

How to deliver public warnings

New research reveals that New Zealand institutions are failing to deliver effective public communication about imminent natural hazards.

Most of us know the story of the boy who cried wolf. In the versions popularized in the 1500s, the tale-telling boy is not believed when a wolf does appear. In some versions of the story there really is a wolf, but the villagers create such a racket that it is warned and slinks away unharmed.

Either way, the “boy who cried wolf” has become a phrase meaning that people learn from experience not to trust those whose stories turn out false.

We were reminded of this morality tale amidst the public alarm generated in response to Cyclone Cook, which moved over New Zealand in April this year, and the Kaikoura earthquake last November.

It got us wondering – just how effective are warnings to the public from authorities and companies? Are people less likely to believe warnings when some turn out to be exaggerated or false?

We decided to review the existing literature and run our own survey of the behavior of New Zealanders.

Summary

We found that no public hazard warnings in the past year followed approaches recommended by international research, except product hazard and recall warnings.

¹ 1,270 respondents from Horizon Research’s national HorizonPoll panel, representing the New Zealand population 18+, responded to the survey between 16 and 24 May 2017. The sample is

International research shows a vast range of reactions to hazard risk and warnings, because the public make up their minds on hazard avoidance by gathering information on the risk posed to them – of which official public warnings are only one source. General and unspecific warnings are not heeded because the information content is low.



We found that the best warning format is:

1. warn early (provide time for people to decide),
2. from many official sources (increase credibility),
3. provide corroborating information (so people can judge the risk themselves),
4. provide very specific instructions (help people act, and to increase immediacy of risk),
5. define who should act and who should not (so warnings appear soundly reasoned).

Survey results

In our survey of 1,270 New Zealanders¹,

1. The accuracy of a warning is likely to affect future belief in similar warnings by around half the population. 42-59% of respondents say their belief in various categories of warnings is influenced by their perception of the accuracy of previous warnings.
2. Roughly half the population claim they are unaffected by warnings and their

weighted on age, gender, education, personal income and ethnicity, and has a maximum margin of error at a 95% confidence level of $\pm 2.8\%$ overall.

- accuracy, meaning the warnings do not feature highly in their assessment of risk. 41-58% of New Zealanders say they do not change their attitude to various categories of warnings no matter whether they are accurate or not.
3. Education is the key operating factor. The higher the level of education, the more likely respondents are to be unaffected by accuracy of warnings. This suggests official warnings are only a small part of their assessment of risk.
 4. There are signs that public warnings are accurate and trusted; depending on the type of warning, between 35% and 48% say they are more likely to believe future public safety warnings based on accuracy of previous warnings.
 5. Young people are the most likely to be skeptical about future warnings. For example, 23% of this group said they were less likely to believe future weather warnings – over double the rest of the population.
 6. Cyclone warnings generated the highest level of skepticism; 11% were less likely to believe future warnings.
 7. Considering recent water quality warnings, 8% were less likely to believe the warnings, but 49% were more likely to – the highest of all the categories measured.
 8. Tsunami warnings had generated the lowest level of future believability (34%), and the highest percentage of people who were ambivalent (56%).

Questions over public warnings

The veracity of public warnings came into question this year over two incidents; public safety warnings about Cyclone Cook, and mixed messages about tsunami-risk following the Kaikoura Earthquake.

That wasn't all. Other warnings that cut into mainstream public consciousness include

domestic drinking water, recalls of lettuce, Volkswagens and parsnip tainted milk.

These public safety and health warnings, and many more, have been subject to public discussion about accuracy, timing and usefulness. This appears to have corresponded with an increased expectation (unsubstantiated) among social institutions that 'authorities' should provide hazard warnings.

The issue of when, how, and even if, to issue public warnings is very complex. Very little in life is straightforward. The truth, even in science, is always complicated.

There is another complication, often overlooked; the dimension of human communication. Those people issuing warnings are influenced not just by facts, but by personal feeling and concerns. The public receiving the communication are similarly influenced in how they interpret a warning.

All these dynamics of facts, psychology and social behavior are at play in any assessment of whether and how to warn the public.

This is incredibly interesting to communicators and public relations experts. We have to understand them, and work out how they are operating, to communicate "successfully" (that is, achieving the objectives of those we work for).

The small tsunami

The 7.8 Kaikoura earthquake on 14 November was bad enough. The ground moved 12 metres horizontally at its worst point. Faults ruptured offshore, generating a tsunami².

Following the earthquake, official tsunami warnings for populated areas of Wellington and Christchurch were issued over the hours after the event. Some were executed hesitantly. Sirens went off in some areas, but were sporadic or non-existent in others.

² <http://www.stuff.co.nz/science/90769048/Kaikoura-earthquake-moved-the-South-Island-new-research-shows>

Was a warning needed? There was no time for one on the remote coast alongside the quake area, which immediately experienced a tsunami just under seven metres³. This left sea life high up on the foreshore and river mouths, and across the coastal railway.

On the Wellington coast unusual waves were experienced minutes later. The largest tsunami waves - 1.6m – were recorded 30 mins later, then 1.5 hours after that. This height was quite close to the tidal range (1.4 m), and occurred when the tide was still low. There was indeed a tsunami but the actual sea level changes were comparable to what happens most days with the typical rise and fall of the tide⁴.

So in Wellington and Christchurch, where there was time to evacuate, the warnings came late, and when they did, included advice for coastal evacuations that were unnecessary.

The baddish storm

Cyclone Cook - dubbed the “Storm of New Zealand” by Facebook – became an officially sanctioned potential disaster when the Met Service warned it could be the worst since 1968, in which the Wahine sunk⁵.

Civil Defence Director Sarah Stuart-Black sent a very clear message to the public when she assembled media at her “Beehive Bunker”. The ‘bunker’ is associated in the public mind with large scale disasters, often in which people die or are injured and property and infrastructure is considerably damaged. Without even saying anything, the message was that this storm threatened lives. In her press conference, Sarah told New Zealanders it was “an extremely serious

weather event” and urged everyone to “put safety first”.

The storm turned out to be a speedy pocket of rough weather, generating flooded streams, slips and downed trees that closed or narrowed some roads. There was undoubtedly disruption, but it was isolated and quickly remedied. The storm was closer to any bad storm experienced annually this country, than it was to the worst we’ve experienced since 1968.

The media, which did so much to help spread the word of impending disaster, were quick to question the accuracy of official warnings⁶. Commentators and the public joined in, mocking the forecasts and warnings⁷.

Some of the public, and the authorities, defended the warnings on two grounds; that it was best to be prepared because ‘you never know’, and because the storm impact would have been worse had it travelled directly over the country.

What do we know about good warnings?

There has been plenty of research into how people react to disaster as it happens to them, to imminent hazards, and to warnings of pending hazards⁸.

Many people, many responses

International research shows a vast range of reactions to hazard risk and warnings. People make up their own minds on the risk posed to them and whether they should act to avoid it. Their information gathering and assessment is influenced by their attitudes to life and risk, and by their previous or direct and current experience of adverse events.

³ <http://www.stuff.co.nz/national/90773348/kaikoura-earthquake-tsunami-was-as-high-as-7-metres-at-one-spot>

⁴ <http://www.metocean.co.nz/news/2017/1/8/kaikoura-tsunami-waves-measured-in-wellington-harbour>

⁵ <http://www.radionz.co.nz/news/national/328681/worst-storm-since-wahine-disaster-metservice>, <http://www.stuff.co.nz/national/91505996/metservice-warns-cyclone-cook-could-be-similar-to-storm-that-sank-the-wahine>

⁶ http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11838270, <http://www.stuff.co.nz/dominion-post/news/national/91577795/Cyclone-Cook-was-supposed-to-be-a-record-breaker-so-what-happened>

⁷ <http://www.newshub.co.nz/home/new-zealand/2017/04/kiwis-mock-facebook-s-cyclone-safety-check-feature.html>,

<https://studentcard.co.nz/BlogListView/showBlog/986>,

https://www.reddit.com/r/newzealand/comments/653o3z/this_cyclone_has_been_hugely_overhyped/, <https://thedailyblog.co.nz/2017/04/14/the-metservice-that-cried-cyclone/>, http://www.nzherald.co.nz/wanganui-chronicle/opinion/news/article.cfm?c_id=1503423&objectid=11839019

⁸ <https://www.nap.edu/read/11671/chapter/6#128>

Official public warnings are only one source of information in this process.

Time is key factor

A key factor is the time it takes for people to react. This time is governed primarily by the effort to verify and assess what to do. It is always lengthened by a sense that disaster won't happen specifically to us, by the time it takes to gather information to ascertain how likely it is we will be affected, and by what is known as 'normalization' of bad events (a phenomenon where people act like everything is normal although something extraordinary is happening). These factors are inflexible – they cannot be easily short-circuited. So, the earlier a warning, the more time people have to work out what to do.

Unskilled and imprecise warnings are not heeded

Senior staff in authorities and companies make decisions about issuing warnings based on poor knowledge about emergency communications, while influenced by other objectives not related to public or customer safety. For example, they believe people will panic, when they do not; they believe warnings should be short and general, when people want specific information and advice. The less information that is given in warnings, the less likely they will form a significant component of an individual's own risk assessment.

Best warning format

According to research, the best warning format is:

1. warn early (provide time for people to decide),
2. warn using many official sources (increase credibility),
3. provide corroborating information (so people can judge the risk themselves),
4. provide very specific instructions (help people act, and to increase immediacy of risk),

5. define who should act and who should not (so warnings appear soundly reasoned).

No warnings met best standard

We used the above format to examine a range of selected public warnings. None of them, outside of product recalls, met this standard derived from disaster and warning research.

In the examples we reviewed, the main factor New Zealand is good at is using many authoritative sources. Unfortunately, they tend to repeat the same unspecific warning.

The Kaikoura tsunami warnings were, in general, late, provided no information about scale and forces at work, provided no specific instructions or guides, and did not differentiate. The general warnings were, though, repeated by many sources. We did find isolated examples of localised civil defence messages that were very specific about the affected area, but these were swamped by more generalized warnings to all the public about heading for higher ground.

The Cyclone Cook warnings were not late, and were widely repeated, and underlined by localized states of emergency, mandatory and "advised" evacuations. The civil defence warnings were very general and tonally suggestive of a dire emergency. Weather forecasts did provide corroborating information, although they were phrased in language that suggested certainty⁹ and dangerous scale ('as big as Wahine'). Although warnings appeared to be specific (eg. tie down property and bring pets indoors) these are not anything more than people could work out for themselves.

The warnings were mixed. Despite Wellington being included in official warnings, the Civil Defence regional manager Bruce Pepperell said it was likely to be nothing more than another "crappy day in paradise".

⁹ http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11837219

Warnings over water for swimming were generally timely, but from one source. They did not provide information about levels of contamination, nor specific locations¹⁰. There were mixed messages, with many warnings against swimming typically described by the issuers as 'conservative' or 'precautionary'¹¹.

Warnings over water consumption were generally timely, but only issued by the respective local authority, often supported by the local district health board. They lacked specific detail about the level of contamination, and opted for contextual explanations (eg. E-coli was at the lowest measurable amount)¹².

The Hastings bore contamination in August 2016 showed all the challenges that face authorities seeking to spread information. The communication was timely in terms of the final decision to chlorinate the water), and was specific (boil water). But spreading the message was hampered by using just one authoritative source (via multiple channels), considerations of cost (against using a leaflet drop) and causing public alarm (against using mobile sirens)¹³.

We reviewed product recalls over the past year to assess the public warnings involved. They only used one source (the company). Most often the time between discovery and warning was unclear, so only in one case could it be considered timely (Leaderbrand¹⁴, which was possibly even precipitous). When warnings were issued to the general public via mainstream media, the information on the cause was usually non-specific and the warning always to dispose or return. In contrast, formal product recalls and advertisements on the same issue, which followed the Consumer Affairs official template¹⁵ were always specific about cause, problem, danger, and response.

Warning fatigue is real

As the number of public warnings climbs, with most of them so inadequately framed, there is a real risk that the potency of warnings will diminish.

We do not diminish the sincerity of those forecasting, warning, or reporting any of the public warnings. We have worked with agencies and companies facing these problems. Everyone wants to do the right thing by the public. The usual dispute is over whether people would benefit from knowing what is known at that point (and whether enough is known to be useful to anyone), or would not.

In our view though, sincerity and "safety first" is no excuse for adding yet again to the phenomenon known in psychology and disaster research as "warning fatigue".

This is the effect where continuous, regular, and undifferentiated warnings, many of which turn out false, cause people to discount the importance of future warnings.

We know people learn from experience. It's fundamental to our existence. In his book "Cry Wolf: The psychology of false alarms" (1984) Shlomo Breznitz explained that "a subsequent episode is automatically altered by past experience." Continued experience of poorly framed safety warnings in which the warned risk is not experienced, teaches people that the warnings are of little value.

A review of Australian bush fires conducted by a Canterbury University student¹⁶ found that as the number of warnings increase, people are more likely to respond with apathy, become complacent and skeptical, react less and prepare less.

The use of medical equipment illustrates the problem. An American report¹⁷ listed 80

¹⁰ <http://www.stuff.co.nz/dominion-post/news/wellington/89079087/swimmers-told-to-avoid-contaminated-wellington-harbour-and-lyall-bay>

¹¹ <http://www.stuff.co.nz/national/89098021/water-restrictions-imposed-on-napier-as-reservoirs-hit-critically-low-levels>

¹² <http://www.stuff.co.nz/environment/89050620/napier-drinking-water-ecoli-contamination-test-results-due-friday>

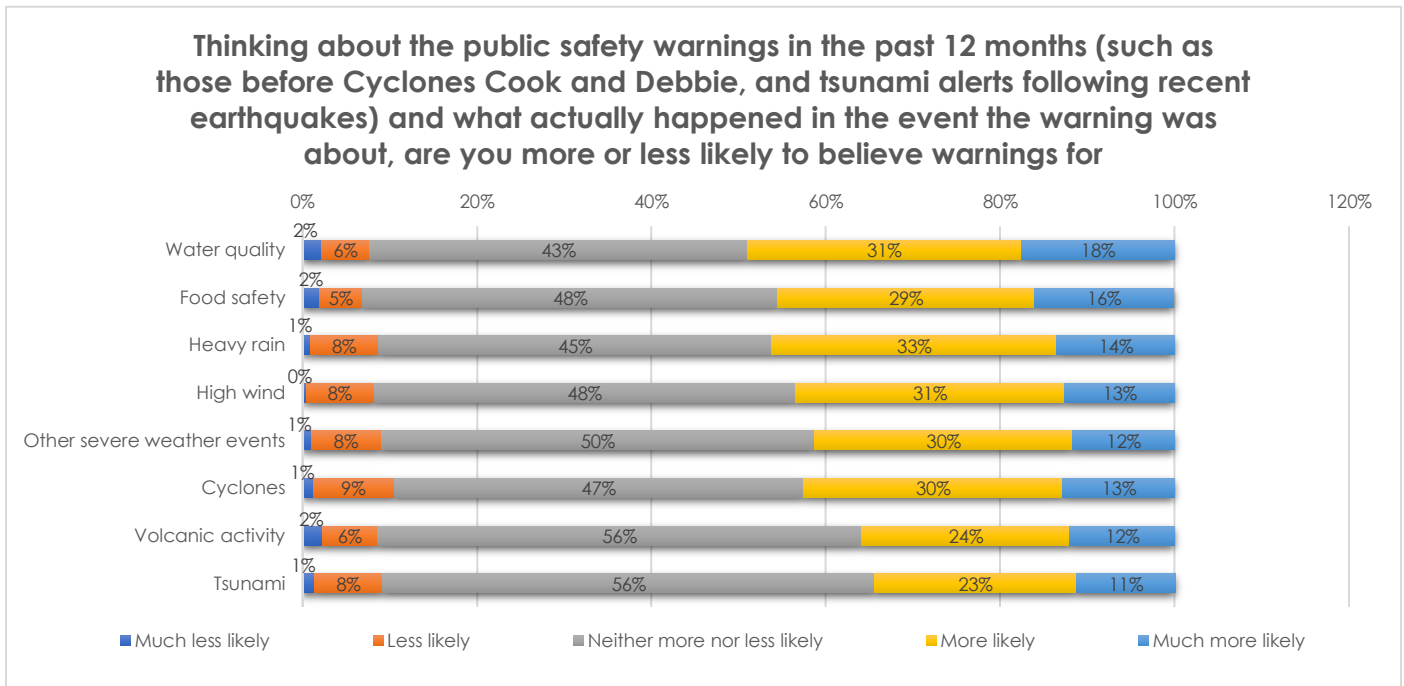
¹³ <http://www.stuff.co.nz/environment/88758563/emergency-declaration-would-have-helped-in-gastro-outbreak-report-finds>

¹⁴ <https://www.consumer.org.nz/articles/recall-leaderbrand-bagged-salads>

¹⁵ <https://www.consumerprotection.govt.nz/tradingstandards/product-safety/product-recalls/product-recall-templates-examples-and-forms/>

¹⁶ https://ir.canterbury.ac.nz/bitstream/handle/10092/9029/Thesis_fulltext.pdf?sequence=1

¹⁷ <https://psnet.ahrq.gov/primer/primer/28/alert-fatigue>



hospital deaths over the past few years because medical staff had become so immune to equipment sounds that they failed to respond to real alarms.

Computer use illustrates it again. Google research shows¹⁸ people ignore over 70% of virus warnings on their computer because they see so many of them with nothing noticeable ever happening.

Luckily for officials, scary warnings are sometimes self-fulfilling. The frame of a weather disaster leads people to interpret actual experience is worse than it really was. For example, people described the storm's shrieks of wind and creaking of trees - things that could be heard in any storm. News reports cited how the storm had "caused" evacuations and even car accidents, when these were due to human decisions and frailties - not a direct physical impact of the storm.

The above phenomenon illustrates the complexity of human response to safety warnings.

Warning fatigue is worsened by the tainted credibility of government through other non-related events (research shows less 30% of people believe government officials), high levels of public skepticism and feelings of helplessness.

Our study

We wanted to find out whether warning fatigue could be identified following the recent controversial public warnings. We asked 1270 people via the Horizon Research panel¹⁹ whether they were more or less likely to believe certain warnings based on their memory of the outcome of the most recent one.

The respondents were most likely to believe the next warning about water quality, but

¹⁸ <https://nakedsecurity.sophos.com/2015/02/03/google-redesigns-security-warnings-after-70-of-chrome-users-ignore-them/>

¹⁹ 1,270 respondents from Horizon Research's national HorizonPoll panel, representing the New Zealand population 18+, responded to the survey between 16 and 24 May

2017. The sample is weighted on age, gender, education, personal income and ethnicity, and has a maximum margin of error at a 95% confidence level of ±2.8% overall.

tsunami warnings had the lowest number of believers based on previous warning accuracy.

Over half the population say the previous accuracy of a warning has no bearing on whether to believe future warnings. We think this agnosticism underlines the extent to which people make up their own minds. Most institutional discussion about warnings appears to believe that warnings are

The level of skepticism based on previous warnings is low and relatively consistent across all warnings (less than 11% of respondents) – suggesting relative accuracy or a lack of detail in public warnings, and a frame of mind of part of the population.

The level of believability based on previous warning accuracy is strong (up to 48%). This level is more variable than the skeptics though. It appears that when warnings are not accurate, some in this group switch to an agnostic attitude to the veracity of future warnings.

These two groups of people who change their mind depending on past accuracy, represent half the population.

There is also a solid and consistent half of the population that claim they are unaffected by the accuracy of the warnings at all.

Education is the key operating factor. The higher the level of education, the more likely respondents are to be unaffected by accuracy of warnings. This suggests official warnings are only a small part of their assessment of risk. So organisations must be careful about wording warnings to provide this group with information rather than instruction.

Young people are the most likely to be skeptical about future warnings. For example, 23% of this group said they were less likely to believe future weather warnings – over double the rest of the population. The relative lack of hazard experience of this group corresponds with international research suggesting most people don't expect to be affected by adverse events,

and actual experience of previous or current hazards motivates action.

Direct impact counts: There is a small but note-worthy difference across the warning categories. The number of people who assess believability of warnings based on previous accuracy changes with directness of the threat. The most believed warnings are water quality and food safety. The least believed, and highest rate of self-determination of the risk, are tsunami warnings



Key findings

1. Between 35% and 48% felt they would be more likely to believe certain future public safety warnings based on accuracy of previous warnings.
2. 42-59% of respondents changed whether or not they believe various categories of warnings in the future based on their perception of the accuracy of previous warnings.
3. 41-58% of New Zealanders would not change their attitude to various categories of warnings no matter whether they are accurate or not.
4. Cyclone warnings generated the highest level of scepticism; 11% were less likely to believe future warnings.
5. Considering recent water quality warnings, 8% were less likely to believe the warnings, but 49% were more likely to – the highest of all the categories measured.
6. Tsunami warnings had generated the lowest level of future believability (34%), and the highest percentage of people who were ambivalent (56%).

Conclusion: Less intensity, more information

New Zealand institutions appear to have only one approach for hazard warnings; to issue broad unspecific warnings with low information, but with the intensity turned completely on or completely off.

It's probable that as pressure and expectation to issue warnings increases, organisations will simply ramp up the intensity.

Half the population will be influenced by the accuracy of any one of these warnings. The other half are unaffected. For both halves, officials warnings are only one component of their judgement.

Either way, there is a pressing need for organisations to become more sophisticated at the task of issuing warnings. Institutions need to;

1. Ignore or deprioritize "political" pressures
2. Provide information that helps people make their own decisions
3. Restrain and vary the frequency and intensity of 'warnings'
4. Involve experts in behavioural psychology and communication
5. Follow the "five rules" of issuing warnings

This reserves the space for the intensity and credibility needed for *real* emergencies; the ones where the wolf is standing right next to you plain as day, and you need to yell to people to run to the place you tell them without thinking twice.