



# **Pediatric HVAs**

## **Incorporating Children into Regional Hazard Vulnerability Analyses (HVAs)**

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**1**

Overview of Children in Disasters

**2**

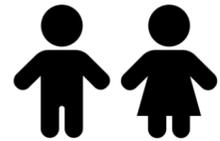
Current State and Examples of HVAs

**3**

Need for Pediatric Considerations in HVAs

**4**

Eastern Great Lakes Pediatric HVA Categories and Examples



Children under 18 years old comprise 25 % of the US population and are one of the country's most vulnerable groups.



The unique anatomic, physiologic, and developmental features of children cause them to be disproportionately affected by disasters.



Children must often contend with short and long-term psychological trauma.



Children with special healthcare needs are even more affected by disasters.

As a result of these vulnerabilities, studies have shown that children compose up to half of all disaster victims.



Regional and adult hospitals often lack or overlook pediatric considerations in their disaster preparedness.

## Equipment & Injuries

- Size-specific equipment (e.g. laryngoscope blades, venous catheters) as well as formula, diapers, etc.
- Weight-based medications
- Injuries present differently due to pediatric physiology

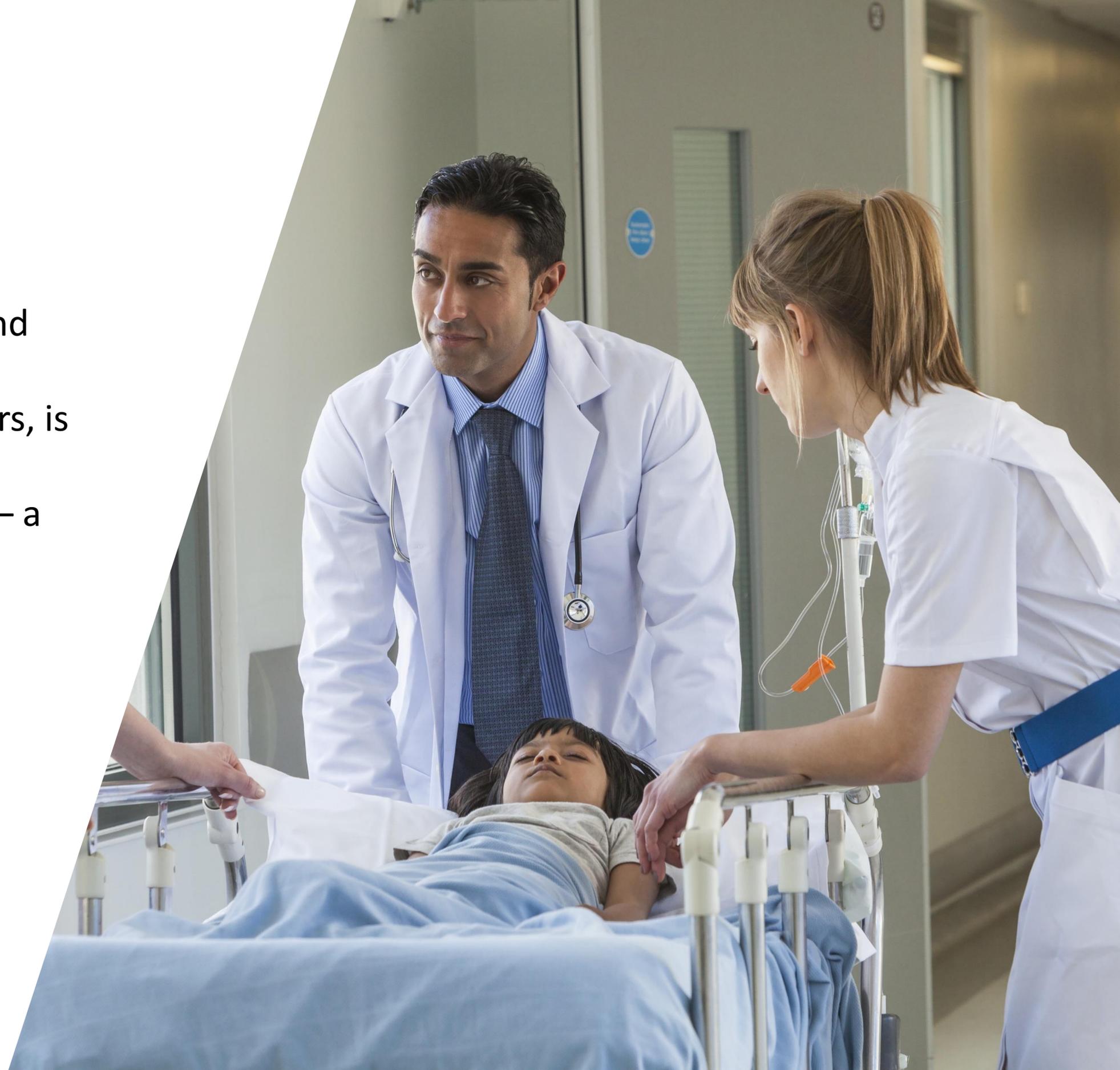
## Policies & Procedures

- Unique policies for children such as family reunification, psychosocial support, etc.
- How to care for and place children who are alone

## Transport & Pre-Hospital Care

- Triage and transport needs are different
- Locations of disasters (daycare, school) tend to be unique
- How to transfer between adult/peds hospitals?

One way to both improve regional and adult hospital preparation and responsiveness to children in disasters, is to begin incorporating children into Hazard Vulnerability Analyses (HVA) – a tool many healthcare organizations already use.





A commonly used tool by emergency managers to prepare for disasters.

HVAs identify hazards, their probability of occurrence, their potential impacts, and assess overall risk by incorporating existing mitigation efforts.

Ideally, they should account for population-specific characteristics (i.e. ages, medical needs, health conditions) and population-specific vulnerability to different disasters

HVAs vary based on an institution's location, population served, and community vulnerabilities.

Just as adult and community hospitals tend to not include pediatric considerations in their disaster planning...

... these same regions and hospitals tend to omit children from HVAs.





Though HVAs vary across the country, most tend to use one of three templates:

- 1** Kaiser Permanente
- 2** Pennsylvania Public Health Risk Assessment Tool (PHRAT)
- 3** Threat / Hazard Assessment Module (THAM)
- 4** Others....





# Pennsylvania Public Health Risk Assessment Tool (PHRAT) HVA:

## Pennsylvania Public Health Risk Assessment Tool Baseline At-Risk Populations

### Hearing Disability

Percent of Population with a Hearing Disability:

Population Size Score:

0

Data Source:

### Vision Disability

Percent of Population with a Vision Disability:

Population Size Score:

0

Data Source:

### Ambulatory Disability

Percent of Population with na Ambulatory Disability:

Population Size Score:

0

Data Source:

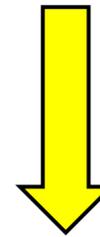
### Cognitive Disability

Percent of Population with a Cognitive Disability:

Population Size Score:

0

Data Source:



### Children Under 18

Percent of Population Under Age 18:

Population Size Score:

0

Data Source:

### Elderly 65 and Older

Percent of Population Age 65 and Older:

Population Size Score:

0

Data Source:



# Pennsylvania Public Health Risk Assessment Tool (PHRAT) HVA:

Probability

Probability:

Probability Score: 2  
Occasional

Human Impact

Mortality

Baseline Mortality per Day:

Hazard-Related Increase in Mortality per Day:

Magnitude Score:

0: No change from baseline  
1: ≤ 5% increase  
2: ≤ 50% increase  
3: ≤ 100% increase  
4: >100% increase

**OR, Estimate the Magnitude Qualitatively:**

**Qualitative Magnitude Score:**

Duration of Impact:

Duration Score:

Data Source / Explanation (Optional):

Mortality Score:

EMS Transports

Baseline Transports per Day:

Hazard-Related Increase in Transports per Day:

Magnitude Score:

0: No change from baseline  
1: ≤ 5% increase  
2: ≤ 50% increase  
3: ≤ 100% increase  
4: >100% increase

Healthcare Service Impact

Outpatient Services

Baseline PCPs:

Hazard-Related Loss of PCPs:

Hazard-Related Increase in Demand for PCPs per Day:

(PCP Demand = Increase in Office Visits / 20)

Magnitude Score:

0: No change from baseline  
1: (Baseline + ↑ demand) / (Baseline - ↓ supply) ≤ 1.05  
2: (Baseline + ↑ demand) / (Baseline - ↓ supply) ≤ 1.5  
3: (Baseline + ↑ demand) / (Baseline - ↓ supply) ≤ 2  
4: (Baseline + ↑ demand) / (Baseline - ↓ supply) > 2

**OR, Estimate the Magnitude Qualitatively:**

**Qualitative Magnitude Score:**

Duration of Impact:

Duration Score:

Data Source / Explanation (Optional):

Outpatient Services Score:



Even within the more detailed PHRAT categories, there is still important considerations about children that are missing:

- Cannot determine how pediatric anatomy, mobility, development leads to different presentations and outcomes
- Does not stratify within the '18 and younger' population – though a community's population breakdown is important.
- Does not discuss pediatric-specific policies such as reunification, mental health, transfers to adult/peds hospitals, etc.

To provide regional and hospital emergency managers with a flexible way to include children in their disaster preparedness efforts, we developed a novel pediatric HVA template to be used on its own or alongside existing frameworks.

# PEDIATRIC HVA | EGL Template



PEDIATRIC VULNERABILITY SCORING MATRIX																
Location: Hospital/Region	Hazard Impact / Severity Measures									Probability Measures		Hazards Preparedness Efforts				
Date:	Human Impact			Healthcare System Impact			Community Safety Infrastructure					VULNERABILITY SCORE	Human Impact Preparedness	Healthcare System Impact Preparedness	Community Safety Infrastructure Preparedness	OVERALL RISK SCORE
Pediatric Hazard Description	Acute Pediatric Morbidity	Long-Term Pediatric Morbidity	Hospital	Public Health	Emergency Medical Services	Family Reunification	School/Childcare	Shelter/Food	IMPACT SCORE	# Regional Events	Likelihood Score*					
Identified Potential Hazard ; when scoring, consider a reasonable worst case scenario.	1 - Low 2 - Medium 3 - High	Weighted score of hazard impact alone	If known, indicate number of hazards in past 5 years	0 - Implausible 1 - Low 2 - Moderate 3 - High	Weighted score of hazard impact, incorporating likelihood	1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	Weighted risk of exposure to hazard impact, incorporating likelihood and preparedness							
<b>I. NATURAL OCCURRING HAZARDS</b>																
<u>Tornado/Severe Wind</u>									0.00			0.00				0.00
<u>Severe Thunderstorm</u>									0.00			0.00				0.00
<u>Public Health Epidemic</u>									0.00			0.00				0.00
<u>Sinkholes/Karst</u>									0.00			0.00				0.00
<u>Earthquake</u>									0.00			0.00				0.00

The workbook-based template informs regional and hospital managers about their institution’s pediatric risk and resiliency as well as how they are for the pediatric consequences of those disasters.

It is **not** meant to be a thorough checklist of preparation – but instead spur the inclusion of general pediatric considerations into HVAs.



## Impact Score

Determines a hazard's impact on children. Broken into pediatric-specific *impact / severity* categories that mirror PHRAT (*human, healthcare system, and community safety infrastructure* impacts) and then novel sub-categories that apply to children.

## Vulnerability Score

Incorporates hazard probability into the '*impact score*'.

## Overall Risk Score

Allows managers to input their region's and/or hospital's preparedness (using the same categories as the '*impact score*' to gauge overall hazard preparedness.



**Hazard Impact / Severity Measures**

<b>Hazard Impact / Severity Measures</b>								
<i>Human Impact</i>		<i>Healthcare System Impact</i>			<i>Community Safety Infrastructure</i>			
<b>Acute Pediatric Morbidity</b>	<b>Long-Term Pediatric Morbidity</b>	<b>Hospital</b>	<b>Public Health</b>	<b>Emergency Medical Services</b>	<b>Family Reunification</b>	<b>School/Childcare</b>	<b>Shelter/Food</b>	<b>IMPACT SCORE</b>
1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	1 - Low 2 - Medium 3 - High	<i>Weighted score of hazard impact alone</i>



### Impact Scoring Key

		Domain	Impact is Low (1)	Impact is Medium (2)	Impact is High (3)
<b>Human Impact Preparedness</b>		<b>Acute Pediatric Morbidity</b>	Small number of children affected; isolated incident	Potential for moderate number of children impacted across multiple locals	Large number of children impacted, potentially state or nationwide
			Minimal types and low number of predicted pediatric acute injuries from hazard	Increasing severity and numbers of pediatric injuries predicted	Very severe types and numbers of pediatric injuries predicted
			Age-based physiology makes children marginally more vulnerable to the hazard	Age-based physiology makes children moderately more vulnerable to the hazard	Age-based physiology makes children significantly more vulnerable to the hazard
			Mild physiologic impact across all pediatric age distributions*	Mild to moderate physiologic impact across all age distributions and/or 1-2 age distributions significantly impacted*	Significant physiologic impact across more than 1 pediatric age distribution and/or 1-2 age distributions lethally impacted*
		<b>Long-Term Pediatric Morbidity</b>	Little to no long-term pediatric injuries predicted from hazard	Increasing severity and types of long-term pediatric injuries predicted	Very severe types and numbers of long-term pediatric injuries predicted
			Long-term effects do not adversely impact youngest age distributions*	Mild to moderate long-term effects adversely impact youngest age distributions*	Lifelong and severe hazard effects adversely impacting youngest age distributions*
			Long-term mental health and/or rehabilitation needs met by existing system	Long-term mental health and/or rehabilitation needs bring system to capacity; may need to expand beyond current mental health resources	Long-term mental health and/or rehabilitation needs exceed current system capacity; state-level support needed due to severe and broad impacts



Our HVA tool introduces often missed and consequential pediatric considerations into the disaster planning process.



Designed to be used *alongside* existing tools and mirror PHRAT/Kaiser. Even if not used as a thorough preparedness template, it can be used to educate on these topics.



A limitation of our HVA is its specificity. Will regions need a separate tool for each age-group or population? How time-consuming and burdensome would that become?

We hope the use of our template leads to improved pediatric equipment management, introduction of new policies, and the establishment of new relationships with transfer facilities, government agencies, and EMS.

# PEDIATRIC HVA

# EGL Template



## Severe Winter Blizzard/Cold

Freezing rain, sleet, heavy snow, blizzards, icy roadways, extreme low temperatures, and strong winds.

Human Impact	
Acute Pediatric Morbidity	Long-Term Pediatric Morbidity
<p>Potential for moderate number of children affected, depending on spread of blizzard</p> <p>Children's large body surface area/body mass ratio, less subcutaneous fat, peripheral vasoconstriction, and lack of mobility makes them more prone to multiple types of cold injuries, including hypothermia and frostbite. Younger ages (0-2 yo, 3-5 yo) worst affected.</p> <p>Several types of injuries including hypothermia, frostbite, carbon monoxide poisoning, sledding, MVCs, etc.</p>	<p>Minimal long-term physiologic or mental health injuries predicted</p> <p>Predicted mental health / rehabilitation needs can be met by current system</p>
Assigned Score: 2	Assigned Score: 1

## Impact Scoring Key

Domain	Impact is Low (1)	Impact is Medium (2)
Acute Pediatric Morbidity	Small number of children affected; isolated incident	Potential for moderate number of children impacted across multiple locals
	Minimal types and low number of predicted pediatric acute injuries from hazard	Increasing severity and numbers of pediatric injuries predicted
	Age-based physiology makes children marginally more vulnerable to the hazard	Age-based physiology makes children moderately more vulnerable to the hazard
Long-Term Pediatric Morbidity	Mild physiologic impact across all pediatric age distributions*	Mild to moderate physiologic impact across all age distributions and/or 1-2 age distributions significantly impacted*
	Little to no long-term pediatric injuries predicted from hazard	Increasing severity and types of long-term pediatric injuries predicted
	Long-term effects do not adversely impact youngest age distributions*	Mild to moderate long-term effects adversely impact youngest age distributions*
	Long-term mental health and/or rehabilitation needs met by existing system	Long-term mental health and/or rehabilitation needs bring system to capacity; may need to expand beyond current mental health resources



**THANK YOU!**

[Hazard Vulnerability Analysis Template • EICC \(emscimprovement.center\)](#)