



How emergency alerts convey risks matters. AP Photo/Eric Gay

Why it can be hard to warn people about dangers like floods – communication researchers explain the role of human behavior

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Flash floods like the one that swept down the Guadalupe River in Texas on July 4, 2025, can be highly unpredictable. While there are sophisticated flood prediction models and different types of warning systems in some places, effective flood protection requires extensive preparedness and awareness.

It also requires an understanding of how people receive, interpret and act on risk information and warnings. Technology can be part of the solution, but ultimately people are the critical element in any response.

As researchers who study emergency communications, we have found that simply providing people with technical information and data is often not enough to effectively communicate the danger and prompt them to act.

The human element

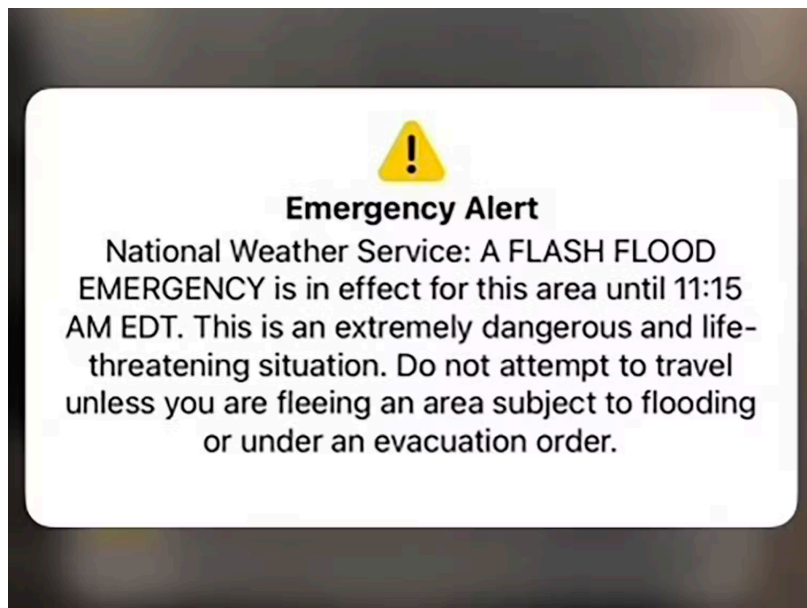
One of us, Keri Stephens, has led teams studying flood risk communication. They found that people who have experienced a flood are more aware of the risks. Conversely, groups that have not lived through floods typically don't understand various flood risks such as storm surges and flash floods. And while first responders often engage in table-top exercises and drills – very important for their readiness to respond – there are only a few examples of entire communities actively participating in warning drills.

Messages used to communicate flood risk also matter, but people need to receive them. To that end, Keri's teams have worked with the Texas Water Development Board to develop resources that help local flood officials sort through and prioritize information about a flood hazard so they can share what is most valuable with their local communities.

The commonly used "Turn Around Don't Drown" message, while valuable, may not resonate equally with all groups. Newly developed and tested messages such as "Keep Your Car High and Dry" appeal specifically to young adults who typically feel invincible but don't want their prized vehicles damaged. While more research is needed, this is an example of progress in understanding an important aspect of flood communication: how recipients of the information make decisions.

Interviews conducted by researchers often include responses along these lines: "Another flash flood warning. We get these all the time. It's never about flooding where I am." This common refrain reveals a fundamental challenge in flood communication. When people hear "flood warning," they often think of different things, and interpretations can vary depending on a person's proximity to the flooding event.

Some people equate flood warnings with streamflow gauges and sensors that monitor water levels – the technical infrastructure that triggers alerts when rivers exceed certain thresholds. Others think of mobile phone alerts, county- or geographic-specific notification systems, or even sirens.



A typical alert from the National Weather Service. AP Photo/Lisa Rathke

Beyond technologies and digital communication, warnings still come through informal networks in many communities. Emergency managers directly coordinate with and share information with major businesses and organizations, saying, “Hey, John, be sure you have somebody up tonight watching the National Weather Service alerts and rivers.”

This human-centered approach, [similar to neighborhood-level systems we have studied in Japan](#), can provide direct confirmation that warnings have been received. This is something mass media and mobile systems cannot guarantee, especially during infrastructure failures such as power and cell tower outages.

Effective messages

Research shows that effective warning messages need to [include five critical components](#): a clear hazard description, location-specific information, actionable guidance, timing cues and a credible source. The Federal Emergency Management Agency’s integrated public alert and warning system [message design dashboard](#) assists authorities in rapidly drafting effective messages.

This warning system, known as IPAWS, provides nationwide infrastructure for wireless emergency alerts and Emergency Alert System messages. While powerful, IPAWS has limitations – not all emergency managers are trained to use it, and messages may extend beyond intended geographic areas. Also, many older mobile devices lack the latest capabilities, so they may not receive the most complete messages when they are sent.

Hyperlocal community opt-in systems can complement IPAWS by allowing residents to register for targeted notifications. These systems, which can be run by communities or local agencies, face their own challenges. People must know they exist, be willing to share phone numbers, and remember to update their information. Social media platforms add another communication channel, with emergency managers increasingly using social media to share updates, though these primarily reach only certain demographics, and not everyone checks social media regularly.

The key is redundancy through multiple communication channels. Research has found that multiple warnings are needed for people to develop a sense of urgency, and the most effective strategy is simple: Tell another person what's going on. Interpersonal networks help ensure the message is delivered and can prompt actions. As former Natural Hazards Center Director Dennis Mileti observed: The wireless emergency alerts system “is fast. Mama is faster.”

A Colorado news report explains why emergency alerts have to be tailored for local needs and conditions and use multiple communication channels.

Warning fatigue

Professionals from the National Weather Service, FEMA and the Federal Communications Commission, along with researchers, are increasingly concerned about warning fatigue – when people tune out warnings because they receive too many of them.

However, there is limited empirical data about how and when people experience warning fatigue – or about its impact.

This creates a double bind: Officials have an obligation to warn people at risk, yet frequent warnings can desensitize recipients. More research is needed to determine the behavioral implications of and differences between warnings that people perceive as irrelevant to their immediate geographic area versus those that genuinely don't apply to them. This distinction becomes especially critical when people might drive into flooded areas outside their immediate vicinity.

The key to effective emergency communication is to develop messages that resonate with specific audiences and build community networks that complement technological systems. We are now studying how to do this effectively in the United States and internationally. It's also important to apply behavioral insights to the design of every level of communication warning systems. And it's important to remember to test not just the technology but the entire end-to-end system, from threat identification to community response.

Finally, maintaining true redundancy across multiple communication channels is an important strategy when trying to reach as many people as possible. Technology supports human decision-making, but it doesn't replace it.

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