Vulnerable Population Evacuation

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Ozge Cavusoglu, PhD
Regional Planning Commission of Greater Birmingham
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

A 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
- 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

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

1. Able-bodied non-self-evacuators
2. Dependent non-self-evacuators

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

<table>
<thead>
<tr>
<th>Vulnerable Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>• People with disabilities</td>
</tr>
<tr>
<td>- Living with physical impairment</td>
</tr>
<tr>
<td>- Deaf/hard of hearing</td>
</tr>
<tr>
<td>- Blind/low vision</td>
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<tr>
<td>- Living with mental illness</td>
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<tr>
<td>• People living with developmental/cognitive disabilities</td>
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<tr>
<td>• People in hospitals (including families of patients and hospital staff)</td>
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<tr>
<td>• Elderly population</td>
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<tr>
<td>• Carless and transit-dependent population</td>
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<tr>
<td>• People in prisons</td>
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<tr>
<td>• Tourists</td>
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<tr>
<td>• Poor/homeless populations</td>
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<tr>
<td>• People with service animals and household pets</td>
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</tbody>
</table>
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???