Spreading the word on earthquake risks

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It's one of those coping skills that come with living in earthquake country: Putting the risk out of your mind until that moment you feel the shaking.

But this form of denial is being challenged - thanks to social media and a push by some seismic safety experts to spread the word when the risk of an earthquake increases.

Scientists say they cannot predict when earthquakes will strike. But they have long known that 50 percent of all large quakes are preceded by smaller quakes. Moreover, decades of research show that small quakes near major faults - such as the San Andreas - can trigger bigger temblors.

So when a swarm of more than 200 small quakes several weeks ago began to hit the Salton Sea area in Southern California, scientists immediately took notice. Because the quakes - reaching magnitudes as great as 4.3 - occurred so close to the San Andreas, the experts said the chance of a 7.0 or greater quake on the mighty fault increased significantly, from 1 in 6,000 in any given week to as much as 1 in 100 during that particular week.

Until recently, those probabilities got little attention outside the seismic world. But this time, for a variety of reasons, the heightened risk blew up on social media, generating curiosity as well as a good amount of anxiety.

This response pleased many earthquake experts, who have long struggled

to get the public to focus more on the risk of a devastating temblor. They hope the Salton Sea swarm is the beginning of a much greater focus on "operational earthquake forecasting," which involves assessing the changing risks of an earthquake and sharing that information with the public.

"This is, in some sense, a kind of seismic weather reporting," said Thomas H. Jordan, director of the Southern California Earthquake Center, who sits on the California Earthquake Prediction Evaluation Council. "I don't see any reason why that information shouldn't be made available to the public continuously."

The idea of earthquake forecasts has been controversial among scientists, with some arguing such pronouncements are nowhere near as certain as weather forecasts. Some remain skeptical about how useful it is to share these quake probabilities with the public.

Government scientists are already working on a computerized forecast system focused on aftershocks, which could more quickly tell officials the higher chance of an earthquake after a significant seismic event strikes, said Morgan Page, a U.S. Geological Survey research geophysicist who also sits on the state's earthquake prediction committee.

There's some trickiness to explaining earthquake risk.

Scientists know that the southern San Andreas fault will eventually rupture again someday, and scientists believe it is overdue for a major quake. The San Andreas fault's southern end last ruptured more than 330 years ago, and it's believed to rupture, on average, every 250 to 300 years.

Some scientists say that even when the probability of a quake increases,

the chances remain so slim that public warnings might be counterproductive.

"We're really talking about a probability increase from 'practically impossible' to 'extremely unlikely,'" said Kelin Wang, a research scientist with the Geological Survey of Canada who has been a noted skeptic of operational earthquake forecasting. "I don't think it's very useful."

But in California, many scientists say a large quake would take such a devastating toll that any preparations would be well worth it.

"You and I probably wouldn't carry an umbrella if the probability of rain was 1 percent to 5 percent. ... (But) the consequence of missing a magnitude 7 or greater earthquake on the San Andreas is a very, very serious consequence," said James Goltz, a former emergency manager on earthquake hazards for the state.

"More information is better: If we're completely sharing the information, rumors are a lot less likely," added seismologist Lucy Jones.

The forecasts also help remind people of what they should do to prepare for an earthquake, she said, such as talk to your children about what to do if the earthquake cuts off phone lines.

Other tips to do during a seismic advisory: Make sure you have stored water at home, or even consider filling up your bathtub with water for a day or two. If you have your cherished vintage grandmother's collector's plate displayed, consider taking it down for a while.

And refresh your memory of what to do: Drop, cover and hold on, and head to a hardware store to buy equipment to bolt bookcases to walls, strap down televisions and install safety latches on kitchen cabinets to prevent the risk of deadly head injuries during a quake.

In the most recent swarm, San Bernardino officials decided to close down their seismically unsafe city hall for two days, which had already been scheduled to be vacated in the coming months because of its earthquake risk.

Some of the world's most deadly earthquakes have been preceded by smaller quakes.

Just this spring, a magnitude 7.0 earthquake that struck southwest Japan in April, killing at least 32 people, was preceded by a series of smaller temblors.

And in 2011, the 9.0 earthquake that struck east of Japan and caused a devastating tsunami was preceded 50 hours earlier by a 7.2 earthquake, Jordan said. There was no warning issued that a bigger earthquake and tsunami was possible.

Part of the problem was that the official Japanese model said that a magnitude 9.0 earthquake in that part of the world was impossible. But an experimental earthquake forecast model, running in a lab in Tokyo, did show a higher probability of a larger earthquake like the kind that struck.

Italy has already announced that it wants to establish an operational earthquake forecast system. And, as outlined by Jordan in a recent report, there's a tragic reason for that.

In January 2009, the central Italian medieval town of L'Aquila was hit with increased seismic activity. In an effort to calm jitters, government officials held a news conference at the end of March "to reassure the public." One official told reporters: "The scientific community tells us there is no danger, because there is an ongoing discharge of energy. The situation looks favorable."

The statement was wrong.

Lulled into safety, there was little public concern after a 3.9 earthquake jolted L'Aquila before midnight on April 5, 2009. A few hours later, a 6.3 quake struck, and more than 300 died.

Among the dead was the wife and terrified 9-year-old daughter of a man who persuaded his family to remain at home overnight, convinced by official pronouncements that smaller earthquakes did not mean a larger earthquake would come. Their apartment building collapsed during the main shock.

Italian prosecutors later charged a government official and six members of a government advisory commission with manslaughter, in part for how they handled the situation before the largest quake struck. The initial convictions of the six commissioners were overturned on appeal, but the government official's conviction was sustained. He did not serve jail time.

California began establishing procedures for earthquake forecasts back in the 1980s. Over the last three decades, about 10 advisories of increased earthquake probabilities have been issued.

But none got the attention of the recent Salton Sea swarm.

Part of the reason is the rise of social media - people reacted to their family and friends sharing the same news, and a forecast that might've been seen as abstract a few years ago suddenly seemed more real.

"People want authoritative information," Goltz said. "People process information, they discuss it with their friends ... they make some kind of an assessment of the threat. And I think that if it's of significance enough to them personally, then they do something about it."

There were some problems with the rollout of last month's earthquake advisory. The California Governor's Office of Emergency Services did not post a public announcement on its press release website of the increased threat until about 39 hours after the first magnitude 4.3 earthquake struck on Sept. 26.

Though the scientists had told the state that the chance of a 7.0 or greater earthquake had increased, state officials said the probability of a magnitude 4.3 earthquake or greater had increased. The U.S. Geological Survey, on the other hand, released a statement with the correct numbers, and published it hours earlier than the state did.

State officials changed the alert to warn of a 7.0 or greater quake three days after the news release was published, after an inquiry from the Los Angeles Times.

"The protocol is something that is always under evaluation," said Kelly Huston, a deputy director at the state's Office of Emergency Services.

"Does that mean we think we did something wrong? No. But can we change it? We should always be looking at if there's a better way to do it."

With the rise of social media, and the possibility that incorrect rumors can spread, it's important that authoritative information is sent out swiftly and accurately, scientists said.

"Now that things propagate so quickly, it's more important that the proper information is out there, and the proper context, so that people understand what's going on," Jordan said.