

Vulnerable Population Evacuation



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Objective

- ❑ Present the challenges of vulnerable populations during evacuations
- ❑ Evaluate the role of transit in the evacuation of transit dependent populations
- ❑ Synthesis of state of practice

Overview

- ❑ Introduction
- ❑ Emergency Evacuations
- ❑ Vulnerable Populations
- ❑ Transit's Role in Emergency Evacuations
- ❑ Conclusions and Recommendations



Emergency Evacuations



Emergency Evacuations

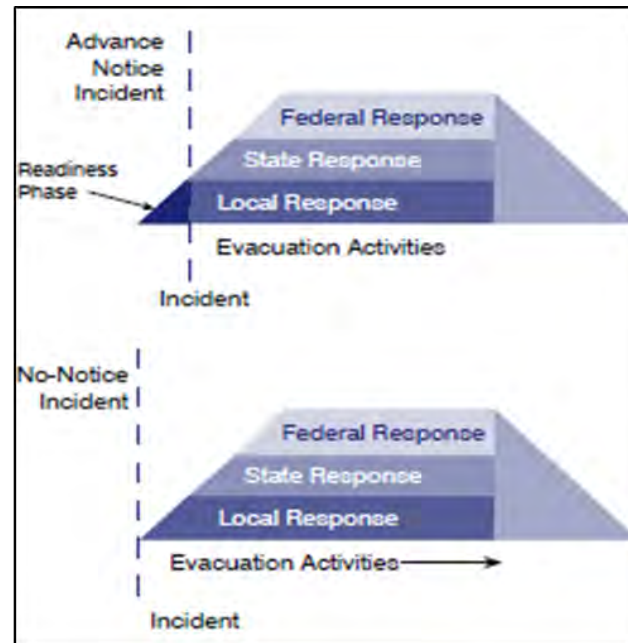
- ❑ number of different circumstances may require a planned or an emergency evacuation:
 - water-main break or a gas leak; office buildings in a block
 - river flood or forest fire; neighborhood
 - an earthquake or hurricane; entire city

Emergency Evacuations

- ❑ human caused
 - intentional; terrorist attack
 - unintentional; chemical explosion
- ❑ natural
 - hurricanes
 - floods
 - earthquakes
 - wildfires
 - tornados

Emergency Evacuations

- ❑ advance Notice
 - allow for advanced evacuation planning
- ❑ no-notice
 - rapid response
 - real-time communications capability
 - redundancy



Source: Technical Report of the U.S. Department of Transportation Federal Highway Administration (FHWA). 'Using Highways for No-Notice Evacuations: Routes to Effective Evacuation Planning Primer Series'

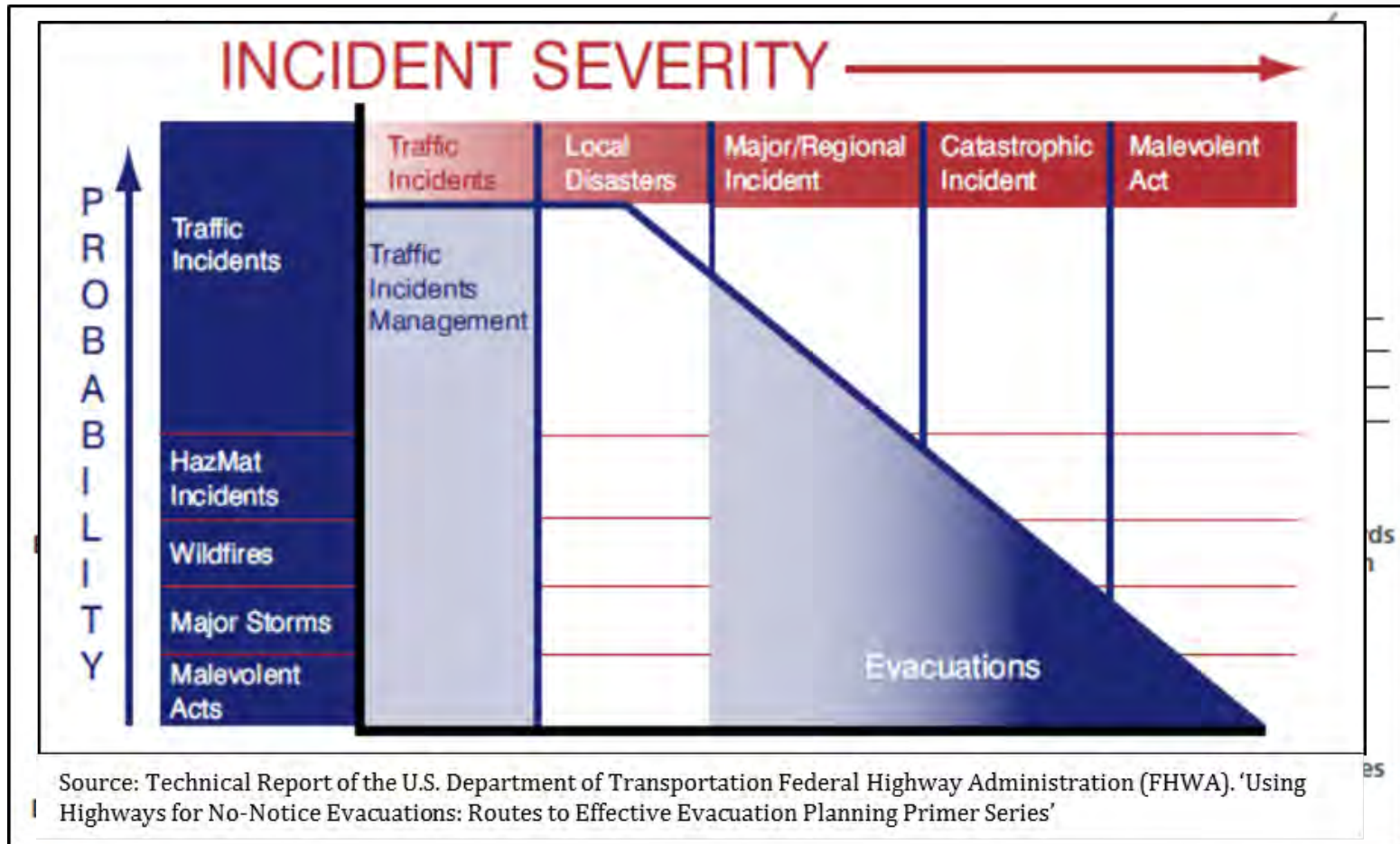
Emergency Evacuations

- ❑ may vary in type, magnitude and impact
- ❑ all require:
 - preparedness
 - effective resource mobilization
 - coordination among agencies
 - communication with public



The role of
transportation is
vital!

Emergency Evacuations



Source: "The Role of Transit in Emergency Evacuation" TRB Special Report 294

Transportation in Emergency Evacuations

- factors affecting the transportation in emergency evacuations
 - characteristics of emergency
 - geographical characteristics
 - human factor
 - available technology and other resources
 - communication requirements

Characteristics of Emergency

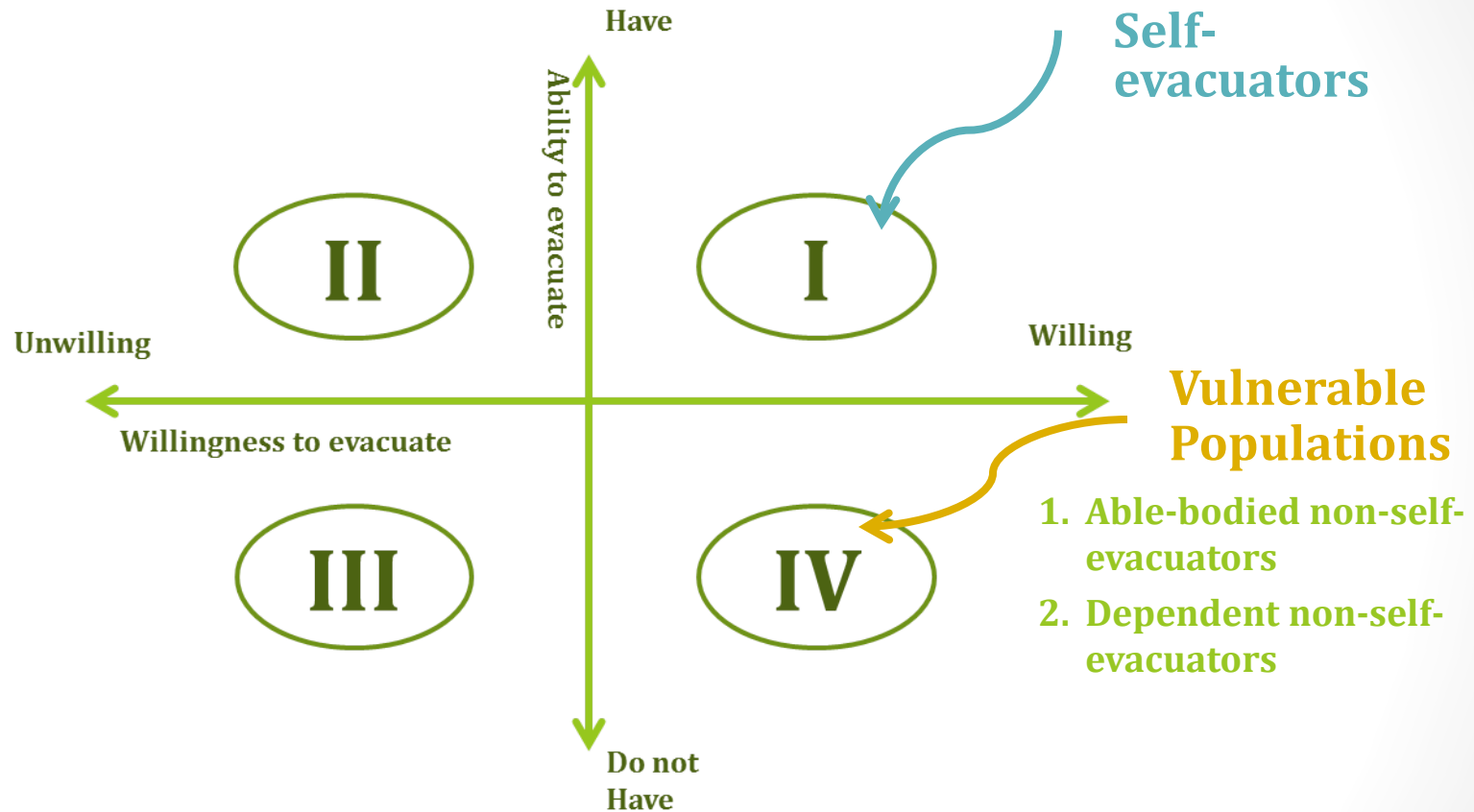
- ❑ type
 - advance notice
 - detailed evacuation plans needed
 - no-notice
- ❑ making the evacuation decision on time
- ❑ time of occurrence
 - emergencies during peak hours
 - one such strategy is phased evacuations
- ❑ duration of emergency
 - more vital if the evacuation plan depends on transit

Geographical Characteristics

- ❑ if emergency is localized and transportation facility enough reserve capacity
- ❑ in regional evacuations, bottlenecks in the transportation system is inevitable
- ❑ political boundaries of the threatened area, creates jurisdictional complexities



Behavioral Characteristics



Available Technology and Other Resources

- ❑ technology support
 - e.g. availability of ITS helps providing real time information
- ❑ organizational arrangements
- ❑ funding resources

Communication Requirements

- ❑ evacuation-related information communications established before, during and after the incident
 - prior to an evacuation, public information and outreach campaigns
 - during an evacuation,
 - accurate on-time traffic information
 - provide details on when to leave and where to go
 - after an evacuation, information how to return
- ❑ communication between and within authorities

Vulnerable Populations

- ❑ No universally accepted definition for vulnerable populations
- ❑ Populations with needs for medical assistance
- ❑ Populations **who are not able to evacuate on their own and need additional assistance** in case of an emergency

“Individuals in need of additional response assistance may include those who have disabilities; who live in institutionalized settings; who are elderly; who are children; who are from diverse cultures; who have limited English proficiency; or who are non-English speaking; or who are transportation disadvantaged.”
FEMA

Vulnerable Populations

- | | |
|--|--|
| <ul style="list-style-type: none">• People with disabilities<ul style="list-style-type: none">○ Living with physical impairment○ Deaf/hard of hearing○ Blind/low vision○ Living with mental illness | <ul style="list-style-type: none">• Elderly population |
| <ul style="list-style-type: none">• People living with developmental/cognitive disabilities | <ul style="list-style-type: none">• Carless and transit-dependent population |
| <ul style="list-style-type: none">• People in hospitals (including families of patients and hospital staff) | <ul style="list-style-type: none">• People in prisons• Tourists |
| | <ul style="list-style-type: none">• Poor/homeless populations |
| | <ul style="list-style-type: none">• People with service animals and household pets |

Challenges Associated with Vulnerable Populations Evacuations

- ❑ spatial concentration throughout an urban area
- ❑ difficulty of estimating their group sizes
- ❑ identifying their specific level of transportation needs



Challenges Associated with Vulnerable Populations Evacuations

- ❑ voluntary registries developed to determine the unique transportation needs
 - keeping registries up to date is costly
- ❑ effective communication
 - reliable communication tools
 - non-English speaking populations



Evacuation Characteristics of Vulnerable Populations

- ❑ willingness in evacuation and ability to evacuate
- ❑ if emergency shelters sufficient enough to meet their needs.
- ❑ mostly think they are safer staying in their home.
- ❑ to take care of a friend or a relative who is not able to be self-evacuated
- ❑ desire to protect their homes or to take care of pets
- ❑ trust issues with government



Transit's Role in Vulnerable Population Evacuations

- ❑ New Orleans experience
 - one third of those who didn't evacuate were carless
 - 24,000 patients, staff, and families of patients were left behind in twenty-two hospitals
 - 79% of nursing homes were not evacuated
 - emergency plan failed due to lack of communication



Transit-assisted Evacuations

- ❑ in advance of Hurricane Rita landfall.
 - the Metropolitan Transit Authority of Harris County (METRO) assisted in evacuating the transit-dependent population
- ❑ 1.2 million workers and residents of Lower Manhattan were carried out of the danger zone by transit, following the September 11 attack on the World Trade Center
 - buses were also used to carry incident victims without any attention to fares or routes
 - NYPD's Harbor Unit ferried 5,000 people to New Jersey and Staten Island
 - 160,000 people evacuated New York City on New York Waterway ferries
 - 250,000 to 300,000 carried by other water transportation such as Coast Guard vessels and other privately operated dining boats and even tug boats
- ❑ Metrorail was used in the Washington, DC area, to evacuate hundreds of thousands people from Washington and Northern Virginia in a few hours

Transit-assisted Evacuations

- ❑ 2006 hazardous material fire in Apex, NC
 - over 17,000 people evacuated
 - with an estimated of 30,000 shadow evacuation contributed to the evacuation
 - that only a small number of people chose not to evacuate the area
 - town's 'Reverse 9-1-1 System' was activated
 - 103 nursing home patients from a singular nursing home evacuated with seventeen ambulances, wheelchair vans, and two transit buses in about 3.5 hours
 - Raleigh city buses were used to evacuate those who needed transportation

Transit-assisted Evacuations

❑ 2005 fire in El Dorado, Arkansas

- half an hour after the incident a mandatory evacuation was ordered
- in 2 hours some nursing homes were evacuated
- 500 El Dorado citizens were evacuated overnight
- county jail was evacuated with 170 prisoners using six school buses

❑ 2003 Southern California Wildfire

- more than 100,000 people evacuated
- long-term residents of Bear Valley Community Hospital were also evacuated

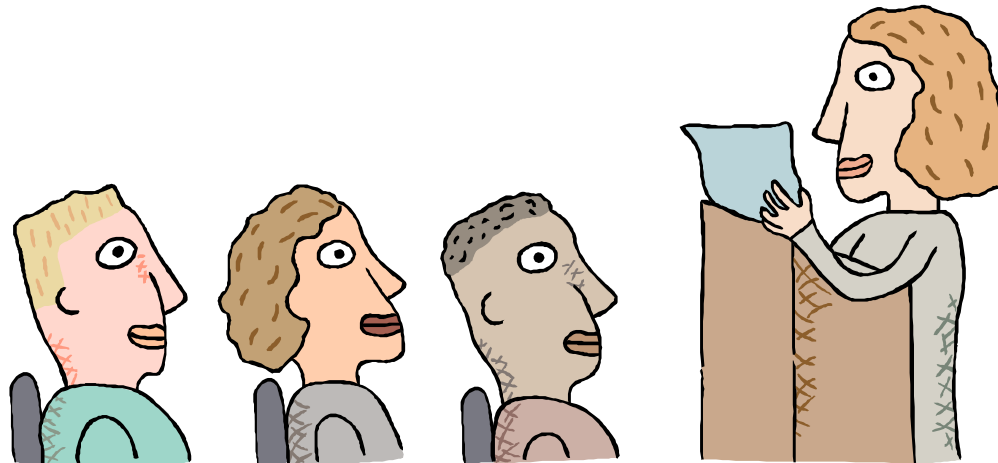
❑ October 2007 California wildfires

- approximately 1 million people evacuated
- 1,000 elderly people were also carried out with transit buses

Transit Evacuations: Lessons Learned

- ❑ Preparedness is crucial
- ❑ Coordination is needed
- ❑ Geographic dispersion of population in need is important
- ❑ Communications issues
- ❑ Limitations of existing transit system is also important
- ❑ Human factors need to be taken into account

THANK YOU



QUESTIONS???
COMMENTS???