
COMMUNICATION AND ALERT FOR MASS EVACUATIONS: IMPROVING ACCESSIBILITY FOR PEOPLE WITH DISABILITIES.

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Executive Summary

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This is what we want to answer / objectives of the research

Evacuations are highly interdisciplinary undertakings that involve a variety of orders of government, sectors, and organizations. The people responsible for mass evacuations are confronted with significant challenges: they must coordinate limited resources in a dynamic context, often in degraded conditions, and their decisions are consequential, time-constrained, and sometimes irreversible. These events are happening more often, and at a growing and significant human, financial, and environmental cost.

There are four key stages to evacuation: communication and alert, transportation, shelter, and return to community. This paper focuses on communication and alert and is part of a larger project looking to improve evacuation of people with disabilities, including considerations for all four stages. The purpose of the paper is to understand how we can improve communication about evacuation of people with disabilities. Unless otherwise stated, we refer to “communication” as the act of conveying information to a given audience, specifically information about evacuation or risks more generally.

Advancements in accessibility and rights for people with disabilities have led to increased concern at all orders of government, over improving emergency services for people with disabilities with a particular focus on the availability of accessible information. Often the main focus of emergency managers has been to increase public emergency awareness, but how can emergency processes be better informed by the perceptions and social context of specific communities, especially people with disabilities?

Our Approach and Methods

Our specific objectives included (1) partnering leading risk scholars with those that are responsible for mass evacuation and organizations that represent the concerns of persons with disabilities to develop a shared understanding of evacuation risks, (2) examining what guides the thinking and actions of those responsible for evacuation, considering the knowledge we have of certain risks and the contextual pressures exerted on the regime, and (3) improving dialogue among researchers, practitioners, and people with disabilities on the subject of evacuation.

We surveyed 29 people with disabilities and some caregivers and eight emergency managers to understand key considerations from different perspectives. A roundtable on the topic of communication and alert in emergency evacuation was conducted on June 14, 2022, with 23 members of the Advisory Board and invited stakeholders. We reviewed academic literature and other publicly available material, such as reports, media articles, and policies.

We used a cybernetic understanding of control, which examines a system's ability to gather information, set standards, and change behaviour. We collected and analyzed data in our survey and roundtable according to these three themes.

What we found:

- **Many factors influence risk perception for individuals.** The behaviour of others, personal experience with risks, trust in institutions and authorities, and socio-demographic considerations are among key factors that influence how a person receives, interprets, and responds to risk messages. Sources of information are not trusted equally.
- **Sociological and institutional factors influence how risks are shaped and managed; emergency management is a highly complex, multi-sectoral, and interdisciplinary field.** Risk communication is complex with focus shifting from physical infrastructure to social systems. There are several organizations and sectors involved in the development and distribution of risk messages, which further complicates the space.
- **Mental Model approaches can be expanded to improve integration of expert knowledge between people with disabilities and experts in risk communications; lived experience of people with disabilities is a form of expert knowledge.** Mental Model approaches are risk communication methods that work to align different ways of thinking of risks by experts and the public. When working with people with disabilities, mental models should be informed by the knowledge and lived experience of people with disabilities in addition to risk expert knowledge.

Findings from the surveys:

- **Lack of public experience with evacuation:** 90% of survey respondents (people with disabilities and caregivers) have not experienced an evacuation, which poses significant challenges to emergency managers. People's plans likely have significant gaps. Regardless of advanced preparation, people may experience emotional and psychological stress that will further complicate an evacuation.
- **Lack of awareness of evacuation supports for people with disabilities:** All survey respondents (people with disabilities and caregivers) rated the perceived accessibility of current evacuation processes between 3 and 6 out of 10, with 30% rating this 4 out of 10. This suggests modest to low confidence in current evacuation processes to meet a variety of functional needs and current awareness of supports for people with disabilities and caregivers.
- **People with disabilities are looking for information on accessible transportation options, expected access to supplies, and who to reach out to for support in an evacuation.** Survey respondents (people with disabilities and some caregivers) identified areas of concern relating to evacuation and accessibility: transportation, access to equipment and supplies, reliance on someone to intervene – especially for people without personal support networks, knowledge of where to relocate, how to get there, and how to access medical treatment.
- **There are jurisdictional and organizational differences.** 60% of respondents (emergency managers) rate the accessibility of current evacuation processes at 6 out of 10 whereas the remaining 40% rate this 2 out of 10. This suggests a discrepancy, even within the emergency management community, about the degree of accessibility of

current evacuation processes. Part of this can be attributed to differences between jurisdictions, the disconnect between strategy, standards, and implementation, as well as issues communicating evacuation planning in advance that reaches the public effectively.

This is what we recommend

- Robust governance arrangements that are agile, adaptable, and take these complex issues into account; are rehearsed in advance; have appropriate governance mechanisms in place to connect with the right people at the right time;
- User-friendly tools to help people better understand the complexity of evacuation for persons with disabilities and how to take a variety of social, cultural, practical, and legal considerations issues into account, as well as respond to diverse functional needs;
- Better understanding of who the key stakeholders are (e.g., emergency organizations, first responders, volunteers, building managers) and their responsibilities. Ensure roles and responsibilities for an emergency evacuation are well known and communicated in advance of an emergency, including:
 - Members of the public, specifically people with disabilities, knowing what they are responsible for, how to connect with necessary services, what their expectations for support should be, and their options for transportation and shelter;
 - Staff and volunteers for various organizations and orders of government involved in evacuation;
 - Understanding liability considerations to plan for evacuations, especially for building owners, employers, and business owners; and
 - Understanding how demographic changes and government policies are changing the context. For example, more people with disabilities and seniors are living at home; rates of disability increase as the population ages.
- Identify disparities between communication standards and practice; training and behaviour change can help fill in these gaps.
- Implement mechanisms where people with disabilities support the development and evaluation of risk communications. Knowledge and lived experience of people with disabilities should be treated as a form of expert knowledge.
- Since many people have not experienced an evacuation, communication strategies to prepare for many first-time evacuees will be important. Communities should be engaged in advance of an emergency to prepare, but many challenges can still arise with first-time evacuees even with advance preparation.
- Risk communications should be readily available in accessible formats, developed to meet the needs of specific communities and populations, and distributed through several sources with particular attention to grassroots organizations and community leaders. This is especially important when there is distrust of authorities.

Sample of questions that emerge for our discussion

Do stakeholders have appropriate and effective information-gathering processes, including knowledge of where people with disabilities are in the community and what supports they need? How should we communicate with persons with disabilities, when should this occur, and who should lead these efforts?

Most of the focus is on standards to ensure accessible communication; however, behaviour change is also necessary as the presence of standards does not always mean effective or consistent implementation. Are the right standards in place and are those responsible aware of those standards?

How do we integrate the lived experience of people with disabilities in emergency processes with expert knowledge about roles and responsibilities for evacuation?

What are the liability considerations regarding accessible evacuations, particularly for residential and commercial buildings? Who is responsible for evacuation planning and communicating such responsibilities / plans? What kind of tools exist / could exist to help persons with disabilities and emergency managers to address better the needs of people with disabilities?

**Part I: Key risk communication theory
concepts and understanding public
perceptions of risk**

1. Introduction

The people responsible for mass evacuations are confronted with significant challenges: they must coordinate limited resources in a dynamic context, often in degraded conditions, and their decisions are consequential, time-constrained, and sometimes irreversible. These events are happening more often and at a growing and significant human, financial, and environmental cost.

Advancements in accessibility and rights for people with disabilities have increased concern over improving emergency services for people with disabilities at all orders of government. Often the main focus of emergency managers is to increase public emergency awareness, but how can emergency processes be better informed by the perceptions and needs of the public, especially people with disabilities?

There are four key stages to evacuation: communication and alert, transportation, shelter, and return to community. This paper focuses on communication and alert and is part of a larger project looking to improve evacuation of people with disabilities, including considerations for all four stages.

The purpose of the paper is to understand how we can improve communication about evacuation of people with disabilities. Unless otherwise stated, we refer to “communication” as the act of conveying information to a given audience, specifically information about evacuation or risks more generally.

METHOD: We surveyed 29 people with disabilities and caregivers and eight emergency managers to understand key considerations from both perspectives.

To understand our ability to control an emergency response, we can apply elements of cybernetic control to analyze how a system gathers information, sets standards, and changes behaviour, such as an emergency services system (Quigley et al. 2017).

Mass evacuations are costly and complex, and concern over improving accessibility is increasing

Disasters have caused hundreds of billions of dollars of damage and killed hundreds of thousands of people over the past five years, and these costs are rising (Klomp and Valckx 2014; Roy et al. 2020; Sadri et al. 2021). Globally, at least 1.35 million people have been killed across 7,000 natural disasters between 1996 and 2015 (CRED and UNISDR 2016; Shoji and Murata 2021). The top ten climate disasters in 2021 alone cost over \$170 billion (Kramer and Ware 2021, 5). Over the past decade, natural disasters have killed an average of 45,000 people globally per year, which accounts for 0.1% of annual global deaths (Ritchie and Roser 2021).

People with disabilities have a higher mortality rate in disasters than people without disabilities (Han et al. 2017; Dai and Hu 2022; Neuhauser et al. 2013). People with disabilities often face challenges to prepare for and recover from disasters due to poverty, discrimination, and limited access to information (National Council on Disability 2014; Dai and Hu 2022). Despite these disproportionate impacts, people with disabilities can be overlooked in emergency responses (Dai and Hu 2022).

After-the-fact reports have emphasized the importance of disaster communications for people with disabilities, such as the 2004 floods in Bangladesh (Alexander et al. 2012), the 2005 Hurricane Katrina (Sullivan and Häkkinen 2006), 2012 Hurricane Sandy (Mukasa 2019), and the 2011 Christchurch earthquakes in New Zealand (Good et al. 2016; Dai and Hu 2022). Despite this, people with disabilities face barriers to accessing information about disasters and face increased risks, but current response efforts are not fully accessible (e.g., evacuation, communications, and assistive devices) (IFRC 2018, 92-93). Nearly 22% of the Canadian population identifies as having a disability (Statistics Canada 2018) and this number will only grow as the population ages and definitions of “disability” continue to evolve.

Concern for persons with disabilities in emergency management has been growing nationally and internationally since the introduction of the United Nations Convention on the Rights for Persons with Disabilities (UNCRPD). Many jurisdictions have agreed that the access and functional needs of persons with disabilities should be integrated within each stage of an emergency—planning, response, and recovery. The [Sendai Framework](#) emphasizes that people with disabilities should lead and be central to founding emergency initiatives on principles of universal design. This is echoed at the Federal level in Canada, as these principles are captured in national emergency management frameworks (e.g., [Emergency Management Strategy for Canada – Towards a Resilient 2030](#)) (Public Safety Canada 2019, 9). Such agreements can act as normative frameworks to assess governments’ actions and hold them accountable (Stienstra 2018).

There are multiple orders of government and organizations across public, private, and non-profit sectors involved in emergency evacuation, and diverse jurisdictions possess their own challenges that necessitate specific approaches. All organizations involved in emergency management require the right knowledge, skills, and resources to empower people with disabilities with information and resources to support themselves to the extent possible. This includes preparing people with disabilities for an emergency by providing them with information about whom to contact and for what purpose, responsibilities of the household, and roles of different organizations. Additionally, organizations responsible for evacuation need the knowledge to support people with disabilities during an evacuation, including a variety of accommodation options to meet diverse functional needs.

2. A balancing act: Tensions at the heart of evacuation

Public Safety Canada recommends individuals prepare to care for themselves for at least 72 hours during an emergency; however, there are disparities in individuals' capacity to prepare themselves (Public Safety Canada 2022). Factors such as age, gender, income, education, abilities, and caregiving responsibilities influence the degree to which a household can prepare for an emergency. The ability to prepare supplies such as food, clothing, and medications varies by household and there are additional considerations for people with disabilities such as providing for guide animals, supplies for assistive devices, and having necessary medications on hand, often in addition to inequities such as financial constraints.

The Sendai Framework for Risk Reduction commits Canada to inclusive disaster risk–reduction approaches and “requires empowerment and inclusive accessible and non-discriminatory participation”, especially for the poorest people. An intersectional framework considering gender, age, disability, and cultural perspectives can guide policies and practices. Leadership from women and youth is noted as being especially important (Stienstra et al., 2021, 8).

Risk communication is a key stage but not without complexity

Everyone processes risks differently. When presented with a risk such as a flood, individuals often look to their past experiences, reflect on their present situation and responsibilities such as children or elderly people in the household, and interpret information through lenses based on socio-demographic factors. Understanding risk perception helps us understand and predict people's behaviour. It also helps us improve communication between technical experts and lay people, or the public (Burns 2012).

Scholars have studied risk communication for decades to improve practices and understand both the expected and unexpected impacts of risk communication (Sheppard et al. 2012). Risk communications can be used for different purposes. For example, during the preparedness phase, it can spur people to action by evoking negative public perceptions of a risk or positive perceptions to reduce the public's fear of a risk (Shine 2001; Keller et al. 2006; Sheppard et al. 2012). No one communications plan is adequate for all crises, as each emergency has unique circumstances that need to be incorporated in the content of risk communication (Avery et al. 2016; Coombs 2020; Cannaerts 2021).

Generally, there are seven steps between receiving a message and taking action. This decision-making process is delayed when messages are not understood and hastened when messages are clear and relevant (Cahyanto and Pennington-Gray 2015):

1. Warning receipt
2. Affirming its credibility
3. Confirmation
4. Determination of relevance
5. Deciding if action is required
6. Deciding if the action is feasible
7. Deciding specific actions to be taken (Phillips and Morrow 2007).

Effective public crisis communication is honest, accurate, empathic, and timely (Cannaerts 2021). Communities need to prepare well in advance of an emergency and information-sharing can effectively increase awareness and therefore support disaster resilience (Press and Hamilton 1999; Kennedy 2002; Cutter and Finch 2008; Guikema 2009; Vespignani 2009; Dittenbaugh and Field 2013; Helbing 2013; Mortula et al. 2020; Sadri et al. 2021).

Social media networks are two-way channels that have changed how organizations communicate during an emergency and can impact crisis communication in both positive and negative ways (Andrade *et al.* 2020; Coombs 2020; Roy *et al.* 2020; Cannaerts 2021). Social media can be used to reach a broad audience quickly (Panagiotopoulos et al. 2016; Andrade et al. 2020). It is also an effective way to mobilize large groups of volunteers. Risk communication research has shown that people look to family and friends for information (Ploran et al. 2018), meaning information shared by family and friends on social media can influence others.

Other positive impacts of social media include enabling transparency and situational awareness. Social media can be both an alternative and supplement to traditional media (e.g., radio, TV, newspapers) since it can provide relevant information about the crisis itself and safety of family and friends, and facilitate requests for support (Yi and Kuri 2016). A study of disability networks in China during the COVID-19 pandemic found effective ways social media was used to empower members of the disability community and address gaps neglected by government agencies (e.g., converting information to accessible formats, coordinated donations, improving awareness of disability rights and independent living skills (Dai and Hu 2022)).

Concerns have been raised about the spread of misinformation through social media (Sutton et al. 2008; Starbird and Palen 2010; Sutton 2010, Stephens et al. 2015; Dai and Hu 2022). It is important to monitor social media because the spread of false information can be harmful and reach large audiences quickly, but this ability may be limited when resources are stretched during an emergency (Roozenbeek and Van Der Linden 2019). Access to social media and other digital technologies could be disrupted in an emergency due to limits on internet and cellular access. There are also general access issues regarding internet and mobile devices, such as the inability to buy or use such products (e.g., connectivity issues in rural areas) (Mileti and Peek 2000; Manoj and Baker 2007; Murray-Tuite and Wolshon 2013; Stephens et al. 2015). This is especially concerning for people with disabilities who rely on assistive technologies.

Finally, it is one thing to have emergency alert communications at the ready, but it is another to decide whether and when to use them. For example, in British Columbia, despite a high degree of planning, the emergency management office took 50 minutes to issue a tsunami warning following a 7.7 magnitude earthquake in 2012. In contrast, officials in the adjacent state of Washington released an alert in just over 10 minutes (CBC News, October 2012).

Evacuation alert is a type of risk communication with additional considerations

Evacuation messaging is a specific type of emergency communication. Calling for and acting upon an evacuation are both significant decisions that are costly to all involved. Shelter-in-place is on the opposite end of the spectrum to evacuation, but also brings similar considerations to light. Shelter-in-place means that an individual remains in their current location until notified of further action (Employment and Social Development Canada 2015). Many of these considerations are accentuated for people with disabilities. For example, as experienced during the COVID-19 pandemic, there are challenges to planning and stocking up on supplies such as medications and household products.

Deciding whether or not to evacuate is a complex process for members of the public. Communication channels, sources, and message content impact the rate of people evacuating and the speed with which they evacuate (Lindell and Perry 2012; Stephens et al. 2015). Evacuation communications can be for immediate evacuations such as wildfires, floods, and tornadoes or with more advance notice such as hurricane evacuation warnings (Tierney et al. 2001; Sutton 2010; Stephens et al. 2015). Generally, people go through a six-step process when deciding to evacuate: hearing, understanding, believing, personalizing, deciding, and performing (Mileti and Peek 2000). The time needed to move through these stages varies by individual (Stephens et al. 2015).

Receiving notice to evacuate does not mean someone will evacuate. Before hurricane/post-tropical cyclone Sandy in October 2012, nearly two-thirds of Long Beach, New York, did not evacuate despite clear warnings to do so. In contrast, at the peak of evacuation after the storm, an estimated 90% of people left the city due to infrastructure and housing damage (Ploran et al. 2018). Even in the cases of “mandatory” evacuations, if there is no punishment for non-compliance, then the evacuation order is essentially voluntary (Ploran et al. 2018).

2.1 Risk Psychology: How people receive, process, and act on risk messages

Risk psychology is helpful in understanding how people interpret and act on messages. Many psychological factors influence how someone will respond to communications about an emergency. Will they take the risk seriously? Will they believe the information is credible? And, how will they act as a result?

Psychologists and social psychologists have proposed frameworks to understand risk challenges, including the social amplification of risk framework (SARF)¹ (Kasperson et al. 1988) and the mental models² approach (Morgan et al. 2001). Mental models approaches work to align perspectives of lay people with expert views by addressing knowledge gaps.

Information from people with disabilities following disasters shows that experts need to gather more information about the knowledge and lived experiences of people with disabilities, and better integrate this in emergency management practices.

Mental Model approaches are risk communication methods that work to align different ways of thinking of risks between experts and the public

Many people cannot assess risks appropriately on their own. Risks can be undetectable by the senses (e.g., microscopic), be too technical for non-specialists (e.g., financial risks), and compete with many other pressures for attention. Experts understand technical aspects of risks better than the general public, and therefore the public relies on experts to communicate information about risks (Boase et al. 2017).

The mental models approach recognizes that perceptions are based on experience and many external factors. This offers the opportunity to identify risk communication gaps and misperceptions by working to align mental models from different perspectives (Bostrom et al. 1992; Aliperti et al. 2020). Although the value of two-way communications is recognized in mental models approaches, it assumes expert models will be more technically accurate than the public's (Sheppard et al. 2012; Boase et al., 2017; Aliperti et al. 2020).

Risk communication has traditionally been a one-way approach, meaning risk communications are developed by experts without sufficient public input, or by the public without input from experts. Two-way approaches, which involve both expert and lay-person knowledge, have been recognized as more effective at accounting for both the technical information of the risk and public concerns (Boase et al. 2017). Despite opportunities for different groups to discuss disaster preparedness together, it can be common to default to top-down communications approaches (Aliperti et al. 2020). Two-way approaches require dialogue between stakeholders, mutual learning, and voluntary participation (Gray, 1989; Aliperti et al. 2020). A key challenge is

¹ SARF explains how risks are amplified or attenuated by scientists, media, cultural groups, and interpersonal networks (Kasperson et al. 1988).

² A mental model is a set of principles from which people understand the processes that govern the creation and control of an environmental hazard (Bostrom et al. 1992; Aliperti et al. 2020).

that many people and organizations do not have the time or resources to engage in disaster preparedness proactively (Aliperti et al. 2020).

Many factors influence how a person responds to risk communication, especially the behaviour of others, personal experience with risks, and socio-demographic factors

Many factors impact how the public perceives a risk, which poses challenges for risk communicators in determining appropriate content for messages (Boase et al. 2017). Risk psychology raises questions about how risk messages can be designed so that target audiences can understand the message and take appropriate action. Trust, credibility, and building relationships with communities and grassroots organizations can help ensure that risk messages are meaningful and resonate with the target audience.

Many people look to the behaviour of family, friends, and community members in an emergency in addition to their own experiences with risks (Gladwin and Peacock 1997; Lindell et al. 2005; Wood et al. 2011; Sheppard et al. 2012; Hasan et al. 2011, 346; Stephens et al. 2015; Ploran et al. 2018). The affect heuristic refers to how individuals use their experiences to address new situations (Sheppard et al. 2012). This has implications for communications about an evacuation as many people have never experienced one.

The stronger the emotional response to a past risk, the more likely someone will take action against another risk (Gladwin and Peacock 1997; Slovic et al. 2004; Siegrist and Gutscher 2006; Mileti et al. 2011; Cahyanto and Pennington-Gray 2015; Huang et al. 2016). Additionally, people who have evacuated when it turned out not to have been necessary may be hesitant to follow future evacuation notices. Often, potential loss of utilities and inability to travel between locations are motivators to evacuate an area (Ploran et al. 2018; Kuligowski et al. 2022). When social cues (e.g., businesses closing, people evacuating) indicate that people perceive enough of a risk to act, others are more likely to follow (Huang et al. 2016).

Disaster resiliency efforts need to focus on more than physical infrastructure and consider social factors as well (Cutter et al., 2013; Sadri et al., 2017, 2021). These factors influence to varying degrees evacuation decisions and the sources people search for information (Cahyanto and Pennington-Gray 2015). Factors include gender (Carr 2001; Kozak et al. 2007; Huang et al. 2016), race/ethnicity (Pennington-Gray et al. 2012), age (Floyd and Pennington-Gray 2004), Indigeneity (Stienstra 2018), income (Floyd and Pennington-Gray 2004; Cahyanto and Pennington-Gray 2015), education (Kuligowski et al. 2022), disability, household location (e.g., rural or urban community), and household composition (e.g., elderly people and children in the household), and if an individual is unhoused (Dash and Gladwin 2007; Sadri et al. 2021; Shoji and Murata 2021).

Generally, women, interpret risk communication as being more credible than men do across different types of information sources (e.g., authorities, media, family and friends) and take action (Cahyanto and Pennington-Gray 2015). People with higher levels of education, such as a graduate degree, are more likely to evacuate than people with lower levels of education (Kuligowski et al. 2022). People with higher incomes are generally more likely to evacuate than those with lower incomes (Yabe and Ukkusuri 2020). Larger households and those with pets or

livestock are also less likely to evacuate than smaller households (Kuligowski et al. 2022). The type of emergency (e.g., wildfire, hurricane) also has an impact.

Intersectional frameworks can help analyze policies to understand the interconnection between these factors (Stienstra 2018). These factors also influence the resources and networks available to individuals in crisis, perceptions of caregiving responsibilities, and trust in authorities; all influence how an individual perceives risk and their capacity to respond. Anticipated personal impacts influence how people view risks to themselves, loved ones, and property and are strong motivators to take protective action (Huang et al. 2016); however, not everyone has the resources to take action. For example, during evacuations for Hurricane Harvey, non-poor White people were more likely to evacuate, and for longer periods, than poor racialized people (Hengfang et al. 2021).

“We know there are significant gaps that reflect systematic inequalities—with people with intellectual disabilities and Indigenous people with disabilities among the poorest, women with disabilities and people with intellectual disabilities experiencing the greatest violence in their lives, and Indigenous children with disabilities overrepresented in the child welfare system” (Stienstra 2018, 3).

Trust influences how people receive and act on risk messages

Many studies suggest that the most effective messaging that results in the desired behaviour comes from a variety of sources. For example, accurate information that is repeated through many trusted sources (e.g., government, traditional media, social media, person-to-person) is more likely to be acted upon, although sources are not trusted equally (Basolo et al. 2009; Smarick 2010; Sheppard et al. 2012).

The degree of trust in institutions and authorities influences how people process information (Earle 2007; Bearth and Siegrist 2021). Research has also found that different ethnic groups interpret messages from different sources with varied levels of trust (Pennington-Gray et al. 2012; Cahyanto and Pennington-Gray 2015).

Peters et al. (1997) identified three dimensions that people tend to look for in others to develop trust: knowledge and expertise; care and concern; openness and honesty (cited in Eiser and White 2006). These concepts can be applied equally at the individual and organizational level (Gillespie and Dietz 2009).

The concept of open communication, in particular, appears repeatedly in research on developing organizational trust (Clarke and Payne 1997) and encompasses free data-sharing, inclusive decision-making, and collaborative work (Firth-Cozens 2004; Jeffcott et al. 2006). Trust is easy to lose because negative information that can diminish people’s feelings of trust is more attention-grabbing, more powerful, and often more readily available than positive information (Eiser and White 2006). If established in advance of an emergency, trust can be effective, particularly in communities with poor law enforcement systems (Shoji and Murata 2021).

2.2 The Sociology of Risk: The importance of institutional and community context

The systemized interaction between institutions informs how risks are socially constructed and provides additional ways to look at risk. Due to growing technical, social, and organizational interdependencies across society, the debate about safety culture has shifted from single organizations to networks of organizations (Quigley et al. 2017).

Often, emergency communications are focused on one-way communications from various authorities to the public. Efforts to improve two-way communication channels with people with disabilities can encompass improvements to integrating knowledge and lived experience with the operational and strategic knowledge of emergency management professionals. How can we improve involving people with disabilities in emergency management efforts?

We have delineated discussions between the individual-psychological and the institutional-sociological for the purposes of this paper. There are many factors to consider in the sociology of risk. We have chosen to focus on the roles of public institutions, such as emergency management organizations, media, communities, and social capital.

Decisions to mandate evacuation are challenging to make and communicate. The decision to call an evacuation is complex, with many organizations, orders of government, sectors, jurisdictions, and factors involved. Whether there are shelter-in-place orders, or mandatory or voluntary evacuation orders, there are significant consequences and trade-offs. The information these decisions are based on is often continually changing. Processes to communicate evacuation orders also involve multiple orders of government, government agencies, emergency responders, non-governmental organizations, media, businesses, residential building managers, community leaders, and volunteers.

Some key questions that emerge include: How can our systems and institutions better prepare for and communicate evacuation messaging, especially in advance of emergencies? How can systemic and institutional barriers be better addressed to ensure all organizations involved in evacuation processes can support people with disabilities effectively, especially given current social barriers? Given the complexity of evacuations and communicating evacuations, how can organizations improve collaboration given the many interests involved? How can trade-offs and consequences of evacuation decisions be made more explicit and transparent?

Shifting focus from physical infrastructure to social systems

The social dimension of disability is important to consider, as the systemic exclusion of people with disabilities has enabled institutional barriers to be imposed on people with disabilities across society (Wildeman 2013). Disability is also an evolving concept (Dai and Hu 2022). People with disabilities in Canada experience a high rate of poverty, high rate of youth not in school, high level of extra costs related to living with disabilities, and a high level of violence directed towards them, demonstrating some of the social barriers imposed on people with disabilities (Stienstra 2018). The omission of accessible communications demonstrates systemic and institutional exclusion of people with disabilities (Dai and Hu 2022).

Many policies for disaster risk reduction focus on physical infrastructure; however, there is less focus on the role of social systems (Aldrich and Meyer 2015). Emergency communication and alert processes involve social systems (e.g., individuals and organizations that receive messages, social networks, warning sources) and infrastructure considerations such as transportation capacity (Stephens et al. 2015). A “multiple-actor approach” instead of an “organization-centred approach” is often called for in emergency communications (Cannaerts 2021). Besides advance planning, training is also important. Such training can involve many external public and private partners, as well as communication partners such as the media (Cannaerts 2021).

Social capital has been recognized as a factor in disaster preparedness and resilience (Aldrich 2012; Aldrich and Meyer 2015; Nakagawa and Shaw 2004; Shoji and Murata 2021). People with high levels of social capital can often access informational, emotional, and financial support more easily than people with lower social capital. Bonding social capital refers to connections with family members, neighbours, close friends, and colleagues whereas linking social capital refers to ties between a community and people in positions of influence in formal organizations such as banks, schools, housing authorities, and law enforcement (Shoji and Murata 2021). People with weaker social relationships often struggle more following disasters than people connected to well organized groups (Sadri et al. 2021). Social capital also has implications for digital personal networks, such as social media, including the organizations and people one is connected to and their ability to access accurate information and support from these networks.

Studies to understand the influence of social capital on decisions to evacuate have produced mixed results. Some found that those with higher social capital are more likely to evacuate because they can access disaster information and the support they need (Airriess et al. 2008; Aldrich and Sawada 2015; Collins et al. 2018; Dynes 2006; Klinenberg 2003; Metaxa-Kakavouli et al. 2018; Moore et al. 2004; Patterson et al. 2010; Riad et al. 2006; Sadri et al. 2017; Zakour 2008, Hanson-Easey et al. 2018; Shoji and Murata 2021). Socio-economically vulnerable individuals with limited resource accessibility particularly rely on these forms of community support (Eisenman et al. 2007; Hawkins and Maurer 2010). Some studies have identified that bonding social capital in particular increases likelihood of evacuation, especially for religious minorities, socio-economically vulnerable households, and people that do not trust law enforcement systems (Eisenman et al. 2007; Hawkins and Maurer 2010). Social capital has also shown negative effects on evacuation behaviour by lowering the perception of the disaster’s severity (Wolf et al. 2010) and motivating people to help others instead of evacuating themselves (Horney et al. 2010; MacDougall et al. 2014).

The decision to order a mandatory evacuation is layered and complex

To order an evacuation will likely cause public distress, subject people to costly preparations and logistics to evacuate themselves, strain resources, mobilize many professionals and volunteers, and cause disruptions to traffic. Decision-makers must make the call with the best information available to them at the time, and in a crisis this information can be continuously evolving (Krupa 2018).

On one hand, failing to mandate an evacuation could mean death, injury, and lack of access to medical care, utilities, and food. On the other, ordering an evacuation is costly to both individuals and governments, and can mean expensive stays in shelters or alternative accommodations (e.g., residence of a family member or friend away from the danger). No matter the decision, lives, homes, incomes, and resources hang in the balance (Krupa 2018).

The decision to order a voluntary or mandatory evacuation relies on forecasts, trust of residents in authorities, available communication networks, capacity of roads and transportation networks, availability of shelters, resources to move elderly or ill patients, and potential economic impacts (Krupa 2018).

Following Hurricane Harvey, the mayor of Houston, Sylvester Turner, defended his decision not to evacuate. He stated that to put 6.5 million people on the road through an evacuation order would have created a nightmare (Krupa 2018). In contrast, one of the regrets of the mayor of New Orleans, Ray Nagin, following Hurricane Katrina was not issuing the mandatory evacuation earlier. He stated that if he had received information that the storm was something that hadn't been seen in 33 years, he would have mandated an evacuation sooner (Flessner 200; Krupa 2018).

There are several organizations and sectors involved in the development and distribution of risk messages, which further complicates the space

There are many organizations involved in the development and distribution of risk messages across sectors and jurisdictions. Municipal and provincial government emergency management offices, first responders (e.g., police, fire department, emergency health services), government agencies and departments, non-governmental organizations, and media organizations (Kruger et al. 2019). Traditional news media is a common way many public organizations communicate information to the public (Austin *et al.* 2012). The accuracy of information in the content distributed is important, as well as the specific media outlets that disseminate it. Distributing risk messages to a variety of media channels is often beneficial (Austin *et al.* 2012; Cannaerts 2021).

The after-action report for evacuations in North Carolina during Hurricane Florence in 2018 noted that extended partnerships and collaborations before the event strengthened contingency plans to manage traffic flow and decrease evacuation time. The report also noted that communications about shelter were an issue, as shelters were required to open longer than expected and there were shortages of medical supplies because the storm lasted longer than expected (Kruger et al. 2019).

This calls attention to coordination and governance of multiple institutions across orders of government, jurisdictions, and sectors that are involved in evacuation processes, and communicating evacuation orders. There are many competing factors and interests to address before an emergency because during a crisis resources are stretched and decisions about what to prioritize are made quickly. Building these relationships and establishing trust among institutions in advance of an emergency has been shown to improve the general success of evacuations.

2.3 Accessible risk communications need to consider diverse functional needs, and standards do not always mean effective implementation

There are many accessibility factors to consider when facilitating risk communication. Access to information is often limited for people with disabilities, as experienced during the COVID-19 pandemic where people with disabilities found communications unclear, conflicting, and not readily available in accessible formats. These communication barriers were accentuated for young people, people with sensory disabilities, and people with intellectual disabilities (Stienstra et al. 2021).

The COVID-19 pandemic has demonstrated that having standards for accessible communication does not mean effective implementation (Stienstra et al. 2021, 34). People with disabilities have experienced challenges with access to and affordability of phones and internet, especially people who live in poverty or are racialized, Indigenous, have families, or reside in rural communities (Stienstra et al. 2021; ASC 2021b). Increased focus on evaluation and improvement of existing initiatives can work to close these gaps (Aliperti et al. 2020).

Even when information has been available in alternative formats, such as sign language (ASL) interpretation, these approaches were not always effective. For example, broadcasters have limited the view of ASL interpreters in frame (Stienstra 2018) and captioning or use of subtitles has been inconsistent (Neuhauser et al. 2013). ASL users share a “unique set of values, social behaviors and other characteristics recognized as ‘Deaf culture’ that are not always considered” (Neuhauser et al. 2013).

Operational and logistical considerations

Experts have developed strategies for risk communication that include identifying target audiences, identifying the most appropriate messaging for that audience, considering in advance how risk messages are interpreted, considering diverse perspectives, involving community members, using multiple communication channels and consistent messaging across them, and considering the social context of risks (Sheppard et al. 2012, 3-4). Relationship building, strategic thinking and information sharing within and outside an organization are factors to consider in risk communication planning (Horsley and Barker 2002; Gilstrap et al. 2016; Cannaerts 2021).

Advocates for disabled persons call for accessible communication practices and emphasize that communications should implement accessible universal design principles from the start (Neuhauser et al. 2013; Stienstra 2018; Government of Canada, 23 October 2020; Canadian Hearing Services 2022). Messages need to include information relevant to people with many different functional needs, such as information regarding service animals, assistive technologies and devices, and access to medical services and medications.

People with mobility impairments have faced challenges to access information applicable to their specific needs, such as use of assistive devices, technologies, and medication (Dai and Hu 2022). Not all webpages and mobile applications are accessible to all types of abilities and

functional needs (Dai and Hu 2022). One approach to disaster communication is to use mobile applications; however, there can be issues with availability, usability, and awareness of such applications. As seen with the Government of Canada's COVID-19 mobile app, availability of a tool does not mean it will be used (Aliperti et al. 2020).

Inclusive policies should “offer redress for disability disadvantages, recognize the stigma associated with disabilities, ensure full participation in all its unique manifestations, and provide necessary accommodations” (Stienstra 2018, 6). Information should go beyond details of the disaster and also support behaviour change such as acquiring supplies, while recognizing challenges people with disabilities face, such as a lack of information and limited financial resources (Dai and Hu 2022).

There are intersectional barriers such as literacy, language, and culture to consider as well (Neuhauser et al. 2013). Accessible communication for people with intellectual disabilities has additional considerations, as they must be “clear, in plain language, repeat directions at least three times, deliver instructions often at an elementary school reading comprehension level, and if possible, integrate pictures” (Dai and Hu 2022, 12 and Kailes 2011).

Accessibility Standards Canada (ASC) has emphasized that accessible information must be clear and easy to use, presented in predictable and barrier-free ways, integrate well with assistive technologies, be readily available in a variety of formats, use plain language, and be developed and evaluated by people with lived experience (ASC 2021a; Stienstra 2018; Government of Canada, 23 October 2020).

For web content, the ASC states digital information should be perceivable, operable, understandable, and robust (Government of Canada, 23 October 2020). The Government of Canada has specific style guides for accessible social media content, such as image captioning, subtitles, links to alternative formats, and transcripts of podcasts and videos (Government of Canada, 23 October 2020).

People with disabilities may face financial, physical, or intellectual barriers to accessing digital communications (Stienstra et al. 2021). This especially impacts people who are deaf or hard of hearing, those with intellectual disabilities, older adults with disabilities, and people with mental health disabilities (Stienstra et al. 2021). Disability advocacy organizations are necessary to bridge these gaps, as well as to develop, test, disseminate, and evaluate emergency messaging (Stienstra 2018). Leaders in these communities often have lived experience, professional expertise, and social capital in their respective fields, which can be effective for delivering effective emergency communications (Dai and Hu 2022).

There are specific considerations for First Nations, Inuit, and Métis communities. It is recommended that emergency information “be available in Indigenous languages and shared through representatives of Indigenous communities to ensure accessibility and cultural appropriateness for Indigenous persons with disabilities” (Stienstra et al. 2021, 91).

Emergency communicators should be aware of emergency processes on the ground to communicate information effectively and answer questions. For example, knowledge of evacuation routes and transportation considerations can be helpful in sharing information on how people should travel away from an emergency situation (Stephens et al. 2015). It is important for emergency planners to understand the links between information, human behaviour, and the resulting infrastructure issues (Stephens et al. 2015). By coordinating

information-spreading and traffic-management strategies, synergistic strategies can be identified and lead to more rapid evacuation while mitigating congestion to the extent possible; however, there are many logistical constraints that need to be considered (Stephens et al. 2015).

Part II: Our study: How we improve

3. Our Approach and Methods

Our specific objectives were to (1) partner leading risk scholars with those responsible for mass evacuation to develop a shared understanding of evacuation risks, (2) examine what guides the thinking and actions of those responsible for evacuation, considering the knowledge we have of certain risks and the contextual pressures exerted on the regime, and improve dialogue between researchers, practitioners, and communities in this domain. We used a cybernetic understanding of control, which examines a system's ability to gather information, set standards and change behaviour. We collected and analyzed data in our survey and roundtable according to these three themes.

Emergency evacuation is an interdisciplinary event and involves organizations from many sectors and orders of governance. In 2020 we established an Advisory Board to recognize the interdisciplinary nature of emergency evacuation and implement principles of community-based participatory research. The Board's members guided research for the project, including providing feedback on research instruments (e.g., survey guides), reviewing materials, and participating in roundtable sessions. The Advisory Board comprised academics and representatives from partner organizations in the public sector, private businesses, emergency services, disability organizations, and NGOs.

Scholarly literature and other publicly available material was reviewed, such as media articles and policies. Eight participants from public, private, and non-profit sector organizations responsible for evacuation completed a survey. A total of 29 participants who self-identified as having a disability or caregiver responsibilities were surveyed, including members of registered disability-related organizations, to understand the perspectives of persons with disabilities and their priorities during an evacuation.

Participants were recruited through the Advisory Board members and their respective organizations. The surveys were distributed by email and hosted on Opinio between October and December 2021. There were challenges to engaging representatives from emergency services due to the ongoing pandemic.

A roundtable on the topic of communication and alert in emergency evacuation was conducted on June 14, 2022 with 23 members of the Advisory Board and invited stakeholders. The roundtable was an opportunity to develop a collaborative community of practice in this area, discuss experiences and contexts relating to communication and alert of an evacuation, provide feedback on report drafts, and identify areas for further study.

4. Results of our study

4.1. People with disabilities and caregivers survey

65% of respondents personally identify as having a disability while 25% identify as a support person for someone with a disability. Our participants' disabilities included the following:

- Blindness
- Visual impairment
- Deafness
- Deafblindness
- Physical impairment
- Hearing loss
- Chronic pain
- ADHD
- Depression
- Autism Spectrum Disorder

Many respondents indicated use of assistive devices and medications, including white cane, walker, hearing aids, service animals, reliance on a support person, alternative formats (e.g., braille, text-based emergency announcements and captioning, and large print).

The support roles included supporting newcomers to Canada who have disabilities, day programming for people with disabilities, organizations supporting adults with intellectual disabilities, Regional EMO, and parents of young adults with intellectual disabilities.

90% of respondents have not experienced an evacuation, approximately 30% of respondents have participated in an evacuation drill or practice through school, work, and summer camps. All respondents rated the perceived accessibility of current evacuation processes between 3 and 6 out of 10, 30% rate this as 4 out of 10. This demonstrates some variance in confidence in current evacuation processes to meet a variety of functional needs.

Public awareness of evacuation processes, especially focused on people with disabilities, is a noted as an area to improve. The availability of supports for people with disabilities during an evacuation does not mean that people are aware of them, and therefore may not integrate these supports into their emergency planning effectively. Results from our survey show that many people with disabilities and caregivers feel unaware of emergency evacuation plans in their communities and do not know who to contact for support. At the same time, many respondents emphasized the importance of having such knowledge in advance to prepare adequately for an evacuation.

Most of the focus is on standards but behaviour change is also necessary as the presence of standards does not always mean implementation.

Participants noted that appropriate training should be in place for workplaces, commercial spaces, learning institutions, healthcare facilities, and businesses. Understanding roles and liability considerations can inform relevant standards and practices. Mechanisms for decision-

makers to hear directly from potential evacuees with disabilities about their needs was raised by participants. This is especially important for invisible disabilities such as autism and dementia. For example, changes to environment and routine have significant impacts on people with intellectual disabilities (e.g., autism and dementia). What may generally be considered inappropriate behaviour is often a reaction/coping strategy for changes in environment, and impacts can be severe if not considered in emergency planning. Families especially will face challenges and will need support. A “one size fits all” approach is ineffective at meeting a variety of functional needs.

Survey respondents were asked about the top accessibility issues that came to mind regarding evacuation. Responses are summarized and ranked by frequency in Table 4.1. The following issues were identified as being top of mind for survey respondents: transportation, access to equipment and supplies, reliance on someone to intervene—especially for people without personal support networks—advanced knowledge of where to relocate to, how to get there, and how to access medical treatment if necessary.

Advance communication of emergency plans was also emphasized by respondents, especially for schools, workplaces, and apartment buildings. General awareness of emergency plans at the municipal and regional levels was identified as another possible issue. Knowledge sharing between organizations and individuals was emphasized by the survey respondents, and the need for it to be an intentional step, even in advance of an emergency. Timely, accurate, and accessible information can save lives.

Top accessibility considerations for communication and alert included plain language information delivered in a variety of formats in a relevant and timely manner. Considering the emotional well-being of those impacted was also noted as an important concern.

Table 4.1 Accessible shelter, access to information, and transportation are some of the top-of-mind issues of surveyed people with disabilities and caregivers relating to evacuation.

What are the top accessibility issues that come to mind relating to evacuation?
1. Accessibility of shelter locations
2. Access to information (e.g., print, non-print, digital)
3. Transportation
4. Access to mental health and emotional support services
5. Access to medical treatment (e.g., medications and treatments)
6. Advance knowledge of emergency plans
7. Inaccessibility of existing apartment buildings
8. Ability to maintain personal hygiene
9. Plans in place for successful return and recovery
10. Is it reasonable to expect someone to be self sufficient for up to 72 hours?
11. Whether or not first responders are aware of who and where vulnerable people are
12. Need for an intervenor with appropriate skills to provide support
13. Lack of community and family support
Additional information provided by survey participants
Knowledge sharing is important and needs to be intentionally done
Not everyone has access to social media to be alerted of an emergency situation.

We do lots of planning to get people with disabilities into buildings; we need to remember to plan for getting them out in emergency situations. There may be liability concerns to consider.
Training must be in place for workplaces, commercial spaces, learning institutions, healthcare facilities, retail spaces, etc.
It is incorrect to assume reliance on fire departments alone.
Standards for evacuation procedures for people with disabilities.
Timely, accurate, and accessible information is important.
A significant portion of the population struggles with accessibility, financial resources, home care, and other supports.

Although the vast majority of respondents have not participated in an evacuation, they identified areas of concern and made recommendations that could improve the accessibility of evacuation process. These recommendations included:

- Increasing availability of accessible information and availability of alternative formats (e.g., Braille, large print, word processor file for screen readers to access)
- Ensuring first responders can be aware of the location of people with disabilities who need support and their functional needs (e.g., a system where individuals can register for community support in an emergency)
- More information about accessible transportation options during emergencies
- Awareness of procedures in advance, including who to contact and where to go for information, plans for workplaces and apartment buildings
- Advance knowledge of the responsibilities of emergency management organizations, various levels of government, employers, and building owners in evacuation planning and communicating this information
- Expanding evacuation planning at workplaces and apartment buildings
- Advance planning for accessible transportation
- Outlining the responsibility of building owners to develop and communicate evacuation plans
- Outlining the role of emergency management personnel to accommodate people with disabilities
- Appropriate training for evacuation staff and shelter personnel to support people with disabilities.
- Additional considerations include resources for people with limited English proficiency.

The needs respondents anticipated for an evacuation related to accessible transportation, accessible shelter locations, the ability to pack necessary supplies (e.g., assistive equipment, medications, chargers for devices, and food to accommodate dietary restrictions). Many respondents raised concerns about a lack of personal support networks, or difficulty for friends and family to intervene in an emergency.

Approximately 10% of survey participants indicated they would be able to evacuate themselves without support of family, friends, or another intervenor. Respondents stated that having the necessary information about where to go in advance was important. Some indicated they could use a personal vehicle, but the majority would need a family member or friend to drive them, or have access to public transportation, or use taxi services.

There are also particular considerations for service animals, including appropriate space, supplies, and acceptance of these animals. The ability to access financial resources such as cash and banking systems was also raised, let alone concerns about having enough financial resources to cover costs in a sudden emergency. It is important to ensure a trauma-informed response to address the emotional hardships and stress that accompanies disasters. Respondents raised the importance of advance knowledge, communicated appropriately, to ensure plans can be made.

Several formats of communication through all forms of media and as many organizations as possible are needed during an emergency, such as radio, phone alerts, TV alerts, government websites, social media, closed captioning, sign language on television, large print, and door-to-door communication. Radio and television were identified by survey respondents as preferred methods for emergency communications (see Table 4.2). Availability of communications in advance of an emergency is one thing, but it's another to have these be available during an emergency.

The importance of plain language across all forms of communication was emphasized. Key considerations raised were the ability of the user to understand the message, access to internet and cellular service, the level of involvement with local community groups for messaging, translators for people who do not speak English, and ASL interpreters.

Table 4.2 Survey respondents prefer emergency communications through radio, television, mobile device alerts, and websites.

Ranking Sources of information preferred by survey respondents	
1.	Radio, including local radio stations
	Television (including local news networks and television alert messages)
2.	Phone alerts (i.e., mobile device alerts)
	Websites (Google, government websites, CBC news websites)
3.	Social media
	Personal networks
4.	Door-to-door
	Municipal alerts

Survey respondents were asked to identify key organizations they were aware of that are involved in emergency evacuation or should be. Many of these organizations are involved in emergency evacuation in some way, such as emergency services, Red Cross, and provincial and municipal emergency management offices. Additional organizations identified included disability advocacy organizations, building owners and landlords, employers, schools, churches, and community groups (see Table 4.3).

Table 4.3 Please identify other key organizations you are aware of that are involved in emergency evacuation, or should be?

<ul style="list-style-type: none"> • Fire departments, police, and medical personnel 	<ul style="list-style-type: none"> • Provincial community service programs 	<ul style="list-style-type: none"> • Building owners and landlords
<ul style="list-style-type: none"> • Red Cross 	<ul style="list-style-type: none"> • Municipalities 	<ul style="list-style-type: none"> • Employers
<ul style="list-style-type: none"> • Canadian Armed Forces and National Defense 	<ul style="list-style-type: none"> • Transit services 	<ul style="list-style-type: none"> • Schools (e.g., elementary and secondary schools, universities and colleges)
<ul style="list-style-type: none"> • Provincial emergency management organizations 	<ul style="list-style-type: none"> • School bus services 	<ul style="list-style-type: none"> • Churches
<ul style="list-style-type: none"> • Fire prevention awareness teams 	<ul style="list-style-type: none"> • Community groups 	<ul style="list-style-type: none"> • Local businesses and suppliers of equipment and necessities
<ul style="list-style-type: none"> • Disability advocacy organizations 		

4.2. Emergency Management Survey

All survey respondents had roles relating to evacuation or emergency management and rated their knowledge of evacuation processes as 8–10 out of 10. All respondents also rated their knowledge of the accessibility of evacuation processes as 7–9 out of 10. 80% of respondents had previously supported evacuation efforts of houses, buildings (e.g., long-term care facilities), and communities (e.g., First Nations), including evacuations due to fire, flooding, and extreme weather events.

These evacuations included supporting people with disabilities. 60% of respondents rate the accessibility of current evacuation processes at 6 out of 10, whereas the remaining 40% rate this at 2 out of 10. This demonstrates a discrepancy, even within the emergency management community, about the degree of accessibility of current evacuation processes. Part of this can be attributed to differences between jurisdictions, the disconnect between strategy, standards, and implementation, as well as issues communicating evacuation planning in advance that reaches the public effectively.

80% of respondents indicated participation in an evacuation practice and 90% participated in multi-organizational meetings about evacuation or emergency management more generally. Organizations involved include RCMP, EHS, Fire Department, emergency management organizations, Ground Search and Rescue, Red Cross, public health, emergency services, animal health support, Autism Canada community advisors and ambassadors, organizations within the disability community, First Nations, and Indigenous Services Canada. In terms of improving these meeting spaces, respondents recommend increasing sharing of best practices and identified lessons, as well as expanding active engagement with people with disabilities and other stakeholders.

The accessibility considerations that were top of mind for the emergency management respondents highlighted the importance of planning that considers a diverse array of functional needs (e.g., visible and invisible disabilities), creation of back-up plans, and plans to address

specific accommodations. It is vital that the disability community be active in the planning, learning, and post-event debriefs to ensure their lived experiences shape responses. The support of families, friends, and communities becomes increasingly important during emergencies but also might not be feasible depending on the circumstances. Survey respondents in the emergency management sector recognize that the public lacks the knowledge to effectively prepare for an evacuation.

Survey respondents offered these key considerations for communication and alert: ensuring appropriate transportation and shelter options in advance of an emergency and communicating them; effective use of language to ensure it is effective for the target audience; clearer messaging about how to prepare for an evacuation; advance planning for accommodations; using the voice of communities in messaging. Considerations for accessible communication should be more diverse than physical and cognitive (i.e., visible disabilities) and considered before emergencies happen. Standards for communication may be helpful.

More generally, respondents offered recommendations to improve evacuation processes. For example, mandates to have evacuation plans with legislated considerations for people with disabilities could be implemented. Improvements should be made to educate the general public about how to better prepare for evacuations. There was also emphasis on helping your neighbour within emergency management communication but this may not be realistic. There is also a lot of public confusion about where to go for accurate information. It is important to consider that not everyone will interpret and respond to information in the same way. Support for people who are neurodivergent, for example, can include asking about accommodations for sensory supports and support animals. Community organizations, such as disability organizations, should be involved well in advance of an emergency to address any gaps and improve training for personnel at all steps of evacuation. One recommendation was to implement mandates to ensure evacuation plans with legislated considerations for people with disabilities.

4.3 Communication/Alert Roundtable

The Advisory Board highlighted some overarching concerns regarding emergency communication and alert for people with disabilities, particularly during an evacuation. As noted in the scholarly literature, communicating an evacuation has specific considerations and risks psychological implications compared to other types of emergency information. There are also implications for communications prior, during, and after an evacuation.

The role of informal communication (e.g., social media), especially at the community level, is a growing area of focus. The Advisory Board noted that intersectional considerations such as age, gender, race, Indigeneity, income, education, primary language, parental status, and household composition (e.g., children, elders, animals) need to be considered in advance because they impact how individuals perceive risk. It is important that risk communications be designed to reach people from various backgrounds, which can be informed by community organizations. Effective practices to communicate emergency information to family, friends, and personal support networks that care for people with disabilities need to be factored into communication strategies.

The Advisory Board emphasized that emergency communication must be delivered in an accessible way at all times. Public alert is one piece of the system; alert distributors decide on formats for those alerts. One issue is that alerts can be sent in an accessible format but not be received by a device as such. There also needs to be a variety of forms of alert (e.g., different sensory alerts such as lights or sound). In an emergency, access to technology should never be assumed due to affordability and network access.

Decision-makers must also consider if there are the human resources necessary to communicate an emergency (e.g., culturally appropriate messengers/interpreters). The legislative context in Canada for accessibility and human rights should be considered in relation to accessible communication and alert in emergencies, as these are enshrined in human rights and accessibility legislation.

Ensuring access to accurate data about the location of people with disabilities in the community and knowledge of their functional needs was highlighted as key to effective evacuation. Whether it is a database or information managed by emergency services, it must be able to identify locations of people with disabilities in a given jurisdiction that includes information about their functional needs and should include congregate facilities (e.g., long-term care, group homes, prisons). There are implications for how such data should be collected and managed because people with disabilities may be afraid to disclose a disability. Many who need support to evacuate in an emergency may not identify themselves as having a “disability”.

5. Discussion of results

The key themes that emerged were the importance of advance communication and information sharing between emergency management organizations and people with disabilities. It is not enough to have accessible processes and supports in place because the people that will rely on these need to have advance knowledge of them. Standards and availability of accessible formats may not mean they are readily available during an emergency.

The scholarly literature and survey findings reinforce that although standards are in place to guide accessible communication practices, the means of implementation are not always consistent or the most effective. This was especially evident during the COVID-19 pandemic when people with disabilities faced challenges to access information.

People with disabilities have faced challenges in accessing emergency information, particularly information most relevant to their needs. For example, there have been issues with ASL interpretation, accessibility of webpages and mobile applications, and finding information suitable for various functional needs (e.g., physical, intellectual, sensory). In our survey, people with disabilities voiced confusion about whom to contact in an emergency and emphasized the importance of knowing this information.

Public awareness of evacuation processes, especially focused on people with disabilities, is a noted area to improve. The availability of supports for people with disabilities during an evacuation does not mean that the public is aware of them and able to integrate such supports in emergency planning. Although most of the focus is on standards, behaviour change is also necessary, as the presence of standards does not always mean they are implemented.

Behaviour change, such as training, is necessary to reduce accessibility barriers within emergency management systems. The emergency management survey results showed discrepancies in perceptions of accessibility across evacuation processes, highlighting the gaps between standards and implementation and also the variance in processes between jurisdictions.

Much of the research to date focuses on the experiences of people with disabilities following an evacuation or disaster; however, the data demonstrate the value of considering accessibility needs in advance of an emergency. Risk communication approaches also often focus on improving one-way communication from experts to the public. Communications have been shown to be more accessible and effective when people with disabilities inform the content, messaging, formatting, and method of delivery. This requires two-way communication where people with disabilities inform expert risk communication strategies. This relates to broader goals to integrate knowledge and lived experience of people with disabilities across policy areas.

Evacuations are highly interdisciplinary undertakings that involve various orders of government, sectors, and organizations. One of the most common recommendations from the literature, survey, and roundtable findings was how important it is for the general public, especially people with disabilities, to know who to contact in a given situation and what they can expect from the process and available supports. The survey for people with disabilities yielded suggestions of additional organizations and authorities to involve in evacuation planning, such as building owners and landlords, employers, and retail businesses.

There are liability considerations for those with responsibility to plan for evacuations appropriately (e.g., apartment buildings and commercial buildings). Private-sector organizations may be at risk of liability by not adequately preparing for an evacuation. Accessibility is legislated, and therefore ensuring emergency processes are accessible is not a choice but a right for people with disabilities.

Participants noted that evacuation preparations can be improved if each authority understands its responsibilities and scope, and that of other emergency professionals, well in advance of an evacuation. This extends beyond first responders to employers, educational institutions (e.g., schools and post-secondary institutions), and building owners and landlords (e.g., apartment buildings). Members of the public should generally understand how these roles are delineated and who to contact for certain supports well in advance of an evacuation.

It was also noted that communications regarding emergency evacuations should include information about all phases of evacuation, such as transportation, shelter, and recovery and return to community, including accessibility considerations. There are different considerations for people with disabilities living in institutions (e.g., long-term care and group homes) and those living in the community. As there are more and more initiatives^{3,4} to enable people with disabilities and seniors to live at home, there should be increased focus on people with disabilities living in the community.

Even though 90% of respondents have not experienced an evacuation, approximately 30% have participated in an evacuation drill or practice through school, work, and summer camps. All respondents rated perceived accessibility of current evacuation processes between 3 and 6 out of 10; with 30% of respondents rating it 4 out of 10. This demonstrates some variance in confidence in current evacuation processes to meet a variety of functional needs and a disconnect between planning and implementation. It also poses significant challenges to emergency managers, as many people have not experienced an evacuation and, although advance preparation is key, there will likely be many additional issues that could arise with first-time evacuees.

The role of institutions in evacuation communications needs to expand to address liability considerations in evacuating people with disabilities. This adds complexity to evacuation processes that are already multidisciplinary and involve many organizations across sectors. Expanding on mental models approaches, two-way communication strategies will be necessary, as information from organizations to the public not only needs to be effective but also integrate the knowledge and lived experience of people with disabilities into organizational processes.

Emergency managers responsible for evacuation need to consider a multitude of factors and each decision carries inherent trade-offs. While this paper does not propose a method to address these trade-offs, we seek to make factors of risk perception, risk sociology, and accessibility more explicit. At the organizational level, opportunities and challenges to integrate knowledge and lived experience from people with disabilities should be explored across public, private, and non-profit sectors.

Public and non-profit organizations are often involved in emergency planning, but the role of private-sector organizations could be expanded. There are liability considerations in emergency

³ Aging in Place (Employment and Social Development Canada 2022; Enabling Access 2021).

⁴ Independent living models for people with developmental disabilities (National Housing Strategy 2020).

evacuation that can impact private-sector organizations such as residential and commercial spaces.

6. Conclusion

Evacuations are highly interdisciplinary undertakings that involve a variety of orders of government, sectors, and organizations. The people responsible for mass evacuations are confronted with significant challenges. These events are happening more often, and at a growing and significant human, financial, and environmental cost. Advancements in accessibility for and rights of people with disabilities have also increased concern at all orders of government over improving emergency services for people with disabilities. Communication/alert is the primary phase to facilitate evacuation.

According to cybernetics, we need to control information, standards, and behaviours in order to control a system. Much of the focus in emergency response concerns standards; information and behaviours can at times be overlooked. Behaviour change requires appropriate training and implementation in a particular context. Information is equally complex; it is gathered and processed in a particular psychological, social, and institutional context. This context is fluid; the number of persons with disability is increasing as the population ages and more and more people are living at home rather than in institutions.

Mental Model approaches are risk communication methods that work to align different ways of thinking of risks between experts and the public. When working with people with disabilities, mental models should be informed by the knowledge and lived experience of people with disabilities in addition to risk-expert knowledge. Lived experience and knowledge from people with disabilities is a form of expert knowledge. Risk communications can be more accessible when people with disabilities inform the development, distribution, and evaluation of such materials. There can be disparities between standards and practice that people with disabilities can identify.

Survey respondents (people with disabilities and some caregivers) identified transportation, access to equipment and supplies, reliance on someone to intervene – especially for people without personal support networks, advanced knowledge of where to relocate, how to get there, and how to access medical treatment as top accessibility issues. These represent key content areas for evacuation communications for people with disabilities, as they are top-of-mind issues respondents raised.

There are opportunities for further research, including liability considerations for building owners, employers, and business owners with respect to evacuating persons with disabilities from their premises. Improving communication strategies to support first-time evacuees also requires more attention because not many people have personal experience with evacuations. Much of the research to date has focused on the experiences of people with disabilities following an evacuation or disaster; the data demonstrate the value of considering accessibility needs in advance of an emergency. Also, the research needs to distinguish more clearly between people with disabilities who are institutionalized, living in the community, and a part of transient communities (e.g., unhoused, tourists, migrants). Their needs can be different.

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List of organizations of Persons with Disabilities survey respondents

- Alliance for the Equality of Blind Canadians (AEBC)
- Canadian National Society of the Deaf-Blind
- Alliance for Equality of Blind Canadians
- CNSDB
- NS Accessibility Directorate
- Immigrant Services Association of Nova Scotia, invited by Accessibility Directorate
- CACL Antigonish
- Accessibility standards committee
- Built environment standards committee
- Invited by the Accessibility Directorate of Nova Scotia
- Invitation from Accessibility Directorate
- Standards development committee
- Bridge Adult Service Centre
- L'Arche
- Accessibility Directorate – Provincial Accessibility Advisory Board
- NS Accessibility Directorate
- Inclusion Nova Scotia

List of Organizations Emergency Management Survey Responses

- Halifax Regional Municipality
- Salvation Army Canada
- NSCC emergency management program
- Nova Scotia Emergency management organization
- Autism Canada