McMaster University | HEALTH FORUM

Rapid Evidence Profile

Examining the health and social impacts of evacuations and interventions that can help to mitigate their effects

22 July 2024

[MHF product code: REP 74]

Box 1: Evidence and other types of information

+ Global evidence drawn upon

Evidence syntheses selected based on relevance, quality, and recency of search

+ Forms of domestic evidence used (🍁 = Canadian)

Evaluation

Qualitative insights

+ Other types of information used

Jurisdictional scan (two countries: CA, US, and select international organizations)

*** Additional notable features**

Prepared in the equivalent of three-business days using an 'all hands-on deck' approach

Context

- In 2023, Canadians witnessed a significant number of climate-related events, including a record number of wildfires, heat waves, and floods.
- In 2023 alone, an estimated 230,000 people in Canada were evacuated due to wildfires.
- The burden of these and other evacuations is not evenly distributed throughout the Canadian population, with Northern and remote communities, including First Nations and other Indigenous communities, being more likely to be evacuated than southern urban communities.
- While evacuations are needed to protect people from immediate physical harm, they also risk additional harm, including physical and mental health concerns and challenges in maintaining community and social well-being.
- This rapid evidence profile examines the health and social effects of evacuations, how they vary by population and context, and what interventions are available to mitigate the public health and social impacts of evacuations.

Questions

- What are the health and social impacts of evacuations for particular populations (e.g., children, older adults) and for particular healthcare settings (e.g., hospitals, long-term care homes) before, during and after evacuations?
- What is known about interventions to mitigate the health and social impacts of evacuations during and after the evacuation?

High-level summary of key findings

- We identified 35 evidence documents, of which we considered 28 to be highly relevant, including three evidence syntheses and 25 single studies.
- For the first question, most of the identified evidence focused on the physical and mental health impacts of evacuation due to hurricanes, floods, and wildfires on the general population.

- However, we found specific findings related to pregnant women, mothers, and children, as well as for specific settings including hospitals and assisted-living facilities.
- Physical health impacts from evacuations included increases in traffic accidents and metabolic syndrome
- Mental health impacts from evacuations included increases in symptoms of depression, post-traumatic stress disorder, anxiety, psychological distress, sleep problems and increases in alcohol intake.
- We found little evidence on socioeconomic impacts, though at times these were identified as mediators of mental health impacts.
- For the second question, we identified findings related to support for specific populations including older adults, females, and dependent individuals, as well as for the general population.
- We identified evidence related to six different types of support provided prior to, during and following evacuation that may help to mitigate health and social impacts.
- We identified many guidance and planning documents to inform both decision-makers and the public on evacuations due to climate emergencies.

Framework to organize what we looked for

- Reason for evacuation
  - Extreme weather event
  - Flood
  - Wildfire
    - Smoke
    - Combined wildfire smoke and heat
    - Pollutants
- Evacuation status
  - Evacuation alert
  - Evacuation order
  - Tactical evacuation
- Length of evacuation
  - Short-term
  - Long-term
- Frequency of evacuation
  - Single
  - Multiple
- Place of evacuation
  - Local (e.g., neighbouring town or community)

Box 1: Approach and supporting materials

We identified evidence addressing the question by searching Health Systems Evidence, Social Systems Evidence, PubMed and Proquest. Initial searches were conducted on 28 May 2024, with a follow-up search conducted on the 27 June 2024. The search strategies used are included in Appendix 1. In contrast to synthesis methods that provide an in-depth understanding of the evidence, this profile focuses on providing an overview and key insights from relevant documents.

We searched for full evidence syntheses (or synthesis-derived products such as overviews of evidence syntheses) and protocols for evidence syntheses.

We appraised the methodological quality of evidence syntheses that were deemed to be highly relevant using the first version of the AMSTAR tool. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality, medium-quality evidence syntheses are those with scores between four and seven, and low-quality evidence syntheses are those with scores less than four. The AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to evidence syntheses pertaining to delivery, financial or governance arrangements within health systems or implementation strategies.

A separate appendix document includes:
1) methodological details (Appendix 1)
2) summary of key findings from highly evidence syntheses and single studies (Appendix 2)
3) details about each identified evidence synthesis (Appendix 3)
4) details about each identified single study (Appendix 4)
5) jurisdictional scan on guidance and planning documents for evacuations due to climate events
6) documents that were excluded in the final stages of review (Appendix 6).

This rapid evidence profile was prepared in the equivalent of 3-days of a 'full-court press' by all involved staff.

  - Within province or state
  - Distant (e.g., to another province or state)
- Supports provided prior to, during, and following evacuation that may help to mitigate the impacts of evacuation
  - Information and communication
  - Food and water
  - Temporary housing/shelter
  - Home goods and clothing
  - Healthcare services
  - Mental health services
  - Workplace supports
  - Social support services
  - Financial supports
  - Childcare supports
  - Cultural supports (e.g., for Indigenous healing, cultural safety)
  - Language supports
  - Religious supports
- Populations
  - Children
  - Indigenous peoples
  - People living in areas directly affected by evacuations
  - Occupations directly affected by evacuations
  - Individuals with pre-existing conditions (e.g., respiratory or cardiac)
  - People who use drugs
  - People who are housing insecure
  - People with lower socioeconomic status
  - Pregnant women
  - People with disabilities
  - Older adults
  - People who have experienced evacuation in the past
  - Hosting communities
- In-patient healthcare settings
  - Hospitals (including mental health and other specialized hospitals)
  - Long-term care homes
  - Nursing homes and other residential care facilities
- Outcomes
  - Physical health outcomes
    - Cardiovascular effects (e.g., heart failure, heart attack, stroke)
    - Death
    - Effects on pre-existing conditions
    - Injuries
    - Obstetric outcomes
    - Respiratory effects (e.g., bronchitis, reduced lung function)
    - Physical violence (including domestic violence)
    - Sexual violence (including sexual assault)
  - Mental health outcomes
    - Anxiety
    - Depression
    - Post-traumatic stress disorder
    - Personal and community isolation
    - Substance use

- Socio-economic effects
  - Displacement of individuals and communities
  - Employment and labour challenges
  - Economic hardship
  - Property destruction
  - Community and social wellbeing

What we found

We identified 56 evidence documents related to either evacuations' health and social impacts or interventions to mitigate these impacts. Of these documents, we considered 28 to be highly relevant, including:

- three evidence syntheses (including one meta-analysis)
- 25 single studies.

We also undertook a jurisdictional scan to identify guidance, plans and support tools related to evacuation due to climate events in all Canadian provinces and territories as well as at a national level in the U.S. and in 11 U.S. states that have been significantly affected by climate events in recent years. In addition, we included reports and guidance from select international organizations (Intergovernmental Panel on Climate Change, United Nations Environmental Program, Organization of Economic Cooperation and Development, Canadian Red Cross and American Red Cross).

In general, we would like to note the challenge of separating the effects of the natural disaster from those of evacuation. In some cases, this was explicit in the study, while other designs (e.g., observational and qualitative) did not allow for this type of analysis.

Coverage by and gaps in existing evidence syntheses and domestic evidence

For the first question, most of the identified evidence focused on the physical and mental health impacts of evacuation on the general population. Evacuations were the result of a range of different events including hurricanes, floods, and wildfires and were generally shorter-term evacuations. We found specific findings related to Indigenous peoples, older adults, people with lower socioeconomic status, pregnant women, mothers, children, and people who had experienced evacuation in the past. We also identified findings for specific settings including hospitals and assisted-living facilities.

For the second question, we identified evidence related to six different types of supports, including:

- information and communication
- food and water
- temporary housing/shelter
- healthcare services
- mental health services
- cultural supports.

We found relatively few findings from evidence documents that addressed support prior to evacuation, though one evidence synthesis examined the likelihood and different factors that affect the decision to evacuate, which could support the tailoring of evacuation messages. Despite the limited findings in evidence documents, the jurisdictional scan identified many guidance documents directed at decision-makers and the public to help prepare for evacuation. With respect to specific populations, we identified findings from one recent low-quality evidence synthesis on supports for older adults and one single study on considerations for dependent individuals. We did not identify findings from highly relevant evidence documents related to how to mitigate the health and social impacts of evacuations for specific settings.

Key findings from included evidence documents

In the two sections below, we profile key findings from the evidence documents. For additional insights into each of the included documents see Appendix 2, which provides a table synthesizing findings from all highly relevant evidence documents and Appendices 3 and 4, which provides details about each of the included evidence syntheses and single studies, respectively.

Key findings related to the health and social impacts of evacuations

Of the highly relevant evidence documents, findings from one recent low-quality evidence synthesis and 17 recent single studies are relevant to this question.

For specific populations, four recent single studies reported that pregnant women and mothers experienced anxiety and psychological distress before and during evacuation,(1-4) with some reporting that these effects continued following evacuation.(1) One of the recent single studies also noted that rates of post-traumatic stress among mothers were higher for those with children aged seven to 17 compared to those with children aged zero to six.(1) Two recent single studies identified mental health impacts including symptoms of depression, suicidal thinking, post-traumatic stress and anxiety in children and youth who were evacuated due to wildfires and from a hurricane.(5; 6) Finally, one single study found the evacuation of Indigenous communities due to wildfires led to family and community separation, which in turn resulted in emotional distress among evacuees.(7)

For specific settings, one recent low-quality evidence synthesis, which included a meta-analysis, found individuals who are evacuated or relocated during a natural disaster had statistically significant increases in overall health effects, including mortality, diabetes and weight problems as compared to non-evacuated or re-located individuals.(8) The synthesis notes that studies underpinning the significant increase in mortality focused predominantly on nursing home residents and hospitalized populations and may not be generalizable to the whole population.(8) However, it points to the importance of carefully weighing the risks of evacuation compared to the risks of sheltering in place, which may differ by type of disaster.(8) In addition, one recent single study examined the effects of evacuation on assisted living residents in advance of a hurricane and found increased odds of emergency department visits and nursing home admissions within 30-days of evacuation as compared to those who sheltered in place.(9) The study found no significant effect on hospitalization (e.g., longer-term admissions) or mortality.(9) Finally, one single study found an increase in inpatient cardiorespiratory visits among wildfire evacuees who use durable medical equipment (e.g., oxygen tanks, wheelchairs).(10) This finding may not be generalizable to other populations, as another study found no association between evacuation orders and cardiovascular events when controlling for known risk factors, including pre-existing conditions.(11)

Within the general population, one recent low-quality evidence synthesis and six single studies found an increase in traffic accidents (resulting in some physical injuries) during evacuations (12) and increases in metabolic syndrome from changes to lifestyle during evacuation.(8)

One recent low-quality evidence synthesis and three recent single studies found increases in mental health impacts among evacuees, including:

- symptoms of depression (8; 13; 14)
- symptoms of post-traumatic stress disorder (8; 13)
- symptoms of anxiety (8; 13)
- psychological distress (8; 15)
- sleep problems.(8; 13)

Other recent single studies noted that experiences with mental health challenges prior to, during and following evacuation were higher among those who:

- lacked time to prepare before the evacuation became mandatory (15)
- experience multiple evacuations (16)
- have pre-existing mental-health conditions (16; 17)
- have fewer protective factors in place (e.g., unemployed, few social contacts, experienced injury or illness during evacuation, experienced higher levels of stress leading into the evacuation).(13; 14)

Another recent study found that support received, clinical variables, and sociodemographic context all affected the resiliency of those impacted by floods. Respondents under the age of 25 were more likely to show low resilience than respondents 40 years and older. Similarly, those receiving less or no governmental support were more likely to express low resilience than those who received support.(17)

Key findings about interventions to mitigate the health and social impacts of evacuations during and after the evacuation

Of the highly relevant evidence documents, findings from two recent low-quality evidence synthesis and nine recent single studies are relevant to this question. As mentioned above, many of the included evidence documents focused on findings related to support for evacuation and evaluating how they were experienced by evacuees rather than their effects for mitigating particular impacts.

One evidence synthesis and two single studies identified findings specific to older adults, while an additional single study addressed shelters for people experiencing disability. One recent low-quality evidence synthesis found older adults require multi-faceted supports during evacuation including supports for daily living, finances, social support, care for ongoing health needs, religion and culture, and clear dissemination of information to help maintain their mental and physical health.(18) One single study noted the importance of carefully considering the appropriateness of different shelters during climate-related events, highlighting that dependent evacuees from a long-term care facility were unable to benefit from the use of hotel guest rooms as they were isolated from caregivers and support providers that were placed in other evacuation areas.(19) The second single study focused on older adults and found that urban homebound older adults in Philadelphia indicated that they were unprepared for evacuations due to their physical disabilities, and noted they would need shelter to have complex supports available.(20) The third single study, focused on individuals with special needs (e.g., requires additional assistance due to physical, mental, cognitive or sensory impairments). The study found that to best support safe evacuation, admittance to special needs shelters should have flexible admittance, should consider the experiences of people with disabilities to inform approaches, and should involve people with disabilities and disability people's organizations as active members of disaster planning and community response.(21)

We did not identify any findings from highly relevant evidence documents related to interventions to mitigate impacts in specific settings.

A recent single study examining historic calls during Hurricane Katrina and Hurricane Rita to 211 (the local information and referral line) found during and following the hurricane, there was a significant increase in the volume of shelter-related calls, increasing from approximately 70 per weekday to 228 during Hurricane Katrina. The peak of these calls was experienced a few days after Hurricane Katrina made landfall.(22) The study reported the most significant needs for housing came from unmet rental housing needs, noting that renters comprised a significant component of individuals who experience access barriers to seeking shelter, given property owners may have additional resources or home insurance able to support their needs during a hurricane.(22)

We identified evidence related to six different types of supports provided prior to, during or following evacuations, including:
- information and communication
- food and water
- temporary housing/shelter

- healthcare services
- mental health services
- cultural supports.

One older medium-quality evidence synthesis found a range of factors including demographics, socioeconomic status, household size and makeup, as well as sources of information all affect individual decisions about whether or not to evacuate during a climate event.(23) The evidence synthesis noted that two particularly important factors determining individual decisions were whether the evacuation order was mandatory or voluntary and whether they had previous experience with an evacuation. (23) One recent single study found that providing timely and accurate information prior to and at the beginning of wildfires can help encourage evacuation.(24)

A recent single study examined emergency planning for evacuations due to hurricanes in Florida. The study noted that families should develop specific disaster plans to mitigate communication and decision-making stressors. In addition, the study noted the need for local authorities to undertake specific planning including monitoring and easing local and highway traffic in efforts to reduce evacuation stress, ensuring and regulating the delivery of food and supplies to evacuation shelters, and anticipating the state of panic and unease among evacuees arriving at shelters and ensuring supports are in place.(20)

Recent single studies point to the critical importance of housing and shelter at all stages of evacuation. Prior to evacuation, the availability housing and temporary shelter was found in one recent single study to be one of the most important indicators of whether or not individuals would evacuate.(24) A second recent single study found following evacuation from sequential hurricanes, housing was the most common type of support needed, often due to financial problems related to renting new housing.(22) Lastly, a third recent study found low-income populations had difficulties evacuating and relocating during Hurricane Harvey in Texas, and frequently returned faster than higher income individuals.(25)

With respect to healthcare services, two single studies found telemedicine can support continuity of care during and after evacuation. However, they noted important sex and cultural differences that need to be considered, including that males, older adults, and those who speak other languages were less likely to use these services.(26; 27)

For mental health supports, online self-guided treatment programs were found to support patients following a wildfire evacuation.(28) The self-guided treatment program was found to improve symptoms of PTSD, depression and insomnia among participants.(28) The completion of more modules in self-guided treatment program predicted greater reductions in symptoms.(28)

Key findings from the jurisdictional scan

As part of the rapid evidence profile, we undertook a jurisdictional scan for guidance, plans or tools (e.g., checklists) for evacuation due to climate events at the national level in Canada and the United States, across all Canadian provinces and territories, and in 10 U.S. states (Alaska, Arizona, California, Colorado, Florida, Louisiana, New Mexico, Oregon, Texas and Washington) that have been significantly affected by climate events in the recent years (determined by data from the National Centres for Environmental Information). We also searched several international organizations.

As part of the jurisdictional scan, we identified various guidance documents and tools to support decision-makers, individuals, and families preparing for, experiencing, and returning from evacuations.

To inform decision-makers, we identified guidance from Manitoba, Ontario (for emergency planners and health-system partners and more generally), New Brunswick, Alaska, and Colorado. Most of these documents provide details about the division of responsibilities between different actors and actions that should be taken in the event of a climate (or other) emergency. In the case of Oregon, we also identified a planning tool which provides local

Oregon planners with data and wildfire risk inventory reports, as well as templates to create more Advanced Wildfire Reports and Social Vulnerability Reports.

For the public, we identified both general guidance for individuals and families, which includes elements such as understanding and planning for events, creating an evacuation plan, identifying health needs, and creating an emergency kit. We identified public guidance in Canada at the federal level, at the provincial level in Canada in British Columbia, Alberta, Saskatchewan, Ontario, Quebec, New Brunswick, Prince Edward Island, Newfoundland and Labrador, Northwest Territories, and Yukon, and from the Canadian Red Cross. We also found federal-level guidance in the U.S. from the Department of Homeland Security, Federal Emergencies Management Agency, and at the state level in Alaska, Arizona, Florida, Louisiana and Oregon. In addition, we found specific guidance based on the type of climate event, such as for floods and wildfires (e.g., Manitoba, Arizona, California, New Mexico, Texas, and Washington) and for particular aspects of evacuation such as preparing emergency kits (Quebec), applying for financial assistance (Prince Edward Island), and evacuation routes (Texas).

We also identified specific guidance for select populations, including:

- persons with disabilities (Canada; Ontario; Nova Scotia; U.S. – National Fire Protection Association; California)
- older adults (U.S. – Federal Emergency Management Agency; Canadian Red Cross; American Red Cross)
- caregivers (U.S. – Federal Emergency Management Agency)
- Muskego Cree families in the James Bay First Nation Community (Canadian Red Cross)
- those working and living in long-term-care homes (Ontario)
- those working and living in group care facilities (Florida).

Additional information about the content of each of these guidance documents is provided in Appendix 5.

Next steps based on the identified evidence

- With the effects of climate change increasingly felt around the globe, we can expect an increase in the occurrence of these types of climate-related events and the need for evacuation.
- This profile provides an overview of the recent literature on a rapidly evolving topic but, given the significance to individual and population health and well-being, its limitations points to the need to stand up other evidence supports such as a living evidence synthesis that can quickly mobilize evidence throughout the year when it becomes available and not only in times of crisis.

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