

2006 NASA Occupational Health Conference

Planning for Environmental Threats:

How Ready Are We?

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Objectives

- 1. Discuss the importance of specific environmental health-related threats and disasters that impact workers, workplaces, and communities.**
- 2. Describe the importance of preparedness for environmental health/disaster events (e.g., pandemic flu).**
- 3. Discuss the role of the occupational and environmental health professional in advocacy, risk communication, support, and management (e.g., hurricanes Katrina and Rita).**

According to the CDC...

As we move into the 21st Century, new health and safety challenges have emerged or will emerge:

- **Infectious diseases (e.g. SARS, monkeypox, pandemic influenza)**
- **Terrorism**
- **Environmental threats (e.g. hurricanes, wildfires, mudslides, toxic chemical spills)**
- **Aging population**
- **Lifestyle factors (e.g. tobacco use, poor nutrition, physical inactivity)**

Environmental Threats...

like biological, chemical, nuclear, radiological, and natural disasters are mostly

- **Unfamiliar**
- **Unpredictable**
- **Unfair**

What does this mean for us?

- **Challenge adaptation needed**
- **Threat preparation needed**
- **Better public health systems needed**

CDC's *New* Health Protection Goals

- **People: Healthy People in Every Stage of Life**
- **Places: Healthy People in Healthy Places**
- **Preparedness: Prepared for Emerging Threats**
- **Global: Healthy People in a Healthy World**

Focus: Preparedness for Emerging Health Threats

Protection from infections, occupational, environmental, and terrorist threats

- **Pre-event**
- **Event**
- **Post-event**

Haddon Matrix

DHS Emergency Management Program

Pre-event



Training, structural, and evaluation system

- Preparedness
- Risk Mitigation

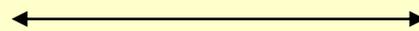
Event



Emergency actions implemented

- Response

Post-event



Restoration after injury, illness, destruction

- Recovery

Preparing for Emerging Health Threats

(CDC, 2006)

- **Pre-event:**
 1. **Increase interventions**
 2. **Decrease time to classify health events**
 3. **Decrease detection and reporting time needed (chemical, biological, radiological agents)**
 4. **Improve communications**
- **Event:**
 5. **Decrease time to identify causes and risk factors**
 6. **Decrease time needed to provide countermeasures and interventions**
- **Post-event**
 7. **Restore health services and environmental safety to pre-event levels**
 8. **Improve long-term follow-up**
 9. **Implement recommendations from after-action reports quickly**

Avian Flu: Preparing for a Pandemic



Why a Pandemic?

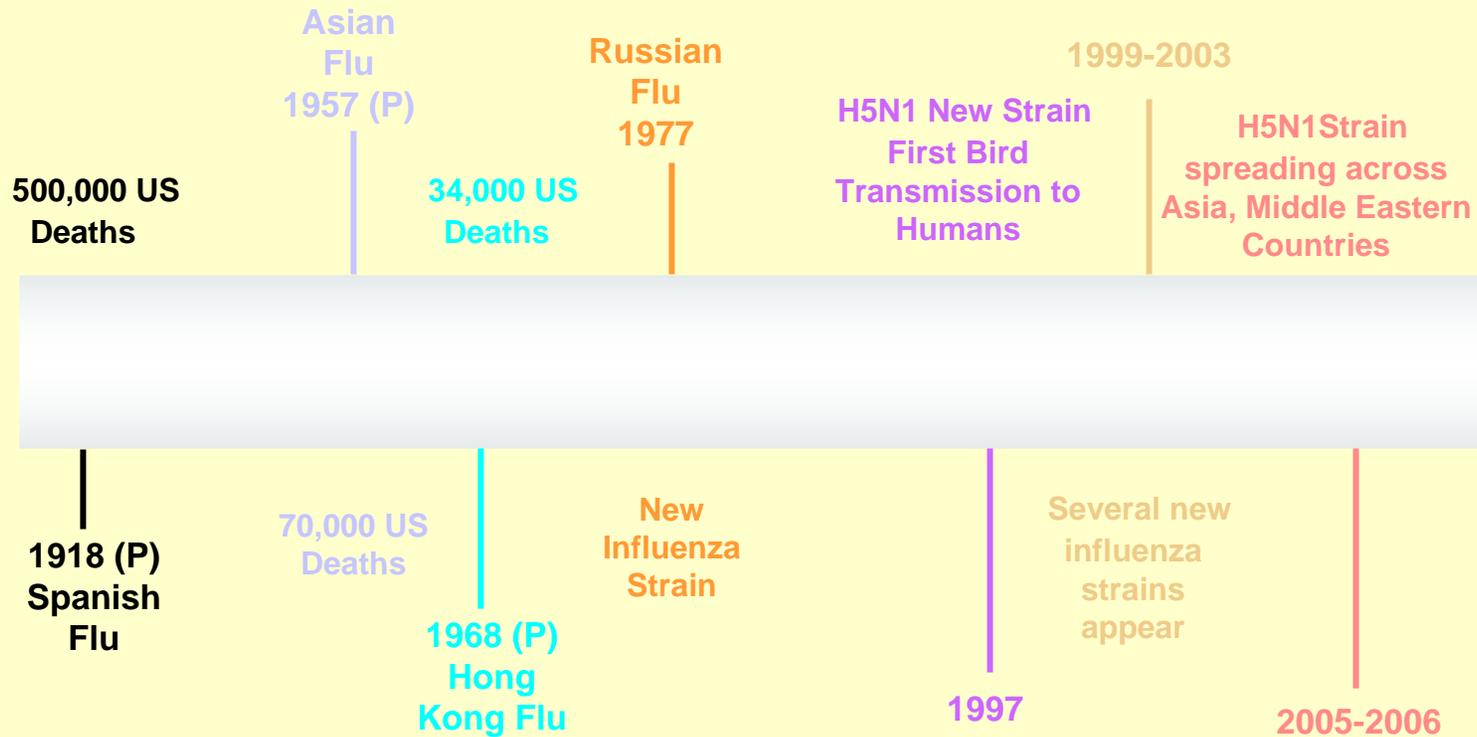
A pandemic occurs when a new strain of the influenza A virus strikes humans, spreads easily from person to person, and causes serious illness with a high death rate.

Pandemic

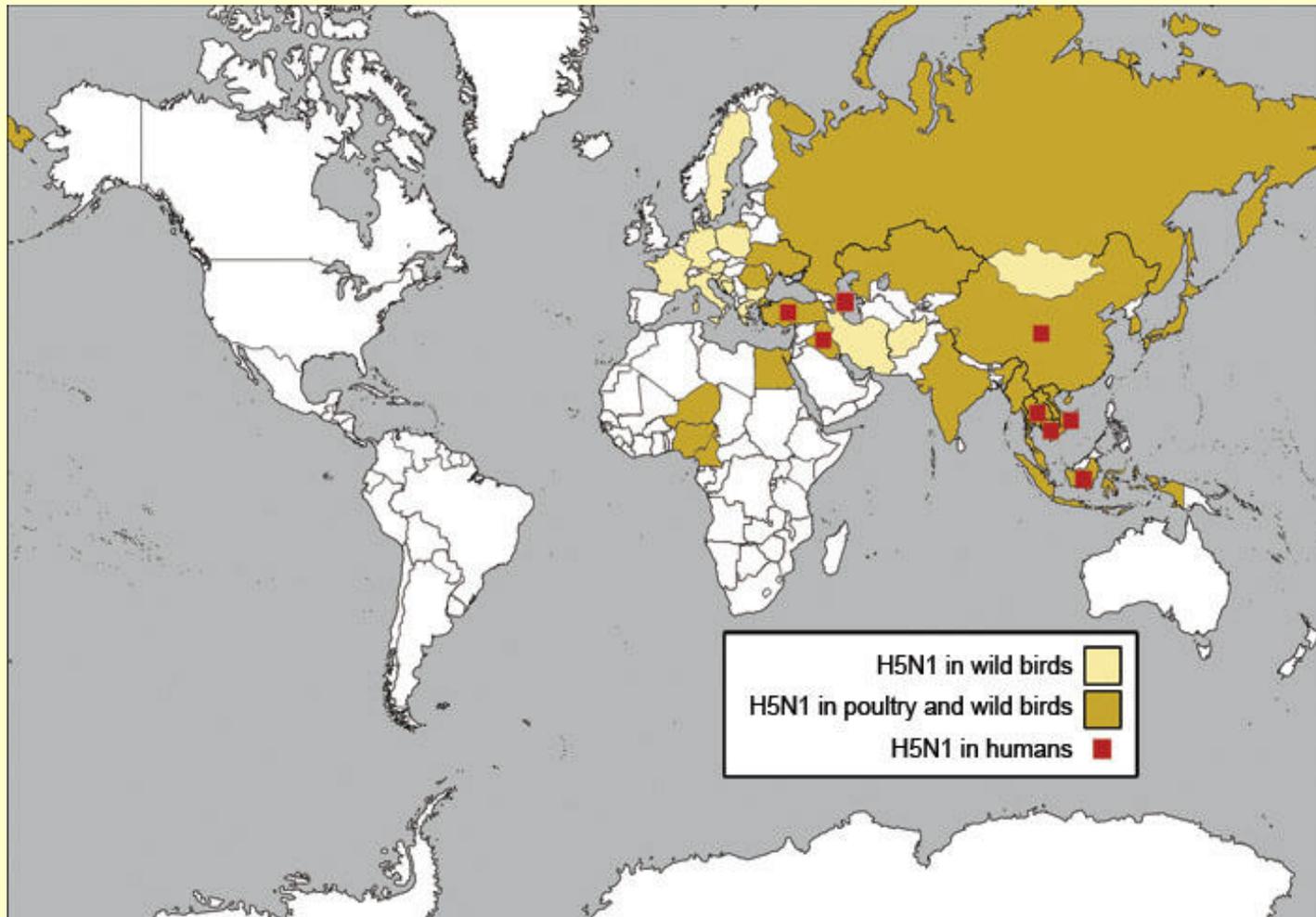
An influenza pandemic has the potential to cause more death and illness than any other public health threat. If a pandemic influenza virus with similar virulence to the 1918 strain emerged today, in the absence of intervention, it is estimated that 1.9 million Americans could die and almost 10 million could be hospitalized over the course of the pandemic, which may evolve over a year or more. Although the timing, nature, and severity of the next pandemic cannot be predicted with any certainty, preparedness planning is imperative to lessen the impact of a pandemic.

(DHHS, 2005)

Flu Timeline



Nations With Confirmed Cases H5N1 Avian Influenza (April 4, 2006)



Influenza Pandemic Comparisons

Year	Worldwide death estimates (millions)	Worldwide population (billions)
1918-1919	20-100	1.8
1957-1958	2	2.8
1968-1969	1	3.6
Avian flu estimates (if pandemic were to emerge in 2006)	7.5-more than 350	6.5

Sources: Population data from U.S. Census Bureau
Death estimates from World Health Organization and others

Pandemic Poses Potential to Stress U.S. Health Care Delivery

	Low impact	High impact
Total number infected	38 million	90 million
Outpatient hospital visits	18 million	42 million
Hospitalized	314,000	734,000
Deaths	89,000	207,000
Estimated economic impact	\$71.3 billion	\$166.5 billion

Source: <http://www.cdc.gov>

Seasonal Flu versus Pandemic

Seasonal = Variant strain of existing influenza virus A

Pandemic = New influenza A virus emerges

A Global Threat

A human influenza pandemic...

- **Low-frequency/high-severity events**
- **Total severity of a pandemic unknown but will have worldwide consequences**
- **25% - 35% population affected**
- **More than 7 million deaths from even a mild pandemic (WHO)**
- **Between 89,000 to 207,000 deaths in the U.S.(CDC)**
- **≥ 25 percent of a countries' workers will be absent between 5 and 20 sick days (United Kingdom Department of Health)**
- **\$800 billion in worldwide economic damage (World Bank)**
- **Major disruptions to every industry, particularly those with strong ties to travel, tourism, sports and entertainment, lodging, and health care**

Pandemic Disease

- **Susceptibility universal**
- **Clinical disease attack rate = 30%**
~ 90 million infected
- **Deaths from 207,000 – 1.9 million**
- **High risk: infants, elderly, pregnant, chronic illness, immunocompromised**
- **At least 2 viral waves**
- **Extraordinary demands on healthcare system**

Increase Potential for Pandemic Disease

- **Global population larger and more urbanized**
- **Increased travel**
- **More elderly and chronically ill**

The probable onset of a pandemic

STAGE ONE

Emergence of a virus to which the general population will have little or no immunity

A human with flu visits a bird market, cockfight or infected stretch of water



The person catches avian flu from a bird by way of its blood, sputum or feces



STAGE TWO

Replication of a dangerous virus

The two viruses exchange genetic material to become a virus that transmits easily between humans, who have no immunity to this new virus



STAGE THREE

Sustained virus replication from human to human

The virus, that causes serious illness in humans when it replicates in humans, spreads to other humans. It takes several days for symptoms to show so they are unaware they are contagious or spreading the disease



An infected person catches a plane to a hub airport



Many more people, in many more countries, now carry the supervirus

If the present avian flu virus in Asia and now eastern Europe is to become a pandemic it must reach stage three above and change so that it can transmit human to human. (AON, 2005)

Since 2003...

- **148 Human cases of H5N1 virus (avian flu) reported in Thailand, Cambodia, Vietnam, and Indonesia; 2 confirmed human to human transmission**
- **Death rate 50%**

(DHHS, 2005)

Characteristics of an Influenza Pandemic for Strategic Planning

- **Virus spreads rapidly worldwide**
- **Asymptomatic while infectious**
- **Simultaneous or near-simultaneous outbreaks in communities across the U.S.**
- **Enormous demands on the healthcare system**
- **Unavailability of vaccines and antiviral drugs**
- **Potential disruption of national and community infrastructures including transportation, commerce, utilities, and public safety**

HHS Pandemic Influenza Plan



U.S. Department
of Health and
Human Services

November 2005



Lessons from History

- **Quarantine and travel restrictions can only delay the spread of a pandemic event**
- **Preparations have value**
- **Monitoring is a necessity**



Business Pandemic Influenza Planning (CDC, 2006)

Plan for the impact of a pandemic on your business:

- **Pandemic preparedness coordinator and/or team**
- **Essential employees and other critical inputs**
- **Ancillary workforce**
- **Likely scenarios preparation**
- **Impact on company business financials**
- **Impact on business-related domestic and international travel**
- **Current pandemic information from community public health/emergency management services**
- **Emergency communications plan**
- **Exercise/drill test of the plan**

Business Pandemic Influenza Planning

(con't)...

Plan for the impact of a pandemic on your employees and customers:

- **Allow for employee absences**
- **Modify the frequency and type of face-to-face contact**
- **Track annual influenza vaccination**
- **Access to and availability of health and mental health services**
- **Prepare for those with special needs**

Business Pandemic Influenza Planning

(con't)...

Establish policies to be implemented during a pandemic:

- **Employee compensation, sick-leave absences, and flexible worksites**
- **Preventing influenza spread at the worksite**
- **Travel restriction**
- **Authorities, triggers, and procedures**

Business Pandemic Influenza Planning

(con't)...

Allocate resources to protect your employees and customers during a pandemic:

- **Infection control supplies in all business locations**
- **Information technology infrastructures**
- **Medical consultation and advice for emergency response**

Business Pandemic Influenza Planning

(con't)...

Communicate to and educate your employees:

- **Materials dissemination**
- **Fear and anxiety, rumors, and misinformation**
- **Culturally and linguistically appropriate information**
- **At-home care of ill employees and family members**
- **Community sources and resources for timely and accurate pandemic information**
- **Timely worksite communication**

Business Pandemic Influenza Planning

(con't)...

Coordinate with external organizations and help your community:

- **Insurers, health plans, local healthcare facilities, federal, state, and local public health agencies and/or emergency responders**
- **Best practices communications**

Before an Outbreak (Marsh, 2006)

- **Manage the event before it becomes a crisis**
- **Understand the nature of the disease and its business impact**
- **Review corporate-preparedness plans, procedures, policies**
- **Know what to do and whom to inform should a suspected case of avian flu among employees occur**

Upon Outbreak

Information and Communication Concerns

- **Transmissibility**
- **Procedures and contacts**
- **Communications with absent employees or clients**

Upon Outbreak (con't)...

Human-Resource/Benefit Concerns

- **Work at home or if an infected employee comes to work**
- **Transfer options**

Upon Outbreak (con't)...

Operational Concerns

- Operate with ≥ 25 % absenteeism
- Procedures to decontaminate the facility
- How will traveling employees be brought home, particularly if they are sick?
- On-call crisis management team

Upon Outbreak (con't)...

Risk-Communication Concerns

- Executives deliver the right messages
- Mechanisms for managing internal and external communications. What if they fail?
- Trained spokespeople for dealing with the media and other stakeholders

After an Outbreak

- **Business-recovery team**
- **Continuity strategies for stress-related outcomes and return to work**

Key Risk Communication Concepts

(DHHS, 2005)

- **Need information about what is known and unknown from authoritative sources**
- **Guidance about protection of self, family members, and colleagues**
- **Avoid over-interpretation of data, overly confident assessments of investigations, and speculation**
- **Healthcare workers and public health staff are likely to be involved in media relations and public health communications**
- **Be transparent**

Key Risk Communication Actions

- **Provide regular updates**
- **Distribute practical information (e.g., travel advisories, antiviral medications, vaccines)**
- **Self-care information**
- **Address rumors/misinformation promptly**
- **Minimize stigmatism**

Acknowledge...

- * **Uncertainty**
- * **Unpredictability**

Hospital Settings/Occupational Health

- Health workers' protection from exposures
- Ill workers' management
 - Sign/Symptom detection plan
 - Assignment of staff
- Time-off policies
- Reassignment of high risk staff
- Psychosocial health services
- Vaccine/antiviral drugs
- Risk/recuperation sites
- Surge issues
- Confidentiality

Hospital Settings/Occupational Health

(con't)

- **Infection control practices**
- **Personal protective equipment**
- **Waste disposal**
- **Environmental cleaning**
- **Information/education**
- **Resources/supports**

Research

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graph TD; Research[Research] --- ImprovedDiagnostics[Improved Diagnostics]; Research --- AntiviralDrugs[Antiviral Drugs]; Research --- Vaccines[Vaccines]; Research --- SurgeCapacity[Surge Capacity]; Research --- Preparedness[Preparedness]; Research --- RiskCommunication[Risk Communication];
```

Improved Diagnostics

Antiviral Drugs

Vaccines

Surge Capacity

Preparedness

Risk Communication

Summary

IMPACT OF PANDEMIC INFLUENZA ON HEALTHCARE WORKERS

- Increased risk of exposure to pandemic influenza
- Need for special precautions to avoid viral exposure
- Illness and death among patients, as well as among colleagues and family members
- Stigmatization and discrimination associated with being perceived as a source of contagion
- Ethical dilemmas, such as conflicts between one's roles as healthcare provider and parent/spouse, or concern about receiving vaccines or antiviral drugs before other people
- Difficulty in performing crucial tasks and functions as the number of severely ill patients increases, healthcare staff decreases, and medical and infection control resources deplete
- Frustration to maintain business as usual
- Physical isolation / limit interpersonal contact

(DHHS, 2005)



**Occupational and
Environmental Health and
Safety: Response to Hurricanes
Katrina and Rita Survey**

**AAOHN and ACOEM Survey
December 2005**

Purpose of Survey

- **To identify the roles health care professionals played in the response efforts for Hurricanes Katrina and Rita.**
- **To determine the information and resources health care professionals needed during the response.**
- **To identify any challenges faced in the efforts to protect the health and safety of their employees.**
- **To help in the continuing efforts to design a preparedness system that maximizes the skills and expertise of occupational and environmental health physicians and nurses.**

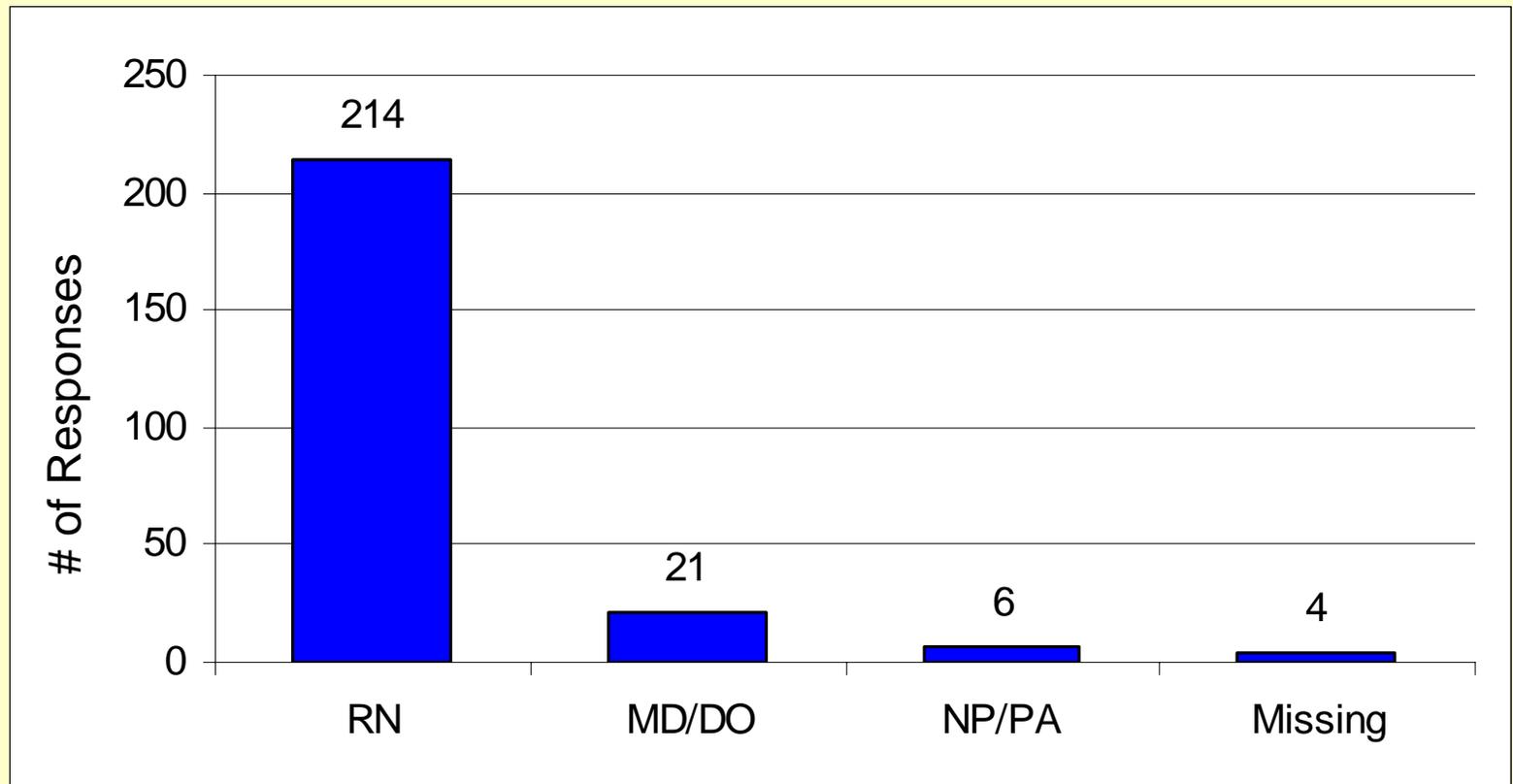
Survey Selection

- **E-mail survey conducted from October 2005 to December 2005**
- **ACOEM: 4,000 members**
- **AAOHN: 7,300 members**

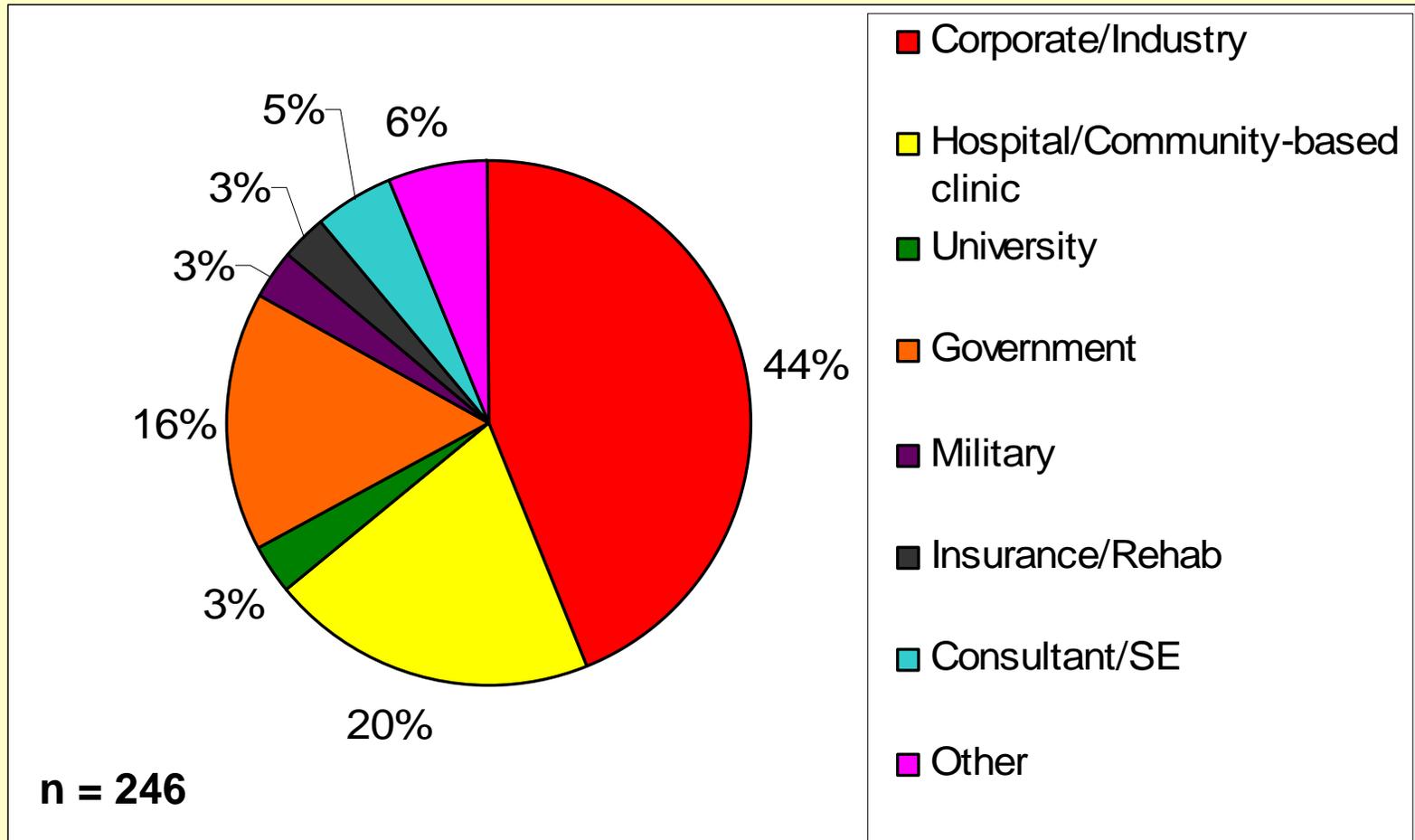
n = 725 Respondents

Survey Respondents Involved in Disaster Management

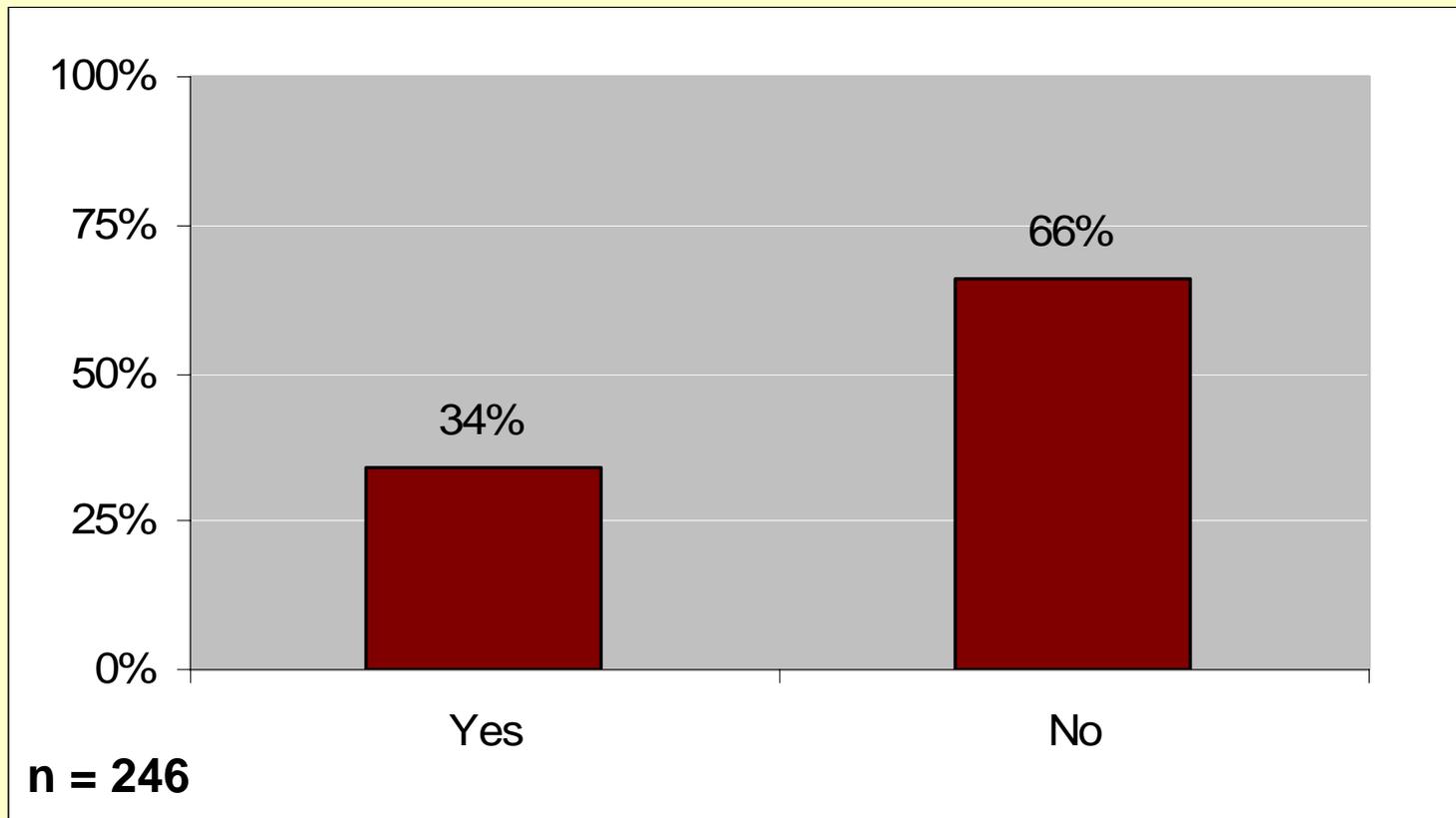
246 respondents



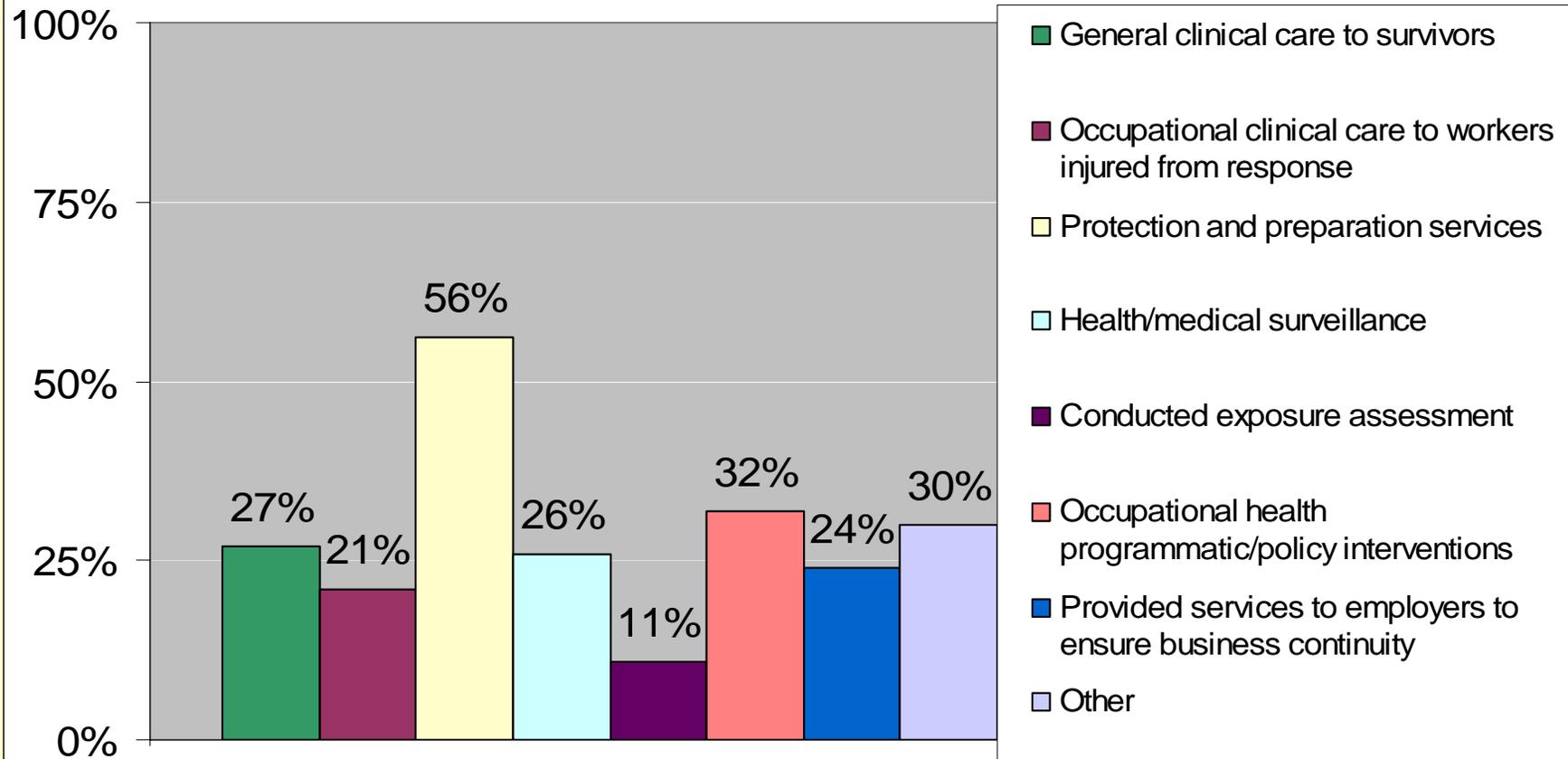
Practice Settings



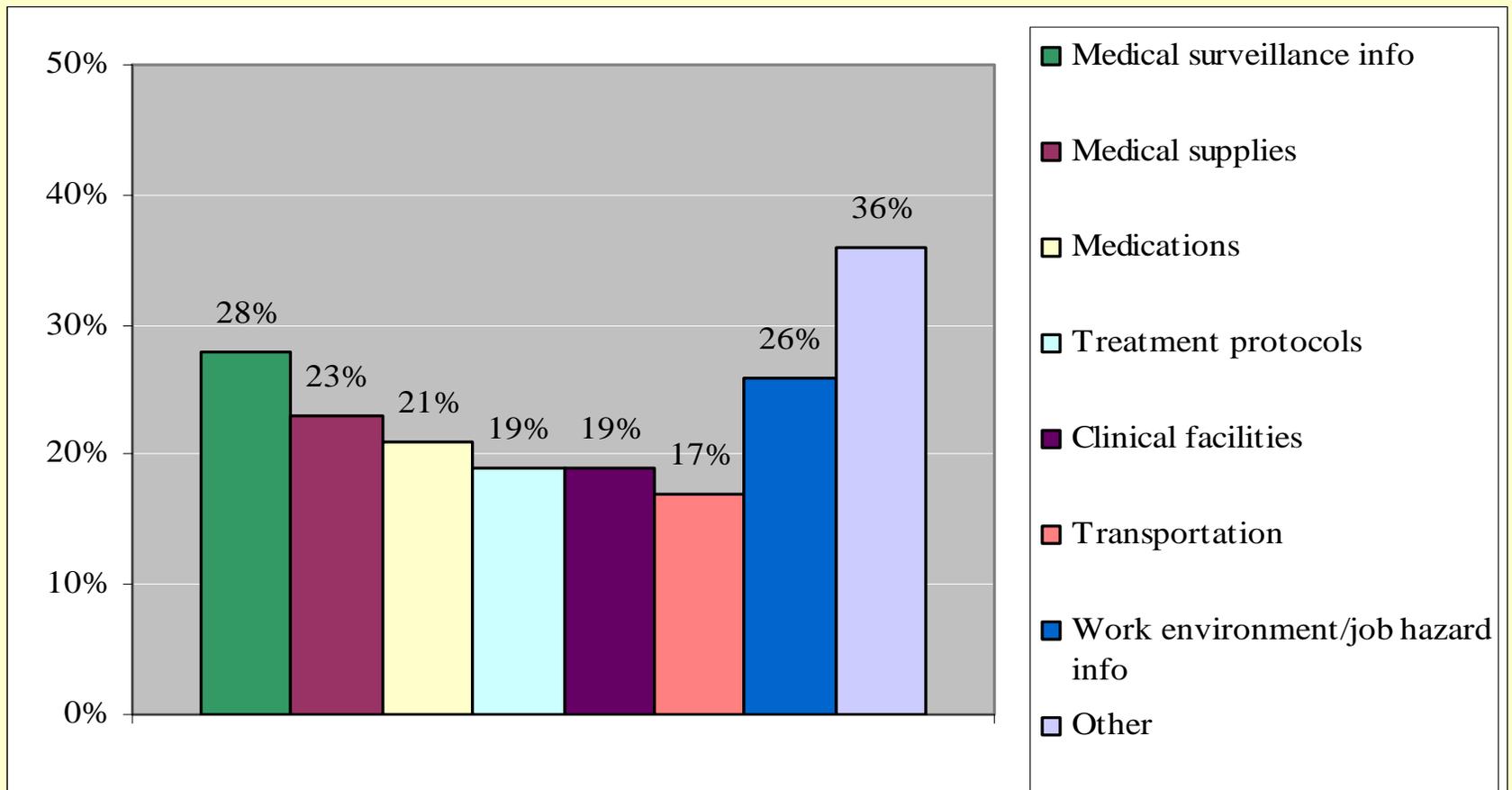
Are/were you involved in responding to some aspect of the impact from the hurricanes?



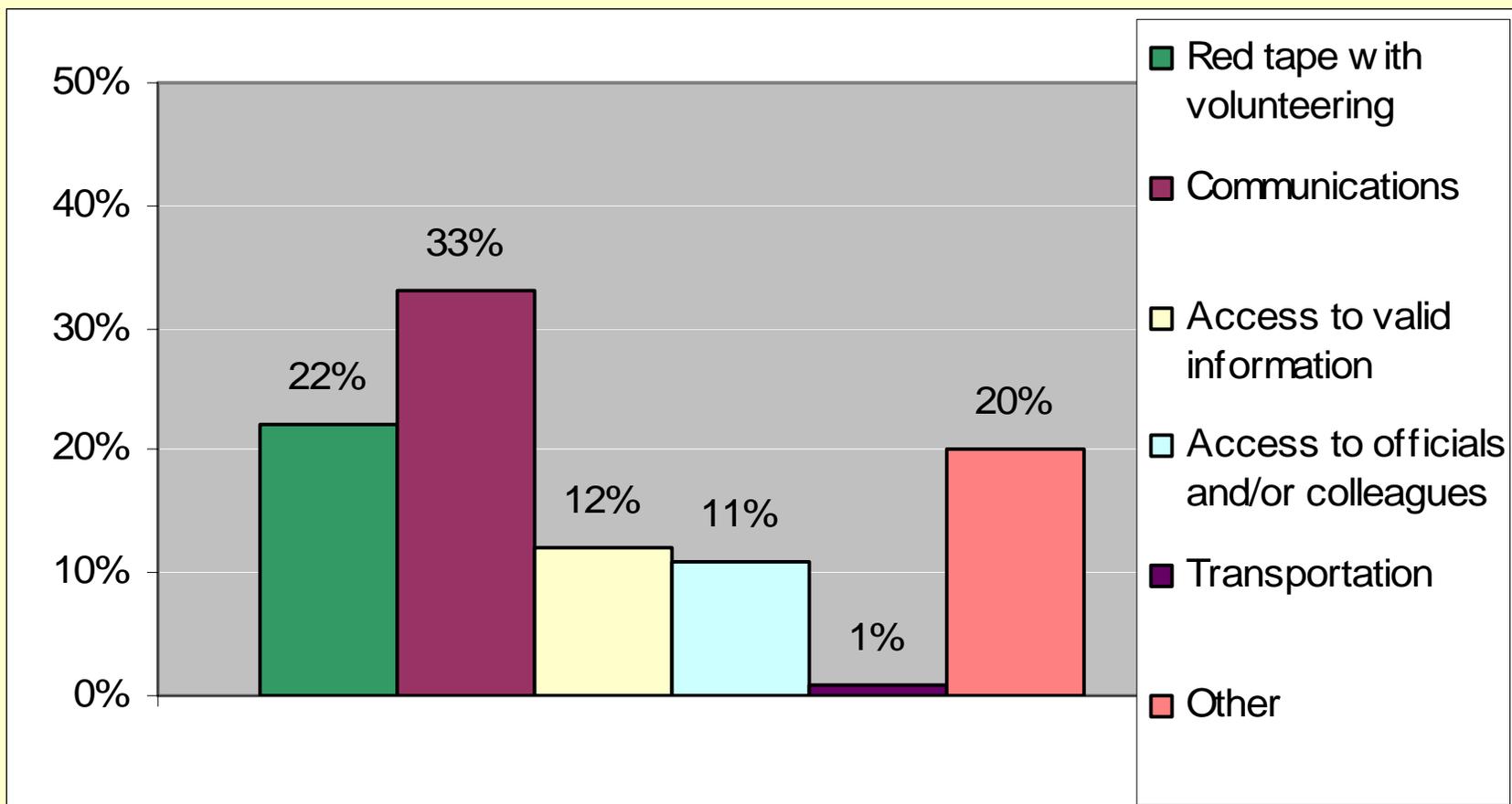
What role did you play in the response?



Were you lacking any of the following that would have helped you better fulfill your role?



What was the biggest obstacle in fulfilling your role as an occupational/environmental health professional in the response?



Breakdowns in Response/ Recovery Efforts

- **“Because I was not included in any phase of hurricane preparedness, pre or post, medical issues were lacking. Problems were addressed as they arose, which resulted in a delay in response. Lack of planning and lack of communication were rampant.”**
- **“I was involved in a corporate response to assist employees whose place of business was wiped out in the hurricane. As quickly as the employer set up renovated office space to allow us to see patients, the first several days were plagued by lack of communication (no land based telephones available, very limited cell phone service) and problems with delivery of medical supplies and equipment.”**
- **“I live in Louisiana and work on corporate staff of a global company. The complete lack of communication and appropriate pre-planning within the government and between government and business made it impossible to address my employee’s needs let alone to respond to the thousands of people in shelters.”**

Breakdowns in Response/ Recovery Efforts (con't)...

- **“Maryland sent 100 RNs and MDs to Jefferson Parish without establishing a support network. We had no medicine to give people, no food, water or security. We depended on the Arkansas Army Reserve for MREs, Red Cross for water and an occasional hot meal...We were more of a burden on the already depleted resources of the Parish than a benefit...I [also] spent a week in the Astrodome. They had a plan, they activated the plan before the evacuees came and they had everything doctors and nurses needed in order to care for the evacuees. I hope that they use the Houston plan as a model of how to respond to the medical needs of evacuees.”**
- **“It was mass confusion, not knowing exactly where to go or how to volunteer, no one was checking credentials, supplies were good some places, not at others. You basically had to just take it upon yourself to just show up and do the best you could.”**
- **“Disorganization and power struggles between local, state, and federal agencies.”**

How did occupational and environmental health professionals use their skills to address the challenges?

- **“We provided information, helped to set up site health & safety plans, provided education on hazard protection, administered vaccines and eventually set up at key sites and provided basic medical/first aid services to multiple contractor groups working to clean up the areas. Our presence on these sites, and our specific knowledge in occupational health helped to keep reportable injuries down not only with education and prevention but also by sheer availability.”**
- **“In the last eleven years, Jefferson Parish Government never included me in any discussions or meetings regarding disaster/hurricane preparedness. As nurses, we are good at looking at the total picture regarding actual and potential problems that can arise regarding our patients and environments we are working in. I believe I could have been a valuable asset.”**

How did occupational and environmental health professionals use their skills to address the challenges? (con't)...

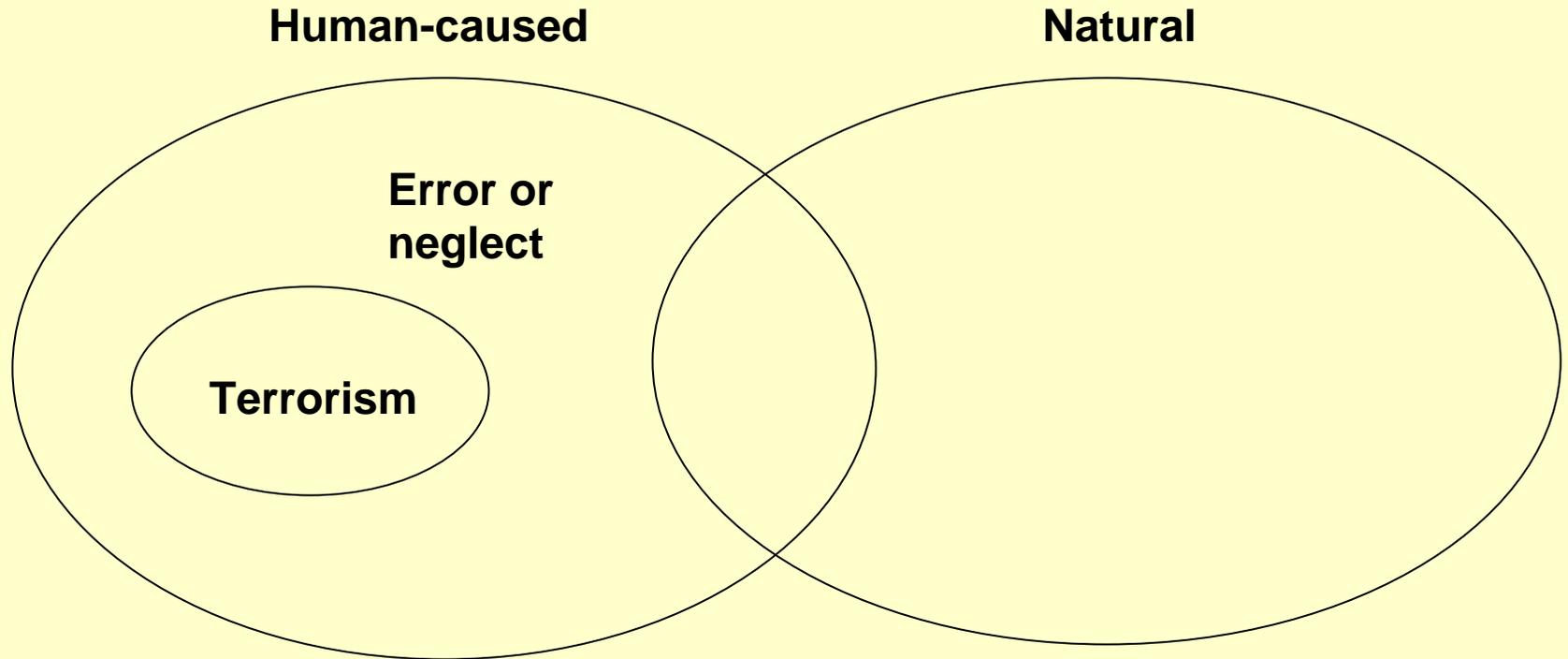
- **“My blackberry was a life saver...consultation with out of the area physicians was done by text messaging for several days until phone and computer network lines were available....Looking back, I will load a lot more contact info in my blackberry and laptop for our next evacuation.”**
- **“There was a meeting at Ochsner Hospital in New Orleans and the EOC which were exceptional in providing information and hazards that were present in the flood area. The fact it was a teleconference provided the opportunity for us to "attend" the conference everyday and get updated info for trends and safety hazards.”**
- **“My colleague and I helped expand the Red Cross list of RNs available to respond from 10 to 93 by accessing our local Occupational Health Association network.”**
- **“We completed physicals and medical surveillance both before the fireman were deployed as well as once they returned. Due to the stressful nature of the work, we had a counselor from our partner EAP services come over to the Occupational Health clinic to speak privately with each and every returning volunteer...Our Medical Director did a great job of contacting the physicians at the NIH for recommendations for returning firefighters, etc.”**

Immense Challenges for the Health Care System

Disasters such as pandemic or hurricane will touch every business sector, but few will be as heavily involved as the health care industry, from the frontline doctors, nurses, and others treating patients to the companies that will eventually handle a potentially massive number of insurance claims. While companies in many other industries will be able to tell their workers to work from home or take time off, health care providers in most instances will not only be expected to show up, but also to work longer hours.

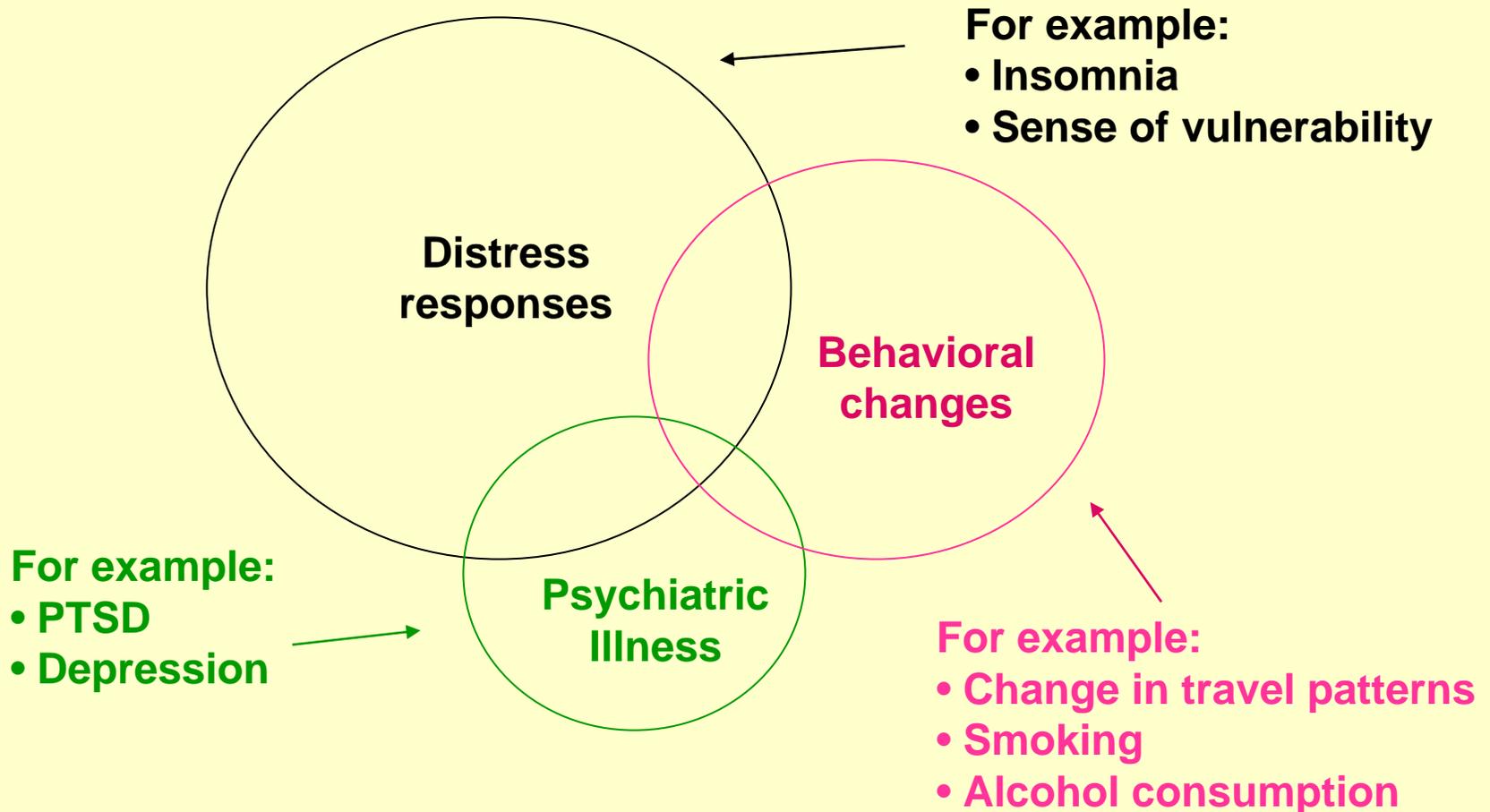
(Marsh, 2006)

Categories of Disaster



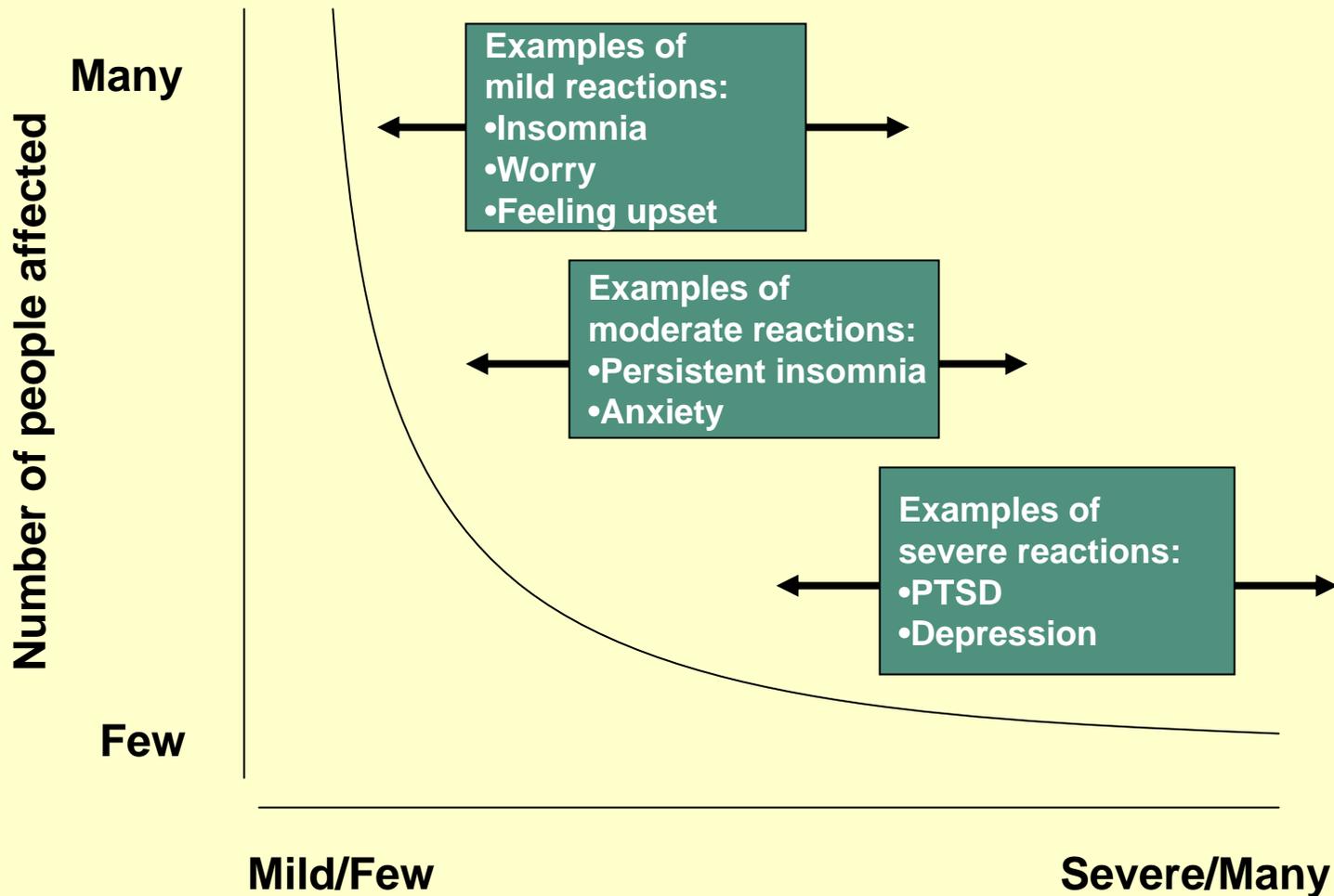
SOURCE: Ursano (2002)

Psychological Consequences of Disaster and Terrorism



(Ursano, 2002)

Severity of Psychological Reactions Experienced by the Population Following a Traumatic Event



Examples of Reactions of People Who Experience Traumatic Stress

Thoughts

Common

- Recurring dreams or nightmares about the disaster
- Reconstructing the events surrounding the disaster in your mind, in an effort to make it come out differently
- Difficulty concentrating or remembering things
- Repented thoughts or memories of the disaster, or of loved ones who died in the disaster, that are hard to stop

Less Common

- Questioning your religious or spiritual beliefs

Examples of Reactions of People Who Experience Traumatic Stress

(con't)...

Feelings

Common

- Experiencing fear and anxiety when things remind you of the disaster, particularly sounds and smells
- Feeling a lack of involvement or enjoyment in everyday activities
- Feeling depressed, blue, or down for periods of time
- Feeling bursts of anger or intense irritability
- Feeling a sense of emptiness or hopelessness about the future

Less Common

- Feeling numb, withdrawn, or disconnected

Examples of Reactions of People Who Experience Traumatic Stress

(con't)...

Behaviors

Common

- Being overprotective of you and your family's safety
- Becoming very alert at times and startling easily
- Having problems getting to sleep or staying asleep
- Having increased conflict with family members
- Being tearful and crying for no apparent reason

Less Common

- Isolating yourself from others
- Avoiding activities that remind you of the disaster, avoiding places or people that bring back memories
- Keeping excessively busy to avoid thinking about the disaster and what has happened to you

World Trade Center Clean-up and Recovery Worker Health Survey (JHU, 2005)

Survey Respondents: Truck drivers, carpenters, laborers, heavy equipment operators (n=1114)

One open-ended question about experiences (n=322):

- **Somatic Health Effects**
 1. Current
 2. Future
- **Mental Health**
 1. Depression, anxiety, PTSD, suicidal thoughts, substance abuse
- **Lack of Preparation and Training**
 1. Respiratory protection
 2. No or limited disaster training
 3. Lack of PPE
 4. Family contamination
 5. Extensive emotional demands
- **Lack of Recognition by Employer**

Protection, Acknowledgement, Recognition

Developing a Disaster Crisis Safety Plan

- **Input from public/private agencies (e.g., local law enforcement, emergency services, public health, Red Cross, mental health)**
- **Strategize to overcome potential communication difficulties with input from telecommunications experts**
- **Practice drills based on the plan**
- **Procedures to provide employees accurate and timely information**
- **Plan and policy review on a regular basis to ensure they incorporate the latest areas of concerns (e.g., hoaxes)**
- **Address the short and long-term health and mental health needs of employees**
- **Screen volunteers during time of crisis.**
- **Need a person or group to act as lead official(s) for response to crisis/disaster situations**
- **Plan for a post-traumatic event follow-up**

What a pretty blue planet!



**South of the Iberian peninsula.
A sand storm leaves North
Africa and the Canary Islands**



Strait of Gibraltar



**Night arrives over Europe
and Northern Africa**



The Swiss Alps



Iceland



The Black Sea



The Red Sea



**Even submerged in darkness it
is a beautiful sight!**













Isn't it Magnificent?

Now, so that our children can continue to benefit from this beauty for generations...

...Reflect on the environment as often as you can so that each and every one of us can be aware of what we are walking on!