EMERGENCY WARNING MESSAGES: HOW DO COMMUNITY MEMBERS COMPREHEND THEM?

ABOUT THIS PROJECT

This is the first of three concurrent *Hazard Notes* for the Bushfire and Natural Hazards CRC project, *Creating effective multi-channel communication during disaster response and recovery*, as part of the Communication and Warnings cluster. This research adopts a multi-hazards approach to examine the effectiveness of response and recovery communication in communities affected by natural hazards. It applies well-established risk communications and psychological theories of human behaviour to determine whether existing emergency messages could be revised to improve comprehension.

This *Hazard Note* outlines opportunities for emergency services agencies to improve their communication and messaging. *Hazard Note 80* details which types of specific messages encourage community readiness. *Hazard Note 81* explores whether icons and graphics help to encourage action during emergencies.

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▲ **Above:** THIS RESEARCH IS HELPING EMERGENCY SERVICES IMPROVE COMMUNICATION MESSAGES. CREDIT: SOUTH AUSTRALIA STATE EMERGENCY SERVICE.

SUMMARY

The negative impacts of natural hazards in Australia can be lessened by community members responding appropriately to emergency warning messages during disasters. Using case studies conducted in Queensland, New South Wales, Victoria and Western Australia in 2015, this research draws on a social psychological framework of information processing (Mileti 1995) to explore how emergency warning messages are comprehended by community members. By understanding how community members process information and reflect on their behavioural intentions, this research provides

a means to enhance message design to ensure protective action can be undertaken.

This research shows that emergency services agencies can improve information processing by:

a. removing barriers to information and making information easy to access;
b. connecting with local community groups, including those on social media, to ensure the information is received;
c. using simple language that translates impact;
d. personalising messages by naming the affected location and using visuals;
e. improving readability through stylised messages and content ordering;
f. assuming no preparation, no hazard knowledge and no geographic knowledge, to appeal to the majority of the population;
g. understanding how time between updates can become an (unintended) signal of risk;
h. repeating instructions in escalated messages, i.e. assume that the community will not (or, in the case of warnings received via the radio, cannot) go back to check what they should have been doing prior to evacuating;
i. understanding that the presence of emergency responders can lead to over-reliance on these responders or optimism bias that the event is being handled, delaying community action; and
j. understanding that there is a tolerance for uncertainty in weather-related information.

CONTEXT

Australia experiences a broad range of natural hazards that can lead to loss of life, negative sustained impacts on community wellbeing, and up to $9 billion a year in economic expenses (Deloitte 2016). This significant impact can be lessened by individuals undertaking protective action for each hazard (Burns and Slovic 2012). However, for an individual to take protective action following the receipt of an emergency warning message, they first need to accurately comprehend the warning message they receive. This research examined how community members comprehend (and translate into action) emergency warning messages during the response phase of a natural hazard.

BACKGROUND

Even small changes in protective behaviours can make valuable impacts during disaster response (Lindell and Perry 2012). Mileti's (1995) social psychological framework of information processing can be used to understand how emergency warning messages are comprehended in order to drive protective behaviour. The framework suggests there are five stages of information processing: (1) hear, (2) understand, (3) believe, (4) personalise and (5) respond. This process is repeated for each emergency warning message an individual receives. By investigating how community members process information and reflect on their behavioural intentions, this research aims to enhance message design to ensure better protective action.

BUSHFIRE AND NATURAL HAZARDS CRC RESEARCH

To examine emergency warning message comprehension, 10 focus groups were conducted across seven urban and regional locations in Australia (Brisbane and Hervey Bay, Queensland; Kempsey, New South Wales; Melbourne and Dandenong, Victoria; Kalamunda and Busselton, Western Australia) from June to October 2015. In the focus groups, researchers tested how members of the community comprehended emergency warning messages about an imminent tsunami, severe storm, cyclone, storm surge, fire and flood, which were supplied by end-users as stimuli for discussion. More than 900 minutes of data were collected from 55 respondents across Australia.

RESEARCH FINDINGS

The findings present 10 opportunities for emergency services agencies when issuing warnings:

1 Remove barriers to information and make information easy to access

Community members do not always know where the exact information is that they need, and barriers to information can lead to abandonment of information seeking.

As most individuals seek to confirm information distributed by official or unofficial sources during an emergency, this research identified an opportunity to aggregate hazard information in one accessible place. Emergency warning messages can ask the community to remain informed, to check for road closures and consider public transport options. Aggregating this information reduces the barriers to confirming the information and taking protection action. Many emergency services agencies across Australia have already begun the aggregation process (see the South Australian Government Alert SA website, for example).

While aggregating all the key sources helps address the barriers of information seeking, emergency services can additionally direct people to the exact source of the information (e.g. using the exact URL in a message as opposed to providing a link to the homepage that requires recipients to dig for further information).

However, aggregating the information does not mean emergency services should stop using multiple channels to disseminate their messages. The use of multiple channels is consistent with emergency management policy in Australia and is valuable for a community with diverse needs. Multiple channels mean an individual has a greater opportunity to be exposed to the emergency warning message before and during an event.

Another barrier to information seeking is awareness around the SMS or app-based alerting systems that are available to the community. Increasing awareness about what systems are available to the community would encourage information access.

> **Opportunity**
> Emergency services agencies have an opportunity to remove any potential barriers to information seeking by (a) continuing to use multiple channels of communication that can then be aggregated in one easy-to-access location, (b) using direct URLs/links to the exact sources of further information and (c) raising awareness of local SMS alert systems available to the community.

2 Connect with local community groups, including those on social media, to ensure the information is received

Emergency services agencies may benefit from collaborating with local community groups on different social media sites that community members already use as their first point of reference to triangulate emergency information (e.g. dedicated Facebook pages).

> **Opportunity**
> Connect and build relationships with local community groups, including those on social media, prior to an event to ensure that, when an event hits, the groups are sharing accurate and timely information.

3 Simplify language and translate impact

Continuing to simplify the language used in emergency warning messages will assist with better comprehension of the messages. If the removal of some technical information is not possible, visuals can translate the location into something meaningful to the recipient, making it easier to comprehend the information. For instance, what damage would be expected from 150km/hr winds? Where exactly is the Wide Bay Burnett forecast district? Illustrating the impact helps inform protective action.

Findings also suggest that community members refer to past events to help them translate the impact described in emergency messages. However, there was variability in whether the past event the participant was referring to was similar to the current event. To improve the accuracy of community references to past events, emergency services agencies could use a specific event as an anchor to encourage more accurate risk assessments and subsequent behaviours.

> **Opportunity**
> Continuing to simplify the language used in emergency warning messages and translating the technical language into something meaningful for the community, will improve comprehension of the messages. Using past events as a reference point in the messages also helps to translate the technical language about the hazard, highlighting the potential consequences of the current event.

4 Personalise messages by naming the affected location and using visuals

Research shows that the community has a strong desire for visuals, including images of the hazard and relevant maps. Visuals are valuable in personalising the information presented in the emergency warning message. When a participant saw they were in the affected area on a map, they claimed they were more likely to read the whole message, rather than dismiss it.

Being able to personalise the risk presented in the message is not only valuable for attention to the message, but also effective in triggering action. Where visuals are not available, personalisation can be achieved by mentioning the affected location/s early in the message.

Messages that included visuals were considered more appealing, and easier to read. Visuals also have the potential to overcome limitations in geographic knowledge of the affected region and knowledge of how the hazard may track throughout an event. Moreover, using images to illustrate the impact of the hazard can overcome technical language barriers.

Opportunity
There is an opportunity for greater use of visuals and maps to overcome limitations in geographic knowledge, hazard knowledge, language barriers and other technical information. It also facilitates the personalisation of risk, which is required to trigger protection action.

5 Improve readability through stylised messages

Findings suggest that stylised messages – those using bolding, headings, colours and textboxes – are preferred over large chunks of text in an emergency warning message. Stylised messages aid message comprehension, enable content to be processed more quickly, and promote longer engagement with the message.

Opportunity
Emergency services should use styling tactics – bolding, headings, colours and textboxes – where possible and appropriate in warning messages to highlight important information, such as location and level of warning.

6 Assume no preparation, no hazard knowledge and no geographic knowledge, to appeal to the majority of the population

All emergency warning messages should assume the community has not completed preparation activities and has no knowledge of the hazard or the geography of the region. This structure of the message appeals to the majority of individuals. The message can then include a link to further information for those in the community who want tailored information to suit specific knowledge sets or requirements. For example, farmers may need specific information that the rest of the community doesn't need. Further, some members of the community need specific weather information from the Bureau of Meteorology regarding tides, which the majority of the community doesn't need.

Opportunity
All emergency warning messages should assume the community has not prepared for the event and should include instructions and direct links to preparation information. Also, agencies should craft messages to assume the recipient has no geographic or hazard knowledge.

7 Use time between updates to signal risk

Research suggests that the community is using time between updates to signal the severity of the event, which is an unintended outcome of including update times in messages. Emergency services could leverage this and actively use time to signal the severity of the event by having a short time between updates (e.g. 15 minutes or less) to signal a severe event, or stating a long time between updates (e.g. one hour) to signal a less severe event. Signalling the severity of the event can activate the community to seek further information or act on the message, depending on the instruction of the message.

Opportunity
Emergency services agencies can use time to signal the severity of the event by having a short time between updates (e.g. 15 minutes or less) to signal a severe event or stating a long time between updates (e.g. one hour) to signal a less severe event.

8 Repeat instructions in escalated messages, as the community cannot go back to check what they should have been doing prior to evacuating

Instructions presented on the radio need to be repeated for those who do not initially perceive a threat. Unlike a written warning, the individual cannot go back and read the instructions a second time. Repetition of instructions is also important in the evacuation order message, as it is difficult for an individual to go back and double check what instructions they were supposed to follow in the evacuation preparation stage.

Opportunity
Instructions should include consistent and still-relevant instructions repeated across all messages during an event. Instructions should not build on one another as the event escalates, as it is not easy for individuals to go back and check what they should have done at an earlier event stage.

9 Exercise caution when mentioning the presence of emergency responders, as this can lead to over-reliance on emergency services or optimism bias that the event is being handled, delaying protective action

Mentioning the presence of emergency responders (e.g. fire trucks, swift water rescue teams) appears to have unintended consequences for community perceptions of risk. Knowing there are responders around makes the community feel overconfident that the situation is being handled and could suggest that help is available if they delay enacting their emergency preparedness plans, including evacuation. Mentioning the presence or absence of responders should be done so with caution.

Opportunity
Emergency services should disclose the presence of emergency responders with caution as it can lead to overconfidence in, or over-reliance on, support from emergency services during an event.

10 Acknowledge the tolerance for uncertainty in warning information

The findings suggest that, contrary to popular belief, participants preferred to receive information and have an event not eventuate than not receive information

to act when an event occurs. The balance between under-warning to avoid message fatigue and over-warning to avoid crying wolf is complicated. While the results in these focus groups are not generalisable to the entire population, they signal a tolerance for uncertainty in predictions.

Recommendation
The amount of information shared by an emergency service agency during an event is at the discretion of that agency, bearing in mind individuals do have a tolerance for uncertainty in weather events.

HOW IS THIS RESEARCH BEING USED?

By adopting current evidence-based practice, Australian emergency service agencies continue to create and refine effective emergency warnings that encourage readiness to act. Good practice exists across the sector and this research has supported broader initiatives in emergency communications and warnings, not just for individual organisations, but also at the national level by providing reviews and assisting with the development of evidence-based warning doctrine. Agencies now have an evidence base for continued changes to warnings so that they better meet community needs. One example of this impact is a guideline – called *Warning Message Construction: choosing your words* – published in 2019 as part of the Australian Institute of Disaster Resilience Handbook Collection.

FUTURE DIRECTIONS

This research identifies 10 opportunities to continue to refine emergency warning messages in Australia. By exploring the effectiveness and efficiency of official emergency warning messages in the response and recovery phases, this research aims to promote both community and end-user understanding of the

psychological motivators for maximising engagement with emergency instructions. The findings from this research offer a number of contributions that align with recommendations from the National Review of Warnings and Information.

Primarily, this research adds to the gap in sector knowledge on designing warnings that are capable of interrupting the lives of busy Australians to ensure they protect themselves from imminent natural hazards.

This research also has the potential to contribute an evidence base to conversations around nationally consistent warning frameworks.

Finally, the findings provide empirical evidence for developing a congruent warnings framework across all hazards.

END-USER STATEMENT

"This research is a really important piece of the puzzle. It is a game-changer for us as we had been sending out information and warnings in a format that met the needs of the emergency services. This research tips the process on its head and puts the community first and foremost. Emergency services are forming warning messages with the community in mind, so we can get the best possible response from the community in a time of disaster."
Anthony Clark, Director Corporate Communications, NSW Rural Fire Service

FURTHER READING

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