



Improving Public Messaging for Evacuation and Shelter-in-Place

Findings and Recommendations for Emergency Managers
from Peer-Reviewed Research

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FEMA

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Overview

The Federal Emergency Management Agency (FEMA) conducted this study to provide emergency managers with:

- peer-reviewed research findings on public understanding and decision-making for evacuation and shelter-in-place protective actions, and
- data-driven recommendations for improving public messaging to inform the public about risk and to increase compliance with instructions to evacuate or to shelter-in-place.

FEMA tasked Argonne National Laboratory (Argonne) with conducting a literature review of published peer-reviewed research, summarizing the research findings, and developing related recommendations. This analysis can inform outreach strategies, communication strategies, evacuation planning, and emergency operations plans. Some recommendations are best implemented before an event and some suggest ways to improve response operations.

Literature Review Design and Methodology

FEMA and Argonne used the Protective Action Decision Model (PADM) (Figure 1) as the framework to develop the literature review research questions and the coding scheme for subsequent analysis.² This model offers a robust exploration of the many factors that can influence decision making in response to urgent disasters, and its framework is used by other peer-reviewed research on evacuation and shelter-in-place (SIP). The PADM framework proposes that environmental and social cues, information sources, information channel access and preferences, warning messages and receiver characteristics all influence a complex set of psychological processes that form the basis for protective-action decision making.³

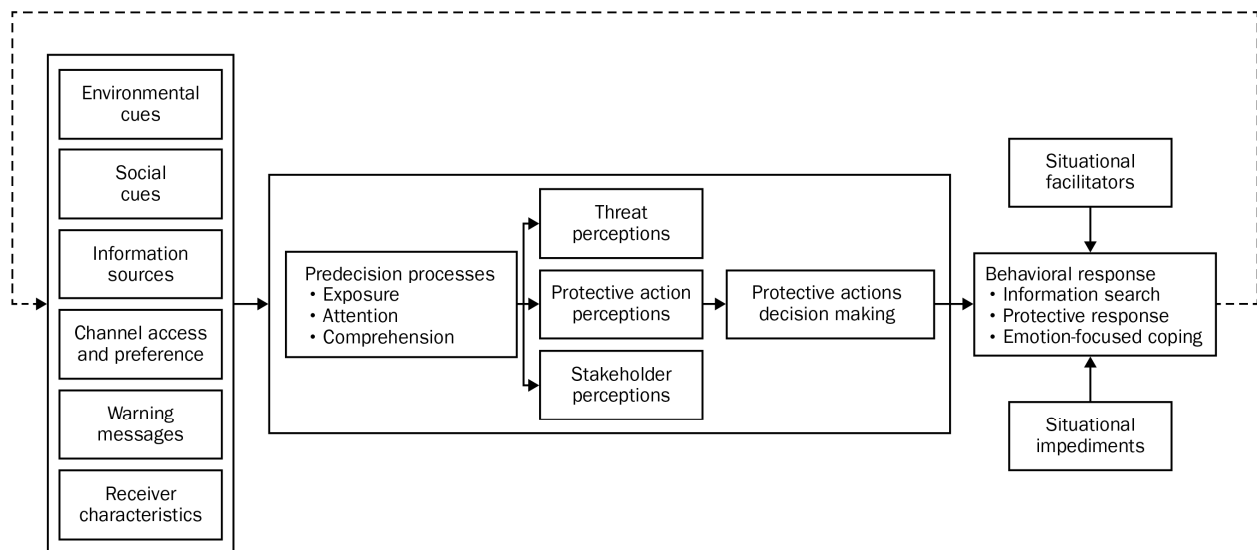


Figure 1: Protective Action Decision Model

Using the PADM as a framework, the research team identified the following literature review research questions (RQs) to support the Evacuation and SIP TA content:

1. RQ1. How do environmental and social cues affect individuals' attention and response to evacuation and SIP guidance?

² Lindell, M. and R. Perry. "The Protective Action Decision Model: Theoretical Modifications and Additional Evidence." *Journal of Risk Analysis*, Vol. 32, No.4. 2012.

³ Huang, S., M. Lindell, et.al. "Household Evacuation Decision Making in Response to Hurricane Ike." *Natural Hazards Review*, Vol. 13, Issue 4, American Society of Civil Engineers. 2012.

2. RQ2. How do warning messages and their information sources and channels affect message receiver beliefs and behaviors?
3. RQ3. What individual and family characteristics affect beliefs and behaviors relative to evacuation and SIP guidance?
4. RQ4. How do awareness and perceptions of different threats and hazards affect decision making?
5. RQ5. What are the impediments to positive behavioral response? What situational factors tend to support public response to evacuation and SIP guidance?

Next, the team created primary and secondary search terms to locate as much published research as possible (see Table 1). The search function used Boolean logic to find the exact phrase and combinations of words from the primary and secondary terms using “and” or “or,” as well as using the wildcard single asterisk (*) to look for all words that begin with those letters.⁴

Table 1: Primary and Secondary Search Terms

Primary Search Terms	Secondary Search Terms	
Evacuation Shelter-in-place	Communicat* Alert Warning Awareness Preparedness Perception Decision making Children Pets Protective Action* Milling	Messag* Behavior Risk management Zone* Phase Hub/Spoke Reunification Return/Re-entry Hazards: hurricane, flood, chemical, wildfire, earthquake, winter, ice storm, tsunami, tornado, radiologic*, nuclear

To capture a comprehensive body of research that incorporated recent advances in technology and social media use, the team examined research published in the past 10 years, using the Social Science Citation Index (Web of Science) to identify published peer-reviewed literature with the search terms noted in Table 1. This process identified 771 articles.

⁴ U.S. National Library of Medicine. “Basic Boolean Search Hints.” [Accessed](https://www.nlm.nih.gov/pubs/techbull/ja97/ja97_pubmed.html) on 12/21/2020. https://www.nlm.nih.gov/pubs/techbull/ja97/ja97_pubmed.html.

The research team reviewed the abstracts of all 771 articles and selected those that met all the following criteria:

- Focused on decision making by an individual rather than an organization, or focused on tools or technology, simulations, transportation impacts and emergency planning;
- Conducted on populations within the United States;
- Published within the past 10 years (2009–2019);
- Included quantitative and qualitative research on whether individuals expected they would make the decision to evacuate given a specific hazard scenario, as well as research on those who had experienced an evacuation; and
- Focused on evacuations of communities versus evacuation of a building or other structure.

This review reduced the set of abstracts to 187.

The next step was to read the full published content of the identified abstracts. The research team was unable to locate the full article for 11 abstracts and determined that 49 articles did not meet the inclusion criteria. This resulted in 127 articles as the universe of peer-reviewed published research on evacuation and SIP for further analysis.

Analysis

The team read and coded the 127 articles to identify themes and patterns related to the research questions. Given the number of articles involved, researchers used NVivo qualitative data analysis software to support the analysis. NVivo analyzes large volumes of data using coding nodes created by the research team (i.e., potential areas of interest to help answer the research questions). Appendix A outlines the coding nodes for this analysis.

To consistently code the text, the research analysts conducted inter-coder reliability tests. Each analyst coded several of the same articles and then compared and discussed the resulting codes and coding strategies to achieve consistent coding methods across the team. Analysts also coded each finding into all applicable nodes so that the analysis included findings that related to multiple areas of inquiry.

After the literature was coded, one analyst conducted a thematic analysis to identify patterns relative to each research question.⁵ Fourteen articles had findings that were singular in nature, (focused on a narrow audience or topic area (for example communities at risk for storm surge near petrochemical infrastructure) and therefore did not fit within one of the identified themes. These 14 articles did not contribute to the Findings and Recommendations Section and are denoted with an asterisk in the list of referenced articles in Appendix B.

To document insights that can best serve the emergency management community, findings focus on key differences between demographic groups and insights into individuals' perceptions, beliefs and attitudes regarding evacuation and SIP protective actions. In addition to the findings for each research question, this report provides recommendations for how the findings can inform evacuation plans, public education and outreach strategies, and improve risk and crisis communication messages.^{6 7}

⁵ Lindlof, T.R. "Qualitative Communication Research Methods." Thousand Oaks, CA: Sage Publications. 1995.

⁶ Centers for Disease Control and Prevention. Crisis and Emergency Risk Communication: 2018 Update. https://emergency.cdc.gov/cerc/ppt/CERC_Introduction.pdf. 2018.

⁷ Sheppard, B., M. Janoske and B. Liu. "Understanding Risk Communication Theory: A Guide for Emergency Managers and Communicators, Report to Human Factors/Behavioral Sciences Division, Science and Technology Directorate, Department of Homeland Security.", National Consortium for the Study of Terrorism and Responses to Terrorism, College Park, MD. 2012.

Findings and Recommendations

The body of research in this literature review provides findings for all five research questions. Although some of the research is specific to one hazard, the collective set of articles provides important findings across a range of hazards. Reference numbers after each finding indicate specific source reference articles as listed in Appendix B.

This review also found that certain aspects of the PADM model have been more fully explored than others. For example, a robust body of research has investigated how receiver characteristics (e.g., sociodemographic attributes; economic and social resources) relate to behavioral response, but fewer studies focused on other areas of the framework (e.g., the effect of information-seeking behaviors or emotion-focused coping). In addition, materially more research on evacuation for hurricanes is available than for other hazards, as well as more on evacuation than SIP behaviors.

The findings for each research question are followed by a set of recommendations specific to that topic area. These are research-based recommendations that public safety officials can use to motivate individuals in their communities to implement preparedness measures and to take appropriate, timely evacuation or SIP protective actions. The recommendations are grouped in the following categories:

- Prepare – Those that should take place prior to the incident; or
- Response – Those that should be an element of the incident response.

Appendix C provides a summary list of all recommendations. To support implementation of these recommendations they are grouped by communication and outreach strategy.

1. RQ1. How do environmental and social cues affect individuals' attention to evacuation and SIP guidance?

1.1. Environmental Cues

- Individuals find environmental cues such as sights, sounds or smells that indicate an impending threat important for confirming that a risk is real. Research studies across hazards showed that people seek environmental cues for the decision to take a protective action. These could be visual or other sensory cues, such as visible rising water related to flooding or hurricane storm surge and the sight of smoke or flames or the smell of smoke related to wildfires. The appearance or lack of these cues might influence whether individuals adhere to evacuation orders. [References 39, 46, 64, 112, 100, 117,121,]

- Studies focused on wildfires noted that environmental cues play a significant role in the evacuation decision, finding that if environmental cues are not present, individuals may take a wait-and-see approach. One study noted that six in 10 survey respondents would wait and see how bad the wildfire got before deciding that it would be too dangerous to stay. Another noted that individuals could be categorized into three groups based on their probable response to evacuation as a protective action in the event of a wildfire:
 - Wait and see (the largest group);
 - Stay and defend; and
 - Likely to evacuate.

Both the stay-and-defend and the evacuate groups were affected by visual cues. Given a lack of visual cues, those in the evacuate group might move into the wait-and-see group. Similarly, upon seeing the visual cues, those in the stay-and-defend group might move into the wait-and-see group. [References 35, 71]

1.2. Social Cues

- Social cues that are based on seeing the behaviors of others are an important factor in deciding whether to evacuate or not. The research noted the following types of social cues as particularly important:
 - Seeing neighbors evacuate or others leave was a predictor of increased evacuation. This held true across hazard types. [References 39, 104, 105]
 - Social cues have some negative effects, however. If individuals in non-evacuation zones saw neighbors leave, it increased the likelihood that they would also leave, and if individuals in areas that should evacuate did not see neighbors leave, that may have caused them to conform to the neighborhood norm and also not evacuate. [References 89, 104]
 - Receiving messages from family and friends in addition to local authorities was a major positive influence on evacuation decision making. [References 1, 4, 8, 30, 46, 47, 58, 64, 75, 100]
 - One study noted that those who shared information with others about evacuation warnings or visual cues of storm risk were more likely to themselves evacuate. [Reference 107]
 - The actions of local governments and businesses also provided important social cues that can heighten risk perception. These included closing and boarding up businesses and closing public areas, public transportation or specific roads. [References 8, 30, 89]

1.3. Recommendations

1.3.1. ENVIRONMENTAL CUES

1. **Response:** Use websites and social media platforms and work with local media to provide authoritative, time-stamped, geo-tagged photos and videos of hazards such as rising waters and wildfires. Encourage individuals to share those visuals with friends and family, including via social media.

1.3.2. SOCIAL CUES

1. **Response:** Encourage media to cover the different ways jurisdictions, businesses and individuals prepare for the threat, including preparing to evacuate (e.g., closing public transportation or other public areas) via their multiple channels.
2. **Response:** Encourage businesses to share their actions on their websites and social media accounts (e.g., closing their businesses, encouraging employees to evacuate and stay safe).
3. **Response:** Encourage individuals to share with their friends the alerts and warning messages they receive and the responsive protective actions they take. Also, encourage individuals to post photos and videos of visual cues of the hazard as they evacuate.
4. **Response:** Encourage those with neighborhood-focused social media platforms like Nextdoor, homeowner associations (HOAs) and other neighborhood groups to support evacuation guidance and checks on neighbors.

2. RQ2. How do warning messages and their information sources and channels affect message receiver beliefs and behaviors?

2.1. Warning Messages

- Mandatory evacuation orders significantly increased evacuation rates. [References 9, 27, 35, 39, 47, 56, 58, 61, 68, 71, 75, 80, 87, 95, 100, 105, 109, 127]
 - There is strong agreement across research studies that although both voluntary and mandatory evacuation orders increased the likelihood of evacuation, mandatory evacuation orders had a significantly greater effect than voluntary evacuation orders. This finding was consistent across different hazards.
 - Mandatory evacuation orders tended to increase media coverage of the risk, which then increased individual perceptions that the threat was credible.
 - While some individuals may have evacuated in direct response to an evacuation order, for others a combination of the order and other risk-confirming factors, such as forecast

information and social and environmental cues, led to evacuation. This held true for evacuation across all types of hazards, including wildfire, flood and hurricane.

- Changing the geographic area of the evacuation order or the type of order based on changing storm conditions caused confusion as individuals worked to understand their location within the evacuation area. [References 75, 117]
 - Residents could become confused when jurisdictions have mixed types of evacuation orders (some areas under mandatory orders and others under voluntary orders). This confusion is especially true when the geographic area specified in those orders changes or when orders switch between voluntary and mandatory orders.
- Messages that clearly described the probable personal impact of the hazards (e.g., loss of utilities, upcoming travel bans) helped individuals realize they would be personally impacted, which in turn motivated protective action. [References 19, 20, 46, 89, 94]
- Messages that compared the current hazard to similar hazards from the past helped individuals understand the risk. [Reference 89]
 - This seemed especially helpful for lower-rated hurricanes that were expected to result in significant storm surge or flooding.
- Adding visuals, such as maps or photos, improved message comprehension and supported decision making. [References 51, 52, 65, 77, 92, 98, 108, 122, 125]
- Research on using attention-getting language, such as “emergency” or “dangerous” and describing storm impacts, indicated that these practices increased attention to the seriousness of the situation. However, this research also indicated that language designed to scare people, such as “certain death,” did not seem to further increase the motivation to act. [References 20, 75, 76, 120]
 - A study on tornadoes found that statements such as “This is a dangerous situation” or “tornado emergency” were as effective as, or more effective than, the use of the term “catastrophic damage” to influence individuals’ intention to take shelter. [Reference 20]
 - Similarly, a research study on hurricane warning messaging using “certain death” phrasing did not increase evacuation behavior for Hurricane Rita in counties on the Texas Gulf Coast. Instead, the study indicated that messaging describing the impact of the storm in creating storm surge as well as wind risk was more effective in increasing evacuation intention. [Reference 120]
- For those living in areas at risk of tornadoes, the research indicates that “over-warning” may be a problem, because the warning areas are typically much larger than the area at risk from the tornado. If individuals receive a warning and then the event does not affect them, this can desensitize individuals to future warnings by making them feel that they are probably not

personally at risk. [References 28, 98] Future improvements in forecasting may minimize this issue.

- The higher the hurricane storm category, the more individuals are likely to evacuate. However, the National Oceanic and Atmospheric Administration's National Weather Service (NWS) hurricane scale continued to cause confusion, as individuals do not understand that it only categorizes potential damage from wind (what the cone is meant to represent), nor that, as the hurricane category moves up the scale, it represents an exponential multiplication of the risk of damage. [References 9, 39, 47, 58, 61, 106]

2.2. Information Sources

- Receiving several warning messages from multiple, credible, trusted sources, such as NWS, local authorities and local media, increased rates of evacuation. NWS was specifically seen as a trusted source of information. [References 9, 39, 46, 47, 53, 61, 109, 124]
- The issuance of evacuation orders by local authorities helped those who were uncertain about whether to evacuate decide to evacuate. [References 39, 58]
- Research indicates that both authorities and family/friends influenced the decision to evacuate. Studies show mixed results in trying to gauge their relative influence. [References 58, 61, 75, 109]
- Authority figures, such as local fire and police, acting as role models by evacuating their families or going door-to-door to urge others to leave could increase the effectiveness of their evacuation message. [Reference 89]
- Trust in government and guidance from local first responders influenced preparedness and the decision to evacuate. For wildfires, an element of this trust was due to the visibility of firefighters in the community. For hurricanes, individuals were more likely to take action when emergency responders went door-to-door in the community. [References 4, 85, 124]
- Lack of trust in authorities caused individuals to spend more time thinking about and trying to confirm their evacuation decision with others. On the other hand, high trust in authorities caused some individuals to believe that the actions of community officials would keep them safe, and therefore they did not need to take personal responsibility for their own safety. [Reference 44]
- Tourists who sought information from tourist offices rather than hotel staff were more likely to evacuate. [Reference 15]

2.3. Channel Access and Preference

- Although television remained the chief communication channel, receiving warnings from multiple channels increased the likelihood of individuals taking protective action. [References 16, 21, 31, 39, 54, 75, 107, 109]

- Television maintains its predominance as the channel most used to gather information on weather status and watches and warnings.
- For radio and television, individuals often indicated a specific station name rather than the simply citing the medium.
- Many individuals use more than one communication channel to receive information, including mobile phones, radio and computers with internet access.
- People tended to use social media as a complementary rather than their primary source of information. [References 49, 95]
 - People turned to social media if they lacked direct access to other sources of information.
 - Social media was also often used to amplify or share information with others.
- As cell phone ownership is now more prevalent than home landlines, public alert and warning calls to landline phone numbers are less effective. The increased reliance on cell phones may also result in cellular bandwidth congestion during an incident. [Reference 109]
 - In transit, individuals relied on cell phones and commercial radio but also on highway advisory radio for gathering weather and traffic information.
- Evacuated individuals tended to rely on the same information sources for the return-entry phase that they used in deciding whether to evacuate. [Reference 101]
 - Evacuees who relied on local authorities and local and national news media were more likely to be aware of the return plan than those who relied on the internet or peers for information.

2.4. Information Seeking

- While substantial research exists on information sources and the results of information gained from those sources, relatively little research has examined how individuals seek or do not seek information after receiving an alert and warning. A few studies looked at responses to tornado or tsunami warnings. These found that individuals seek corroborating information, although that may be reduced by receiving warnings with geographically specific information. Those who accessed weather apps and/or radar imagery were more likely to seek shelter in the event of a tornado warning. [References 21, 63, 64, 81, 98]
- Tourists not familiar with hurricanes or the area they were visiting tended to be more concerned with the potential impact of a hurricane than those more familiar with the area, and so they looked for information from multiple sources when a hurricane was approaching. Tourists who were more local to the area at risk generally relied on their existing knowledge and did not seek as much information. [References 15, 16, 70]

- One study found that past experience with hurricanes, especially hurricane impacts, was a strong predictor of active information-seeking activities regarding hurricane evacuation. [Reference 16]

2.5. Recommendations

2.5.1. WARNING MESSAGES

1. **Prepare:** In creating pre-scripted warning messages:
 - a. Consider warning language that will capture attention (dangerous situation, emergency) but that is not overly dramatic, which may cause individuals to feel the threat is overblown.
 - b. When communicating about hurricane risk, include flood and storm surge risk, as well as the hurricane category (which only denotes wind risk).
 - c. When use of cell phones may saturate bandwidth, be prepared to use the Integrated Public Alert and Warning System (IPAWS) Wireless Emergency Alert (WEA) capability for messages, as WEAs are not constrained by the same bandwidth limitations.
2. **Prepare and Response:** Provide public outreach campaigns with links to user-friendly interactive maps to help individuals locate their home and work addresses and know their zone. During the response phase, these maps should help individuals quickly know whether they are in a zone that is or is not under an evacuation order.
3. **Response:** Do not use the term “voluntary” with evacuation notifications. Research shows that the term “voluntary” is confusing to the public. If people in specific zones should evacuate, issue mandatory evacuation notifications. Include time stamps and easy-to-identify zones or geographic boundary identifiers in notifications to help people comply.
4. **Response:** Help individuals validate the threat by continuing to share and update authoritative forecasts from NWS and local trusted meteorologists. Compare the potential impact of an upcoming hazard to others that have posed similar threats and post visual cues. This strategy also supports wildfire response, where wind and humidity forecasts have a significant effect on wildfire risk.
5. **Response:** Given increased forecasting accuracy for tornadoes, use the smallest map polygon possible, associated with local landmarks, to increase people’s understanding when the warning forecast is specific to their area. Also consider use of WEAs, which can direct warning messages to a smaller geographic area.
6. **Response:** Highlight probable impacts to individuals who stay, including lack of water and electricity and the potential duration of those impacts. Address the urgency for immediate action by noting when it will no longer be safe to evacuate or for emergency personnel to attempt rescues as the storm gets close.

2.5.2. INFORMATION SOURCES

1. **Prepare:** Build relationships in advance with television and radio reporters, weather forecasters and other journalists likely to cover hazards facing the community.
 - a. Familiarize the media with community plans, including evacuation zones, transportation for those who need it and support for those in nursing homes or other similar facilities.
 - b. Provide information about how plans consider public health issues, such as the spread of illness in crowded public shelters.
2. **Prepare:** Encourage individuals and organizations with large numbers of followers (e.g., media stations, weather forecasters, American Red Cross, houses of worship, universities) to follow the jurisdiction's social media accounts so they can receive updates during the disaster and share authoritative messages with their networks.
3. **Prepare:** Have plans use all communication channels that can provide information, especially if cell bandwidth becomes constrained. This includes highway advisory radio, highway signs, amateur radio and NWS weather radio.
4. **Prepare and Response:** Encourage individuals to sign up for the jurisdiction's opt-in alert and warning channels so they directly receive updated information. Continue to encourage sign-ups during the event when individuals are paying attention to information on the situation.
5. **Response:** Confirm that the jurisdiction's social media channels are active and provide up-to-date information during the event. Include messaging and live interviews that address individuals' barriers to evacuation.
6. **Response:** Follow and monitor the social media of authoritative sources within the jurisdiction and across neighboring jurisdictions to keep information consistent and address inconsistencies and inaccuracies if they occur.
7. **Response:** Share and promote NWS's warnings and forecasts to reinforce those of the local jurisdiction. Recommend that individuals follow the local NWS Forecast Office social media accounts.
8. **Response:** Provide easy and quick ways for individuals to corroborate information through hyperlinks to other authoritative sources. Always encourage individuals to share information with family and friends.

2.5.3. CHANNEL ACCESS AND PREFERENCE

1. **Response:** Work closely with local media during the event to:
 - a. Show first responders encouraging evacuations;
 - b. Provide press with information about the early stages of evacuation so viewers see the actions of first responders, businesses and individuals taking action before the storm;

- c. Update media with regular, updated information (including information to override issues that individuals might see as barriers to evacuation), including alternative routes to avoid congestion, availability of services along evacuation routes and shelter information.
 - d. Work with local television and radio to highlight how local authorities are heeding the warnings: closing roads, boarding up schools or other government buildings at risk and so on. While some jurisdiction employees will stay in the emergency operations center, others will evacuate, and these should be highlighted; for example: “I’m staying here because it’s my job, but my family has evacuated to safety.”
2. **Response:** Use social media monitoring tools to identify the channels that reach the most people with effective messaging. Use these channels to disseminate information about plans for re-entry. Plan to surge staff to monitor social media for rumors, misinformation and disinformation that must be quickly corrected.

2.5.4. INFORMATION SEEKING

1. **Prepare:** Work with local hotels and motels to help equip management to provide tourists guidance from local authorities regarding evacuation or SIP decisions.

3. RQ3. What individual and family characteristics affect beliefs and behaviors relative to evacuation and SIP guidance?

3.1. Characteristic: Multiple Vehicles

- Households with multiple vehicles not only evacuated in multiple vehicles but tended to split their evacuation times. One study found that the odds that a household would evacuate in two or more groups is 2.7 times higher for households with multiple vehicles. Studies noted that multiple-vehicle evacuation increases highway congestion. Households see the ability to evacuate with multiple vehicles as a benefit, as one person can delay leaving to safeguard property. [References 69, 97, 109]
- Those living in an evacuation zone tended to evacuate with all their vehicles to minimize potential damage. [Reference 68]

3.2. Characteristic: Age

- Across the literature, findings regarding the relationship between age and evacuation varied. This may indicate that other factors have greater influence on the evacuation decision. These variations were similar across hazard types. [References 13, 29, 39, 57, 58, 61, 77, 80, 91, 95, 124, 126]

3.3. Characteristic: Attitude

- The research found that individuals' attitudes mattered in their evacuation decision making. Those with stronger confidence in their ability to defend their home, as well as attitudes associated with self-reliance and being an individualist, were associated with lower levels of evacuation. Those who see themselves as individualists may also have felt that warnings were overblown. [References 39, 61, 77, 86]
- Those who indicated they were less likely to evacuate tended to have higher self-reported risk tolerance. In wildfire areas, those with higher risk tolerance also tended to have a stay-and-defend attitude, as well as the belief that individuals who choose to live near wildland-urban interface areas should accept the risk. They also had a strong emotional connection to their property. [References 26, 39, 56, 71, 77]

3.4. Characteristic: Education

- Studies varied widely on whether those with less or more education were more likely to evacuate. There tended to be agreement that individuals who had not completed high school were less likely to evacuate, possibly because they did not have the financial means to evacuate. But there was not agreement regarding those with higher levels of education, with some studies indicating those populations were more likely to evacuate and others that they were less likely. Some research indicated that those with higher levels of education had higher rates of home ownership, and that characteristic may make it less likely for those individuals to evacuate. [References 57, 58, 62, 74, 91, 111, 126]

3.5. Characteristic: Gender

- There is strong agreement across studies and hazards that women are more likely to take appropriate protective action (SIP or evacuate) than men. In fact, one study of response behaviors during Hurricane Sandy found that women were almost twice as likely to evacuate. Female tourists were also more likely to evacuate. This held true for wildfires as well as hurricanes. [References 13, 15, 17, 39, 46, 55, 80, 88, 91, 98, 99, 103, 126]
- Men were more likely not to evacuate because they wanted to protect their property. [References 39, 61, 71, 121]

3.6. Characteristic: Households with Children

- Parents with children in the household tended to have more difficulties with making the decision to stay or to leave for hurricanes and flooding. While some of their concerns may be similar to those of other households (e.g., traffic congestion, fuel availability, uncertainty regarding destination, cost), children in the household, especially younger children and larger numbers of children, raised the anxiety level and increased logistical challenges, which caused delays in decision making. [References 59, 61]

- The desire to “keep my family safe” served as a motivation to evacuate. [References 59, 61, 66]
- Study findings varied on whether the presence of children in the home and the number of children in the home increased or decreased the likelihood of evacuation. In some studies, larger numbers of children in the home negatively affected the likelihood of evacuation. For wildfires, however, parents tended to make decisions to evacuate faster, even if the evacuation order was voluntary. [References 47, 58, 61, 97, 103]
- Households with children tended to go to friends’ homes or motels rather than to public shelters. [Reference 126]
- Single parents with medical conditions were less likely to evacuate than others. [Reference 82]

3.7. Characteristic: Households with Pets

- Having a pet, especially where there is a strong attachment to the pet, decreased the likelihood of evacuation. Many studies highlighted concerns about shelters accepting pets, the added cost of evacuating with pets and the logistics of having a pet at a shelter as impediments to evacuation. A greater number of pets exacerbated the difficulties associated with evacuation, leading more individuals to decide not to evacuate. [References 10, 13, 32, 33, 37, 39, 58, 59, 61, 66, 75, 80, 121]
- One research study on wildfires noted that having livestock contributed to the sense of a need to “stay and defend.” [Reference 39]

3.8. Characteristic: Housing

- Homeowners: Across several studies and hazards, homeowners were less likely to evacuate than those who rent. Homeowners tended to underestimate storm severity and believe their home was safe. For hurricanes, homeowners who did evacuate did so only after protecting their homes (e.g., boarding up windows). [References 39, 47, 61, 74, 77, 96, 103, 110]
- Renters: Those who rent were more likely to believe that their home was not safe from a hurricane. [Reference 74]
- Mobile Homes: In response to hurricanes, those who live in mobile homes were more likely to evacuate than those who live in other types of housing. Mobile homes do not provide adequate safety from a tornado, yet mobile home residents living in areas susceptible to tornadoes were less likely to have a preparedness plan that included where to go for shelter in the event of a tornado. [References 21, 95, 127]

3.9. Characteristic: Income

- If households with higher incomes evacuated, they did so in multiple groups, at different times, using multiple vehicles. They stayed at hotels or friends' houses rather than shelters. [Reference 69]
- Findings were mixed for those with low income levels, with some studies indicating higher risk perception and intention to evacuate early and others indicating that they had higher non-evacuation rates. Some studies also found that those with lower incomes or lacking bank accounts were less likely to understand evacuation orders. If they did evacuate, they went to shelters. [References 58, 72, 96, 110, 115]

3.10. Characteristic: Need for Assistance

- Homebound adults indicated a lack of ability to evacuate due to issues of physical mobility. Many would need emergency responder assistance to leave their house, as well as assistance with transportation out of the area. [Reference 33]
- Adults who have dementia or other cognitive disabilities and a caregiver(s) who would evacuate with them have evacuation rates that are the same as, or lower than, others. Caregivers were concerned with the potential for those in their care to be exposed to stigma and lack of privacy in a shelter. They were also concerned that unfamiliar settings would exacerbate their symptoms. Family and friends (the social network) tended to play an important role in determining whether to evacuate or not. [References 6, 13, 23, 41, 54, 82, 117]
- Adults with dementia and their caregivers who did go to shelters experienced a range of difficulties, including increased agitation, emotional distress and disorientation. It was challenging for caregivers to provide normal levels of care and comfort in this environment. [Reference 41]
- Care facilities and their caregivers were challenged in making the decision whether to evacuate or not, given their sense of responsibility to their residents. This research also indicated the importance of care facility residents and their families deciding (and documenting) who would care for them in a disaster (e.g., whether or not they would evacuate to a family's residence) and then not changing that decision as the threat neared. [References 12, 40]

3.11. Characteristic: Preparedness

- Having a household plan increased the likelihood of taking the appropriate SIP protective action for a tornado. [References 39, 61, 80, 81, 88, 94]
- Individuals who had prepared for an emergency by strengthening their home or purchasing generators were less likely to evacuate. [References 13, 39, 82, 84, 127]

- Individuals who lacked knowledge of their community plan, or who didn't know whether their community had an emergency management plan, tended to be less willing to comply with evacuation directives. [Reference 109]

3.12. Characteristic: Race

- Research studies looking at individuals' forecasted intention to evacuate found that Black and Hispanic people had relatively high intentions to evacuate when asked about different hazard scenarios. [References 27, 29, 44, 77, 87, 88, 91, 126]
- Studies that looked at actual evacuation behavior found that Black and Hispanic people were less likely to evacuate than white respondents. [References 103, 111, 115]
- No differences in race/ethnicity were documented related to trust in media sources. [Reference 31]

3.13. Characteristic: Social Network⁸

- Findings differed among studies that looked at the role of social networks. For hurricane areas, some studies found that a strong social network supported the decision to evacuate, while others indicated increased non-evacuation decisions if people felt they had a strong network of support within the community. For the medically fragile, a strong sense of social support tended to result in non-evacuation. In wildfire-prone areas, strong social networks tended to support the decision to evacuate. [References 18, 24, 25, 39, 73, 82, 95, 111]
- Some studies noted a difference between community cohesion (how strongly individuals feel attached to their larger community) compared to an individual's specific social network. Those who lived in communities with higher community cohesion tended to make similar evacuation decisions (whether or not to evacuate), while those who felt their specific social network would provide support tended to stay. [References 13, 18, 49, 119]
- Those who are married were less likely to evacuate. [References 47, 95]
- Being employed and having family/friends significantly increased the likelihood of receiving information about evacuation orders. [References 110, 111]

⁸ "Social networks are representations of ties between nodes such as people, organizations and meetings. Ties represent connections between nodes, such as frequency of interaction, or degree of friendship." Casagrande, David G., Heather McIlvaine-Newsad and Eric C. Jones. "Social Networks of Help-Seeking in Different Types of Disaster Responses to the 2008 Mississippi River Floods," 352. Society for Applied Anthropology. 2015.

3.14. Recommendations

3.14.1. ACCESS TO A VEHICLE

1. **Prepare:** For jurisdictions where many households have multiple vehicles, evacuation model assumptions should include the added volume from multiple cars and multiple departure times.

3.14.2. ATTITUDE: THOSE WHO DECIDE TO ‘STAY AND DEFEND’

1. **Response:** In messaging to those who want to stay and defend their property (more likely to be men), clearly define the risks and communicate the likely inability of first responders to help them once the threat has reached a certain severity threshold.

3.14.3. GENDER

1. **Prepare and Response:** Communications strategies should be tailored to gender differences. For example, given that women are more likely than men to take protective actions, messaging on preparedness should use outreach channels geared toward women.

3.14.4. HOUSEHOLDS WITH CHILDREN AND/OR PETS

1. **Prepare:** Consider using daycare centers, schools, pet stores and breeders and rescue centers as delivery channels for information to help parents and pet owners reduce the stress of an evacuation by pre-planning, including preparing go bags. For children, go bag items can include games, special foods, clothes/diapers, health information and medications. For pets, consider pet carriers and pet food, pet identification and health and vaccination information, as well as information on shelters or hotels and motels that take pets.
2. **Prepare and Response:** Include the message “evacuating will keep your family and/or your pets safe” to motivate households with children and pets to evacuate early.
3. **Prepare and Response:** Encourage shelters and hotels to publish relevant policies regarding pets to their website and social media channels.

3.14.5. HOUSING: HOMEOWNERS, RENTERS AND THOSE LIVING IN MOBILE HOMES

1. **Prepare:** To increase the likelihood that homeowners will evacuate, promote methods to mitigate damage to homes prior to evacuation. Note the likely impacts of the hazard, including loss of electricity and running water, which will make staying risky and uncomfortable.
2. **Prepare:** Address concerns up front about how re-entry will be handled. Messaging should acknowledge that homeowners will be anxious to return to their homes as soon as possible to mitigate damage to the property but that should not stop them from evacuating. If relevant, note steps that government is taking to keep property secure until individuals can return to their community, such as increased patrols, curfews, etc.

3. **Prepare and Response:** Provide messaging specifically for residents of manufactured or mobile homes in areas at risk because this type of housing is structurally less safe. Encourage those individuals to be ready to evacuate and plan to provide services to those who may need assistance.
4. **Response:** Those who have purchased generators may feel more secure in staying, so if there is loss of power, messaging should address how to use generators safely to avoid carbon dioxide poisoning.

3.14.6. INDIVIDUALS WHO NEED ASSISTANCE

1. **Prepare:** Include individuals with disabilities, access and functional needs, and associated advocacy organizations in developing and reviewing community plans for evacuation.
2. **Prepare:** Work with shelters in advance to prepare for individuals with disabilities, access and functional needs. Bring together community advocates for those with disabilities, access and functional needs to discuss and address how to improve shelter operations.
3. **Prepare:** Work with first responders and other agencies to plan for evacuation transportation assistance for those who cannot evacuate on their own.
4. **Prepare and Response:** Ask neighbors to check in on individuals with disabilities, access and functional needs to help them plan how to evacuate. When evacuation orders are issued, encourage neighbors to ask if they need help to evacuate, and if so, alert authorities that these individuals need evacuation assistance.
5. **Response:** Coordinate with advocacy organizations for those with disabilities, access and functional needs. Ask them to support their constituents' evacuation decisions and describe how shelters are prepared to provide appropriate care and services.
6. **Response:** Ensure messaging includes information about how individuals with disabilities, access and functional needs can find support for transportation evacuation planning, transportation assistance and assistance at shelters.

3.14.7. SOCIAL NETWORKS

1. **Prepare:** Ask community and HOA leaders to encourage their constituents to plan for evacuations and commit to modeling that evacuation behavior.
2. **Prepare:** Encourage advocacy organizations for at-risk individuals, their caregivers and their social support networks to help them prepare and think through the evacuation decision-making process in case they need to evacuate. Integrate advocacy organizations into the community planning process for evacuation and SIP.
3. **Response:** Encourage people to share official warnings and safety information with their personal social networks.

4. RQ4. How do awareness and perception of different threats and hazards affect decision making?

4.1. Threat Perceptions

- Many studies noted that the greater the perceived risk, the greater the likelihood of evacuation. [References 34, 39, 45, 46, 48, 61, 105, 113, 116, 117]
- Several studies found that prior experience with a disaster had a positive impact on the decision to take protective action. However, those who experienced near miss events (event where a forecasted disaster did not happen) found that experience reduced the likelihood of evacuation. Similarly the passage of time after a disaster reduced individuals' perception of the threat and their intention to evacuate. [References 39, 40, 107, 109, 112, 114]
- The personalization of a risk or impact (I/my family/my house is at risk) increased the probability of evacuation. [References 46, 47]
- Individuals' perception of a hurricane's risk tended to focus on its Saffir-Simpson hurricane category (higher categories reflect higher risk), which conveys only wind speeds, and whether its forecasted path was directly over their location. However, some studies also found that perception of hurricane risk included the potential for flooding and storm surge. [References 3, 9, 30, 34, 61, 62, 75, 80, 88, 103, 116, 117, 121]

4.2. Recommendations

- **Prepare:** Remind individuals of prior disasters. Compare the potential impact of an upcoming hazard to prior events and their consequences.
- **Response:** To motivate people to leave when evacuations are issued, messages should include information about the risk of the hazard and its probable effect on individual safety, property damage and community functions. Include descriptions of prolonged impact on quality of life considerations (e.g., water, electricity, food).
- **Response:** For hurricane risk, include all the risks associated with a hurricane in messages including wind, flooding and storm surge.

5. RQ5. What are the impediments to positive behavioral response? What situational factors tend to support public response to evacuation and SIP guidance?

5.1. Situational Impediments

- Studies found that individuals grapple with many concerns when deciding to evacuate. According to these studies, the following concerns delayed or negatively influenced the decision:
 - Traffic congestion and availability of gasoline. Individuals facing hurricanes and wildfires want reliable information about alternative routes to help overcome worries about traffic congestion. Residents at risk of wildfire were especially concerned with the capacity of the road system to handle the traffic. [References 2, 3, 39, 59, 60, 71, 86, 109, 121]
 - The ability and cost of evacuating with pets. The greater the number of pets in the household, the greater the barrier to departure. [References 32, 37, 39, 56, 59, 61, 66, 75]
 - The physical security of the home. Many studies noted concerns about the ability to re-enter the evacuation zone after the disaster to quickly take care of any damage as a reason not to evacuate. These concerns were especially prominent in hurricane research, as delays in repairs to water damage can lead to mold. Some studies also noted fear of looting in evacuated neighborhoods. [References 3, 32, 39, 58, 59, 60, 62, 77, 82, 83, 102, 121]
 - Costs of evacuation, including travel costs. [References 39, 58, 77, 122]
 - Potential issues around the legal status of undocumented immigrants. [Reference 122]
- Studies noted the high level of stress and anxiety surrounding evacuation decision making. Sources of stress included the many unknowns related to the evacuation (e.g., potential destination, space at shelters, shelter safety, travel issues) as well as separation from family, pets and the home. [References 38, 56, 60]
- Lack of agreement among family members about the decision to stay or leave could delay or inhibit evacuation decision making. [Reference 59]
- Individuals faced with a public shelter as their primary destination had more reluctance to evacuate. Their concerns include crowding with strangers and being located farther away from social networks. [References 58, 115]
- Some individuals could not leave because of ongoing job responsibilities. [Reference 75]

5.2. Situational Facilitators

- The desire to be safe and to protect children from physical or psychological harm from experiencing a disaster were positive motivations to evacuate. [References 59, 61]
- Ensuring comfort and convenience (power and air conditioning) supported evacuation decisions. [References 59, 121]
- According to the research, several factors facilitated evacuation in hazard situations that provide advance notice. [References 59, 61,67] These include:
 - Evacuation notifications issued early in the day or at other trigger points, such as school dismissal making it easier to pick up children.
 - Evacuation orders scheduled to provide sufficient time for individuals to complete preparation and still leave before traffic became congested.
 - The ability to leave at a time that allowed travel to be completed during daylight hours.
 - Early notification that supported a household’s choice of preferred destination (e.g., family, friends, hotel) rather than a public shelter.
- Lack of traffic congestion in the early stages of an evacuation was a facilitator, and the increasing traffic congestion as the storm came closer became an impediment. [References 59, 72, 109, 121]

5.3. Evacuation Zones

- Evacuation likelihood was higher for those who believed they lived in evacuation zones. Those in designated evacuation zones were significantly more likely to take preparation measures on receipt of advanced watches or warnings. [References 27, 58, 76, 77, 104, 105, 124, 127]
- For individuals living outside of hurricane evacuation zones, the media focus on severe weather forecasts noting elevated risks from wind damage caused them to evacuate unnecessarily. [References 27, 58, 76, 77, 104, 105, 124, 127]
- Studies indicated that many individuals did not know whether they were in an evacuation zone or an area with flood risk. [References 45, 61, 78, 115, 117]

5.4. Recommendations

1. **Prepare:** Begin or continue public education “know your zones” campaigns since those who know they live in an evacuation zone or area of flood risk have higher intention to evacuate. Link alert and warning communication channels to interactive maps that can pinpoint specific addresses as in or not in evacuation zones.

2. **Prepare and Response:** Acknowledge and express empathy for the stress and anxiety associated with evacuations.
 - a. To reduce these elevated levels of stress, encourage individuals, especially households with children and pets, to discuss and agree on evacuation plans early.
 - b. To reduce the number of evacuation unknowns, which can delay decision making, provide as much detailed information as possible on evacuation routes, traffic, shelters and re-entry plans.
 - c. Have and promote behavioral health services available at shelter locations to support those who are feeling anxious and stressed.
3. **Response:** When issuing evacuation orders, explain the risks that led to the decision to evacuate some zones and why other zones are not evacuating.
4. **Response:** When there is advance notice of the hazard, encourage individuals to evacuate early. Stress benefits to include: avoiding traffic congestion, driving during daylight hours, and having more assurance regarding availability of gasoline along routes. Provide up-to-date information on evacuation routes, alternatives, and services available, including availability of gasoline.
5. **Response:** Provide information about public shelters, including items associated with comfort (e.g., availability of power, air conditioning, rest rooms, and space for families and pets) as well as services for individuals with disabilities and access and functional needs.

Summary

This literature review provides an overview of research into the behaviors and beliefs related to evacuation and SIP from the past ten years. The findings from this research inform key recommendations for emergency managers and local leaders to implement before and during responses to disasters to increase the number of individuals who take the appropriate protective action to evacuate or to SIP. Many of these research findings are likely to be familiar to emergency managers with experience in evacuation operations.

Key recommendations include:

1. Understand the potential impediments to action and take steps to address these barriers in advance.
2. Make evacuation decisions easier by only issuing mandatory evacuation orders.
3. Provide residents and tourists with multiple ways to know if they are in a zone under an evacuation order.
4. Use multiple, authoritative messaging channels that include photos or links to other visual information about the hazard and encourage individuals to share this information with friends and families.
5. Provide frequent updates with information that can reduce the stress of the unknown related to evacuation.

Although this literature review identified similarities and differences in attitudes and behaviors related to multiple types of hazards, the largest set of research is associated with hurricanes. More research should be conducted on little- or no-notice incidents, such as wildfires, earthquakes and tornadoes, as well as manmade emergencies such as chemical spills.

Suggestions for additional research:

More research and analysis are also needed to continue to provide improved strategies that move individuals to take appropriate life-saving actions. Additional research could focus on:

- Hazards other than hurricanes, especially the no-notice hazards such as wildfires. The limited research that has been done indicates important differences in attitudes and behaviors for people at risk for wildfire versus other hazards.
- Best practices in language and the use of visuals (photographs or graphics) in warning messages to capture attention and motivate action.
- The effect of misinformation or disinformation in complicating the decision to evacuate and ways to convey accurate information from authoritative sources so that it is received and trusted.

- Organizational decision-making behaviors that offer important insights into the actions of businesses, not-for-profit organizations, houses of worship, schools, nursing homes and other organizations that are key to a whole community perspective.
- Social networks, to better understand how different types of social networks affect decision making and how those decisions may differ by hazard.
- Individuals whose risk tolerance, sense of individualism or desire to stay and defend negatively affects evacuation decision making.

Every disaster requires emergency managers to communicate to the public the best place for safety, either leaving the area or sheltering-in-place. As hazards continue to increase in frequency, size and reach, the emergency management community must understand how individuals, households and organizations decide whether to leave in order to implement more effective risk and crisis communications. The research findings from this literature review provide helpful insights to support emergency managers as they update and practice their evacuation and SIP planning.

Appendix A: NVivo Coding Nodes

- Name
- Behavioral response, emotion-focused coping
- Behavioral response, information search
- Behavioral response, protective response
- Channel access and preference
- Environmental cues
- Information sources
- Pre-decision process
- Protective action perceptions
- Receiver characteristics
- Situational facilitators
- Situational impediments
- Social cues
- Stakeholder perceptions
- Threat perceptions
- Warning messages

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*These articles did not contribute findings to this literature review. They are included to provide a comprehensive list of all articles coded for analysis.

Appendix C: Recommendations

This Appendix summarizes the recommendations for use by public safety officials based on the research findings. The recommendations are organized by communication strategies and by implementation timeline – whether the recommendation is best implemented before an event occurs or during the response, denoted with checkmarks in the columns to the left. The column on the right provides the reference number of the specific finding(s) that supports each recommendation.

Prepare the Public

Prepare	Respond	Recommendations	Findings Reference
✓		Provide public outreach “know your zone” campaigns with links to user-friendly interactive maps to help individuals locate their home and work addresses and know their zone.	2.1 5.3
✓		Encourage individuals to sign up for the jurisdiction’s opt-in alert and warning channels so they directly receive updated information.	2.2 2.3
✓		Ask community and HOA leaders to encourage their constituents to plan for evacuations and commit to modeling that evacuation behavior.	1.2 3.13
✓		Ask neighbors to check in on individuals with disabilities, access and functional needs to help them plan how to evacuate.	3.10
✓		Encourage advocacy organizations for at-risk individuals, their caregivers and their social support networks to help them prepare and think through the evacuation decision-making process in case they need to evacuate. Integrate advocacy organizations into the community planning process for evacuation and SIP.	3.10
✓		Work with local hotels and motels to provide tourists information on whether the hotel/motel is in an evacuation zone and how to access guidance from local authorities regarding evacuation or SIP decisions.	2.2 2.4

✓	✓	Provide outreach and messaging specifically for residents of manufactured or mobile homes in areas at risk because this type of housing is structurally less safe. Encourage those individuals to be ready to evacuate and plan to provide services to those who may need assistance.	3.8
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Target Messaging Based on Socio-demographic Characteristics

Prepare	Respond	Recommendations	Findings Reference
✓		Women: Given that women are more likely than men to take protective actions, messaging and communication channel selection should focus more on women.	3.5
✓	✓	<p>Households with children and/or pets:</p> <ul style="list-style-type: none"> ▪ Include the message “evacuating will keep your family and/or your pets safe” to motivate households with children and pets to evacuate early. ▪ Acknowledge and express empathy for the stress and anxiety associated with evacuations for households with children and/or pets. Recommend these households discuss and agree on evacuation plans early. ▪ Consider using daycare centers, schools, pet stores and breeders and rescue centers as delivery channels for information to help parents and pet owners reduce the stress of an evacuation by pre-planning, including preparing go bags. For children, go bag items can include games, special foods, clothes/diapers, health information and medications. For pets, consider pet carriers and pet food, pet identification and health and vaccination information, as well as information on shelters or hotels and motels that take pets. 	3.7

✓	✓	<p>Homeowners:</p> <ul style="list-style-type: none"> ▪ Promote methods to mitigate damage to homes prior to evacuation. ▪ Note the likely impacts of the hazard, including loss of electricity and running water, which will make staying risky and uncomfortable. ▪ Messaging should acknowledge that homeowners will be worried about security and anxious to return to their homes as soon as possible to mitigate damage to the property but that should not stop them from evacuating. If relevant, note steps that government is taking to keep property secure until individuals can return to their community, such as increased patrols, curfews, etc. 	3.8
✓	✓	<p>Those living in manufactured or mobile homes:</p> <ul style="list-style-type: none"> ▪ Because this type of housing is structurally less safe, encourage those individuals to evacuate early and plan to provide services to those who may need assistance. 	3.8
✓	✓	<p>Individuals who need assistance: Ensure messaging includes information about how individuals with disabilities, access and functional needs can find support for transportation evacuation planning, transportation assistance and assistance at shelters.</p>	3.10

Work with Local Media

Prepare	Respond	Recommendations	Findings Reference
✓		Build relationships in advance with television and radio reporters, weather forecasters and other journalists likely to cover hazards facing the community.	2.3

✓		<p>Familiarize the media with community plans in advance of a disaster:</p> <p>Ensure the media has access to easy-to-use information and graphics related to evacuation zones and routes. The graphics should clearly depict what zones are included in evacuation orders and which are not.</p> <p>Provide information on the jurisdiction’s plans for transportation for those who need it and support for those in nursing homes or other similar facilities.</p> <p>Describe how plans consider public health issues, such as minimizing the spread of illness in public transportation or shelters.</p>	5.3
	✓	<p>Provide press with information about the early stages of evacuation so viewers see the jurisdiction, businesses and individuals taking action before the storm. Highlight how local authorities are heeding the warnings: activating the emergency operations center, closing roads and boarding up schools or other government buildings at risk.</p>	2.3
	✓	<p>Keep media informed with regular, updated information (including information to overcome potential barriers to evacuation), including suggestions of how to avoid congestion, availability of services along evacuation routes and shelter information.</p>	2.3
	✓	<p>During the event, work closely with local media to show first responders encouraging evacuations of community members and their own family members. While some jurisdiction responders will staff the emergency operations center or support response operations, others will evacuate, and these should be highlighted; for example: “I’m staying here because it’s my job, but my family has evacuated to safety.”</p>	2.3
	✓	<p>Provide media with authoritative, time-stamped, geo-tagged photos and videos that they can share during broadcasts and their websites of:</p> <p>Hazards such as rising waters and wildfires that they can share.</p> <p>Different ways jurisdictions, businesses and individuals prepare for the threat, including preparing to evacuate (e.g., closing public transportation or other public areas).</p>	1.2

Maximize Social Media Use

Prepare	Respond	Recommendations	Findings Reference
✓	✓	Confirm that the jurisdiction’s social media channels are active before and during the event. Provide up-to date information during the event.	2.3
✓	✓	Encourage individuals and organizations with large numbers of followers (e.g., media stations, weather forecasters, American Red Cross, houses of worship, universities) to follow the jurisdiction’s social media accounts so they can receive updates during the disaster and share authoritative messages with their networks.	2.2
✓	✓	Follow and monitor the social media accounts of other authoritative sources within the jurisdiction and across neighboring jurisdictions to keep information consistent and address inconsistencies and inaccuracies if they occur.	2.2
	✓	Urge businesses to share their preparedness and response actions on their websites and social media accounts (e.g., closing their businesses, encouraging employees to evacuate and stay safe).	1.2
✓		Encourage those with neighborhood-focused social media platforms like Nextdoor, homeowner associations (HOAs) and other neighborhood groups to support evacuation guidance and checks on neighbors.	1.2 3.13
	✓	Provide environmental cues that the hazard is real by posting authoritative, time-stamped, geo-tagged photos and videos of hazards such as rising waters and wildfires on social media and website. Encourage individuals to share those visuals with friends and family, including via their social media.	1.1
	✓	Encourage people to share official warnings and safety information with their personal social networks. Encourage them to post photos/videos of visual cues of the hazard as they evacuate.	1.1 2.1

	✓	Use social media monitoring tools to identify the channels that reach the most people with effective messaging. Use these channels to disseminate information about plans for re-entry. Plan to surge staff to monitor social media for rumors, misinformation and disinformation that must be quickly corrected.	2.3
	✓	Use social media channels during the event to encourage individuals to sign-up for community alerting systems to make sure they receive the most up-to-date information.	2.3

Leverage Trusted Messengers

Prepare	Respond	Recommendations	Findings Reference
	✓	Help individuals validate the threat by sharing the authoritative forecasts from NWS and local trusted meteorologists. Recommend that individuals follow the local NWS Forecast Office social media accounts.	2.2
✓	✓	Coordinate with advocacy organizations for those with disabilities, access and functional needs. Ask them to support their constituents' evacuation decisions and describe how shelters are prepared to provide appropriate care and services. Note that this requires the involvement of these advocacy organizations in the evacuation and shelter planning process.	3.10
	✓	When evacuation orders are issued, ask neighbors to check in on individuals with disabilities, access and functional needs to see if they need help to evacuate, and if so, alert authorities that these individuals need evacuation assistance.	3.10
	✓	Encourage individuals to share the alerts and warning messages they receive and the responsive protective actions they take with their friends and their community.	1.2

Help People Overcome Barriers To Action

Prepare	Respond	Recommendations	Findings Reference
	✓	To motivate people to leave when evacuation orders are issued, messages should include information about the risk of the hazard and its probable effect on individual safety, property damage and community functions. Include descriptions of prolonged impact on quality of life considerations (e.g., water, electricity, food).	4.1
	✓	Because many individuals do not want to go to public shelters, provide information about the shelters associated with comfort (e.g., availability of power, air conditioning, rest rooms, and space for families and pets) as well as services for individuals with disabilities and access and functional needs.	3.10
	✓	In messaging to those who want to stay and defend their property (more likely to be men), clearly define the risks and communicate the likely inability of first responders to help them once the threat has reached a certain severity threshold.	3.5
	✓	Those who have purchased generators may feel more secure in staying, so if there is loss of power, messaging should address how to use generators safely to avoid carbon dioxide poisoning.	3.11
	✓	Stress the benefits that will encourage individuals to evacuate early, including: avoiding traffic congestion, driving during daylight hours, and having more assurance regarding availability of gasoline along routes. Provide up-to-date information on evacuation routes, alternatives, and services available, including availability of gasoline.	3.9
	✓	To reduce the number of evacuation unknowns which can delay decision making, provide as much detailed information as possible on evacuation routes, traffic, shelters and re-entry plans.	5.1

Improve Effectiveness of Alert and Warning Messages

Prepare	Respond	Recommendations	Findings Reference
✓		Create pre-scripted warning messages using warning language that will capture attention (dangerous situation, emergency) but that is not overly dramatic as that may cause individuals to feel the threat is overblown.	2.1
	✓	Compare the potential impact of an upcoming hazard to similar prior events and their consequences.	2.1
	✓	Address the urgency for immediate action by noting when it will no longer be safe to evacuate or for emergency personnel to attempt rescues as the storm gets close.	2.1
	✓	Provide easy and quick ways for individuals to corroborate information through hyperlinks to other authoritative sources.	2.1
	✓	Do not use the term “voluntary” with evacuation notifications. Research shows that the term “voluntary” is confusing to the public. If people in specific zones should evacuate, issue mandatory evacuation notifications. Include time stamps and easy-to-identify zones or geographic boundary identifiers in notifications to help people comply.	2.1
	✓	When issuing evacuation orders, explain the risks that led to the decision to evacuate some zones and why other zones are not evacuating.	2.1
	✓	Always encourage individuals to share information with family and friends.	3.13
✓	✓	Provide links to user-friendly interactive maps to help individuals locate their home and work addresses and know their zone. During the response phase, these maps should help individuals quickly know if they are in a zone that is or is not under an evacuation order.	2.1
✓	✓	When use of cell phones may saturate bandwidth, be prepared to use the Integrated Public Alert and Warning System (IPAWS) Wireless Emergency Alert (WEA) capability for messages, as WEAs are not constrained by the same bandwidth limitations.	2.2

	✓	Tornado: Given increased forecasting accuracy for tornadoes, use the smallest map polygon possible, associated with local landmarks, to increase people’s understanding when a warning forecast is specific to their area. Also consider use of WEAs, which can direct warning messages to a smaller geographic area.	2.1
	✓	Hurricane: For hurricane risk, include all the risks associated with a hurricane in messages including wind, flooding and storm surge.	2.1

Review the Jurisdiction Evacuation and SIP Plan

Prepare	Respond	Recommendations	Findings Reference
✓		Plan to use all communication channels that can provide information, especially if cell bandwidth becomes constrained. This includes highway advisory radio, highway signs, amateur radio and NWS weather radio.	2.3
✓		For jurisdictions where many households have multiple vehicles, evacuation model assumptions should include the added volume from multiple cars and multiple departure times.	3.1
✓		Work with shelters in advance to prepare for individuals with disabilities, and access and functional needs. Involve representatives of advocacy organizations for these health conditions in these preparations.	3.10
✓		Work with first responders and other agencies to plan for evacuation transportation assistance for those who cannot evacuate on their own.	3.10
✓	✓	Have and promote behavioral health services available at shelter locations to support those who are feeling anxious and stressed.	5.1
✓		Encourage shelters and hotels to publish relevant policies regarding pets to their website and social media channels.	3.7