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Systematic Review

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Trust and Public Health Emergency Events: A Mixed-Methods Systematic Review

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Abstract

The systematic review examined the phenomenon of trust during public health emergency events. The literature reviewed was field studies done with people directly affected or likely to be affected by such events and included quantitative, qualitative, mixed-method, and case study primary studies in English ($N = 38$) as well as Arabic, Chinese, French, Russian, and Spanish (all non-English $N = 30$). Studies were mostly from high- and middle-income countries, and the event most covered was infectious disease. Findings from individual studies were first synthesized within methods and evaluated for certainty/confidence, and then synthesized across methods. The final set of 11 findings synthesized across methods identified a set of activities for enhancing trust and showed that it is a multi-faceted and dynamic concept.

The role of trust during the course of public health emergency events, such as emergent infectious disease pandemics, is complex and encompasses multiple stakeholders involved in managing the event. In particular, trust in authorities as well as in the information being conveyed is multi-faceted in the ways it can influence the behavior of the public. Additionally, trust operates in a variety of social-structural contexts when events escalate from local and regional levels to national and global problems. As such, a comprehensive examination of the phenomenon of trust during public health emergency events is needed. To this end, we conducted a systematic review of primary studies on the topic.

Although there were existing reviews related to the topic,[1–7] the present review took a systematic approach to examine the broader phenomenon of trust during public health emergency events. To achieve this, the review looked at studies conducted in the field (contrasted to the laboratory) that measured, observed, or described trust in all affected populations, including publics, communities, and organizations. Thus, the present review not only reviewed evidence from studies that had comparison groups, but also studies that examined factors that may have an association with the concepts/variables contained in the phenomenon of interest, seeing these factors to be potentially associated with trust to find out how trust functions and for whom and in what contexts.

The present review focused on data from multiple methods from field studies of populations that *directly* experienced a relevant public health emergency event. Also of interest were data from studies of populations who may be likely to be affected by particular public health emergency events, especially studies that examined individual preparedness for such events. Of interest also were data from studies that addressed how organizations, predominantly government organizations or individuals employed by governments, respond to or work to develop public communication messages. As such, the scope of the review was limited to (a) primary studies, (b) done in the field (as opposed to laboratories), (c) with people and organizations directly affected or likely to be affected by public health emergency events.

Methods

The process of evidence synthesis for the present mixed-methods systematic review is similar to and fully described for a related systematic review.[8] An overview of the steps and any modifications to the process are presented below.

Methodological Streams and Language

After an iterative process of close reading of the literature, 4 methodological streams were adopted for the review: Quantitative-Comparison Groups (QN-CG); Quantitative-Descriptive Survey (QN-DS); Qualitative (QL); and Mixed-Method and Case Study (MM, CS). These constituted the 4 methodological streams for the review.

Table 1. Search terms

Main search term	*Boolean 'And' term (used with any of the main search terms)*
Disaster*	Trust
Disaster plan*	Spokesperson
Communication	Public information officer
Risk communication	Credibilit*
Emergenc*	Confidence
Hazard*	Official
Risk*	Public Official
Threat*	Ambiguity
Emergency preparedness	Uncertaint*
Emergency management	Protection (health)
Crisis communication Cris!s (or other truncation for a specific database, eg ?, #)	Authorities (health)
Disaster preparedness	Safety
Hazard communication	Reliance/Reliabilit*
Emergency communication	Governmen*; Governance (health/risk)
Catastrophe communication	Public (communities/stakeholders)
Health communication	Public trust

The primary search was for literature in the English language. Additionally, we conducted searches for studies published in the other United Nations (UN) languages as well, which included Arabic, Chinese, French, Russian, and Spanish. Because we translated only portions of the studies in these languages into English, we treated findings from these studies as a separate "sub-stream" at the time of synthesis of findings within methodological streams.

Search Databases, Terms, and Criteria

In addition to a Google Scholar and a general Google search, we also conducted a search using the academic library Summon function, which searches all holdings in the library as well as several databases including: Academic Search Complete, Communication and Mass Media Complete (CMMC); ArticleFirst, JSTOR; PsychInfo, Science Direct, Scopus, SpringerLink, Taylor & Francis, and Wiley Online. We also searched in Cumulative Index of Nursing and Allied Health Literature (CINAHL); CINAHL Complete; Elsevier; PubMed/Medline-National Library of Medicine (NLM); Web of Science; and WHO databases. Native readers of Arabic, Chinese, French, Russian, and Spanish who were fluent in English conducted the search for non-English language primary studies in databases with holdings in these languages.

The search terms are shown in Table 1. Not all terms worked in all databases; therefore, thesauri were consulted for each database to find synonyms and related terms, if they existed, for each term, or any functionality that allowed the word to be "exploded" or "expanded." The following *inclusion* criteria were used:

- Research related to the practice of risk communication and the process of disaster management with no preference for any specific emergency or health hazards.
- Research within the viewpoint or scope set by the risk communication field related to: trust, uncertainty, communities, health, misinformation, health protection, media (including social media), messages, and stakeholders.

The following *exclusion* criteria were used to keep a focus on trust during public health emergency events:

- Research in organizational risk communication and disaster management, such as technology failures.
- Research outside of the specified scope of the study, such as laboratory studies and those related to chronic disease, lifestyle, or personal living/attributes (such as personal health, mental health, etc.).
- Studies published before 2003. This cutoff was used to focus on current research.

Study Selection and Quality Appraisal

Only data-based primary articles and reports from all methodologies were selected. The selection process broadly conformed to the Preferred Reporting Items for Systematic Reviews and Analyses (PRISMA) process.[9] Selected articles and reports were judged for different levels of relevancy to the review objective and phenomena of interest.[10,11] Studies were judged to have *direct relevance* (ie, directly mapped onto phenomenon of interest), *indirect relevance* (ie, corresponded with some aspects of the phenomenon of interest), *partial relevance* (ie, a part of the issue of interest or population was addressed but not all), or *unclear relevance* (ie, unclear whether underlying data were relevant) with the review topic. A study judged as directly, indirectly, partially, or unclearly relevant (as opposed to not relevant at all) was selected for extraction of its key findings. Only these relevant (direct, indirect, partial, unclear) primary study articles/reports were used to generate the systematic review for this report.

The individual data-based primary studies selected for the review were appraised for their quality using available method-specific tools. These tools ascertain quality through a series of questions that identify concerns about methodological limitations that can amplify threats to rigor (qualitative research) or risk of bias (quantitative research). The following tools were used: *Quantitative control/comparison* groups studies were appraised using the Effective Practice and Organization of Care (EPOC) 9-criteria risk of bias tool[12] (see section 12.2.2 of the Cochrane Handbook for definitions of levels of risk)[13]; *Quantitative descriptive survey* studies were appraised using an adapted version of survey quality appraisal criteria that note reporting or nonreporting of sampling, response rate, validity and reliability, sources of data, content and focus of study, and relevancy to the corresponding question information to determine categories of weak, moderate, and strong quality[14]; *Qualitative* studies were appraised using Critical Appraisal Skills Programme (CASP) checklist that assesses appropriateness of qualitative methodology, data collection, relationship between research and participants, ethics, rigor of data analysis, clarity of findings, and value of research using "yes." "no," and "can't tell" to determine 4 categories of very low, low, moderate, and high quality[15]; *Mixed method and case study* studies were appraised using Mixed Methods Appraisal Tool (MMAT) that assesses areas relevant to each type of methodology (eg, quantitative descriptive, qualitative) using "yes," "no," and "can't tell" to determine an overall 4 categories of very low, low, moderate, and high quality[16]; and *media reports* were appraised for their quality using the Authority, Accuracy, Coverage, Objectivity, Date, and Significance (AACODS) tool that assesses the 6 areas noted in the tool title using "yes." "no," and "can't tell" to determine 4 categories of very low, low, moderate, and high quality.[17]

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Data Extraction

Given the heterogeneity of methods, as recommended in section 11.7.2 of the Cochrane Handbook dealing with situations where quantitative meta-analyses are not possible to conduct,[13] we followed a narrative summary approach[13,18] to extract findings from studies in all 4 methodological streams. For qualitative studies the narrative summary approach was an initial step and the final step included reading the entire article to extract the data. Each finding along with supporting information was extracted in the form of short 3- to 5-sentence paragraphs. The findings focused on the phenomena of interest broadly and any outcomes/impacts noted specifically, and the support for each finding was in the form of quantitative and qualitative information. In addition, the following study characteristics were also extracted: method; country focus; disaster/emergency type; disaster/emergency phase; and at-risk/vulnerable population inclusion.

Synthesis of Findings

The synthesis of findings was done in 2 stages. In the first stage, findings from individual studies were synthesized within methodological streams and then these within-method synthesized findings were evaluated for certainty/confidence using appropriate tools. In the second stage, the within-method synthesized findings were synthesized across methodological streams, taking into account the certainty/confidence evaluations by making studies with higher evaluations more salient in the synthesis process. In both the within-method and across-method stages, the synthesis of findings included subgroup analyses. These included examination of type of emergency event, phase of emergency event, country of emergency event, and presence of vulnerable population. The last 2 subgroups allowed considerations of equity in the synthesized findings.

Synthesis of Findings Within Each Methodological Stream

For each methodological stream, the synthesized findings were created by building explanatory and higher level analytical statements supported by quantitative and qualitative evidence from individual studies. For the 2 *quantitative* methodological streams, we followed a narrative summary approach to synthesis of findings. For the *qualitative* methodological stream, we broadly followed the framework synthesis method,[19,20] which is a mix of deductive-inductive processes. For the *mixed-method and case study* methodological stream, the individual studies typically did not differentiate their overall findings based on type of methodology and so we looked at the findings holistically following a broadly narrative summary approach.

The assessment of certainty/confidence of synthesized findings was done separately for each methodological stream. *Quantitative-comparison* groups within-method synthesized findings were assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach.[13,21,22] *Quantitative-descriptive survey* within-method synthesized findings, which did not have comparison groups for outcomes of interest, were assessed using a tool developed for the present review that was based on the principles of GRADE as noted above. *Qualitative* within-method synthesized findings were assessed using GRADE-Confidence in the Evidence from Reviews of Qualitative research (GRADE-CERQual).[10] *Mixed method and case study* within-method synthesized findings were assessed using principles of GRADE and GRADE-CERQual approaches as appropriate. We want to note here that the adaptation of GRADE principles for application to descriptive quantitative studies and use of GRADE-CERQual principles for application to mixed-method studies has not been approved by the tool originators.

Synthesis of Findings Across Methodological Streams

We synthesized the findings across the 4 methodological streams to develop an overarching synthesis of findings. The synthesized findings within a methodological stream were compared and contrasted with findings from the other methodological streams. Whenever the findings supported and amplified each other, they were combined into higher order findings that represented synthesis across the method streams. The evaluation of certainty in the within-method synthesized findings was kept in mind during this process by making findings with higher evaluations more salient in the synthesis process.

All methodological streams did not yield the same kind or similar number of synthesized findings. We did not consider this a problematic issue as we were seeking to find the points of alignment of the findings across the method streams rather than simply merging them together, which would have given some methodological streams more importance than others. Within-method findings that did not contribute to an across-method higher order finding were analyzed thematically. These thematic analyses were used to uncover a nuance or modification to the across-method findings, which were then either used to create a new higher order across-method finding or incorporated into an existing across-method finding.

A few synthesized findings within a methodological stream provided evidence that countered the synthesized findings from other methodological streams. Whenever this happened, we strived to retain this finding as a separate finding in the final set of across-method findings or used it to modify an existing across-method finding.

Results

Study Selection

For literature in English language, approximately 4300 titles and abstracts were identified and scanned, of which almost 2900 full-texts were quickly read to identify meeting of eligibility criteria. After this, 74 full-texts were downloaded, of which 38 data-based primary field studies were selected for data extraction. These study selection process details and those for Arabic, Chinese, French, Russian, and Spanish languages are provided in Figure 1.

Study Characteristics

Of the 38 English language studies examined for the present review, 18 were directly relevant, 13 were indirectly relevant, 7 were partially relevant, and none were unclearly relevant. Two studies used quantitative-comparison groups method, 21 studies used quantitative descriptive survey methods, 8 studies used qualitative methods, and 7 used mixed methods/case study methods.

Of the 30 other UN languages (ie, not English) data-based primary studies, 3 were in Arabic, 7 in Chinese, 15 in French, 3 in Russian, and 2 in Spanish. A total of 19 studies were directly relevant and 11 were indirectly relevant; the relevancy was judged as only direct and indirect due to lack of sufficient clarity for the partial and unclear categories for the coders. Other study characteristics, including, country, types of disasters/emergencies,

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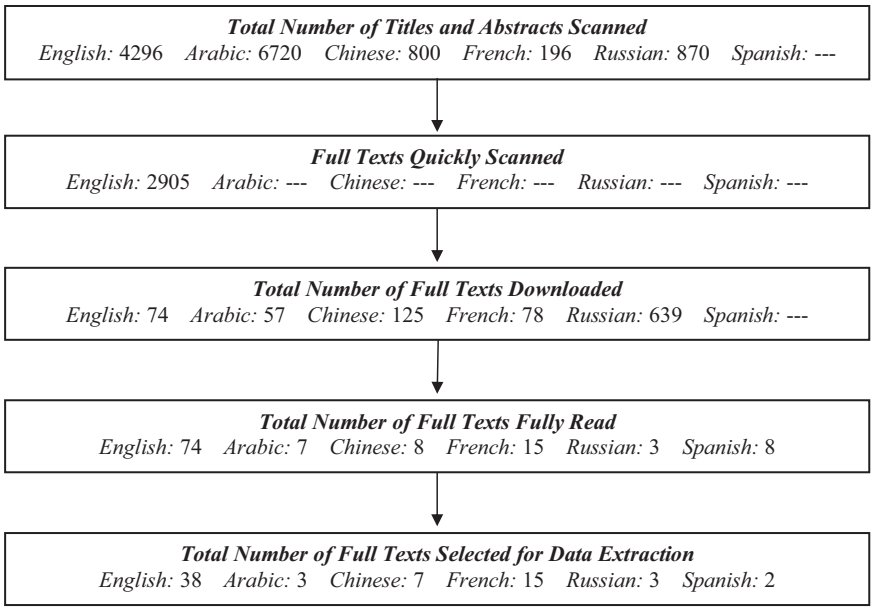


Figure 1. Study selection.

disaster/emergency event phase, and populations studied for both English and other UN languages are provided in Table 2.

Quality Appraisal of Individual Studies

Of the 38 English language studies used in the present review, 2 were placed in the quantitative-comparison group stream, 21 in the quantitative-descriptive survey stream, 8 in the qualitative stream, and 7 in the mixed methods/case studies stream. Within the quantitative-comparison groups stream, both studies were trials and were rated to be of moderate quality. In the quantitative-descriptive survey stream, 7 studies were rated to be strong quality, 10 were rated to be moderate quality, and 4 were rated to be of weak quality. In the qualitative methods stream, 2 studies were rated to be of high quality, 5 of moderate quality, and 1 of low quality. In the mixed methods/case studies methods stream, 2 studies were rated to be of high quality, 3 of moderate quality, and 2 of low quality. For the other UN languages individual studies, a quality appraisal could not be determined for all the studies.

Synthesis of Findings Within Methodological Stream

Findings from individual studies, both English and other UN languages, were put into 4 method streams, quantitative comparison group, quantitative descriptive survey, qualitative, and mixed method/case study. The findings within each method stream were synthesized using the procedures described above. An individual study could support more than 1 synthesized finding. Most synthesized findings were supported by multiple studies though a few were supported by only 1 study. There were total 41 synthesized findings within method streams. The findings are detailed in Table 3 along with the evaluations of certainty/confidence for each finding.

There were 2 synthesized findings in the quantitative comparison group stream. Each was supported by a single study. The countries covered included Japan and the United States. Infectious disease and radiological events were covered; the phases covered were onset, containment, and recovery. No vulnerable populations were studied. The evaluation of certainty in the findings ranged from low to moderate.

There were 20 synthesized findings in the quantitative descriptive survey stream. Four findings were supported by only a single study, whereas the rest were supported by multiple studies. The countries covered included Australia, Belgium, Canada, China, France, India, Japan, Netherlands, New Zealand, Norway, Oman, Saudi Arabia, Slovenia, Spain, Sweden, Switzerland, Thailand, the United Kingdom, several European Union countries, the United States, and Vietnam. Bioterrorism, climate change-related severe weather, cyclone, earthquake, flood, foodborne illness, infectious disease, general natural disaster, industrial accident, radiological, tsunami, volcanic, water contamination, and wildfire events were covered. All 4 phases of a disaster event were covered along with evaluation. Vulnerable populations were covered in 3 findings. The evaluation of certainty in the findings ranged from low to high, with the majority being moderate.

There were 10 synthesized findings in the qualitative stream. One finding was supported by only a single study whereas the rest were supported by multiple studies. The countries covered included Canada, China, France, Iran, Russia, the United Kingdom, and the United States. Bioterrorism, earthquake, floods, foodborne illnesses, infectious disease, and radiological events were covered. All 4 phases of an event were covered along with evaluation. Vulnerable populations were covered in 3 findings. The evaluation of confidence in the findings ranged from low to high, with the majority being moderate.

There were 9 synthesized findings in the mixed methods/case study stream. Three findings were supported by only a single study, whereas the rest were supported by multiple studies. The countries covered included Canada, the Caribbean nations, France, Germany, Indonesia, Japan, Philippines, Russia, Singapore, Spain, several European Union countries, and the United States. Bioterrorism, earthquake, floods, foodborne illnesses, infectious disease, and radiological events were covered. All 4 phases of an event were covered along with evaluation. Vulnerable populations were covered in 1 of the findings. The evaluation of certainty/confidence in the findings ranged from low to high, with the majority being moderate.

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Table 2. Characteristics of studies

Relevancy	*Method*	*Country focus*	*Disaster/emergency type*	*Emergency phase*	*At-risk groups*
		English language (38 studies)			
Direct: 18 Indirect: 13 Partial: 7 Unclear: 0	QN-CG: 2 QN-DS: 21 QL: 8 MM, CS: 7	Australia: 2 Belgium/ Netherlands: 2 Canada: 1 Caribbean: 1 China: 1 European Union: 1 France: 2 Germany: 1 India: 1 Indonesia: 2 Iran: 1 Japan: 3 New Zealand: 1 Norway: 1 Singapore: 1 Slovenia: 1 Spain: 1 Sweden: 1 Switzerland: 2 Thailand: 1 United Kingdom: 5 United States: 14	General: 2 Bioterrorism: 5 Cyclones: 1 Earthquake: 2 Flood: 2 Foodborne Illness: 4 Industrial: 1 Infectious Disease: 9 Natural Disasters General: 1 Public Health: 2 Radiological: 5 Tsunami: 1 Volcanic: 3 Water Contamination: 1 Wildfire: 1	All phases: 4 Preparation: 22 Onset: 11 Containment: 9 Onset & Containment: 1 Recovery: 5 Evaluation: 1 Unclear: 1	Yes: 5 (Low SES: 2 Minorities: 3 Mothers of young children: 1 Underserved: 1)
		Other UN languages (30 studies)			
Direct: 19 Indirect: 11	QN-CS: 0 QN-DS: 12 QL: 7 MM, CS: 11	General: 1 Austria: 1 Belgium: 1 Canada: 5 China: 7 France: 5 Japan: 1 Norway: 1 Oman: 1 Philippines: 1 Russia: 3 Saudi Arabia: 2 Spain: 2 Switzerland: 1 United Kingdom: 1 Vietnam: 1	General: 10 Cyclone: 1 Earthquake: 3 Flood: 5 Food Safety: 1 Infectious Diseases: 10 Petroleum Spill: 1	All Phases: 1 Preparation: 5 Onset: 2 Containment: 2 Recovery: 4 Evaluation: 3 Preparation, & Evaluation: 4 Preparation, & Onset: 2 Preparation, Onset, & Containment: 1 Preparation, Recovery, & Evaluation: 2 Onset, & Containment: 1 Onset, & Evaluation: 1 Onset, & Recovery: 1 Onset, Containment, & Evaluation: 1	Yes: 4 (Children: 2 Chronic Disease: 1 Low-SES: 3 Minorities: 1 Older People: 1 Pregnant Women: 1)

Notes. Some categories are not mutually exclusive and so the frequencies will not sum to the total of 38 (English language) and 30 (other UN languages). Method: Quantitative-Comparison Groups (QN-CG); Quantitative-Descriptive Survey (QN-DS); Qualitative (QL); Mixed-Method/Case Study (MM, CS).

Synthesis of Findings Across Methodological Streams

The 41 within method synthesized findings were further synthesized yielding a final set of 11 synthesized findings across the 4 method streams. Of these, 1 synthesized finding was based on all 4 method streams, 4 synthesized findings were based on 3 method streams, 4 synthesized findings were based on 2 method streams, and 2 synthesized findings were based on just 1 method stream. We wish to note here that the across-method synthesis sought to identify commonalities in themes across the method streams but at the same time it allowed for findings that were unique to not get subsumed under more general themes; this resulted in 2 synthesized findings that drew only from 1 method stream.

The quantitative comparison group within-method synthesized findings appeared in 2 across-method findings, quantitative descriptive survey within-method synthesized findings appeared in 9 across-method findings, qualitative within-method synthesized findings appeared in 10 across-method synthesized findings, and mixed method/case study within-method synthesized findings appeared in 5 across-method findings.

There was coverage of a large number of countries, but countries in Africa and South America were not represented at all. The coverage of different types of events was adequate and all 4 phases of an event (preparation, onset, containment, and recovery) along with evaluation were covered. Vulnerable populations appeared in all the findings.

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Table 3. Synthesis of findings within methodological stream and evaluation of certainty/confidence

Method	Synthesized finding within method	Citations supporting synthesized finding within method (first author only)	Evaluation of certainty/ confidence of synthesized finding within method	Explanation of evaluation
QN-CG	In the United States for an infectious disease event for onset and containment phases, trust in authorities may show a slight decrease as a result of openly acknowledging uncertainties in messages. However, this decrease is only for a small proportion of the total number of message recipients; for the vast majority of message recipients, there is no change in their level of trust.	Johnson (2015)	Low to moderate	Two studies reported in article, one not a randomized group comparison. Some evaluation categories not applicable or 'cannot tell'.
QN-CG	In Japan for a radiological event for recovery phase, crisis communication via Facebook (compared to Twitter and print newspaper) can result in a more positive perception of organizational reputation. Social media users mainly talk about news from traditional media because they interpret traditional media as more credible in general. Hence, organizations should not neglect traditional media and should aim for an integrated communication strategy.	Utz (2013)	Moderate	Some evaluation categories not applicable of 'cannot tell'.
QN-DS	In the United States, Switzerland, and the Netherlands, for bioterrorism and infectious disease events, for all 4 event phases, and for urban minority African American and Hispanic populations, trust is found to have several components/aspects. Thus, looking at general trust in government agencies will not be as helpful to improve communication as evaluations of specific components of trust.	Paek (2008); Siegrist (2005); Vaughan (2012); van der Weerd (2011)	Moderate	Overlapping findings by 4 studies, individually appraised as strong (2), moderate (1), and weak (1).
QN-DS	In India, Thailand, and France, for floods, cyclones, and industrial events, and for preparation, onset, and recovery phases, including evaluation, trust in authorities can be enhanced by communication of uncertainty. Credibility of warning messages can also be improved by communicating uncertainty. This is particularly important as the experience about the credibility of the message in a current hazard event can affect the response to the next future event.	Janmaimool (2014); Sharma (2012); Glatron (2009) FR	Moderate	Overlapping findings by 3 studies, individually appraised as moderate (2), and weak (1).
QN-DS	In the United States, Australia, New Zealand, Japan, and Vietnam, for infectious disease, wildfire, earthquake, and volcanic activity events, and for preparation, onset, and containment phases, trust as an outcome is predicted by several person-factors. Authorities should account for individual-difference factors when developing strategies for enhancing trust.	Freimuth (2014); Johnson (2016); Maeda (2003); Paton (2008); Figuié (2010) FR	Moderate	Overlapping findings by 5 studies, individually appraised as strong (1), and moderate (4).
QN-DS	In Japan, Oman, and France, for cyclone and flood events, and for preparation, onset, and recovery phases along with evaluation, trust as an outcome is predicted by characteristics of messages sent by organizations.	Maeda (2003); Al-Shaqsi (2013) AR; Glatron (2009) FR	Moderate	Overlapping findings by 3 studies, individually appraised as strong (1), and moderate (2).
QN-DS	In the United Kingdom and the Kingdom of Saudi Arabia, for water contamination and general natural disaster events, and for all 4 phases, trust as an outcome is predicted by characteristic of media relations of authorities.	Rundblad (2010); Al-Douwihi (2004) AR; Al-Khayli (2007) AR	Moderate	Overlapping findings by 3 studies, individually appraised as strong (2), and moderate (1).
QN-DS	In Canada, France, and in general globally, for food contamination, floods, and general natural disaster events, for preparation, onset, and containment phases, including evaluation, and for low-SES groups, trust as an outcome can be predicted by public engagement and participation.	Government of Canada (2002) FR; Ruin (2010) FR; UNFAO (2011) FR;	Moderate	Overlapping findings by 3 studies, individually appraised as strong (1), and moderate (2).

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Table 3. (*Continued*)

QN-DS	In the United States, several European countries, and the United Kingdom, for foodborne illness, infectious disease, cancer clusters, climate change related severe weather, and water contamination, and for all 4 phases, trust varies across different information sources. Local public health officials are usually near the top of the trust rankings whereas there is a low trust for local elected officials. Also trusted are personal health professionals, family, friends, and neighbors. Generally people do not trust media or government communication relative to communication from scientists.	Boon (2016); Freimuth (2014); Frewer (2003); Kjaernes (2006); Rundblad (2010); Trumbo (2003)	High	Consistent findings by 6 studies, individually appraised as strong (3), moderate (1), and weak (2).
QN-DS	In China, for infectious disease, earthquake, and general public health emergency events, and for containment and recovery phases, trust varies across media sources. Trust for information from traditional media is higher than information from the Internet. However, trust for information from Weibo/social media and the Internet can sometimes be higher than from television.	Liu (2014) CH; Su (2008) CH; Xie (2005) CH	Low	Not overlapping and inconsistent findings by 3 studies, all individually appraised as strong.
QN-DS	In the United Kingdom, the United States, Netherlands, and China, for infectious disease and foodborne illness, and for all 4 phases, trust varies across the course of an event. Usually trust is higher in the early phases of an event, after which it declines.	Freimuth (2014); Frewer (2003); van der Weerd (2011); Liu (2014) CH	High	Overlapping findings by 4 studies, individually appraised as strong (3), and moderate (1).
QN-DS	In the United States and the United Kingdom, for infectious disease and water contamination events, and for all 4 phases, trust varies across public demographics.	Freimuth (2014); Paek (2008); Rundblad (2010)	Moderate	Overlapping findings by 3 studies, individually appraised as strong (1), moderate (1), and weak (1)
QN-DS	In the United Kingdom, for foodborne illness event, and for preparation phase, trust varies across hazards even within hazard event type.	Frewer (2003)	Low	Finding based on one study, appraised as weak.
QN-DS	In Switzerland, the Netherlands, and the United States, for infectious disease event, and for onset, containment, and recovery phases, trust can lead to higher vaccination and health protection behaviors.	Freimuth (2014); Gilles (2011); van der Weerd (2011)	Moderate	Not overlapping findings by 3 studies, all individually appraised as strong.
QN-DS	In Australia, New Zealand, Norway, and China, for wildfire, earthquake, volcanic activity, floods, and tsunami events, and for preparation phase, trust can lead to higher preparation and evacuation behaviors.	Paton (2008); Rod (2012); Su (2015)	Moderate	Overlapping findings by 3 studies, individually appraised as strong (1), and moderate (2).
QN-DS	In the United States, Belgium, and Slovenia, for infectious disease and radiological events, and for preparation, onset, and containment phases, trust can lead to attention to news but may not be associated with message acceptance.	Johnson (2016); Perko (2012)	Low	Not overlapping findings by 2 studies, both individually appraised as moderate.
QN-DS	In Thailand and the United States, for bioterrorism and industrial accident events, for all 4 phases, and for urban minority African American and Hispanic populations, trust can be associated with negative affect. If individuals believe that officials will be honest and forthcoming with negative information, they will tend to feel less reassured/more fearful by the acknowledgment of risk uncertainties.	Janmaimool (2014); Vaughan (2012); Kutovaya (2014) RU	Moderate	Overlapping findings by 3 studies, individually appraised as strong (1), moderate (1), and weak (1)
QN-DS	In India, for cyclone event, and for preparation and onset phases, experience about the credibility of the message in a current hazard event can affect credibility of and the response to warning in the next future event. Greater the experience of false alarms, lesser is the tendency to respond to warnings in the future.	Sharma (2012)	Moderate	Finding based on one study, appraised as moderate.
QN-DS	In the United States, for general public health events, and for preparation phase, public health agencies frequently use public meetings for spreading risk communication information to the general public. Views about public meetings and willingness to attend public meetings are associated with credibility of local health department, citizen groups, and news media.	Besley (2012)	Moderate	Finding based on one study, appraised as moderate.

(*Continued*)

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Table 3. (*Continued*)

Method	Synthesized finding within method	Citations supporting synthesized finding within method (first author only)	Evaluation of certainty/ confidence of synthesized finding within method	Explanation of evaluation
QN-DS	In the United States, United Kingdom, France, Sweden, Spain, Switzerland, Australia, China, and Thailand, for general public health, general severe weather, radiological, flood, infectious disease, and industrial accident events, and for preparation, onset, and containment phases, generally there is a linear negative relationship between trust in authorities and perceived risk of a hazard (higher trust, lower perceived risk). The relationship between trust and risk perceptions may be more complex. Perceiving high credibility for industry and state health departments, and perceiving low credibility for citizen groups, may promote heuristic processing, which in turn may lead to perception of lower risk; in contrast, perceiving low credibility for industry and state health departments may promote greater systematic processing, which in turn may lead to perception of greater risk.	Boon (2016); Janmaimool (2014); Johnson (2016); Siegrist (2005); Su (2015); Trumbo (2003); Viklund (2003)	Moderate to high	Overlapping findings by 7 studies, individually appraised as strong (3), moderate (3), and weak (1)
QN-DS	In Thailand, the United Kingdom, France, Sweden, and Spain, for radiological and industrial accident events, and for preparation phase, trust can lead to risk perceptions but can explain only a small proportion of variation in it.	Janmaimool (2014); Viklund (2003)	Moderate	Overlapping findings by 2 studies, individually appraised as moderate (1), and weak (1)
QN-DS	In China, for flood events, and for preparation phase, trust can lead to both positive and negative attitudes towards disaster alleviation.	Su (2015)	Moderate	Finding based on one study, appraised as moderate.
QL	In Iran and the United States, for earthquake and bioterrorism events, for preparation and recovery phases, and for underserved urban and rural communities, past experience with authorities contributes to perceptions of trust for current events.	Alipour (2015); Wray (2006)	Moderate	Overlapping findings by 2 studies, individually appraised as high (1), and moderate (1).
QL	In the United States, China, France, Canada, and Russia, for foodborne illnesses, bioterrorism, earthquake, floods, and infectious disease events, for all 4 phases along with evaluation, and for at-risk/vulnerable populations (pregnant women, children, people with chronic disease, low-SES), there are several reasons for high and low trust of authorities that should be noted when developing trust enhancing strategies.	Anthony (2013); Quinn (2008); Sun (2009) CH; Zhong (2009) CH; Duchêne (2004) FR; Massé (2011) FR; Gryzunova (2012) RU	High	Overlapping findings by 7 studies, individually appraised as high (4), moderate (1), and low (2)
QL	In the United States, for foodborne illnesses and bioterrorism events, for preparation phase, and for low-SES rural residents and urban low SES minorities, people engage in a thoughtful process of considering the credibility of multiple sources offering information and recommendations. People avoid rushing to judgment and remain "in waiting" for what they consider the most accurate account of the crisis and of the best actions to take to protect themselves. In general, source credibility serves as a primary means of resolving among the multiple voices.	Anthony (2013); Meredith (2007)	Moderate	Overlapping findings by 2 studies, individually appraised as high (1), and moderate (1).
QL	In the United States, for foodborne illness and bioterrorism events, for preparation, onset, and containment phases as well as evaluation, and for urban minorities and underserved urban and rural communities, professionals and agencies in disagreement should join together to discuss in public the rationale and processes by which they come to their conclusions to build trust instead of just issuing conflicting statements.	Anthony (2013); Malet (2014); Meredith (2007); Quinn (2008); Wray (2006)	Low to moderate	Not overlapping findings by 5 studies, individually appraised as high (1), and moderate (4).
QL	In the United States and China, for bioterrorism, radiological, infectious disease, and floods events, for preparation phase, and for mothers of young children, urban low SES minorities, and underserved urban and rural communities, there are variations in trust across different sources. There is greater receptiveness to information delivered by local agencies. There can be deep distrust for government agencies, police, and local elected officials.	Bass (2015); Malet (2014); Meredith (2007); Petts (2004); Wray (2006); Zhong (2009) CH	Moderate	Overlapping findings by 6 studies, individually appraised as high (1), moderate (4), and low (1).

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Table 3. (*Continued*)

QL	In the United States and the United Kingdom, for bioterrorism and infectious disease events, for preparation phase, and for urban minorities and mothers of young children, trust in authorities has several components/aspects.	Meredith (2007); Petts (2004); Wray (2006)	Moderate	Overlapping findings by 3 studies, individually appraised as moderate (2), and low (1)
QL	In the United States, for bioterrorism event, for preparation phase, and for urban minorities, patterns of trust vary according to the event stage.	Meredith (2007)	Moderate	Finding based on one study, appraised as moderate.
QL	In the United States, for bioterrorism event, and for preparation phase, people can also have critical trust, which is that people can rely on a person or institution for knowledge and information but combine this with a healthy scepticism. Trust in this case is a combination of competence and care with a vested interest dimension.	Petts (2004)	Low	Finding based on one study, appraised as low.
QL	In the United States and China, for bioterrorism, radiological, and infectious disease events, for preparation and containment phases, and for urban low SES minorities and underserved urban and rural communities, lower trust in information or government is associated with concerns about preparedness and increased anxiety. On the other hand, higher trust in media coverage may be related to greater unwillingness to contact health authorities such as doctors to get information.	Bass (2015); Wray (2006); Xie (2010) CH; Xie (2013) CH	Low	Not overlapping findings by 4 studies, individually appraised as high (2), and moderate (2).
QL	In the United States, for bioterrorism event, and for preparation phase, even among members of the public with high levels of trust in government, a public communication announcing minor level of risk for an event may be rejected as insufficient by the public. This is because the public generally tends to perceive higher risk levels than is warranted by the scientific evidence. Thus, there will always be a gap between the public perception of risk and the scientific estimation of risk.	Malet (2014)	Moderate	Finding based on one study, appraised as moderate.
MM, CS	In the Caribbean, for a volcanic event, and for onset, containment, and recovery phases, trust has several components.	Haynes (2008)	High	Finding based on one study, appraised as high.
MM, CS	In Singapore, Canada, and several European countries, for infectious disease and petroleum spill events, and for all 4 phases as well as evaluation, when health professionals, experts, and politicians, have clear coordination among themselves and with the traditional and social/ digital media, and all relayed a uniform communication strategy, there is higher trust.	Karan (2007); Rousseau (2008); Fernandez Souto (2012) SP; Jakubowski (2004) FR	Moderate	Overlapping findings by 4 studies, individually appraised as high (2), and moderate (2).
MM, CS	In the Caribbean, Indonesia, Canada, and France, for volcanic, flood, and infectious disease events, and for all 4 phases, different information sources are trusted differently. In general, local health-care workers, personal doctors, friends and relatives, local self-help groups, and scientists are the more trusted sources. In general, local elected authorities and politicians, outside aid institutions, and world press are less trusted sources.	Haynes (2008); Rousseau (2008); van Voorst (2015)	Moderate	Overlapping findings by 3 studies, individually appraised as high (1), and moderate (2).
MM, CS	In the United States and Indonesia, for foodborne illness and volcanic events, for all 4 phases, when there is trust in governmental authorities, people alter their purchasing habits of food and successfully evacuate from volcano eruption zones,	Bitsch (2014); Mei (2013)	Low	Not overlapping findings by 2 studies, individually appraised as moderate (1), and low (1)

(*Continued*)

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Table 3. (*Continued*)

Method	Synthesized finding within method	Citations supporting synthesized finding within method (first author only)	Evaluation of certainty/ confidence of synthesized finding within method	Explanation of evaluation
MM, CS	In Canada and several European countries, for infectious disease and flooding, and for preparation, onset, and containment phases along with evaluation, trust in governmental authorities can be increased by: quickly educating the public and rapidly intervening; developing new information systems to respond quickly and efficiently; create scientific communication (eg, flood plain maps) in an easy to understand manner; seek input from the public and encourage a dialog; ensure coordination between different health authorities and the media along with a uniform message; avoid rapid changes in information and prevent conflicting information; disseminate information through multiple platforms; and provide information about uncertainties and dangers.	Rousseau (2008); Deshaies (2004) FR; Hechmati (2004) FR; Heitz (2013) FR; Jakubowski (2004) FR; Lord (2009) FR	High	Overlapping findings by 6 studies, individually appraised as high (2), moderate (3), and low (1)
MM, CS	In the Caribbean, Japan, Canada, France, Spain, Russia, for volcano eruption, petroleum spill, radiological, and infectious disease events, and for all 4 phases, trust fluctuates during the course of an event. The fluctuation is influenced by: history of interactions with authorities; political factors; inefficient response especially for recovery; poor communication; and changing nature of the event.	Haynes (2008); Maeno (2014); Rousseau (2008); Fernandez Souto (2012) SP; Kutovaya (2015) RU	Moderate	Overlapping findings by 5 studies, individually appraised as high (2), moderate (2), and low (1)
MM, CS	In Singapore, Japan, the United States, Germany, Canada, France, and Spain, for infectious disease, radiological, foodborne illness, and petroleum spill events, and for all 4 phases, the traditional media continue to play a very important and credible role in health communication; despite the use of new media (Internet, social/digital media) and mobile telephones, traditional media such as newspapers, news on television, and radio continue to be the channels that people depend on heavily.	Bitsch (2014); Karan (2007); Maeno (2014); Rousseau (2008); Fernandez Souto (2012) SP; Francescutti (2007) SP	Moderate	Overlapping findings by 6 studies, individually appraised as high (1), moderate (2), and low (3)
MM, CS	In Canada, France, and Indonesia, for infectious disease and flood events, and for preparation, onset, and containment phases, mistrust in authorities is shaped by negative experiences during past events.	Rousseau (2008); van Voorst (2015)	Moderate	Overlapping findings by 2 studies, both individually appraised as moderate,
MM, CS	In Indonesia, Philippines, Japan, and France, for floods and earthquake events, and for preparation and recovery phases along with evaluation, and for low-SES populations, there is a need to take into account the whole living environment which is uncertain due to economic poverty; a particular risk may be just one among many other risks. In such living circumstances, it would be unrealistic to interpret a behaviour just as a direct response to a single, acute hazard. Similarly, the life circumstances include people's local knowledge and cultural traditions (eg, respect for volcanos). The government should take all these into account when creating plans to inspire trust.	van Voorst (2015); D'Ercole (2002) FR; Gaillard (2008) FR; Affletranger (2003) FR	Moderate	Overlapping findings by 4 studies, all individually appraised as moderate.

Notes. Quantitative-Comparison Groups (QN-CG); Quantitative-Descriptive Survey (QN-DS); Qualitative (QL); Mixed-Method/Case Study (MM, CS). Citations: English has no suffix; Arabic (AR); Chinese (CH); French (FR); Russian (RU); Spanish (SP). Certainty/confidence evaluation categories are high, moderate, low, and very low.

Core Aspects of Across-Method Synthesized Findings

The review examined the phenomenon of trust in the context of public health emergency events. The final 11 across-method synthesized findings covered various features of the phenomenon, with a focus on trust in authorities, and are discussed in full in Table 4. The core aspects of each finding are presented next.

1. Trust in authorities is a multi-component construct and not a singular concept. It is important to distinguish among and account for these components, and not treat trust as a unidimensional concept, to fully explicate the processes through which trust may be enhanced. Some examples of components are: reliability, competence, openness, and integrity; fiduciary responsibility, honesty, competency, consistency, and faith; and confidence in government preparedness; allocation of resources; expectations of government; honesty; disclosure; dedication/commitment; and caring/empathy.[23–30] Trust can also be conceptualized as critical trust, which is that people can trust a person or institution for information and action but combine this with a healthy skepticism.[26]
2. High trust in authorities can lead to both positive and negative psychological and behavioral outcomes. The positive outcomes of high trust include higher: investment in event warning and control; health protection behaviors; vaccination behaviors; preparation, but only if benefits are clear; evacuation; attention to news; message acceptance; and willingness to attend public meetings.[29,31–39] The negative outcomes of high trust may include higher: fearfulness; uncertainty; and discounting of probability estimates of event occurrence, if event control mechanisms are effective.[28,40,41] Along the same lines, low trust can also lead to negative outcomes, such as anxiety and lack of preparation.[30,42–44]
3. Trust in authorities is a strong predictor of risk perceptions. Generally, there is a linear negative relationship between trust in authorities and perceived risk of a hazard (higher trust, lower perceived risk), although the strength of the relationship may change based on the component of trust, type of organization, event type, demographics, and personal or global risk. The trust-risk perception relationship can be a positive one (higher trust, higher perceived risk) for citizen groups and climate change induced severe weather. However, the relationship between trust and risk perceptions may be more complex. For example, perceiving high credibility for industry and state health departments, and perceiving low credibility for citizen groups, may promote heuristic processing, which in turn may lead to perception of lower risk; in contrast, perceiving low credibility for industry and state health departments may promote greater systematic processing, which in turn may lead to perception of greater risk.[27,30,39,40,42–48] It is also important to note that, although trust in authorities can be a significant source of variation in perceived risk, the amount of variation in perceived risk explained by trust is small and most of the variation remains unexplained or can be explained by other factors.[40,48]
4. Trust varies greatly across different message sources, with people usually assessing differently the credibility of 3 information sources: industry, citizen groups, and health-related departments. In general, local health-care workers and agencies, personal health professionals, friends, neighbors, and relatives, local self-help and community groups, and scientists are the more trusted sources; also in general, local elected authorities and politicians, government officials, industry, and media are relatively less trusted sources.[24,26,30,33,42,45,47,49–53] It is important to note that there may be different levels of trust in different agencies of the government, with higher trust in those arms of the government that are perceived as nonbiased.[30,50] Within different media sources, trust varies between traditional and digital/social media sources, with trust in traditional media (eg, television news) relatively higher than social media (eg, Twitter).[32,54–61] For social media, Facebook (compared with Twitter and print newspaper) can result in a more positive perception of organizational reputation.[62]
5. Trust in authorities varies across the course of an emergency event, type of hazard, and demographics. Trust in different information sources may be dependent upon the phase of an event. Generally, trust is usually high at the start of an event but can get eroded as the event progresses.[24,29,33,49,57] Trust in different information sources may also be dependent upon the nature of a specific hazard itself and the extent to which the particular hazard is perceived to be threatening at different points in time during a crisis. The fluctuation is influenced by several factors, such as history with authorities' response to events and associated politics, inefficient response especially for recovery, poor communication, and changing nature of the event.[23,54,58,59,63] Trust in the government and individual spokespersons also varies considerably across demographic groups. For example, generally a highly trusted source is one's own physician, but at-risk/vulnerable groups such as low socioeconomic status (SES) racial and ethnic minorities may trust their own physicians less than majority groups. Similarly, trust in the early stages of an infectious disease event predicts vaccine acceptance later in the event, but only for White, non-Hispanic individuals.[25,33,52]
6. People use credibility of information sources as a primary means of resolving the conflict among multiple voices typical in a public health emergency situation. People engage in a thoughtful process of considering the credibility of multiple sources offering information and recommendations in an emergency event, at least in the preparation phase. People may avoid rushing to judgment when considering the multiple arguments surrounding crises; people remain in a "wait and watch" mode for what they consider the most accurate account of the crisis and of the best actions to take to protect themselves.[24,64]
7. Trust in authorities occurs in a life context and should not be seen in isolation for just a specific hazard. For example, people generally tend to perceive higher risk levels than is warranted by the scientific evidence; thus, for all hazards, there will always be a gap between the public perception of risk and the scientific estimation of risk, even when the trust in government is high.[51] Similarly, the whole living environment may be risky and uncertain due to economic poverty; thus, a particular risk may be just one among many other risks. In such living circumstances, it is unrealistic to interpret a behavior just as a direct response to a single, acute hazard. Along the same lines, life circumstances include people's local knowledge and cultural traditions.[65–68]
8. Trust in authorities can depend on the extent of coordination among different agencies, institutions, and the media. Integration of local and national agencies in emergency response preparedness and communication, with an emphasis on full disclosure, action steps, and leadership, enhances trust. When health professionals, experts, and politicians have clear

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Table 4. Synthesis of findings across methodological streams

Synthesized finding across method	Citations supporting synthesized finding across method (first author only)	Evaluation of certainty/confidence
1. Trust in authorities is a multi-component construct. It is important to distinguish among and account for these components, and not treat trust as a singular concept, to fully explicate the processes through which trust may be enhanced. Some examples of components are: reliability, competence, openness, and integrity; fiduciary responsibility, honesty, competency, consistency, and faith; and confidence in government preparedness; allocation of resources; expectations of government; honesty; disclosure; dedication/commitment; and caring/empathy. Trust can also be conceptualized as critical trust, which is that people can trust a person or institution for information and action but combine this with a healthy scepticism. Countries covered include the Caribbean, the Netherlands, Switzerland, the United Kingdom, and the United States. Events include bioterrorism, infectious disease, and volcano eruption. All 4 event phases are included with emphasis on preparation. Vulnerable populations include low SES urban African American and Hispanic minorities and mothers of young children.	Haynes (2008); Meredith (2007); Paek (2008);Petts (2004); Siegrist (2005); Vaughan (2012); van der Weerd (2011); Wray (2006)	QN-CG (GRADE): — QN-DS (GRADE Adapted): Moderate to High QL (CERQual): Low to Moderate MM, CS: Moderate to High
2. High trust in authorities can lead to both positive and negative psychological and behavioral outcomes. The positive outcomes of high trust include higher: investment in event warning and control; health protection behaviors; vaccination behaviors; preparation, but only if benefits clear; evacuation; attention to news; message acceptance; and willingness to attend public meetings. The negative outcomes of high trust include higher: fearfulness; uncertainty; and discounting of probability estimates of event occurrence, if event control mechanisms are effective. On the other hand, low trust can lead to negative outcomes such as anxiety and lack of preparation. Countries covered include Australia, Belgium, China, Indonesia, the Netherlands, New Zealand, Norway, Slovenia, Switzerland, Thailand, and the United States. Events include earthquake, floods, foodborne illness, industrial accident, infectious disease, radiological, tsunami, volcanic activity, and wildfire. All 4 phases of an event are covered with an emphasis on preparation and containment. Vulnerable populations include urban low SES minority African American and Hispanic populations and underserved urban and rural communities.	Bass (2015); Besley (2012); Bitsch (2014); Freimuth (2014); Gilles (2011); Janmaimool (2014); Johnson (2016); Mei (2013); Paton (2008); Perko (2012); Rod (2012); Su (2015); Vaughan (2012); van der Weerd (2011); Wray (2006); Kutovaya (2014) RU; Xie (2010) CH; Xie (2013) CH	QN-CG (GRADE): — QN-DS (GRADE Adapted): Low to High QL (CERQual): Low to Moderate MM, CS: Low to Moderate
3. Trust in authorities is a strong predictor of risk perceptions. Generally there is a linear negative relationship between trust in authorities and perceived risk of a hazard/event (higher trust, lower perceived risk) although the strength of the relationship may change based on component of trust (eg, trust, confidence), type of organization (eg, CDC, industry, state health departments, scientists), event type (food contamination, industrial accidents), demographics (in the United States African Americans, Hispanics), and type of risk (eg, personal, global). The trust-risk perception relationship can be a positive one (higher trust, higher perceived risk) for citizen groups and climate change induced severe weather. However, the relationship between trust and risk perceptions may be more complex. For example, perceiving high credibility for industry and state health departments, and perceiving low credibility for citizen groups, may promote heuristic processing, which in turn may lead to perception of lower risk; in contrast, perceiving low credibility for industry and state health departments may promote greater systematic processing, which in turn may lead to perception of greater risk. It is also important to note that although trust in authorities can be a significant source of variation in perceived risk, the amount of variation in perceived risk explained by trust is small and most of the variation remains unexplained or can be explained by other factors. Countries covered include Australia, China, France, Spain, Sweden, Switzerland, Thailand, the United Kingdom, and the United States. Events include flood, industrial accidents, infectious disease, general public health, radiological, and general severe weather. The event emphasized is preparation with some little coverage of onset and containment. Vulnerable populations include urban low SES minority African American and Hispanic populations and underserved urban and rural communities.	Bass (2015); Boon (2016); Janmaimool (2014); Johnson (2016); Siegrist (2005); Su (2015); Trumbo (2003); Viklund (2003); Wray (2006); Xie (2010) CH; Xie (2013) CH	QN-CG (GRADE): — QN-DS (GRADE Adapted): Low to High QL (CERQual): Low to Moderate MM, CS: —

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Table 4. (*Continued*)

4. Trust varies greatly across different message sources, which should be kept in mind when developing trust enhancing strategies. People usually assess the credibility of three information sources, industry, citizen groups, and health-related departments, and find them different. In general, local health-care workers and agencies; personal health professional (doctors, nurses); friends, neighbors, and relatives; local self-help and community groups; and scientists are the more trusted sources. In general, local elected authorities and politicians; government officials; industry; religious leaders; and media are relatively less trusted sources. It is important to note that there may be different levels of trust in different modes and agencies of the government, with higher trust in those arms of the government that are perceived as non-biased and not related to enforcement, such as the CDC in the United States. Within different media sources, trust varies between traditional and digital/social media sources, with trust in traditional media (eg, television news), especially in local television news and newspapers, relatively higher than social media (eg, Twitter). For social media, Facebook (compared to Twitter and print newspaper) can result in a more positive perception of organizational reputation. Countries covered include Canada, Caribbean, China, France, Germany, Indonesia, Japan, Singapore, Spain, the United Kingdom, and the United States. Events include bioterrorism, climate change related severe weather, earthquake, flood, foodborne illness, infectious disease, petroleum spill, general public health, radiological, volcanic, and water contamination. All 4 event phases are covered with emphasis on preparation. Vulnerable populations include mothers of young children, urban low SES minorities, and underserved urban and rural communities.	Bass (2015); Bitsch (2014); Boon (2016); Freimuth (2014); Frewer (2003); Karan (2007); Kjaernes (2006); Maeno (2014); Malet (2014); Meredith (2007); Petts (2004); Rousseau (2008); Rundblad (2010); Trumbo (2003); Utz (2013); Wray (2006); Fernandez Souto (2012) SP; Francescutti (2007) SP; Liu (2014) CH; Su (2008) CH; Xie (2005) CH; Zhong (2009) CH	QN-CG (GRADE): Moderate QN-DS (GRADE Adapted): Low to High QL (CERQual): Low to Moderate MM, CS: Low to High
5. Trust in authorities varies across the course of an emergency event, demographics, and type of hazard. Trust in different information sources may be dependent upon time/phase of an event. Generally, trust is usually high at the start of an event but can get eroded as the event progresses. The fluctuation is influenced by several factors such as history of authorities' responses to events and related politics; inefficient response especially for recovery; poor communication; and changing nature of the event. Trust in the government and individual spokespersons also varies considerably across demographic groups. For example, generally a highly trusted source is one's own physician but minorities may trust their own physicians less than majority groups. Similarly, trust in the early stages of an infectious disease event predicts vaccine acceptance later in the event, but only for White, non-Hispanic individuals. Trust in different information sources may also be dependent upon the nature of a specific hazard itself and the extent to which the particular hazard is perceived to be threatening at different points in time during a crisis. Countries covered include Canada, Caribbean, China, France, Japan, Netherlands, Russia, Spain, the United Kingdom, various other European Union countries, and the United States. Events include bioterrorism, foodborne illness, infectious disease, petroleum spill, radiological, volcano eruption, and water contamination. All 4 phases of an event are covered with emphasis on preparation and onset. Vulnerable populations include urban minorities.	Freimuth (2014); Frewer (2003); Haynes (2008); Maeno (2014); Meredith (2007); Paek (2008); Rousseau (2008); Rundblad (2010); van der Weerd (2011); Fernandez Souto (2012) SP; Kutovaya (2015) RU; Liu (2014) CH	QN-CG (GRADE): — QN-DS (GRADE Adapted): Low to High QL (CERQual): Moderate to High MM, CS: —
6. People use credibility of information source as a primary means of resolving the conflict among multiple voices typical in crisis communication. People may engage in a thoughtful process of considering the credibility of multiple sources offering information and recommendations in an emergency event. People may avoid rushing to judgment when considering the multiple arguments surrounding crises; people remain in a "wait and watch" mode for what they consider the most accurate account of the crisis and of the best actions to take to protect themselves. Countries covered include the United States. Events include bioterrorism and foodborne illness, and event phase includes preparation only. Vulnerable populations include urban low SES minorities.	Anthony (2013); Meredith (2007)	QN-CG (GRADE): — QN-DS (GRADE Adapted): — QL (CERQual): Low to High MM, CS: —

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Table 4. (*Continued*)

Synthesized finding across method	Citations supporting synthesized finding across method (first author only)	Evaluation of certainty/confidence
7. Trust in authorities occurs in a life context and should not be seen in isolation for just a specific hazard. For example, people generally tend to perceive higher risk levels than is warranted by the scientific evidence; thus, for all hazards there will always be a gap between the public perception of risk and the scientific estimation of risk, even when the trust in government is high. Similarly, the whole living environment may be risky and uncertain due to economic poverty; thus, a particular risk may be just one among many other risks. In such living circumstances, it is unrealistic to interpret a behaviour just as a direct response to a single, acute hazard. Along the same lines, life circumstances include people's local knowledge and cultural traditions (eg, respect for volcanos, traditional coping styles). Government and health authorities should take these life contexts into account when developing plans to inspire trust. Countries covered include France, Indonesia, Japan, Philippines, the United States, and Vietnam. Events include bioterrorism, earthquake, floods, and infectious disease. The emphasis is on the preparation phase with some coverage of recovery; evaluation is also considered. Rural low-SES vulnerable population included.	Malet (2014); van Voorst (2015); D'Ercole (2002) FR; Gaillard (2008) FR; Affletranger (2003) FR	QN-CG (GRADE): — QN-DS (GRADE Adapted): Low to Moderate QL (CERQual): Moderate MM, CS: —
8. Trust in authorities can depend on the extent of coordination among different agencies, institutions, and the media. Integration of local and national agencies in emergency response preparedness and communication, with an emphasis on full disclosure, action steps, and leadership, enhances trust. When health professionals, experts, and politicians have clear coordination among themselves and with the traditional and social/digital media, and all relay a uniform communication strategy, there can be higher trust in authorities. When there is a gap between information conveyed by health authorities and the media, this can lead to reduced trust. Collaboration with mass and digital media is important while dealing with crisis because media can take on the spokesperson role and put attention on political responsibilities and shortcomings rather than talking about the event itself. In times of great uncertainty and with highly diverse audiences, having multiple voices is useful; however, professionals or agencies in disagreement should jointly discuss in public the rationale and processes by which they come to their conclusions to build trust. If a coordinated effort is not undertaken, media can take the spokesperson role of presenting the doubts and disagreements about definitive recommendations expressed by various organizations and public health experts, which can lead to distrust. Countries covered include Canada, France, Germany, Japan, Singapore, Spain, various other European Union countries, and the United States. Events include bioterrorism, foodborne illness, infectious disease, petroleum spill, and radiological. All 4 event phases are covered with an emphasis on onset; evaluation was also covered. Vulnerable populations include urban minorities and underserved urban and rural communities.	Anthony (2013); Bitsch (2014); Karan (2007); Maeno (2014); Malet (2014); Meredith (2007); Quinn (2008); Rousseau (2008); Wray (2006); Fernandez Souto (2012) SP; Francescutti (2007) SP; Jakubowski (2004) FR; Wilkinson (2016)	QN-CG (GRADE): — QN-DS (GRADE Adapted): — QL (CERQual): Low to High MM, CS: Low to High
9. Past experience with authorities contributes to perceptions of trust. Distrust of the government and non-government aid groups is related to problems (eg, mismanagement, inefficiency, incompetence) with recovery efforts in previous events. Distrust can also stem from questioning the intentions of authorities based on past experiences. Distrust in authorities is also shaped by past, disappointing experiences regarding minimization of health hazards, that turned out to be incorrect, in official communications during the early phases of previous events. Along the same lines, credibility of messages in a current hazard event can affect credibility of and the response to warnings in the next future event if sufficient uncertainty about the predictions is not included in the messages. Countries covered include Canada, France, Iran, India, Indonesia, and the United States. Events include bioterrorism, cyclone, earthquake, floods, and infectious disease. All 4 phases of an event are covered with an emphasis on preparation and recovery. Vulnerable populations include underserved urban and rural communities.	Alipour (2015); Rousseau (2008); Sharma (2012); van Voorst (2015); Wray (2006)	QN-CG (GRADE): — QN-DS (GRADE Adapted): Moderate QL (CERQual): Moderate MM, CS: Moderate to High

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Table 4. (*Continued*)

10. Trust in authorities as an outcome is predicted by several person-level factors that should be taken into account when developing communication strategies. Some important factors are: exposure and attention to news about the event; self-reported knowledge of event; self-reporting of local impacts of event; previous experience of discrimination; ability to articulate problems and empowerment to achieve goals; involvement, engagement, and participation with issue; low political conservatism and being a Democrat (relative to other, non-Republican partisans); communitarianism (low individualism); concern with risk of hazard; and perception of consensual values with and sympathy for organization. Countries covered include Australia, Canada, France, general global, Japan, New Zealand, and the United States. Events include earthquake, floods, food contamination, infectious disease, general natural disaster, volcanic activity, and wildfire. The preparation, onset, and containment phases were covered, with emphasis on preparation; evaluation was also covered. Low-SES vulnerable population was covered.	Freimuth (2014); Johnson (2016); Maeda (2003); Paton (2008); Figuié (2010) FR; Government of Canada (2002) FR; Ruin (2010) FR; UNFAO (2011) FR	QN-CG (GRADE): — QN-DS (GRADE Adapted): Low to High QL (CERQual): — MM, CS: —
11. Trust in authorities as an outcome is predicted by several organizational message and action factors that should be taken into account when developing communication strategies. Health and related authorities can explicitly acknowledge uncertainty in their messages, including forecasts and warnings, as this will enhance trust during the event as well as for future events. Sometimes trust in authorities may show a slight decrease as a result of openly acknowledging uncertainties; however, this decrease is only for a small proportion of the total number of message recipients and for the vast majority there is no change in their level of trust. Along the same lines, with the proliferation of alternative information sources (eg, social media), concealing information, such as reporting lower rates of casualties, backfires on efforts to manage events and leads to decrease in trust of authorities. Trust in authorities can be enhanced by the following actions: Create specialized groups; quickly inform the public and rapidly intervene; develop new information systems to respond quickly and efficiently; create scientific communication (eg, area risk maps) in an easy to understand manner; seek input from the public and encourage a dialog; ensure coordination between different health authorities and the media along with a uniform message; avoid rapid changes in information and prevent conflicting information; disseminate information through multiple platforms; provide specific and clear information; provide information in a transparent manner about uncertainties and dangers; communicate competence, openness and honesty, concern and care (for both physical and psychological well-being), and commitment; and be impartial and rely on methodologies (such as scientific) that minimize bias. Regarding the last item, authorities may want to keep in mind that sometimes low trust may result from use of a consent form (required for investigational protocols) which provides information about risks. In their interactions with the media, authorities can take the following steps to maintain trust: Choose local and national media outlets (especially visual); proactively cooperate and follow up with media outlets to disseminate information; respond to rival media outlets; prevent an information gap from occurring where the media have to rely on other sources for full information on all aspects of an event; assign official spokespersons who can provide information to news outlets efficiently and timely, and can dispel rumours and respond to criticism professionally; and prevent or efficiently manage conflicting official statements	Anthony (2013); Janmaimool (2014); Johnson (2015); Maeda (2003); Quinn (2008); Rousseau (2008); Rundblad (2010); Sharma (2012); Al-Douwihi (2004) AR; Al-Khayli (2007) AR; Al-Shaqsi (2013) AR; Deshaies (2004) FR; Duchêne (2004) FR; Glatron (2009) FR; Gryzunova (2012) RU; Hechmati (2004) FR; Heitz (2013) FR; Jakubowski (2004) FR; Lord (2009) FR Massé (2011) FR; Sun (2009) CH; Zhong (2009) CH;	QN-CG (GRADE): Low to Moderate QN-DS (GRADE Adapted): Moderate to High QL (CERQual): Low to High MM, CS: —

(*Continued*)

Table 4. (*Continued*)

Synthesized finding across method	Citations supporting synthesized finding across method (first author only)	Evaluation of certainty/confidence
by multiple organizations. Countries covered include Canada, China, France, India, Japan, the Kingdom of Saudi Arabia, Oman, Russia, Thailand, the United Kingdom, various other European Union countries, and the United States. Events include bioterrorism, cyclone, earthquake, floods, foodborne illnesses, industrial events, infectious disease, general natural disasters, and water contamination. All 4 event phases were covered, with an emphasis on preparation; evaluation was also covered in a substantive manner. Vulnerable populations (children, pregnant women, people with chronic disease, low-SES) covered.		

Notes. Citations-language: English has no suffix; Arabic (AR); Chinese (CH); French (FR); Russian (RU); Spanish (SP). Certainty/confidence evaluation categories are high, moderate, low, and very low. Only English language studies considered for certainty/confidence evaluation.

coordination among themselves and with the traditional and social/digital media, and all relay a uniform communication strategy, there can be higher trust in authorities. When there is a gap between information conveyed by health authorities and the media, this can lead to reduced trust.[54,56,59,69] Collaboration with mass and digital media is important while dealing with crisis because media can take on the spokesperson role and put attention on political responsibilities and shortcomings rather than talking about the event itself. In times of great uncertainty and with highly diverse audiences, having multiple voices is useful; however, professionals or agencies in disagreement should jointly discuss in public the rationale and processes by which they come to their conclusions to build trust. If a coordinated effort is not undertaken, media can take the spokesperson role of presenting the doubts and disagreements about definitive recommendations expressed by various organizations and public health experts, which can lead to distrust.[24,30,32,51,54–56,58,59,64,70,71]

9. Past experience with authorities contributes to perceptions of trust. Distrust of the government and nongovernment aid groups is related to problems (eg, mismanagement, inefficiency, incompetence) with recovery efforts in previous events. Distrust can also stem from questioning the intentions of authorities based on past experiences. Distrust in authorities is also shaped by past, disappointing experiences regarding minimization of health hazards, that turned out to be incorrect, in official communications during the early phases of previous events. Along the same lines, credibility of messages in a current hazard event can affect credibility of and the response to warnings in the next future event if sufficient uncertainty about the predictions is not included in the messages.[30,59,68,72,73]
10. Trust in authorities as an outcome is predicted by several person-level factors. Some important factors are: exposure and attention to news about the event; self-reported knowledge of event; self-reporting of local impacts of event; previous experience of discrimination; ability to articulate problems and empowerment to achieve goals; involvement, engagement, and participation with issue; political ideology; concern with risk of hazard; and perception of consensual values with and sympathy for organization.[33,36,46,74–78]
11. Trust in authorities as an outcome is predicted by several organizational message and action factors. Health and related authorities can explicitly acknowledge uncertainty in their messages, including forecasts and warnings, as this will enhance trust during the event as well as for future events.[40,73,79] Sometimes trust in authorities may show a slight decrease as a result of openly acknowledging uncertainties; however, this decrease is only for a small proportion of the total number of message recipients, and for the vast majority, there is no change in their level of trust.[80] Trust in authorities can be enhanced by several actions by organizations, some of which are: quickly informing the public and rapidly intervening; developing new information systems to respond quickly and efficiently; creating scientific communication in an easy to understand manner; seeking input from the public and encouraging a dialog; ensuring coordination between different health authorities and the media along with a uniform message; avoiding rapid changes in information and preventing conflicting information; disseminating information through multiple platforms; providing specific and clear information; communicating competence, openness, honesty, concern,

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care, and commitment; being impartial and relying on methodologies that minimize bias; and proactively cooperating with media outlets to disseminate information and efficiently managing conflicting official statements to the media by multiple organizations.[52,53,59,64,69,70,76,79,81–91]

Media Reports

One English-language data-based media report examined a multi-platform health campaign in Sierra Leone during the Ebola virus outbreak.[71] Lack of trust in governmental and health systems was the largest barrier to stopping the spread of the disease. Radio services, especially local radio stations, were a highly trusted communication channel. Specific radio programs that had a large following and were trusted were useful in conveying behavior change information. The editorial independence of the radio services also helped build the public's trust by questioning elements of the response when necessary. The main lesson learnt was that local media have a strong role in building community trust. The media report findings contributed to the across-method synthesized finding that trust in authorities can depend on the extent of coordination among different agencies, institutions, and the media.

Discussion

Overall Summary

The synthesis of evidence on the phenomenon of trust during public health emergency events was based on findings from 68 studies (38 English language, 30 other UN languages). The findings were limited to (a) primary studies, (b) done in the field (as opposed to laboratories), and (c) with people and organizations directly affected or likely to be affected by public health emergency events. The final set of 11 across-method synthesized findings provide an understanding of trust in health and related authorities during public health emergency events and the message and activities that can be undertaken to maintain and enhance the trust in this situation. Overall, the synthesized findings illuminate multiple aspects of the phenomenon of trust in health-related authorities during public health emergency events. The findings in various ways cover the following: structure/components of trust (in the context of emergency health events); the life circumstances in which trust as a phenomenon is experienced; the role of trust in the common situation of multiple information sources; the variability in trust across contexts; trust as an outcome of different factors; and trust as a predictor of different outcomes. Although of most interest for the present review might be the findings related to factors that can lead to trust as an outcome, such as extent of coordination among agencies and the media, past experience with authorities, and organization action and messaging, it is important to note that all of the findings directly contribute to maintaining and enhancing trust in authorities.

At-risk/vulnerable populations (eg, children, pregnant women, people with chronic disease, older people, low-SES urban and rural communities) whose life circumstances may exhibit inequalities/inequities relative to the general population were only marginally covered in the studies under review. Thus, it is not possible to fully address how the pattern of trust in these populations may specifically differ from that in the general populations. However, the findings show that vulnerable communities may often rely on personal networks to make their decisions as they trust information from these sources more than from media sources. Similarly, a life circumstance of economic poverty along with a less-than-desirable response to events by authorities may lead to lowered trust among such communities. Importantly, the findings also point to not assuming that the pattern of trust in authorities in all vulnerable groups is similar. The findings show, for example, that there are differences between urban African American and Hispanic communities in the United States with regard to judgements of trustworthiness of health and other related agencies.

Results Vis-a-Vis Findings From Other Reviews

There were 7 existing reviews related to trust during public health emergency events[1–7] that were assessed as high and moderate quality using a modified Assessment of Multiple Systematic Reviews (AMSTAR) quality appraisal checklist.[92] (Four existing reviews[93–96] were rated as low quality and these were "unpacked" for their data-based primary studies, which were added to the literature for the present review.) The results from the present review generally overlap with and extend the findings from these published reviews, and provide newer findings as well; in 1 case, the present results do not include a previous finding.

The present findings broadly replicate and extend the previous findings about organizational actions and messages that can enhance trust. These include: trust is influenced by organizational reputation; quality of stakeholder relationships; understanding and managing media relations; risk information provision strategies; accuracy, timeliness, and comprehensive information; transparency about available information; fairness in treatment of populations; building trust and trustworthiness through participatory dialogue and involvement in pre-event planning, exercises, and the design and testing of communication plans; and trust in public officials and the governments' ability to respond to a public health emergency are related to greater likelihood of adoption of recommended actions. In particular, the present review more comprehensively details the complex relationship between trust and risk perceptions. The present review also more clearly identifies that trust in authorities can depend on the extent of coordination among different agencies, institutions, and the media.

Some findings not emphasized in the previous reviews are highlighted in the present review. These include that trust in authorities is a multi-component construct and not a singular concept, which needs to be kept in mind when developing any message strategies; people engage in a thoughtful process of considering multiple sources offering information and recommendations, and use source credibility for resolving the conflict among the many pieces of information; and trust in authorities occurs in a general life context and should not be seen narrowly in isolation for just a specific hazard or emergency event. The present review extends previous results and offers new findings regarding variation in trust across different message sources, the course of an emergency event, demographics, and type of hazard.

One finding from the existing reviews not covered in the present review was that lack of trust between employees and supervisor within authority organizations minimizes employees' responses that could undermine operations. Studies that examined within-organization communication were not included in the review; only studies that dealt with communication with the general public in some way were included.

Suggestions for Practice

The final set of findings provides an understanding of the phenomenon of trust in the unique situation of public health

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emergency events and the activities that can be undertaken by authorities to communicate and increase trust in this context. Overall, to develop communication strategies for enhancing trust, there are several organizational message and action factors that can predict higher trust when developing communication strategies. Among these especially are: acknowledging uncertainty in messages, including forecasts and warnings; being transparent and not concealing negative information, such as rates of casualties; creating groups with specialized skills and knowledge; speedily disseminating information and intervening; creating scientific communication in an easy to understand manner; seeking input from the public and encouraging a dialog; ensuring coordination between different health authorities and the media along with a uniform message; avoiding rapid changes in information and preventing conflicting information dissemination from different agencies; and disseminating information through multiple platforms. It is again important to note that these actions occur in a larger context that includes factors such as different components of trust, history with authorities' response to events, life circumstances of the public, and person/individual differences, all of which can both strengthen or weaken the message-trust relationship. It should also be kept in mind that trust develops over time in a relational manner particularly through participatory dialogue and involvement, which often is through community engagement.

Some of these findings may not be entirely new to practitioners; nevertheless, they may help strengthen current practices and inform their adaptation to novel and unanticipated circumstances. In contrast, some of the present findings may not accord with work from other domains of trust research (eg, laboratory studies, politics). As such, we wish to alert practitioners that translating such present findings into practical implications should be done in consultation with that work.

Research Gaps in the Reviewed Literature

The present review identified 5 main gaps in the literature on trust during public health emergency events. First, there is insufficient coverage of low-income countries. It could be that the characteristics of low-income countries, especially in terms of infrastructure and national histories, influence trust processes differently enough for the practices of health authorities to be different. To address this, comparative research between countries needs to be undertaken. The review did not identify even a single study that compared countries, even those using a case study methodology.

Second, there is a lack of a comprehensive examination of the various components of trust along with concepts that substantially overlap with trust but may behave somewhat differently, such as confidence. There are studies that investigated different sets of components, but the review did not identify any study that comprehensively examined all relevant components and concepts, and tested their relationships with variables of interest, both as outcome, such as communication strategies that influence trust as an outcome, and as predictor, such as health protection behaviors that are influenced by trust as a predictor.

Third, also completely absent in the literature are longitudinal studies. It is not always necessary to have randomized comparison group research design, which may be precluded due to the nature of public health emergency events, to draw out causal relationships. Such linkages between variables of interest, such as trust as an outcome of certain communication strategies, can also be examined using a longitudinal research design where data of interest are measured at multiple time points. Such a research design can better reveal how trust dynamically varies during the phases of an event; even if, say, preparation and recovery phases are only used for data collection, this will still provide insight into how trust in authorities varies across the phases. Such a design can also provide knowledge about how trust operates simultaneously as both an outcome and predictor.

Fourth, a research gap exists in how mass media and personal networks interact during events. Several studies talk about the importance of integration of traditional mass media (eg, television news, newspapers) with personal networks that include both face-to-face and digital/social media (such as Facebook, Twitter). Communities, especially those that may identify themselves as marginalized or be considered vulnerable, often rely on personal networks for guidance to inform their decisions as they consider information from these sources more trustworthy than from media sources. Although there are studies that recommend authorities aim to integrate information disseminated through mass media and personal networks, the review did not identify any study that investigated how this integration may actually take place.

Fifth, there is an absence of integrative model building and theory construction. Trust in health authorities and other risk communication sources and trust in information from these sources varies across populations, especially that may be considered vulnerable, and hazards/events, among other contexts. The present review identified very few models or theories that sought to provide insightful theoretical explanations of these variations. To develop effective communication strategies that enhance trust, effective theory development needs to take place as otherwise a set of empirical facts of relationships between trust and other variables will not add up to accurate predictions about these relationships that can assist with planning and management.

Future research should address these research gaps and also undertake 2 additional lines of investigation. First, future research should take findings from field studies as synthesized in the present systematic review and explore their integration with findings regarding trust obtained from laboratory studies as well as findings from domains other than public health emergency events, especially when there is divergence in the findings. This has the potential to inform theoretical frameworks for future primary studies. Second, future studies should investigate the conditions under which people use trust in message sources to decide which message to attend when faced with multiple sources of information. People may effort fully or rapidly engage in this process, and future research can disentangle the factors, such as the phase of a public health emergency event, that influence the 2 processes.

Limitations of the Present Review

There are 3 main limitations of the present systematic review. First, some information from the articles and reports that were in non-English UN languages may have been missed as these were not translated into English in their entirety. Only selected paragraphs from the different sections, with an emphasis on the findings, were translated, which may have inadvertently led to overlooking of relevant information.

Second, the extraction of data from individual studies was conducted primarily by 1 person (for English language by the review lead author; other UN languages by a reader with native proficiency) as was done the same for the synthesis of findings across studies (by the review lead author), with the results scrutinized by

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another research team member. However, this cross-checking process was not done formally, which did not allow the computation of inter-coder ratings statistics to assess the degree of consistency of the results.

Third, in an attempt to search a diversity of resources to obtain references representing multidisciplinary viewpoints, we were not able to include every potential keyword for all the concepts related to trust. In particular, search terms "distrust" and "mistrust" (concepts on the opposite side of the question) were not included in the searches due to limits of time, search interfaces, number of characters allowed, and other such reasons. As a result, although the broader search provided more comprehensive set of references from a range of disciplines, a potentially small number of references focusing exclusively on distrust or mistrust (rather than "trust") may have been missed.

Conclusions

The public's trust in health-related authorities during times of emergency public health events is a complex phenomenon. Trust is a multi-faceted concept with multiple components and closely related concepts, all of which may be affected differently by the same message designed to enhance it. Trust is also dynamic. It changes across different message sources, the public's demographics, type of hazard/event, and the course of the event. Thus, a message designed to enhance trust in a message source for a particular event affecting a particular population may be quite effective at 1 point in time but may fail to work at a different point in time. Thus, the specificity of each message situation needs to be carefully analyzed to create messages that work.

During an emergency event, people use source credibility for resolving the conflict among multiple information sources and may engage in a thoughtful process of considering different sources offering information and recommendations, especially in the preparation phase. The careful sorting of information and its sources occurs in life circumstances that may include economic poverty and associated multitude daily hazards and risks, entrenched cultural beliefs and behaviors, and history with authorities' response to events. Messages that disregard this broader social context outside of basic demographics will fail to work.

Irrespective of the difficulties for message and activities design posed by the above for health and related organizations, some cautious generalizations about what works to enhance trust are possible. Some of these include: coordination with other agencies, institutions, and the media; swift and uniform message dissemination and intervention; communicating uncertainties; being transparent and not concealing negative data; avoiding rapid changes in information and preventing conflicting information dissemination from different agencies; disseminating information through multiple platforms; and sustaining public involvement and dialog. However, it should be noted that, although high trust in authorities can lead to positive outcomes, such as higher vaccination behaviors, it can also lead to negative outcomes, such as lowered perceived risk for hazards.

Conflict of interest. The views expressed in the present paper are those of the authors and do not necessarily reflect the views of the World Health Organization.

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