attention is needed to ensure they are kept safe and away from cleanup activities. Guidance from the Pediatric Environmental Health Specialty Units recommends pregnant women and children, including adolescents, not participate in clean-up projects.[14]

Actionable Items for Local Officials

- Understand ECE licensing regulations and other voluntary programs that address dampness and mold.
- Consider visiting ECE facilities or other places children spend time to check for mold and indoor air quality.
- Distribute information on how to safely clean up mold.

Existing Regulations and Standards

- **State/Local/Territory/Tribal regulations**

  Many states have licensing regulations for ECE programs for mold and dampness. A summary of some of the regulations can be found in Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy

  https://www.eli.org/sites/default/files/eli-pubs/reducing-environmental-exposures-child-care_6.pdf

  Environmental Law Institute has a database that includes laws that address a variety of pollutants, practices and building types

  https://www.eli.org/buildings/database-state-indoor-air-quality-laws

Resources

- CDC, *Mold Cleanup and Remediation*
  https://www.cdc.gov/mold/cleanup.htm
- EPA, *Mold Resources*
  https://www.epa.gov/mold
- EPA, *Flood Clean up: Protecting Indoor Air Quality*
  https://www.epa.gov/sites/production/files/2015-09/documents/floods.pdf
- WHO, *Dampness and Mold Guidelines for Indoor Air Quality*
  http://www.euro.who.int/__data/assets/pdf_file/0017/43325/E92645.pdf
- PEHSU, *Questions about Mold*
  http://www.childrenshospital.org/centers-and-services/programs/o-_-z/pediatric-environmental-health-center-program/helpful-links/questions-about-mold
- FDA, *Masks and N95 Respirators*
  https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/masks-and-n95-respirators
- CDC, EPA, FEMA, HUD, and NIH, *Homeowner's and Renter's Guide to Mold Cleanup After Disasters*
  https://www.hud.gov/sites/documents/IEPWG_MOLD_CONS.PDF

Cleaning and Disinfection Products

Cleaning and sanitizing are important to help prevent the spread of illness and disease. However, some disinfectants and sanitizers contain toxic substances. The ability of chemicals in cleaning products to cause health effects varies greatly; some have no known health effects and some are highly toxic.

Bleach is frequently used to kill bacteria, viruses, and mold. However, bleach must be used with caution. Bleach was the cause of 34,000 calls to U.S. poison control centers in 2011; 12,000 of them for were for children under age 5.[24] According to the Association of Occupational and Environmental Clinics in 2012, bleach can have respiratory effects even in at low doses with long-term exposure.[24] Bleach can be helpful for cleaning and disinfecting after a disaster, but it must be used safely.

Understanding how to safely use cleaning products and following label instructions is important to helping ensure that these products are used properly and effectively. Cleaning products should never be mixed together because the combination can create toxic vapors. Good ventilation can ensure that indoor air quality is not compromised from the use of cleaning products.

Some state licensing regulations specify how products are stored within an ECE facility and how some surfaces, spaces, or materials in ECE facilities must be cleaned or sanitized.[25] Some states have also enacted regulations for "green cleaning" and for cleaning when children are not present.[20] The FDA Food Code (sections 7-204.11 and 7-204.12) also has regulations about cleaning, sanitizing, and washing.[13] *Caring for Our Children Basics* addresses cleaning in the section on Health Promotion and Protection.[12]

Some states may also have licensing regulations about chemical storage at an ECE facility. This helps keep chemicals, including cleaning products, away from children. Be aware of state, territory, or local regulations to help prevent communicating conflicting information on cleaning and storage of cleaning chemicals.

Actionable Items for Local Officials

- Understand state, territory, or local ECE licensing regulations for cleaning and disinfecting.
- Distribute materials on how to safely clean up after a disaster, including products that should be avoided and products that are recommended.
- Distribute information on safely storing cleaning products to prevent children from accessing them.
- Promote the number for Poison Control Centers 800-222-1222.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  3.3.0.1 Routine Cleaning, Sanitizing, and Disinfecting

  Programs should follow a routine schedule of cleaning, sanitizing, and disinfecting. Cleaning, sanitizing, and disinfecting products should not be used in close proximity to children, and adequate ventilation should be maintained during use.

  5.2.9.1 Use and Storage of Toxic Substances

  All toxic substances should be inaccessible to children and should not be used when children are present. Toxic substances should be used as recommended by the manufacturer and stored in the original labeled containers. The telephone number for the poison control center should be posted and readily accessible in emergency situations.

- **State/Local/Territory/Tribal regulations**

  Many states have licensing regulations for ECE programs to prevent chemical exposures from things like cleaning products. A summary of some of the regulations can be found in Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy:

  https://www.eli.org/sites/default/files/eli-pubs/reducing-environmental-exposures-child-care_6.pdf

Resources

- CDC, *Clean Up After a Disaster*
  https://www.cdc.gov/disasters/cleanup/index.html
- EPA, *Flood Related Cleaning*
  https://www.epa.gov/indoor-air-quality-iaq/report-flood-related-cleaning
- EPA, *Resources about Green Cleaning for Child Care Providers*
  https://www.epa.gov/childcare/information-child-care-providers-about-green-cleaning
- American Association of Poison Control Centers (AAPCC)
  https://www.aapcc.org/
- AAPCC, *Daycare and School Safety*
  https://www.aapcc.org/prevention/daycare-school-poison-safety
- Eco-Healthy Child Care®, *Household Chemicals Fact Sheet*
  https://cehn.org/wp-content/uploads/2019/01/Household_chemicals_1_19.pdf

Pesticide Usage

Pesticides are chemicals commonly used to help control insects and other pests. After a disaster, pest populations may change based on environmental conditions. For example, damaged facilities and delays in trash or debris removal may encourage the proliferation of some insects. Standing water can also allow pests like mosquitos to flourish. Since some pests can transmit harmful human diseases, pesticides may be used to help limit pests. However, all pesticides have some level of toxicity, and pose some risk to infants and children.

Children may have more exposure to pesticides in their environment than adults because of how they interact with their environment. For example, crawling on the floor may increase exposure to any pesticides sprayed at the floor level. The health risks from pesticides depend on the toxicity of the pesticide ingredients and how much of the pesticide a child is exposed to.[26] Because young children spend more time closer to the ground, put objects into their mouths, and rely on adults for assistance with things such as washing their hands, children can be exposed to pesticides by incidental ingestion at greater amounts than adults.[26]

Taking precautions to limit children's exposure to pesticides helps reduce their risk of developing a negative response to these chemicals. Integrated Pest Management (IPM) can help limit pests while also protecting children. IPM helps prevent pests though a variety of techniques including non-chemical measures and using the least toxic means to destroy pests.

Children should never be present when pesticides are being applied. Pesticides can linger in spaces long after application. Adults and children should know how to limit their exposure to pesticides with measures such as good hand washing before eating. When pesticides have been used outside, removing shoes before coming inside can help limit some of the chemicals from being tracked inside.

Pesticide use is frequently left to licensed professionals. These professionals can help determine which pesticides are most effective, which may help decrease the amount of pesticide needed to control pests. However, many commercially products are available to buy without being a licensed professional. Always follow the manufacturer's directions and take appropriate precautions. Several

states regulate pesticide use at larger child care centers differently than at smaller home-based programs.[20]

Some states have regulations or policies that require schools or ECE facilities to notify parents and community members about when pesticides are applied.[20] Some of these rules also require IPM practices to help decrease the need for pesticides. *Caring for Our Children Basics* also states that programs should adopt IPM programs.[12] Other states may require ECE facilities to use non-chemical methods of pest control or restrict specific types of pesticides even if they don't require an IPM program.[20] It's important to know these regulations and policies to ensure any advice provided during disaster recovery does not conflict with rules and policies already in place.

Eliminating standing water and employing the use of insecticide-treated nets (ITNs) can mitigate the risk of infection of mosquito-borne diseases. While these nets are very effective at preventing mosquito bites, consider careful use around small children or children who may be prone to putting objects into their mouths. ITNs are typically treated with chemicals such as permethrin or deltamethrin that have been proven safe for short-term, topical use. However, these chemicals are not designed to be ingested. Bed nets have also been cited as a fire hazard.[27]

ECE providers and parents should be aware of how ITNs can help protect children from mosquito bites while also using them carefully to prevent chemical exposures. Exposure to these chemicals can be decreased by limiting contact of netting to exposed skin, practicing good hand washing to prevent incidental ingestion of these chemicals, and prohibiting children from putting the netting into their mouths.

Actionable Items for Local Officials

- Understand state, territory, or local regulations concerning use of pesticides in ECE facilities and other places children spend time.
- Encourage use of Integrated Pest Management plans and non-chemical methods to control pests.
- Encourage pesticides only be applied by licensed professionals.
- Educate on how pest control may need to change (frequency/duration) during disaster recovery due to changes brought by the disaster.
- Promote knowledge of how to contact Poison Control Centers 800-222-1222.
- If encouraging use of insecticide-treated netting to prevent mosquito bites also explain how to limit exposure to the chemicals in the netting.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  5.2.8.1 Integrated Pest Management

  Programs should adopt an integrated pest management program to ensure long-term, environmentally sound pest suppression through a range of practices including pest exclusion, sanitation and clutter control, and elimination of conditions that are conducive to pest infestations.

  5.2.9.1 Use and Storage of Toxic Substances

  All toxic substances should be inaccessible to children and should not be used when children are present. Toxic substances should be used as recommended by the manufacturer and stored in the original labeled containers. The telephone number for the poison control center should be posted and readily accessible in emergency situations.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **State/Local/Territory/Tribal regulations**

  Many states have licensing regulations for ECE programs for integrated pest management. A summary of some of the regulations can be found in Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy.

  https://www.eli.org/sites/default/files/eli-pubs/reducing-environmental-exposures-child-care_6.pdf

Resources

- EPA, *Pest Control and Pesticide Safety for Consumers*
  https://www.epa.gov/safepestcontrol
- CDC, *Pesticide Exposure*
  https://ephtracking.cdc.gov/showPesticidesHealth
- Eco-Healthy Child Care®, *Pesticides Fact Sheet*
  https://cehn.org/wp-content/uploads/2018/05/Pesticides_5_18.pdf
- National Pesticide Information Center (NPIC), *Reducing Pesticide Risk After a Disaster*
  http://npic.orst.edu/aftermath.html

INTEGRATED PEST MANAGEMENT

- NPIC, *Integrated Pest Management*
  http://npic.orst.edu/pest/ipm.html
- EPA, *Resources about Pesticides and Integrated Pest Management for Child Care Providers*
  https://www.epa.gov/childcare/information-child-care-providers-about-pesticidesintegrated-pest-management

ZIKA INFORMATION

- ACF, *Fact Sheet: What Head Start or Child Care Programs Need to Know about Zika Virus*
  https://www.acf.hhs.gov/archive/ohsepr/resource/head-start-or-child-care-programs-need-to-know-bout-zika

BED NETS

- WHO, *Guidance on Insecticide-treated Mosquito Nets*
  http://www.who.int/mediacentre/news/releases/2007/pr43/en/
- CDC, *Insecticide-Treated Bed Nets*
  https://www.cdc.gov/malaria/malaria_worldwide/reduction/itn.html
- *Net Risk: A Risk Assessment of Long-Lasting Insecticide Bed Nets Used for Malaria Management*
  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3110360/
- NPIC, *Permethrin General Fact Sheet*
  http://npic.orst.edu/factsheets/PermGen.html
- NPIC, *Deltamethrin General Fact Sheet*
  http://npic.orst.edu/factsheets/DeltaGen.html

Physical Hazards

Physical hazards are often described as factors within the environment that can harm the body without touching it, e.g., radiation, heat, and cold. After a disaster, the structural integrity of buildings and infrastructure could also be compromised, which poses a hazard to the safety and wellbeing of those around it. Building damage can also create situations where it's harder to protect children from heat or cold. Other examples include power lines falling, trees collapsing, and sharp debris hidden in the environment. Automobile or truck traffic and changes to traffic patterns after a disaster is another potential physical hazard due to the possibility of pedestrian accidents. Identify and reduce any physical hazards in the area to help protect children.

Exposure to heat and cold is another physical hazard to consider. If a disaster causes disruption to power supplies, heating and cooling systems may no longer be functional. Damaged buildings may not have proper doors or windows to keep cold or heat out. Children are at greater risk for hypo- and hyperthermia because of their physiology.[28]

The heat index can be used to help determine how hot it really feels when humidity is factored into the air temperature,[29] which can help determine when children are most at risk for heat related injuries. Some states have licensing regulations on minimum and maximum indoor air temperatures for ECE facilities.[20]

Radiation is another physical hazard. Several types of disasters can release radiation such as a nuclear reactor meltdown or a transportation or industrial accident.[30] Small radiological sources may be found in places such as hospitals. Although radiological disasters are not very common, always determine if radiological materials were released during a disaster and how that may affect disaster recovery. Radon is another concern and is discussed in the section on indoor air quality.

State and territory ECE licensing regulations may have information on specific physical hazards. *Caring for Our Children Basics* also has a section on Safety of Equipment, Materials and Furnishings which may apply to ECE facilities and other places children spend time during disaster recovery efforts. Determine which state, territory, or local regulations may exist for physical hazards to ensure consistency with these regulations.

Actionable Items for Local Officials

- Anticipate necessary guidance on risks from physical hazards known to exist locally.
- Promote understating of heat index and heat and cold injuries.
- Understand state, territory, or local licensing regulations and policies which address physical hazards at ECE facilities.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  5.3.1.1/5.5.0.6/5.5.0.7 Safety of Equipment, Materials, and Furnishings

  Equipment, materials, furnishings, and play areas should be sturdy, safe, in good repair, and meet the recommendations of the U.S. Consumer Product Safety Commission (CPSC). Programs should attend to, including, but not limited to, the following safety hazards:

  a. Openings that could entrap a child's head or limbs;
  b. Elevated surfaces that are inadequately guarded;
  c. Lack of specified surfacing and fall zones under and around climbable equipment;
  d. Mismatched size and design of equipment for the intended users;
  e. Insufficient spacing between equipment;
  f. Tripping hazards;
  g. Components that can pinch, sheer, or crush body tissues;
  h. Equipment that is known to be of a hazardous type;
  i. Sharp points or corners;
  j. Splinters;
  k. Protruding nails, bolts, or other parts that could entangle clothing or snag skin;
  l. Loose, rusty parts;
  m. Hazardous small parts that may become detached during normal use or reasonably foreseeable abuse of the equipment and that present a choking, aspiration, or ingestion hazard to a child;
  n. Strangulation hazards (e.g., straps, strings, etc.);
  o. Flaking paint;
  p. Paint that contains lead or other hazardous materials; and
  q. Tip-over hazards, such as chests, bookshelves, and televisions.

  6.2.5.1 Inspection of Indoor and Outdoor Play Areas and Equipment

  The indoor and outdoor play areas and equipment should be inspected daily for basic health and safety, including, but not limited to:

  a. Missing or broken parts;
  b. Protrusion of nuts and bolts;
  c. Rust and chipping or peeling paint;
  d. Sharp edges, splinters, and rough surfaces;
  e. Stability of handholds;
  f. Visible cracks;
  g. Stability of non-anchored large play equipment (e.g., playhouses);
  h. Wear and deterioration; and
  i. Vandalism or trash.

  Any problems should be corrected before the playground is used by children.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **State/Local/Territory/Tribal regulations**

  Many states have licensing regulations for ECE programs for ventilation and temperature. A summary of some of the regulations can be found in Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy

  https://www.eli.org/sites/default/files/eli-pubs/reducing-environmental-exposures-child-care_6.pdf

Resources

- CDC, *Protect Yourself and Others from Electrical Hazards After a Disaster*
  https://www.cdc.gov/disasters/electrical.html
- OSHA, *PPE for Emergency Response and Recovery*
  https://www.osha.gov/SLTC/emergencypreparedness/gettingstarted_ppe.html

HEAT AND COLD

- CDC, *Tips for Preventing Heat-Related Illness*
  https://www.cdc.gov/disasters/extremeheat/heattips.html
- NWS, *Heat Index*
  https://www.weather.gov/safety/heat-index
- NWS, *Heat and Safety for Kids and Teens*
  https://www.weather.gov/safety/heat-kids
- AAP, *Extreme Temperatures: Heat and Cold*
  https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Children-and-Disasters/Pages/Extreme-Temperatures-Heat-and-Cold.aspx

RADIATION

- CDC, *Radiation Emergencies and Children*
  https://www.cdc.gov/childrenindisasters/radiation-emergencies.html
- CDC, *Radiation Emergencies*
  https://emergency.cdc.gov/radiation/index.asp
- American Academy of Pediatrics (AAP), *Pediatric Considerations Before, During and After Radiological or Nuclear Emergencies*
  https://pediatrics.aappublications.org/content/142/6/e20183001.long

Disaster Debris

Disasters can generate large volumes of debris and waste, including home goods and building materials. Before a disaster, some hazardous substances like lead or asbestos that were encapsulated in building materials may become hazardous after a disaster. Disturbing or removing materials containing lead-based paint or asbestos may result in elevated concentrations of lead or asbestos dust in the air. Most states have ECE regulations which address lead exposure.[20] Understanding these regulations may help with recovery efforts.

Several states have ECE licensing regulations that govern the presence of children during any construction activity, including renovation, alteration, remodeling, and/or repair.[20] Know what state, territory, or local regulations apply to disaster recovery efforts. *Caring for Our Children Basics* also contains language about building inspections and the safety of equipment, materials, and furnishings which also may address some hazards during disaster recovery.[12]

Disaster debris can also result in the damage and loss of electronic equipment like computers, computer peripherals, televisions, small scale servers, and small electronic equipment. White goods like washing machines, refrigerators, and stoves may also be in debris piles. Some of these materials may contain metals or other chemicals such as refrigerants.

Debris piles or other large abandoned items (such as cars or refrigerators) may be tempting places for children to play or explore. Children should be discouraged from playing on or near debris because of physical and chemical hazards. Some physical hazards associated with debris piles include sharp objects, fall risks, fire risks, and collapse of large piles. Debris piles also make good hiding places for wild and potentially dangerous animals such as snakes.

Cleanup should occur when children are not onsite. Guidance from the Pediatric Environmental Health Specialty Units recommends children, including adolescents, not participate in clean-up projects.[14]

Actionable Items for Local Officials

- Understand the types of hazards that may be found in debris or building materials, based on local conditions such as age or housing.
- Disseminate information on how to properly handle debris and protect children from debris.
- Consider recommending inspections for things such as lead or asbestos before reopening an ECE program.

Existing Regulations and Standards

- **Caring for Our Children Basics—Administration for Children and Families, 2015**

  5.1.1.2 Inspection of Buildings

  Existing and/or newly constructed, renovated, remodeled, or altered buildings should be inspected by a building inspector to ensure compliance with applicable state and local building and fire codes before the building can be used for the purpose of early care and education.

  https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf

- **State/Local/Territory/Tribal regulations**

  Many states have licensing regulations for ECE programs for renovation or repair. A summary of some of the regulations can be found in Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy

  https://www.eli.org/sites/default/files/eli-pubs/reducing-environmental-exposures-child-care_6.pdf

  Many states also require lead tests or inspections. A summary of some of the regulations can be found in Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy

  https://www.eli.org/sites/default/files/eli-pubs/reducing-environmental-exposures-child-care_6.pdf

Resources

- FEMA, *Debris Removal and Demolition*
  https://www.fema.gov/media-library-data/1465335317204-387ea71c5b3ae8f55577aaa32baa66ac/FactSheetDebrisRemoval2016.pdf
- EPA, *Hazard Standards for Lead in Pain, Soil and Dust*
  https://www.epa.gov/lead/hazard-standards-lead-paint-dust-and-soil-tsca-section-403
- EPA, *Disaster Debris Planning*
  https://www.epa.gov/large-scale-residential-demolition/disaster-debris-planning
- Congressional Research Service, *Disaster Debris Management: Requirements, Challenges and Federal Agency Roles*
  https://fas.org/sgp/crs/homesec/R44941.pdf
- CDC, *What to Wear when Cleaning Up Debris and Household Waste after a Disaster*
  https://www.cdc.gov/disasters/cleanup/cleanup-debris-after-disaster.html
- EPA, FEMA, HUD, and NIH, *Homeowner's and Renter's Guide to Reducing Lead Hazards after Disasters*
  https://www.hud.gov/sites/documents/IEPWG_LEAD_FAMILY.PDF
- Wisconsin Department of Health Services, *Trash and Wood Burning*
  https://www.dhs.wisconsin.gov/air/burning.htm
- Minnesota Pollution Control Agency, *Mercury-catalyzed Polyurethane Flooring and Mercury-contaminated Demolition Debris and Soil*
  https://www.pca.state.mn.us/sites/default/files/w-hw4-25.pdf
- PEHSU, *Mercury in Gym Flooring: Advice for Caregivers from Environmental Pediatricians*
  https://icahn.mssm.edu/files/ISMMS/Assets/Research/PEHSU/For_Caregivers_Mercury_Flooring_Factsheet_Nov_2019.pdf

Noise

Generators and construction equipment can produce a lot of noise for extended amounts of time. Heavy machinery or other loud operations could be uncomfortable for children, and certain exposures could cause hearing damage or hearing loss. Noise can also create other health concerns that generally fall into three categories: physiological effects, motivational effects, and cognitive effects.[31]

Mitigation efforts can help prevent some noise exposure to children. If possible, control noise at the source.[32] Other mitigation efforts, such as limiting the amount of time children are close to loud noises, creating quiet time and spaces, and using sound absorbing materials and barriers to help dampen noise, are all ways to help limit some exposure. Using individual hearing protection is always a last resort and is likely not practical with children, especially for extended periods of time.

Actionable Items for Local Officials

- Raise awareness about the health effects of noise on children.
- Encourage mindful work hours for loud operations near places where children spend time.
- Encourage limiting additional noisy activities (e.g., playing loud music) when noisy operations are happening near places children spend time.

Resources

- Cornell University, *Design of Child Care Centers and Effects of Noise on Young Children*
  http://www.earlychildhoodmichigan.org/articles/12-03/Cornell12-03.htm
- CEHN, *Noise Pollution*
  https://cehn.org/wp-content/uploads/2015/12/Noise_Pollution_9_16.pdf
- National Institutes of Health (NIH), *It's a Noisy Planet. Protect their Hearing*
  https://www.noisyplanet.nidcd.nih.gov/
- CDC, *Loud Noise Can Cause Hearing Loss*
  https://www.cdc.gov/nceh/hearing_loss/default.html
- EPA, *Noise and Its Effect on Children*
  https://www.epa.gov/sites/production/files/2015-07/documents/ochp_noise_fs_rev1.pdf
- NIH, *Noise-Induced Hearing Loss*
  https://www.nidcd.nih.gov/health/noise-induced-hearing-loss
- WHO, *Training Package for the Health Sector; Children and Noise (includes actions to take)*
  http://www.who.int/ceh/capacity/noise.pdf

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12. Administration for Children and Families, Office of Child Care. (2015). *Caring for Our Children Basics Health and Safety Foundations for Early Care and Education.* Retrieved 9/3/2019 from https://www.acf.hhs.gov/sites/default/files/ecd/caring_for_our_children_basics.pdf
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Appendix A

Resources by Topic

Exposures to Children and Disasters

- Centers for Disease Control and Prevention (CDC), *Caring for Children in Disasters*
  https://www.cdc.gov/childrenindisasters/index.html
- CDC, *Children and Disaster Specific Threats*
  https://www.cdc.gov/childrenindisasters/specific-threats.html
- Administration for Children and Families (ACF), *Early Childhood Disaster-Related Resources*
  https://www.acf.hhs.gov/ohsepr/early-childhood
- American Academy of Pediatrics, *Climate Change and Children's Health*
  https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/climate-change/Pages/Climate-Change-and-Childrens-Health.aspx
- National Resource Center for Health and Safety in Child Care and Early Education, *Environmental Health in Early Care and Education standards*
  https://nrckids.org/CFOC/Environmental_Health
- Children's Environmental Health Network (CEHN), *Eco-Healthy Child Care® Checklist*
  https://cehn.org/our-work/eco-healthy-child-care/ehcc-sign-up-form/#join
- CEHN, *Eco-Healthy Child Care® Fact Sheets*
  https://cehn.org/our-work/eco-healthy-child-care/ehcc-factsheets/
- Federal Emergency Management Agency (FEMA), *Ready Kids*
  https://www.ready.gov/kids

Environmental Issues and Disasters

- CDC National Institute for Occupational Safety and Health, *Emergency Preparedness and Response Resources*
  https://www.cdc.gov/niosh/emres/
- CDC, *Emergency Preparedness and Response*
  https://www.cdc.gov/features/emergency.html
- CDC, *Natural Disasters and Severe Weather*
  https://www.cdc.gov/disasters/index.html
- CDC, *Climate Change and Public Health*
  https://www.cdc.gov/climateandhealth/effects/default.htm
- Food and Drug Administration (FDA), *Masks and N95 Respirators*
  https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/masks-and-n95-respirators
- Housing and Urban Development (HUD), *Post-Disaster Healthy Housing Resources*
  https://www.hud.gov/program_offices/healthy_homes/Post-Disaster-Resources
- HUD, *Rebuild Healthy Homes*
  https://www.hud.gov/sites/documents/REBUILD_HEALTHY_HOME.PDF
- U.S. Department of Health & Human Services, *Topic Collection: Natural Disasters*
  https://asprtracie.hhs.gov/technical-resources/36/natural-disasters

Floodwater

- CDC, *Guidance on Microbial Contamination in Previously Flooded Outdoor Areas*
  https://www.cdc.gov/nceh/ehs/publications/guidance_flooding.htm
- State of Rhode Island Department of Public Health, *Flooding: About Cleaning up Yards and Public Spaces*
  http://www.health.ri.gov/emergency/flooding/about/outdoorcleaning/
- CDC, *Household Cleaning & Sanitizing*
  https://www.cdc.gov/healthywater/emergency/cleaning-sanitizing/household-cleaning-sanitizing.html
- CDC, *Protect Yourself from Chemicals Released During a Natural Disaster*
  https://www.cdc.gov/disasters/chemicals.html
- FEMA, *Initial Building Restoration for Flooded Buildings*
  https://www.fema.gov/media-library-data/20130726-1604-20490-7953/fema549_apndx_e_ra2.pdf
- Pediatric Environmental Health Specialty Units (PEHSU), *Children's Health in the Aftermath of Floods*
  https://www.pehsu.net/Hurricane_and_Flooding_Resources.html#Items
- PEHSU, *Clinical Recommendations Regarding Return of Children to Areas after Floods or Hurricanes*
  https://www.pehsu.net/_Library/facts/flood_hurricane_2011.pdf
- State of Massachusetts, *Flooding and Sewage Back-ups*
  https://www.mass.gov/guides/flooding-and-sewage-back-ups-home-care-guide
- Environmental Protection Agency (EPA), *Naturally Occurring Asbestos*
  https://archive.epa.gov/region9/toxic/web/html/hazard6.html
- National Weather Service (NWS), *Interactive Flood Information Map*
  https://www.weather.gov/safety/flood-map
- NWS, *National Weather Service Weather Safety Tips*
  https://www.weather.gov/safety/
- Food and Drug Administration (FDA), *Masks and N95 Respirators*
  https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/masks-and-n95-respirators
- CDC, *Model Aquatic Health Code: An All-inclusive Model Public Swimming Pool and Spa Code*
  https://www.cdc.gov/mahc/index.html
- HUD, *Rehabbing Flooded Houses*
  https://www.huduser.gov/portal//Publications/pdf/Rehab_FloodedHouses.pdf

Cisterns and Wells

- CDC, *Well Testing*
  https://www.cdc.gov/healthywater/drinking/private/wells/testing.html
- CDC, *Cisterns and Other Rain Catchment Systems, with links to printable fact sheets*
  https://www.cdc.gov/healthywater/emergency/drinking/disinfection-cisterns.html
- CDC, *When Every Drop Counts: Protecting Public Health During Drought Conditions*
  https://www.cdc.gov/nceh/ehs/docs/when_every_drop_counts.pdf
- CDC, *Water, Sanitation, & Hygiene (WASH)-related Emergencies & Outbreaks*
  https://www.cdc.gov/healthywater/emergency/index.html
- CDC, *Drinking Water Advisory Communication Toolbox*
  https://www.cdc.gov/healthywater/emergency/dwa-comm-toolbox/index.html

- EPA, *Drinking Water Emergency Response*
  https://www.epa.gov/ground-water-and-drinking-water/drinking-water-emergency-response
- New Hampshire Department of Environmental Services, *Disinfecting Small Public Water Systems*
  https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm
- Environmental Law Institute, *Drinking Water Quality in Child Care Facilities A Review of State Policy*
  https://www.eli.org/sites/default/files/eli-pubs/drinking-water-cc-final-posting-sept-4-2015.pdf

Water Advisories

- CDC, Making Water Safe in an Emergency
  https://www.cdc.gov/healthywater/emergency/drinking/making-water-safe.html
- CDC, *Water, Sanitation, & Hygiene (WASH)-related Emergencies & Outbreaks*
  https://www.cdc.gov/healthywater/emergency/index.html
- FEMA, *Fact Sheet: How to Make Your Water Safe to Drink*
  https://www.fema.gov/news-release/2017/10/08/fact-sheet-how-make-your-water-safe-drink
- CDC, *Drinking Water Advisory Communication Toolbox*
  https://www.cdc.gov/healthywater/emergency/dwa-comm-toolbox/index.html

EXAMPLES OF BOIL WATER ADVISORIES AND FACT SHEETS

- State of Massachusetts, *Drinking Water Boil Orders and Public-Health Orders*
  https://www.mass.gov/service-details/boil-water-order-faqs
- Rhode Island Department of Health, *Questions and Answers about* E. Coli *and Fecal Coliform Bacteria in the Water Supply and Boil Water Advisory*
  http://health.ri.gov/publications/instructions/HouseholdBoilWaterGuidance.pdf
- New Hampshire Department of Environmental Services, *Frequently Asked Questions about Boil Orders*
  https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-4-12.pdf

EXAMPLE BOIL WATER FACT SHEET FOR CHILD CARE

- Leeds, Grenville & Lanark District Health, *Guidelines for Child Care Centers During a Boil Water Advisory*
  http://healthunit.org/wp-content/uploads/Guidelines_for_Child_Care_Centres_During_a_Boil_Water_Advisory.pdf

EXAMPLE DO NOT DRINK – CYANOTOXINS

- EPA, *Drinking Water Advisory example*
  https://www.epa.gov/sites/production/files/2017-06/documents/003_drinking_water_advisory_everyone.pdf
- CDC, *One Health Harmful Algal Bloom System*
  https://www.cdc.gov/habs/ohhabs.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fhabs%2Fohhabs%2Findex.html
- Government Technology, *Polluted Water from Camp Fire*
  https://www.govtech.com/em/disaster/Rare-Toxic-Cocktail-From-Camp-Fire-is-Poisoning-Paradise-Calif--Water.html
- CDC, *When Every Drop Counts: Protecting Public Health During Drought Conditions*
  https://www.cdc.gov/nceh/ehs/docs/when_every_drop_counts.pdf
- Great Lakes Center for Children's Environmental Health, University of Illinois at Chicago School of Public Health, *Investigating Environmental Contamination: A Guide for Communities*
  https://great-lakes.uic.edu/wp-content/uploads/sites/480/2019/07/print_comm-resource-guide_62619-min.pdf

Onsite Wastewater Treatment Systems

- CDC, *Septic & Onsite Wastewater Systems*
  https://www.cdc.gov/healthywater/emergency/sanitation-wastewater/septic.html
- CDC, *Guidance for Reducing Health Risks to Workers Handling Human Waste or Sewage*
  https://www.cdc.gov/healthywater/emergency/sanitation-wastewater/workers_handlingwaste.html
- CDC, *Water, Sanitation, & Hygiene (WASH)-related Emergencies & Outbreaks*
  https://www.cdc.gov/healthywater/emergency/index.html
- EPA, *Septic Systems—What to Do After the Flood*
  https://www.epa.gov/ground-water-and-drinking-water/septic-systems-what-do-after-flood
- EPA, *Managing Septic Systems to Prevent Contamination of Drinking Water*
  http://www.nesc.wvu.edu/pdf/ww/septic/epa_septicwater_protection.pdf
- Florida Department of Health, *Environmental Health Preparedness Guide for Onsite Sewage Treatment Systems*
  http://www.floridahealth.gov/environmental-health/eh-preparedness/_documents/ostdspreparednesstoolkit.pdf
- EPA, *How Your Septic System Can Impact Nearby Water Sources*
  https://www.epa.gov/septic/how-your-septic-system-can-impact-nearby-water-sources

Air Pollution and Particulate Matter

- Air Now, *to check local air quality*
  https://www.airnow.gov/
- CDC, *Particle Pollution*
  https://www.cdc.gov/air/particulate_matter.html
- California Air Resources Board, *Overview: Diesel Exhaust & Health*
  https://www.arb.ca.gov/research/diesel/diesel-health.htm
- World Health Organization, *Air Pollution (including guideline values)*
  http://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health
- EPA and CDC, *Air Quality and Outdoor Activity Guidance for Schools*
  https://www3.epa.gov/airnow/flag/school-chart-2014.pdf
- CDC, *Air Quality and Emergencies*
  https://www.cdc.gov/air/air_events.htm
- Environmental Research, *Volatile Organic Compounds and Particulate Matter in Child Care Facilities in the District of Columbia: Results from a pilot study*
  https://www.sciencedirect.com/science/article/pii/S0013935115301687

MITIGATION STRATEGIES

- EPA, *Indoor Particulate Matter*
  https://www.epa.gov/indoor-air-quality-iaq/indoor-particulate-matter
- EPA, *Air Cleaners and Air Filters in the Home*
  https://www.epa.gov/indoor-air-quality-iaq/air-cleaners-and-air-filters-home-0
- California Environmental Protection Agency, *Reducing Your Exposure to Particle Pollution*
  https://www.arb.ca.gov/research/indoor/pmfactsheet.pdf
- Air Now, *Extremely High Levels of PM2.5: Steps to Reduce Your Exposure*
  https://www.airnow.gov/aqi/aqi-basics/extremely-high-levels-of-pm25/

- U.S. Geological Survey (USGS), *Volcanic Ash Impacts and Mitigation*
  https://volcanoes.usgs.gov/volcanic_ash/

WILDFIRE

- CDC, *Protecting Yourself from Wildfire Smoke*
  https://www.cdc.gov/features/wildfires/
- EPA, *Wildfire Smoke: A Guide for Public Health Officials revised 2019*
  https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf
- EPA and PEHSU, *Protecting Children from Wild Fire Smoke and Ash*
  https://www3.epa.gov/airnow/smoke_fires/protecting-children-from-wildfire-smoke-and-ash.pdf
- EPA, *Wildfire and Indoor Air Quality*
  https://www.epa.gov/indoor-air-quality-iaq/wildfires-and-indoor-air-quality-iaq
- Washington State Department of Health, *Smoke from Fires Toolkit*
  https://www.doh.wa.gov/CommunityandEnvironment/AirQuality/SmokeFromFires/SmokefromFiresToolkits
- EPA, *Create a Clean Room to Protect Indoor Air Quality During a Wildfire*
  https://www.epa.gov/indoor-air-quality-iaq/create-clean-room-protect-indoor-air-quality-during-wildfire

DROUGHT

- CDC, *Drought and Health*
  https://www.cdc.gov/nceh/drought/default.htm
- National Weather Service (NWS), *Why Air Quality is Important, Safety Tips*
  https://www.weather.gov/safety/
- NWS, *Volcanic Ash and Ashfall*
  https://www.weather.gov/safety/airquality-volcanic-ash
- Wisconsin Department of Health Services, *Trash and Wood Burning*
  https://www.dhs.wisconsin.gov/air/burning.htm
- Great Lakes Center for Children's Environmental Health, University of Illinois at Chicago School of Public Health, *Investigating Environmental Contamination: A Guide for Communities*
  https://great-lakes.uic.edu/wp-content/uploads/sites/480/2019/07/print_comm-resource-guide_62619-min.pdf

Carbon Monoxide

- CDC, *Carbon Monoxide Poising after a Disaster*
  https://www.cdc.gov/disasters/carbonmonoxide.html
- FEMA, *Carbon Monoxide Safety Outreach Materials*
  https://www.usfa.fema.gov/prevention/outreach/carbon_monoxide.html
- FEMA, *Carbon Monoxide Safety Sheet*
  https://www.usfa.fema.gov/downloads/pdf/publications/co_safety_flyer.pdf
- PEHSU, *Carbon Monoxide Poisoning in Children: Guidance for Disaster Events*
  https://www.pehsu.net/_Library/facts/carbon_monoxide_poisoning_in_children_guidance_for_disaster_events_July2013_mmiller.pdf
- Environmental Law Institute (ELI), *Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy*
  https://www.eli.org/research-report/reducing-environmental-exposures-child-care-facilities-review-state-policy

- ACF, *Caring for Our Children Basics, Carbon Monoxide Detectors*
  https://eclkc.ohs.acf.hhs.gov/health-services-management/caring-our-children-basics/carbon-monoxide-detectors
- EPA, *Emergencies and IAQ: Power Outages*
  https://www.epa.gov/indoor-air-quality-iaq/emergencies-and-iaq#power%20outages

Indoor Air Quality and Ventilation

- CDC, NIOSH, *Recommendations for Cleaning and Remediation of Flood-Contaminated HVAC Systems*
  https://www.cdc.gov/niosh/topics/emres/cleaning-flood-hvac.html
- CDC, *Indoor Air Quality Information by State*
  https://www.cdc.gov/nceh/airpollution/pdfs/iaq_contacts.pdf
- EPA, *Emergencies and Indoor Air Quality*
  https://www.epa.gov/indoor-air-quality-iaq/emergencies-and-iaq#dust
- EPA, *Radon Information*
  https://www.epa.gov/radon
- EPA, FEMA, HUD, and NIH, *Homeowner's and Renter's Guide to Reducing Radon After Disasters*
  https://www.hud.gov/sites/documents/IEPWG_RADON_FAMILY.PDF
- EPA, FEMA, HUD, and NIH, *Homeowner's and Renter's Guide to Asbestos Cleanup After Disasters*
  https://www.hud.gov/sites/documents/IEPWG_ASBESTOS_FAMILY.PDF
- EPA, *Wildfire Smoke: A Guide for Public Health Officials revised 2019*
  https://www3.epa.gov/airnow/wildfire-smoke/wildfire-smoke-guide-revised-2019.pdf
- Washington State Department of Health, *Smoke from Fires Toolkit*
  https://www.doh.wa.gov/CommunityandEnvironment/AirQuality/SmokeFromFires/SmokefromFiresToolkits
- EPA, *Create a Clean Room to Protect Indoor Air Quality During a Wildfire*
  https://www.epa.gov/indoor-air-quality-iaq/create-clean-room-protect-indoor-air-quality-during-wildfire
- ELI, *Database of State indoor air quality laws*
  https://www.eli.org/buildings/database-state-indoor-air-quality-laws
- ELI, *Reducing Environmental Exposures in Child Care Facilities: A Review of State Policy*
  https://www.eli.org/research-report/reducing-environmental-exposures-child-care-facilities-review-state-policy
- Occupational Safety and Health Administration, *Indoor Air Quality*
  https://www.osha.gov/SLTC/indoorairquality/building_ops.html
- FDA, *Masks and N95 Respirators*
  https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/masks-and-n95-respirators

Mold

- CDC, *Mold Cleanup and Remediation*
  https://www.cdc.gov/mold/cleanup.htm
- EPA, *Mold Resources*
  https://www.epa.gov/mold
- EPA, *Flood Clean up: Protecting Indoor Air Quality*
  https://www.epa.gov/sites/production/files/2015-09/documents/floods.pdf

- WHO, *Dampness and Mold Guidelines for Indoor Air Quality*
  http://www.euro.who.int/__data/assets/pdf_file/0017/43325/E92645.pdf
- PEHSU, *Questions about Mold*
  http://www.childrenshospital.org/centers-and-services/programs/o-_-z/pediatric-environmental-health-center-program/helpful-links/questions-about-mold
- FDA, *Masks and N95 Respirators*
  https://www.fda.gov/medical-devices/personal-protective-equipment-infection-control/masks-and-n95-respirators
- CDC, EPA, FEMA, HUD, and NIH, *Homeowner's and Renter's Guide to Mold Cleanup After Disasters*
  https://www.hud.gov/sites/documents/IEPWG_MOLD_CONS.PDF

Cleaning and Disinfection Products

- CDC, *Clean Up After a Disaster*
  https://www.cdc.gov/disasters/cleanup/index.html
- EPA, *Flood Related Cleaning*
  https://www.epa.gov/indoor-air-quality-iaq/report-flood-related-cleaning
- EPA, *Resources about Green Cleaning for Child Care Providers*
  https://www.epa.gov/childcare/information-child-care-providers-about-green-cleaning
- University of Illinois, *Disaster Cleanup: FAQ about Cleaning Products*
  https://web.extension.illinois.edu/disaster/facts/clean-q.cfm
- American Association of Poison Control Centers (AAPCC)
  https://www.aapcc.org/
- AAPCC, *Daycare and School Safety*
  https://www.aapcc.org/prevention/daycare-school-poison-safety
- Eco-Healthy Child Care®, *Household Chemicals Fact Sheet*
  https://cehn.org/wp-content/uploads/2019/01/Household_chemicals_1_19.pdf

Pesticide Use

- EPA, *Pest Control and Pesticide Safety for Consumers*
  https://www.epa.gov/safepestcontrol
- CDC, *Pesticide Exposure*
  https://ephtracking.cdc.gov/showPesticidesHealth
- Eco-Healthy Child Care®, *Pesticides Fact Sheet*
  https://cehn.org/wp-content/uploads/2018/05/Pesticides_5_18.pdf
- National Pesticide Information Center (NPIC), *Reducing Pesticide Risk After a Disaster*
  http://npic.orst.edu/aftermath.html

INTEGRATED PEST MANAGEMENT

- NPIC, *Integrated Pest Management*
  http://npic.orst.edu/pest/ipm.html
- EPA, *Resources about Pesticides and Integrated Pest Management for Child Care Providers*
  https://www.epa.gov/childcare/information-child-care-providers-about-pesticidesintegrated-pest-management

ZIKA INFORMATION

- ACF, *Fact Sheet: What Head Start or Child Care Programs Need to Know about Zika Virus* https://www.acf.hhs.gov/archive/ohsepr/resource/head-start-or-child-care-programs-need-to-know-bout-zika

BED NETS

- WHO, *Guidance on Insecticide-treated Mosquito Nets* http://www.who.int/mediacentre/news/releases/2007/pr43/en/
- CDC, *Insecticide-Treated Bed Nets* https://www.cdc.gov/malaria/malaria_worldwide/reduction/itn.html
- *Net Risk: A Risk Assessment of Long-Lasting Insecticide Bed Nets Used for Malaria Management* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3110360/
- NPIC, *Permethrin General Fact Sheet* http://npic.orst.edu/factsheets/PermGen.html
- NPIC, *Deltamethrin General Fact Sheet* http://npic.orst.edu/factsheets/DeltaGen.html

Physical Hazards

- CDC, *Protect Yourself and Others from Electrical Hazards After a Disaster* https://www.cdc.gov/disasters/electrical.html
- OSHA, *PPE for Emergency Response and Recovery* https://www.osha.gov/SLTC/emergencypreparedness/gettingstarted_ppe.html

HEAT AND COLD

- CDC, *Tips for Preventing Heat-Related Illness* https://www.cdc.gov/disasters/extremeheat/heattips.html
- NWS, *Heat Index* https://www.weather.gov/safety/heat-index
- NWS, *Heat and Safety for Kids and Teens* https://www.weather.gov/safety/heat-kids
- AAP, *Extreme Temperatures: Heat and Cold* https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Children-and-Disasters/Pages/Extreme-Temperatures-Heat-and-Cold.aspx

RADIATION

- CDC, *Radiation Emergencies and Children* https://www.cdc.gov/childrenindisasters/radiation-emergencies.html
- CDC, *Radiation Emergencies* https://emergency.cdc.gov/radiation/index.asp
- AAP, *Pediatric Considerations Before, During, and After Radiological or Nuclear Emergencies* https://pediatrics.aappublications.org/content/142/6/e20183001.long

Disaster Debris

- FEMA, *Debris Removal and Demolition* https://www.fema.gov/media-library-data/1465335317204-387ea71c5b3ae8f55577aaa32baa66ac/FactSheetDebrisRemoval2016.pdf

- EPA, *Hazard Standards for Lead in Pain, Soil and Dust*
  https://www.epa.gov/lead/hazard-standards-lead-paint-dust-and-soil-tsca-section-403
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Appendix B

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  Learn more at www.neha.org.
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  Learn more at: https://www.region2headstart.org/about.

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https://www.atsdr.cdc.gov/safeplacesforECE/

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