Determining the scope of your study

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Asset mapping to consider outcome measurement and stakeholder engagement

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3.1.1 Learning objectives

To understand key factors to consider when using asset mapping to support research into health emergency and disaster risk management (Health EDRM), including:

1. The tradition of community health outcome measurement in disaster research.
2. The concept of asset literacy and how it can be leveraged as an outcome of asset mapping to support disaster risk reduction.
3. The value of engaging key stakeholders from the outset in order to develop a common vision of health deficits and assets and identify solutions to maximize community resilience.
4. The use of an asset lens in outcome measurement studies in pre- and post-disaster contexts.

3.1.2 Introduction

Communities affected by disasters may experience extensive impacts to the health and well-being of the population. Disasters also affect the economy, infrastructure and the environment. The impacts are not all inherently negative, and positive impacts may result from a disaster at the individual-level (such as post-traumatic growth) and the community-level (such as strengthening of social connectedness and safer or greener structures). In addition to reducing future risk, this underscores the essence of building adaptive capacity before a disaster and ‘building back better’ after a disaster (Chapter 1.3) *(1–2)*. All these issues need to be considered when planning and using research in Health EDRM. Furthermore, recognition of the need to understand the complexity of different types of impact in turn prompts recognition of the need for diverse research approaches and methods that can account for existing and emergent capacity in outcome measurement.

Disaster research has traditionally involved methods to develop risk and vulnerability profiles (Chapters 1.3 and 3.2), map hazards and assess adverse outcomes following events. Tyler and Moench *(3)* refer to this paradigm as 'predict and prevent' (to which we may also add 'protect') and underscore its limitations based on anticipation, surveillance and reaction to threats rather than building resilient systems. Further to this deficit-based approach, measurement of outcomes and associated predictors should be based on wider considerations, including protective factors and positive consequences arising from disasters.

The disaster literature has traditionally focused on financial or physical infrastructure, when referring to assets. However, as the field of DRR has become more interdisciplinary, understanding of assets has broadened toward inclusion of critical social infrastructure and a more balanced approach to understanding resilience, which focuses not only on risk and deficits, but also on physical and social assets within a community that can support resilience *(4)*. Here, resilience broadly refers to the intrinsic capacity of an individual or community to resist, adapt and recover after experiencing a disturbance, such as a disaster *(5)*.

This chapter describes asset mapping as it relates to both outcome measurement and stakeholder engagement, and the relevance of asset literacy from a public health perspective. The intent is to highlight the importance of outcome measurement that focuses not only on deficit-oriented measurement, but also on community assets to support resilience. The role of stakeholder engagement in supporting asset literacy is also discussed. Case Study 3.1.1 illustrates how these concepts fit together by highlighting a community initiative introduced to measure asset-based outcomes, map community assets and engage stakeholders in the monitoring of long-term impacts and the community recovery following the Lac-Mégantic train derailment and explosion in 2013.

Case Study 3.1.1
Psychosocial Impacts of the Lac-Mégantic Train Explosion

On 6 July 2013, a train carrying 72 cars of oil derailed in downtown Lac-Mégantic in the Estrie region of Quebec, Canada. The derailment provoked a major conflagration and a series of explosions. The disaster resulted in 47 deaths, the destruction of 44 homes and businesses, the evacuation of 2000 citizens (that is, one third of the local population) and an unparalleled oil spill. The disaster caused major human, environmental, and economic impacts *(6)*. In the first years after the disaster, the Estrie Public Health Department undertook several actions, including monitoring physical health and psychological consequences. Four cross-sectional health surveys (2014, 2015, 2016, 2018) were conducted by the Public Health Department and the University of Quebec in Chicoutimi among large and representative samples of adults living in and around Lac-Mégantic, gathering data on a variety of physical and mental health outcomes. Findings from the first two surveys in and around Lac-Mégantic revealed that about one in six adults were considered as having been intensely exposed to the disaster. Steep gradients were observed in the prevalence of adverse psychosocial outcomes as a function of intensity of exposure to the train derailment. The findings showed persistent and widespread health needs, such as PTSD, anxiety, and a higher proportion of people seeking mental health services *(7)*. In addition to adverse psychosocial outcomes, various asset-based outcomes were considered in the surveys. This found, for instance, that intensely exposed adults were less likely to report optimal mental health in 2015 (as opposed to low exposed ones), suggesting that health assets can weaken with time among people directly impacted by a disaster, especially in the absence of adequate support and services.

Given the magnitude of the disaster, the Estrie Public Health Department hosted a collective reflection day, bringing together local stakeholders to discuss possible solutions for the health and well-being of the community *(8-9)*. A defining moment of this day was the asset mapping activity through which participants constructed together a historical timeline that traces key milestones in the recovery of their community and recognizes the progress made. By highlighting a series of interventions and initiatives previously implemented by social workers and other partners, the group identified benefits at the individual and community level, as well as features common to the actions that created positive effects.

During the reflection day, it became apparent there was a need to initiate a positive campaign to highlight the strengths of the community. A community-based participatory research approach was chosen to address this need, and an asset-mapping project using a Photovoice method was designed with the purpose of allowing local citizens to explain the aspects that make their community an attractive place to call home and to map assets that support resilience within their community (see also Case Study 4.12.1 in Chapter 4.12). Following this six-month initiative, the group hosted two exhibitions to share their photos and ideas with the public, including politicians and decision-makers. These events were an opportunity for the participants to enhance collective asset literacy and showcase the assets in their community and a collective vision for the community going forward.

Fostering community engagement was a hallmark of the physical, economic and social reconstruction process in Lac-Mégantic. The importance of identifying and leveraging existing assets or resources at the community level, including local health agencies, and working with existing capacities were strongly valued. A better understanding of the local needs and capacities gave residents in Lac-Mégantic the opportunity to become increasingly involved in personal or community projects, as well as collective events. Although the disaster has left its mark, the local community is gradually adapting to its new reality. The asset-based approach contributed to this “new reality” and emphasizes the importance of social capital to activate individual and community resilience in post-disaster contexts.

The outreach team published a report five years after the tragedy to highlight the different strategies used in this community to mobilize the local community in the post-disaster landscape *(10)*. All these initiatives have contributed greatly to empower citizens and mobilize the community of Lac-Mégantic and surrounding areas.

3.1.3 Outcome Measurement

In their asset model for public health, Morgan and Ziglio *(11)* present a model showing the theoretical base of salutogenesis (saluto = health; genesis = origin of) as the foundation for asset-based health promotion. They emphasize the need for enhanced outcome measurement methods, with a caution toward using a traditional deficit-oriented approach, which tends to focus on what produces disease and psychosocial problems (rather than health and well-being). Over the past few decades, many positive health concepts have emerged in science (such as self-efficacy, resilience, social support or participation, civic engagement). Public health actors, including those involved in disaster research or disaster risk management, are invited to consider and assess such asset-based outcomes (in addition to deficit-based ones) and to adopt more broadly a "salutogenic" orientation.

Outcome measurement is a core activity of public health and Health EDRM. It is used to assess prevention and preparedness programmes and initiatives, response and recovery activities, and community health impacts in the months and years following a disaster (see also Chapter 2.2). Measuring community health outcomes is critical for understanding how a population is impacted over time, allowing public health and the broader health system to develop and tailor programmes and services to meet the changing needs of the population *(12)*. Adverse impacts on physical and mental health are common outcome measurements for community health, requiring both short- and long-term monitoring *(7)*.

By causing body stress, mental workload, losses and disruption, injuries and lesions, and changes in lifestyle habits, disasters often lead to adverse impacts for individual and community health and well-being, over the short and long term. The acute consequences of large-scale traumatic events vary according to disaster type. Primary health problems are directly caused by disaster action (such as wounds, intoxication due to toxic fumes). Secondary health problems can also be observed, including infections, accidents, or dysfunction of physiological functions associated with disaster-generated stress (such as hypertension as a result of overexposure to stress) *(13–14)*. Finally, various somatic symptoms may affect victims of a disaster. These include sleep disorders, headaches, fatigue, abdominal pain, and shortness of breath. The prevalence of somatic symptoms, which can last several years, have been found to range from 3% to 78% *(15)*.

In addition to acute consequences of disasters (mostly physical health consequences), the population burden of mental health problems in the aftermath of disasters is substantial and potentially of long duration (Chapter 5.1) *(15–16)*. PTSD is the most common mental health outcome studied in a post-disaster context *(17)*. One review of the literature estimates the prevalence of PTSD to be 30-40% among direct victims, 10-20% among rescue workers, and 5-10% in the wider community *(18)*. Given the high prevalence of PTSD after a disaster, more research is needed to evaluate a broader range of psychosocial outcomes such as psychological distress, major depression, generalized anxiety disorder, panic disorder, phobia, complicated grief, maladaptive behaviours (including alcohol and drug abuse), suicidal ideation, but also positive outcomes (including sense of belonging to the community, sense of coherence, positive mental health, and post-traumatic growth). Exposure to a disaster can also have a positive long-term effect on the beliefs and values of certain individuals and create a stronger sense of family, social capital and collective solidarity. Some individuals may even discover personal strengths which had been previously untapped *(19–20)*.

Communities struck by a disaster caused by natural or human-induced hazards need to learn to assess the evolving health of the population, in order to implement upstream and downstream actions that can properly respond to the needs of the individual and wider community. To do this, short- and long-term monitoring of both physical and psychological consequences through various quantitative methods is essential. A variety of data sources can be used for monitoring population health over time, including routinely collected information, such as medical and administrative databases and surveys, as discussed in Chapters 2.2 and 2.4. Surveys can be either clinical- or community-based, and cross-sectional or longitudinal in nature. Ideally, both exposed and unexposed individuals should be monitored over time. Indeed, having a control or comparison group allows investigation of the association between exposure to the disaster and health effects observed.

Regardless of the data sources chosen, in an ideal world it is important to ensure a complete set of measures is monitored over time, including physical health, psychological health, health behaviours, perceptions, access to services, social support, risk and protective factors, and so on. Negative and positive consequences should be considered. For example, following a major flood, researchers may wish to examine temporal trends in a given community, using repeated cross-sectional surveys to assess a wide range of issues such as injuries, respiratory health problems, post-traumatic stress, emotional and financial stress, depressive symptoms, excessive drinking, psychosocial support received, sense of community belonging and so on, among a random sample of the local population.

Disaster-related losses should be measured in order to be able to examine health outcomes as a function of the level of exposure to the disaster. Various types of losses can be considered, including human losses (such as loss of a loved one, fear for one's life or that of a loved one, suffering injuries), material losses (such as home damage, permanent or temporary relocation, job loss), and subjective losses (such as perception that the event was stressful, that something important was lost, that something important was interrupted, or that harm will potentially occur in future).

Such surveys are powerful tools for health promotion initiatives and local advocacy initiatives. They help with raising awareness, providing an understanding of the full scope of local issues, as well as understanding the preferences and needs of the community to inform priority setting. By doing so, they contribute to the tailoring of interventions aiming to support citizens, communities, and inter-sectoral partners, and, more generally speaking, to the promotion of resilience and recovery processes *(7)*.

Beyond traditional surveys and other quantitative methods, qualitative approaches (such as focus groups and interviews) are also valuable for ensuring that the voices of groups who are disproportionately at high-risk are heard, in order that their specific needs and capacities are taken into account (see Chapters 4.12 and 4.13). It is important to take time to listen and learn from citizens, and to consider all members of the community as assets rather than victims *(2)*.

Regardless of the extent of the problems observed in the field, public health must seek a balance between a deficit-approach, which focuses on needs as well as disease or ill-health, and an asset-approach focused on strengths, capacities and resources of the community *(8)*. A good understanding and mastery of these two approaches is necessary for teams working in a psychosocial recovery context.

3.1.4 Asset Mapping

Bortel and colleagues *(21)* describe an asset approach to health as one which "...aims to identify those health-promoting or protective factors operating at different levels ... within individuals, communities, organizations and systems that are most likely to lead to higher degrees of overall health, well-being, achievement and sustainability". Asset mapping, which complements an asset approach, is a method that originated in the field of community development and is used to identify outcome measures that are asset-oriented *(22–23)*. Asset mapping was introduced by Kretzmann and McKnight in the early 1990s to promote citizen engagement and empowerment, by creating opportunities for participation *(22–24)*. It is based on a strengths-based approach to challenge traditional deficit-oriented mapping that has been employed in development initiatives. This method focuses on identifying resources that promote health and resilience in a community or organization, in contrast to deficit-oriented mapping, which has a pathogenic orientation to identify what makes people ill *(25)*. A balanced approach is needed if people are to be empowered *(11)*.

In the past decade, asset mapping has gained recognition as an upstream strategy for DRR (such as the CART Community Resilience Toolkit *(26)*, the EnRiCH Community Resilience Intervention *(2)*), and more recently for use in the recovery phase *(27)*. There is better understanding of the need to engage communities in identifying not only physical resources that can support resilience, but also social assets across multiple ecological levels (such as person, interpersonal, institutional, community, broader society).

The asset model for public health proposed by Morgan and Ziglio *(11)* describes asset mapping as an assessment method for intervention design. In support of this, Tracey and colleagues *(28)* developed a list of asset indicators that can be used for asset mapping to build organizational resilience. They used one-on-one interviews and focus groups to consult with representatives from essential service organizations. Thematic analysis was used to identify emergent themes related to organizational resilience from this qualitative dataset. The themes were then used to develop asset-oriented indicators which can be used by organizations to measure adaptive capacity within organizations to support disaster resilience.

For Health EDRM research, a diverse set of assets should be considered in pre- and post-disaster contexts. One of the challenges in asset mapping is to define and categorize different types of assets; both Hobfoll *(29)* and Moser and Satterthwaite *(30)* developed categories to address this challenge. The categories of assets span socioecological levels. They include individual, household, institutional, community and societal levels. Table 3.1.1 shows four types of asset categories that can be used for asset mapping. This list was created by combining the categories identified by Hobfoll *(29)* and Moser and Satterthwaite *(30)* for the purpose of household asset mapping with families impacted by stroke *(31)*.

Table 3.1.1 Sample of Asset Categories *(31)*

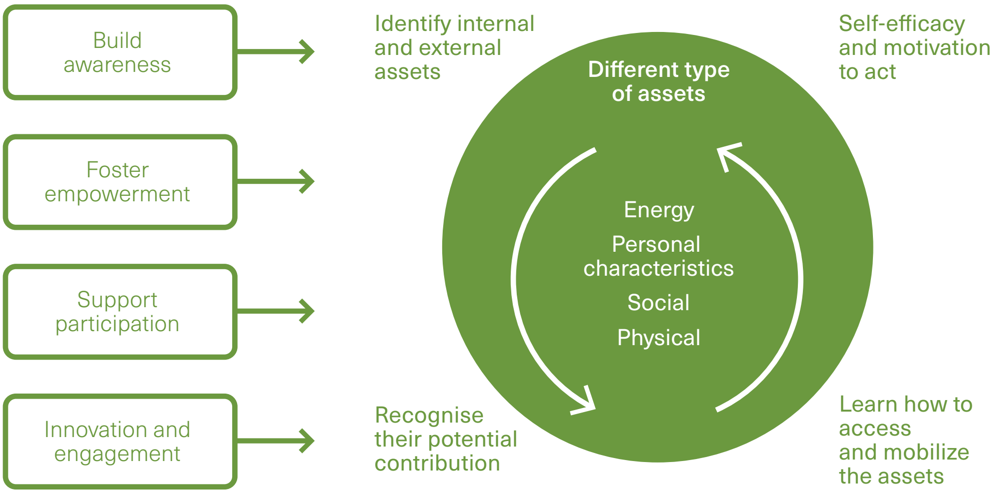
Asset Category	Description (and examples)
Social	Assets that involve people, community networks, social programmes, and are related to the social environment (such as family, friends, neighbours, culture, informal communication channels, social services, policy, bylaws).
Personal Characteristics	Assets within a person that can be mobilized to support resilience (such as knowledge, skills, attitude, perseverance, creativity).
Energy	Energy assets are those which can be converted into other assets to support prevention/mitigation, preparedness, response and recovery (such as money, time invested by an organization or group).
Physical	Tangible assets in the physical environment that support needs and operational functioning of different systems in the community (such as power grids, roads, housing, water treatment systems, transportation).

3.1.5 Asset Literacy

Literacy is a common term used to refer to learning and cognitive processing around different domains. The UN Educational Scientific and Cultural Organization (UNESCO) defines literacy as “the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts… Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society” *(32)*.

Asset literacy, a type of literacy, can be improved through asset mapping and stakeholder consultation. This concept was developed through a series of studies in which the processes and outcomes of asset mapping were observed and discussed *(4, 28, 31)*. Basic asset literacy is being able to identify assets which can then be categorized according to the types described in Table 3.1.1. For utility, however, awareness must be fostered so that people and organizations understand the potential value and contribution of different types of assets to support resilience. Beyond this awareness is empowerment, where citizens understand how to mobilize different assets in their communities and how to get involved to contribute their own assets to support their communities. Opportunities for social participation (such as through stakeholder engagement) is key for asset literacy to expand to this actionable level. Finally, innovation and engagement are supported when people have self-efficacy and motivation to act on their knowledge of assets. Self-efficacy is similar to confidence, but includes perceptions of control *(33)*. O’Sullivan and colleagues *(31)* expand on this description of asset literacy in a research study with stroke survivors who described assets they would rely on to support resilience in a disaster (Figure 3.1.1).

Figure 3.1.1 Components of Asset Literacy *(31)*



3.1.6 Stakeholder Engagement

Citizen engagement is central to the relevance and success of asset mapping interventions. It is critical to acknowledge stakeholders when identifying acceptable and effective solutions, taking into account evolving needs and the local context *(22, 26)*. Formally, stakeholder engagement refers to the active and equitable involvement of a diverse group of stakeholders, including the community, opinion leaders and media, in the research process *(34–35)*. Its purpose is to enhance the relevance of research to policy and practice, increase the transparency of the process, and reduce the time between knowledge generation and adoption into practice *(34)*. Engagement of the affected community can also contribute to the broadening of outcome measures by identifying assets within the community which can shape the research agenda and public health initiatives. It is not a trivial endeavour, but one that requires the time and commitment of researchers and decision-makers to redistribute power among all those involved, enabling communities to contribute their expertise and gain a shared sense of ownership *(36–37)*.

The tradition of involving stakeholders is evident in several academic research approaches, including community-based participatory research *(35, 38)*, participatory action research *(39)*, implementation science *(40)* and knowledge translation *(41)*. Although not new, stakeholder engagement is increasingly recognized as important by research funding organizations and many research initiatives. To effectively engage stakeholders in research projects, the research team must first identify the relevant stakeholders, broker relationships, collaboratively define roles and meaningful engagement activities. Any of these steps may be revisited throughout the research process to adapt and adjust to emergent needs of the stakeholders or community. The steps are outlined below.

Firstly, it is important to engage stakeholders and communities early in the process, so as to incorporate their ideas into the research questions while the study protocol is still malleable. To help identify relevant stakeholders, Concannon and colleagues *(42)* developed the 7P framework which includes:

i) patients and the public;

ii) providers;

iii) purchasers;

iv) payers;

v) policy makers;

vi) product makers; and

vii) principal investigators.

Although this framework was developed for health services research, the categories are applicable to Health EDRM. For example, "providers" could refer to professionals in health care (such as nurses, physicians, paramedics and so on), emergency services (such as fire, police, ambulance), or emergency management (incident commander, for example). Another way to conceptualize stakeholders is at the micro (individual), meso (organizational), and macro (policy) level *(43)*. The goal is to bring together stakeholders with diverse backgrounds, expertise, and skills relevant to the area of inquiry. Oftentimes, stakeholders are identified within a research team's first- and second-degree network connections, meaning relationships are already established. In cases where the identified stakeholder is unfamiliar, the research team can reach out to the individual to introduce themselves and invite them to the table. This strategy of cold contacting requires time and patience to broker a meaningful relationship.

Once stakeholders are invited to the table, there are several considerations that must be made around the design of the research project. This requires, and is not limited to, planning the roles of stakeholders, recognizing the values and objectives of engagement, and scheduling activities to exchange information *(34, 37)*. Phillipson and colleagues *(44)* noted several ways stakeholders have contributed to projects, such as providing input on study design, participating as research participants, supporting data collection, providing resources (such as facilities and materials), giving feedback, and helping to disseminate findings. Consultation methods, such as the structured interview matrix (SIM) facilitation technique, are also effective for garnering feedback from stakeholders and stimulating solution-oriented thinking across different sectors in the community *(2)*. Other activities used to engage stakeholders include town halls, small group meetings, establishing a community of practice, lunch and learns, and online collaborative platforms, to name a few. The key is to ensure that stakeholder input is reflected in the research study, and that decision-making power is a shared responsibility so that engagement moves beyond symbolic partnership but becomes one that is active and mutually beneficial.

3.1.7 Applying an Asset Lens to Outcome Measurement

To redress the balance of a deficit-based approach, an asset lens can be applied to assess the strengths and capabilities of a community *(24)*. Outcome measurement is not only important for assessing the negative impacts to a community, but also emergent strengths and capacities *(11)*. Using a socioecological model can help to differentiate which level the strengths or assets reside in: individual, organizational, and community or society. Rippon and South *(45)* conducted a rapid review of the literature for the WHO to determine how asset-based approaches are being used in the field of health promotion and public health for intervention design and evaluation.

There is a need for better identification of what makes a community resilient, through an assessment of assets before, during and after emergency or disaster (that is, its characteristics, strengths, and resources) that are associated with greater community resilience *(26)*. Local knowledge should be considered in the same manner as scientific knowledge. Having been through a unique and informative experience, the local health workforce involved in psychosocial management can benefit from drawing and sharing lessons in the aftermath of a disaster.

Case study research has a strong foothold among academics and practitioners as a methodology for studying disasters, due to its emphasis on providing in-depth and comprehensive information about an event. Case studies can therefore be used to capture the experiences of communities preparing for or impacted by disasters, and further illuminate assets that bolster resilience. To fully realize the potential of this type of methodology, standard formats, which include both deficit- and asset-based outcome measures, are needed to guide case study reporting. This would facilitate the pooling and sharing of such local evidence. In time, these case studies could be subjected to meta-analyses, to distil common features that transcend each unique emergency or disaster ravaged community. Some guidelines for these types of case study might include sharing lessons about:

- the needs and assets in the local community
- how and by whom these needs and assets should be addressed
- barriers and success factors for sustaining resilience and recovery.

3.1.8 Conclusions

Given the context of disaster prevention, preparedness, response and recovery, it is natural to focus on risks, hazards and vulnerability. However, adoption of an asset-oriented lens can stimulate innovation and solution-oriented thinking to complement an all-hazards approach in Health EDRM. Asset mapping requires investment and commitment by leaders to support grass-roots initiatives that foster citizen engagement. This type of initiative is the essence of an all-of-society approach to disaster health research, but it requires meaningful opportunities for participation by all.

3.1.9 Key messages

- **A balanced paradigm which recognizes both assets and risks is needed to support better outcome measurement in disaster research.**
- **Stakeholder engagement must be part of asset mapping to ensure broad community perspectives and that local context is included in assessment and measurement.**
- **Asset mapping can inform outcome measurement, but it is important that indicators reflect a balanced paradigm by including appropriate measures that consider assets in a community.**
- **Asset literacy is both a process and an outcome measure, which emphasizes local knowledge and intervention strategies that support community participation.**

3.1.10 Further reading

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3.2

Disaster risk factors – hazards, exposure and vulnerability

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3.2.1 Learning objectives

To understand the key factors to consider when developing a study to assess risk factors relevant to health emergency and disaster risk management (Health EDRM), including:

1. How hazards, exposure, and vulnerability/capacity create disaster risk.
2. The unique challenges of defining, identifying and measuring risk in disaster research.
3. Common issues of validity and quality in causal research in disasters.
4. How to conduct a study to assess disaster risk factors.

3.2.2 Introduction

In disasters, there are three broad areas of risk to health: the hazard that can cause damage, exposure to the hazard and the vulnerability of the exposed population (see also Chapters 1.3 and 2.5) *(1)*. Disaster research often strives to show that these risks affect morbidity, mortality or well-being in some way. This provides evidence to inform decisions relevant to Health EDRM.

Causative studies look for a risk factor that, if removed, would prevent the associated adverse outcome. A hypothesis is developed to explain the relationship between exposure to the risk factor and the outcome, and assumptions are made about what other factors (usually called confounding factors) might influence the relationship. The conclusions that can be drawn depend on how well these elements are addressed and measured when conducting the study and interpreting the results.

Research on disasters requires critical reflection around choosing and measuring risk factors because of the pragmatic difficulties inherent with conducting research in disaster settings *(2)*. This chapter outlines areas of disaster risk and discuss how research can be used to determine the causes of the problem, and how these causes and the size of their effects can be measured reliably. Chapter 4.2 provides additional information on how to undertake and interpret the statistical analyses that would help with this.

3.2.3 Hazards

Disasters often follow a hazard that negatively impacts a population *(3)*. Hazards can take many forms:

Natural: earthquake, landslide, tsunami, cyclones, extreme temperatures, floods, or droughts

Biological: disease outbreaks including human, animal, and plant epidemics and pandemics

Technological: chemical and radiological agent release, explosions, and transport and infrastructure failures

Societal: conflict, stampedes, acts of terrorism, migration, and humanitarian emergencies

Many ways to classify hazards exist (see Table 3.2.1 for an example). Hazards can occur individually, sequentially or in combination with each other. A primary hazard can be followed by secondary hazards, as seen with the earthquake, tsunami, and radiological hazards in the 2011 East Japan disaster (Chapter 1.3) *(4–5)*. Timing, severity, geographic location, and frequency are important characteristics of hazards. Hazards can have a short or long duration, and can have different impacts depending on the time of day, week or month when they happen *(6)*. They can be sudden onset, like an avalanche, or develop slowly over time as the result of a combination of factors. Deforestation, for example, is a slow onset hazard which can stem from factors such as limited resource management, land use planning, economic opportunities, and climate change. Hazards can be severe in their scope and impact or small-scale and localized. Hazards can happen infrequently, like radiological incidents, or frequently, like hurricanes and typhoons. How important these characteristics are and how they are translated to risk is relative to the population exposed to the hazard. For example, areas of the southern USA frequently experience hurricanes of varying strengths. People living in mobile homes in these regions are more likely to evacuate their homes during a hurricane because they perceive their risks to be high, based on prior experience with hurricanes and the strength of the hurricane, compared to those who live in more strongly built structures *(7)*.

Table 3.2.1 Truncated WHO Classification of Hazards *(8)*

Groups	Sub-groups	Examples of main types
Natural	Geophysical	Earthquake, geophysically triggered mass movement, volcanic activity
	Hydrological	Flood, wave action, hydrometeorological triggered mass movement
	Meteorological	Storms, extreme temperature
	Climatological	Drought, wildfire, glacial lake outburst
	Biological	Air-, water-, and vector-borne diseases, animal and plant diseases, food-borne outbreaks, antimicrobial resistant microorganisms
	Extraterrestrial	Impact, space weather
Human-induced	Technological	Industrial hazard, structural collapse, fire, air pollution, infrastructure disruption, cybersecurity, hazardous materials (including radiological), food contamination
	Societal	Armed conflict, civil unrest, financial crisis, terrorism, chemical, biological, radiological, nuclear, and explosive weapons
Environmental	Environmental degradation	Erosion, deforestation, salinization, sea level rise, desertification, wetland loss/ degradation, glacier retreat/melting

Case Study 3.2.1 describes the interaction of hazards with risks, using the example of earthquakes and masonry in Nepal.

Case Study 3.2.1

Structural risks during a hazard: Earthquakes and low-strength masonry in Nepal

Low-strength masonry of stone or bricks with mud mortar is the dominant building typology in Nepal and has been used as a building material since ancient times. It is still used in many parts of the country. Construction of early monuments, temples and residential buildings was generally limited to materials that were readily available and easily worked by local artisans. The trend at present is to use cement-based construction, especially in urbanizing areas.

In April 2015, an earthquake and its aftershocks killed more than 8800 people and injured more than 22 000, largely due to the damage to low-strength masonry structures. Among other factors, the impact on life depended on building vulnerability and the evolution of construction methods. Indeed, fatalities from the earthquake indicated that, on average, there had been a reduction in building vulnerability in urban areas, whereas buildings in rural areas remained highly vulnerable. A post-disaster needs assessment reported the following damage to houses associated with masonry strength *(9)*:

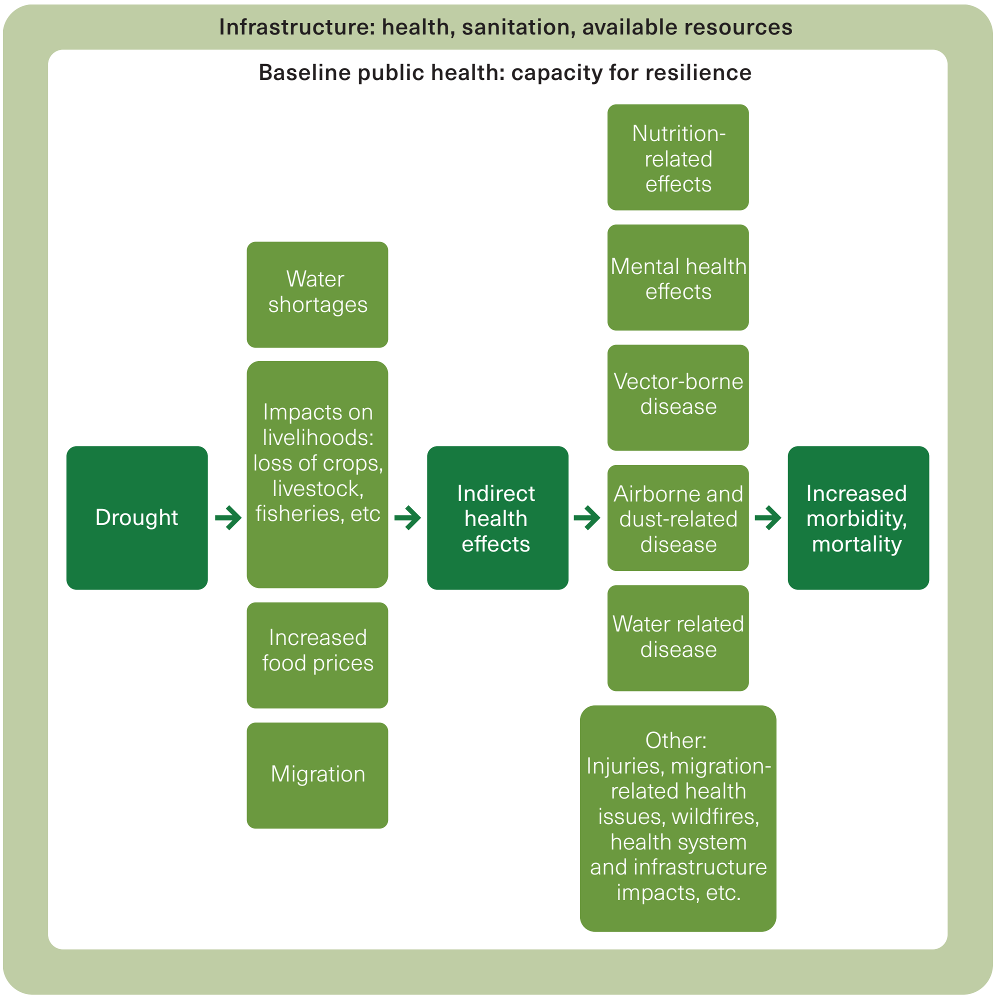
	Low-strength masonry	Cement masonry	Reinforced concrete	Total
Partially damaged	173 867	65 859	16 971	256 697
Fully damaged	474 025	18 214	6 613	498 852

The National Society for Earthquake Technology in Nepal started conducting training on earthquake resistant construction of vernacular buildings for masons in the late 1990s, and the government has taken the lead with national and international support, especially after the 2015 earthquake. There remains a continuing need for the institutionalization of a comprehensive, multi-tier and hands-on training certification programme to teach further skills in improving seismic performance of buildings and for developing nationwide capacities in earthquake-resistant reconstruction.

3.2.4 Exposure

Populations and societies need to be exposed to a hazard to be affected by it. Populations are often talked about as being directly or indirectly affected. Direct effects include injury, illness, other health effects, evacuation and displacement, and economic, social, cultural, and environmental damages. Indirect effects refer to additional consequences over time that cause unsafe or unhealthy conditions from economic, infrastructure, social, or health and psychological disruptions and changes. One of the major challenges in disaster research is measuring who has been affected and when. Determining which effects can be attributed to a disaster is complex, as there are multiple indirect pathways to an outcome (Figure 3.2.1). This is further complicated when populations are repeatedly or continuously exposed to a hazard, and when the time until the effects appear varies. For instance, disruptions to the health system and persistent stress from exposure to a hazard can lead to a greater burden of chronic conditions that may not present until months or years after a disaster.

Figure 3.2.1 Example of the indirect impact of droughts on health *(10)*



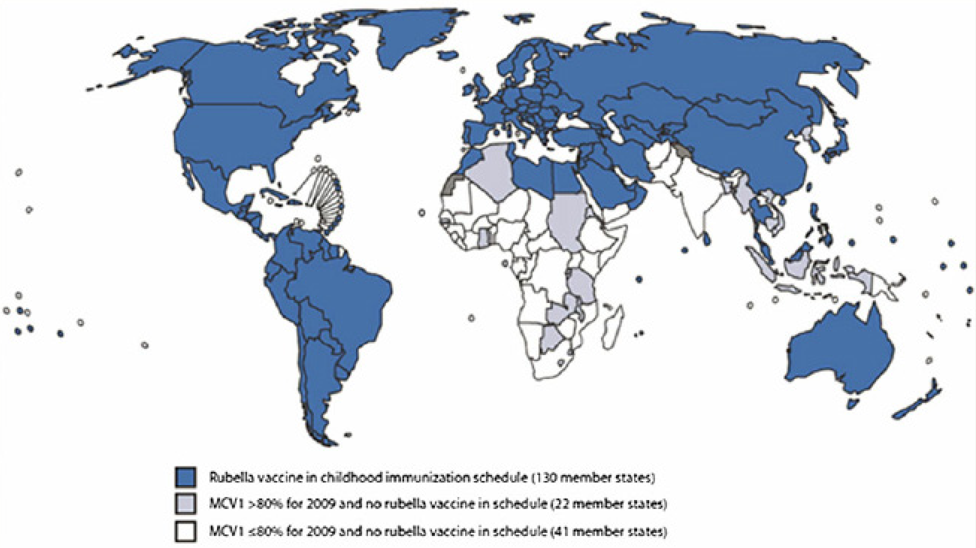
Case Study 3.2.2 shows how exposure risk can be reduced by changes to organizational behaviour.

Case Study 3.2.2
Changing organizational behaviour to reduce exposure risk: Vaccination to prevent congenital rubella syndrome

In the first half of the twentieth century, the link between infectious diseases and birth defects was not known. Rubella was a common childhood infectious disease, but also occurred in adults, including pregnant women. It was not until 1941 that the ophthalmologist Norman Gregg noticed that there were more infants with congenital eye problems that year than in the preceding years, and realized that their mothers had had rubella when pregnant. By reviewing patient records, he connected the increased number of infants with congenital eye problems he had observed to a large epidemic of rubella which had recently occurred, and went on to show that rubella in early pregnancy could be linked to many serious birth defects in children. The possibility that an apparently trivial illness could cause major birth defects like deafness, blindness, and heart defects was initially dismissed, and it took time for the association to be understood and identified as congenital rubella syndrome *(11)*.

Recognizing the value of vaccination to reduce exposure risk, the number of WHO Member States using rubella vaccines in their national immunization programmes continues to grow, increasing from 83 out of 190 Member States in 1996 to 130 out of 194 in 2009 (Figure 3.2.2). As a result, rubella has been eliminated in the WHO Region of the Americas to less than 1 case of congenital rubella syndrome per 100 000 births. Developing comprehensive vaccination programmes to prevent exposure to rubella required high-level political commitment and partnerships, proven technical strategies and surveillance tools, ongoing training for surveillance staff, and recognizing outstanding performance by individual countries. *(12)*

Figure 3.2.2 Countries using rubella vaccine and countries meeting WHO criteria for rubella vaccination introduction, 2009



3.2.5 Vulnerability

Vulnerability and capacity are made up of a wide range of physical, social, economic, and environmental factors, and are closely tied to development *(13)*. Vulnerability is highly dependent on the context of the hazard, since it is shaped by the context's individual factors and behaviours, history, politics, culture, geography, institutions, and natural processes. This can include things such as land use, public infrastructure, the burden of disease in the population and previous exposure to hazards. What makes people vulnerable is complex, and vulnerability can be both a risk factor for and an outcome of disasters. Vulnerability is discussed in Chapter 2.5 in relation to high-risk groups but, for example, poverty can put people at risk by forcing them to live in areas highly exposed to hazards, and exposure to hazards can cause poverty by damaging assets, interrupting livelihoods, and so on. While some factors can make an entire population vulnerable, such as poor governance or corruption, others are individual or specific to certain groups. Examples include level of education, social mobility, access to economic resources, physical and mental capacity, language barriers, or formal access to protection and services (see Case Study 3.2.3). As discussed in Chapter 2.5, some groups that are commonly thought of as having higher levels of vulnerability are *(14)*:

- People living in poverty
- Women
- Children and youth
- Older people
- People with disabilities
- People with chronic illness or underlying health conditions
- Migrants
- Ethnic minorities and indigenous peoples
- Sexual minorities

Case Study 3.2.3

Understanding individual vulnerability as health risk: Cold weather impacts and the social determinants of health *(15,16).*

The health risks and impacts resulting from cold weather greatly affect the most vulnerable people in society, such as children, older people and the chronically ill. Cold temperatures increase the risk of respiratory infections, stroke, heart attack and hypothermia, for example. Most countries affected by the impacts of cold weather have developed and implement each winter a 'cold weather plan' to help institutions and individuals better prepare and respond to cold temperatures (example: Cold Weather Plan for England *(17)*). Preventing cold-related illnesses and deaths is possible but requires interventions to reduce vulnerability.

In order to understand how this could be done, a mixed methods study (Chapter 4.13) using surveys and interviews with older people was conducted in Lisbon, the Portuguese Republic. The study found that the following factors are associated with vulnerability and the ability to adapt to cold weather: health status; knowing what to do during cold weather; individual awareness of vulnerability; quality of housing; costs of heating (electricity and gas); social networks; medical support; and health costs. These results provide evidence to inform policy and practice on opportunities for reducing the vulnerability of older people to cold weather. These include life-long education, knowledge sharing and learning, individualized advice by health professionals on what to do during cold weather, financial incentives to improve home insulation, subsidies to reduce the costs of heating, and improving social safety nets and activities for older people. An example of such interventions exists in the United Kingdom through the 'Keep Warm, Keep Well' initiative *(18)*. This provides financial incentives to help reduce the costs of keeping warm at home for those who cannot afford it. Other innovative policy and practice interventions are needed to assist and support individuals in reducing their vulnerability to cold weather

3.2.6 Determining and measuring risk factors

All causative studies are prone to issues around validity. Internal validity is the extent to which an individual study can answer the research question. In classic experimental research, such as a randomized trial (Chapter 4.1) the hypothesized causal factor can be manipulated to see what effect it has on the outcome (such as testing the efficacy of different dosages of a drug). Although the cause-and-effect relationship can be affected by confounding factors that are associated with the exposure and the outcome, a well-designed study will identify potential confounders and control for them. A good study will also try to reduce its selection bias and choose a study population so that the exposed and unexposed group do not differ in ways that can affect the outcome.

Typical experimental methods are difficult or impossible to apply when studying risk factors, because doing so would require the researcher to expose the population to hazards that might be harmful to them. Furthermore, in disasters, the study population and exposed group are often ‘selected’ by the disaster itself, depending on the geographic location of the hazard, biologic agent and route of transmission involved, and so on. Researchers are then left with the task of identifying a control group to which the exposed group can be compared, in order to see what effect the risk factor – rather than any other element – had on the outcomes of these people. Common examples are to compare the same population before and after the disaster, or to compare groups in highly affected versus less affected geographic areas. Researchers need to be keenly aware of the potential differences in risk between these groups. For example, someone studying floods and social support may select people living in a flood plain as their affected group and people living in a nearby mountainous area as their comparison group. In this case, consider how the hazard will affect each region; a larger proportion of displacement because of mudslides in the mountainous region compared to the flood plain may be a key difference between the groups that could affect social support *(19)*.

Researchers who use data collected for other reasons (often called “secondary data”) (Chapter 4.4) need to think about who is missing from the data. Data that comes only from medical facilities, for instance, will not include people who were unable to access healthcare, and this population may differ substantially in health status or socioeconomic status from those who were able to do so. An example of this is an unexpected reduction in mortality after flooding that was observed in a health dataset from the United Kingdom *(20)*. The reduction may have been the result of the affected population moving away and dying in geographic locations that had not flooded and were thus not reported as dead in the dataset from the flooded area.

Identifying which risk factors to use in a study will depend on the context and outcome *(21)*. Factors must have a logical link to the outcome to be a risk. One way to help determine this is by using a source-pathway-receptor approach *(22)*. A factor (the source) may be a risk if there is a reasonable pathway for it to cause harm to a population (receptor), and if the harm in the population can be traced back to the factor. This has been used to evaluate flood risks *(23)*, where the river is the source, the floodplain is the pathway, and the people living in the floodplain are the receptor. The impact on the people living in the floodplain can be traced back to the river that flooded via the floodplain. Using risk assessments are another approach that can help to identify the relevant hazards, direct and indirect exposures, and potential vulnerabilities of interest for the context *(14)*.

Measuring risk factors requires a firm understanding of the relationship that will be assessed. A study interested in the relationship between a hazard and an outcome will need to choose which characteristics of the hazard and population are relevant for their hypothesis. Using the example of hurricane exposure and PTSD, it would be necessary to decide if it is important to study ethnicity and level of exposure to the hurricane, or if individual trauma is expected to have the same impact on the outcome as neighbourhood trauma *(24)*. Any assumptions the researcher makes about relevance need to be explicitly stated. This is a helpful way to keep the study focused, avoid introducing bias, and guide the search for information.

Careful consideration also needs to be given to how to measure a risk factor. Some risk factors, such as age, can be measured directly. Others, like social exclusion, are more open to interpretation by the researcher and study population. Directly asking a study population is one way to measure risk, but accurately and completely recalling information, events, or situations from before, during, and after a disaster is challenging, and the information received from the participants can be inaccurate and biased. For any data that are collected, the tools used to measure risk should be tested and piloted in a similar population before data collection begins. A good measurement will be reliable, and produce similar results among similar participants. Pre-validated tools do exist for certain domains, especially for psychological research *(25)*, but attention should be paid to how well the questions and concepts translate from the context where the tool was developed to the context where it will be used, and it is important to keep in mind that all factors can be measured and defined in multiple ways. This raises issues about comparability of findings among research studies that use different definitions and measurements. A good rule of thumb is to clearly state the definitions and measurements that are used in the study, and the rationale for choosing them.

External validity is the extent to which the results of a study can be applied to other situations. Thinking about external validity means acknowledging the selection bias in the study and how this may affect the results, and understanding the study setting so that the findings can be interpreted in a realistic way. This is particularly important for disaster research, when the unique combinations of hazards, exposure, and vulnerability means studies are conducted in a specific context that may not be replicable elsewhere. While a single study may have poor external validity, it is still part of a larger base of evidence that can help people to understand the relationship between a risk factor and outcome *(26)*.

3.2.7 Conclusions

Health EDRM requires a good understanding of the risk factors that, when coupled with hazards relevant to a disaster, can cause health problems and harms. Research into this needs to take account of the interaction between hazards, exposure, and vulnerability or capacity. Then, when this research is being considered by decision makers, they need to assess the study's internal validity (relating to how well it was conducted) and external validity (relating to its relevance to settings or times other than where and when the study was done).

3.2.8 Key messages

- **Disasters are a combination of hazards, exposure and vulnerability. Finding causative factors for disaster outcomes means examining risk factors in these areas.**
- **Risk factors can combine in unpredictable ways, creating a complex and unique research context. While it can be difficult, this complexity must be grasped and acknowledged if research is to be valid.**
- **When designing, conducting and using research, careful scrutiny of the definitions, measurements, and risk factors used is important to understand what conclusions can be drawn from the individual study and from the overall body of evidence.**

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3.3

Designing a research intervention for Health EDRM

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3.3.1 Learning objectives

To understand important factors to consider when designing an intervention for health emergency and disaster risk management (Health EDRM), including:

1. Key social and behavioural science theories, models and framework that could be used for designing interventions for the management of health risk arising from an emergency or disaster and related evaluative research.
2. Theory-derived intervention methods.
3. Methods to use for planning and developing an intervention to achieve behavioural change.

3.3.2 Introduction

A health intervention is an act or set of actions performed for, with, or on behalf of a person or population with the objective of assessing, improving, maintaining, promoting or modifying health functioning or health conditions. A wide array of approaches exists for designing and researching interventions for the health risks associated with disasters and emergencies, and this chapter discusses some of these in the context of Health EDRM.

Although the focus has long been on relief responses during and after the onset of the disasters, Health EDRM now emphasizes interventions to be applied throughout the disaster management cycle, starting with prevention and mitigation of health risks through to empowerment of communities and national capacities to provide timely and effective response and recovery. Prevention occurs at three levels: primary, secondary and tertiary. Primary prevention involves either preventing the hazard from occurring or preventing exposures to the hazard leading to injuries or diseases. Secondary prevention involves interventions such as early diagnosis and management of injuries or diseases after the exposure has occurred. Tertiary prevention attempts to avoid further complications leading to more severe injuries, disabilities or death. Interventions aiming at changes in the determinants of health behaviours and environmental conditions during the pre-impact phase help build resilience of individuals and communities to risks, as well as their capacities to respond to and recover from the effects of emergency and disasters.

This chapter is intended to provide a framework for intervention development that can guide healthcare practitioners and policymakers involved in designing and researching effective interventions. It begins with the planning phase, which includes needs assessment, and outlines the dominant theories or models for explaining and changing behaviours and environmental settings that can be used to inform the intervention methods.

3.3.3 Needs and resources assessment

Needs and resources assessment is a prerequisite for understanding the targeted populations, the risks they face and the available resources (such as people, time, budget and political will) that will help inform the design of any intervention. Assessment involves the researchers' collection of epidemiological, social, environmental and health service information that could describe the existing situation (see also Chapter 3.1). During this stage, researchers responsible for designing an intervention also need to determine the prevalence and incidence of the problem as a whole and among sub-populations, as well as identify audiences of the health intervention in order to achieve maximum outcomes (Chapters 2.1 to 2.4).

The PRECEDE-PROCEED model *(1)* provides a useful example for this. The PRECEDE part of the model provides a framework for understanding the causation of health problems at multiple levels and the consideration of multiple determinants of health-related behaviour and social and physical environment. Phases 1 to 4 of PRECEDE explain the various perspectives to be assessed:

Phase 1: Social assessment: determine the problems and needs of a targeted population and identify desired results.

Phase 2: Epidemiological, behavioural and environmental assessment: identify the health determinants of the identified problems and set priorities and goals.

Phase 3: Ecological assessment: analyse behavioural and environmental determinants that predispose, reinforce and enable the behaviours and lifestyles.

Phase 4: Administrative and policy assessment: identify administrative and policy factors that influence implementation and choose appropriate interventions that lead to desired and expected changes.

The targeted populations and stakeholders should be involved in all aspects of the PRECEDE model. They may suggest issues that need to be analysed in detail. Despite the importance of primary data, secondary data from reports or studies conducted by other agencies should also be examined.

3.3.4 Understanding theory and approach

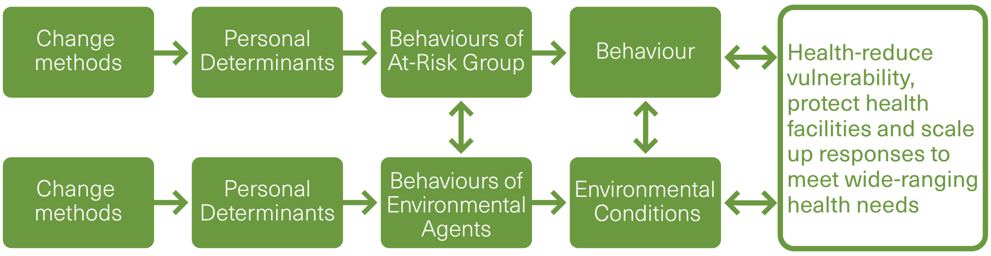
Improving the implementation of Health EDRM practices depends on achieving changes in behaviours and environmental settings. The prevention and control of communicable and noncommunicable diseases, as well as climate change-induced risks, require behavioural change. Deaths, injuries, diseases, disabilities, psychosocial problems and other health impacts brought about by emergencies and disasters could be reduced or avoided through effective interventions that initiate, promote and sustain behavioural changes at individual, interpersonal and community levels.

Behaviour change interventions are implemented to change behaviours that are associated or causally linked to mortality and morbidity. They are designed based on behaviour change theories or models, which are a combination of approaches, methods and strategies drawn from social and health sciences, such as psychology. Behaviour change theories guide an understanding of people's behaviours as individuals or groups (interpersonal, organizational, community and societal) and play a critical role during the various stages of an intervention, such as when identifying what information is required to develop an intervention strategy that will be effective *(2)*. Systematic reviews have indicated that using behavioural theory or models in the selection, planning, implementation and evaluation of interventions can lead to more positive effects than interventions designed without the support of any theory or model *(3)*.

Although a multitude of health behaviour theories or models for the development of interventions exist, criticisms prevail about the lack of research into the choice of theories *(4)* and the description of interventions *(5)*. This chapter therefore discusses some of the most widely used theories or models for understanding behavioural changes, including the kinds of changes needed to enhance emergency and disaster risk management *(6)*.

Human behaviours happen in a complex ecological system. A health problem could therefore be understood in an ecological way (Figure 3.3.1), which includes behavioural and environmental determinants, for making an informed choice as to the levels of intervention *(7)*. Changing health behaviours involves altering an individual's attitude and motivation, which may be influenced by a range of people (such as family members, teachers and colleagues) and conveyed in a variety of settings (such as home, school and workplace). The settings enable the interaction of the environmental, organizational and personal factors to affect health and well-being *(8)*.

Figure 3.3.1 Logic Model for Methods, Determinants, Behaviours, Environmental Conditions and Health *(7)*



3.3.5 The health belief model

The health belief model *(9–12)* is among the most popular conceptual frameworks in health behaviour research and provides a guide to frame interventions to change health behaviour (Table 3.3.1). The health belief model provides a useful, simple, actionable model and is commonly used for prevention and detection (such as vaccination against influenza, injury prevention and hazard preparedness) *(6, 13–15)*. However, its efficacy, effectiveness and impact remain limited.

Therefore, many researchers have extended the original health belief model or identified other variables to be incorporated into it, which could enhance its predictive capacity – to such an extent that the model no longer only comprises the key constructs *(16)*. Moreover, for most effective use, the health belief model should be integrated with other models that account for the environmental context and suggest strategies for change *(17–18)*.

Table 3.3.1 Key constructs and definitions of the health belief model *(9-12)*

Construct	Definition	Application
Perceived susceptibility	Belief about the probability of experiencing a risk or suffering from a disease	Identify populations at risk and assess their risk levels; Define the risk based on an individual's characteristics, behaviour or experience.
Perceived severity	Belief about how serious the situation is and its consequences	Specify the consequences, which could be multi-dimensional (such as physical illness, mental health deterioration and relationship issues).
Perceived benefits	Belief in the potential benefits of the action	Define the action to be taken (such as what, where, when and how). Describe the positive effects.
Perceived barriers	Belief about the potential barriers carrying out the action	Identify and tackle the barriers such as costs, loss of opportunities through reassurance, incentive, etc.
Cues to action	Strategies to activate behaviour change	Provide information and reminders.
Self-efficacy	Confidence in the ability to take action	Training and guidance to strengthen one's confidence in taking the recommended action. Goal setting and reinforcement.

3.3.6 Theories of reasoned action

Although theories of reasoned action do not suggest methods for changing health behaviours, theories of reasoned action have their significance in understanding health risk behaviours among people who are aware of the negative outcomes associated with behaviour. These started with the Theory of Reasoned Action (*19*), then the Theory of Planned Behaviour *(20)*. Later, these authors co-developed the Reasoned Action Approach *(21–22)*. While the Theory of Planned Behaviour emphasizes that behaviour intention is determined by some conceptually independent elements, such as one's attitude towards the behaviour, subjective norm and perceived behaviour control, the Reasoned Action Approach includes subcomponents of attitude (experiential/instrumental), perceived norm (injunctive/descriptive) and perceived behavioural control (capacity/autonomy) as well as environmental constraints to predict intention and behaviour *(23)*. The Theory of Planned Behaviour provides a useful, multi-factorial, actionable model, but empirically its prediction for actual behaviours, beyond the mere intention, has remained modest – and especially so for generic and complex behaviours. The SMART specifications required to achieve high prediction can become ludicrously precise. The Theory of Planned Behaviour remains a good model for articulating the cognitive factors (beliefs and knowledge) with the social pressure and the enabling environment (control, competencies, skills, power and so on).

These theories of reasoned action have captured the belief and the intention to change. The stronger the intention to engage in behaviour, the more likely it is that it will be performed. In previous studies, the Theory of Planned Behaviour has predicted an individual's intention to engage in certain behaviours, such as the use of helmets while cycling, the prevention of sexually transmitted diseases through human papilloma virus (HPV) vaccination and adaptation or mitigation of climate change *(24–26)*. The Reasoned Action Approach has also been applied in multiple contexts, such as smoking cessation, HIV prevention, health promotion and changing multiple behaviours *(27)*.

3.3.7 Stage theories: The transtheoretical or stages of change model

Stage theories suggest that people in different stages require different methods to help them cope with the stage they are in, and so finally change *(28)*. The transtheoretical model (the stages of change model) *(29)* is not a direct behaviour change theory but rather a time perspective on the deployment of behaviour change development and unrolling. It reveals that behaviour change unfolds through a series of stages *(30)*.

The transtheoretical model focuses on the decision-making of the individual and is a model of change. It assumes behaviour change does not happen quickly and decisively, but rather that the process of change occurs continuously and can relapse at any time. Unlike other theories or models where behavioural change is regarded as an individual event, the transtheoretical model postulates that such change is a process that needs to progress through a series of five stages for behavioural change (Figure 3.3.2 and Table 3.3.2). The stages include pre-contemplation,

contemplation, preparation, action and maintenance. For each stage of change, different intervention strategies will be applied to move the person to the subsequent stage of change until they reach the maintenance stage to accomplish the behavioural change.

Figure 3.3.2 The Transtheoretical Model and Stages of Change *(28-30)*

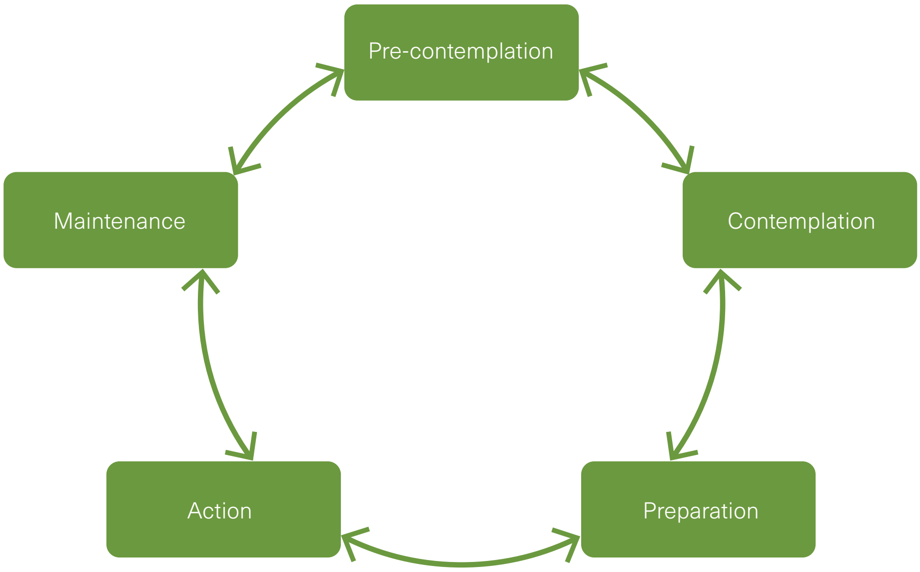


Table 3.3.2 Stages of Change in the Transtheoretical Model *(28-30)*

Stage	Description	Intervention Strategy
Pre-contemplation	Do not intend to take any action in the near term, usually within six months	Raise the awareness of the need for change; personalize the information about risks and benefits.
Contemplation	Be thinking about the behavioural change, but has not made a commitment to take action	Motivate the individual, encourage or support them to make action plans.
Preparation	Is prepared to take action within 30 days and has taken some preliminary steps	Help the individual to develop a specific, measurable action plan as well as goals.
Action	Have made significant modifications in lifestyle over the past six months	Provide them with feedback, support and reinforcement.
Maintenance	Behavioural change has lasted for at least six months; individual is working to maintain the change and prevent relapse	Give them reminders to avoid relapse.

The majority of transtheoretical model-related interventions focus on cessation of addictive behaviours and there is ongoing debate as to the validity of the transtheoretical model, such as its negligence of independent variables *(31)*. Some have also commented that effective longer-term health promotion requires longer-lasting interventions that may need to go beyond health education and incorporate environmental change strategies *(32)*. In view of these concerns, the precaution adoption process model *(33)* is also worthy of consideration for Health EDRM interventions and research, such as infection control and hazard risk management. The precaution adoption process model identifies seven stages along the path from lack of awareness to action and tailors potential designs of individual and organizational-level interventions throughout the process *(34)*. It raises consciousness among individuals and the community, specifies consequences of the risk and uses step-by-step process to provide information of those risks.

3.3.8 Social cognitive theory

Social cognitive theory is an interpersonal theory which proposes that learning happens in a context that is dynamic and with reciprocal interaction of the person, environment and behaviour *(35)*. The behaviours of an individual are influenced by their experiences and by observing the actions of people around them, taking into account the benefits of those actions. Reciprocally, the people themselves also exert influence on their surroundings. Social cognitive theory interventions are based on active learning that promotes performance during the entire process composed of the following six constructs:

i) Reciprocal determinism: the core concept of social cognitive theory, the dynamic and reciprocal interaction of person, environment and behaviour.

ii) Behaviour capability: an individual's ability to behave through necessary knowledge and skills, as well as knowing what to do and how to do it.

iii) Observational learning: individual observes a behaviour conducted by others and then replicates those actions.

iv) Reinforcements: the internal and external response to a person's behaviour. It will affect the likelihood of continuing or discontinuing the behaviour. Internal reinforcement refers to self-reward; external reinforcement refers to whether the environment encourages or discourages the enforcement of the behaviour.

v) Expectations or anticipated outcomes of the behaviour: one anticipates the outcomes before adopting the behaviour and this influences the successful completion of the behaviour.

vi) Self-efficacy: the level of one's self-knowledge or confidence that one can succeed in adopting the behaviour.

Social cognitive theory considers many determinants of the social ecological model *(36–37)* in explaining the behavioural change of individuals. Methods derived include modelling and reinforcement. It has been applied to behaviours that are complex and require much behaviour capacity, for instance, in the promotion of physical activity and disaster preparedness *(38)*.

3.3.9 The setting approach

Aside from theories or models informing interventions to promote behaviour changes, the setting approach, where setting is defined as “the place or social context in which people engage in daily activities in which environmental, organizational and personal factors interact to affect health and wellbeing”, was laid out in the 1986 Ottawa Charter for Health Promotion. This holistic and multifaceted approach has been developed into intervention programmes such as Healthy Cities (one of the most widely recognized examples of the settings approach), Safe Hospital Initiatives *(39)* as highlighted in the Sendai Framework *(40)*, and Health Promoting Schools. These highlight community participation and empowerment, inter-sectoral partnerships and participant equity for health promotion *(41)*.

While research on epidemiological and environmental risk transitions reveals that environmental risks might be responsible for 25% to 40% of the global burden of disease *(42)* (see also Chapter 2.3), the healthy environment or settings approach *(43)* have become prominent for health promotion. Meanwhile, in consideration of problems with the setting approach *(44–45)*, it has been “revitalized” with the advance to the supersetting approach. The supersetting approach is an ecological approach *(46)* emphasizing that health promotion interventions may be optimized through the integrated efforts of a variety of stakeholders such as private, public and voluntary sectors and civil society. The principles of integration, participation, empowerment, context-sensitive and knowledge-based development have guided the variety of stakeholders to carry out coordinated activities within the supersetting (school, hospital, home, workplace, and so on) to achieve a sustainable impact on community health promotion. Evidence has demonstrated that the supersetting approach is a useful conceptual framework for developing and implementing a complex multicomponent health promotion intervention. Still, more research on its sustainability may be required. For instance, “ownership” of the development and implementation of the activities has been identified as a motivational factor to foster sustainability of the intervention *(47)*.

In summary, the setting approach is a useful framework for developing intervention-based initiatives or enhancing the effectiveness of interventions. It emphasizes that coordinated and integrated health promotion activities that are implemented together with multiple stakeholders and across multiple settings are powerful in bringing about change. Similarly, in the promotion of individual and interpersonal behavioural change, a single theory could not explain all aspects or determinants of a health problem. A multi-theories approach should always be adopted when designing or tailoring interventions.

3.3.10 Techniques employed in intervention designs

The following techniques can be employed to design interventions that could resolve a health problem. Again, there is no single method dominating intervention development and intervention research. The various methods could be applied in combination and with consideration to feasibility, efficacy and cost:

- **Chunking:** this enhances the performance of memorizing and learning outcomes, facilitating comprehension and fluency by using thought units *(48).*
- **Cues:** these are a technique to retrieve information. The use of cue reminders may increase the effectiveness of interventions that aim to prevent health-risk behaviours *(49)* especially when presented at the time of encoding and retrieval. For instance, by printing the oral rehydration solution formula on a teaspoon, it reinforces the behaviour of making and using the solution when having diarrhoea.
- **Elaboration:** unlike chunking, elaboration is for an audience with the ability to process the information and are motivated to do so. Techniques to effective elaboration include rehearsal such as disaster preparedness drills, where more information could be gathered and consolidated among the audience.
- **Fear:** arousal of fear has long been used as a method to raise awareness of risk behaviour and promote change *(50).* However, it only motivates individuals who have high outcome and self-efficacy expectations. Fear has been adopted in NCD prevention and intervention.
- **Nudging:** these interventions are broadly defined as a rearrangement of a choice context that gently suggests a specific choice, with some applications in domains such as health *(51).* Further research in nudging is needed to help improve understanding of applied nudging interventions *(52).*
- **Social marketing:** this is a behavioural change approach that adapts commercial marketing techniques to achieve specific behavioural goals for a social good. Research shows that despite its small effect by clinical standards, it can have a large impact on population health *(53).*

Among the different types of intervention that might be used, researchers and practitioners should examine the effectiveness and feasibility of each before finalizing their choice. Furthermore, an approach of multiple interventions targeting different layers of stakeholders (such as the general public, patients, practitioners, regulators and decision-makers) might prove more effective *(54)*.

The effectiveness of an intervention refers to how well it reduces the burden of a disease (Chapter 2.3), as well as its efficacy and cost. This may require knowledge of the epidemiology of the disease *(55)*. In disasters or emergency situations where infectious diseases can be life-threatening, interventions have to be effective at multiple points in the chain of transmission (that is between the vector, the host and the environment). Cost is important not just for healthcare practitioners but for researchers too. The intervention must be provided within the budget allocated. Moreover, although primary prevention is always the most cost-effective prevention level, for policy-makers, prevention is not always sufficiently visible and palpable, with the result that rescue or curative actions might be more attractive and perceived to be more impactful. Convincingly documenting the gains from prevention intervention is critical. Lastly, the effectiveness of an intervention also depends on the cultural and social beliefs of the audience.

Feasibility describes how easy it is to implement the intervention and its related research. Complex interventions are more challenging to implement *(56)*. The feasibility of an intervention depends not just on organizational factors, but also on gender, cultural and political factors *(55)*. There should be an assessment of how acceptable the intervention is to the community and its stakeholders. Researchers may need to consider whether the intervention requires a high degree of community involvement and whether the expected outcome is possible.

Table 3.3.3 presents examples of intervention strategies that can be used in relation to Health EDRM; Case Studies 3.3.1, 3.3.2 and 3.3.3 provide detailed descriptions of interventions to prevent influenza and Ebola virus disease, as well as for disaster prevention and preparedness.

Table 3.3.3 Examples of Health EDRM intervention strategies for emergencies and crises

Health risk related to health emergency and disaster	Topical focus	Strategies or interventions used
Epidemic	Interventions to combat a cholera outbreak.	WASH intervention techniques *(57)* Modelling: Reinforcing cholera intervention through prediction-aided prevention *(58)*
Pandemic	Interventions to be used during 2009 A/H1N1 influenza pandemic.	Use of antiviral drugs together with social distancing (such as extended school closure) may substantially slow the rate of influenza epidemic development in the initial stage *(59)*. Risk communication strategies used during the pandemic included "speaking with one voice", involving academic experts and government officials in the effort, and targeting core groups of at-risk populations. Activities included awareness campaigns, advocacy, call centres, online response capacity and multi-ministerial, nongovernmental and private sector partnerships *(60)*.
Dead body management	Interventions for safe and dignified burials after disasters or during outbreaks of infectious disease.	Policy or guidelines enforcing the better management of dead bodies have been released, including "Management of dead bodies after disasters: A field manual for first responders" which provides practical and easy-to-follow guidelines on the recovery, documentation and storage of the remains of individuals who have died in disasters *(61)*. Another WHO guideline outlines the steps for the safe and dignified management of patients who have died from suspected or confirmed Ebola virus disease *(62)*. These guidelines have helped promote community engagement, awareness raising on the contagious Ebola virus disease as well as respect towards the cultural practices and beliefs (Case Study 3.3.2).
Basic sanitation	Health education and communication strategies to reduce faecal-oral transmission of disease and exposure to disease-bearing vectors.	Awareness raising and adoption of practices in personal or household hygiene such as handwashing, improved water and sanitation through health education and demonstration of health practices such as handwashing have been achieved (Case Study 3.3.3).

Case Study 3.3.1

Non-pharmaceutical interventions for the prevention of pandemic influenza

An influenza pandemic is an ever-looming threat. Non-pharmaceutical interventions, also known as community mitigation strategies, are a critical tool as the first line of defence for limiting the transmission and spread of influenza. Non-pharmaceutical interventions demonstrate the ecological approach to health promotion. They include personal and interpersonal levels of prevention such as better handwashing *(63)*, the use of facemasks and covering the mouth when coughing. Most interventions have been done at the community level, such as introducing checklists stating specific actions to help public health professionals and administrators of schools, workplaces and mass gatherings for the implementation of non-pharmaceutical interventions *(64-65)*. These checklists address the concerns or issues from the "planning", "take action" to "follow-up" phases for administrators of various settings to tackle. It should be noted that workplace emergency planning efforts occur with a recognition of, and in concert with, other levels mentioned in the ecological model, especially at the level of families and schools (such as working parents struggling to send their sick children to schools *(66)*).

Since the 2009 influenza pandemic, several countries have geared non-pharmaceutical interventions into their national influenza pandemic preparedness plans and there have been an increasing number of studies assessing the effectiveness of non-pharmaceutical interventions *(67)*. Furthermore, the importance of educating policymakers about the benefits of promoting an effective national influenza prevention and control strategies has been further reiterated. The WHO Global Influenza Strategy 2019-2030 *(68)* also highlights the expansion of seasonal influenza prevention and control policies and programmes using non-pharmaceutical interventions.

Case Study 3.3.2

Importance of health interventions for coping with the highly contagious Ebola virus disease in the Republic of Côte d’Ivoire

The 2014-2016 Ebola virus disease outbreak in West Africa was one of the largest Ebola outbreaks in history. It was first reported in March 2014 and officially declared over by WHO on 10 June 2016. The impact this epidemic had in West Africa, particularly in the Republic of Guinea, the Republic of Sierra Leone, and the Republic of Liberia is significant. Despite its proximity to these three countries, no cases had been reported in Cote d’Ivoire *(69)*.

A series of interventions were carried out in Côte d’Ivoire to prevent the spread of Ebola virus disease. First, a team of community health workers, community leaders and religious leaders was formed, which played a crucial role in delivering information about risks associated with Ebola virus disease. The Ebola-related health risks were also disseminated through major mass communication channels, such as television. Citizens who recalled thinking Ebola was a rumour during the initial disease outbreak later perceived the susceptibility to and the severity of the disease through news updates on the television.

Ebola virus disease is highly contagious. The priority in infection control is to avoid physical contact with the sick or deceased person, including their body fluids and the objects they have used. This highlights the challenge of dead body management. WHO, in partnership with the International Federation of Red Cross and Red Crescent Societies and faith-based organizations, developed a protocol outlining the step-by-step processes for safe and dignified burials *(62)*. The protocol highlights the consideration of cultural practices and inclusion of family in the planning, preparation and implementation of the burial, especially for Christians and Muslims, who have different burial rituals and constituted the majority of the populations being affected.

The Government of Côte d’Ivoire also implemented other prevention measures. It banned bush meat and promoted regular handwashing. It was suggested that people should raise their arms as a way of greeting instead of hugging and shaking hands. These interventions have been effective in controlling the transmission of the disease *(70)*.

Case Study 3.3.3
Health education intervention in a rural Chinese, earthquake-prone transitional village

CCOUC conducted disaster preparedness interventions, including face-to-face health education in 2009 and 2011, and an intervention evaluation research in 2018, in the earthquake- and flood-prone Dai and Yi ethnic minority-based community in Sichuan Province, China *(71)*. These interventions examined how the villagers' experiences and beliefs interact with the external social context (environment) to make certain behavioural changes. The research showed that awareness raising and adoption of practices in personal or household hygiene, such as handwashing, food and nutrition, and water and sanitation were retained. This suggests that the interventions not only improved the immediate knowledge of the participants, but also achieved temporal stability, as observed in 2018, seven years after the original intervention. However, the intervention to promote preparation of a disaster preparedness kit was found to be unsustainable because villagers' intention to prepare a disaster preparedness kit decreased over time.

Conceptualizing disaster preparedness as a social cognitive process may contribute to understanding of the improvement in the uptake of related health behaviours. The social context such as the improvement in socioeconomic conditions, the increased access to media and internet technologies as well as the knowledge transfer from the migrant populations may have contributed to the positive intervention outcomes. It should be noted that disaster response is regarded in China as a Government-initiated and organized activity rather than a personal or family-related responsibility *(72)*. This may explain the low intention of action. Meanwhile, the active promotion of disaster preparedness kit preparation through a bottom-up approach should be reinforced, with repeated educational efforts to enhance the improvement of self-efficacy in case of emergency.

3.3.11 Conclusions

This Chapter has discussed theories, models and settings to help researchers understand and review health problems, and so design effective interventions and related evaluations. One of the biggest challenges for researchers is to conduct translational research in which the knowledge gained from research is applied in the implementation of interventions that address critical needs and risks. The classical approach to translation of basic research findings into interventions typically takes some time (73) and further investigations are needed to shorten this time lag (74-75). This would improve identification, evaluation and implementation of effective interventions in Health EDRM, and improve the outcomes of the research in the long-run.

3.3.12 Key messages

- **Developing effective interventions in Health EDRM requires review of the most relevant and applicable theories or models, as well as understanding of relevant approaches.**
- **The theories on which the intervention design is to be based should be chosen on the basis of the health risk or problem as well as an understanding of the targeted populations and their health risk factors.**
- **Changeable factors and the mechanism for change should be identified.**
- **Translational research is needed to show sufficient evidence of effectiveness to justify implementing the intervention.**

3.3.13 Further reading

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3.4 Ethics in Research

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3.4.1 Learning objectives

To understand the following key concepts in research ethics as they apply to health emergency and disaster risk management (Health EDRM):

1. The role and importance of ethical considerations throughout the different phases of a research process.
2. The limitations of normative ethical guidelines when operationalized in emergency and disaster contexts.
3. The importance of reciprocal community engagement in ensuring valid and valuable results.
4. The role of project managers, research funders, national governments and research ethics committees.

3.4.2 Introduction

Emergencies and disasters significantly impact people's health and livelihoods. Whereas the health sector has traditionally focused on emergency response, Health EDRM shifts risk management to a more all-encompassing, proactive approach that emphasizes prevention and mitigation, alongside preparedness, response and recovery, across multiple hazards and reducing vulnerability through building community capacity *(1)*.

Decisions and priorities in Health EDRM in both programmes and research must involve ethical considerations that minimize short and long-term harm in a transparent manner *(2)*. Ethical guidelines are not simply obligatory approval mechanisms but are tools to promote more equal researcher-participant partnerships and uphold integrity throughout a project's life-course, from research design, review, implementation to publication *(3-4)*, in a way that protects and respects the community's welfare *(5)*. Ethical guidelines take into consideration the value of undertaking the project itself, assessing its contribution to social good, potential to save lives and reduce suffering, and the significance of knowledge outcomes. The consequences of failing to ensure ethical considerations are addressed can lead to problems of moral significance, such as loss of public trust, disruption of livelihoods, confusion about roles and responsibilities, and low morale of both researchers and participants *(6)*.

3.4.3 Limitations of normative ethical guidance

There is an ethical imperative to collect good data in all research. In Health EDRM, such data are essential to provide public health and clinical practitioners with high quality evidence on which to assess the impact of a crisis, identify necessary risk management measures and plan for future interventions *(7)*. Appropriate research findings are often lacking in the field of Health EDRM as many interventions are not evaluated in rigorous trials that result in evidence of adequate depth and quality *(3, 8)*.

Emergencies create unique challenges in logistics, security, resources and time-management *(9)*. Standard processes and procedures designed to operate in non-emergency circumstances may not be sufficiently flexible to adapt to the uncertainty inherent to disasters. However, changes to process or methodology can be perceived as undermining ethical rigour *(8, 10)*. Lower income countries are disproportionately impacted by disasters since technical capacity, governance and resources may be both limited and poorly coordinated, putting further strain on research implementation *(6)*. Other areas where there may be particular pressures during disasters that are not well addressed in normative guidance include: determining a fair approach to research participation; duties and roles at the interface between research, treatment and public health; management of expectations on the front line; and protection of participants from stigmatization, discrimination and exclusion *(10)*.

Despite these challenges, there is consensus that stakeholders must prioritize the interests of communities involved (see also Chapter 2.7), many of whom are at their most vulnerable during and after emergencies and disasters *(5)*. Pressures in time and situation should be assessed in the overall context and should not be excuses for bypassing the underpinning ethical values that ensure research is rigorous and fit for purpose *(7)*. Case Study 3.4.1, and the rest of this chapter, identify ways in which these values can be upheld despite the challenges to the procedures through which they are operationalized in non-disaster situations. These include the creation of specialist scrutiny committees and a strong focus on partnership working – to the extent possible – with affected communities.

Case Study 3.4.1
Deviation from normative procedure: use of unregistered interventions for Ebola in West Africa *(11)*

During the 2014 West Africa Ebola outbreak, the rapidly rising case fatality rate under a fragile health system prompted calls to accelerate the development of interventions that were successful in laboratory and animal models, but had not yet been evaluated for safety and efficacy in humans. A WHO expert panel considered the ethical implications of using promising unregistered interventions outside the context of standard clinical trials *(11)*. The panel concluded that although this was a departure from well-established systems of regulation, it was acceptable on ethical and evidential grounds to offer the experimental interventions in the absence of any existing effective interventions, and under these unprecedented, exceptional circumstances *(12)*. Relevant ethical considerations both in the initial decision and in subsequent requirements for implementation included:

- The need to prioritize essential public health measures and resources
- Transparency to participants about the status of medical products and their uncertainty
- Transparency on risks and benefits
- Informed consent and freedom of choice, emphasizing the preservation of dignity
- Fair distribution of products in the event of scarcity
- Community involvement
- Full capacity by the research team to monitor and manage any side-effects and progress of treatment.

The panel also stressed the moral obligation of researchers to rapidly and transparently share all relevant data with the scientific community. Researchers have a moral duty to continue the evaluation of these interventions in clinical trials (see Chapter 4.1), in order to establish the safety and efficacy of the interventions for both current and future benefit *(11)*.

3.4.4 Value, feasibility and validity

The need to justify research in communities during or after emergencies is intensified In the light of the constraints described above. Decisions about research must take into consideration value, feasibility and validity:

Value: Identifying the necessity and added value of the proposed research is essential in justifying access to the available financial, human and time resources. It is therefore crucial for the research design to consider unmet needs of the target community *(3)*.

Feasibility: Feasibility and purpose, not just desirability, should steer research design. This includes: considering whether research should be done immediately after a disaster, or at a later point; the method and duration of data collection; or whether the research question needs to be adapted *(3, 13, 14)*. Importantly, research should be conducted in ways that are compatible with the existing healthcare response and public health needs *(15)*.

Validity: Unreliable or unusable findings can interfere with good practice and take up necessary resources during times of need. Reviewers have sometimes found that Health EDRM research lacks reliability and validity, which undermines its contribution to establishing baselines, standards, or trends *(7, 16)*.

It is critical to explicitly acknowledge any limitation. Researchers should also consider the risk of not undertaking research, or of prioritizing one project over another. Ultimately, researchers must consider the benefit of a project along with the cost of a missed opportunity.

3.4.5 Participant selection and exclusion

Research participation must be determined fairly, equitably and in line with objectives – and not due to privilege, access, perceived vulnerability or other subjective factors. Any exclusions should be based on valid scientific justification *(3)*. Those who are at particular risk of exclusion include those marginalized due to their age, gender, ethnicity, pregnancy, or previous trauma. Furthermore, damage to geographical, physical or governmental structures during emergencies could become barriers to access that result in research participation being decided on grounds of convenience rather than scientific validity *(7)*. Failure to include the necessary groups creates a knowledge gap in understanding the impact of an event across the entire population *(17)*. Exclusion can be particularly harmful in behavioural or mental health research (see also Chapter 5.1), as there is evidence that these marginalized groups experience significant long-term emotional and physical consequences following disaster events.

3.4.6 Informed consent

Informed consent is a process whereby potential research participants decide whether they wish to participate in a proposed study, having clearly understood the purpose and process of the research, including its risks and other implications. An informed consultative process has the potential to empower participants, build capacity, resilience and agency, and facilitate early identification of rights violations *(18)*. It is the researcher's duty to ensure that all necessary information has been communicated transparently, with consideration given to participants' health literacy, language barriers, and that decisions made by participants are well-informed, autonomous and voluntary.

While mainstream international guidelines unanimously agree that participant consent is mandatory, obtaining the appropriate informed consent can be practically challenging in Health EDRM. An individual's desire to survive may alter their perception of the potential harms of research participation. Researchers are often perceived as having the power to effect change, and it is crucial to be aware of power differentials and to not take advantage of potential participants' desperation and mistake this for voluntary and informed consent *(19-20)*. Populations in situations that render them particularly vulnerable, and who may lack clinical or research knowledge, are more likely to participate in research under the expectation of receiving assistance or monetary compensation without fully understanding underlying risks *(18)*. Although it cannot be assumed that all survivors of emergencies have impaired decision-making capacities, researchers should incorporate safeguards to ensure adapted procedures are used for particularly vulnerable groups in order to not exclude or exploit them based on any perceived vulnerability *(7, 21)*.

Innovative ways have been developed to improve informed consent. For example, members of the community can be involved within the research infrastructure so as to contribute local perspective, act as translators to inform potential participants, and become trained in research methods themselves *(3)*.

3.4.7 Harm-benefit

Health EDRM researchers operate in unstable contexts and so unforeseen obstacles will occur – the extent of which can range from inconvenience to participants, to psychological discomfort, loss of dignity or inflicting physical harm *(13, 21)*. In justifying the added value of research, any potential harm must also be considered, taking into account the novelty and necessity of the research *(20)*.

In practical terms, there is an ethical responsibility to structure research in a way that minimizes risk exposure by balancing risk with protective measures to alleviate burden and distress, particularly for participants who may be made more vulnerable by their age, gender, ethnicity, disability or previous trauma. Community representatives could be recruited as advisers in the planning process, to ensure researchers have an understanding of potentially controversial topics, such as those involving gender roles, family dynamics, political beliefs, and abuse. International researchers in particular must be cognisant of how their presence and behaviour may be perceived by the community *(3, 20)*.

In addition, researchers must consider risks to themselves and ensure they do not cause additional burden in settings facing geographic, political or medical instability *(22)*. Potential harm can be mitigated through training in cultural awareness, psychological support, security and practical protection measures. Research supervisors and funders are responsible for delaying projects until risks decrease, should this be necessary, and for not placing front-line researchers into high-risk settings without appropriate protection *(3, 20)*.

3.4.8 Participant protection

Research can be intrusive, so it is necessary to protect participants' interests while maintaining methodological rigour, particularly where vulnerability is exacerbated. To the extent possible, participants should be viewed as 'collaborators' and never just as 'data' *(23)*. At the same time, researchers must be alert to the potential power differentials, and associated risks of misunderstanding and exploitation. Welfare, privacy, confidentiality, protection from stigmatization and respect to gender, religion and culture must be acknowledged, regardless of urgency *(3)*. In order to be able to recognize what might constitute "harm" or "stigmatization" within a population, community involvement during the study development phase is crucial, especially where international researchers are involved. A breach in trust, or reinforcing stigmatizing factors, can result in harm to participants or wider communities, and in compromising the research, can in turn impact public health outcomes *(7)*.

To protect both participants and their information, researchers should include the following operating procedures *(7, 24)*:

- Avoid exposing participants to further harm as a result of the research, including physical and psychological harm.
- Respect each participant's freedom to withdraw from research.
- Assist participants in understanding their rights and any potential risks in a manner they can understand. Consider involving local representatives in sharing necessary information between the participant and research groups, as community awareness can reduce anxiety and promote ownership.
- Do not collect information that is not related to the research activity and minimize the use of identifiable information, such as by using codes to refer to participants rather than names and addresses. Irrelevant data collection wastes resources, and adds a burden to data storage and protection (see also Chapter 4.4).
- Be explicit about the intended use of the information collected, and the circumstances under which it will be collected and shared.
- Securely store information and ensure access is limited. Physical data should be locked, and electronic data should be password protected and encrypted. Assign "record-keepers" within the research team to oversee data storage and sharing, which includes distribution method and to whom it is shared. Technological advances continue to shift the benchmark for what constitutes as secure, and it is important for those responsible for data management to keep up with such advancements.
- Fully consider the impact of publishing findings, including the consequences of not doing so, such as the reaction of national governments or other relevant authorities.

Case Study 3.4.2 provides an example of the importance of research participant engagement in conducting research relevant to Health EDRM.

Case Study 3.4.2
Research participant engagement during the 2006 Israeli-Hezbollah war in the Lebanese Republic

Research undertaken by the American University of Beirut sought to assess the psychosocial status and needs of the internally displaced people in order to inform appropriate psychosocial interventions in wars. In addition to methodological difficulties, such as security and access, the experience of the researchers illustrated how conducting surveys in wartime intensifies certain ethical considerations. Important considerations arising out the researchers' experience include:

- Different expected outcomes between researchers and participants. Some participants attempted to expand the research focus into issues that addressed other needs, which caused diversions during data collection, sometimes resulting in overt conflict that was not easily resolved. Researchers have an ethical duty to clarify expectations, even if this decreases the likelihood of participation. This experience further emphasizes the importance of prior community engagement in order to identity priority research needs.
- The scope for harm in asking participants to reflect on a traumatic experience. It is important to be sensitive to individuals' reactions in these discussions. While some may feel indifferent or feel relieved and unburdened, others may be negatively triggered. In this case, data collectors were asked to stop the survey at first sign of distress and shift to casual conversation.
- Approaching potential participants who may feel humiliated by their living conditions. Media images from the camps showed some of those living there covering their faces. Survey participants were given the opportunity to describe their pre-war living conditions, which many did with pride.
- Concern that communities felt obliged to participate in return for assistance or provision as it was political "gatekeepers" and welfare providers swho were linking students with participants. It is the responsibility of the researcher to ensure participants have freedom of participation, with no sanction resulting from refusal *(25)*.

3.4.9 Community engagement

Ethical integrity in research is rooted in mutually respectful partnerships between researcher and participants, which increases the likelihood of developing mutual trust, of local ownership of the research aims, and of generating results that are valuable to the community. Researchers should work to achieve relationships that are as reciprocal, collaborative and transparent as possible, where participants feel their needs and interests are acknowledged *(6)*. Time pressure during emergencies should not be an excuse for researchers failing to engage *(15)*.

Effective and respectful community engagement starts with recognition of the broader situation, experience and practice of the affected population, as these are factors essential to people's identity, dignity and reactions. This can include understanding: the successes and weaknesses of the local health system; the situation of staffing, structure and resources;

unmet needs; familial and community relationships; and culturally or politically sensitive subjects. Historically, emergencies have most impacted those with limited financial resources, education and knowledge about clinical research, so special measures should be taken to include representatives from all subgroups, including the most marginalized to the extent that is possible, in order for the research outcomes to reflect their needs and experience, and to generate useful, valid data *(15, 26)*.

For the research to be appropriate, for the community to understand the objectives, and for relevant harms and benefits to be identified, participants' communities must be consulted continuously in a two-way process throughout the design, implementation and reporting of research *(10, 14)*. This can be achieved through identifying key stakeholders, including political, military and religious leaders, local media, social influencers and women's organizations at the earliest opportunity. Information can be gathered through focus groups, surveys or interviews with diverse community representatives, and in turn shared by integrating and coordinating within existing services such as community health workers (*15)*.

Some have suggested that by participating in relief efforts or volunteering within the community, researchers can build a rapport, and promote mutual understanding about the research goals *(27)*. However, this relationship can cause confusion in distinguishing researchers from responders, and blur the line between research and provision of care. Regardless of potential benefit to participants, the purpose of research is to achieve scientific goals and contribute to knowledge, and the potential for therapeutic misconception must be acknowledged. This can include misinterpreting the benefits of an intervention or, conversely, downplaying harm. Some ethicists have even suggested that informed consent should include clarification on the differences between research and provision of care *(28)*.

It is important to not promise what cannot be delivered and to maintain a respectful relationship between researcher and participant. Furthermore, effective communication and feed-back mechanisms are essential for addressing rumours or misunderstandings, which are grounded in valid experiences and should not simply be dismissed. Communities must be able to receive information about research progress and outcomes in ways that are respectful of their contribution *(15)*.

3.4.10 Stakeholder roles and responsibilities

There are other important stakeholders in the research process, beyond the researchers themselves, who have responsibilities in ensuring a project is planned, designed, and implemented appropriately. These include research managers, research funders, national governments and research ethics committees, as outlined below. Other stakeholders also include civil society organizations, other local research facilitators, and members of the international community.

Research managers

Research managers should encourage needs-based collaboration, national ownership and sustainability of a project, which includes avoiding the "parachute" or "lone" researcher model. Managers are accountable for the safety and welfare of their front-line staff, and need to take appropriate action to manage both the inherent risks staff face in working in dangerous settings, and any additional risks associated with the research. Staff must also be provided with adequate guidance in identifying and managing practical ethical issues throughout the life-course of the project. This includes completing cultural sensitivity and security training in order to successfully work in complex settings, and ensuring access to ongoing support as needed. Local partners and staff can help international organizations interpret and respond to certain situations; however, these local staff must also be protected from unfair employment practices or mistreatment from their community as a result of being involved in research *(15, 29*).

Research funders

Research funders should be fully informed on resource and access constraints during emergencies and disasters before defining or prioritizing activities, in order to avoid unrealistic and subsequently unmet expectations. They should actively promote collaboration and encourage capacity development and community engagement in research projects. This can include providing resources to enable partnership with local entities or civil society organizations. Having a holistic view on projects, research funders should monitor potentially duplicative research in order to avoid unnecessary research burden on participants *(10, 13, 17)*.

National governments

National governments are responsible for strengthening their emergency preparedness under the International Health Regulations (2005). This includes overseeing and pushing forward the scientific agenda for coordinated, integrated, partnership-based research, in particular by supporting academic and research capacity strengthening for the development of national expertise. National governments also have a role in overseeing and coordinating research to ensure competing research priorities do not overburden the population. This is particularly important during emergencies, where the influx of multiple agencies may cause confusion over roles and mandates *(15)*.

Research ethics committees

Research ethics committees (see Chapter 6.4) are responsible for promoting high ethical standards, which include overseeing participant protection and accounting for potential risks *(30)*. Although there is agreement that the research ethics governance systems need to be timely and flexible in the context of Health EDRM, and that committees should have relevant technical capacity to assess these projects, there is little consensus about what this adapted process looks like in practice, and further work is needed in this area *(5, 10)*.

The final case study in this chapter, Case Study 3.4.3, provides another example of how high quality, ethically conducted research can lead to important findings for Health EDRM.

Case Study 3.4.3

Delivering on the promise of research: Collaborating with the New York City Fire Department following the 9/11 terrorist attacks

Past research has shown that people are more willing to participate in research if it is seen to benefit the health system, recovery efforts, or clinical services, rather than be purely experimental. This process relies heavily on trust. Populations affected by disasters have lived through a physically and mentally traumatic experience and may prioritize coping with the aftermath, rather than other activities.

The 2001 9/11 terrorist attacks on the World Trade Center in New York City resulted in 2735 deaths, including 343 firefighters and paramedics who died during the response, over 6000 injured, and countless suffering long term physical and mental health effects *(31)*.

Following 9/11, the New York City Fire Department published early assessments of cancer outcomes associated with the event, which affected federal health care policy, and was eventually translated into cancer being added to 9/11 insurance coverage. New York City Fire Department was also involved in various studies on short and long-term declining pulmonary function in responders. Blood banked following the aftermath of 9/11 has been used to link biomarkers to pulmonary function, potentially predicting susceptibility and resistance to the disease.

New York City Fire Department firefighters had agreed to participate in this research as long as they felt the outcomes were beneficial to themselves or another responder. Maintaining this trust was particularly important in allowing researchers to conduct successful longitudinal studies into the long-term health outcomes of 9/11 responders.

Researchers partnered with the American Cancer Society and the US Centers for Disease Control and Prevention (CDC) to secure buy-in within the community, and found that partnership with these credible organizations was beneficial to the success of the project *(32)*.

3.4.11 Conclusions

The goal of health research is to obtain knowledge that will improve health and healthcare and help refine future programmes. For Health EDRM in particular, balancing the pursuit of knowledge with ensuring the safety and wellbeing of participants can be challenging *(20)*.

Ultimately, successful outcomes are dependent on ethical practices throughout the entire life-course of a project, that ensure validity, accountability and sustainability. These are all built on mutual respect between researchers and the communities where the research takes place. It is important that scientific progress, ownership and capacity are retained through the appropriate inclusion of local institutions and communities, that evidence is published for future use, and that learnings are systematically fed back into the community so that they may build evidence-based resilience in the future *(15)*. Experience-sharing will promote robust ethical practices that prioritize participant protection within the complexities of Health EDRM research *(5, 10)*.

3.4.12 Key messages

- **There are ethical aspects to consider throughout the design, review, implementation and publication phases of research that go beyond merely obtaining ethical approval. These considerations help researchers to mitigate against any potential short- or long-term harm to stakeholders in a transparent manner. In addition to evaluating potential for harm alongside scope for immediate benefit, researchers must also take into account the potential broader impact of a project, for example its overall contribution to societal good, capacity to improve livelihoods, the adaptability of knowledge outcomes to benefit other research areas or communities and the potential harm of not filling an evidence gap with high quality research.**
- **Decisions about the design, implementation or use of research should take into account the value, feasibility and validity of the research question. The added value of research towards addressing an unmet need is necessary to justify the financial, time and human resources that is invested, including the value of missed opportunity in not conducting the research. The feasibility of implementing certain activities within a Health EDRM context must be considered alongside the desirability of completing a research project; and validity must be ensured to avoid unreliable or unusable findings.**
- **Normative ethical guidelines for research may have to be adapted when operationalized in emergency and disaster contexts due to the unique challenges faced across different areas including security, logistics, time-constraints, or availability of adequate human resources. However, there can be no excuses for bypassing the underpinning ethical or scientific values that ensure research is rigorous and fit for purpose.**
- **Reciprocal and continued engagement with the affected community is not only key to understanding practical and contextual elements that will facilitate the collection of data and improve the quality of evidence, but is also essential for the development of a respectful partnership in which the participants' interests are not only considered, but protected, especially within the Health EDRM context where the community is made more vulnerable by its circumstances. Outcomes of the research should ultimately be fed back to the community, in order to empower and build capacity, and promote resilience to future disaster or emergency situations.**

3.4.13 Further reading

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3.5

Determining the research question

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3.5.1 Learning objectives

To understand key factors to consider when determining the question that would be answered by research to resolve an uncertainty in health emergency and disaster risk management (Health EDRM), including:

1. Deciding on the general issue that needs to be studied.
2. Defining a precise research question for the study.
3. Confirming that the study is a priority, will make an important contribution to the existing evidence base and will not waste funding or other resources.

3.5.2 Introduction

The first step when planning, doing or using a research study to resolve an area of uncertainty in Health EDRM is to be clear about what type of information is needed. For example, the issue may relate to how often something happens, why it happens, how to change what would otherwise happen or what might happen when something new is done. The desire may be to try to explain what has already happened or to find ways to improve things in the future. Clarity in this helps, both in the development of the appropriate research question and in the choice of what type of study to use to answer it.

This chapter begins with an outline of some of the types of study that would be suitable for tackling the broad topics, which are discussed in more detail in other chapters. This is followed by a section on defining the research question and the need to ensure that answering this question is a priority and will not waste funding or resources.

3.5.3 Deciding on the broad topic

Research can generally be categorized as observational, in which the study looks at what has already happened or is likely to happen anyway in the future, or experimental, in which it investigates the effect of changing something. Taking the example of the Great East Japan Earthquake in March 2011 and subsequent problems at the Fukushima nuclear power plant *(1)*, observational research might study:

- the number and types of injury caused by the tsunami *(2);*
- the types of people most likely to suffer from subsequent PTSD, anxiety and depression *(3);*
- the consequences of evacuating people from the area near to the power plant *(4)*.

Experimental studies might be used to:

- investigate different ways of treating injuries *(5)* or preventing PTSD *(6);*
- identify effective and efficient methods for risk communication *(7)* and mass evacuation.

Furthermore, with events as rare as major radiological incidents *(8)*, such as Chernobyl and Fukushima, computer-based modelling studies might be used to predict the likely impact of policies such as “shelter in place”.

Deciding on the broad topics that need to be studied allows choices to be made about the type of new research that would be most relevant. Observational studies investigate the consequences of certain events (see Chapters 2.2, 2.3 and 2.4) or risk factors (see Chapter 3.2), whereas experimental studies such as randomized trials (see Chapters 4.1 and 4.3) determine the effect of a new intervention, action or strategy and provide evidence to help people to decide whether it should be implemented in the future.

3.5.4 Defining the research question

For any new study, it is important that the research question is formulated correctly. It is the research question that will:

- underpin the choice as to which type of study to undertake;
- ensure that it is clear what is being investigated;
- ensure that the correct measurement tools are chosen;
- ensure any potential biases are avoided, such as those that might arise if the accumulating findings lead to unplanned changes;
- ensure that, if the study is completed successfully, it will provide a clear answer.

Case Study 3.5.1 provides an example of how a clear question produced a clear answer in an observational study in the aftermath of the Wenchuan earthquake in China in 2008.

Case Study 3.5.1
Analysis of inpatients and deaths in the West China Hospital of Sichuan University following the Wenchuan earthquake

The 8.0 magnitude earthquake that struck on 12 May 2008 affected nearly 46 million people and caused tremendous loss of life and property. The West China Hospital of Sichuan University is the only large-scale, state-level, general teaching hospital in the disaster area. It acted as the rescue centre for treating severe and complicated injuries caused by the earthquake, the support centre for the hospitals in the disaster area, and the logistics centre for medical teams from other provinces. It treated a total of 2728 injured people: 872 in the emergency department and 1856 admitted as inpatients. Amidst this delivery of health care, opportunities were taken to do research so as to provide evidence to help improve emergency plans for earthquakes and the establishment of state-level regional medical centres.

This research sought to answer questions such as "what were the gender, age, source, distribution of admission time, and types of injury of the patients?" And, "what were the causes of death among those who were admitted to hospital?" An observational study was designed to answer these questions, with clear definitions of what was to be counted and how. The findings were reported in the *Journal of Evidence-based Medicine* later that year *(9)*.

In the most straightforward type of experimental study, some participants are given the new intervention, while others act as a control group, continuing to receive the routine care. Many randomized trials use this simple, comparative design in which half the participants are randomly allocated to a new therapy and the other half receive usual care (see Chapter 4.1). The following paragraphs illustrate how the same basic topic for a piece of research would require different types of comparative study depending on the precise research question that is asked about the effects of the intervention.

The illustrative example is fish oil for treating PTSD, which was studied in a randomized trial after the Great East Japan Earthquake (see Case Study 4.1.1). If the broader topic is whether fish oil alleviates PTSD among people exposed to a disaster, there are many different possible comparisons that could be made, each answering a different research question, as discussed below.

Fish oil versus control
In this comparison, some participants would be allocated to take fish oil capsules and others would be asked to avoid them. In some studies, a placebo, or "dummy" capsule, might be given so that the participants and those looking after them or measuring their outcomes do not know who is receiving the fish oil. This simple design would answer the question "does taking fish oil have more or less benefit than not taking it?". However, it will not show whether fish oil is better, worse or the same as taking a different therapy or using a different type of intervention.

Fish oil versus another intervention

If there is an acceptable alternative to the intervention being tested, comparing that intervention with no intervention is unlikely to help decision makers who are trying to choose between the intervention and an alternative they would routinely use. In this PTSD example, if routine practice is to provide counselling, then answering a question about fish oil versus no intervention is not helpful. Instead, a comparison of fish oil versus counselling would answer the question “does taking fish oil have more or less benefit than counselling?” However, it will not show whether fish oil might provide further benefit if it was given in addition to the counselling.

Counselling plus fish oil versus counselling alone

If counselling would be routinely used to prevent or treat PTSD, the previous comparison would investigate whether it might be worth replacing it with fish oil. However, people might be cautious about changing practice. To overcome this, a study would be needed in which everyone continues to be provided with counselling but some receive fish oil in addition. This would then answer the question “does fish oil bring any additional benefit to the normal management of PTSD?”

Immediate fish oil versus delayed fish oil

In some circumstances, the uncertainty might be about whether something should happen immediately or can be delayed. For example, the fish oil might be given straight away or delayed for a few weeks. During those few weeks, the measurement of PTSD would provide information that is the same as that from the first example above, when one group of people are receiving the fish oil and another group are avoiding it. However, after those first few weeks, both groups will have been given fish oil, just at different times. This design would show whether fish oil should be given immediately or later. However, it leaves some participants exposed to a no-intervention period before the delayed fish oil is given, and this might not be acceptable if an alternative, such as counselling, is available. This might raise ethical issues (see Chapters 3.4 and 6.4). In such a case, the comparison might need to become immediate fish oil versus counselling followed by fish oil, so that everyone is being offered something straight away.

There are even more possible permutations for this topic than the examples given above, including whether different sequences of fish oil and counselling have different effects, and the most appropriate dose or type of fish oil product. However, these examples illustrate how different research questions need different comparisons and so different types of study. They also show that if the research question is not carefully defined, the resulting study might not be of an appropriate design and so might fail to produce a meaningful answer.

People designing an experimental study need to decide whether to compare a new intervention, action or strategy against no intervention or against an alternative, or if the new intervention should be added to something that is already used. A study of the effects of a combination might also be used to investigate the sequence in which the components are given.

3.5.5 Avoiding research waste

Once a research question has been clearly defined, the researcher needs to be confident that the study will fill an important gap and ensure that it will not contribute to research waste *(10)*. In the context of Health EDRM, research waste could mean that doing the research actually does more harm than good by diverting resources that could be used for other purposes or by hampering the response and relief effort. It is important, therefore, to ensure that answering the research question is of sufficient priority to justify doing the study. Sometimes, working through the following steps leads to the research question being changed, in order to improve it and increase its relevance. One of the steps in determining this might be to do a scoping review (Chapter 3.6).

Is the answer already out there?
Before embarking on a new study, it is important to review the existing research to ensure that the research question has not been answered already. Reviewing the existing research might also help when designing the new study, by enabling researchers to draw on practical lessons learned from earlier studies *(11)*. Doing a systematic review (see Chapter 2.6) or finding one that has already been done by others (see Chapters 3.7 and 6.2) should help to clarify the topics to be investigated and determine the precise research question to answer. For example, Case Study 3.5.2 describes the Cochrane Review of the health effects of electric fans during heatwaves, which concluded with the suggestion for a randomized trial that would focus in particular on people living in nursing homes *(12)*.

Case Study 3.5.2
Health effects of electric fans during heatwaves

As heatwaves become more common, their devastating effects on health are likely to increase. For example, during the heatwave that occurred in Europe in August 2003, an additional 30 000 people may have died. People will often use electric fans to help them feel more comfortable as temperatures rise, and a systematic review *(12)* was prepared to provide evidence on their effects on health to help inform England's national heatwave plan in the run up to the London Olympics of 2012. This review found that the existing research was not able to confirm or refute the potential benefits and harms of using an electric fan during a heatwave. It highlighted a lack of reliable evidence on whether or not people with a fan were more or less likely to survive the heatwave. This is of concern because fans work by encouraging the evaporation of sweat, which can lead to dehydration, which can be particularly dangerous for vulnerable groups such as children and the elderly. When air temperatures are above 35 °C, it is postulated that the fan might actually contribute to heat gain by blowing hot air onto the body. The review highlighted that one way to resolve this uncertainty would be to conduct a new, high quality study and it proposed the following design for this:

Population: Adults of any age with or without co-morbidity who are likely to be representative of general population, with a particular focus on participants aged ≥65 years in residential or care homes; during a heatwave.

Comparison: Electric fan versus routine care.

Outcomes: Use of healthcare services, heat-related illnesses, deaths and self-report comfort.

Design: Randomized trial, possibly a cluster trial with randomization of specific settings (such as care homes) or areas (such as small geographic regions).

3.5.6 Is the research a priority?

Identifying priorities for research is challenging in any area, as discussed in Chapter 2.7. However, this is particularly true in Health EDRM where the range of evidence needed and the complexity of emergency response make it difficult to prioritize key questions that might provide the decision makers and those making choices about interventions, actions and strategies with the evidence they need. Case Study 3.5.3 describes a priority setting exercise which was led by Evidence Aid to identify a set of 30 questions used to prioritize the conducting or updating of systematic reviews *(13)*.

Case Study 3.5.3

Identifying the highest priority systematic reviews of humanitarian action

During 2011 to 2013, Evidence Aid worked with a group of partners on a priority setting exercise for systematic reviews, producing a priority list of research questions for new or updated systematic reviews. The process included contributions from representatives of, among others, Action Contre La Faim, ALNAP, Centers for Disease Control and Prevention (USA), Centre for Global Health Trinity College Dublin, Department for International Development (United Kingdom), International Federation of Red Cross and Red Crescent Societies, Médecins Sans Frontières (including the Epicentre-Paris), Merlin, Nutrition Works, Public Health England, Save the Children, UNICEF, UN Office for the Coordination of Humanitarian Affairs, WHO and World Vision.

The exercise identified 30 priorities for up-to-date systematic reviews of the effects of interventions, actions and strategies on health outcomes, which would be particularly relevant to those involved in Health EDRM at an international level. It built on a needs assessment that had identified a couple of hundred relevant research questions, which were grouped under 43 themes. Ten themes were prioritized through an online survey and the questions attached to these themes were discussed at a face-to-face meeting in London, United Kingdom in May 2013, leading to the generation of the list of 30 highest priority questions *(13)*.

There is a reasonable body of literature on the setting of priorities in healthcare research *(14)* and some attention has been paid to this issue in the context of Health EDRM. For example, the Radiological/Nuclear Threat Countermeasures Working Group identified and prioritized 18 areas for further attention in relation to radiological or nuclear threat countermeasures *(15)*. A formal process has also been developed for conducting a rapid review to identify research priorities, especially in regard to infectious disease outbreaks *(16)*. This resonates with the ethics of doing research (Chapters 3.4 and 6.4). Murray and Kessel highlighted the need for agreement on the prioritization process because

- Undertaking health and social research to help facilitate disaster risk reduction and disaster risk management is vitally important to increase preparedness to respond to disasters, to enable the most effective action to be taken once disasters have occurred and to understand better the consequences of disasters *(17)*.

UNICEF also stressed the need for formal methods of research prioritization in 2011:

- The efficiency of knowledge generation and dissemination at both the global and country levels is diminished by a lack of coordinated, systematic planning and rigorous evaluations. Insufficient coordination among HQ [UNICEF headquarters], ROs [regional offices] and COs [country offices] in establishing research priorities and planning evaluations detracts from development of a focused research agenda in ECD [early childhood development] and results in missed opportunities to leverage resources for more rigorous, longer-term country-specific and multi-country evaluations. Current processes at the country and global levels do not facilitate sequencing of evaluations into formative and summative stages. *(18)*

The framework presented in Table 3.5.1 can help when deciding on the relevance and relative priority of a new piece of research. This was suggested in a report on the impact evaluations that are already available or are needed for humanitarian assistance, prepared by Evidence Aid and the International Initiative for Impact Evaluation (3ie).

Table 3.5.1. Framework for planning an impact evaluation *(19)*

Item	Things to consider
Feasibility of undertaking impact evaluations	Consider methodological difficulties (for example in finding comparison groups), operational difficulties (for example in defining and delivering the policies, interventions, actions or strategies to be evaluated) or institutional difficulties (for example unwillingness to evaluate).
What to evaluate?	Consider whether the impact evaluation should be of a topic that will be particularly easy or difficult to evaluate. For example, it might be relatively easy to do a randomized trial of a specific medical procedure for treating cholera but examining a complex intervention to improve the protection of women and children in a displaced person camp might require the assessment of a range of difficult-to-measure outcomes (such as gender-based violence, dignity and livelihoods).

Item	Things to consider
Use of existing evidence when prioritizing individual impact evaluations	Consider whether to focus on areas with little or no existing research or areas with a relatively large amount of research that is not sufficiently reliable or robust.
Creating review standards	Review the existing evidence to confirm that there is sufficient uncertainty to justify a new study and, when it is complete, place its findings in the context of other relevant studies, to provide users with an up-to-date summary of the evidence base.
Choosing the interventions to evaluate – innovation	Consider whether to focus on innovative interventions or those that are already in wide use.
Choosing the interventions to evaluate – relationship with the development sector	Consider whether to focus on interventions where there is considerable overlap with the development sector.
Choosing the interventions to evaluate – uncertainty, controversy and debate	Consider whether to focus on policies or interventions with considerable uncertainty, controversy or debate about their relative effects.
Choosing the populations to study	Consider whether to focus on particular subgroups of people (such as vulnerable or disadvantaged), or the population as a whole.
Settings for the impact evaluations	Consider whether to focus on sudden-onset disasters (possibly with the need to put some impact evaluations 'on the shelf' for future events) or for ongoing protracted emergencies.
Phases for the impact evaluations	Consider whether to focus on impact evaluations in resilience, risk reduction, immediate short-term response, or prolonged response or engagement.
Choosing the outcomes to measure	Consider whether an existing core outcome set should be used, or a new one developed (see below). In the absence of a core outcome set, identify and measure those outcomes that will be most helpful to future decision makers.
Methodology research	Consider whether research into the methods to be used in the study could be embedded in the study, for example in a SWAT (Study Within A Trial) *(20)*.
Impact evaluation of the impact evaluations	Consider whether the study should include an evaluation (either by the research team working on the study or by someone independent) of the impact of the study on future policy, practice and outcomes.
Dissemination and implementation of findings	Consider having an implementation or knowledge translation plan, which should include how best to reach key decision makers and how the findings might be made available to those who took part in the study.

3.5.7 Choosing the right outcomes to measure

Regardless of the topic chosen, the outcomes measured need to be those that will answer the research question reliably and be most useful to decision makers. Some of the causes of waste in healthcare research generally are the inconsistent measurement of outcomes across studies of the same topic, and selective reporting of the outcomes that have been measured *(9, 21)*. One way to reduce this waste is through the development of agreed, standardized sets of outcomes for research, known as core outcome sets. A core outcome set would help when comparing, contrasting and combining the findings of Health EDRM research. Although a core outcome set is not yet available for humanitarian action, a template has been prepared showing the data that should be reported for acute disaster medical response. This includes 15 data elements with indicators that can be used for research and quality improvement (Case Study 3.5.4). Furthermore, the international COMET Initiative *(22)* provides support for the development and uptake of core outcome sets and has identified more than 300 examples across health and social care *(23-25)*.

Case Study 3.5.4
Template for uniform data reporting of acute medical response in disasters

In order to tackle the lack of standards for collecting and reporting data in research studies on disaster medical management, the Academy for Emergency Management and Disaster Medicine brought together a group of 16 experts in the fields of research, education, ethics and operational aspects of disaster medical management from eight countries in a consensus process. Their aim was to produce a template for uniform data reporting of acute disaster medical response. The intention was to support more accurate completion of reports on disaster medical response, which would in turn contribute scientific evidence and knowledge that could be used to optimize medical response system interventions and improve the outcomes of disaster victims. The template was finalized at a meeting at the Utstein Abbey, on the island of Mosterøy, off the coast of Stavanger, Norway in November 2010. It followed the Utstein model, in which meetings are characterized by strong international collaboration and sponsorship of scientific organizations, using a process of gathering in an isolated intellectual environment experts who engage in well-facilitated discussions. The template contains 15 data elements with indicators, that can be used for both research and quality improvement, and it is available in the journal article *(26)*.

3.5.8 Being research ready

Chapter 3.6 describes how a scoping review might be the next step in moving forward with a piece of research. Sometimes, a pilot or feasibility study might be needed to develop the methods for a definitive research study and to ensure that it can be completed successfully. These might be particularly important steps when planning a study for implementation in a sudden-onset disaster, when it may be necessary to have plans for a prospective study (such as a randomized trial) pre-prepared and ready to be activated. Without this “on the shelf” study, it might not be possible to do the necessary research, especially if it would take days or weeks to design and activate the study and the need and opportunity for the research would therefore be missed. To overcome this challenge, it might be worth having the study pre-designed and ready to initiate at the appropriate time in the disaster. This is the case with a series of studies funded by the United Kingdom’s National Institute for Health Research, which will be activated in the event of an influenza pandemic *(27)* and include a randomized trial of steroids for the critically ill *(28)*.

3.5.9 Conclusions

There are many areas of uncertainty in Health EDRM which would benefit from research. However, before embarking on any new study it is important that it is carefully planned and designed. The first step in doing this should be the development of a precise research question to help ensure that the design of the resulting study is appropriate and will produce a relevant, reliable and robust answer.

3.5.10 Key messages

- **Defining a clear research question, including any comparisons that will be made, is vital when planning a research study to fill an evidence gap for Heath EDRM.**
- **Outcomes to be measured and reported should be chosen carefully, in order to allow the study to answer the research question and provide evidence that will influence decision makers.**
- **A review of the existing evidence will help to ensure that the new study is a priority and that the answer to its research question is not available from existing research.**
- **If the study will need to be implemented rapidly (such as in a sudden-onset disaster), a pilot or feasibility study may be necessary and it will be important to have the design “on the shelf” and ready to activate.**

3.5.11 Further reading

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3.6

Assessing the problems and developing a scoping review

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3.6.1 Learning objectives

To understand the role of scoping reviews when planning research in health emergency and disaster risk management (Health EDRM), including:

1. Scoping reviews as a research methodology.
2. Application of the methodology, including the steps involved and reporting of findings.
3. Tools that facilitate the scoping review process.

3.6.2 Introduction

A scoping review is a research method which synthesizes the available evidence in a subject area. Although relatively new, it is an increasingly popular approach in health sciences and research *(1)* and can make an important contribution to Health EDRM. It is used to examine the extent, range and nature of research activity; to determine the value of undertaking a full systematic review (see Chapter 2.6); to summarize and disseminate research findings; and to identify research gaps in the existing literature (see Chapter 3.7) *(2)*.

While scoping reviews are similar to systematic reviews in their utility, a key difference emerges when it comes to the research question or objective. The nature of the scoping review as a 'reconnaissance tool' means that it typically has a broader scope, and so the research question tends to be less focused than in a systematic review. Consequently, the inclusion criteria for scoping reviews are wider and may be defined both a priori and post hoc. Another element that differentiates scoping reviews from systematic reviews is the lack of a formal quality assessment process. This is again linked to the nature of the scoping review for which the main goal is to map the available evidence rather than to produce a response to the research question by synthesizing evidence from critically appraised documents. However, in spite of these differences, like systematic reviews, scoping reviews must adhere to the principles of transparency, validity, and reproducibility.

This chapter outlines and describes the scoping review methodology and uses two case studies as examples to illustrate the process.

3.6.3 Methods

Arksey and O'Malley *(1)* first proposed a methodological framework for conducting scoping reviews in 2005. However, since then it has undergone several revisions and modifications. In 2012, Levac and colleagues reviewed and made recommendations on how to improve scoping reviews *(2)*. Subsequently, Peters and colleagues proposed guidance for scoping reviews based on the methodology developed by members of the Joanna Briggs Institute and Collaborating Centers *(3)*. In 2018, Tricco et al, developed an extension to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) for the reporting of scoping reviews with the aim of improving the quality of the methodology and its reporting *(4)*.

A scoping review can be viewed as a five-step process, which includes:

i) identifying the research question

ii) identifying relevant studies

iii) selecting relevant studies

iv) charting the data

v) collating, summarizing and reporting the results.

Arksey and O'Malley also recommend the additional but optional step of carrying out a consultation exercise to inform and validate the findings of the literature review *(1)*.

3.6.4 Identifying the Research Question

The first step of the scoping review process is to create a review team, which should include people with expertise in scoping reviews and where possible, the subject matter, such as Health EDRM. The review team should also includelibrarians *(5)* (Chapter 6.2). Co-production and collaboration among people with such a diverse range of skills and experience will ensure that the research proceeds in a logical, scientific manner that is aligned with and builds on the existing knowledge in the subject area.

When the review team has been created, the next step is to identify the objective of the review and, based on this, define the research question (see Chapter 3.5). The scope should be as wide as possible, to allow the review to capture as much of the available evidence as possible, but this should be balanced against practicalities such as feasibility, time and resource constraints *(2)*.

Next, a scoping review protocol should be developed and published. The protocol should contain the rationale for the review, its objectives, detailed information on the methodology, including the inclusion and exclusion criteria, and an account of how the findings will be disseminated *(6)*. This will guide the research process, ensure transparency and help to reduce duplication of efforts by researchers who undertake similar studies in the future.

3.6.5 Identifying Relevant Studies

The next step is to identify the relevant literature, which begins with defining the search strategy and identifying the key concepts in the research question (see Chapter 6.2). This is an activity which should, where possible, be done together with a librarian. Defining the search strategy involves identifying the keywords, subject terms, themes and phrases related to and based on the key concepts as well as their synonyms. When this has been done, other limits such as the type and language of the publication and the period that the review will cover should be defined. Finally, the databases to be searched should be identified. The identified keywords, subject terms, themes and phrases should be combined and applied to each of the selected databases, bearing in mind that such combinations (and the search strategy as a whole) may need to be adapted for the different databases. A good approach is to carry out preliminary searches to test the process, and refine it if necessary, before undertaking the definitive search. The search should include searches of protocol registries and be followed by hand-searching of key journals and checking the reference lists of relevant articles, in order to minimize the possibility of missing relevant documents.

The process described above generally identifies peer-reviewed literature but may omit important documents like grey literature – that is, information produced and found outside of traditional publishing and distribution channels, such as presentations, reports, theses, conference proceedings, policy statements and working papers produced by government, inter- and nongovernmental organizations, professional networks or other organizations. Therefore, the peer-reviewed literature search should, where possible, be reinforced by a grey literature search, in order to ensure a more comprehensive capturing of the evidence and reduce the risk of reporting bias. Grey literature can be found through searches using online search engines and targeted searches on the websites of relevant and related organizations.

The search process and results of the searches conducted should be documented as meticulously as possible, in order to maximize recall, and to ensure that it can be reported and reproduced accurately. It is important to keep a record of the databases searched, the dates each search was done, and the results that were produced. Data management tools such as spreadsheets and bibliographic software packages such as Reference Manager or Endnote, can be useful for this. The search strategy should be included in the review report.

3.6.6 Study Selection

The third step in the scoping review process is the selection of relevant articles and studies, which is performed by a team of people who screen the articles retrieved in the search. This begins with a definition of the inclusion and exclusion criteria based on the scoping review's research question and objectives and involves describing the characteristics that eligible studies must possess. These criteria may be defined before or after the search, but a good approach is to draw up a preliminary list of criteria which can be reviewed and refined after the initial search and emerging themes become more apparent. The criteria will guide the people screening the articles for inclusion and ensure consistency in decision-making around the selection of articles to be included in the review.

Study selection should be carried out by at least two screeners, each of whom document and report their decision making. This should begin with a rapid screening of the titles and abstracts, to eliminate irrelevant studies or those which do not respond to the eligibility criteria. This can be done manually or might be helped through the use of software tools such as Abstrackr, Covidence, SRA-Helper for EndNote, Rayyan and RobotAnalyst, DistillerSR: details of these tools and others can be found online *(7)*. Using software can facilitate, speed up and improve the efficiency of the abstract screening process *(8)*. In most cases, the search results can be uploaded to the screening platforms either directly from databases, or from bibliographic management tools and spreadsheets. They also allow labels to be attached to processed references, which are indicated and displayed to each member of the screening team. This enables collaborative and concurrent work among multiple screeners, with each being able to make independent decisions about which articles should be included or excluded.

Following the initial selection, the full texts for the articles should be obtained and checked against the review's inclusion and exclusion criteria. This requires a reading of each article and a decision about whether it should be included in the review. The final selection should be done independently by at least two people to minimize bias and error. In case of disagreement, decisions should be evaluated and discussed as a team until consensus is reached *(2)*. This may involve seeking the input of a more senior team member. Any deviations from the scoping review protocol should be documented and reported.

3.6.7 Charting the Data

This is the process of recording the characteristics of the reviewed documents and keeping a record of the extracted information, in a systematic way. Such records should include general information such as the article's authors, title, type and date of publication and country of origin; study characteristics including the aim and objectives of the study; design and methodology; population characteristics; intervention; outcomes or results; subject areas or themes; and other relevant notes. The extracted data can be stored in simple spreadsheets such as Excel, but dedicated software is also available, including those mentioned above to help with screening as well as Sysrev *(9)*, SRDR *(10)*, the Joanna Briggs Institute's System for the Unified Management, Assessment and Review of Information (JBI SUMARI) *(11)*, TableBuilder *(12)*. To minimize error, everyone working on data extraction and charting should use a standardized extraction sheet which has been designed collaboratively.

3.6.8 Collating, Summarizing and Reporting the Results

In this stage, the review process should be summarized and presented in a comprehensible manner. The information can be organized and displayed using tables and flow charts such as the PRISMA diagram *(9)*, which illustrate the search and selection processes.

The results should be synthesized, analysed and used to generate responses to the research questions for the review. The findings should be collated and presented in a format that facilitates easy understanding for readers and the report should also contain information on the data analysis and synthesis methods used *(13)*.

Guidance on good reporting of scoping reviews are available in a special extension to the PRISMA guideline, which includes a checklist, as well as examples and explanations of best practices for reporting the findings of scoping reviews *(4)*.

Case Studies 3.6.1 and 3.6.2 provide examples of scoping reviews of the evidence base for disaster management in low- and middle-income countries (LMIC) and primary research in public health emergency preparedness (PHEP). The first study *(14)* reviewed existing evidence on emergency planning in health for LMIC settings with a particular focus on studying how it differs from high-income countries. The focus was mainly on searching the literature. In the second review *(15)*, the aim was to get a comprehensive overview of PHEP stakeholders were therefore consulted to ensure that no crucial areas or documents were overlooked. The consultation exercise also served to validate the findings from the literature based on the stakeholders' knowledge and experience. This highlights how scoping reviews are not a 'one size fits all' activity, but rather an exercise that should be closely aligned with and adapted to the research question and objectives.

Case Study 3.6.1
Disaster management in LMICs: scoping review of the evidence base

This study reviewed the evidence on emergency planning in health for LMIC settings with a particular focus on studying how it differs from high-income countries.

A search strategy was developed by compiling the themes and topics relevant to the topic and using them to generate search terms that were then applied in a pilot search. The search strategy was then adapted and applied to six electronic databases: Embase, The Medical Literature Analysis and Retrieval System Online (MEDLINE), PsycINFO, Biosis, Science Citation Index, Cumulative Index of Nursing and Allied Health Literature (CINAHL) and the Cochrane Library. The search was limited to articles published between 1990 and 2011.

The citations generated were downloaded into a reference manager database and duplicates were excluded, resulting in 2652 articles to be screened. A title and abstract review and thematic coding was done by the members of the reviewing team; disagreements regarding the relevance or categorization of articles were resolved through discussion and collective reviewing until a consensus was reached. 1545 articles were eventually selected for review. The characteristics of the reviewed documents, as well as extracted information from the studies themselves were recorded. This included a categorization of the results according to country of origin of articles, type of report and type of disaster, and thematically according to income classification and phase of the disaster management cycle *(14).*

Case Study 3.6.2
The evidence base of primary research in PHEP: a scoping review and stakeholder consultation

This scoping review explored existing research on PHEP and identified knowledge gaps.In consultation with a library specialist, the reviewers developed a search strategy with search terms relevant for public health, emergencies or disasters, emergency preparedness or emergency management and evidence or evaluation. This search strategy was applied to MEDLINE, Embase, BIOSIS, PsycInfo and Ebsco (CINAHL, Academic Search Premier, Health Business Elite, Environment Complete and SocINDEX). The search was restricted to the years 1998-2013 but designed to include key emergency events. In a second phase, the reference lists of included articles were checked for further articles. Finally, a Google search was done and other relevant sources were consulted to find grey literature.

The database search produced 3631 citations, which after duplicate and title screening, resulted in 322 articles for the selection stage of the review. Together with the 74 results generated from the other searches, two researchers independently reviewed all the articles for possible inclusion based on the following inclusion criteria:

- Does the article specifically include the actions of Public Health (local, province/state or national level)?
- Does the article include public health actions in aspects of emergency management such as prevention/mitigation, preparedness, response, and/or recovery?
- Does the article include an evaluation of public health actions during an emergency event (whether based on qualitative or quantitative data) OR propose emergency management-related standards or best practices that have been derived from a process with clear methods?

The characteristics of the studies were charted, and the information extracted was coded and analysed using the thematic analysis approach.

The next stage was a consultation with key informants which began with a survey to elicit their feedback on the key themes identified during the document review, and the identification of any themes or relevant documents that had been overlooked in the review. The consultation stage was concluded with a face-to-face working group meeting to validate the findings of the previous stages of the review *(15).*

3.6.9 Consultation Exercise

Although there is some debate around the necessity of having a consultation stage such as that noted in Case Study 3.6.2, it is recommended that this stage of the process be included where possible. It should include subject experts and other key informants. The information generated from such an exercise allows for triangulation with the findings from the literature and so helps to validate the findings of the scoping review.

3.6.10 Conclusions

This chapter has described the general principles of the scoping review methodology. More information is available in the suggestions for further reading. A more in-depth explanation of how to apply the methodology in health policy and systems research in both routine and emergency contexts has also been prepared by Tricco and colleagues *(16)*.

3.6.11 Key messages

- **Scoping reviews map and synthesize the available evidence in a given subject area.**
- **They can be used to gauge the extent, range and nature of research activity, determine the value of undertaking a more formal systematic review, identify research gaps and develop a research agenda.**
- **While scoping reviews differ from systematic reviews, they are not substandard systematic reviews, rather, they are a research methodology in their own right. They should therefore adhere to good research principles of transparency, validity and reproducibility.**

3.6.12 Further reading

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3.6.13 References

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3.7

Research resources to support policy and new research

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3.7.1 Learning objectives

To understand:

1. Some of the key information resources that can be used to find existing research into the effects of interventions relevant to health emergency and disaster risk management (Health EDRM);
2. How to access these resources; and
3. How the evidence from this research might be used in decision making.

3.7.2 Introduction

Evidence derived from evaluation and research into the effects of interventions relevant to Health EDRM can help policy makers and practitioners to understand what works, where, why and for whom *(1)*. Not only can evidence from research be used to help design interventions that effectively mitigate health and disaster risks, it can also help policy makers and practitioners avoid interventions which may cause harm, and avoid repeating the mistakes of the past.

This chapter explores some of the sources of such high-quality research evidence and how these can be accessed by policy makers and those designing new research studies; by accessing this existing research evidence, they will be better able to set well-informed policies and to design future research that will fill important gaps. This is explored in greater detail elsewhere in this book. For example, see Chapter 3.6 for the key steps in conducting a scoping review before embarking on a new study and Chapter 6.2 for information on how to search for literature and research evidence that might be used to support a proposal for a new study.

3.7.3 Challenges faced by policy makers looking for research evidence

Researchers and policy makers face several challenges when looking for research evidence on the effects of interventions that might be relevant to Health EDRM. The first is common to many fields and is the frequently contested nature of 'evidence' itself *(2)*. Scientific principles of proof, validity and reliability, or research frameworks in which credible steps have been taken to minimize bias, may find themselves crowded out by expert opinion, established ways of working ("we've always done it this way") or ideological policy making ("we believe this is the right way to do things"). To some extent, resistance from policy makers and practitioners in health emergency and disaster management who feel that evidence is no substitute for experience, expertise and localized knowledge reflects a reasonable concern – research evidence showing what works is seldom definitive, and because it may have been generated under ideal or highly controlled circumstances, it often lacks 'real world' implications. Also, research evidence does not tell decision makers what to do or how to act. In the context of interventions, it merely indicates the likelihood of certain outcomes being achieved based on a rigorous comparative analysis with doing something else (Chapter 4.1). In other contexts, it might, for example, tell them about risk factors (Chapter 3.2) or how common a particular problem is likely to be after a disaster (Chapters 2.1, 2.2 and 2.4). Such research evidence requires interpretation and judgement by decision makers based on their experience, substantive expertise, and *in situ* knowledge.

Secondly, the complexity of disaster settings and the difficulties of conducting research in such environments may mean that high quality, relevant evidence is not available. For instance, there are relatively few controlled impact evaluations using experimental or quasi-experimental designs compared to other sectors (3) and, therefore, fewer systematic reviews of the effects of interventions. Blanchet and colleagues (1) have noted that it might be impossible to use a randomized trial to compare the relative effects of different ways to coordinate the response to a major emergency, or the impact of a national policy intended to improve the social inclusion of refugees. In such cases, researchers might use a quasi-experimental design to investigate the link between the interventions and the outcomes" (See Chapters 4.14 and 4.15). Puri and colleagues *(4)* listed some factors that limit the use of controlled evaluations in the broader humanitarian sector. These include:

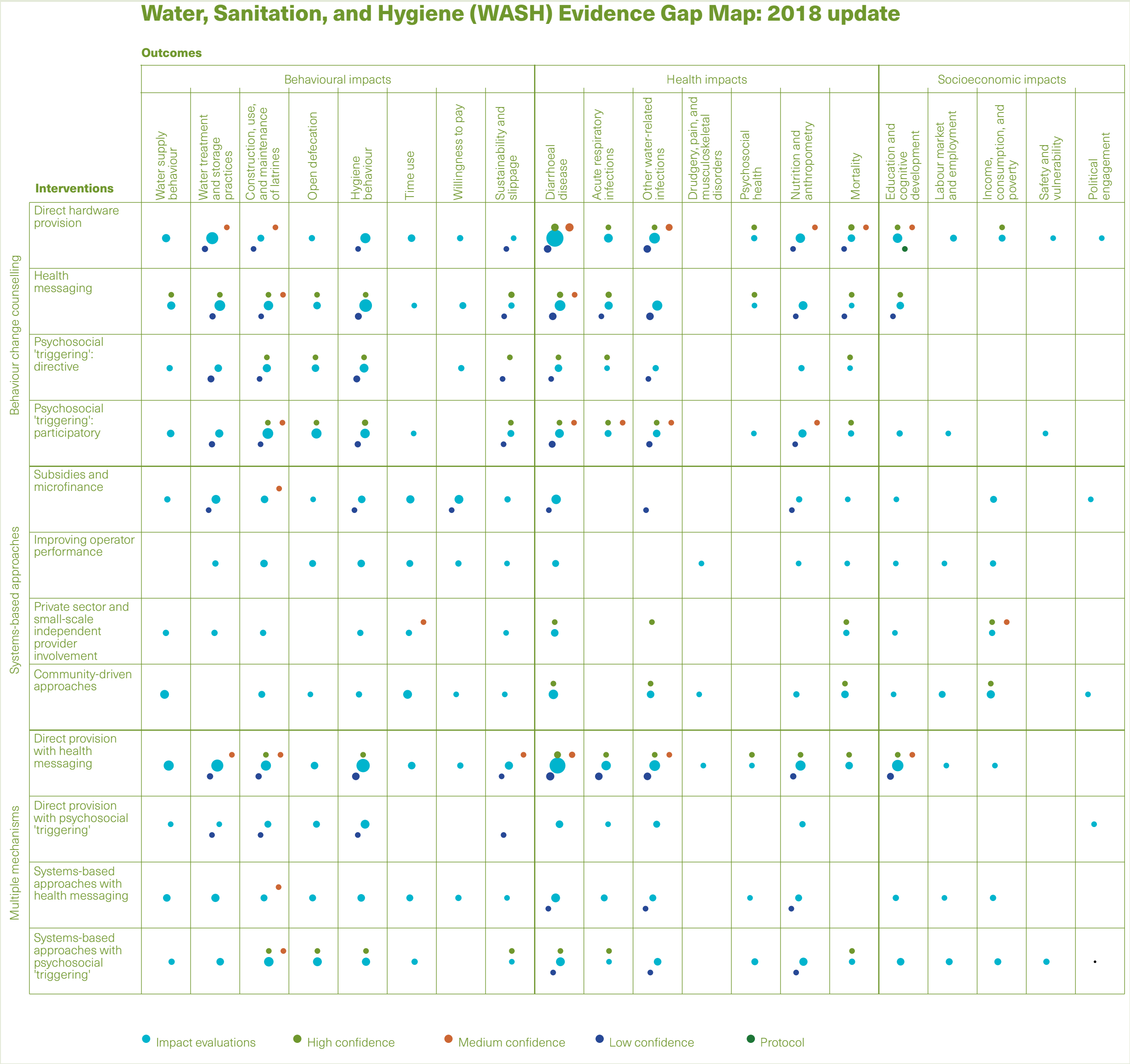
- the urgency of humanitarian action, which makes advance preparation for evaluation very difficult;
- the absence of baseline data and the inability to plan for and construct counterfactuals;
- the multiplicity of agencies providing support in any one area, which makes it difficult to decouple actions and outcomes;
- the fact that conflict and disasters do not usually have clean boundaries means that it is also difficult to find or establish comparable groups that can serve as counterfactuals in a scientifically robust and ethically sound way;
- a lack of impact evaluation experts in the humanitarian sector and a lack of humanitarian experts in the impact evaluation sector.

Notwithstanding these challenges, there is a growing body of evidence from experimental and quasi-experimental evaluations, and systematic reviews, as to what works, and what does not work, in disaster settings (see Case Study 3.7.1).

Case Study 3.7.1
Mapping and synthesizing the evidence base

3ie (The International Initiative for Impact Evaluation) was established in 2008 to support the generation and effective use of high-quality evidence to inform decision-making and improve the lives of people living in poverty in LMICs. 3ie now offers several searchable databases online. Two of these, the 3ie Database of Systematic Reviews and the Database of Impact Evaluations catalogue evidence of the effectiveness of interventions in the humanitarian sector. These databases also include systematic reviews and impact evaluations on the broader landscape of international development, many of which have relevance to interventions in emergency situations. Furthermore, 3ie's evidence gap maps provide a visual display of completed and ongoing systematic reviews and impact evaluations in a sector or subsector, structured around a framework of interventions and outcomes (for an example, see Figure 3.7.1). They provide both researchers and policy makers with a valuable 'at a glance' view of the quality of the existing evidence base and the confidence with which a link between particular interventions and outcomes can be established.

Figure 3.7.1 Example of a 3ie gap map, on water, sanitation and health*



*reproduced by kind permission of 3ie

However, where high quality research exists, it may be difficult to find, written in complex language or in a language other than that spoken by those responding to a disaster. The vast number of opportunities for researchers to publish or present their studies means that relevant studies may be scattered across tens of thousands of reports, thousands of websites and journals, or hidden within closed databases or behind paywalls. Even where research can be found on relatively established databases such as PubMed, Global Index Medicus (which includes the Latin American And Caribbean Health Sciences Literature database, LILACS), ERIC and OpenGrey, sifting through such evidence can be daunting and may require the services of an information specialist (see Chapters 3.6 and 6.2). For policy makers and practitioners, this means it is often difficult to understand what evidence actually exists even though they wish to use it *(5)*. For researchers, it may be challenging to see what gaps are present in the evidence base and hence where to direct scarce research resources.

3.7.4 The evidence base for interventions in health emergency and disaster settings

Research synthesis is one solution to the problem of finding research studies. Research synthesis has been described as "the most important single offering by academics to the policy process" *(6)*. Research synthesis is increasingly used in disaster preparedness and response, and humanitarian action to develop evidence-based guidelines and design interventions *(7)*. For example, WHO seeks to support its guidelines with research evidence that has been brought together in systematic reviews *(8)* and several organizations (Table 3.7.1) seek to make available details of systematic reviews on a wide range of humanitarian- and disaster-related topics. These include Enhancing Learning and Research for Humanitarian Assistance (ELRHA), the Global Health Institute (GHI) at the American University in Beirut, Lebanon and Evidence Aid. Case Study 3.7.2 provides an example of how Evidence Aid organized systematic reviews relevant to malnutrition into one of its broader thematic collections *(9)*.

Some international disaster response agencies, such as the International Rescue Committee, are also making increasing use of systematic reviews and other forms of research synthesis to underpin intervention design (Case Study 3.7.3).

Case Study 3.7.2

Special collection of systematic reviews of interventions for the prevention and treatment of moderate and severe acute malnutrition relevant to humanitarian and disaster settings

The use of evidence to inform policy making can often be hampered by the sheer diversity, complexity and inaccessibility of evidence. Relevant research may be dispersed across many databases, may not be publicly available and requires assessment of its relevance to ensure generalizability to a given risk or context. Furthermore, there may be barriers to research uptake that are nothing to do with the accessibility, relevance or complexity of the evidence itself, but rather with the value attached to that evidence by policy makers.

By working with multistakeholder, multidisciplinary groups of specialists to curate and produce its research synthesis products, Evidence Aid seeks to address both the inherent challenge of conducting research synthesis relating to disaster settings and the potential challenges of research uptake. Working with groups that include policy makers and practitioners as well as researchers allows it to capture the broadest range of relevant and robust research evidence, and also to generate an enhanced sense of 'ownership' over the evidence base from those whose job it is to design interventions.

Between March 2017 and March 2018, Evidence Aid brought together a group of 21 stakeholders from a variety of backgrounds to review and curate a collection of systematic reviews of interventions for the prevention and treatment of moderate and severe acute malnutrition relevant to humanitarian and disaster settings *(9)*. The methodology loosely followed general guidance for overviews of systematic reviews, with a pre-defined question formulated using the population, intervention, comparison, outcome, study design (PICOS) format, and search strategies applied to multiple databases. Pairs of collaborators first screened the search yields to identify potentially eligible reviews; other pairs then screened the list of potentially eligible reviews for relevance and thus inclusion in the final collections. Search strategies were run in 12 databases yielding a total of 4646 records after de-duplication.

Through this collaboration, Evidence Aid successfully generated collections of systematic reviews to guide prevention and management of acute malnutrition in humanitarian emergencies. These collections, made available on its website, provide accessible, synthesized evidence that can be used to inform decision-making on strategies and policies in the humanitarian emergency and disaster risk reduction sectors and to guide future research by identifying gaps in robust evidence and areas that are under-researched *(10)*.

Case Study 3.7.3
Using research synthesis in practice

The International Rescue Committee (IRC) is a long-established international humanitarian agency that offers emergency aid and long-term assistance to refugees and those displaced by war, persecution, or natural disaster. IRC has been placing increasing emphasis on high-quality evidence in the development of programme guidance documents and tools for field staff. It does this by conducting evidence reviews across many high-quality sources around specific interventions or approaches, and using what it learns about impact, contexts, populations and conditions to inform whether and how to adapt those interventions.

IRC's agency-wide effort to ensure that evidence is readily available to staff is framed by its Outcomes and Evidence Framework *(11)*, a publicly available online platform in which it defines the outcomes and sub-outcomes that it wishes to focus on, the general theories of change or pathways through which it seeks to achieve those outcomes, and indicators for measuring them. For each outcome and sub-outcome, it has summarized the best available evidence on the effectiveness of relevant interventions, with a primary focus on evidence from systematic reviews. For topics where systematic reviews do not yet exist, IRC has identified and summarized individual studies. IRC's collection of systematic reviews is drawn from the databases of 3ie, the Campbell Collaboration Library, the Cochrane Library and the United Kingdom's Department for International Development (DFID) Research for Development website. IRC also has a collection of Evidence Maps on health, education, economic wellbeing, safety, and power, and cross-cutting maps that focus on cash transfer interventions, service delivery interventions, and interventions in humanitarian emergencies.

The increasing use of rapid evidence synthesis to inform health systems development in LMICs also opens up potential opportunities to support better evidence-based decision-making via research synthesis even in the midst of disasters *(12)*.

3.7.5 Repositories of research evidence and systematic reviews

In order to help bring research evidence together, repositories have been established of systematic reviews and high-quality evaluations that are relevant to Health EDRM. Using these resources can make it easier and more efficient for both researchers and policy makers to navigate the existing evidence base. Table 3.7.1 shows several of these repositories; an up-to-date list is available from Evidence Aid on its website *(13)*.

Table 3.7.1 Online repositories of systematic reviews, high-quality evaluations and research evidence relevant to Health EDRM

3ie (International Initiative for Impact Evaluation) (see also Case Study 3.7.1) www.3ieimpact.org

3ie was established in 2008 to support the generation and effective use of high-quality evidence to inform decision-making and improve the lives of people living in poverty in low- and middle-income countries. 3ie now offers several searchable databases online.

Global Health Institute (GHI) www.ghi.aub.edu.lb/about-us

The Global Health Institute was established within the American University in Beirut, Lebanon. Its library of resources reflects the outputs of its interdisciplinary programmes on conflict medicine, refugee health, and nutrition, obesity and related diseases. They have also formed strategic partnerships with local and international stakeholders in health, aspiring to strengthen South-North collaborations among organizations and academic institutions.

Australian Disaster Resilience Knowledge Hub https://knowledge.aidr.org.au/

This hub provides a national, open-source platform that supports and informs policy, planning, decision making and contemporary good practice in disaster resilience.

Campbell Collaboration www.campbellcollaboration.org

The Campbell Collaboration is an international research organization that publishes a library hosting a wealth of research and evaluation on the effectiveness of interventions in crime and justice, education, social welfare and international development, many of which have relevance for interventions in the humanitarian sector. The Campbell Collaboration also produces a Policy Brief Series and provides training for researchers in how to undertake systematic reviews.

Centre for Evidence-Based Practice (CEBaP) www.cebap.org

The Centre for Evidence-Based Pratice is a non-profit global centre located in Belgium that uses scientific evidence to support humanitarian aid activities, including those of the Belgian Red Cross. The Centre uses systematic reviews to provide this evidence for a range of humanitarian activities, development programs and emergency relief.

Cochrane Library www.cochranelibrary.com

The Cochrane Library is an online publication offering a collection of high-quality, independent evidence to inform healthcare decision-making. Some of the reviews in the Cochrane Library have relevance for interventions in the humanitarian sector. The Cochrane Library is produced by an international organization called Cochrane (formerly ‘The Cochrane Collaboration’), which also has a training arm that provides training in how to undertake systematic reviews, both online and at training events. Cochrane also publishes one of the leading handbooks for preparing and maintaining systematic reviews of the effects of interventions: training.cochrane.org/handbook.

Department for International Development (DFID) Research for Development Library https://www.gov.uk/dfid-research-outputs

The United Kingdom’s Department for International Development is a major funder of research on international development, disaster relief and conflict. It has an online library of resources.

Enhancing Learning and Research for Humanitarian Assistance (ELRHA)
www.elrha.org/research-database

The Enhanced Learning and Research for Humanitarian Assistance is a global charity that seeks to find solutions to humanitarian problems through research and innovation. Its website hosts a free and easy to use resource library which holds every output from the work they fund as well as other publications, gap analyses, peer-reviewed journals, case studies and evaluations.

Evidence for Policy and Practice Information and Co-ordinating Centre
http://eppi.ioe.ac.uk/cms/

The Evidence for Policy and Practice Information and Co-ordinating Centre is based at University College London, United Kingdom. It covers a wide range of sectors, including the humanitarian sector, providing access to primary studies, systematic reviews and other types of evidence synthesis, including through its database of systematic reviews and database of primary research, which can be searched from its website.

Evidence Aid www.evidenceaid.org

Evidence Aid was founded by Cochrane staff to champion evidence-based decision-making in humanitarian action. Having initially worked by making the full text of several dozen Cochrane systematic reviews freely available online, it has now collated several hundred systematic reviews relevant to disaster settings, all of which are free to view on its website. Its resources also include Special Collections, which are bundles of reviews relevant to hazards (such as windstorms or earthquakes), specific disease risks (such as the Ebola and Zika viruses) or particular types of interventions (such as those relevant to prevention and treatment of malnutrition (Case Study 3.7.2).

Harvard Humanitarian Initiative
http://hhi.harvard.edu/resources#publications

The Harvard Humanitarian Initiative is a dedicated humanitarian research initiative at Harvard University, USA. It brings an interdisciplinary approach to promoting understanding of humanitarian crises and global health problems, and to developing evidence-based approaches to humanitarian assistance. Its Humanitarian Academy is dedicated to educating and training current and future generations of humanitarian leaders.

Health in Humanitarian Crises Centre
https://www.lshtm.ac.uk/research/centres/health-humanitarian-crises-centre

The Health in Humanitarian Crises Centre is based at the London School of Hygiene and Tropical Medicine, United Kingdom. It generates primary research and systematic reviews on public health in humanitarian crises, working closely with international humanitarian agencies and research centres in affected countries to address critical health challenges. A four-year research and capacity-building programme, RECAP was launched in 2018, focusing on decision-making and accountability in response to humanitarian crises and epidemics.

Humanitarian and Conflict Research Institute (HCRI)
https://www.hcri.manchester.ac.uk/

The Humanitarian and Conflict Research Institute is based in Manchester University, United Kingdom. It is a global centre for the study of humanitarianism and conflict response, global health, international disaster management and peacebuilding. Its library of research includes many studies on the effectiveness of interventions in areas such as health, wellbeing, social justice and peace-building.

International Rescue Committee (IRC) (see also Case Study 3.7.3)
www.rescue.org

IRC is a long-established international humanitarian agency that offers emergency aid and long-term assistance to refugees and those displaced by war, persecution, or natural disaster. It places an emphasis on high-quality evidence in the development of programme guidance documents and tools for field staff by conducting evidence reviews across many high-quality sources around specific interventions or approaches.

Johns Hopkins Center for Humanitarian Health
http://hopkinshumanitarianhealth.org/research/publications

The Johns Hopkins Center for Humanitarian Health is hosted at and administered by the Bloomberg School of Public Health, USA. The centre draws upon a variety of disciplines, including epidemiology, demography, emergency and disaster medicine, health systems management, nutrition/food security, environmental engineering, mental health, political science and human rights. Its library of resources includes many studies on evidence-based strategies for prevention, preparedness, response, recovery and reintegration.

Oxfam https://policy-practice.oxfam.org.uk/

Oxfam’s Policy and Practice website offers free access to thousands of publications including training manuals, evaluations, research reports and policy briefs, as well as programme overviews, staff profiles and their practitioner blogs. It also includes a collection of systematic reviews and other types of evidence synthesis relevant to humanitarian emergencies.

Tufts University / Feinstein International Center’s Humanitarian Evidence Program
https://fic.tufts.edu/research-item/the-humanitarian-evidence-program/

Tufts University / Feinstein International Center’s Humanitarian Evidence Program produced a series of reviews to distil humanitarian evidence and communicate it to key stakeholders in order to enable better decision-making and improve humanitarian policy and practice. The initiative was a Department for International Development-funded partnership between Oxfam and the Feinstein International Center.

UNICEF – Office of Research-Innocenti www.unicef-irc.org/publications/series/methodological-briefs

UNICEF – Office of Research-Innocenti collaborated with Royal Melbourn Institute of Technology University, Better Evaluation and 3ie to produce methodological briefs and videos on counterfactual evaluation designs. The series covers the building blocks of impact evaluation, strategies for causal attribution, and different data collection and analysis methods.

WHO Health Emergencies Programme (HEP) / Humanitarian Health Action (HHA) www.who.int/hac/techguidance/en

WHO Health Emergencies Programme/Humanitarian Health Action works with countries and partners to prepare for, prevent, respond to and recover from all hazards that create health emergencies, including disasters, disease outbreaks and conflicts. The Humanitarian Health Action website includes technical guidance based on available evidence on a wide range of health emergency topics.

3.7.6 Conclusions

Policy makers and practitioners in Health EDRM can and should make systematic use of high-quality evidence to inform operational and strategic decision making. Likewise, researchers should consider the evidence from existing research before embarking on a new study (Chapter 2.6). Those who fund and commission research and evaluation in disaster-affected settings should publish what they fund on open access platforms where possible and these studies should be brought together in systematic reviews. Not doing so risks rendering the investments in research ineffective and contributes to publication bias. While the increasing number of studies and variability in study design may make it difficult for policy makers to understand and appraise the growing evidence base, systematic reviews and other forms of research synthesis offer effective pathways to bring evidence to bear on policy and practice. Furthermore, resources that collate these reviews, such as those described in this chapter, make it much easier for those who need and those who should use this synthesized research to find it.

3.7.7 Key messages

- **Evidence derived from evaluation and research of the effects of interventions relevant to Health EDRM can help policy makers and practitioners to understand what works, where, why and for whom, and to avoid interventions which may cause harm.**
- **There are a growing number of existing quality studies relevant to Health EDRM, but these can be difficult to access or to analyse in their ‘raw’ state.**
- **Systematic reviews and other forms of evidence synthesis may offer a pathway to turn this high-quality evidence into sound policy and effective interventions.**
- **Many such reviews are available in free-to-access repositories such as those listed in this chapter.**

3.7.8 Further reading

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3.7.9 References

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