Communicating with Diverse Populations Before, During and After CBRN Events

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CBRNE Expert Working Group

Counter Terrorism Preparedness Network (CTPN)

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About the Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) Expert Group

The Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) expert working group monitors and briefs on the CBRNE threat and associated trends and implications for authorities in terms of prevention, planning, and response; shares initiatives, guidance, and events that may be of interest to CTPN members; and exchanges tactical and operational expertise. It is chaired by Superintendent Lee Kendrick, Head of the National CBRN Centre at UK Counter Terrorism Policing.

CTPN COUNTER TERRORISM PREPAREDNESS NETWORK

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Table of Contents

Foreword

The CTPN CBRNE Expert Working Group brings together specialists from across the CBRN community to consider city-based threats, risks and capabilities. Its membership blend of academics, policy leads and responders has provided a unique opportunity to translate the global CBRN landscape to the local level and develop understanding on how cities can effectively prepare for a CBRN event.

Our discussions were clear. Irrespective of the agency, the geographical location or the budget to build capability, the consistent primary aim was to protect the public and save lives. The granularity as to how this was to be achieved, the equipment used or the scale of response was overshadowed by a common capability requirement – the need to better understand how to effectively communicate with the public.

If communication was delivered by the right organisation, through the best medium, at the most appropriate time, it could save lives. To achieve this, however, was complex as the requirements varied at the stage of the incident, and the specific needs generated by population added a further dimension to the issue.

The ambition for this report is to provide a practical insight into considerations for cities, organisations and individuals with responsibility for any element of CBRN response. It draws on a formal systematic review of the academic literature on the communication needs of diverse populations who may be disproportionately affected during a CBRN event and wider literature on best practice for CBRN communications.

These concepts are combined with learning from the CTPN CBRN Exercise 'Mercury' held in Washington DC, USA in November 2024, which focused on the role of public and responder communication in the aftermath of a CBRN terrorist attack. The attendees were from the full spectrum of the international CBRN community. The variation in roles, responsibilities, skills and experience combined to develop an enriched, insightful and informed understanding of the complexity of this challenge.

As Chair of the CTPN CBRNE Expert Working Group, I hope the contents of this report prompt you to consider a review of local processes and procedures. Working together, we can make a difference, improve preparedness and contribute to the safety and security of our communities. Ultimately, a review could achieve that shared primary aim of saving life.

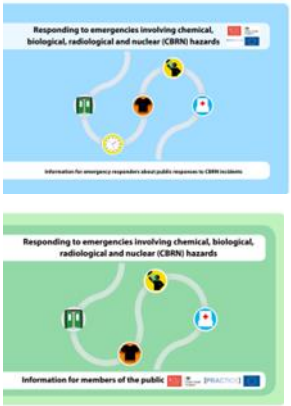
Superintendent Lee Kendrick
Chair, CBRNE Expert Working Group

1. Key Principles for Effective CBRN Communications

Effective risk and crisis communication is essential for a successful CBRN response, as it can reduce anxiety and confusion, build trust, encourage protective health behaviours, and foster resilience during and after incidents.[1] While much research has focused on communicating with the public during a CBRN event, there is also good evidence for the value of sharing pre-event information to enhance knowledge, build resilience and establish trust[2], as well as the role of effective post-incident communication in supporting recovery.

In addition to understanding the needs of the general population, there is growing recognition of the importance of tailoring communications to mitigate the disproportionate impacts of public health emergencies on specific groups.[3] **Tailored communication involves designing, delivering, and evaluating messages to address the unique needs, preferences, and values of target audiences.** Effective tailored communication enhances accessibility, raises awareness, and encourages the adoption of protective health behaviours. However, poorly executed targeted messages can inadvertently create confusion and stigma.[4]

While the benefits of effective CBRN communications are clear, the challenges for achieving this in practice are also widely recognised. Co-ordinating and sharing accurate information at speed can pose difficulties during any incident response. These challenges are further amplified by the complexity and uncertainty associated with CBRN events.[5] This report summarises the available evidence on communicating with diverse populations before, during and after CBRN events to share key insights and provide practical recommendations for addressing these challenges. **This chapter provides an overview of key principles for understanding and informing public responses that are relevant to all stages of preparedness, response and recovery.** Later chapters will examine specific communication needs and how best to address them during each phase.



Key Principles for Effective Communication[1,5-8]

- Understand risk perceptions & likely behaviours
- Develop & test messages with multiple audiences
- Recognise increased information seeking as a normative response
- Provide targeted, actionable advice (including brief explanation)
- Use language that is understandable & that resonates
- Use trusted communicators and validators
- Use multiple channels (having identified preferred channels)
- Demonstrate trustworthiness (based on fairness & competency)

Understanding Public Responses to CBRN Events

Understanding likely public responses and how these will vary according to **perceptions about the event**, **perceptions about the response** and the **beliefs and experiences of particular groups** is essential for effective CBRN communications.

Public Beliefs, Feelings & Behaviour to Consider[6,7,9]

- The public are likely to have **limited knowledge** about CBRN agents and about how to respond to this type of incident
- While panic is rare, **fear, anxiety, confusion** & feelings of **helplessness** are likely
- People commonly **try to help** each other, but in doing so may unintentionally spread contamination or recommend inappropriate actions
- They may hold **unrealistic expectations** of emergency response and responders (including the length of time it will take for responders to arrive)
- They may therefore **wish to leave the scene** before emergency services arrive

Will People Panic?

While people will undoubtedly experience heightened anxiety in response to a CBRN event, decades of research across multiple incidents suggest that **panic is very rare** and that **prosocial and co-operative behaviours are more common**.[10,11]

What is Panic? [12]

Experiencing fear and anxiety during a CBRN event does not mean that people are panicking. In this context, behaviour must take on four additional features to qualify as panic:

- Attempting to access scarce or decreasing resources
- Prioritising personal safety over helping others
- Engaging in irrational behaviours
- Contagion of emotional/behavioural responses

If your plans assume public panic, this can reduce the effectiveness of your communication strategy if the public behaviours you need to manage do not align with your expectations. For example, assumptions of panic may lead planners to predict that crowd movement will be unidirectional, with people moving rapidly away from the source of danger. However, in reality, people who are involved in an incident may not immediately recognise the risk that they face or may move towards danger to help others or retrieve belongings. The assumption of panic also obscures the extent to which **public reactions are shaped by the way that the event is managed** (see perceptions about the response below) and can lead authorities to withhold information that could help mitigate risk.

The Dawn Sturgess Inquiry[13]

In June 2018, Dawn Sturgess was fatally poisoned by the nerve agent Novichok after spraying herself with the contents of a perfume bottle that had been discarded in a charity collection bin following the attempted murder of former Russian double agent Sergei Skripal and his daughter Yulia.

The inquiry into her death heard that the public were not warned to avoid picking up discarded items following the attempted murder, with a note shown to the inquiry from health officials suggesting this was so as "*not to stoke panic by issuing public messages about this hypothetical scenario.*"[13]

Perceptions About the Event

Public perceptions will be influenced by specific features of the event, including **scale** (numbers affected), **location** (Is it familiar? Are exits well signposted? Is it an enclosed/staffed or outdoor space?), **social cues** (how others are reacting) and perceptions about the **cause** and likely **trajectory** of the event. For example, a targeted attack, such as the 2006 Polonium poisoning of Alexander Litvinenko in London, may be interpreted as less of a threat by individuals who have not been directly affected if it is understood as a one-off event. Whereas a terrorist attack, particularly if it involves multiple locations, is more likely to change behaviours in the wider public, as was seen following the 2001 anthrax attacks in the United States when thousands of people purchased broad-spectrum antibiotics that they thought would provide protection.[14]

The **level of ambiguity** surrounding the event is also likely to influence public responses. For example, an attack involving a covert Radiological Exposure Device (RED) may initially produce more muted reactions than a radiological event involving a Radiological Dispersal Device (RDD e.g. a 'dirty bomb').[15] Similarly, there may be less behavioural change in response to a gradually unfolding event such as a biological attack involving an infectious disease than a catastrophic event with immediate mass casualties.

Public responses will also depend on **risk perceptions**, which **may be lower than expected**. For example, in February 2020, two people were stabbed and the perpetrator (who was wearing silver canisters strapped to his chest) was shot dead in a terrorist incident in Streatham, London. Restaurant staff and customers at a local café were reluctant to evacuate despite the entreaties of a clearly agitated police officer.[16] Conversely, **heightened risk perceptions may lead low risk patients to seek unnecessary treatment**. For example, during the 1995 Tokyo sarin attacks, over five-thousand people without direct exposure to nerve agent sought medical care having experienced physical symptoms.[17]

Perceptions About the Response

Public reactions are shaped not only by their understanding of the risk posed by the event but also by **how the event is managed** and their **perceptions of the risks and effectiveness of recommended countermeasures**. For example, survivors of the 1995 Tokyo Sarin attacks reported that **challenges in contacting the emergency services** and the length of **time it took first responders to arrive** created "real fear" and "total chaos".[18] During COVID-19, rapid vaccine development created mistrust, which was later amplified by concerns over limited protection against infection and the need for booster doses.

Withholding information will create circumstances in which rumours flourish and members of the wider community may not understand low likelihood of exposure, as was seen following a localised radiation event in Goiânia, Brazil.

Goiânia 1987 Radiation Event[5]

Scavengers found caesium-137 in an abandoned teletherapy unit, were drawn to its blue glow, and took it home without realising the danger. As a result, 4 people died and 249 were contaminated. Poor communication in the aftermath contributed to:

- >112,000 people seeking monitoring to confirm lack of exposure
- Stigmatisation of communities and products from the region
- Unwillingness to return to previously contaminated areas

How well the response is communicated will also influence trust in authorities. For example, following the 1986 Chernobyl nuclear accident there was public outrage in response to Norwegian government guidance that advised it was safe for children to play outside while cattle were to be kept indoors for six weeks. If the guidance had clarified the risks of ingesting grass compared to walking on it and highlighted that its aim was to protect children from potential harm due to contaminated milk supply, this reaction could have been prevented.[18]

The Role of Specific Beliefs and Experiences

Key principles for communicating with the public about CBRN events have been shown to hold across multiple national contexts.[1,5,15,19] However, much of the available evidence comes from North America and Europe, so these principles will need to be tested with and adapted for other populations. Elements to consider when adapting for local contexts include levels of **trust in national and local authorities**, **prior experience of related events** (e.g. malicious or accidental release), **health beliefs/knowledge**, and the broader **communicative context** (including exposure and receptivity to misinformation).

It is important to note that these elements also differ between population sub-groups, and the **likelihood of hazard exposure - and subsequent chances of experiencing poor health outcomes - varies significantly for different groups**. It is therefore crucial to take into consideration the needs of diverse populations when preparing for and responding to CBRN events.

Checklist: How Prepared Are You and Your City to Communicate with the Public About CBRN Events?

1. Have you prepared messages for release to the public during a CBRN incident?
2. Have you identified and trained good communicators within your organisation?
3. Have you established trusted relationships with your communities ahead of an event?
4. Have you established trusted media partnerships that you can call on during an event?
5. Do you have processes in place for testing messages and evaluating their impact?

2. Which Groups Need to be Considered and Why?

Some groups and communities will experience greater impacts from CBRN events and require specific attention from emergency planners and responders due to differences in likely exposure, reactions and needs. For example, young children are likely to be at higher risk from CBRN agents because of their physical characteristics and behaviours, as well as difficulties they may experience in following decontamination instructions.[20,21]

People may be disproportionately affected by virtue of personal, occupational, medical, cultural or socio-economic characteristics. The impacts of longstanding social and health inequalities were starkly demonstrated during the COVID-19 pandemic, which also highlighted the situational vulnerabilities of frontline healthcare workers and essential service employees (e.g. public transportation staff).[3]

While responding organisations tend to categorise populations or groups, **individuals have multiple characteristics, experiences, and overlapping identities that uniquely contribute to the impact of CBRN events**.[22,23] Furthermore, communities are built on shared identities, localities, practices and social connections, and these do not always align with public health categories. For example, broad categories such as Black, Asian and Minority Ethnic (BAME) or 'People of Color' (POC) obscure distinct experiences, needs and identities, and may unintentionally reinforce exclusion.

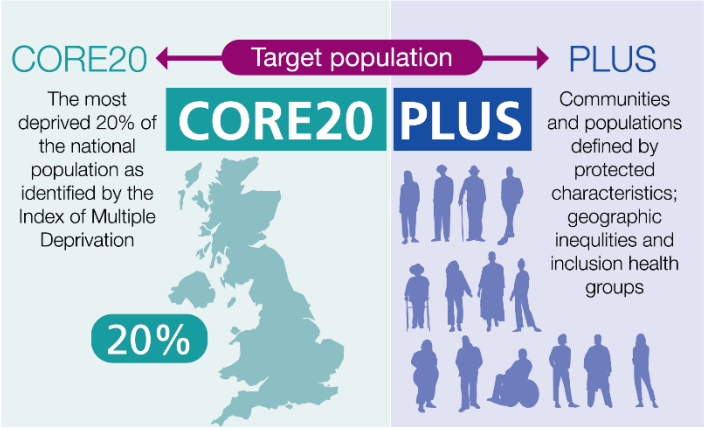
Characteristics	E.g.
Personal	Age (children and elderly); neurodiversity; sexual orientation
Health	Pregnancy; chronic disease; disability; mental illness
Occupation	First responders; healthcare workers; carers; critical infrastructure workers
Location	Proximity to CBRN facilities; access/proximity to emergency care; prison populations
Cultural	Religion; language; literacy
Social	Minority ethnicity; economic deprivation; social exclusion; undocumented migrants

Examples of characteristics that can exacerbate the impact of CBRN events

It is important to note that the disproportionately affected will include **individuals who may not recognise themselves as being at high risk** and who **may reject labels such as 'vulnerable'**[24,25]. For example, it is not uncommon for older adults to perceive their peers as 'elderly' but not themselves. Furthermore, while older adults are likely to be more clinically vulnerable and may also experience social and logistical challenges relating to mobility issues, many possess capabilities equal to or exceeding those of younger adults.[26]

Conversely, **some individuals and groups who are resilient in day-to-day life may require additional support and information** relating to their specific experiences during a CBRN event. For example, first responders who have not received CBRN-specific training may be uncertain about the risk of exposure to themselves and their families. Similarly, otherwise resilient individuals who are involved in an incident in a city where they do not speak the local language may struggle to access critical safety information. Effective CBRN communication must therefore **consider event-specific needs and capabilities,** and **it is not sufficient to solely rely on existing lists of vulnerable people** when considering people and communities who are likely to require targeted or tailored communication interventions before, during and after CBRN events.

While public health authorities have long been aware that social and health inequalities impede effective healthcare response, **COVID-19 has prompted renewed efforts to identify and tailor interventions for those most at risk to reduce avoidable harm**. For example, in the US, The Centers for Disease Control and Prevention released *CDC Health Equity Guiding Principles for Inclusive Communication*[22] to offer non-mandated guidance and training to help public health practitioners to "*create health communication messages that can be heard, understood, and acted on"* that are *"respectful, inclusive and nonstigmatizing."* [22]



UKHSA CORE20PLUS for Health Protection Framework, adapted from NHS England[23]

The UK approach to reducing healthcare inequalities follows the NHS CORE2OPLUS framework, which recognises that **priority groups will vary by region and therefore need to be identified at a local level**.

This framework has been adopted by the UK Health Security Agency (UKHSA) in preparing for and responding to CBRN events to provide "*a structured way to routinely consider people and communities who are more likely to experience inequalities in health security and may benefit from tailored and targeted interventions*."[23]

While these examples show that the needs of disproportionately affected people and communities are increasingly considered in emergency planning, **there is evidence to suggest that this does not necessarily translate into CBRN communication strategies**. For example, a recent survey of 47 EU members states found only limited consideration of potentially vulnerable groups in CBRN communication strategies.[27]

This research also suggests that even **when vulnerabilities are considered, the focus is predominantly on people with mobility restrictions, older adults and children**, and there is less consideration of other groups who were identified by this project as requiring special attention (e.g. ethnic minorities, pregnant women, people with hearing or visual impairments or mental health conditions). Furthermore, the 91 **representatives of at-risk populations** included in this study **reported difficulties in finding information that would be useful** for preparing the people they represented for CBRN events.

Current adaptations for at-risk groups in emergency planning reflect protected characteristics that are legally mandated under equalities legislation. While such mandates are vital drivers of inclusive practice – for example, Local Law 30 in New York, USA, ensures translations are provided in the ten most commonly used languages in the city – **effective tailored communication should go beyond simply meeting legal requirements**; for example, by working in partnership with communities to ensure that literal translations are culturally appropriate and understood as intended. [28]

Having established the need to tailor CBRN communications for at-risk groups and communities, the following chapters will integrate insights from a systematic review of available evidence[29] to identify key principles for communicating with diverse populations before, during and after CBRN events.

3. Pre-Event Communication for Diverse Populations

Most research on communicating with the public about CBRN events focuses on preparing messages for release during or after an incident. This mirrors relatively limited focus on pre-event communication in practice, which has been attributed to authorities being concerned about scaring the public, despite **evidence that effective pre-event communication does not increase perceived risk from terrorism but can increase trust in official guidance**, **encourage protective behaviours and reduce intentions to engage in risky behaviours**.[30,31] The limited focus on pre-event communication also reflects the comparative infrequency of major CBRN events.[5]

More research is needed to better understand the preparedness needs of diverse populations and the circumstances in which pre-event communication would be beneficial. However, **there is some evidence for variation in CBRN event knowledge among groups and communities likely to be disproportionately affected,** indicating that levels of preparedness are also likely to vary. This suggests that some at risk groups would benefit from receiving additional pre-event information.

Current pre-event guidance for CBRN events tends to focus on **occupational groups** (e.g. information about workplace chemicals and their hazards) or **geographically affected groups** (e.g. preparedness advice for residents living near a nuclear facility).[32] However, research insights into variation in CBRN knowledge and attitudes towards preparedness among different groups indicate that it **could be beneficial for cities to consider targeting or tailoring messages for a wider range of groups**.

Although there is limited evidence on how best to prepare the public for CBRN events, research suggests that **people are unlikely to attend to or act on pre-event guidance unless they feel some degree of threat and believe that the recommended behaviour will be effective**. For example, residents living near to a nuclear facility who believed it was safe and who also believed there would not be time to evacuate in the event of an emergency were unlikely to undertake preparedness activities.[32]

Key Principles for CBRN Pre-Event Communication

Key Principles for CBRN Pre-Event Communication[32]

Messages should:

- Improve knowledge of/intention to take appropriate protective actions during an event
- Avoid presenting facts without explanation
- Include information on the effectiveness of recommended behaviours
- Be clear and easily understood (e.g. not too long and include illustrations)
- Be provided by multiple trusted sources

Variation in CBRN Knowledge

Understanding **baseline knowledge about CBRN agents and what CBRN event response would involve** is crucial. These expectations **shape how individuals perceive their risk of exposure**, which in turn affects their behaviour before and during an incident. This includes **how likely people are to undertake preparedness activities**, such as eligible residents near nuclear power plants obtaining free iodide, **or to follow recommended actions during a CBRN event**, such as sheltering in place or evacuating.[32]

Research conducted in the USA has found **varied levels of understanding about what CBRN events involve** among different population groups. This suggests that some historically underserved groups - particularly non-English speakers and those in low-income and rural areas – have lower levels of knowledge about radiation events[33] and find it more difficult to distinguish between CBRN agents.[34] As levels of trust in authorities also tends to be lower among these groups, **equitable pre-incident community engagement is required to understand information needs and establish trust**.

Key Principles for Community Engagement[4]

Community engagement underpins effective tailored communication. This requires:

- Building, maintaining and sustaining trust over time through regular, consistent engagement
- Trusting communities to be equitable partners in designing, sharing and evaluating messages
- Knowledge of previous engagement to avoid duplication and ensure communities feel heard
- Moving from instruction to dialogue to ensure messages reflect community needs, priorities & values
- Sufficient resourcing to ensure capacity is available when needed, as well as to support response

Surveys in the USA[35] and across 23 EU countries[36] have also identified mixed levels of knowledge about CBRN threats among first responders. As would be expected, **CBRN training enhances understanding of these agents and raises awareness of their potential involvement in incidents, but this is more often accessed by firefighters than law enforcement or medical responders.**[35,36] First responders may therefore share public uncertainties about risk of exposure to themselves and their families and would similarly benefit from pre-event tailored communication to build knowledge and foster resilience.

Benefits of Training for First Responder Wellbeing & CBRN Communication

Understanding risk of exposure and the level of protection offered by Personal Protective Equipment (PPE) will affect:

- Degree of stress and trauma experienced by first responders
- Willingness to attend the scene and return to work in aftermath

Knowledgeable and confident first responders will increase public confidence in the response, which in turn will increase the likelihood that the public will undertake recommended actions.

Variation in Preparedness Attitudes and Behaviours

There is evidence for lack of preparedness for CBRN events, even in situations where people recognise the benefits of preparing. As with levels of knowledge, attitudes towards preparedness have been shown to vary among different population groups.[37-39] However, there is evidence to suggest that **preparedness information for 'at risk' groups is valued**[38] and that some **disproportionately affected groups are interested in helping to develop community and organisational plans.**[39]

Lack of preparedness relates to low-risk perceptions, even among population groups who may face disproportionate impacts, such as older adults, non-native speakers, migrant workers, refugees and people with disabilities or visual impairments.[40] Reasons provided for low perceived risk also vary by group. For example, a US study on preparedness for bioterrorism found rural communities expected terrorism to target more urban areas, refugees didn't feel at risk as they believed the country to be a 'safe haven' and the elderly had not considered the possibility of this type of event occurring.[40]

It is important that preparations for CBRN events are proportionate to the risk. **Attempts to increase fear are not only unethical but are also likely be ineffective** as perceived scaremongering reduces public trust and engagement with advice, and heighted risk perceptions can lead to fatalism and inappropriate actions.[5] However, **pre-event communication that enhances understanding of exposure risk and the effectiveness of recommended behaviours can improve physical and mental health outcomes during and after a CBRN event**. Engaging with potentially disproportionately affected groups in advance to understand and address their information needs will establish trust and maximise the effectiveness of CBRN response.

Checklist: How Prepared Are Your Staff and Communities for a CBRN Event?

1. Do you know which groups in your city would benefit from tailored messages during a CBRN event?
2. Have you engaged with these groups to understand their needs, priorities and values?
3. Is any community engagement you undertake inclusive, respectful and appropriately resourced?
4. Before engaging with groups or communities, have you reviewed any previous engagement efforts to avoid duplication and demonstrate the value of their contributions?
5. Have you considered potential benefits of sharing CBRN information in advance of an event?
6. If you share pre-event CBRN information, have you developed or tested this with diverse audiences?
7. Do the first responders in your city undertake CBRN training?
8. Have you co-created or tested messages with diverse audiences for release during CBRN events?

4. Communicating with Diverse Populations During CBRN Events

Available evidence on the likely reactions and information needs of diverse populations during CBRN events reinforces the key principles for effective CBRN communication outlined in Chapter 1, while also highlighting some specific needs that must be addressed.[29]

Irrespective of background, people generally have limited knowledge about CBRN agents and response procedures and **are likely to experience fear, anxiety, and confusion** during an incident.[6] **They will also try to help one another**, though in doing so may unintentionally spread contamination or suggest inappropriate actions – for example, recommending precautionary medication that is not required or persuading others that recommended medical interventions are unsafe or ineffective.

Similarly, **trust in authorities and health recommendations will determine how people engage with and respond to recommended interventions** across all groups and communities.[5,9] **Maintaining trust during CBRN events is challenging, even in situations when initial levels of trust are high**, due to the uncertainty and complexity involved in the response, and potential lack of scientific and political consensus.[5] In the post-COVID-19 era, heightened political and social polarisation, along with declining trust in public health officials—exacerbated by the rapid spread of misinformation—will make this especially challenging.

Where levels of trust in authorities and public health interventions are already low – such as among marginalised ethnic groups due to historic and ongoing experiences of systemic racism – **inconsistencies in or changes to health recommendations are particularly harmful**. For example, changing messages and perceptions of unfair treatment along racial and socioeconomic lines eroded postal workers' trust in public health agencies and confidence in vaccine safety and efficacy during the 2001 US Anthrax attacks. The resulting loss of trust contributed to low vaccine uptake.[41,42]

During the initial stages of an incident, **people want to understand the likelihood that they have been affected and if so, how to mitigate potential harm**.[6] They will also want to know about the risks and benefits of countermeasures. To maintain fairness and trust, **it is important to share consistent information with all groups and communities.** At the same time **specific needs and priorities should be recognised and addressed**, such as the concerns of pregnant women regarding potential impacts of countermeasures on their unborn child.[27]

As described in Chapter 3, **the primary route to build trust and identify the needs of priority groups and communities is community engagement that is based on equitable partnership working**.[4] During a CBRN event, trust can be maintained by listening to the views and concerns of disproportionately affected groups to anticipate and address specific needs and challenges. **Valid reasons for mistrust need to be acknowledged as well as addressed.** Communities tend to place more trust in people and organisations they are in regular contact with, so identifying where support is likely to be needed and **establishing relationships with these groups and communities ahead of time will enhance incident response**.

Variation in Willingness and Ability to Undertake Recommended Protective Actions

The COM-B framework can be used to support the development of tailored CBRN communication interventions by focusing on three critical drivers of behaviour: capability, opportunity and motivation.[43] By understanding these components – and how they vary among different groups and communities - messages can be designed to address individual, social and societal factors that will encourage or limit the uptake of recommended actions.

In this framework, **Capability** refers to both psychological and physical ability to engage with the recommended actions. **Opportunity** encompasses both physical opportunity (e.g. access to information) and social opportunities (e.g. social norms that support the uptake of recommended actions). **Motivation** involves both conscious decision-making and automatic, habitual responses.

The COM-B system and Behavioural Change Wheel[43]

There is evidence for **variation in the capability, motivation and opportunity for different groups to access, understand and use CBRN guidance**. For example, psychological capability to follow shelter-in-place instructions requires an understanding of why this is important and what it entails. To achieve this, **messages must be easy to access, use and understand for all communities**. Standard literal translations into different languages may not be sufficient to maintain intended meanings. It is therefore important to check translations with end users to ensure clarity and cultural appropriateness.[3]

Furthermore, even individuals with high psychological capabilities may encounter financial and social barriers that limit their physical opportunities to comply with CBRN guidance. For example, **people living in poverty in densely populated urban areas face significant challenges to sheltering in place** or maintaining quarantine for extended periods regardless of motivation. [44]

It is also important to recognise variation within groups and communities. For example, evidence suggests that younger people may have different motivations for non-compliance with shelter-in-place instructions compared to older counterparts within the same community.[33] Younger people are also likely to have different preferences for modes of communication and trusted sources.

Key Principles for Decontamination Communication

Respectful communication that addresses the needs and concerns of casualties is particularly important for CBRN events that require mass decontamination to ensure a timely and effective response. [6,45]

As with other aspects of CBRN response, **there are shared information needs and concerns that need to be addressed for anyone undergoing this process**. However, in addition to these core requirements, some people will have physical, medical, social or cultural needs that require specific consideration.[45] Decontamination **communication must therefore also address functional, language and cultural considerations** to ensure accessibility and effectiveness for diverse populations.

The decontamination process will be unfamiliar and uncomfortable, and likely to provoke anxiety and fear for all involved.[6] It is therefore important that **initial communications should provide practical information about the process** (including what to do and what not to do) and the **likely duration** (to manage expectations about the need to wait, including an explanation for delays that describes ongoing behind-the-scenes work). It is also important to **explain why decontamination is necessary, its effectiveness** and **how the needs of those affected will be met** (e.g. privacy and respect).[6,45]

It is particularly important to explain actions and instructions that go against expectations or intuitive behaviours. For example, people may instinctively feel less confident in dry decontamination methods unless detailed information is provided about the reasons for their use and effectiveness.[46] Similarly, people may expect to see soap and bubbles during wet decontamination and question the effectiveness of showers if unmet expectations are not explained.[6] Potential risks associated with instinctive helping behaviours (e.g. the potential to unintentionally contaminate others) also require explanation.[6]

Key Considerations for Decontamination Communication[6,45]

- Does the process fit likely public expectations?
  (e.g. that water will be used and detergent will foam up)
- Have you communicated...
  - What to do and expect
  - Basic rationale behind instructions
  - Information about effectiveness of process
- Have you considered…
  - The capabilities of your spokespeople
  - The rights and capabilities of members of the public
  - Needs and concerns of different groups

Variation in Decontamination Needs

There is evidence of **substantial overlap between the needs of different groups that are likely to require additional support during decontamination**. For example, language barriers, hearing impairments and age-related challenges can all hinder communication with responders during the decontamination process.[45] Instead of focusing on demographic categories, the **functional needs**

approach therefore focuses on addressing barriers that prevent people from effectively navigating the decontamination process. For example, using pictorial instructions; training staff wearing personal protective equipment (PPE) to effectively communicate using body language and gestures; and employing buddy systems have all been shown to enhance communication for a range of groups experiencing communication challenges.[45]

Functional needs will affect both what needs to be communicated and how this information needs to be conveyed. For example, the removal of functional aids (e.g. glasses, hearing aids, mobility aids) can create distress and feelings of helplessness. It is therefore important to explain why they are being taken away and whether they will be returned (if so, why, when and how; if not, why not). It is also important to clearly explain how support will be provided in the absence of these aids and to ensure that this is respectful and appropriate.[47]

A recent mass decontamination exercise in Germany, which included participants with visual, hearing, physical, and medical impairments, identified **challenges related to the quality and appropriateness of functional aids that were provided** – such as the provision of instructions for the visually impaired in Braille, which could not be read by all – and suggests that **staff training will be necessary to ensure respectful and effective communication**.[47] These findings are consistent with earlier research conducted in the USA, which also highlighted the importance of staff sensitivity training.[48]

Including people with specific functional needs in decontamination exercises and planning ensures that communication is effectively tailored to **address the concerns, priorities and values of groups facing heightened risk**. It is essential to identify and consider how these will be addressed ahead of time to prevent unexpected challenges due to unmet expectations. For example, a participant in this study wanted to know about decontamination processes for service animals:

> "*Until recently I had a guide dog, and if I had my guide dog with me, how was it supposed to work, to decontaminate the dog in the shower. My dog would have panicked in the shower*" [47]

Checklist: Do Your CBRN Communications Meet the Needs of Your Staff & Communities?

1. Are your messages clear, consistent and shared by multiple trusted sources?
2. Do you have a process to monitor and address misinformation?
3. Do your messages recognise and address staff and community willingness and ability to undertake actions?
4. Do you have effective processes to build (where needed) and maintain (where established) staff and community trust?
5. Do you have effective processes to actively engage with and respond to staff and community needs during a response?
6. Do your decontamination plans reflect the functional needs of your local & visiting populations?
7. Have you included members of at-risk populations in your planning team and training?
8. Have you identified strategies to overcome challenges of communicating when wearing PPE?
9. Are your staff trained in respectful and effective communication?

5. Communicating with Diverse Populations After CBRN Events

Effective post-event communication is essential to support the recovery of affected populations (e.g. by encouraging return to previously contaminated areas, if/when appropriate) **and individuals** (e.g. by addressing mental health impacts and available support). The type of information and support required will depend on the scale, location and nature of the incident. Regardless of these differences, **the presence of a CBRN agent increases the likelihood of chronic medical, environmental and psychological impacts, making effective communication to support recovery particularly important.**

There is limited research on communicating with diverse populations after CBRN events, but the **available evidence suggests that core information needs related to concerns about long-term physical health risks and the provision of mental health support will be consistent** across groups and communities.[29] This underscores the need for ongoing clear and consistent messaging for all affected populations in the aftermath of a CBRN event.

However, evidence of **variation in specific health risk concerns** (e.g. anxiety about radiation impacts on pregnant women and children), **levels of trust in authorities, and health beliefs and attitudes** – such as cultural attitudes towards seeking mental health support, which may lead to avoidance or delay in accessing care after terrorist incidents[50] – demonstrate that it is also **important to tailor communications to support the recovery of diverse populations after CBRN events**.

Communicating to Support Recovery

Effective communication during a CBRN event is essential to the success of post-event messaging designed to encourage longer-term protective health behaviours. For example, clearly communicating the risks of exposure and the risks and benefits of any necessary treatment - such as extended antibiotic or antiviral therapies after biological exposure or lifetime cancer screening following a radiological incident – during an event will support informed health decision-making during recovery.

To effectively support recovery, healthcare systems must consider not only the direct impacts of the event, but also the secondary stressors related to the recovery process. For example, chemical releases causing persistent contamination may delay or prevent residents from returning to their homes, intensifying stress for affected communities.[51] In these circumstances, **it is crucial to share timely and clear updates about environmental monitoring** through credible and trusted sources.

Successful recovery depends on communities understanding the necessity of interventions, trusting their effectiveness, believing environmental safety assessments, and having the appropriate resources to follow recommendations. For example, when evacuation zones began reopening four years after the Fukushima Daiichi nuclear accident, evacuees' reluctance to return was attributed to inadequate housing, education and health infrastructure, as well as persistent anxiety about health risks and distrust in the government and safety regulators.[5]

The COM-B model[43] (described in Chapter 4) **offers a structured approach to tailoring post-event communications to address variations in the capability, opportunity and motivation** of diverse populations to undertake actions that promote recovery.

Lessons identified from the 2011 accident at the Fukushima Daiichi Nuclear Power plant in Japan **underscore the inherent challenges of communicating during and after CBRN events** – relating to scientific uncertainty and gaps between expert and public understandings - **and how these challenges will be exacerbated if communications are not effectively tailored** for the needs of affected communities.[52]

Fukushima Nuclear Accident[5]

In March 2011, a tsunami struck the Fukushima Daiichi nuclear powerplant, causing a significant radioactive release.

An initial 3km mandatory evacuation zone was extended to 10km the following day.

Approx. 150,000 residents evacuated (mandatory & voluntary).

Nearly a month later, the evacuation zone was extended due to unacceptable yearly excess radiation levels in wider area.

The new evacuation zone included areas where some evacuees had initially relocated, creating mistrust and confusion.

The Fukushima accident demonstrates that communication during and after a CBRN event that is not clear, timely and factually correct and which lacks meaningful engagement with affected communities, can heighten anxiety, reduce trust and lead to unnecessarily cautious or risky behaviours, such as avoiding outdoor activities when unnecessary or consuming potentially contaminated food.[52.53]

Moreover, this incident underscores the pivotal role that trust plays in receptivity to official guidance and how **trust can be eroded by one-way, top-down approaches to communication that prioritise providing reassurance over clear, transparent, factually correct information**. It also highlights the importance of citizen involvement in recovery decision making, including processes to manage the challenges associated with engaging historically underserved communities.[52]

Sustaining Trust and Preparing for Future Events

In addition to providing any ongoing messages that may be required to support recovery, the **post-event period offers a vital opportunity to evaluate and enhance communication** strategies and materials used during the incident, **identify and address training needs**, and **ensure processes are in place to build, maintain, or sustain trusted relationships with communities** as needed to **strengthen preparedness for future events**.

Community relationships established before or during a CBRN event can be strengthened or strained by experiences during the response, particularly in larger scale events requiring sustained efforts, as seen during the COVID-19 pandemic. It is essential to **recognise community contributions to the response** and **demonstrate a long-term commitment** to their needs and priorities, ensuring they do not feel undervalued once the urgent need for their involvement ends.[4] Achieving this **requires sustained effort**, including consideration of how to maintain relationships with community organisations that may no longer be regularly engaged **and the provision of ongoing resources**, such as staff time and standing funding.[4]

Key Principles for Communicating After CBRN Events

Key Principles for Communicating After CBRN Events

Messages should:

- Provide clear, honest, factually correct information about any ongoing health risks.
- Address the specific concerns and needs of diverse populations.
- Explain any changes in scientific understanding and related recommendations.
- Foster two-way inclusive communication that encourages dialogue.
- Avoid prioritising reassurance over transparency or accuracy.
- Consider the impact of both primary and secondary stressors.

In addition to the specific considerations for communicating with diverse populations after CBRN events discussed in this review, there are **well-established principles for respectful and compassionate post-terrorism communications that also need to be applied after CBRN events to effectively address the needs of affected populations** (e.g. by extending proactive outreach and support for victims) **and to avoid creating additional harms** (e.g. through public statements and social media use). These principles are detailed in Chapter 2 of the CTPN Humanitarian Assistance and Psychosocial Support (HAPSS) Expert Group compendium on Supporting People After Terrorism.[54]

Checklist: Do Your CBRN Communications Support Recovery and Future Resilience?

1. Have you included affected communities and diverse populations in your recovery planning?
2. Do you have effective processes for evaluating how well you communicated with staff and communities during the event?
3. Do you have effective processes for identifying and addressing any new or ongoing information needs for your staff and communities?
4. Do you know what, if any impact the incident has had on trust in your organisation and other authorities?
5. Do you have effective processes to build and sustain trusted community partnerships?
6. Have you identified any new priority groups for future engagement?

Concluding Comments

This report was motivated by a shared understanding that effective CBRN communication, while essential for saving lives and fostering resilience, is challenging to achieve in practice.

Recognising these complexities, this report has drawn together practical insights from the academic literature, policy leads and responders to identify key recommendations for communicating before, during and after CBRN events – with a particular focus on how best to support the groups and communities likely to experience the greatest impacts.

I will be taking the recommendations from this report to the CTPN board and into our future work. Please reach out if you would like to be part of this initiative or if you have any comments on the report. We would also welcome feedback on how the report is being used.

Superintendent Lee Kendrick
Chair, CBRNE Expert Working Group

Contact Us

The CTPN CBRNE Expert Group is a point of reference, advice and support for those involved in planning, training and exercising, both within and beyond the CTPN. We welcome inquiries from those seeking further information about our work or support in relation to their work as part of planning and preparedness activities. For more information you can contact us at ctpn@london.gov.uk or via the Expert Group Chair at cbrnadmin@westmidlands.police.uk.

References

[1]Rubin, G.J., Chowdhury, A.K., and Amlôt, R. (2012) How to communicate with the public about chemical, biological, radiological, or nuclear terrorism: a systematic review of the literature. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science*, 10(4):383-95. Available here.

[2]Carter, H. Drury, J. and Amlôt R. (2020) Recommendations for improving public engagement with pre-incident information materials for initial response to a chemical, biological, radiological or nuclear (CBRN) incident: A systematic review. *International Journal of Disaster Risk Reduction*. Available here.

[3]Kamal, A., Hodson, A., and Pearce, J.M. (2021) A rapid systematic review of factors influencing COVID-19 vaccination uptake in minority ethnic groups in the UK. *Vaccines*. 9(10):1121. Available here.

[4]Kamal, A. and Bear, L. (2023) *Community Champions policy: key principles and strategic implications for recovery from Covid-19*. Available here

[5]Pearce, J.M. (2023) Responding to Radiological Terrorism. In C Hobbs, S Tzinieris & Aghara, S.K. (Eds) *The Oxford Handbook of Nuclear Security*. Oxford University Press. Available here.

[6]Rogers, M. B., Krieger, K., Jones, E., and Amlot, R. (2014) Responding to emergencies involving chemical, biological, radiological and nuclear CBRN hazards: Information for emergency responders about public responses to CBRN incidents. Available here.

[7]Rogers, M. B., Jones, E., Krieger, K., & Amlot, R. (2014) Responding to emergencies involving chemical, biological, radiological and nuclear (CBRN) hazards: Information for members of the public. Available here.

[8]Stone, F.P. (2007) *The "Worried Well" Response to CBRN Events: Analysis and Solutions*. Alabama: USAF Counterproliferation Center. Available here.

[9]Gupta, K., Ripberger, J., Fox, A., Maiello, M. Peach, K. and Jenkins-Smith, H. (2024) Risk communication and public response to potential radiation emergencies in New York City. *Risk Analysis*. Available here.

[10]Drury, J., Cocking, C. and Reicher, S. (2009) Everyone for themselves? A comparative study of crowd solidarity among emergency survivors. *British Journal of Social Psychology,* 48: 487–506. Available here.

[11]Proulx, G. And Fahy, R.F. (2003) Evacuation of the World Trade Center: What went right? *Proceedings of the CIB-CTBUH International Conference on Tall Buildings*, October 20-23 2003, Malaysia, CIB Publication No. 290. Available here.

[12]Sheppard, B., Rubin, G.J., Wardman, J.K. and Wessely, S. (2006) Terrorism and dispelling the myth of a panic prone public. *Journal of Public Health Policy*, 27: 219-245. Available here.

[13]BBC (2024) Novichok inquiry: What have we learnt? 3 December 2024. Available here.

[14]Gray, G.M., and Ropeik, D.P. (2002) Dealing with the dangers of fear: The role of risk communication. *Health Affairs*, 21(6):106-16. Available here.

[15]Pearce, J.M., Rubin, G.J., Selke, P., Amlôt, R., Mowbray, F. and Rogers, M.B. (2013a) Communicating with the public following radiological terrorism: Results from a series of focus groups and national surveys in Britain and Germany. *Prehospital and Disaster Medicine*, 28(2), 1-10. Available here.

[16]Sky News (2020) Streatham terror attack: Woman asks police to delay café evacuation. Available here.

[17]Lemyre, L., Clement, M., Corneil, W. et al. (2005) A psychosocial risk assessment and management framework to enhance response to CBRN terrorism threats and attacks. *Biosecurity and Bioterrorism: Biodefense Strategy, Practice and Science*, 3(4): 1-15. Available here.

[18]Lemyre, L., Johnson, C., and Corneil, W. (2010) Psychosocial considerations for mass decontamination. *Radiation Protection Dosimetry*. 142(1):17-23. Available here.

[19]Pearce, J.M., Rubin, G.J., Amlôt, R., Wessely, S. and Rogers, M.B. (2013b) Communicating public health advice following a chemical spill: Results from national surveys in the UK and Poland. *Disaster Medicine and Public Health Preparedness*, 7(1), 65-74. Available here.

[20]Lemyre L, Corneil, W., Johnson, C., and Boutette P. (2010) Psychosocial considerations about children and radiological events. *Radiation Protection Dosimetry*, 142(1):70-6. Available here.

[21]Zhao, X., Dughly, O., Simpson, J. (2016) Decontamination of the pediatric patient. *Current Opinion in Pediatrics*, 28(3):305-9. Available here.

[22]CDC (2003) CDC's Guiding Principles to Promote an Equity-Centered Approach to Public Health Communication. *Tools for Public Health Practice,* 20. Available here.

[23]UKHSA (2025) Health Equity for Health Security Strategy 2023 to 2026. Available here.

[24]Munari, S.C., Wilson, A.N., Blow, N.J., Homer, C.S.E. & Ward, J.E. (2023) Rethinking the use of 'vulnerable'. *Australian and New Zealand Journal of Public Health, 45*(3), 197-199. Available here.

[25]Logan, P.E., Rundblad, G., Rogers, M.B., Amlôt, R., and Rubin, G.J. (2025) Reducing health inequalities in disasters: A cross-sectional study of the viability of 'vulnerability' terminology and of priority lists in the UK. *Public Health in Practice,* 9. Available here.

[26]McLelland, E., Amlôt, R., Rogers, M.B., Rubin, G.J., Tesh, J. and Pearce, J.M. (2017) Psychosocial and physical impacts of extreme events on older adults: Implications for communications. Prehospital and Disaster Medicine, 11(1), 127-134. Available here.

[27]Carbon, D., Arnold, A., Görgen, T., & Wüller, C. (2022) Crisis communication in CBRNe preparedness and response: Considering the needs of vulnerable people. *International Journal of Disaster Risk Reduction, 79*, 11. Available here.

[28]SPI-B (2020) *Public Health Messaging for Communities from Different Cultural Background*. Available here.

[29]Brooks, S.K., Rogers, M.B. and Pearce, J.M. (2025) Communicating with diverse populations before, during and after Chemical, Biological, Radiological and Nuclear (CBRN) events: Systematic literature review. Available here.

[30]Pearce, J.M., Parker, D., Lindekilde, L. and Rogers, M.B. (2019) Communicating with the public about marauding terrorist firearms attacks: Results from a survey experiment on factors influencing intention to 'Run Hide Tell'. *Risk Analysis*, 39(8): 1675-1694. Available here.

[31]Lindekilde L., Pearce, J.M., Parker, D. and Rogers, M.B. (2021) '"Run, Hide, Tell" or "Run, Hide, Fight"? The Impact of Diverse Public Guidance about Marauding Terrorist Firearms Attacks on Behavioral Intentions during a Scenario-based Experiment in the United Kingdom and Denmark', *International Journal of Disaster Risk Reduction*, Vol 60, 15 June 2021, 102278. Available here.

[32]Gauntlett, L, Amlôt, R. and Rubin, G.J. (2019) How to inform the public about protective actions in a nuclear or radiological incident: A systematic review. *Lancet Psychiatry,* 6:22-80. Available here.

[33]Bass, S.B., Greener, J.R., Ruggieri, D. et al. (2015) Attitudes and perceptions of urban African Americans of a "dirty bomb" radiological terror event: Results of a qualitative study and implications for effective risk communication. *Disaster Medicine and Public Health Preparedness, 9*(1), 9-18. Available here.

[34]Wray, R.J. & Jupka, K. (2004). What does the public want to know in the event of a terrorist attack using plague? *Biosecurity and Bioterrorism: Biodefense Strategy Practice and Science, 2*(3), 208-215. Available here.

[35]Rebmann, T., Charney, R.L., Loux, T.M., Turner, J.A. and Nguyen, D. (2019). Firefighters' and emergency medical service personnel's knowledge and training on radiation exposures and safety: Results from a survey. *Health Security, 17*(5), 393-402. Available here.

[36]Havârneanu, G.M., Petersen, L., Arnold, A., Carbon, D. and Görgen, T. (2022). Preparing railway stakeholders against CBRNe threats through better cooperation with security practitioners. *Applied Ergonomics, 102,* 103752. Available here.

[37]Santos, S., Helmer, D., Fotiades, J., Copeland, L. and Simon, J. (2007). Developing a bioterrorism preparedness campaign for veterans: using focus groups to inform materials development. *Health Promotion Practice, 8*(1), 31-40. Available here.

[38]Carbon, D., Arnold, A., Görgen, T., and Wüller, C. (2022). Crisis communication in CBRNe preparedness and response: Considering the needs of vulnerable people. *International Journal of Disaster Risk Reduction, 79*, 11. Available here.

[39]Lasker, R.D. (2004). Redefining readiness: Terrorism planning through the eyes of the public. New York: Center for the Advancement of Collaborative Strategies in Health, New York Academy of Medicine.

[40]McGough, M., Frank, L.L., Tipton, S., Tinker, T.L. and Vaughan, E. (2005). Communicating the risks of bioterrorism and other emergencies in a diverse society: A case study of special populations in North Dakota. *Biosecurity and Bioterrorism, 3*(3), 235-245. Available here.

[41]Blanchard, J.C., Haywood, Y., Stein, B.D., Tanielian, T.L., Stoto, M., Lurie, N. (2005) In their own words: Lessons learned from those exposed to anthrax. *American Journal of Public Health*, 95(3):489-95. Available here.

[42]Quinn, S.C., Thomas, T. and McAllister, C. (2005) Postal workers' perspectives on communication during the anthrax attack. *Biosecurity and Bioterrorism: Biodefence Strategy, Practice & Science*, 3(3):207-15. Available here.

[43]Michie, S., van Stralen, M.M., and West, R. (2011) The behaviour change wheel. A new method for characterizing and designing behaviour change interventions. *Implementation Science*, 6. Available here.

[44]Wray, R.J., Harris, J.K., Jupka, K., et al. (2012) Individual and community influences on adherence to directives in the event of a plague attack: Survey results. Disaster Medicine and Public Health Preparedness, 6(3):253-62. Available here.

[45]Carter, H. and Amlôt, R. (2016) Mass Casualty Decontamination Guidance and Psychosocial Aspects of CBRN Incident Management: A Review and Synthesis. *PLOS Currents Disasters*, Available here.

[46]Carter, H., Weston, D., Betts, N., Wilkinson, S. and Amlôt, R. (2018) Public perceptions of emergency decontamination: Effects of intervention type and responder management strategy during a focus group study. *PLoS ONE* 13(4). Available here.

[47]Dennis, A., Weston, D., Amlôt, R., Arnold, A., Carbon, D. and Carter, H. (2023) The role of pre-incident information and responder communication in effective management of casualties, including members of vulnerable groups, during a decontamination field exercise. *International Journal of Disaster Risk Reduction,* 94:18. Available here.

[48]Taylor, K., Balfanz-Vertiz, K., Humrickhouse, R. and Jurik, C (2008) Decontamination with at-risk populations: Lessons learned. *The Internet Journal of Rescue and Disaster Medicine*, 9(1):1-18. Available here.

[49]Zod, R., Fick-Osborne, R. and Peters, E.B. (2014) A functional needs approach to emergency planning. *Disaster Medicine and Public Health Preparedness*, 8(4):301-9. Available here.

[50]Chiriboga, D. (2006) Cultural considerations: Caring for Culturally Diverse Communities in the Aftermath of Terrorist Attacks. B. Bongar (Ed.) *Psychology of Terrorism*. Oxford University Press. Available here.

[51]FEMA (2022) Key planning factors and considerations for response to and recovery from a chemical incident. Available here.

[52]Perko T. (2016) Risk communication in the case of the Fukushima accident: Impact of communication and lessons to be learned. *Integrated Environmental Assessment and Management*,12(4):683-6. Available here.

[53]Svendsen, E.R., Yamaguchi, I., Tsuda, T., Guimaraes, J.R.D. and Tondel, M. (2016) Risk Communication Strategies: Lessons Learned from Previous Disasters with a Focus on the Fukushima Radiation Accident. *Current Environmental Health Reports*, 3(4):348-359. Available here.

[54]CTPN (2023) Supporting People After Terrorism: A compendium of Learning, Practices and Resources. Available here.