

The effectiveness of disaster risk communication: A systematic review of intervention studies

Appendix 2: Database Search Terms

Cochrane Central Register of Controlled Trials search strategy

Cochrane Central Register of Controlled Trials : Issue 5 of 12, May 2013

Title, Abstract, Keywords: Disaster AND communication

From 2000 to 2013, in Cochrane Reviews (Reviews and Protocols), Other Reviews, Trials and Methods Studies (Word variations have been searched)

Embase search strategy

1. disaster/ or disaster planning/ or disaster medicine/2. terrorism/3. pandemic/ or pandemic influenza/4. disaster*.ti,ab.5. interpersonal communication/6. medical information/7. mass communication/8. health education/9. 1 or 2 or 3 or 410. 5 or 6 or 7 or 811. 9 and 1012. limit 11 to yr="2000 -Current

MEDLINE search strategy

1. Disasters/
2. Terrorism/ or Chemical Terrorism/
3. Disease Outbreaks/
4. disaster*.ti,ab.
5. Health Communication/
6. Hotlines/
7. Information Dissemination/
8. Social Networking/
9. Mass Media/
10. Publications/
11. Teaching Materials/
12. Telecommunications/
13. Communication/
14. communication.ab,ti.
15. Health Promotion/
16. Health Education/
17. 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16
18. limit 17 to yr="2000 -Current"
19. 1 or 2 or 3 or 4
20. limit 19 to yr="2000 -Current"
21. 18 and 20

PsycInfo search strategy

1. disasters/ or natural disasters/ or accidents/ or crises/ or emergency management/ or emergency preparedness/2. exp Terrorism/3. epidemics/ or pandemics/4. disaster*.ti,ab.5. communication/ or electronic communication/ or interpersonal communication/ or persuasive communication/ or scientific communication/6. information dissemination/ or websites/7. messages/8. exp Communications Media/ or exp Mass Media/ or exp Computer Mediated Communication/ or exp Radio/9. Internet/10. 1 or 2 or 3 or 411. limit 10 to yr="2000 -Current"12. 5 or 6 or 7 or 8 or 913. limit 12 to yr="2000 -Current"14. 11 and 13

Sociological Abstracts search strategy

disaster AND communication

Additional limits

Source type: Books, Conference Papers & Proceedings, Dissertations & Theses, Reports, Scholarly Journals

Document type: Book, Book Chapter, Conference, Conference Paper, Dissertation, Journal Article, Review

Language: Afrikaans, Arabic, Basque, Belarusian, Bulgarian, Catalan, Chinese, Croatian, Czech, Danish, Dutch, English, Esperanto, Estonian, Filipino, Finnish, French, Gallegan, German, Greek, Hebrew, Hungarian, Indonesian, Italian, Japanese, Korean, Latin, Lithuanian, Malay, Malayalam, Norwegian, Oromo, Persian, Polish, Portuguese, Romanian, Russian, Serbian, Slavic language, Slovak, Slovenian, Spanish, Swedish, Tagalog, Turkish
01/01/2000 – 18/06/2013

Web of Science search strategy

(TS=(disaster) AND TS=(communication)) AND Document Types=(Article OR Abstract of Published Item OR Book OR Book Chapter OR Letter OR Meeting Abstract)Databases=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, CCR-EXPANDED, IC Timespan=2000-2013

Appendix 3: Characteristics of included studies and assessment for bias

Ardalan 2009	
Participants:	Participants were the residents of Kalaleh and Minoodasht districts of Golestan province. The intervention was conducted in 15 villages with population 11,302. The control group was 16 villages with population 11,718. Pre-assessment and post-assessment surveys were conducted using a sampling frame of 10% of the population aged greater than 6 years, but using a different sample each time. Selection was by taking every tenth name on a register from local health centres. The intervention group had 1,163 pre-intervention and 1,159 post-intervention participants. The control group had 1,200 pre-intervention and 1,210 post-intervention participants.
Interventions:	Village Disaster Teams (VDTs) consisting of community, government and non-governmental organisation representatives were formed to conduct participatory disaster reduction programmes in each village. VDTs were trained by the project team on preparedness and early warning system (EWS) for floods, and VDTs trained village inhabitants. A community-based EWS was established and an evacuation drill conducted. A map was created by the VDT that identified areas at risk from flash floods, places of refuge and possible evacuation routes. Inhabitants were asked to add personalised risk and emergency information, such as contact details, and to display the map in their homes.
Outcomes:	The difference between pre- and post-intervention tests was compared between intervention and control groups in the study using chi-squared tests and interaction between variables and time in a logistic regression. Individuals in the intervention group were very much more likely to have undertaken the preparedness measures promoted by the intervention than the control group. The outcomes were: Having a family preparedness meeting, risk mapping, having emergency supplies, having a plan for vulnerable people and having an evacuation drill. Adjusted odds ratios for the intervention group ranged from 6 to 50. Control group odds ratios (comparing before and after) for the same measures ranged from 0.4 to 2.7.
Random sequence generation:	High risk: The trial was not randomised
Allocation concealment:	Unclear risk: Not applicable: The allocation was not concealed
Blinding of participants and personnel:	High risk: It was not possible to blind because of the nature of the intervention.

Blinding of outcome assessment:	Unclear risk: Insufficient information to make an assessment.
Incomplete outcome data:	Low risk: A different random sample of participants was used for the follow-up survey from that used for the pre-intervention survey.
Selective reporting:	Low risk: This was a prospectively planned trial.
Other bias:	High risk: Analyses were not adjusted for the increased similarity that is likely within the clusters.
Beaudoin 2008	
Participants:	The intervention was directed towards African American residents of New Orleans following Hurricane Katrina. The participants were those enumerated people who contacted a telephone help line.
Interventions:	A media campaign ran for 11 weeks in 2006 on four radio stations targeted at African Americans. Messages were broadcast five times each weekday on four radio channels. Five different messages with a focus on stress and depression were played. The messages promoted preventive behaviours (normal productive routine, social and physical activity and working to resolve conflicts), and information about an existing telephone helpline that provides information and referrals for physician support, counselling and crisis intervention. A comparison group was made by comparing the number of calls to another phone number for the same help line that was not promoted in the campaign.
Outcomes:	Calling a PTSD help line was regarded as a desirable observed health behaviour following Hurricane Katrina in New Orleans. Call volume before, during and after the media intervention were recorded. The number increased from a mean of 100 each day, to 125 during the campaign and 134 each day after the campaign. Alternative help line telephone numbers that were not the focus of the media campaign showed smaller increases in call volume.
Random sequence generation:	Unclear risk: There was no control group, and therefore no randomisation for allocation.
Allocation concealment:	Unclear risk: There was no allocation.
Blinding of participants and personnel:	Unclear risk: There was no blinding of participants or personnel.
Blinding of outcome assessment:	Unclear risk: It was not stated whether the time points of the study questionnaires were blinded.

Incomplete outcome data:	Unclear risk: The study used independent samples over time, so no attrition could occur.
Selective reporting:	Low risk: This was a prospectively planned study.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Beaudoin 2009	
Participants:	Nine hundred and sixty eight adult African Americans were surveyed in a serial cross-sectional surveys.
Interventions:	The intervention is the same as that described in Beaudoin 2008, above.
Outcomes:	Questionnaires comparing surveys taken before and during the campaign showed no change in combined post-traumatic stress disorder (PTSD) preventive beliefs (understanding of PTSD), preventive behaviours (keeping routine, monitoring stress, talking with others, being productive and problem-solving) or screened incidence (indicated by avoidance, losing interest, isolation, losing hope, being jumpy and having difficulty sleeping). A regression analysis incorporating the date of interview relative to the commencement of the programme showed an increase in PTSD beliefs/understanding and preventive behaviours, but not PTSD incidence. PTSD behaviour was mediated by PTSD beliefs.
Random sequence generation:	Unclear risk: There was no randomisation in this study.
Allocation concealment:	Unclear risk: There was no allocation in this study.
Blinding of participants and personnel:	Unclear risk: Participants and personnel were not blinded in this study
Blinding of outcome assessment:	Unclear risk: It was not stated whether researchers were blinded to the date that individuals were interviewed at.
Incomplete outcome data:	Unclear risk: There should be no attrition in this study because each individual was interviewed only once.
Selective reporting:	Unclear risk: It is not clear whether this study was prospectively planned.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Blando 2008	
Participants:	Surveys were conducted of 421 individuals who received potassium iodide (KI) tablets with written information and 286 individuals who

	<p>did not receive the KI or information. The participants all lived within 10 km of a nuclear power plant. Other groups outside the scope of this review were also investigated. The participants had themselves chosen whether to attend special clinics for distribution of KI and are therefore each group is likely to be systematically different from the other.</p>
Interventions:	<p>Potassium iodide tablets were distributed as prophylaxis against thyroid cancer in the event of a disaster affecting a nearby nuclear power station. Educational materials were developed ("Flesch Kincaid Grade level of 6.5"), pilot tested and given to individuals who voluntarily attended clinics to receive KI.</p>
Outcomes:	<p>Individuals who received KI and information scored an average of 46% on a knowledge test, while those who did not receive KI or information scored an average of 15%. Individuals who reported reading the information provided were much more likely to answer questions correctly.</p>
Random sequence generation:	<p>High risk: The study was not randomised.</p>
Allocation concealment:	<p>High risk: Allocation was by self-selection.</p>
Blinding of participants and personnel:	<p>Unclear risk: Blinding of participants or personnel was not possible because of the design.</p>
Blinding of outcome assessment:	<p>Unclear risk: It was not stated whether there was blinding for outcome assessment.</p>
Incomplete outcome data:	<p>Unclear risk: There was no attrition because of the study design.</p>
Selective reporting:	<p>Unclear risk: Insufficient information to make an assessment.</p>
Other bias:	<p>Unclear risk: Insufficient information to make an assessment.</p>
<p>Chan 2007</p>	
Participants:	<p>Participants were recruited from a list of members of a social service centre in Hong Kong. Eligible participants were aged 55 years or greater, spoke Cantonese, had no hearing impairment and were contactable by telephone. Two hundred and ninety-five eligible people were invited to participate, of whom 182 were successfully contacted by telephone for a baseline survey and 122 completed the study, with attrition due to refusal and non-response.</p>
Interventions:	<p>Telephone-delivered health education programme. Nursing students were trained to conduct the survey and deliver information according</p>

	to the study protocol. Interviewers gathered information from participants and delivered tailored health information about SARS and its prevention depending on the results of the survey. The same survey was repeated one week later.
Outcomes:	Anxiety, knowledge and health (preventive) behaviours related to SARS transmission. Improvements in knowledge of transmission were noted with respect to droplet ($p < 0.001$) and contact with urine or faeces ($p < 0.01$), but no change was noted for knowledge about other potential routes. Changes in self-reported behaviour were observed. Participants reported covering the mouth when coughing or sneezing less frequently ($p < 0.001$) following the intervention, to wash their hands after sneezing or coughing less frequently ($p < 0.001$), to wash their hands with liquid soap less frequently ($p < 0.001$), to wear a face mask in public less frequently ($p < 0.001$), and to avoid using serving towels more often ($p < 0.05$)
Random sequence generation:	Unclear risk: Not randomised. All participants received the intervention.
Allocation concealment:	Unclear risk: Not applicable. All participants received the intervention.
Blinding of participants and personnel:	Unclear risk: Not applicable: All participants received the intervention.
Blinding of outcome assessment:	Unclear risk: Not applicable. All participants received the intervention
Incomplete outcome data:	High risk: There was a 62% response rate and a 67% follow-up rate.
Selective reporting:	Unclear risk: Insufficient information to make an assessment
Other bias:	Unclear risk: Insufficient information to make an assessment.
Clerveaux 2010	
Participants:	Forty two Grade 5 pupils aged 9 to 12 years (mean 10.9 years) from one school on the Carribean island of St. Vincent and the Grenadines, and 33 Grade 5 pupils aged 9 to 12 years (mean 10.2 years) from one school on the Turks and Caicos Islands were recruited.
Interventions:	Participants took part in a two day workshop where they played and discussed the Disaster Awareness Game, which measures disaster awareness, educates, encourages positive behaviour and dispels myths. The intervention involved presentations about local hazards and a board game that informs players about the consequences of

	hazard-related behaviour. Three levels of game difficulty existed. Players were asked questions and provided with answers and explanations.
Outcomes:	Participants were surveyed before playing the game, then scores from the game were recorded before and after the provision of disaster preparedness information. Among St. Vincent and the Grenadines participants, disaster awareness levels for floods and hurricanes increased following the workshop, though no statistical tests were conducted. Average awareness (measured by game score) of the hazard of flooding increased from 65% to 87%, and hurricanes from 65% to 83%. Among Turks and Caicos Islands participants, awareness for the five tested hazards also increased (floods, 69% to 75%; hurricanes, 75% to 83%; volcano, 54% to 80%; landslide 51% to 92%; mudflow 43% to 83%). Scores for knowledge of how to prepare, evacuate safely and recover from damage for both floods and hurricanes increased in both groups of participants. No statistical comparisons were made of before/after or between the two islands.
Random sequence generation:	Unclear risk: Not randomised. All participants received the intervention.
Allocation concealment:	Unclear risk: All participants received the intervention.
Blinding of participants and personnel:	Unclear risk: Not blinded because all participants received the intervention.
Blinding of outcome assessment:	Unclear risk: Insufficient information to make an assessment
Incomplete outcome data:	Unclear risk: Not stated whether there was any attrition
Selective reporting:	Unclear risk: Insufficient information to make an assessment
Other bias:	Unclear risk: Insufficient information to make an assessment.
Colindres 2007	
Participants:	One hundred families who had received education and a water purification product following a natural disaster. Median household size was seven, with a median of one child aged under 5 years in each house. No houses had electricity, 64% had dirt flooring and 78% had fewer than three rooms.
Interventions:	The US Centers for Communicable Disease Control and Prevention and Proctor and Gamble's Populations Services International

	developed a flocculent-disinfectant product for home water purification. Following Tropical Storm Jeanne, floods made usual water sources potentially unsafe. A network of community leaders was established to act as promoters, disseminators of and educators about how to use the product. The manufacturers and the leaders provided community demonstrations and distributed the purifying product for free to households.
Outcomes:	Thirty-seven of the 100 families treated drinking water before the floods. Following the flood 58 used the product while others used a variety of other reliable and unreliable methods. Only two opened the packet using their teeth, 83 knew how much water to mix a sachet with, 88 knew how long to mix for, 79 knew how long to let the water stand for and 80 knew to put the flocculated waste in the latrine. Seventy eight answered all questions correctly. Only 22 families had PūR®-treated water at the time of the interview, and only a few had used it often during the few weeks between distribution and survey.
Random sequence generation:	Unclear risk: There was no randomisation
Allocation concealment:	Unclear risk: There was no allocation: All participants received the intervention.
Blinding of participants and personnel:	Unclear risk: There was no blinding of the participants or personnel
Blinding of outcome assessment:	Unclear risk: There was no blinding of outcome assessment because information was gathered in one survey.
Incomplete outcome data:	Unclear risk: There was no risk of attrition because the study took place on one occasion.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	High risk: There is a risk of recall bias because information was collected retrospectively.
Dumais 2009	
Participants:	Thirty five female students from a year 10 biology class in a private school.
Interventions:	A teaching session was developed in light of curricular needs and the students' pre-intervention surveys. The session was delivered by lecture and discussion in 80 minutes. Information covered included viral structure, cellular tropism, influenza epidemics and vaccination.
Outcomes:	A questionnaire with open and closed questions was delivered one week before and six weeks after the intervention. Questions were

	asked about the biology of viruses and their responses categorised as non-scientific, intermediate or advanced according to a marking scheme. Prior to the intervention, no students had advanced understanding, six had intermediate and 29 had non-scientific understanding of viruses. Subsequently, 14 had advanced understanding, 17 had intermediate and four had non-scientific understanding. Comparison of the mean scores showed significant improvement. There were significant improvements in the number of pupils able to explain antigenic shift and drift, herd immunity and percentage of high school students who get vaccinated. The authors propose that improving scientific understanding by interventions such as this facilitates more directly targeted health education.
Random sequence generation:	Unclear risk: There was no randomisation in this study.
Allocation concealment:	Unclear risk: There was no allocation in this study.
Blinding of participants and personnel:	Unclear risk: There was no blinding of participants or personnel.
Blinding of outcome assessment:	Unclear risk: It was not stated whether researchers were blinded to the before/after status of questionnaires. However, as the intervention was influenced by the first questionnaires, it seems likely that they were analysed together and in the knowledge that they were the pre-intervention survey.
Incomplete outcome data:	Low risk: There was no attrition mentioned.
Selective reporting:	Unclear risk: Insufficient information to make an assessment
Other bias:	Unclear risk: Insufficient information to make an assessment
Eastwood 2009	
Participants:	2,201 telephone contacts were made from randomly selected numbers from a telephone directory. 1,166 interviews were successfully conducted. Females were slightly over-represented, and the sample was slightly older than the Australian population.
Interventions:	The participants were surveyed regarding their knowledge and behavioural intentions regarding pandemic influenza. A short verbal information intervention was given and specific questions repeated to assess change in intentions. The interviewers told all participants: "We are talking about an entirely new type of influenza virus that spreads easily from person to person. No one would have natural immunity to it and every age group could be affected. Potentially a quarter to a third of the population could get sick. In the 1918

	Spanish flu pandemic at least 40 million people died and a third of the world's population was infected. In this case, the usual flu vaccine would not have prevented illness."
Outcomes:	Three questions were asked before and after the intervention. Stated intention to comply with recommendations was initially high, but significantly improved after the intervention for all three questions. 1. "If told you might have had contact with pandemic influenza, would you stay home 7–10 days to avoid exposing others?" Increased from 94.1% to 97.5% 2. "If told you needed to avoid public events, would you?" Increased from 94.2% to 98.3% 3. "If told you needed to postpone social gatherings, would you?" Increased from 90.7% to 97.2%
Random sequence generation:	Unclear risk: Not randomised. All participants received the intervention.
Allocation concealment:	Unclear risk: No allocation because all participants received intervention
Blinding of participants and personnel:	Unclear risk: No blinding because of nature of study
Blinding of outcome assessment:	Unclear risk: No blinding of outcome assessment due to nature of the study
Incomplete outcome data:	Unclear risk: The study should not be biased, because there is no comparison group. However, generalisability may be limited by the differences between the sample and the population characteristics.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Eisenman 2009	
Participants:	Participants were recruited by snowball sampling, starting with seven 'seed' recruits. Three hundred and five Latino men and women were identified as potential participants, of whom 242 were randomised to the intervention or control group. The high-intensity intervention group consisted of 123 people, of whom 115 received the intervention and 87 were analysed. The low-intensity intervention group consisted of 119 people, of whom 116 received the intervention and 100 were analysed.
Interventions:	Participants were randomised to either attend a platica group (the 'high-intensity intervention'), which consisted of small-group discussions led by a health promoter or to receive "media" (a culturally tailored mailer; the 'low-intensity intervention'). The mailer consisted of "a pamphlet, a laminated shopping card and six

	perforated pre-printed communication cards with instructions on how to fill them out". The platica group attended a standardised one-hour session led by lay health promotion workers who received 6 hours disaster preparedness training, an instructional video and reviewed book chapters.
Outcomes:	A self-reported disaster preparedness checklist was used to report behaviour. The percentage of people with a communication plan and all of the specified supplies (for example: food, water, radio) for a disaster increased in both the media and the platica groups. Statistically significant improvements (at $p < 0.05$) were reported for having a communication plan in both groups ($p < 0.001$ for both), and for keeping supplies for seven of 13 named items on the shopping list. The platica group showed significant improvements for nine of the 13 items. Direct comparison of the media and the platica groups showed the platica group to have reported greater compliance with keeping stores of water ($p = 0.003$), food ($p = 0.01$) and a blanket ($p = 0.05$), and no significant difference for other items.
Random sequence generation:	Low risk: Block randomisation with blocks 6-10 in size and corresponding to ZIP code.
Allocation concealment:	Low risk: Allocation was carried out by a statistician
Blinding of participants and personnel:	High risk: Not possible due to the nature of the intervention
Blinding of outcome assessment:	Low risk: Interviews conducted by investigators blinded to the intervention.
Incomplete outcome data:	High risk: The platica intervention group had relatively high drop-out rate compared to the media group (29% vs 16%).
Selective reporting:	Unclear risk: No extra information about other studies that have not been published.
Other bias:	Unclear risk: Respondent Driven ('snowball') Sampling may mean that the group is not representative. Financial incentive of \$25 for each participant a 'seed' recruited and \$25 for each interview taken. This may also affect decision to participate or recruit others.
Farahat 2010	
Participants:	430 secondary school children were invited to take part in the study, of whom 420 completed the survey.
Interventions:	An intensive health education programme consisting of lectures, role-play and group discussion aided by photos, posters, pamphlets and a 'data show' about influenza H1N1 was held every other day in schools for two weeks.

Outcomes:	The authors investigated participants' knowledge, attitude and practice relating to influenza using a questionnaire before the intervention, and the same questionnaire 3 months afterwards. There were statistically significant (at the 0.1% level) increases in most health knowledge outcomes, including the cause, source, transmission, symptoms, complications and treatment of influenza H1N1. There were improvements in self-reported behaviours relating to respiratory and hand hygiene. There were changes in self-reported behaviour relating to the use of face masks (an increase in the reported use to prevent acquisition and onward spread), and an increase in people reporting social distancing. Overall, there were significant improvements in the outcomes that the authors regarded as good, for knowledge, attitude and behaviours. This study has limited ability to show that the intervention resulted in these outcomes because of the lack of a comparison group. Secular trends could account for the change.
Random sequence generation:	Low risk: There is no comparison group, and although the schools were randomly chosen, there is no randomisation to an intervention and a control group or an alternative intervention.
Allocation concealment:	Unclear risk: All participants received the intervention.
Blinding of participants and personnel:	Unclear risk: Not blinded due to the nature of the intervention and study design
Blinding of outcome assessment:	Unclear risk: Not blinded as all participants underwent intervention.
Incomplete outcome data:	Low risk: 10 students did not complete the study, but it is not clear whether they took part in the first survey or intervention.
Selective reporting:	Unclear risk: Insufficient information to make an assessment
Other bias:	Unclear risk: Insufficient information to make an assessment
Frank 2006	
Participants:	A mass media campaign was directed at the population of New York following the terrorist attacks on 11 September 2001. The number of calls to a helpline was recorded.
Interventions:	A mass media campaign was conducted using print, television, radio and other media (mainly fliers and billboards) between September 2001 and December 2002. The scale of the media campaign was estimated by details of the dates of advertisements and also collating advertising costs. This method also demonstrated the relative expenditure on the various media types during the time of the campaign. The aim of the intervention was to inform the city's

	population of the availability of a help line for mental health problems, which facilitated onward referral to medical services if necessary. In the context of this review, contacting the help line is regarded as a positive health behaviour.
Outcomes:	The major periods of advertising activity appeared to be accompanied by increases in call volume to the help line. Prior to the attacks, between 2,000 and 3,000 calls were made each month. In the month of peak advertising expenditure (September 2002), 9,000 calls were made.
Random sequence generation:	Unclear risk: Not a randomised trial
Allocation concealment:	Unclear risk: No allocation
Blinding of participants and personnel:	Unclear risk: No blinding
Blinding of outcome assessment:	Unclear risk: No blinding
Incomplete outcome data:	Unclear risk: No attrition possible because of the study design
Selective reporting:	Unclear risk: Insufficient information to make an assessment
Other bias:	Unclear risk: Insufficient information to make an assessment
Galarce 2012	
Participants:	Two hundred and sixty seven people who were affected by a water crisis were selected from 726 survey respondents, 78% of whom were from a research database and 22% of whom were purposefully selected. The overall response rate was 73%.
Interventions:	Following the collapse of a major water tunnel, untreated water was pumped to approximately 2 million Boston residents. A boil water notice was issued and information disseminated by the Water Authority, Mayor's office, Boston Public Health Commission, schools, businesses, faith-based organisations, police, newscasters, the Centers for Disease Control and Prevention Health Alert Network, reverse 911 systems, phone calls, the internet, by vehicles with 'bullhorns' and by other emergency management systems. The balance of these methods was not described, nor was the exact content of the messages.
Outcomes:	This study used a cross-sectional survey following the study. Three behavioural outcomes were studied: Drinking un-boiled water,

	<p>flushing the cold water for 1 minute after the crisis and flushing the warm water for 15 minutes after the crisis. The survey showed that 12.5% of those questioned drank un-boiled water. This proportion varied markedly by sex, age and ethnicity, with men more likely to drink un-boiled water than women (16% vs 9%), young more likely than older (18-29 years 27% vs. >65 years 4%), and Hispanic people more likely than black or white to drink un-boiled water (33%, 13%, 10%). Compliance with flushing cold taps for one minute followed a similar pattern, with males complying less than females (73% vs 83%), young less than older (63% vs. 87%) and Hispanic less than white or black (59%, 77%, 96%). Compliance with flushing hot taps for 15 minutes followed an identical pattern to the cold water tap flushing, with males complying less than females (51 vs. 67%), young less than older (51% vs. 66%) and Hispanic less than white or black (51%, 57%, 86%). The intervention succeeded in alerting 89% of those interviewed on the day that the pipe broke and 9% on the following day. There was variation between subgroups, however, with more women than men, more older than younger people and more lower income people finding out on the first day. The study also asked which sources of information were used, and which brought the crisis to individuals' attention, which is beyond the scope of this review. Compliance with recommended measures was much higher among those who heard about the crisis on the day that the pipe broke, compared to those who learned later.</p>
Random sequence generation:	Unclear risk: There was no allocation in this study
Allocation concealment:	Unclear risk: There was no allocation in this study
Blinding of participants and personnel:	Unclear risk: There was no blinding of participants or personnel
Blinding of outcome assessment:	Unclear risk: It is not stated whether there was any blinding of outcome status.
Incomplete outcome data:	Unclear risk: There is no risk of attrition in this study because it required only a cross-sectional survey. However, there may be non-response bias.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Karan 2007	
Participants:	The intervention was directed to the entire population of Singapore. Three hundred individuals (51% male) were surveyed in one of two

	languages by telephone after the end of the SARS outbreak.
Interventions:	<p>An integrated communication campaign involving mass media and interpersonal communication to convey key messages and influence attitudes and behaviours. Press conferences were given regularly and print advertisements were published in four languages. Television adverts in four languages and local dialects demonstrated handwashing, cleaning and infection control techniques. A dedicated collaborative television station and a web site were set up. SARS toolkit containing a thermometer, surgical masks and instructions were sent to 1.1 million homes. A book and fliers were sent to all homes. Telephone help lines were set up, and local meetings were held for discussion and demonstrations. At the same time as the information campaign, other interventions also took place: Schools were closed, visits to hospitals restricted, and home quarantine enforced for contacts of affected people. Singaporeans were asked to check their temperatures every day. Legal measures (fines and imprisonment) were imposed on people who broke quarantine, and spitting in public places was punishable by a fine and a photograph of the offender being published in a local newspaper.</p>
Outcomes:	<p>The survey asked about sources of information, which is outside the scope of this review. No knowledge outcomes were assessed. Behavioural outcomes were assessed: 85% of respondents monitored their temperature daily (though the authors note that this may have been due to compulsory checks by employers and authorities). Forty six percent did this always, and 39% did it sometimes. Fifteen percent did not do it at all. Following the outbreak, 5% continued to always check their temperature daily, 26% sometimes did so, and 69% did not monitor their temperature. This action varied by occupation, with 100% of those in national service always checking their temperature daily, but 0% of retirees complying always, and 13% of housewives doing so. During the outbreak, 40% always washed their hands regularly and 60% sometimes did so. Following the outbreak, 31% always washed their hands regularly, 60% sometimes did so and 10% never did so. The compulsory nature of temperature monitoring in some circumstances makes it impossible to attribute the temperature monitoring solely to the information intervention. Regular handwashing, unlike regular temperature monitoring, is likely to have been a common practice for many people before the outbreak, which means that it is not possible to assume a zero starting point prior to the intervention, and evaluating the effect of the campaign on handwashing is therefore difficult.</p>
Random sequence generation:	Unclear risk: There is no allocation in this study.
Allocation concealment:	Unclear risk: There is no allocation in this study.

Blinding of participants and personnel:	Unclear risk: There was no blinding of participants or personnel because all participants received the intervention and were interviewed only once.
Blinding of outcome assessment:	Unclear risk: Because the researcher collected information about the two time points in the same interview, they were not blinded with regard to the time point.
Incomplete outcome data:	Unclear risk: There should be no attrition because of the cross-sectional nature of the assessment. However, the sample may not be representative of the full population because it was drawn from a research register.
Selective reporting:	Unclear risk: Insufficient information to make an assessment
Other bias:	Unclear risk: Insufficient information to make an assessment
Olsen 2005	
Participants:	Two hundred adults from Nakhon Phanom, Thailand, were interviewed and asked about their practices before and after they had heard about avian influenza. Respondents were predominantly female (72%), with median age 50 years.
Interventions:	A telephone hotline was run from January to May 2004 with information about prevention. A web site displaying information about prevention and surveillance was started in January 2004. Newspaper, radio and television information about how to prevent avian influenza was produced. Newspaper information was published on three days in January 2004, television information for three days in February 2004 and radio information broadcast for nearly three weeks in January and February 2004. Video disks and cassette tapes were distributed to health officers in February 2004 and a comprehensive information brochure sent to the public in August 2004.
Outcomes:	All four knowledge outcomes improved at the 0.05 level of significance: The percentage of people who thought it was safe to touch sick or dead poultry with bare hands decreased from 40% to 14%, and the fraction who thought it was safe for children to do so reduced from 23% to 5%. The percentage who thought that it was safe to prepare raw poultry on the same board as other food decreased from 50% to 37%, and the percentage who thought that eating pink chicken or eggs with runny yolks decreased from 21% to 6%. The only behavioural practice that was reported to have significantly improved was that of touching sick or dead poultry with bare hands (39% to 11%). There was no significant change for the practices of children touching dead poultry, preparing dead poultry from the yard, preparing raw poultry on the same boards as other foods, and washing hands immediately after preparing raw poultry.
Random	Unclear risk: There was no randomisation in this study.

sequence generation:	
Allocation concealment:	Unclear risk: There was no allocation in this study.
Blinding of participants and personnel:	Unclear risk: There was no blinding in this study.
Blinding of outcome assessment:	Unclear risk: There was no blinding of outcomes mentioned in this study.
Incomplete outcome data:	Unclear risk: There is no risk of attrition in this study because of the cross-sectional design.
Selective reporting:	Unclear risk: Insufficient information to make an assessment
Other bias:	Unclear risk: Insufficient information to make an assessment
Pang 2003	
Participants:	1,860 cases of SARS were notified in the time period of the study
Interventions:	The Beijing outbreak of SARS was announced in a health ministry press conference on 20 April 2003, which was followed by four further ministry press conferences, nine municipal government press conferences, billboards, bus advertisements, banners, a daily two-hour educational television programme, a telephone help line, 6,672 SARS community seminars and delivery of 8,280,000 copies of educational materials.
Outcomes:	The authors considered 'lag time', the time between onset of symptoms and hospitalisation, to be an observed marker of behaviour. The median lag time reduced during the time period of the outbreak from six days between 5 March and 9 April, to five days between 10 April and 20 April, and two days between 21 April and 15 June.
Random sequence generation:	Unclear risk: There was no randomisation in this study.
Allocation concealment:	Unclear risk: There was no allocation in this study.
Blinding of participants and personnel:	Unclear risk: There was no blinding in this study.
Blinding of outcome	Unclear risk: There was no blinding of outcome assessment in this study.

assessment:	
Incomplete outcome data:	Unclear risk: There is no risk of attrition in this study.
Selective reporting:	Unclear risk: The study was reported retrospectively, and therefore post hoc selection of outcome variable is possible.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Perry 2007	
Participants:	319 people interviewed by a survey company seven weeks after a tsunami about their responses to the warning message.
Interventions:	The Mauritius Meteorological Service and Mauritius Broadcasting Corporation both learned about the tsunami at 10am from international news media. The Meteorological Service notified police and coastguard at 11am. Local hotels were telephoned directly by the meteorological service. The local media were contacted at 11.45am. Private radio broadcast warnings at 11.50am. The first wave effects reached Mauritius between 12.15pm and 12.30pm. The MBC broadcast a warning after 1pm. An official warning on television was given at between 2pm and 3pm.
Outcomes:	The main focus of the study was on diffusion of information. Ten percent of the surveyed population knew of the tsunami warning by the time that the wave effects reached the island. By the time that the effects subsided at between 3pm and 3.30pm, 42% of the surveyed population knew about the tsunami. By 8pm, 80% of people knew about the tsunami. Most (52%) learned about the tsunami through television, followed by radio (28%) and face-to-face communication (15%). Behaviours reported upon receiving the information were: Continue as normal (64%), inform others face-to-face (58%) or by telephone (27%), take action to protect oneself (25%), go to see the wave (15%) and send SMS text message (6%).
Random sequence generation:	Unclear risk: This study was not randomised
Allocation concealment:	Unclear risk: There was no allocation
Blinding of participants and personnel:	Unclear risk: There was no blinding of participants or personnel
Blinding of outcome assessment:	Unclear risk: There was no blinding of outcome assessment
Incomplete outcome	Unclear risk: There was no attrition because of the design of the survey. However, there may be non-response bias.

data:	
Selective reporting:	Unclear risk: The study was conducted retrospectively, so might have been conducted with post hoc knowledge of the response.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Roess 2011	
Participants:	Approximately 23,860 people received the intervention, of whom 282 completed a before-and-after survey. Of these, 271 were usable. The survey sample was selected by asking for volunteers, followed by convenience and quota sampling.
Interventions:	The intervention was an outreach education programme carried out in villages in the Republic of Congo. Participants were divided by age and sex into groups who attended small group sessions, which included discussion and two information videos about monkeypox. Questionnaires were completed before and after the small group sessions by a facilitator reading questions aloud and a second facilitator recording the answers. Additionally, large group sessions were conducted in evenings, but were not evaluated.
Outcomes:	The authors evaluated knowledge of symptoms and transmission of Monkeypox, risk behavior regarding high-risk foods, and behaviours relating to responding to actions that lower risk. Significant increases (using McNemar's test for matched pair data) were reported for all three disease recognition questions: number of people who knew at least one symptom of monkeypox (49% to 95%), named rash and fever as symptoms (11% to 32%), knew that the rash occurs on palms and soles (14% to 51%). Similar changes were reported for all four questions about knowledge of disease transmission: Knew that transmission could occur by contact with an ill person (28% to 58%), contact with fomites (2% to 14%), contact with an ill animal (24% to 64%) and contact with a dead animal (7% to 19%). No change was reported for intended behaviour for either eating (11%) or selling (4%) primate carcasses found in the forest, but intention to eat or sell found rodent carcasses reduced (eating, 33% to 16%; selling 7% to 3%). Four of five risk mitigation behaviour intentions improved: Would take a family member to a hospital (48% to 87%), would avoid direct contact with an ill person (26% to 59%), would avoid touching soiled items (3% to 13%), would avoid touching animal carcasses found in the forest (23% to 61%). There was no significant change in the number of people who would take a family member to a traditional healer (2% to 1%).
Random sequence generation:	Unclear risk: No randomisation because all participants underwent the intervention.
Allocation concealment:	Unclear risk: No allocation concealment because all participants underwent the intervention.
Blinding of	Unclear risk: No blinding because all participants underwent the

participants and personnel:	intervention.
Blinding of outcome assessment:	Unclear risk: It was not stated whether researchers were blind to the before/after status of the questionnaires when assessing the intervention.
Incomplete outcome data:	Unclear risk: It was not stated whether there was any attrition between the before and after questionnaires.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Rundblad 2010	
Participants:	1000 households supplied with water from Mythe waterworks in Gloucestershire, England, were sent a questionnaire. There were 195 replies, of which 159 were affected by the water problem, and were included in the study.
Interventions:	A non-standard, locally produced 'Do Not Drink' notice was confirmed to be delivered to every affected household before restoration of mains water supply following a major flooding event. Seven days later, this notice was replaced by a standard 'Boil Water' notice, and several days subsequently, the water supply was declared safe to drink. The primary medium used by the water and public health authorities to communicate this information was the delivery of written notices. However, local media also disseminated information.
Outcomes:	Knowledge and behaviour in light of the public information were assessed. Respondents reported the information sources used. The leaflets were used by 46% of people during the 'Do Not Drink' stage, 38% during the 'Boil Water' stage and 37% during the 'Water Safe' stage of the incident. Local radio was used by a larger percentage of people at all stages. Knowledge of what to do during both the 'Do Not Drink' and 'Boil Water' stages was low (23% and 27%). During the 'Do Not Drink' stage, 9% of people drank un-boiled tap water, 16% brushed teeth with it and 21% prepared food with it, all of which were advised against. During this phase, boiled water (also advised against) was used by 47% to prepare food with, 38% to brush teeth, 42% to drink hot and 21% to drink cold. During the 'Boil Water' stage, 42% prepared food with un-boiled tap water, 38% brushed teeth with it and 29% drank unboiled water.
Random sequence generation:	Unclear risk: This study was not randomised.
Allocation concealment:	Unclear risk: There was no allocation.

Blinding of participants and personnel:	Unclear risk: There was no blinding.
Blinding of outcome assessment:	Unclear risk: There was no blinding of outcome assessment.
Incomplete outcome data:	Unclear risk: There were variable numbers of responses to the questions about the three stages. There may be a risk of informative missingness.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment
Sharma 2009	
Participants:	Forty four 'decision-maker' individuals, each from different households, who received a cyclone warning message were recruited. The focus of this study was to assess factors influencing evacuation after the warning was received, and therefore individuals who did not receive the message were excluded.
Interventions:	A written cyclone warning was issued by a Cyclone Warning Centre to relief commissioners of local states and districts. Messages were translated into local languages at the district level, further disseminated to sub-districts and then to villages through government administrative departments. Media messages were also issued, but not further described. Telegram, fax, telephone, radio, and messengers were used. Locally, messages were transmitted orally.
Outcomes:	The only outcome relevant to this review that was reported was whether the decision-maker individuals evacuated. Only 34% evacuated voluntarily, 20% were 'forced' to evacuate and 46% did not evacuate. The main purpose of the article was to assess the non-communication-related factors that influenced the evacuation decision, which are beyond the scope of this review.
Random sequence generation:	Unclear risk: There was no randomisation in this study.
Allocation concealment:	Unclear risk: There was no allocation in this study
Blinding of participants and personnel:	Unclear risk: There was no blinding in this study
Blinding of outcome	Unclear risk: There was no blinding of outcome assessment

assessment:	
Incomplete outcome data:	Unclear risk: The study only investigated individuals who received the warning.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Strawderman 2012	
Participants:	One thousand and twenty individuals were included in the study (8.4%). Emergency officials identified 12,204 telephone numbers within the evacuation zones of San Diego County, California, of which 5,214 were invalid or not in the correct area, 3,536 did not reach anyone, 1,134 called back outside the study period, 314 were unable to take part, 768 declined to take part, 27 did not complete the survey and 190 surveys were invalid. The respondents were predominantly female (64%) and mean age was 54 years. Twelve percent reported damage to their homes from the wildfire and 69% evacuated.
Interventions:	A recently installed 'Reverse 911' system was used to warn individuals of the need for evacuation. The system delivers a recorded message to telephone numbers in an at-risk area. Other methods were also used to alert individuals, including television, radio, interpersonal and police, but these were observed.
Outcomes:	Fifty three percent of the respondents received the Reverse 911 alert. All of these people evacuated, though only 66% of them attributed their evacuation to the Reverse 911 alert. It was not stated how many people the Reverse 911 system attempted to contact.
Random sequence generation:	Unclear risk: There was no randomisation.
Allocation concealment:	Unclear risk: There was no allocation.
Blinding of participants and personnel:	Unclear risk: There was no blinding.
Blinding of outcome assessment:	Unclear risk: There was no blinding of outcome assessment.
Incomplete outcome data:	Unclear risk: There may have been bias in the recruitment of participants. Those who failed to evacuate may have not responded or not been able to respond. The most severely affected people may have not been able to respond because of damage to their properties.

Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Sugerman 2012	
Participants:	One thousand, eight hundred and two adults took part in a survey following wildfires in San Diego, California. The researchers made 18,687 calls, found 7,706 ineligible, 9,052 of unknown eligibility and 1,929 eligible, with 95 calls terminated and 32 partially completing the interview. Calculated response rate was 48%. Ten percent of calls were conducted in Spanish. The respondents were older, wealthier, more educated and more likely to be non-Hispanic white than the San Diego population.
Interventions:	The San Diego County Health and Human Services Agency and American Heart and Lung Association distributed health recommendations through a multi-media approach using television, radio, newspapers and the Internet over a period of three weeks. The health recommendations were stay indoors, drive with all windows closed, run air conditioners on recirculate, keep home windows closed, use HEPA air filters, only exercise indoors, wet ash before cleanup, use N95 respirators during cleanup, limit activities to what is absolutely necessary, boil tap water before drinking and drink bottled water.
Outcomes:	Respondents were surveyed about their recollection of the health messages and their practice during the disaster. The messages reached 88% of those surveyed, mostly by television (77%), with fewer hearing them by radio (7%), Internet (1%) or other (15%). Messages that were recalled were: stay indoors (68%), keep home windows closed (18%) and only exercise indoors (11%), with less than 5% of respondents spontaneously recalling the other messages. The compliance with health recommendations were: stayed inside most of the day (59%), kept windows closed (76%), did not participate in outdoor sports (88%), wet ash during cleanup (76%), used home air conditioning (16%), used HEPA air filters (10%) and wore N95 mask (8%).
Random sequence generation:	Unclear risk: There was no randomisation.
Allocation concealment:	Unclear risk: There was no allocation.
Blinding of participants and personnel:	Unclear risk: There was no blinding.
Blinding of outcome	Unclear risk: There was no blinding of outcome assessment.

assessment:	
Incomplete outcome data:	Unclear risk: There is no attrition because of the study design, but there is a risk of non-response bias.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Tanes 2011	
Participants:	250 college students were recruited from a university research participant database. It is not stated how the participants were approached or selected, or how many were approached. Participants were incentivised with 1% of a credit towards their degree and a chance of winning a \$45 lottery prize. The sample was 62% male, aged 18 to 53 years (mean 20 years), and mainly white (73%) or Asian (20%). The intervention took place in a room with five computers, with layout to minimise communication or contamination. To further reduce contamination, the authors randomised time-slots to each intervention, rather than randomising participants to each intervention. Participants signed up for time slots.
Interventions:	The computer game Beat the Quake was an existing preparedness intervention designed for use in California, USA, requiring participants to click on items in an image of a living room to secure them to prevent injury during an earthquake. The main focus of this study was to assess the effect of setting goals for participants, as opposed to allowing participants to choose goals by themselves. The study therefore had five groups, one of which received no intervention and one of which took part in the game three times with self-chosen goals, one with set goals and three games, one with no goals and three games, one with no goals and only one attempt at the game.
Outcomes:	The outcomes relevant to this review are: Earthquake preparedness knowledge, measured by 16 multiple choice questions. A one-way ANOVA test showed that playing the computer game resulted in a different knowledge score compared to not playing the game ($P < 0.001$). All four intervention groups had higher knowledge scores than the control group (all $P < 0.001$). The group who set their own goals scored slightly better on knowledge than all other groups overall, but in individual comparisons was only better than the no intervention group ($P < 0.001$).
Random sequence generation:	Unclear risk: The randomisation method is not described.
Allocation concealment:	High risk: The self-selection of time-slots by participants and randomisation of time-slots to intervention group by the authors may risk selection bias.

Blinding of participants and personnel:	High risk: Participants were not blinded to the intervention because of its nature.
Blinding of outcome assessment:	Unclear risk: It is not clear whether researchers were aware of the intervention status or which time point the questionnaires related to.
Incomplete outcome data:	Unclear risk: The authors did not report any attrition.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment.
Taylor-Robinson 2010	
Participants:	One hundred and ninety-eight pupils aged 16-17 were asked to complete a questionnaire following an outbreak of meningococcal disease, of whom 88 (44%) responded.
Interventions:	Following the diagnosis of two children in the same year group of a school with meningococcal disease on a Friday afternoon, the Health Protection Agency (HPA) issued letters to parents of pupils and released a press statement for radio on the following Monday and held a briefing on the Tuesday before the mass distribution of antibiotics.
Outcomes:	No specific aspect of knowledge was tested by the authors. The majority of pupils learned about the incident by interpersonal means before the communications by the HPA. Only one person reported learning about the incident from the HPA letter, and none learned about it by radio. Qualitative replies indicated that the official communications were perceived to have occurred too late. During the interim time, uncertainty and anxiety were reported, and speculative information was spread by interpersonal means.
Random sequence generation:	Unclear risk: There was no randomisation
Allocation concealment:	Unclear risk: There was no allocation
Blinding of participants and personnel:	Unclear risk: There was no blinding of participants or personnel
Blinding of outcome assessment:	Unclear risk: There was no blinding of outcome assessment.

Incomplete outcome data:	Unclear risk: There was no attrition, but non-response bias may have been a problem.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment
Wang 2011	
Participants:	525 participants were recruited opportunistically in hospital clinics and waiting rooms (31% male). Surveys were conducted in English (90%), Spanish (7%) or Haitian Creole (3%). The modal age range was 25-34 years.
Interventions:	A boil water notice was issued by Massachusetts Water Resources Authority at 4pm on 1 May 2010. This study did not further describe the steps taken by the Authority to disseminate the information, however.
Outcomes:	The majority, 97.5% of respondents knew about the boil water notice. Of those who knew about it, 97.6% took preventive actions, with 47% using bottled and boiled water, 41% using bottled water only and 9.6% using boiled water only. Only 2.4% consumed un-boiled tap water.
Random sequence generation:	Unclear risk: This study was not randomised.
Allocation concealment:	Unclear risk: There was no allocation.
Blinding of participants and personnel:	Unclear risk: There was no blinding.
Blinding of outcome assessment:	Unclear risk: There was no blinding of outcome assessment.
Incomplete outcome data:	Unclear risk: There was no risk of attrition due to the nature of the study.
Selective reporting:	Unclear risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: The opportunistic sampling used in this study risks limiting its generalisability, though it allowed the researchers to conduct the survey within a week of the event.
Yasunari 2011	
Participants:	Pregnant women (993) who were in their second trimester attended the intervention classes in nine hospitals running the programme, of

	<p>whom 226 completed both the before and after surveys. Another 1,010 women, also in their second trimester attending hospitals that did not run the programme, were asked to complete a survey soon after their maternity appointment and then again one month later, and 262 women did so. The authors found systematic characteristic differences between the two groups, and so changed the inclusion criteria to 'primiparous without disaster experience.' They therefore included only 99 from the intervention group and 104 from the control group.</p>
Interventions:	<p>Six-session educational programme, each lasting 15 minutes as part of normal antenatal classes, the contents of which were: (1.) The importance of preparedness, (2.) communication methods within families in disasters, (3.) receiving medical attention in disasters, (4.) evacuation in disasters, (5.) preparedness items and (6.) preparing for safety at home. Educational tools such as a leaflet and evacuation bags were used.</p>
Outcomes:	<p>Disaster preparedness knowledge and behaviour measured by questionnaire. Knowledge items were awareness of an emergency telephone line, knowledge of a cellular phone disaster message board, knowledge of hospital centres, evacuation sites, a hazard map and being able to explain own health status to facilitate medical examinations when records are unavailable. Behavioural outcomes were: having discussed emergency contact methods with family, can immediately find out family contact methods, taking measures to prevent overturned furniture, falling items, broken glass, sleeping somewhere safe and having prepared an emergency bag. Both the intervention and control groups showed improvements in all measures, though not all significantly. The authors proposed an observer effect to account for the improvement in the control groups. The intervention group made significant improvements in knowledge of the emergency telephone line (69.7% to 82.8%), knowledge of the disaster message board (51.5% to 67.7%), knowledge of local alternative maternity clinics (52.5% to 68.7%), evacuation sites (47.5% to 67.7%) and being explain about own health status (86.9% to 97%). Behavioural improvements were: discussed communication plan with family (20.2% to 43.4%), being able to find out family contact methods (46.5% to 70.7%), taking measures to prevent furniture turning over (33.3% to 48.5%) and objects falling (20.2% to 34.3%). The control group significantly improved in only taking measures to prevent objects falling (9.6% to 20.2%). However, the authors did not directly compare the changes between the intervention and control arm.</p>
Random sequence generation:	<p>High risk: Multi-centre cluster trial with centres allocated as intervention/control, but how this was done was not reported.</p>
Allocation concealment:	<p>High risk: Centres seem to have been systematically different, as evidenced by the different characteristics of the intervention and control groups.</p>

Blinding of participants and personnel:	High risk: Neither participants nor personnel could be blinded due to the nature of the intervention.
Blinding of outcome assessment:	Unclear risk: It was not stated whether assessment of the questionnaires was blinded
Incomplete outcome data:	High risk: There was a high attrition rate. The authors chose to limit the study to a more homogenous group post hoc, which also risks bias.
Selective reporting:	Unclear risk: Insufficient information to make an assessment
Other bias:	Unclear risk: Insufficient information to make an assessment
Yen 2009	
Participants:	Schoolchildren of Taipei and Keelung Cities during an outbreak of acute haemorrhagic conjunctivitis. Taipei City had 277,159 schoolchildren and Keelung City had 41,244. The report contains several different study designs, including an uncontrolled before and after study of school absences in Taipei, case-control study for effectiveness of the media intervention and interrupted time series surveillance data for Taipei and Keelung. The uncontrolled before and after study and the interrupted time series meet the inclusion criteria for this review.
Interventions:	Multichannel risk communication prevention program. Both cities had previously delivered public service messages to schools, health education in schools, a telephone helpline and media information. On a single day, the Taipei mayor addressed the press, a letter from the department of health was given to children to give to their parents and SMS text messages with information and infection control advice were sent to all Taipei citizens with mobile phones.
Outcomes:	The SMS message was sent to 2.2 million registered mobile phone users. School absenteeism rate for cases increased from 10% before the intervention to 62% after the intervention ($P=0.001$). There was a fall in overall daily incidence from 0.093% to 0.056% following the intervention. The authors also noted that the outbreak in Taipei lasted 13 days, which is shorter than the 34 days experienced in Keelung. The crude attack rate in Keelung was 14.9%, and 2% in Taipei. ¹
Random sequence generation:	High risk: The intervention was not randomised
Allocation concealment:	High risk: There was no concealment
Blinding of	High risk: This was not blinded

participants and personnel:	
Blinding of outcome assessment:	High risk: This was not blinded.
Incomplete outcome data:	Unclear risk: There should be a low risk of attrition because of the nature of the study.
Selective reporting:	Low risk: Insufficient information to make an assessment.
Other bias:	Unclear risk: Insufficient information to make an assessment.

Appendix 4: References to excluded studies and reasons for exclusion

Report	Reason for exclusion
Alcántara-Ayala et al. Natural hazards and risk communication strategies among indigenous communities: shedding light on accessibility in Mexico's mountains. <i>Mountain Research and Development</i> 2004;24(4):298-302.	No relevant outcomes
Alsaif et al. Hail Community Acceptance of A/H1N1 Vaccine. <i>J.Med.Sci</i> 2010;10(6):162-8.	No Relevant Intervention or Outcomes
Beaton et al. Evaluation of the Washington State National Pharmaceutical Stockpile Dispensing Exercise: Part I-Patient Volunteer Findings. <i>Journal of Public Health Management and Practice</i> 2003;9(5):368-76.	No Relevant Outcomes
Becker. Communicating risk to the public after radiological incidents. <i>BMJ: British Medical Journal</i> 2007;335(7630):1106.	Not a study
Caress et al. Exploring the needs, concerns and behaviours of people with existing respiratory conditions in relation to the H1N1 'swine influenza' pandemic: a multicentre survey and qualitative study. <i>Health technology assessment (Winchester, England)</i> 2010;14(34):1-108.	No Relevant Intervention
Carter. Public experiences of mass casualty decontamination. <i>Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science</i> 2012;10(3):280-9.	No Relevant Intervention or Outcomes
Davidson et al. Nurses' use of the media to provide public health information during a hepatitis A outbreak. <i>Journal of Professional Nursing</i> 2004;20(2):134-6.	Not a study
De Giusti et al. Risk communication during health crises: results of a cross-sectional study to evaluate the effectiveness of adopted corporate communication strategies during the H1N1 influenza pandemic in Italy and on the training needs of health professionals. <i>Igiene e sanita pubblica</i> 2012;68(1):69-84.	Intervention not aimed at the Public
Deurenberg-Yap et al. The Singaporean response to the SARS outbreak: knowledge sufficiency versus public trust. <i>Health promotion international</i> 2005;20(4):320-6.	Cross-sectional survey with no comparison group
Doke et al. A clinico-epidemiological study of Chikungunya outbreak in Maharashtra state, India. <i>Indian journal of public health</i> 2011;55(4):313.	No Relevant Intervention
Duggan et al. Constructing a model of effective information dissemination in a crisis. <i>Information Research</i> 2004;9(3):9-3.	Not a study
Dunston et al. Collaboration, cholera, and cyclones: a project	No Relevant

to improve point-of-use water quality in Madagascar. American Journal of Public Health 2001;91(10):1574-6.	Intervention
Eagleman. Can the Internet save us from epidemics? Nature 2006;441(7093):574.	Not a study
Eastwood et al. Acceptance of pandemic (H1N1) 2009 influenza vaccination by the Australian public. Med J Aust 2010;192(1):33-6.	No relevant intervention
Eastwood et al. Responses to pandemic (H1N1) 2009, Australia. Emerging infectious diseases 2010;16(8):1211.	No relevant intervention
Ebi et al. A stitch in time: improving public health early warning systems for extreme weather events. Epidemiologic reviews 2005;27(1):115-21.	Review
Eisenman et al. Disaster planning and risk communication with vulnerable communities: lessons from Hurricane Katrina. American Journal of Public Health 2007;97(Supplement_1):S109-15.	No Relevant Intervention
Elder et al. Community Mitigation of Disease Outbreaks: Health Communication Perspectives. American Journal of Preventive Medicine 2010;39(5):487-8.	Not a study
Eslick. Improving flu prevention posters and reducing the risk of infection during outbreaks. The Medical journal of Australia 2013;198(6):313.	Not a study
Falagas et al. Reaction to the threat of influenza pandemic: the mass media and the public. Crit Care 2006;10(2):408.	Not a study
Fallon Jr et al. Communications between local health departments and the public during emergencies: the importance of standardized web sites. Journal of Public Health Management and Practice 2011;17(1):E1-6.	No relevant outcomes
Fontana et al. Risk management: a proposal for communication strategies. Annals of geophysics 2012;55(3).	No relevant outcomes
Geddes. The effective use of the media during an infectious disease emergency. New South Wales Public Health Bulletin 2006;17(10):141.	Not a study
Gershon et al. Factors associated with high-rise evacuation: qualitative results from the World Trade Center evacuation study. Prehospital and Disaster Medicine 2007;22(3):165.	No Relevant Intervention
Gershon et al. The World Trade Center evacuation study: Factors associated with initiation and length of time for evacuation. Fire and Materials 2012;36(5-6):481-500.	No Relevant Intervention
Harkins et al. Vibration Signaling in Mobile Devices for Emergency Alerting: A Study With Deaf Evaluators. Journal of deaf studies and deaf education 2010;15(4):438-45.	Not a study
Hazreen et al. An evaluation of information dissemination	Cross-sectional

<p>during the severe acute respiratory syndrome (SARS) outbreak among selected rural communities in Kuala Kangsar. The Medical journal of Malaysia 2005;60(2):180.</p>	<p>survey with no comparison group</p>
<p>Hermelin et al. Community participation in natural risk prevention: case histories from Colombia. Geological Society, London, Special Publications 2008;305(1):39-51.</p>	<p>Not a study</p>
<p>Hildebrand et al. Comparative study illustrating difficulties educating the public to respond to chemical terrorism. Prehospital and Disaster Medicine 2007;22(01):35-41.</p>	<p>Cross-sectional survey with no comparison group</p>
<p>Hobbs et al. Communicating health information to an alarmed public facing a threat such as a bioterrorist attack. 2010.</p>	<p>No Relevant Intervention</p>
<p>Ioannidou et al. Promotion of hygiene measures to prevent pandemic influenza transmission in Greek nursery schools: the teachers' perspectives. Acta Paediatrica. Vol. 99. Wiley-Blackwell publishing 2010:88.</p>	<p>No relevant outcomes</p>
<p>James. Communication in a disaster: success of text messages. AIDS Treatment News 2005;(414)(414):4-5.</p>	<p>Not a study</p>
<p>Jhao et al. A survey in Taiwan 2009 for the public perception and the willingness to be vaccinated of pandemic influenza A (H1N1). International Journal of Infectious Diseases 2010;14:e97.</p>	<p>No Relevant Intervention</p>
<p>Kamate et al. Public knowledge, attitude and behavioural changes in an Indian population during the Influenza A (H1N1) outbreak. The Journal of Infection in Developing Countries 2009;4(01):007-14.</p>	<p>No Relevant Intervention</p>
<p>Kearon et al. Making Sense of Emergency Advice: Public Perceptions of the Terrorist Risk. Security Journal 2007;20(2):77-95.</p>	<p>Review Article</p>
<p>Kittler et al. The Internet as a vehicle to communicate health information during a public health emergency: a survey analysis involving the anthrax scare of 2001. Journal of Medical Internet Research 2004;6(1).</p>	<p>No relevant intervention.</p>
<p>Knott et al. Health literacy in Pandemic H1N1 2009 and the effect of governmental communications. Emergency Medicine Australasia 2011;23(s1):33-6.</p>	<p>Cross-sectional survey with no comparison group</p>
<p>Koskanet al. Characteristics and influences of H1N1 communication on college students. Disaster Prevention and Management 2012;21(4):418-32.</p>	<p>No relevant intervention.</p>
<p>Kshirsagar et al. Floods in Mumbai: impact of public health service by hospital staff and medical students. Journal of postgraduate medicine 2006;52(4):312.</p>	<p>Not a study.</p>
<p>Kumar et al. Knowledge of swine flu among health care workers of general population of Haryana 2009. Australas Med J 2010;3(9):614-7.</p>	<p>No relevant intervention</p>

Kuppuswamy et al. Women, information technology and disaster management: tsunami affected districts of Tamil Nadu. International Journal of Innovation and Sustainable Development 2009;4(2):206-15.	Case study.
Lalo. Alerting the population in emergency plans: examples of local public policy in Provence. Journal of hazardous materials 2000;78(1):281-301.	Study conducted prior to 1st January 2000
Lamb et al. Travel behaviours following the 2007 Gisborne earthquake: Evidence for the use of simulation in earthquake research. International Journal of Emergency Management 2011;8(1):42-59.	No relevant intervention.
Mack et al. Teaching Emergency Preparedness to Restricted-Budget Families. Public Health Nursing 2006;23(4):354-60.	Not a study.
Mishra. Swine flu outbreak: dissemination of information. The National medical journal of India 2009;22(2):102-3.	Not a study.
Morgan. Communication in emergencies. Environmental health perspectives 2003;111(9):A452.	Not a study.
Murphy et al. Postdisaster health communication and information sources: the Iowa flood scenario. Disaster medicine and public health preparedness 2010;4(02):129-34.	No Relevant Outcomes
Noftsinger et al. Understanding Homeland Security: Policy, Perspectives, and Paradoxes. Palgrave Macmillan, 2007.	Not a study.
Paton et al. Fighting the flu: Developing sustained community resilience and preparedness. Health Promotion Practice 2008;9(4 suppl):45S-53S.	No relevant intervention.
Perko et al. Is knowledge important? Empirical research on nuclear risk communication in two countries. Health physics 2012;102(6):614-25.	No relevant outcomes
Pryor et al. Rapid response to a conjunctivitis outbreak: the use of technology to leverage information. Journal of American college health 2002;50(6):267-71.	No relevant outcomes.
Rød et al. Risk communication and the willingness to follow evacuation instructions in a natural disaster. Health, Risk & Society 2012;14(1):87-99.	No relevant intervention
Rød et al. Risk communication and worried publics in an imminent rockslide and tsunami situation. Journal of Risk Research 2012;15(6):645-54.	No relevant intervention
Romo-Murphy et al. Facilitating disaster preparedness through local radio broadcasting. Disasters 2011;35(4):801-15.	No relevant intervention
Seale et al. University Communication Strategies During a Pandemic: Were the Messages Received? Journal of Public Health Management and Practice 2011;17(1):E29-32.	Cross-sectional survey with no comparison group

Smith et al. Technology and communications in an urban crisis: The role of mobile communications systems in disasters. <i>Journal of Urban Technology</i> 2009;16(1):133-49.	Review.
Soto Maset al. Risk communication and college students: the 2009 H1N1 pandemic influenza. <i>Preventive medicine</i> 2011;52(6):473-4.	Intervention not described
Spence et al. Media use and information needs of the disabled during a natural disaster. <i>Journal of health care for the poor and underserved</i> 2007;18(2):394-404.	Not aimed at general public.
Taylor et al. Activities to increase provider awareness of early syphilis in men who have sex with men in 8 cities, 2000-2004. <i>Sexually transmitted diseases</i> 2005;32:S24-9.	No Relevant Intervention
Terpstra et al. Does Communicating (Flood) Risk Affect (Flood) Risk Perceptions? Results of a Quasi-Experimental Study. <i>Risk Analysis</i> 2009;29(8):1141-55.	No relevant outcomes.
Thoon et al. Survey of healthcare workers' attitudes, beliefs and willingness to receive the 2009 pandemic influenza A (H1N1) vaccine and the impact of educational campaigns. <i>Annals Academy of Medicine Singapore</i> 2010;39(4):307.	Not aimed at general public.
Thurston et al. Risk communication in the aftermath of the World Trade Center disaster. <i>American Journal of Industrial Medicine</i> 2002;42(6):543-4.	No relevant intervention
van Velsen et al. Should Health Organizations Use Web 2.0 Media in Times of an Infectious Disease Crisis? An In-depth Qualitative Study of Citizens' Information Behavior During an EHEC Outbreak. <i>Journal of medical Internet research</i> 2012;14(6):e181.	No relevant intervention
Vihalemm et al. Citizens' Response Patterns to Warning Messages. <i>Journal of Contingencies and Crisis Management</i> 2012;20(1):13-25.	No relevant intervention
Wamalwa. Improving community hygiene and sanitation practices through schools: a case study of the Personal Hygiene and Sanitation Education (PHASE) project in Kenya. <i>Promotion & education</i> 2005;12(3-4):166-7.	Not a disaster context (general hygiene health promotion intervention against infectious diseases)
Williams et al. Changing patterns of knowledge, reported behaviour and sexually transmitted infections in a South African gold mining community. <i>Aids</i> 2003;17(14):2099-107.	Intervention took place before 1st January 2000.
Wilson et al. Pandemic flu knowledge among dormitory housed university students: a need for informal social support and social networking strategies. <i>Rural & Remote Health</i> 2010;10(4):1526.	Cross-sectional survey with no comparison group
Winerman. Social networking: Crisis communication. <i>Nature</i>	Not a study.

2009;457(7228):376-8.	
Yamada et al. Implementation of community flood risk communication in Kumamoto, Japan. Journal of Advanced Transportation 2011;45(2):117-28.	No relevant outcomes.

Appendix 5: References to studies for which an assessment could not be made and reasons for not assessing

Report	Reason
Chen et al. Rapid public health interventions in response to an outbreak of syphilis in Los Angeles. <i>Sexually transmitted diseases</i> 2002;29(5):277-84.	Unclear whether event meets disaster definition.
Edwards et al. Promotion of healthy swimming after a statewide outbreak of cryptosporidiosis associated with recreational water venues-Utah, 2008-2009. <i>Morbidity and Mortality Weekly Report</i> 2012;61(19):348-52.	Unclear whether event meets disaster definition.
Ghosh et al. Comparative efficacy of two poeciliid fish in indoor cement tanks against chikungunya vector <i>Aedes aegypti</i> in villages in Karnataka, India. <i>BMC public health</i> 2011;11(1):599.	Insufficient information about the communication intervention to make an assessment.
Plant et al. Stop the sores: the making and evaluation of a successful social marketing campaign. <i>Health Promotion Practice</i> 2010;11(1):23-33.	Unclear whether event meets disaster definition.
Webster-Kerr et al. Success in controlling a major outbreak of malaria because of <i>Plasmodium falciparum</i> in Jamaica. <i>Tropical Medicine & International Health</i> 2011;16(3):298-306.	Insufficient information about the communication intervention to make an assessment.
Wilson et al. Communication and health protection issues arising from a flooding emergency. <i>Prehospital and Disaster Medicine</i> 2005;20(03):193-6.	Insufficient information about the communication intervention to make an assessment.