

Disaster Response: Climate, Health, and Energy

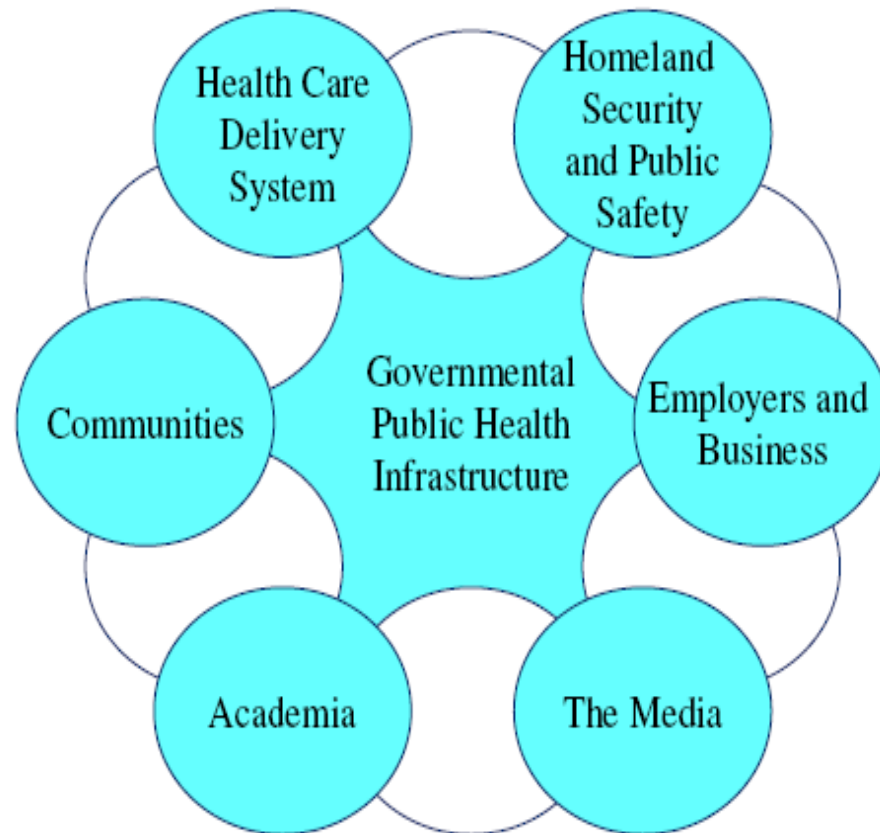
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21st Century Public Health Preparedness Challenges

- Pandemic flu
- Chronic disease
- Terrorism
- Disaster mental health
- **Climate Change**
- ***Petroleum Scarcity***



Public Health Preparedness System Framework

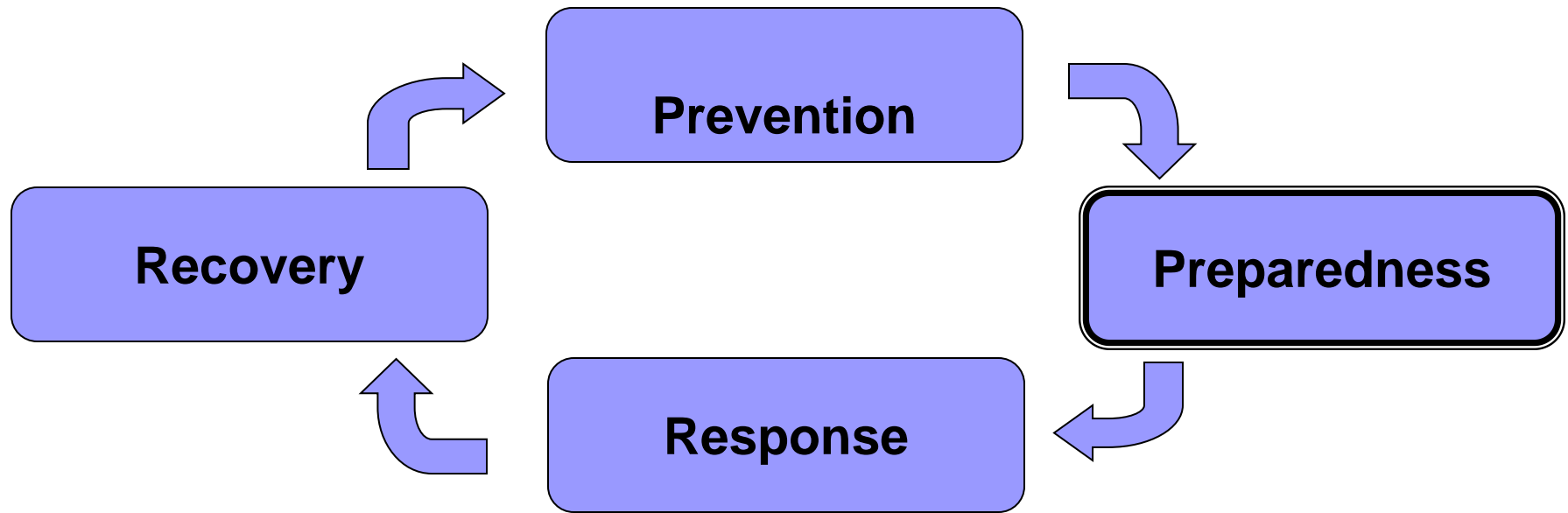


IOM 2008

All disasters start **locally**.

- Regardless of type or magnitude
- Necessitates *locally-driven* response
- Requires *at least* 72-hour self-sustainability at local level post-onset
 - Longer for pandemic flu scenario
 - These estimates do not factor petroleum scarcity

4 Phases of Emergency Management



Petroleum Scarcity and Disaster Response Challenges

Petroleum Scarcity Challenges:

- Cut across all hazards
- Intensify known hazards
- Create “new” hazards
- Impact entire PH preparedness system

Petroleum Scarcity and Local Disaster Impacts

- Impact on emergency response system capacity at all jurisdictional levels
- A Local “Perfect Storm”
 - Local self-sustainability requirements and duration will **increase**
 - Local infrastructure resources will **decrease**
 - Physical and psychological vulnerabilities will **increase**

Petroleum Scarcity and Prevention Phase

- Prevention phase (“pre-event”)
- Disaster prevention needs more attention than ever!
 - Climate-change related physical events
 - E.g., identifying coastal communities at risk and considering relocation *pre-event*
 - Psychosocial preventive measures
 - Psychological “immunization” (*resistance*)
 - Inadequately addressed by National Planning Scenarios

Petroleum Scarcity and Preparedness Phase

- Preparedness phase (“pre-event”)
- Petroleum Scarcity disaster preparedness: inadequate to nonexistent
 - Minimal general public awareness
 - Extremely limited local planning/education
 - Inadequately addressed by National Planning Scenarios

Petroleum Scarcity and Response Phase

- Response (crisis phase – “event”)
 - Increased duration
 - Increased severity
- Example: pandemic flu and transportation



Petroleum Scarcity and Recovery Phase

- Recovery (consequence phase – “post-event”)
 - Increased duration
 - Increased severity
- Example: weather-related events and infrastructure restoration



The Haddon Matrix

	HOST	AGENT	PHYSICAL ENVIRONMENT	SOCIO-CULTURAL ENVIRONMENT
PRE-EVENT				
EVENT				
POST-EVENT				

The Haddon Matrix: Example

Haddon's Matrix, Pedestrian Injury Example

		Epidemiological Dimension			
		Human Factors	Agent or Vehicle	Physical Environment	Sociocultural Environment
Event Dimension	Pre-Event	Intoxicated pedestrian	Speeding vehicle	Intersection with poor lighting	Low rate of enforcement of yield laws
	Event	Osteoporosis in elderly pedestrians	Car front-end profile	Road surface characteristics	Speed limits
	Post-Event	Elderly pedestrian	Crash investigation with vehicle inspection	Distance to trauma care facility	Regionalized trauma care

The Haddon Matrix: Event (Response Phase)

	HOST	AGENT	PHYSICAL ENVIRONMENT	SOCIO-CULTURAL ENVIRONMENT
PRE-EVENT				
EVENT				
POST-EVENT				

The Haddon Matrix: Host

	HOST	AGENT	PHYSICAL ENVIRONMENT	SOCIO-CULTURAL ENVIRONMENT
PRE-EVENT				
EVENT				
POST-EVENT				



Host/Event : Petroleum Scarcity Considerations

- Heightened morbidity and mortality
- Pronounced psychological impacts
- Diminished “human” response infrastructure

- Patients

- Mental health surge

- Psychological : Physical Casualties at least 4:1

- Based on **current (“non-Petroleum Scarcity”)** scenarios

- Response personnel

- Psychosocial vulnerabilities

- ***Willingness*** to respond

The Haddon Matrix: Agent

	HOST	AGENT	PHYSICAL ENVIRONMENT	SOCIO-CULTURAL ENVIRONMENT
PRE-EVENT				
EVENT				
POST-EVENT				

Agent/Event: Petroleum Scarcity Considerations

- New/emerging pathogens
- Increased virulence in face of weakened immunity
- Increased frequency/intensity of weather-related disasters
- “Psychological contagion”

The Haddon Matrix: Physical Environment

	HOST	AGENT	PHYSICAL ENVIRONMENT	SOCIO-CULTURAL ENVIRONMENT
PRE-EVENT				
EVENT				
POST-EVENT				

- Fossil fuel-dependency of PH preparedness infrastructure
 - Supplies/Equipment
 - Transportation
 - Hospitals / EDs

■ **Petrochemical** applications in disasters: a selected list

- Anesthetics
- Antihistamines
- Bandages
- Heating and Cooling
- Pharmaceuticals
- Refrigerators
- Synthetic rubber
- Splints
- Transportation
- X-ray dyes

Physical Environment/Event: Stockpiles

■ Strategic National Stockpile

- 12-Hour Push Packs (less than 5% of the SNS inventory)
 - Broad-spectrum oral and intravenous antibiotics
 - Other medicines for emergency conditions
 - IV fluids and fluid administration kits
 - Airway equipment, such as ET tubes, stylettes, oropharyngeal airways, Ambu-Bags, and CO2 detectors
 - Bandages
- Vendor Managed Inventories
 - Vaccines
 - Antitoxins (e.g., Botulinum)
 - Ventilators
 - Additional quantities of 12-Hour Push Pack items

Physical Environment/Event: Transportation

- Access to supplies/equipment
 - SNS transport issues
- Ambulance – EMS services
- Access to healthcare settings by patients and **providers**
 - Rural areas especially (but not exclusively) challenged

- 1973 Oil Crisis
 - Plastic syringe manufacturers
 - Shortages in ethylene and benzene
 - Increased price
 - Delayed delivery to end-users

Clark GB, Kline B. *Public Health Rep.* 1981;96(2):111-115.

Transportation Issues – Ambulance Services

- Ambulances frequently diverted from overcrowded EDs to more distant hospitals (which may have fewer resources)
 - Ambulances diverted 501,000 times in 2003
 - 1 ambulance diverted per minute

IOM: *Hospital-Based Emergency Care: At the Breaking Point* (2007)

Transportation Issues – LHD Workers

Attitude/Belief Construct	Weather	Pan flu	Dirty bomb	Anthrax
Knowledgeable about PH impact	77%	82%	45%	63%
Awareness of role-specific responsibilities	54%	64%	36%	52%
Psychologically prepared	77%	76%	45%	62%
Ability to safely get to work	65%	76%	39%	60%
Confidence in safety at work	71%	66%	35%	54%
Family prepared	70%	69%	46%	57%
Health Department's perceived ability to provide timely information	74%	81%	58%	71%
Ability to address public questions	66%	69%	35%	52%
Importance of one's role in the agency's overall response	71%	76%	53%	67%

- Qureshi et al (2005) study of 6,428 workers [GNYHA]
 - Most frequently cited barriers to **ability** to respond in disasters
 - **Transportation (33.4%)**
 - Child care (29.1%)
 - Personal health concerns (14.9%)
 - Elder care (10.7%)
 - Pet care (7.8%)
 - Second job obligations (2.5%)

Qureshi K, Gershon RR, Sherman MF et al. *J. Urban Health* 2005; 82(3): 378-88.

The Haddon Matrix: Socio-Cultural Environment

	HOST	AGENT	PHYSICAL ENVIRONMENT	SOCIO-CULTURAL ENVIRONMENT
PRE-EVENT				
EVENT				
POST-EVENT				

- Societal expectations toward PH preparedness systems
- Scarce resource allocation: policy and ethics

Conclusions

- Impact of Petroleum Scarcity is on entire PH preparedness system
- Haddon matrix can be used to parcel out phases and factors
- Local planning must be a priority
- Must consider psychosocial impacts for general public and responders
- Need to explicitly incorporate Petroleum Scarcity into current disaster planning scenarios and exercises
- Must address ethical issues as an urgent priority for healthcare system preparedness

Questions?

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