METADATA-BASED NEEDS ASSESSMENT FOR EMERGENCY TRANSPORTATION OPERATIONS WITH A FOCUS ON AN AGING POPULATION: A CASE STUDY IN FLORIDA

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OUTLINE

- Motivation and Problem Definition
- Emergency Transportation in the Aftermath of a Disaster
  - Emergency Evacuation
  - Shelter Location/Allocation
  - Multi-modal Transportation of Vital Supplies

**FOCUS: AGING POPULATIONS**

- Conclusions and Future Work
DISASTERS

METHODOLOGY

STEP 1: Knowledge Acquisition
- Review of Existing Studies
- Meetings with Experts

STEP 2: Knowledge Elucidation
- Multi-Modal Origins
- Shelters/Distribution Centers

STEP 3: Knowledge Representation
- Transportation Network Evaluation
- Review Results
- Travel Time Analysis

STEP 4: Validation and Verification of the Decision Making Framework
- Traffic Routes and Restrictions
- Disruption (Hazard) Analysis
- Final Framework

Final Review and Recommendations
## META-DATA ANALYSIS

### LITERATURE REVIEW

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<tr>
<td><strong>Scope</strong></td>
<td>Planning for Protective Action decision Making: Evacuate or Shelter-in-Place</td>
<td>Evacuation of Health Care Facilities: A new Twist to a Classic Model</td>
<td>A Comparison of the Nursing Home Evacuation Experience between Katrina and Gustav</td>
<td>To Evacuate or Shelter in Place: Implications of Universal Hurricane Evacuation Policies on Nursing Home Residents</td>
<td>Population Aging, Gender, and the Transportation system</td>
<td>Planning for and Responding to Special Needs of Elders in Natural Disasters</td>
<td>Rapid Needs Assessments for Older Adults in Disasters</td>
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<td><strong>Objective</strong></td>
<td>Provide a framework for decision making during an emergency especially hazardous chemicals.</td>
<td>Compare two models from studies related to evacuation process: Vogt’s adaption and McGlown’s model by examining variables of decision making</td>
<td>Examine whether nursing home administrators were more prepared with the experience of Katrina before Gustav</td>
<td>Examines the differential morbidity/mortality associated with evacuation versus sheltering in place for nursing home residents exposed to the 4 most recent Gulf hurricanes.</td>
<td>Reviews the nature of older people’s interaction with the transport system by gender; older people’s attitude to travel and involvement of aging as road traffic casualties</td>
<td>Explores the special needs of healthy and frail elders in relation to planning for and responding to natural disasters, including hurricanes, tornados, ice storms etc.</td>
<td>Lessons learned in the Astrodome, Houston.</td>
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<td><strong>Methodology</strong></td>
<td>Decision trees / Pareto</td>
<td>Data collection / Cluster grouping</td>
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<td><strong>Type of Source / Media</strong></td>
<td>Academic journals</td>
<td>Academic journals, books, reports</td>
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<td>Academic journals, Practitioners journals, guidebooks, reports</td>
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<td><strong>Contribution</strong></td>
<td>Describes a model for detailed analysis of specific emergency scenarios</td>
<td>Data collected from the source-managers and decision makers issues of importance to managers were ascertained.</td>
<td>Is the first of its kind to compare the hurricane preparedness and evacuation experiences of nursing home administrators.</td>
<td>Although there is significant increased morbidity and mortality related to exposure, there is added risk in evacuation.</td>
<td>Involvement of older women increases in transportation system and population structure day by day. More research and policy changes needed for aging.</td>
<td>Emphasis on planning, identifying and coordination among agencies.</td>
<td>Introduction and emphasis on SWIFT (Senior without family image) tool</td>
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FOCUS AREAS

MAIN MULTI-MODAL FOCUS AREAS:

• Emergency Evacuation.
• Shelter Location/Allocation.
• Transportation of Vital Supplies.

AGING POPULATIONS:

• Aging Victims in Nursing Homes/Assisted Living Places.
• Aging Victims Living Independently/with Families.
2014 Florida’s Aging Road User (65+) Priority Counties

Percent of the Population Aged 65+
- Less than 13.7% (National percentage)
- 13.7% - 18.1%
- Greater than 18.2% (Florida percentage)

Top 10 Urban Priority Counties
- Alachua
- Miami-Dade
- Bay
- Duval
- Leon
- Broward
- Escambia
- Hillsborough
- Monroe
- Pinellas

Top 10 Rural Priority Counties
- Columbia
- Taylor
- Hardee
- Madison
- Baker
- Walton
- Bradford
- Putnam
- Levy
- Okeechobee

Priority counties were selected using a 3-year (2010-2012) average rate of crashes involving individuals aged 65+ compared to the population of 65+ in both urban and rural counties. The chosen counties were found to be above the average crash rate for rural and urban counties, respectively.

Source: Bureau of Economic and Business Research (BEBR), UF; 2012; FDOT Crash Analysis Reporting System (CARS), 2012
MULTI-MODAL FACILITIES OF DISTRICT 3 (SUPPLY)
FLOOD ZONES AND SHELTERS

Flood Zones and Total Shelter Capacities of Bay County

Special Needs Shelter (SPNS)
- 0
- 1 - 301

Shelters
Capacity
- 139 - 222
- 223 - 300
- 301 - 577
- 578 - 1671
- 1672 - 3132

Population
Aging at home
- 28 - 222
- 223 - 366
- 367 - 632
- 633 - 720
- 721 - 1270

Gulf of Mexico
ROAD CLOSURES VS. FLOOD ZONES & POPULATION

Bay County-Panama City Road Closures/Restrictions between January- May 2014 due to Heavy Rainfall/Weather Conditions with Flood Risk Zones and Population Blocks

Legend
- Road Closures / Restrictions
- County Roads
- US Highways
- State Roads
- Flood Hazard Zones
  - RISK LEVEL
    - HIGH RISK - COASTAL AREAS
    - HIGH RISK AREAS
    - MODERATE RISK AREAS
    - MODERATE TO LOW RISK AREAS
- Population Blocks
  - 0 - 35
  - 36 - 102
  - 103 - 240
  - 241 - 605
  - 606 - 1433

Scale: 1 mile
KNOWLEDGE REPRESENTATION:
SCENARIO ANALYSIS
EXAMPLE SCENARIO ANALYSIS

- Emergency evacuation
  - Evaluating the roadway network
  - Identifying all the major multi-modal origins (airports, water ports, railway terminals) and destinations (shelters, staging areas, distribution centers)
  - Identifying the bottlenecks
  - Determining the clearance times
### Analysis of Major Highways in District 3

#### Escambia County

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<th>Proximity to Aging Population</th>
<th>Flooding Risk</th>
<th>Storm Surge Risk</th>
<th>Urban/Rural</th>
<th>Proximity to Nuclear Plant</th>
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SCENARIO-BASED EMERGENCY EVACUATION USING CUBE
IDENTIFYING BOTTLENECKS: QUEUES

Possible Evacuation Bottlenecks
IDENTIFYING BOTTLENECKS: VEHICLES IN TRANSIT
This study presents an extensive evaluation of evacuation operations that can help planners/emergency personnel decide how to transport aging people in the aftermath of an extreme event:

- An extensive review of evacuation studies that focus on aging people.
- A GIS database including highways, airport, port, and railway terminal locations was created to present the locations of these facilities, and their proximities to roadways and aging-populated locations.
- An in-depth evacuation transportation analysis is conducted via FSUTMS model on a case study application set developed for Panama City, Bay County of District 3, which demonstrates the applicability of transportation planning and simulation models for evacuations.
ON-GOING RESEARCH & FUTURE WORK

- Dynamic Traffic Assignment (DTA)-based Scenario Analysis: Emergency Evacuation with a Focus on an Aging Population
- Evaluation of the Available Transit System to Serve the Needs of Aging People
ACKNOWLEDGMENTS

Center for Accessibility and Safety for an Aging Population

Florida State University

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