How to become a researcher

6.1 How to become a successful researcher

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6.1.1 Learning objectives

To understand the lifelong joys and challenges of becoming a successful researcher, by appreciating the importance and value of:

1. Gain a mastery of varied research methodologies to answer timely scientific questions.
2. Field research conducted in real-world and natural environments, which can give the researcher a deeper understanding and appreciation of the research topics and a respect for the research subjects.
3. The ability to work autonomously, set clear goals, be organized, and have a good research plan while meeting deadlines and expectations.
4. Mentorship and of working collaboratively with other researchers, mentors, learning to lead with questions using mature listening and communication skills.

6.1.2 Introduction

The enormous progress made in improving health and life spans during the 20th century is owed in no small part to the impact of high-quality research. *(1)* However, researchers, the public and policy makers are increasingly talking about the challenges of effectively delivering quality care, and a growing implementation gap *(2-4).* This gap manifests as a lack of success in translating research-based scientific findings into routine practice, policy and personal behavior change. Other concerns being raised include those about research waste – either because the right research is not being done, or because the findings of the right research are not being implemented *(5)*. This also holds true in supporting and applying Health EDRM in disaster preparedness and response.

> *"Every time a scientific paper presents a bit of data, an error bar – a quiet but insistent reminder that no knowledge is complete or perfect, accompanies it. The most each generation can hope for is to reduce the error bars a little, and to add to the body of data to which error bars apply".*

This quote, from Carl Sagan's The Demon Haunted World *(6)*, highlights the challenges of pursuing a career in medical research, where one can contribute to addressing the most pressing questions of the day in the constantly emerging challenges of science, such as when managing the aftermath of natural or man-made disasters.

Our aim in this chapter, and of this book as a whole, is to encourage the reader to become passionate about the process of generating, advocating for, and learning how to use high quality and effective research to help support and drive better public awareness, discourse and health policy.

6.1.3 How to Become a Researcher?

If you want to contribute to the body of knowledge and understanding of how to improve Health EDRM while implementing more resilient systems, it is important to understand and learn about research methods and how best to apply them*(7)*. Being a researcher can be the most powerful, empowering and learning experience of your career – it can be challenging and fascinating to address real pain and suffering, while seeing healthcare in its stark reality and learning to improve the delivery of public health by mapping out the full potential of policy interventions *(8)* and, if appropriate, perhaps working at the frontline of the humanitarian response or in an active pandemic. Talking to practitioners and administrators, listening carefully to the concerns of front line workers and leaders, and what drives their understanding will help you appreciate their behavioural choices or mindsets when offering potential solutions to address these concerns *(9)*. Observing their interactions with patients and the public can offer you a new perspective on what frightened, vulnerable people in disasters and emergencies really feel and need, and, what types of research communication can get in the way of effective implementation of public policy, even in the most organized and mature social systems.

Devising and conducting research, for example, to investigate the epidemiological basis of a contagious disease, such as with the novel coronavirus in 2020, to understand issues around weapons of mass destruction *(10)*, or to identify effective public health interventions requires the ability to assess and address complex questions. This might relate, for example, to the causes of earthquake disasters and ways to prepare public health systems to deal with disasters caused by natural or human-induced hazards. Finally, effective written and oral communication skills, and having the ability to present and defend one's ideas and recommendations, are essential to becoming a successful and independent researcher.

Many young people embark on a career in research with little guidance provided about the expectations and immense challenges awaiting them. There is often no set career path, no clear milestones, and limited leadership to guide young students on the most effective pathways. The roadmap to becoming a successful researcher is complex and rather

opaque, as the profession demands distinctive skills and expertise along with a long mandatory formal education *(11)*.

The cornerstone of pursuing a career in research starts with obtaining a formal education in areas such as the biological and medical sciences, public health or the wider healthcare disciplines. One might seek to study and train at an influential university or healthcare organization, aiming for a formal degree such as a bachelor's or master's degree, or ideally at the doctoral level, such as a public health or medical doctorate or PhD. After completing a formal programme with tailored courses, the next milestone towards the development of a career in medical research is participating in a research-based internship or joining an existing ongoing study. In most graduate schools, participating in a research internship and undertaking a research project is an essential part of the exclusively designed curriculum. This will allow for opportunities to be mentored by a practitioner or a research scientist and collaborate with other researchers tackling real public health issues, such as infectious disease pandemics, medication safety, or the mental health challenges of displaced persons (Chapters 5.1 and 5.3).

As a junior researcher, you may be required to assist a senior scientist in devising trials, collecting data (including conducting analytical data mining), interpretation of results and writing a scientific manuscript that can be critically replicated and tested by peers and is generalizable to other settings. A research career revolves around investigations – for example, to understand clinical symptoms caused by diseases or an aberrant human behaviour – and rigorous laboratory or field work – such as to assess the impact of vaccinating refugees in austere environments or the impact of people congregating without social distancing during a pandemic. To be a researcher, formal education will not suffice, though; working in a team on high-quality research requires essential set of key skills, including:

- creative critical thinking, free from prejudice, exercising healthy scepticism and not accepting anything at face value, including the ability to reflect and use hindsight and logical reasoning
- problem solving abilities
- logical decision making
- accurate and verifiable data collecting, and attention to detail
- assimilating critical data and feedback
- drawing clear and meaningful conclusions
- developing a strong work ethic
- performance management of self and others
- good project planning and management
- effective interpersonal communication skills
- identifying and citing appropriate sources
- team building
- excellent writing skills to enable you to present your work in a clear and transparent way (Chapter 6.7) in a peer-reviewed journal of good standing, while avoiding predatory publishers *(12)*.

You will need to read widely to prepare yourself ,covering academic papers and reference articles in your research area but also in different areas, and produce good quality academic articles. This practice will help you to better assimilate and appreciate the vast knowledge in your domain and increase the quality and impact of your writing and professional judgement skills.

Building a valued scientific network, learning to appreciate your peers (in your own discipline and others) and those from other sectors, establishing a reputation for humble inquiry, probing questions, integrity and generosity, will help to attract other researchers to collaborate with you in building a great research team. *(9)*

6.1.4 Establish your research interests

Research interests often spawn from one's own background and curiosity. Practitioners in health care and other areas are blessed if they keep their mind's eye open and remain curious, and are exposed to many potential research questions during their routine clinical work. Consider the following four questions as you narrow your research focus in Health EDRM and support a successful line of inquiry into disaster risk management. This will also be key as you prepare a grant application for funding your research (Chapter 6.3):

- Why is this research needed now?
- Who cares about this phenomenon or research question?
- Will the research, if successful, make a difference to the people, leadership and systems affected by health emergencies and disasters?
- Why are you and your team well suited to study this problem?

Focusing your research interests can give a young researcher an opportunity to master specific research domains, tools, methods, and to become familiar with pertinent networks and resources. However, this is also a delicate balance – it is best to avoid too narrow a focus early on in a young researcher's career, but young researchers should also avoid being a "jack of all trades".

In order to secure funding, academic positions, employment or promotion, a young researcher will often have to describe their passion for their research interests and demonstrate refined skills in a specific area of interest such as being facile in using quantitative, qualitative or data mining methods *(13)*. It is often easy to identify a clear research focus in "successful" researchers. Initial steps, such as reading senior faculty's researcher profiles, reviewing their abstracts and published manuscripts, drilling down into earlier successive papers from the same researcher or research team, and writing and sharing drafts of research interests can help young researchers gain valuable insights into the academic ideation, and implementation process.

Reading existing articles on related topics will advance your knowledge on the topic and help you to critically interpret other researchers' findings, even and especially if they are negative reviews. Furthermore, immersing oneself in clinical encounters will trigger you to think about ideas for new studies, and help you to understand when others have found answers, so

that you do not replicate existing studies. Most journals of merit will decline your studies if they are merely copies of earlier studies.

Some formal training in research methods, either quantitative or qualitative, is essential, and will give you an added advantage to complement your content expertise. Mastering the important concepts discussed elsewhere in this book, such as the formulation of a research question (Chapter 3.5), study design (Section 4), basic descriptive and analytical statistics (Chapter 4.2), sources of bias and research ethics (Chapters 3.4 and 6.4) can often make the difference between publishable manuscripts and fatally flawed ones *(14-16)*. More importantly, poorly designed and conducted research studies might jeopardize a young researcher's reputation and self-confidence, the safety of participants in the research, the possibility to acquire more funds in the future and the reputation of their institution *(17)*. This often results in wasting of limited resources. Young researchers are invited to consider all the available options, such as short courses on grant writing, online resources, and formal degrees. Within institutions, young researchers can organize journal clubs, and widely read and share their critical assessments with each other of their research and how best to learn from one another's work.

6.1.5 Start writing early

The penultimate outcome of research is a published scientific publication in a reputable peer review journal, that has potential for public health impact. The original findings can be shared, judged and used to improve practice and policy. Strong and clear-eyed writing skills are important for successfully achieving grant funding (Chapter 6.3) or peer review publications (Chapter 6.7) and will contribute to career development and success milestones *(18)*. Mastery of the skills required for prolific authorship (including language accuracy, technical accuracy, structured discourse and conciseness) needs to be acquired early. It is essential to learn to formulate a hypothesis and the aims of your study; to learn about different article outcomes; and to learn how to do an expert literature search and review. It is unlikely that you can acquire all the skills required for scientific writing without a lot of practice – hence the earlier a young researcher experiences the hurdles and workload involved in manuscript preparation, the better. Learning to work "smart" with realistic planning and efficient time management will go far, even if you spend only 15 minutes a day refining your work *(19)*. Learning how to deal with and plan for research and grant deadlines is essential. Presenting your research outcomes to your team, your immediate colleagues and perhaps to a wider group of colleagues at conferences – and being receptive to criticisms even when delivered in a critical manner – can be remarkably beneficial and humbling.

When you choose an important but highly complex problem, remember to break it down into digestible parts and build your research competencies one study at a time. First-hand experience with manuscript formatting, referencing, determining authorship, reporting data, grant reviewing, and undergoing peer review are important steps towards an independent career in research. Discuss your proposal with as many people as possible before you start to write to ensure that you have a solid experimental design.

Finally, finding which grants are applicable for your research focus, and being prepared in time for deadlines are battles that will push your limits no matter how wonderful and experienced your supervisors. It is inevitable that one's respect for those who have gone before will grow with each and every passing day.

6.1.6 Doing action research in the field

Strive to do active field research as early and often as you can because this will greatly deepen your understanding of the workflow, enrich your sense of accomplishment and grow your career. Evaluating Health EDRM interventions is critical, while helping you to build rapport and respect with disaster and risk management clinicians and policy makers*(20)*. As you refine your research focus and start to design your research study, you should reflect on the guidance elsewhere in this book. This includes obtaining the necessary funding (Chapter 6.3) and ethical approval (Chapter 6.4) and planning to do the research in the field (Chapter 6.5). Doing field research will help you to learn more about a variety of issues described next, as well as improving your knowledge of practice in the field.

Overcoming lack of data

Field research can resolve gaps in data. Very often, there is limited to no data about a chosen study topic, especially in a specific environment, such as in trying to assess the pattern of a disease outbreak – the problem might be known or suspected, but there is no way to validate your assumptions without primary data. Conducting field research not only helps plug gaps in data and your understanding of the problem, but also helps with the collection of supporting material, such as the availability of suitable drugs and equipment for emergency care and information about how decisions are made under real world constraints *(21)*.

Understanding the context of the study

In many cases, field research supplements other data and can help you better frame the research question (Chapter 3.5). This can provide insights into the existing data but also into the culture and the workflow context of the people working in the field, such as how healthcare systems actually behave when stressed during a tsunami *(22)*. For example, if the data states that clinicians can easily perform emergency intravenous resuscitation while wearing a hazmat suit because the clinicians are well trained *(23)*, field research might identify other factors that influence the success of and barriers to successful donning of disaster hazmat suits. In depth ethnographic observations for example, can help the researcher to avoid preconception bias with regard to fit and comfort, reading and operating equipment, hearing and communicating, reaching and moving, and dexterity to use touch screens, press buttons, open vials/taps and use of syringes. These might also include the fogging up of their glasses, the lack of full proprioception of their gloved hands, the impact of distracting human factors elements such as noise, harsh weather and the subjective personal danger and anxiety of the treating clinicians under adverse conditions *(24)*.

Increasing the quality of data using mixed methods

Since field research usually uses more than one tool to collect data, mixed methods data will be richer and of higher quality *(25)*. This might allow you to harvest more meaning from the data *(26)*. Inferences can be made from the data collected and triangulation of multiple methods (Chapter 4.13) can be used in the analyses to help to overcome the small sample sizes or incomplete data description *(27)*.

Collecting ancillary data

Collecting field research data puts you in a position of localized thinking, which opens you to new lines of inquiry and understanding of the phenomenon and can help avoid getting locked into groupthink. This can help you better appreciate and more critically review existing published articles while using the rich nature of mixed methods data sources to address the challenges of variable data sizes and levels of robustness *(28-29)*.

Applying the data to real world clinical risk management and disaster service care

It is key to appreciate the workflow and work processes of frontline emergency, disaster workers and managers in order to better evaluate the impact of emergency service delivery interventions and how best to modify and improve them *(30-31)*. This applied work can help you to reconcile the rich quantitative and qualitative traditions and methods as you strive to anticipate and support the needs of frontline health care workers in improving patient care under real world demands and resources *(32)*.

6.1.7 Find an expert and nurturing mentor

Perhaps the most important predictor of your success as a researcher will be your ability to find the right mentors. It is important to distinguish between a supervisor and a mentor. A mentor is a wise, confident and trusted counselor or teacher, someone who enthuses you, and has your best interest at heart. Supervisory roles are often limited in time and commitment, usually leading to distinct academic outcomes or professional goals. On the other hand, a mentor and mentee can negotiate their expectations and goals and use a wide variety of skill transfer techniques to achieve them, often for extended periods. The benefits of mentoring have been reported to be associated with a wide range of favourable behavioural, attitudinal, health-related, relational, motivational and career outcomes *(33)*. They also include a greater likelihood of publishing, better academic and career growth, higher research productivity, and a genuine opportunity to learn skills that cannot be achieved through formal channels *(34)*. Today, with improved communication facilities, a young researcher can expand their pool of potential mentors to distant geographic regions globally. In addition to the direct knowledge transfer that occurs between a mentor and a mentee, the mentor can also introduce the mentee to a wider network of collaborators in different disciplines. Reverse mentoring adds great value to the mentor by helping senior mentors learn about various new topics of strategic, technical and cultural relevance.

Mentorship is not without drawbacks, and it is crucial to establish a mechanism to determine when such relationships are not working well.

Mentees can be taken advantage of however, including when their ideas or funding are usurped. At times, these relationships can be fraught with tension, competition and difficult dynamics given the uneven power hierarchy. Always look for mentors who are known to be generous and honest with their mentees, have high integrity and enjoy mentoring. Such people do things not out of selfish gain, but for the good of science and to support the people being mentored first and foremost. They educate rather than give orders, leaving the final decisions to the mentee. Consider publications of potential mentors to ascertain that they consistently support their trainees to be first authors and present key scientific output at conferences.

When you find someone who has heart, expertise, and the right personality, let them know you want to be successful in medical research just like them and that you would like to be mentored by them. But remember this truth: mentorship is a two-way process. You must commit to the hard work and show your dedication, learning from each interaction and never taking your mentor's valuable time for granted. A mentor teaches you but you must demonstrate that you are applying what they taught you if you are to succeed. Make sure to keep a log of all your meetings with your mentor and learn to prepare a summary memo that will enshrine what was discussed and help to hold you and your mentor to the agreed upon meeting actions. This will demonstrate to your mentor your ability and maturity as a budding colleague.

6.1.8 Conclusions

A successful career in biomedical research can be an exciting life choice that can add a special extra meaningful dimension to your professional career and life. Seek out work on important problems – problems that truly matter to you – and choose to study research topics that can make a difference to patients, their families, society and humanity. Strive to work, and surround yourself with people who are smart, courageous and curious. You want to work with the right people and at the right university, healthcare system, non-governmental organizations or international institutions, such as WHO or the United States Agency for International Development. In doing so, you will be inspired by this work, by the people who need help and by those trying to help them.

Research and academic studies are both challenging and time consuming, so seek out research problems about which you are passionate about. Good academic research is hard and daunting; it becomes more so without genuine passion for the subject matter. You need to be passionate about your research if you are to negotiate the challenges that lie ahead, and as you live through the inevitable days of grant and research frustration and disappointment. Learn to savour the small wins and celebrate the findings and joy that come with being able to help reduce pain and suffering while seeking to understand and master the mysteries of the world.

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6.1.9 Key messages

- **Research can be exciting, rewarding and innovative, improve the evidence of policies, reduce uncertainties and lead to improvements in patient care, practice and policy.**
- **Formal education is the foundation of a career as a researcher, but other key skills and practical training are vital too – such as refining your critical thinking and problem solving abilities, a strong work ethic, good project management and communication skills, and being receptive to feedback.**
- **It is important to establish your research interests. Ask yourself: Why is this research needed now? Who cares about this phenomenon or research question? Will the research, if successful, make a difference to the people and systems affected by health emergencies and disasters? Why are you and your team well suited to study this problem?**
- **Research projects should be scientifically sound and guided by ethical principles in all their aspects.**
- **Doing research in the field can help to plug gaps in the data, improve data quality and provide ancillary data, and also give you and your research team a more nuanced understanding of the real-world context of a problem and potential suitability of proposed solutions.**
- **Finding the right mentor is essential and can be instrumental to a researcher's career success.**
- **Research implementation is essential and while it may seem straightforward requires careful advanced planning, multiple stakeholder involvement, addressing other contextual constraints to increase chances for programme stickiness, scale up success and sustainability.**
- **The best research consists of an iterative process of learning, is typically incremental, and is constantly being infused by everyday work experience and hard-earned lessons by researchers working closely with frontline clinicians and staff to provide exceptional, high quality and patient centered clinical care.**

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6.2 How to identify and access reports of existing research

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6.2.1 Learning objectives

To understand the key factors to consider when searching for evidence for Health EDRM, by:

1. Recognizing the issues related to searching for evidence for Health EDRM;
2. Understanding the techniques required for finding the best evidence for Health EDRM;
3. Identifying relevant information sources to answer the focused question; and
4. Being aware of how to manage and appraise the evidence retrieved, so that it can be applied in practice.

6.2.2 Introduction

"Effective healthcare response requires evidence and information to meet various and often unpredictable eventualities" *(1)*. Making good health decisions requires combining the best available research evidence with relevant knowledge and experience, and matching it to local context – which is particularly important in areas where the situation is uncertain, such as in disaster zones and when working on Health EDRM. Information overload is a daily reality for all health practitioners as they struggle to cope, not only with the volume of published literature, but also with the ever-increasing digital exchange from a wide range of sources, and of variable quality.

As shown elsewhere in this book, problems of quality can arise from poor research design and reporting biases but the way evidence is reported, published and organized can also contribute to problems such as difficulties in finding it in bibliographic databases (see below) or lack of open access *(2)*. Perceived lack of time and limited skills in finding and using online resources also contribute to unsystematic and unsuccessful methods of information retrieval, leading the practitioner to consider that 'finding the evidence' represents a significant barrier to evidence-based practice. Good evidence is available, but to find it effectively, practitioners need to acquire knowledge and skills: knowledge about the range, quality and content of available sources of evidence, and the skills to use these

sources effectively. This chapter aims to help you to achieve this. It complements Chapter 2.6, which discusses the role of systematic reviews as a source of evidence, and Chapter 3.7, which describes specific collated resources, such as that created by Evidence Aid *(3)*.

This chapter is intended to help you build skills in finding the evidence you need in a global and disaster health context, by raising your awareness of the range of information sources available, and demonstrating how a structured approach to building search strategies can improve results. These skills should help you to find evidence that will help you to make well-informed decisions about practice and policy, and also to ensure that any research you design, conduct and report takes proper account of other similar studies, as discussed in Chapter 3.5.

6.2.3 Searching for global and disaster health evidence: Key issues

There are different types of disaster (Chapter 3.2):

Natural: earthquakes, landslides, tsunamis, windstorms, extreme temperatures, floods, droughts, or wildfires.

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

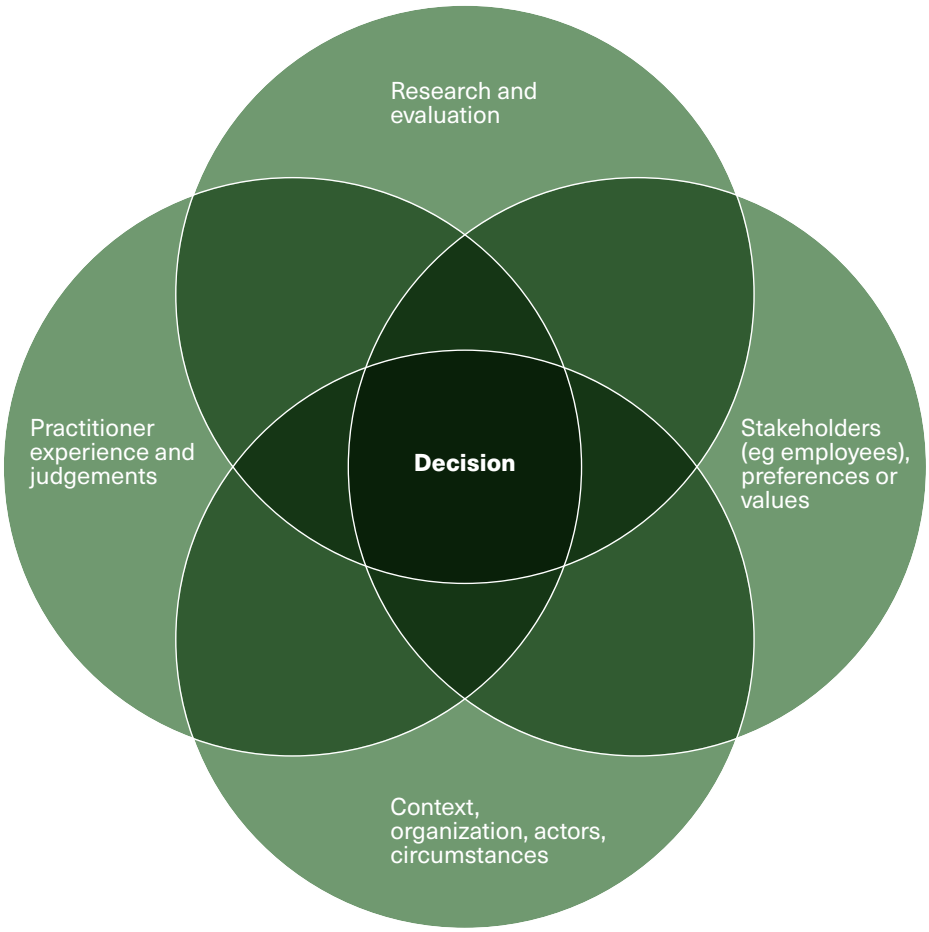
Technological: chemical and radiological agent release, explosions, and transport and infrastructure failures.

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

Figure 6.2.1 illustrates the concepts of evidence-informed decision-making in public health, which would also apply to disasters more specifically *(4)*. In terms of global and disaster health, the context, organization, actors, circumstances (which might include power disruptions resulting in limited or no Internet access), time constraints, cultural issues, safety, local priorities and vulnerabilities, and literacy levels of the community are all important. Furthermore, during emergency situations, there is often a significant burden of disease and limited resources for rescue teams to work with *(5)*.

6.2

Figure 6.2.1 Evidence-informed decision making in public health *(4)*



Finding evidence for Health EDRM requires an awareness of – and ability to retrieve – relevant studies from a wide range of primary and secondary sources across multiple disciplines. These often use differing terminologies and indexing techniques, adding to the complexity of searching for evidence in this field.

6.2.4 Introduction to searching

Developing a systematic and reproducible approach will help you retrieve the most relevant results, save time, and avoid missing important material. Searching techniques need to be *sensitive* (to get as much relevant information as possible) and *specific* (to minimize the amount of irrelevant information retrieved).

Formulating a searchable question

When searching the literature, it is essential to construct a focused question, so that there is no ambiguity around what is being searched for. There are several frameworks *(6-7)* that can be used to help turn the scenario into a focused question, and identify relevant terms on which to base the strategy and words that mean the same (synonyms). Table 6.2.1 lists some of these frameworks.

Table 6.2.1 Frameworks for formulating searchable questions

Framework	Definition	Area of interest
PICO	Patient/Problem/Population, Intervention, Comparison, Outcome	Clinical interventions
PECOT	Patient/Problem/Population, Exposure, Comparison, Outcome, Time	Causation or prognosis
SPICE	Setting, Perspective/Population, Intervention, Comparison, Evaluation	Project, service or intervention evaluation
SPIDER	Sample, Phenomenon of Interest, Design, Evaluation, Research type	Qualitative or mixed methods
ECLIPSE	Expectation, Client group, Location, Impact, Professionals, Service	Service evaluation

A framework does not have to be applied, but it is important to break the scenario into concepts or themes, so that it is clear what is being searched for. Three or four concepts should help you to find relevant evidence, but sometimes, the answer can be found by searching for just two concepts. Four concepts to consider are:

Concept 1 – could be the key population and/or setting

Concept 2 – might be the type of intervention or exposure

Concept 3 – perhaps a comparison of a second intervention

Concept 4 – refers to the final, expected outcomes.

For example, consider the question "What is the evidence on communicable disease and infection control in areas of conflict?" There are three main concepts in this – communicable disease, infection control, and areas of conflict – and the search must find reports about all of these concepts. Under each of the concepts, consider all the alternative terms that could apply to that original concept (Table 6.2.2). For articles in English, think about both American and British terminology and spellings, or brand names. For example, tsunamis are also known as harbour waves, harbor waves, or tidal waves, and earthquakes, as quakes, tremors, or temblors.

Table 6.2.2 Example of building search using term concepts

Concept 1: Communicable disease	Concept 2: Infection control	Concept 3: Areas of conflict
infection	prevention	war zones
infectious disease	prophylaxis	emergencies
Zika	prophylactic	disasters
Ebola	antibiotic chemoprophylaxis	relief work
cholera		rescue work
dengue fever		humanitarian crisis
plague		

6.2

If you already know of, or can find a report that covers the topic that you are interested in, looking at the key words and phrases used in it and those used to index it may help you identify additional search terms.

6.2.5 Step-by-step guide to searching bibliographic databases

If the reports you are interested in have been published in scientific journals, these might be available through electronic bibliographic databases. These include, for instance, PubMed for health care, Global Index Medicus for regional health research, and ERIC for educational literature. These are all freely available. There are also some useful, subscription-based resources, including Embase, which includes conference abstracts and journals that are not indexed on PubMed; Scopus; and Web of Science. If possible, working with a librarian or information specialist should help you to decide which of the many hundreds of such databases to search. Some of the databases are restricted to simple searching, where only the words entered will be searched for. Some allow advanced searching, where it is possible to limit the search to particular parts of each record (fields), such as the title and abstract.

These next paragraphs describe the general principles for searching, and they apply to most databases, but some may operate differently. For example, the truncation and wildcard symbols differ across databases or database vendors (such as OVID). The Help facility for each database can provide details of any differences and provide the best advice for searching effectively. Universities are a good source of useful guides to database searching, for example McMaster University, which provides searching guidance on a range of topics (8). Where possible, it may save you time to engage the services of a librarian or information specialist, who will have the skills to conduct an effective search. There are also discussion forums that might be helpful for finding advice from topic experts (see Table 6.2.5).

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Thesaurus searching

More complex databases will provide access to a thesaurus (also known as index, MeSH or subject headings) where every article that is added to the database is tagged with a set of index terms, to help retrieve articles specifically on that topic. If a thesaurus is available, this is the best place to start searching, because the references found should be highly relevant. When the thesaurus term is selected, there will be an option to “explode” results (“exp”) so that the term you entered and any narrower thesaurus terms will be included. For a comprehensive search, it may be best to

initially explode terms, and then narrow down the search by combining with the other concepts. However, if the search is retrieving too many irrelevant results, then going back to that term and de-selecting the "explode" option so that it only searches for that one index term and none of the narrower terms may help remedy this.There is sometimes an option to choose a "major topic" or "focus", but these can be too restrictive because they will focus more on that chosen term. Once the thesaurus term is selected, there is an option to narrow down by "subheading". Again, it is good practice to keep the search broad, and include all subheadings, but if time is of the essence, the subheadings are a useful tool to reduce the number of records retrieved and increase the concentration of the most relevant records. For example, there are subheadings for prevention and control, therapy, diagnosis, and causality, among others, so it is possible to be more specific in the search. However, this focusing down by using subheadings runs the risk that key papers will be missed because they have not been assigned the relevant subheading.

The thesaurus terms include synonyms related to that term. However, you need to be cautious because it can take a few months for index terms to be added to a new record, which means that a reliance on these terms alone will miss the most recent reports that have not yet been tagged.

Free text searching

Once the thesaurus terms have been searched, a free text (also known as natural language or keyword) search can be conducted. The database will search the whole content of each record in the database (but not the article's full text), for the term that has been entered and no other variations. It will not look for similar terms, plurals, or spelling variations. Truncation, such as * and $, and wildcards, sometimes signified by a ?, help to improve retrieval by expanding options. For example, prophyla* will look for prophylaxis or prophylactic, while behavio?r will retrieve papers containing the British and American spellings. However, not all databases use the same methods of truncating. Searchers should refer to the "help page" or "search guides" for each database so that they can apply the correct methods to do free text searching in that resource.

Proximity searching

This technique is a way of combining words, so that they are searched for in close proximity to each other. This helps to yield more relevant results. NEAR or N and ADJ are the most commonly used proximity operators. ADJ specifies that the terms appear in the order required, while NEAR lets the terms appear in any order. When numbers appear after the word, it means that the terms are separated by that number of words. For example, primary ADJ2 care will find articles on primary care or primary health care; while disaster N2 manag* or disaster NEAR2 manag* would retrieve papers on disaster management or management of disasters or managing disasters. However, not all databases allow proximity searching, and therefore, searchers should refer to the "help page" or "search guides" for each database to understand the most effective way to do free text searching in that resource. However, not all databases allow proximity searching, and therefore, searchers should refer to the "help page" or "search guides" for each database to understand the most effective way to do free text searching in that resource.

6.2

Combining searches

For comprehensive results, it is necessary to search for each concept, one at a time, combining with OR within each concept. The search string for each concept can then be combined using AND, so that the reports retrieved contain all the concept terms and/or synonyms.

Table 6.2.3 Combining search terms

Concept 1:		Concept 2:		Concept 3:
communicable disease **OR** infection **OR** infectious disease **OR** zika **OR** ebola **OR** cholera **OR** dengue fever **OR** plague **OR** disease outbreaks	**AND**	**infection control** **OR** prevention **OR** prophylaxis **OR** prophylactic **OR** antibiotic chemoprophylaxis	**AND**	**areas of conflict** **OR** war zones **OR** emergencies **OR** disasters **OR** relief work **OR** rescue work **OR** humanitarian crisis

When you are doing your initial search, start with something broad, or sensitive. This will find a lot of material, much of which may not be relevant but it is important not to limit or narrow the search too early, because this may exclude vital evidence from your search results. Once you have entered all the terms you wish to use, the overall results can be limited by a range of options, to suit the population or question you are interested in. Types of limits include:

- language of article;
- date of publication;
- age of population;
- publication type (that is, to restrict to specific research methods including randomized controlled trial, meta-analysis or systematic review).

Methodological search filters *(9-11)* are pre-tested literature search strategies that provide a more effective way of refining a search to find evidence appropriate to the type of question under investigation. They may be designed to maximize sensitivity (or recall) or to maximize precision (and reduce the number of irrelevant records that need to be assessed for relevance). Many databases have these filters built in and available for application at the limiting stage.

Table 6.2.4 contains an example of a comprehensive database search. The number of results for each term are in brackets and you can see how the numbers end up as a much more manageable figure by the end of the search.

Table 6.2.4 Example of a search strategy

1	exp Communicable Diseases/ (33764)
2	exp Disease Outbreaks/ (88997)
3	exp Infection/ (757664)
4	infectious disease*.tw. (71286)
5	exp Zika Virus Infection/ (3163)
6	exp Hemorrhagic Fever, Ebola/ (4822)
7	exp Cholera/ (8422)
8	exp Dengue Virus/ (8141)
9	dengue fever.tw. (4273)
10	exp Plague/ (5060)
11	or/1-10 (901566)
12	exp Infection Control/ (60674)
13	exp Primary Prevention/ (144184)
14	prevention.tw. (497908)
15	prophyla*.tw. (154455)
16	antibiotic chemoprophylaxis.tw. (53)
17	or/12-16 (805099)
18	area* of conflict.tw. (255)
19	exp Warfare/ (36098)
20	war zone*.tw. (556)
21	exp Emergencies/ (39087)
22	exp Disasters/ (81001)
23	exp Relief Work/ (4663)
24	exp Rescue Work/ (2039)
25	(humanitarian adj (crisis or crises or effort*)).tw. (409)
26	or/18-25 (115660)
27	11 and 17 and 26 (1183)
28	limit 27 to (English language and last 5 years) (176)

Key: exp – explode term; tw – only searches in the title and abstract fields; adj – adjacent and refers to proximity searching

If too few results are retrieved, then these should be reviewed, and if there are any papers that are exactly as required, these should be checked to see if they contain terms that you might add to your search strategy. If there are, these terms should be added and the search run again to identify other similar reports that were missed the first time.

6.2

Methods for refining searches

Search filters are specially designed search strategies for different databases, which retrieve records on different themes, such as particular study type, geographical location, age, population group, etc.

The InterTASC Information Specialists' Sub-Group Search Filter Resource provides easy access to published and unpublished search filters.
https://sites.google.com/a/york.ac.uk/issg-search-filters-resource/home

In addition to these, the Cochrane Effective Practice and Organisation of Care group has developed a set of filters for PubMed (NLM), MEDLINE (Ovid), Embase (Ovid), and CENTRAL (Cochrane Library) to help identify studies relevant to low- and middle-income countries (LMICs). Please note: The Cochrane EPOC filters have not been tested for sensitivity and precision.
https://epoc.cochrane.org/lmic-filters

6.2.6 Saving your search strategy

Most databases have the option to save the search strategy for future use, and some allow the strategy to be saved as an "alert", so that when new reports that match the search strategy are added to the database, a message is emailed to you. It is important to save a copy of the search strategy along with the date of the search, particularly if the results are to be shared with colleagues or across agencies. This allows someone else to re-run the search later, without having to revisit earlier results. Searching the scientific literature is an iterative process, and strategies may need to be refined and re-assessed throughout the process to improve relevance and ensure that results can be recorded and stored appropriately.

6.2.7 Other searching techniques

Much of this chapter has focused on database searching, but there are other techniques that can be applied:

- **Citation searching** – looking up a specific report in a citation index, for example Web of Science or Scopus, to see who has cited it, and then who has cited their work, and so on.
- **Reference list checking** – identifying additional relevant references and terms by looking at the reference list of a key paper that strongly relates to your question *(12)*.
- **Contact with experts** – getting in touch with the authors of relevant reports to see if they have other work in the pipeline or if they can recommend other experts who have published on the topic.
- **Text mining** – refers to the automated analysis of large collections of written content to identify additional terms to include in the search *(13)*.
- **Pearl harvesting** – taking one reference, and using the terms applied to it to identify additional terms for the search strategy *(14)*.

6.2.8 Key sources of evidence

It is crucial to choose appropriate information sources to search – that is, sources that are likely to contain the type of evidence required. For articles in scientific journals, this is likely to focus on bibliographic databases but you may need to search other sources as well. Grey literature are non-conventional publications, which include conference proceedings, local guidelines, dissertations, bibliographies, technical reports, unpublished official documents and so on (Chapter 3.6) *(15)*. Grey literature is a valuable source of information because it can provide important data about the local context.

As discussed in Chapter 2.6, up-to-date systematic reviews or evidence syntheses that have tackled your question might allow you to move quickly to an answer. When time is of the essence, there may not be time to find and read the full reports of many studies, and so especially in emergency situations, evidence syntheses are essential as they highlight the key messages needed to make quick and accurate decisions. However, the recommendations that are made in such evidence syntheses may not always be feasible in disaster zones. For example, you may not have access to the medication or equipment that research elsewhere has shown to be most effective. Even if you can find a systematic review in your general search or can access collections such as those discussed in Chapter 3.7, you will still need to consider its relevance to your setting and whether you need to supplement it with searches for additional context-specific research. Table 6.2.5 introduces a collection of information sources, organized by levels of evidence. This list is not comprehensive and other information sources are available. A librarian or information specialist can help identify alternative information sources pertinent to your requirements.

6.2

Table 6.2.5 Hierarchy of searching for global and disaster health

Guidelines:

Medbox: The aid library
This is an open source library for health-related work, humanitarian action and development assistance. It contains key information on Ebola, Zika, Tuberculosis, Cholera, Leprosy, Polio, natural hazards, conflict, rapid response, refugee, disability, and specific hazards.
www.medbox.org.

Medécins Sans Frontiéres
This collection of medical guides has been produced to help people working in areas with epidemics of infectious disease, and emergency situations.
https://medicalguidelines.msf.org/viewport/MG/en/guidelines-16681097.html

Oxfam GB Guidelines and toolkits
Oxfam publishes a range of resources, including guidelines, manuals and training packs that provide advice and tools for practical application and adaptation. These cover many different thematic areas including, gender justice, livelihoods, private sector engagement, climate change, resilience, humanitarian response, water and sanitation, governance and fragile contexts.
policy-practice.oxfam.org.uk/our-approach/toolkits-and-guidelines.

TRIP (Turning Research Into Practice)
TRIP searches a range of health information sources to inform clinical and non-clinical decision-making. It contains all levels of evidence, and the results are delivered with the highest level of evidence first. This is free to access, but an enhanced version, TRIP Pro, is also available free to countries with low resource. www.tripdatabase.com.

WHO: Emergency surgical care in disaster situations
These guidelines have been extracted from the WHO manual Surgical Care at the District Hospital (SCDH), which is a part of the WHO Integrated Management on Emergency and Essential Surgical Care (IMEESC) tool kit.
www.who.int/surgery/publications/s16368e.pdf.

Evidence maps and syntheses *(see also Chapter 2.7):*

Humanitarian Evaluation, Learning and Performance (HELP)
This resource contains almost 17 000 resources to support evaluation, learning and performance in the humanitarian sector. www.alnap.org/help-library.

International Initiative for Impact Evaluation (3ie)
3ie produce briefs which summarize evidence from 3ie-supported impact evaluations, systematic reviews, replications and evidence gap maps. They also include summaries of their research programmes, lessons from grant making and instances of uptake and use of evidence. Their database also includes systematic reviews of the effectiveness of social and economic interventions in low- and middle- income countries. It contains almost 303 summaries of systematic reviews drawn from a range of sources and sectors.
www.3ieimpact.org/evidence-hub/publications/briefs/.

Systematic reviews *(see also Chapter 2.7):*

Campbell Collaboration
This database contains systematic reviews on the effects of interventions in crime and justice, education, international development, and social welfare. campbellcollaboration.org.

Cochrane Library
This is a collection of databases that contain different types of high-quality, independent evidence to inform healthcare decision-making. It is also available as a Spanish language version (cochranelibrary.com/es/home). https://www.cochranelibrary.com/

PROSPERO: International prospective register of systematic reviews
This is a register of protocols for systematic reviews, rapid reviews, and umbrella reviews. It should be searched before undertaking a review, to avoid duplication of effort and wastage. www.crd.york.ac.uk/prospero/

Evidence Aid
Evidence Aid, along with partners (including the International Rescue Committee (USA) and Cochrane), has assessed published systematic reviews. Those identified as being of relevance to natural disasters, humanitarian crises or major healthcare emergencies, that include health outcomes, are included within the four categories and include a summary of the review before it links to the full article. Most summaries are also available in Spanish and French. www.evidenceaid.org/resources/

PubMed Clinical Queries
The resource is designed to filter PubMed records by three clinical research areas: Clinical Study Categories (diagnosis, therapy, prognosis and so on), Systematic Reviews, and Medical Genetics.
www.ncbi.nlm.nih.gov/pubmed/clinical.

Primary research

Global Index Medicus
This is a collection of the Regional Index Medicus, and contains medical and health documentation from low-income countries, outside the major industrialized areas.
search.bvsalud.org/gim/advanced.

PubMed
PubMed is a database containing more than 30 million citations from biomedical literature, journals, and online books. www.pubmed.gov.

Clinical trials

International Clinical Trials Registry Platform (ICTRP) search portal
The World Health Organization's portal is a searchable database, which aims to provide a single point of access to information about ongoing and completed clinical trials. This site also includes links to trial registeries from other countries, including China, Netherlands, Germany, Japan, the Republic of Korea, Persia, Peru, Portugal, and the Kingdom of Spain.
www.who.int/clinical-trials-registry-platform

6.2

Grey literature

EM-DAT: The International Disaster Database (see Chapter 2.1)
This resource provides information on the human impact of disasters - such as the number of people killed, injured or affected, along with disaster-related economic damage estimates and disaster-specific international aid contributions. www.emdat.be/publications.

Prevention Web
This is a collaborative knowledge-sharing platform on DRR, managed by the UN Office for Disaster Risk Reduction (UNISDR). It contains a range of knowledge products and services to facilitate the work of DRR professionals. www.preventionweb.net/english/.

Relief Web
This is a humanitarian information source on global crises and disasters, and provides reliable and timely information, including the latest reports, maps and infographics from trusted sources, enabling humanitarian workers to make informed decisions and to plan effective response.
reliefweb.int.

Resilience Library – South East Asia Resources
The International Federation of Red Cross and Red Crescent Societies has collated information on the following topics: climate change, communication and advocacy, disaster law, disaster risk reduction, gender and diversity, health, migration, national society development, and youth and volunteering.
www.rcrc-resilience-southeastasia.org.

Environment, Conflict and Cooperation (ECC) Platform Library
This resource contains documents on topics, including climate change, environment and migration, early warning and risk analysis, and conflict transformation.
library.ecc-platform.org.

TRACIE Healthcare Emergency Preparedness Information Gateway
This resource is produced by the US Department of Health & Human Services. It was created to meet the information and technical assistance needs of people working in disaster medicine, healthcare system preparedness, and public health emergency preparedness.
https://asprtracie.hhs.gov/

Discussion forums

Healthcare Information for All (HIFA)
Healthcare Information for All is a global health network with more than 18 000 members (health workers, librarians, publishers, researchers, policymakers) committed to the progressive realization of a world where every person has access to the healthcare information they need to protect their own health and the health of others. Its members have a vast and unique experience and expertise which they can use to bring clarity to challenging questions around global health issues in general and healthcare information issues in particular.
www.hifa.org.

Disaster Outreach Librarians
This is a discussion list where topics related to library services and disaster preparedness can be discussed, and experiences shared.
disasterinfo.nlm.nih.gov/dimrc/dimrclistserv.html.

Tools

Disaster apps for your digital go bag
The apps on this page contain information to support disaster management, including dealing with blast injuries, hazardous material and incident response and planning, radiation and nuclear emergencies, etc. They have been designed to provide mobile device users access to web-based content, and run on specific mobile platforms, such as iOS (iPhone and iPad), Android, or Blackberry.
disasterinfo.nlm.nih.gov/apps.

Google and Google Scholar

Google (https://www.google.com/) is easily accessible, and can identify relevant information, particularly when a topic is new, and there is not yet much established literature. It is also useful for finding news items, videos and pictures, grey literature, and information about specific organizations.

Google Scholar (https://scholar.google.com/) can be used to quickly locate research papers, particularly full-text articles, but it is not easy, or comprehensive, to use for complex searches.

The International Federation of Library Associations and Institutions (IFLA) Evidence for Global and Disaster Health (E4GDH) has produced two guides, linking to many more information sources: finding the evidence for global and disaster health. www.ifla.org/publications/node/81736?og=25692.

6.2.9 Managing references and creating bibliographies

As your collection of reports grows, you may find it helpful to use reference management software for managing the citations, formatting them into standard referencing styles (such as Harvard, Vancouver and so on), making annotations, and sharing collections with colleagues to facilitate collaborative working across agencies. Endnote (endnote.com) is a subscription-based reference management software, but it does have a component called Endnote Basic (http://myendnoteweb.com), which is a basic free online version that can be used as a stand-alone or together with the subscription-based version of desktop Endnote.

6.2.10 Transparent reporting

When writing research reports, it is important to demonstrate that your methodologies are transparent and robust, and there are a range of tools and standards available to help with this.

The EQUATOR Network (Enhancing the QUAlity and Transparency Of health Research (www.equator-network.org/)) seeks to improve the reliability and value of published health research literature by promoting transparent and accurate reporting. The network has produced 463 reporting guidelines for the main study types, including randomised trials, observational studies, systematic reviews, and economic evaluations. These tools can be used to record the number of included and excluded papers at each stage of the research process.

6.2

6.2.11 Obtaining the full text of reports

Databases will provide brief summaries of the reports, known as abstracts, and in some cases, will include a link to the full text. If this is not the case, there are some options available:

- Local librarian – libraries often have access to a range of other libraries and can source reports this way.
- Direct links from the database – if access to the full text is available, either via your local subscription or open access, these will link directly to the journal publisher.
- Open access databases – PubMed Central is a database which provides access to open access reports (www.ncbi.nlm.nih.gov/pmc).
- HINARI– was set up by WHO together with major publishers to enable people in low- and middle-income countries to gain access to one of the world's largest collections of biomedical and health literature. Visit the website to see eligibility criteria (www.who.int/hinari/en).
- Emergency Access Initiative (EAI) – provides temporary, free access to full text articles from major biomedicine titles to healthcare professionals, librarians, and the public affected by disasters in a region of the USA or throughout the world. This site is only active when a disaster event is named and the access period specified. Visit the website to see eligibility criteria (eai.nlm.nih.gov).

6.2.12 Appraising the evidence

Critical appraisal is the process of assessing and interpreting evidence, enabling you to systematically assess the trustworthiness, relevance and results of published papers. There are many useful tools and checklists to help appraise retrieved content. A simple checklist to assess whether the information is relevant and reliable is:

- **Authorship** – Who wrote the content and what are their credentials? Are they qualified to provide this information?
- **Attribution** – is it clear how the information was generated (for example, is it referenced)?
- **Disclosure** – is the website sponsored by anyone who might have a commercial gain? When did they write it? Who did they write it for?
- **Currency** – is there a date to indicate age of the content? *(16)*

The Critical Appraisal Skills Programme has a set of eight critical appraisal tools, which can be used to assess the quality of research papers (casp-uk.net/casp-tools-checklists/). The Centre for Evidence Based Medicine has translations of some of these English language checklists – into Chinese, German, Lithuanian, Portuguese, Spanish, and Persian (www.cebm.net/2014/06/critical-appraisal/).

6.2.13 Conclusions

Finding the evidence to inform decisions can be challenging in Health EDRM, particularly when timescales are short, and situations are resource-poor. This chapter provides guidance on searching for this type of evidence, so that people working in these areas can make informed decisions about the choices they have to make. It has guided you through each stage of the search process, highlighting relevant resources for this particular topic area, and describing techniques for searching those resources effectively. Once the relevant research has been identified, this chapter provides information on how to manage the references, obtain full text publications, and assess the quality of the research methodology. Although the purpose of the chapter is to facilitate independent information retrieval, you are encouraged to find a librarian or information specialist, where possible, for expert professional assistance or advice.

6.2.14 Key messages

- **If available, contact a librarian who has the skills and understands the context.**
- **Recognize the scenario and formulate a focused question.**
- **Identify the key search terms and compile a list of synonyms.**
- **Decide on the most appropriate study types to answer the question.**
- **Choose the most relevant information sources and apply the search terms.**
- **Start with a broad (or sensitive) search, narrow down by adding additional concepts.**
- **Keep a record of the search strategies and results so that they can be revisited, and revised, later.**
- **Use reference management software to manage the references you find.**
- **Use critical appraisal skills to check whether the information you have found is reliable and relevant.**

6.2.15 Further reading

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6.3 How to write a successful grant application for a research study

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6.3.1 Learning objectives

To understand the general components of a grant proposal, by outlining some key principles and tips for success, including:

1. Components typically required in a grant proposal.
2. Process by which granting decisions are made.
3. Tips to increase the chances of success and avoid common mistakes.

6.3.2 Introduction

A grant is a monetary award given from a funding body; a grant application contains the details of a proposed project, and is used by the funding body to decide whether to award a grant. Grants are an important financial resource to support research, to enable training and to facilitate sharing of the latest evidence from research.

This chapter provides an overview of the steps for preparing and designing a grant application suitable for submission to a funding agency, with particular emphasis on research projects relevant to health emergency and disaster risk management (Health EDRM). The chapter discusses the components of a grant proposal, how to choose the most appropriate funding body to apply to, how the grant application will be processed and tips to increase the chances of success.

Before applying for a grant, some of the first steps to take are to:

- Recognize a service need or research gap, or have an idea.
- Identify the outcomes that the research study might have and work backwards to design a plan for how to achieve these.
- Generate several ideas and narrow these down, based on what is appropriate and feasible.
- Look for funding opportunities to identify grants that would be suitable for the project and for which the project would be eligible.

- Secure partners to establish a working team, which might include members of the public from the populations that will participate in the research.
- Prepare the grant proposal, and address the items as listed.

There are many guides to help new researchers to prepare a grant application, some of which are signposted in the Further Reading section at the end of this chapter.

6.3.3 Grant Proposal

A grant application usually includes a research proposal, which summarizes how the proposed project will be planned, implemented, monitored and reported. The exact content of the proposal will vary depending on the type of grant and the funder's requirements. For example, a grant application might seek funding for academic research on a health emergency or a scholarship to support postgraduate learning, or might be smaller in nature – in order to support attendance at a training event or conference, for example. Sometimes, funds might be sought as seed money for a pilot study or as matching funds to be combined with other sources of funding. Although there is wide variation in proposal formats, Table 6.3.1 shows the components commonly found in grant applications for research studies.

Table 6.3.1 Common components of grant proposals for research

Item	Content
Title	Short project title.
Summary	Summary of the proposed study (usually 200 to 400 words).
Introduction and Background	Background and rationale for the study to show its importance. Description of the current problem and the new study's research questions. Review of existing body of knowledge. Details of the intended participants.
Methods	Justification for the choice of methods. Description of the methods, including: - study design; - sample size and sampling method; - implementation procedures (for recruitment and follow-up for example); - plan for data collection, analysis and interpretation.
Discussion	Plan for reporting and dissemination of findings. Expected outcomes and impact of the study.
Limitations	Limitations of the methods, and risks to the project. Mitigation plans to overcome any difficulties.

Item	Content
Timeline	Time needed for each part of the project (perhaps as a Gantt chart).
Budget	Budget and justification for separate items. Details of any other funding for the study.
Ethics consideration	Ethical issues and process for obtaining ethics approval.
Research team	Information about each member of the research team.

A key aim for a grant proposal should be to present an exciting idea for a research study, that has been transformed into achievable actions and that will provide evidence to fill an important gap in knowledge. The gap can relate to uncertainties in the topic area (for example, to measure a health problem in an emergency and its impact on the population, or to identify the effects of an intervention) or knowledge mobilization (for example, moving available knowledge from research into practice). The existence and importance of the gap might be supported, for example, by a systematic or scoping review of existing research (Chapters 2.6 and 3.6), statements from experts in the field, data from previous research, examples of similar research, a prioritization exercise (Chapter 2.7), or community-based research and asset mapping (Chapter 3.1). In the proposal, it is necessary to demonstrate the applicants' knowledge of current developments in the field and the ability of the research team to deliver the study and uphold the standard of good quality scientific evidence.

Application requirements vary considerably across funding agencies. For example, some funding bodies encourage collaboration between different organizations, others prefer a simple but clear plan without the complications of project dependencies. For research studies with multiple partners and locations, the grant proposal will require clear identification of the qualifications, experience and roles of each research team member. It will also need a justification for their involvement and the costs of doing so.

6.3.4 Grant writing

Grant proposals should be written in a way that will allow peer reviewers from unrelated disciplines to understand the problem to be researched, the methods to be used and the importance of the project. Some of the people that the funder will ask to assess the application may be non-experts, so it is important for the proposal to be understandable to a range of audiences and to avoid jargon. It is helpful to use short and clear examples of what is being studied and why, to provide the assessors with a visual picture of the overall plan.

It is common for funders to ask for a cover letter to accompany the grant proposal and this is an additional way to stress the importance of the study. It is an opportunity to state the need for the project clearly and explicitly, and to show how the proposal meets the eligibility criteria for the grant. The request should clearly state and quantify on what and how the grant will be used, and the benefits to both the researcher and the funder of it being awarded. It is best to use the active voice to emphasize the plan of action. In

addition, if there is sufficient space and it is acceptable to include diagrams and infographics, these can be used to illustrate complex concepts. As with the final report of the study (Chapter 6.7), it is important to check the application carefully for spelling and grammar before it is submitted, and it may be useful to employ an editor or ask a friend to proofread it.

Case study 6.3.1
Example of a research grant on Health EDRM *(1)*

Project title: Optimizing a community-based model for case identification, monitoring, and prevention of hypertension and diabetes among Syrian refugees in the Hashemite Kingdom of Jordan

Funder: Elrha's Research for Health in Humanitarian Crises (R2HC) Programme. R2HC is funded by the United Kingdom's Department for International Development (DFID), Wellcome, and the United Kingdom's National Institute for Health Research (NIHR).

Funder requirements	Project characteristics that match the requirement
Scope: research that will strengthen evidence-based practice around a public health intervention in humanitarian crises.	Research to investigate and improve a community health worker based model for noncommunicable disease care in a humanitarian emergency among Syrian refugees in Jordan.
Impact: demonstrate the potential scale and impact of the proposed research.	The outcomes of this project will be replicable in other contexts (for example, non-refugee emergencies) and will provide a strong case for addressing continuity of care for urban refugees through community health workers.
Methodology: robust innovative methodologies of a standard publishable in peer-reviewed academic journals.	Qualitative and quantitative methods (population-based survey) will be used, including a cost-efficiency analysis. Citing previous work of the research team in the topic area will highlight their experience with the chosen methods.
Partnerships: applicants must have a research team including both a research institution and an operational humanitarian organization	University of Southern California, International Rescue Committee, Jordanian University of Science and Technology, and Brigham and Women's Hospital.
Duration: 36 months.	September 2018 to August 2021.

6.3.5 Funder requirements and suitability

The funder for a research study might be a (federal or state) government agency, a public or private foundation, or a corporation. The funder will have requirements as to the applicant's legal authority to apply for a grant,

whether the applicant is an organization or individual. For example, there are grants specifically aimed at funding partnerships between voluntary and governmental organizations, and grants targeted at people holding an academic position or belonging to certain resident groups. It may be helpful to look at previous grants made by the funder to explore the type of research that they are likely to fund and the content of successful applications.

Grant opportunities might be identified by searching online sources, through the research offices of academic institutions, or by identifying potential funding agencies. Other resources include checking the grant histories of individuals who have similar research interests or asking colleagues with a similar level of expertise. Subscription-based websites, such as Foundation Directory Online and GrantWatch have extensive information in their donor databases.

The National Institutes of Health in the USA, Canadian Institutes of Health Research and the United Kingdom's Wellcome Trust are the top three funding agencies, with the highest number of grants among 12 major funders for health research *(2)*. However, a limitation of all three is that they mainly support academic research at universities in their own countries *(2)*.

The largest source of research and development funding for health is from the business sector, followed by the public sector, and then other sources (including private NGOs) *(3)*. The private sector can be a good source for funding and, although many of these grants support clinical trials on diseases such as cancer, it is worth exploring any that would be a good fit for a project in Health EDRM. Table 6.3.2 lists some websites that contain information for private foundations and corporations that award grants for health research.

Table 6.3.2. Websites for identifying research funders

Funder or organization	Website
Foundation Directory Online	fconline.foundationcenter.org
GrantWatch "Disaster Relief Grants"	www.grantwatch.com/cat/48/disaster-relief-grants.html
WHO Centre for Health Development	extranet.who.int/kobe_centre/en/calls-tors

6.3.6 Allocation of grant funding in different phases of the disaster cycle

There are four phases of the disaster cycle: prevention, preparedness, response and recovery. Research has shown that investing in disaster risk reduction (DRR) measures before a disaster is several times more cost effective than funding the response to disaster *(4–5)*; however, prevention and preparedness are a low priority for attracting funding in comparison to the response and recovery phases. Donors are quick and generous in giving immediately after a major disaster, but donations trail off within a short period. Therefore, finding a way to place prevention and preparedness within response and recovery may increase the chances of

success for a grant proposal, as well as providing the stability required for widespread implementation in Health EDRM.

International aid for disasters from 1991 to 2010 was spent mainly on emergency response (US $69.9 billion, 65.5%) or reconstruction and rehabilitation (US $23.3 billion, 21.8%). A smaller proportion of the funding went to DRR (US $13.5 billion, 12.7%) *(6)*. In 2016, foundations and public charities allocated their global disaster-related funding as follows: 42% for response and relief efforts, 17% for reconstruction and recovery, 8% for resilience and 5% for disaster preparedness *(7)*. Furthermore, more than two thirds of private giving stops within two months of a sudden disaster, and all giving peaks by five or six months *(8)*.

6.3.7 Developing a grant budget

A vital part of planning the research study that is also vital for the grant application is identifying, well ahead of time, where to get assistance and who is needed beyond the immediate team. This will have an impact on the project's budget; an advisor or programme officer may help to determine what expenses will be regarded as reasonable. For example, funders are unlikely to pay for new computers for all members of the research team or for holding research meetings in expensive locations. What is important is that the funding will be sufficient to complete the research, which means that it is critical to request the correct amount of funding.

An effective proposal budget is an accurate assessment of all expenses, provides justification for each item of spending and explains how the costs were arrived at. The timeline for the project needs to be taken into account, as well as the items for which funding will be requested. It is also important to consider the length of time that might be needed by the host organization for the grant in order to approve the proposed budget (if necessary), as well as how to respond if the costs are challenged.

Typically, a research study's budget will include direct costs and indirect costs. Direct costs are project personnel salaries and employee benefits, equipment, supplies, services and travel. Indirect costs are those incurred in the project which cannot be identified specifically, and usually include the money needed for the services provided by the host organization (for example, administrative, procurement, accounting and finance, security, library and so on). These costs are often referred to as overheads, overhead costs, or facilities and administrative costs. They are sometimes calculated as a predetermined proportion of the project's direct costs.

Expenses for personnel will include some or all of the salary or wage for each person on the project (depending on what proportion of their time they will devote to it), as well as employee benefits such as pension expenses, social security contributions, statutory and voluntary medical insurance contributions.

6.3.8 Grant review process

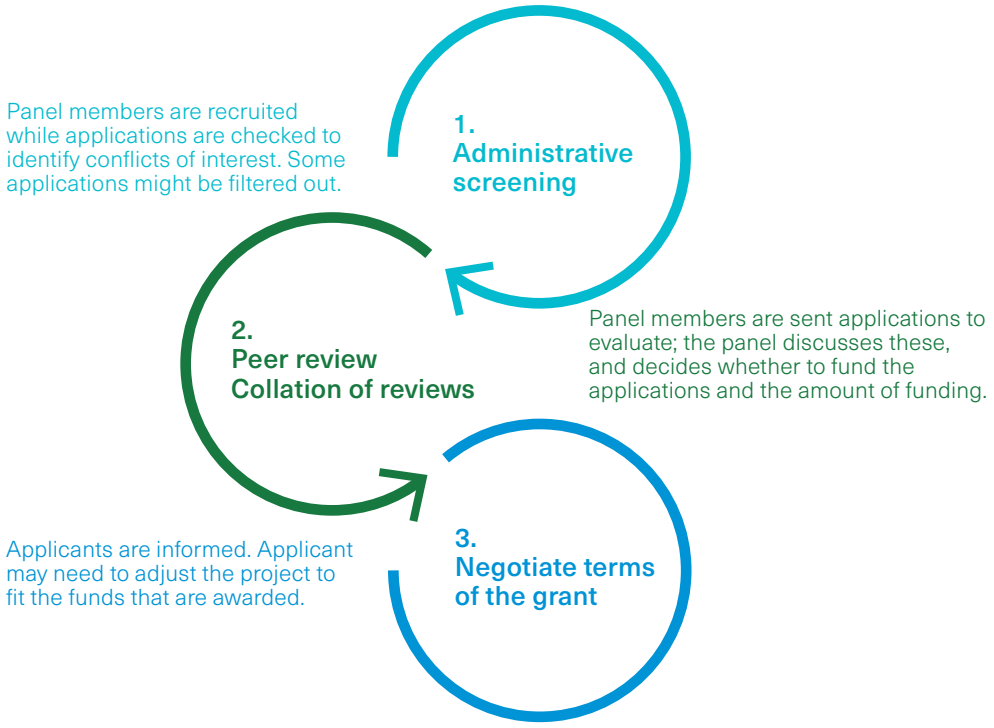
Funders wish to choose well-organized and compelling ideas from among the many proposals submitted to them. They will select applicants who they feel are capable of successfully implementing the proposed project, in accordance with the requirements and eligibility criteria for their funds.

6.3

The funder's guidelines for the application are usually accompanied by information on the objectives of their grants and criteria for evaluation. To increase the chances of success, it is important that the applicant strictly follows the proper format for the application and submits all the required materials.

After a grant application is received, the funder's administrative staff will usually check its completeness and eligibility for the grant before assigning it to peer reviewers, a specific panel or both. Most decisions on research funding are made by a panel of experts who assess the applications and might interview the applicants. The panel assesses the proposal against a set of criteria. A summary of the assessment and any peer review is usually sent to the applicants, sometimes with an opportunity for them to respond before the funding decision is made. The funder would then either offer the grant to the applicant, decline to do so or, occasionally, offer a smaller amount of funding than that requested. Negotiation with the funder may then be possible, as well as adjustments to the project goals, objectives and timelines to match the reduced funding. The whole process from submission of an application to the decision usually takes at least three to six months and can sometimes take more than a year (Figure 6.3.1).

Figure 6.3.1 Grant review process



6.3.9 Managing a grant

Obtaining a funded grant is an achievement and indicates the proposal's appeal to the funder. Implementing a new grant requires good project management and administration. If the grant is for an organization, the relevant department would set up a grant budget account and oversee logistics of monitoring expenditures. Collaboration may also be needed with the human resources department to hire new personnel. A key next step after the grant is awarded may be an application for ethics approval (Chapter 6.4) and it is important to do this as early as possible, because the process can take several months and the study will not be able to start without the necessary level of approval.

6.3.10 Conclusions

There are many resources available that provide advice on preparing grant applications – this chapter outlines how to get started. To be successful, a grant proposal must be persuasive, realistic and written in a way that will appeal to the funder. In the end, success is likely to be a mixture of skill and luck; and the following tips may help:

- Address the objectives of the grant first, and explain how the objectives of the project will complement the grant.
- Identify service and knowledge gaps, and explain how the research will fill this gap.
- Show preliminary data related to the funding call, including records from previous work, feasibility research or pilot projects to demonstrate the proficiency of the research team.
- Show the track record of the research team, including listing related work and bring necessary expertise into the team where this is lacking.
- Choose and be prepared to train responsive collaborators who will complement the initial team and who will help to complete the project, problem-solve, be flexible and maintain a positive transparent outlook.
- Quantify the potential impact of the research.
- Be clear and easy to understand, illustrate with figures, infographics and photographs.
- Support the application with scientific evidence and relevant references.

6.3

6.3.11 Key messages

- **A grant proposal summarizes the idea and components of a research study.**
- **Connections with reliable people with similar research interests and exploration of funding sources in the applicant's area of expertise will help to ensure that there is a good fit between the application and the funder.**
- **The eligibility criteria for grants and the requirements of funders vary widely, making it important to check grant criteria carefully.**
- **Previous grants made by the funder may provide a good guide to the type of research they are likely to fund and the content of successful applications.**

6.3.12 Further reading

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6.4 Getting ethical approval for your research

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6.4.1 Learning objectives

To understand the following in relation to applying for ethical approval for a research study in health emergency disaster risk management (Health EDRM), with a focus on WHO guidance:

1. The general processes involved in ethical approval of research projects.
2. The types of document that are usually needed for an ethics application.

6.4.2 Introduction

Research is an essential component in public health – it is the gateway to evidence on the effects of interventions, disease trends, health system structures and processes. In the context of Health EDRM, research is especially important for investigating the effectiveness of emergency prevention, preparedness, response and recovery, and providing an evidence base for decision making. Research that involves human subjects, regardless of the form of sample/record taken and study design, require ethics approval in order to ensure that the people who participate in research are treated ethically, not taken advantage of, and that the research procedure is carried out to high ethical standards; this is discussed in depth in Chapter 3.4, with particular issues for at-risk groups described in Chapter 2.5. Researchers have a duty to promote and ensure respect for all human subjects and protect their health and rights *(1)*. Specific morals that need to be upheld include respect for persons, non-maleficence, beneficence, justice and utility. According to WHO *(2),* all research involving human beings should be reviewed by an ethics committee. Studies that involve human participants but are potentially exempt for ethics approval, e.g. using public available data only, should also be reviewed by ethic committees to confirm exemption. Ethics approval should be obtained before the study begins from a recognized ethics committee – this chapter introduces the procedure and basic components required for obtaining ethics approval.

6.4.3 Where to request and obtain ethics approval

A research ethics committee (REC) has the responsibility to ensure the ethical safety and scientific merit of the research. It has the authority to reject, approve or cease the research and to require modification to the research protocol. The main responsibility of the REC is to protect the safety of potential research subjects and to evaluate the risks and benefits brought to subjects and the community. In general, RECs evaluate research proposals with reference to established ethical documents *(3-4)*. Each REC may have its own standard. For example, the WHO ethics committee *(5)* is guided by the World Medical Association Declaration of Helsinki *(1)* and the International Ethical Guidelines for Biomedical Research Involving Human Subjects *(6)* . Hence, researchers should check with the REC they intend to approach (in their academic institution, region or country, for example) to identify the documents that will need to be submitted with their application.

RECs are usually based in regional or national public facilities or individual academic institutions. They usually consist of scientific members (with related research expertise) and non-scientific members (with diverse backgrounds) in order to provide for a comprehensive and quality ethical evaluation.

Individual institutions may have their own committees as an internal regulatory process, such as an institutional review board (IRB) or University Human Research Ethics Committee (UHREC). These have the advantage of being able to evaluate the research protocol with local and familiar perspectives and to monitor the study more closely. For example, the community ethics committee of the Center for Bioethics of the Harvard Medical School *(7)* has members from the Greater Boston area, which makes the ethics review a better fit with the local culture and needs. However, financial interests within the studies may present challenges for a local REC such as this to refuse an application or to request significant changes to the research protocol. For that reason, regional or national committees might provide a stronger legitimacy and consistency when reviewing research conducted by the public and research community. For example, the National Health Service (NHS) in the United Kingdom has a Health Research Authority, which is responsible for the management and conduct of national-level research, including the REC process *(8)*.

6.4.4 Research approval for studies that will take place beyond local regions

For studies that will be conducted outside the researchers' local region, the researchers should ensure that the proposed procedure is locally acceptable. The study design should take local culture and tradition into account, and there should ideally be input from local researchers *(9)*. Furthermore, researchers may be required to obtain approval from the relevant foreign authorities, as well as from their host institution. This may require a request to a REC close to the target community, to ensure the evaluation of the research procedures for cultural and legal appropriateness. As Wright, Parker and the Nuffield Council on Bioethics Working Group *(9)* argue, the decision-making of funders, research institutions, RECs and many others should be centred on the priorities and

needs of the local community they try to support.

When applying to the researcher's host institution, the application should indicate that the study will be an international study and that approval from a local REC will be obtained after approval by the host institution. Likewise, the application to a foreign institution should indicate that approval has been obtained from the host institution. When preparing these applications, it is important to remember that the different RECs may follow different processes and require different documents.

6.4.5 What if no REC is available in the affected area?

If no REC is available in the affected region/country during a health emergency or disaster, alternative actions may be needed to obtain ethics approval *(10-11)*. There is no consensus guideline for this type of situation, but some possible courses of action and their limitations are shown in Table 6.4.1.

Table 6.4.1 Obtaining ethics approval if a local REC is not available: Some possible actions and their limitations

Action	Limitation
Ask the relevant local representatives or authorities (such as village elder or community leader) for agreement and obtain ethics approval from researchers' local region.	Approval might be biased to one or a small number of local authorities.
Ask the relevant local representatives or authorities (for example, village elder or hospital director) to organize a review committee.	It takes time to organize a committee and the members might not have the necessary experience for review and decision.
Obtain ethics approval from an international organization (such as WHO).	Approval might not have considered local context.
Obtain approval from an established special review board.	It takes time to organize the committee and must be organized by a trusted organization.

6.4.6 Types of ethics review

Different levels of ethical review may be required depending on the invasiveness of the procedure, urgency and the design of the research. Furthermore, review levels vary across different institutions. The researcher should check the requirements of the target institutions before submitting an application. WHO uses five common types of ethics review for proposals *(5)*, which are outlined below.

Full committee review of proposals

Research proposals that present more than minimal risk to human subjects are reviewed by two REC members who present the proposal to the full committee, which then has a general discussion before reaching a consensus decision (see Section 6.4.7). Researchers responsible for the proposal under review are subsequently invited to respond to queries

raised and to provide clarifications or justifications.

Expedited review of proposals
The proposal is circulated for expedited review when the research procedures present no more than a risk of minimal harm to the research participants or communities. In this case, the proposal is sent to two REC members who are required to provide their feedback to the secretariat within 15 working days. The proposal is then either approved or returned to the researcher for further action.

Exemption from REC review
Proposals are exempted from review if they represent less than minimum risks to participants.

Accelerated review
In a public health emergency, such as the investigation of a disease outbreak or a disaster relief operation, an application may be submitted for accelerated review. This is discussed further below.

Continuing review
Since ethics approvals are valid for a limited time period, the REC reviews the progress of the study at periodic intervals. In order to renew the approval, the researchers should submit the necessary documentation to the REC before their approval expires.

6.4.7 Definition of minimal risk

In some decisions around ethics approval, the REC may consider the concept of "minimal risk". There is no global consensus on minimal risk, but similar definitions are used by many organizations and countries. For instance, Australia, Canada, South Africa, the USA, and the Council for International Organizations (CIOMS) have a standard for minimal risk which revolves around comparisons and interpretations of 'everyday risks', 'routine examinations' and 'best interest' of the studied population. These standards need to be adjusted for vulnerable research participants such as prisoners, incapacitated adults and children *(12)*. Researchers should check the minimal risk definition of the REC they are applying to before submitting their application for ethics approval.

6.4.8 The need for accelerated review: Limitations of the non-emergency ethics review process during emergencies

Although most of the ethical issues in emergency-related research are not unique to emergencies, in an emergency the perceptions of potential harm, benefit, and trust (including the patient-provider relationship) differ, and this should be considered in the ethics review, as discussed in Chapter 3.4 *(13)*. Furthermore, research during an ongoing emergency or disaster is likely to require a faster approval decision. Accelerated reviews are designated for this purpose, but some existing ethics review system cannot accommodate these. In considering this, Kayano and colleagues *(14)* emphasized the importance of ethics review systems evolving constantly; this is discussed in Case Study 6.4.1.

6.4

Case Study 6.4.1
The value of an accelerated ethics review process

Many existing ethics review systems are established to operate in non-emergency situations. However, for emergency research, the complexity of the emergency setting may make it difficult to address practical ethical issues. In such contexts, ethics governance may need to consider non-ideal ethical and methodological approaches rather than insisting on the ideal situation in humanitarian research *(15)*. Decision making will require striking a balance between speed and ethics, with the addition of the voice of the affected communities.

For example, during the Ebola outbreak in 2014-2016, WHO *(16)* was responsible for reviewing and discussing ethics for various interventional and observational studies to control the outbreak. The WHO REC established a subcommittee to conduct accelerated reviews to facilitate this process. This was the first time that the accelerated review was put into practice. The subcommittee reviewed 24 new and 22 amended applications, with an average reviewing time of 6 working days.

6.4.9 The research protocol: what to include when preparing an ethics application

This section lists the documents commonly required as part of an ethics application. However, researchers should always check and understand the specific requirements of the REC they are applying to before submitting their application.

Research Protocol
This is the core document of the application. It describes why the study is needed and how it will be conducted. The WHO recommended format for a research protocol is that it should have the following components *(17):*

- **Project summary:** This summary should include the rationale, objectives, methods, participants, time frame and expected outcomes.
- **General information:** This should include the protocol title (identifying number and date), investigators, sponsors and the locations and institutions where the research will be done.
- **Rationale and background information:** This should describe current knowledge about the research topic and intervention, and the need for the research to be conducted in a disaster, rather than a non-disaster, setting. The proposal should provide basic information about the target population, and the potential benefits and harms of the intervention to them. It should also explain the expected benefits from the research and how these outweigh any potential harms of the study.
- **Study goal and objective:** This should include the intended outcomes and aims for the research, and should be considered alongside the research question (Chapter 3.5).
- **Study design:** This should include the type of study (as discussed in Section 4 of this book) *(18)*, target population, the recruitment procedure, research or diagnostic tools and duration of the study. Information on the study's inclusion and exclusion criteria and any criteria for withdrawal should also be mentioned.

- **Methodology:** This should provide detailed information about the research procedure. This would include information on how the following will be conducted: interventions, measurements, observations, laboratory investigations, and procedures. How participant confidentiality will be ensured should also be included. Standardized and clearly defined procedures will be required for any sites where special protocols are needed. For studies in disaster settings, providing participants with sufficient information about the study and the freedom for participants to choose whether or not to participate are especially important (see Chapter 3.4) and should be clearly stated in the protocol. If the study involves an intervention, the standardized and documented procedure (for example, the frequency of study visit, intervention procedure) should be clearly described and evidence supporting the interventions should be provided (see Chapter 3.3). The procedure for receiving questions and feedback from participants should be clearly defined. If the study is a randomized trial, additional information on randomization, blinding or masking and any stopping criteria for ending the research prematurely will be needed (Chapter 4.1).
- **Safety consideration:** This should describe how safety of participants will be ensured and how adverse events will be recorded, reported and managed.
- **Follow-up:** This should describe what follow-up activities will be provided to the research participants and the duration of this follow-up – for example, follow-up activities relating to data collection or monitoring of adverse events.
- **Data-management and statistical analysis:** This should describe how the data collected will be processed, stored and analysed. Physical and electronic data may have different management protocols and information should be provided about which personnel will have access to the data, and how the confidentiality of participants will be protected.
- **Quality assurance:** This should describe the quality control and quality assurance system for the research, e.g. clincal monitors and data management.
- **Expected outcome of the study:** This should discuss how the study results might contribute to the advancement of knowledge, how the findings will be made available, and how it may impact on the health services, systems and policies.
- **Dissemination of results and publication policy:** The dissemination process for the findings of a study should include information on the method, policy and responsible personnel, target audience (relevant policy makers, scientific media, the community and participants, for example).
- **Duration:** A detailed timeline of the project should be provided, ideally in months and beginning from the point that ethics approval is received.
- **Anticipated challenges:** This should include the foreseeable problems and possible solutions for the study.

- **Project management:** This should describe the roles and responsibilities of each member of the research team.
- **Ethics:** This should describe the ethical consideration. Even in the context of emergency and disaster situations, ethics issues such as time to reflect on to take part in the study or not and the right to withdraw, should be respected. Any procedures that might raise specific ethical issues should be discussed. This section should also describe how informed consent will be taken during recruitment and the relevant documents should probably be included in the application, as discussed below.
- **Conflict of interest:** The researchers should declare any interests that any of them have which are related to the study or its results and might be regarded as a conflict. WHO provides guidance for this online in Guidelines for Declaration of Interests *(19)*.
- **Budget and other financial support:** Some RECs require details on the study's budget and funding source. Researchers should check whether the REC they are applying to requires this.
- **References:** A list of the cited references should be provided to support the content of the protocol.

Informed consent form

An informed consent form is a document used for recruiting potential participants to the research study and obtaining their agreement before they enter it, receive the intervention or have data collected. The form should show study information, and the contact details of the responsible investigators, the ethic committee and of the research institution. It also needs to have space for the name and signature of the researcher (or their representative), the participant and, if necessary, a witness. The procedure of obtaining the informed consent should also comply with international guideline, like the International Ethical Guidelines for Health-related Research Involving Humans (b), while making the informed consent form.

(b) Council for International Organizations of Medical Sciences. International Ethical Guidelines for Health-related Research Involving Humans. Geneva. Switzerland: CIOMS. 2016 https://cioms.ch/wp-content/uploads/2017/01/WEB-CIOMS-EthicalGuidelines.pdf (accessed 13 Feb 2021).

Procedures should be in place for non-written consent if, for example, potential participants are visually impaired or illiterate *(1)*; obtaining their consent is likely to require the presence of an independent witness and a note (written, audio or video) indicating the person's willingness to join the study.

Patient information leaflet (if available)

The patient information leaflet is a document providing more detailed information on the study, which would be given to potential participants and those who are recruited to the study.

Any associated study instruments

These include questionnaires, interview guides, focus group discussion guides or other documents related to the research intervention. They may be required to be in English and the native language of the participants. The collection procedure should give an explanation and reason for the data collected, especially if any of this is sensitive data.

Final approval document by the other scientific/technical review committee, or peer reviewers
If the research intervention involves novel technology or instrument, its implementation should have been already reviewed and approved by other relevant peer reviewers or the scientific/technical review committee. The approval document should be provided with the application.

Principal investigator's response to previous review (if the protocol has been submitted before)
If a resubmission is being made to the REC, perhaps following "conditional approval" (which is described below), the researcher should indicate any changes made in the revised protocol in response to the previous review.

Comments made by the other scientific peer review groups (if the protocol has been reviewed by another REC or other committee)
In international studies, approvals from multiple REC may be required. In such cases, any other submissions or approvals should be mentioned, including proof of these.

Information and curriculum vitae (CV) of the researcher(s)
Information, including a curriculum vitae (CV) for each member of the research team may be required by the REC and researchers committee should check the requirements for this with the REC that they will apply to.

Data collection forms, case report forms, patient diaries, and so on (if the study will use these)
Some RECs require these data collection documents to be submitted. The format of each will depend on how the research has been designed, and how the data will be collected and stored.

Recruitment material (if available)
Recruitment material refers to, for example, any advertising tools that will be used to recruit participants to the study. These might be pamphlets, posters or other media. The materials should be compliant with the local culture and language, and should contain sufficient contact information for the researcher and their organization.

6.4.10 Providing potential participants with information on the study

As noted above, the patient information leaflet and informed consent form provide essential background information on the study to potential participants, in lay language. Several components are recommended for both documents. Firstly, they should provide the background and reasons for the study in the target community and explain why the person is being invited to participate. Secondly, they should describe the selection criteria. Thirdly, there should be a clear explanation of the research procedure (including number of visits and estimated research duration), potential safety concerns, rights of participants, data confidentiality, where and how participants can ask questions or raise concerns, procedures and reason for the collection of any sensitive data and the right of the participant to withdraw from the study. Fourthly, contact information of the responsible researcher, the REC and detail of the research institution should be provided.

These documents should include both English and native language versions. In some cases, the native language version might be prepared after ethics approval *(17)* but the REC should usually be provided with the translated document. This is particularly important in international studies that involved populations that speak different languages. Furthermore, if the study will involve multiple distinctive groups, tailored consent might be needed for each of them.

6.4.11 Approval status

After reviewing an application, the REC will usually make a decision that the application is approved, needs modification or is rejected. RECs usually use four classifications to indicate the status of an application after they have processed it (Table 6.4.2).

Table 6.4.2. The description of each different approval responses of ethics application

Status	Description
Approved as submitted	The proposal is approved and no modifications are required.
Approved conditionally; requires amendments or clarifications	The REC requires clarification or amendment about the application, which the researcher is required to provide before it can move forward. The proposal would be re-evaluated after re-submission.
Not approved; requires additional information or rewriting	The REC considered that the proposal was not acceptable but is willing to consider a revision of the protocol if this is submitted in a new application.
Rejected	The REC considered that the proposal was not acceptable and did not advise re-submission.

6.4.12 Responses to questions from the REC

After the research protocol has been submitted, the REC may have comments or questions for the researcher about it. Researchers are typically required to respond to these queries and the requested amendments by preparing a note which includes a point-by-point response to all queries and to submit a revised protocol which shows the changes they have made.

6.4.13 Other communications with the REC

This section describes a variety of situations which need to be reported to the REC, according to WHO *(20)*.

Progress report

For non-cross-sectional studies, a progress report might be required by the REC on an annual basis. This would cover the status of the study, number of participants (recruited, withdrawn and completed), a summary of any major changes to study procedures, serious adverse events,

participants' complaints, and significant updated information or deviation from approved activities which are related to safety or participation.

Application for continuing review (if needed)
If a study needs continuing review, the researchers may need to submit a renewal application including information justifying the renewal and a progress report of the ongoing study, a report from their study's Data and Safety Monitoring Board (if available), and any amended or new documents. Researcher should ensure approval is obtained before the existing approval is expired.

Application for Amendment
If the originally submitted documents and study protocol are amended after approval, the researchers should notify the REC about these amendments. Revised documents include an explanation of the amendment and an amended protocol (highlighting the changes) should be submitted. If the amendment involves significant changes in the study design, additional justification should be provided. The amended protocol should not be implemented before it is approved.

Project closure
When the study is successfully completed or terminates early, the researchers should inform the REC and provide a completed set of documents. This should include the final report with a summary of the study's findings, the latest progress report and any Data and Safety Monitoring Board reports (where applicable), and any other documents required by the REC.

Protocol Deviation
For any protocol deviation has been made during the research (changes of the protocol without the agreement by the sponsor and prior review and documented approval/favourable opinion from the IRB/REC of an appropriate amendment) (ref. a), it should be promptly reported to the REC.

(a). Integrated Addendum to ICH E6 (R1): Guideline for Good Clinical Practice E6 (R2). Swiss. ICH. 2016. https://www.ich.org/fileadmin/Public_Web.../E6/E6_R2__Step_4_2016_1109.pdf

Adverse events
According to *Safety of Medicines: A guide to detecting and reporting adverse drug reactions* published by WHO, an adverse event is any untoward medical occurrence that presents during treatment with medicine, but which does not necessarily have a causal relationship with the treatment *(21)*. In addition to these, some REC also include non-medical occurrences as adverse events. Researchers should check the specific requirements of their REC and ensure that adverse events are reported according to these requirements.

Serious adverse events
A serious adverse event is defined as an untoward medical occurrence which is fatal, life-threatening, requires inpatient hospitalization, results in persisting and significant disability to the subject or causes congenital anomalies or birth defects *(21)*. These should be reported as per REC required. As with adverse events more generally, some REC also include serious nonmedical occurrences as serious adverse events and researchers should check the specific requirements of their REC to ensure that they report serious adverse events appropriately.

6.4

6.4.14 Conclusions

Research ethics applications and approvals are necessary before research involving human subjects, except for those studies that will be limited to publicly available, anonymous data. This chapter provides a general overview of different types of ethics review, procedures, documents required and other important points, which are part of the WHO guidelines for ethics approval. However, the variety of national and institutional policies around ethical approval mean that there is no single, globally-agreed standard or requirement that applies to all research ethics systems or RECs *(14)*. Researchers should therefore always check the specific requirements of the REC they are applying to before submitting their application.

6.4.15 Key messages

- **All research studies involving human participants should be reviewed and approved by research ethics committee. It is the committee's decision whether a study should be exempted from the full reviewed process.**
- **Research should be conducted in ways that protect the safety and confidentiality of the participants, both physically and mentally (in protocol and document) and be carried out in accordance with the principles underpinning the Declaration of Helsinki.**
- **The type of ethics review required will depend on the nature and the urgency of the study.**
- **Current ethics review procedures might not be fully applicable to the challenges encountered in the Health EDRM context, especially during rapid onset emergencies and disasters because of the relatively long lead time of non-emergency ethics review processes. Changes in the ethics review procedure are needed to accommodate the special needs for emergency researches.**
- **Ethics application requirements vary across REC. Researchers should check the requirements of the REC they plan to submit their application to.**

6.4.16 Further reading

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Policy on research involving human participants. London, United Kingdom: Wellcome Trust https://wellcome.ac.uk/funding/guidance/wellcome-trust-policy-position-research-involving-human-participants (accessed 10 January 2020).

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6.4

6.4.17 References

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6.5 Doing Health EDRM research in the field

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6.5.1 Learning objectives

To understand the following in the context of doing health emergency and disaster risk management (Health EDRM) research in the field:

1. Key preparations necessary before conducting research in the field.
2. Logistics involved in undertaking field research and data collection.
3. Key elements needed for a successful deployment to the field.

6.5.2 Introduction

Fieldwork is a critical component of Health EDRM research. As discussed elsewhere in this book, it may be necessary to conduct real-time research during health emergencies and other disasters, to inform the response, build the evidence base and identify lessons for strengthening existing strategies and processes for Health EDRM.

In order to maintain the integrity of the research being conducted, careful planning and risk assessments should be made for all stages of the process. When planning to undertake research in the field, it is important to ensure adequate preparation and make provisions to maintain operational independence so that the research process does not burden your hosts. This needs to recognize that sometimes, a sustained period in the field is needed – for weeks or even months. Personal safety must be considered, including personal protective training, vaccinations, security in the field and cultural competence. Researchers must also be prepared for rapidly changing situations and have resilience to deal with change and uncertainty. This chapter sets out key practical considerations for those planning to undertake research in Health EDRM.

6.5.3 Preparation

The preparation phase is critical to ensuring that fieldwork undertaken for Health EDRM research is effective, safe and contextually appropriate. There are several areas of importance that need to be planned carefully (Table 6.6.1). Deficits in any aspect of preparation can delay research, extending the length of studies and time required in the field, as well as potentially posing a risk to data quality.

Table 6.5.1 Key points to consider in preparing for research in the field

Ethical and governmental approvals for research and fieldwork
Travel considerations, including letters of invitation and visas
Context analysis
– Locally available resources
– Cultural competence
– Socio-political environment
– Scale of emergency
– Risk assessments
Identification of and communication with local command and control structure
Plans for site visits and pilot scoping studies
Equipment and protocols
– Preparation of physical equipment
– Training on use and handling of equipment, as required
– Well-defined protocols for data gathering
– Protocols for safety of data and equipment
Data and specimen collection (if required)
– Human and physical resources
– Specimen handling and transport

6.5.4 Relationship and team building

Leaders should be identified for key aspects of the research. Describing the specific roles and responsibilities of team members early can minimize the potential for confusion as the research progresses. The person leading the research is typically called the principal investigator (PI). The descriptions of the roles and responsibilities for members of the research team should be delegated by the principal investigator. Local relationships and networks are essential to all aspects of fieldwork, including safety and security, data quality and collection, and the ultimate dissemination of results (see Chapter 6.7). Such relationships can often be brokered by partners – for example, in-country agencies, such as UN country offices, government agencies such as the Ministry of Health, or local NGOs. Significant expertise among local experts and stakeholders should be identified early on and these individuals brought into the research team.

6.5

Researchers should work together to identify and agree team structure, especially between international and local team members where relevant. In Health EDRM research, the balance of personnel within a research team may vary *(1)*. For example, a field research group may be attached to an emergency medical team, which would require its own permission to assist the research team, or the research team may work independently, which would mean that they require specific permission to work in the field. Research-related fieldwork often comprises multiple trips, and each trip must be planned carefully before departure. It is important to understand the context of the environment that you are visiting, including potential political and social tensions, and assess how the presence of the research team will be perceived within this context.

6.5.5 Before you start

A formal mandate for research must be received before initiating fieldwork, usually by way of an invitation from the government and emergency control centre. Given the often sensitive nature of data that are collected in the field, many studies are classified as research by involving governing bodies or universities. This usually makes additional local ethical approval through these institutions a necessity (see Chapter 6.4). Considerations necessary for obtaining ethical or governmental approvals, including the development of proposals, should be prioritized, ideally prior to arrival *(2)*. In emergencies, waivers or expedited reviews are often granted; however, even these processes can take days to weeks. If the need for approvals is not considered in a timely manner, fieldwork can be delayed. Fieldwork benefits from reaching out to networks on the ground and engaging communities at the earliest opportunity to communicate research intentions prior to arrival. Furthermore, it is important to establish protocols for all aspects of the fieldwork (including data gathering and analysis, equipment use and handling, communication and feedback loops and so on) before deployment, and ideally before an emergency even occurs. Although specifics often change upon arrival in the field, having plans in place at the outset that can be adapted as necessary is preferable to minimal pre-arrival planning. Many established response organizations have standard operating procedures; it is imperative that researchers review any such guidelines available from affiliated organizations before they consider establishing new procedures.

Specialized protocols are vital in research for consistent data quality and collection, especially when in a volatile environment. For example, sample collection and testing processes in laboratories are usually well documented with standard operating procedures in place. It is important to know which laboratories can and will carry out the tests, where they are, what their requirements are for submitting samples, and who has the responsibility for keeping the standard operating procedures up to date. All other aspects of the research study should use standard operating procedures reviewed and approved by the principal investigators. All members of the research team should be trained on the standard operating procedures, with written acknowledgement showing training completion. It is essential to have a systematic approach.

6.5.6 Logistics and risk assessments

It is important to establish early on the local logistic arrangements, and whether these include collection of staff on arrival, transportation and lodging. You should seek out information describing local availability of resources (internet, power, water, health care). You should research the culture and socio-political environment, along with the scale of the emergency itself, to allow you to consider how best to prepare for these factors, as well as undertaking a robust risk assessment. Risk assessments are an important part of your preparation activities and should include a detailed account of all possible threats and vulnerabilities associated with fieldwork. These should be informed by reliable information such as ministry recommendations, UN situation reports, consultation with local partners and key contacts. When you have identified potential risks, decide on risk mitigation and reduction measures that will be employed before, during and after the fieldwork. This information will help in formulating initial fieldwork proposals and pilot studies, and in planning the logistics of initial site visits.

6.5.7 Equipment and supplies

Equipment, including computers with the required software already loaded and data backed up to local drives, should be ready for deployment. Ensure that all electronics are compatible with, or adaptable to, local electrical voltage levels, to prevent short circuiting and potentially irreparable damage. Training in use of equipment and technical facilities is essential to ensure familiarity, confidence, and reliability in the field, and should be conducted routinely so personnel are prepared before emergencies.

Planning and protocols for specimen collection are also important. This may include kits and packaging for specimen (blood, urine, faeces for example) collection and storage (that is, necessary containers and transport media). In nutritional surveys or environmental epidemiology studies, measurement tools may be also needed, such as callipers, scales, or peak flow meters. Where cold chains or other transport mechanisms are required, logistics should be investigated and planned for ahead of arrival. Obtaining proper paperwork for security clearance may also be required when transporting medical equipment or laboratory supplies.

Data security must be an integral part of research designs and proposals. Increasingly, research permission, from the home or host organization is made conditional on the development of a robust risk assessment and risk reduction measures. Data security is essential in all settings where research is performed. Often regulations and guidelines are in place to ensure the same standards of data protection are in place in developing country settings as in high-income settings. Usual data security measures should not be relaxed in emergency contexts, as the release of sensitive information may be more harmful to the community involved (for example, harsher stigma for sexually transmitted diseases such as HIV/AIDS). For electronic data, it is important to prepare physical security of databases and the devices on which they are stored (such as laptops), safe servers and data access protocols, including personnel rights. Where paper-based data are used, it is important to retain procedures similar to electronic data, as well increased physical security, such as the use of a safe.

6.5

6.5.8 Special considerations for researchers coming from abroad

International research-related fieldwork often comprises multiple deployments, and each must be planned carefully before departure. It is important to understand the context of the environment that you are working in, including cultural norms and potential political and social pressures, and assess how the presence of the research team's international staff will be perceived within this context. It is also essential that each team member is declared medically fit for deployment and safe to travel before planning to undertake research in the field.

Before deployment, researchers must be familiar with security considerations, including any organizational guidance. In addition to relevant security trainings (for example, UN online courses such as BSAFE and SSAFE), basic first aid training can be beneficial, remembering that some settings may be far from medical assistance. Other types of training which may be helpful include deployment training, psychological first aid, managing data, and safeguarding *(3)*. Some organizations also conduct residential simulation exercises where new staff can engage in a deployment.

Finally, you should identify those personal items (Table 6.6.2) and equipment (Table 6.6.3) that you might wish to bring into the field.

Table 6.5.2 Personal items to consider taking to the field

Personal items to consider will be dependent on the need for domestic or international travel, the environment, climate and destination. Considerations include:
Travel documents (passport, letters of invitation, visas, insurance card/ coverage information, vaccination records), and photocopies/electronic copies (essential if international travel is required).
Mobile phone, charger, and local SIM (subscriber identify module) card, external battery packs.
Personal computer and charger.
Power adapters/converters and extension cords.
Headtorch.
Money (local currency and US dollars) and secure holder (such as a money belt).
Medications (required routine medication and prescriptions as well as additional prescription medications, antimalarials if in malaria endemic setting, back up medications).
Well-stocked first aid kit (including, at minimum, plasters, bandages, gloves, tape, cleansing wipes, creams, scissors/tweezers, over-the-counter medications, and distilled water).
Toiletries, mosquito nets and repellent, and sunscreen.
Clothing and footwear that is appropriate for both local climate and culture.
List of emergency contacts (personal and local), with at least one memorized.

Table 6.5.3 Equipment and resources likely to be needed for undertaking field research

Computers, tablets and relevant software.
Internet connectivity devices (routers, mobile hotspots, and so on).
Mobile phones, chargers, and local SIM cards.
Camera (including charger and spare storage media).
Power adapters/converters and extension cords.
Printer/copier.
Corded telephones/telefax.
Data storage options: USB (universal serial bus) storage device, compact discs, cloud storage, locked safe/filing cabinet.
Calculator.
Stationary: notebooks, paper, pens/pencils, stapler, hole punch, binders, clip boards and so on.
Telephone address list to include reference centres and contacts of authorities and experts.
File templates.
Standard questionnaires.
Consent forms for individual-level data collection, photography and so on.
Standard operating procedures, handbooks, relevant articles, and other reference materials.
Maps, geographic positioning system (GPS).
Laboratory equipment.
Sample containers and sample taking equipment.
Sample storage equipment (such as coolers and so on).

6.5.9 Safety and security in the field

Safety and security are of paramount importance. These factors should be considered before departure, upon arrival and continually thereafter. Given the complexity of safety efforts, it can be useful to appoint a safety officer. This person can hold responsibility for ensuring the safety of the entire team, conducting frequent assessments and alerting team members of concerns.

When arriving at lodgings, evaluate the safety of the building and premises. While travelling, it is generally recommended to identify protective measures, such as gates, security guards, and doors that lock and close. Keep valuable personal items safe – ideally in a locked cabinet or safe – and have multiple duplicates stored in different locations (bag, under bed, and so on) in case of theft. Consider a room that is on the second floor or above, as higher levels may pose a lower risk of break-ins, and consider bringing with you a door jam or security bar to ensure safety whilst asleep. It is also useful to evaluate resources available on the premises, such as power sources (including a generator) and water.

Travelling and working in pairs is good practice, and should be done whenever possible. Transportation also poses a risk, particularly in areas where road traffic crashes happen frequently. If a vehicle does not appear to be roadworthy or does not have seatbelts, find another option. Although this may cause a delay in getting to or from the field, personal safety is essential. It is best to travel with drivers that are reputable and reliable. If not already established, these individuals or companies can likely be identified through trusted local networks. When travelling by car, it can be safer to keep valuables in the boot (trunk), if it is locked. Always leave an itinerary with someone, so it is known where in the field you are going and when you are expected to return.

A secure field office with complete and robust information technology and communications (satellite telephone, radio communications, and, if possible, field video-conferencing capacity) can be invaluable. You may also need specialized protective equipment and medical supplies. For those travelling from another country, incidents tend to happen towards the beginning or end of trips, when researchers are either completely unfamiliar with the environment or have become familiar enough to let their guard down. Remember that risk assessments to evaluate safety and security should be reviewed frequently and anytime there is significant change in the context or you are involved in an incident/near-miss event. Ensure that you follow your organizational policy for reporting incidents and near-miss events so appropriate actions can be taken. Local organizations can be asked to provide security briefings and insight into day-to-day risks that may not be widely known.

6.5.10 Relationship management

Research is a two-way process: researchers and the community involved in research both benefit from the process, but trust is required to manage this relationship *(4)*. This is generally achieved by demonstrating reliability and communicating the value of the research to the community, a process that can take some time. However, if research efforts are rushed before connections are established, people may develop mistrust or false beliefs regarding both the researchers and their work. Importantly, a range of contacts should be established, including community members, academics, medical professionals, and governmental and nongovernmental parties. These groups can help to understand local dynamics: social, cultural, economic and political. They are also key to the data gathering process itself, as input and/or data will likely be required from a range of partners and a variety of groups can help to cross-check information.

6.5.11 Implementing research

When implementing research, review ethical approvals and in-country protocols for research, and follow any policies requested in these documents (see Chapters 3.4 and 6.4). Violations of local codes of conduct are not only detrimental to research, but can be illegal, disrespectful of local sensitivities or harmful to participants. If any policies surrounding consent, data collection, or sharing of results are unclear, be sure to check in with a representative of the institutions granting ethical approval.

Consent is typically necessary to collect individual level data. Although language and literacy barriers can sometimes make it challenging, obtaining informed consent is essential; this is discussed in Chapters 3.4 and 6.4.

Coordination and logistics support should be agreed through prior development of operational protocols and agreed standards. This might apply for specialist equipment and software as well as the basic approach to data collection, research and evaluation. Prior training, including formal exercises, in use of equipment and technical facilities is essential to ensure familiarity, confidence, and reliability in the field. It is important to note that, when using technology for data collection in the field such as tablet computers or cameras, consideration should be given to whether it is likely to be acceptable to the community (discrete or obtrusive). When using such technologies, there are also more practical considerations such as internet accessibility, power and charging limitations, and the security of any electronic equipment.

6.5.12 Processes and mechanisms for research in the field investigations

The research field investigation team should share responsibility using agreements and protocols, clarifying who will lead before any investigation is undertaken. This will also make it easier to transfer responsibility back to the local team when the research field investigation team leave. Within this approach, it may be helpful to compartmentalize aspects of the investigation, for example, by clarifying issues related to data collection and communication of findings.

The timelines for reporting should be discussed and agreed at the outset. Minutes should be taken and disseminated at all research update meetings, listing the agreed actions and the person responsible for each action. It is important to document all decisions and the rationale used to make them, including what information was available at the time. Developing a clear schedule for the reports and updates that are required makes it possible to arrange key field work and meet all the internal and external demands for reports and summaries in good time. For example, it is often useful to release statements to the media at about midday to fit with their publication schedules in print or visual media. Communication with local media should be carefully coordinated and approved with the local incident controller. The release of incomplete research information, or information presented in a manner that is not contextually appropriate, could cause problems.

6.5.13 End of research studies or handover

Research teams are often made up of diverse partners and stakeholders that may take part at varying stages of the research. The pre-implementation and implementation phases are usually seen as an “all hands on deck” collaboration of researchers, while data collection in the field can continue for many months to years under the direct, daily guidance of local team members. Whether data collection is ongoing or the project is in a close out phase, certain procedures can be followed to ensure a smooth transition. Generally, project close out and researchers’

departure from the field should be planned well in advance, and discussed and agreed between the research team supervisor and colleagues.

Factors to consider at the conclusion of fieldwork, include data and equipment transport, sharing of results, and personal wellbeing, including psychological debriefs.

6.5.14 Data storage and reporting

Data must be archived in a secure and organized manner, accessible only to those parties that may need to continue reviewing them(see also Chapter 4.4). If some results (laboratory or clinical) are outstanding, there must be a plan in place to ensure that these are communicated to partners in a secure fashion (typically using electronic safeguards).

6.5.15 Dissemination

A preliminary report must be prepared prior to departure, so that critical results can be shared in a timely manner, and a researcher should be appointed as lead writer to complete the final report. Local institutions and ethics committees that have supported or approved the fieldwork may require internal review of results prior to wider dissemination. While this may take time, it is often expedited for urgent matters. When appropriate, results should be shared with all stakeholders. This may include non-scientists, such as government parties and the general public. In such cases, it is essential to employ strategic scientific communication strategies using layperson language.

6.5.16 Health and wellbeing

Those involved in the data collection and research should be offered a debrief to discuss the challenges and opportunities encountered during their time in the field. This should be used to inform existing policies and processes. Organizations may also wish to consider offering a period of rest and recuperation to support staff health and wellbeing. This is especially relevant where researchers have been working in fragile or high-risk environments for an extended period of time.

Individuals should be offered the opportunity to discuss any health requirements confidentially. This can include any onward referral to mental health and wellbeing services, counselling and/or ongoing medical support as required. It is important to refer to any health monitoring processes that may be in place nationally if researchers have been working on or in proximity to infectious diseases.

6.5.17 Conclusions

Undertaking fieldwork is important, but can be challenging, especially in emergency or disaster contexts. It is essential that all research has a local mandate to be carried out. Preparation and good organizational skills are essential. It is important to use pre-prepared plans in a flexible way while working with local stakeholders. Help from local agencies should be sought, especially when working in unfamiliar contexts. Where findings are shared in the scientific literature the work of all team members should be

acknowledged and ethical approvals may need to be set up at the start to allow this to happen. Such reports are vital to improve practice in the future. Other forms of research dissemination to communities involved, such a local talks and press briefings, are important to acknowledge those involved and strengthen relationships with key prior, and possibly future, contributors.

6.5.18 Key messages

- **Preparation is critical to ensuring that research in the field is effective, safe and contextually appropriate. This includes obtaining the necessary administrative and ethical approvals, preparing protocols and standard operating procedures, as well as careful planning in regard to equipment, data security and logistical questions.**
- **Security and safety in the field is paramount and should be considered before and during field work. Training courses are available in this.**
- **It is important to develop a good relationship between researchers and the community; this can be achieved by demonstrating reliability and communicating the value of the research to the community.**
- **Review ethical approvals and in-country protocols for research and follow any policies requested in these. Using agreements and protocols can ensure clarity as to roles and responsibilities. Adhere to standard operating procedures. Document all decisions and the rationale used to make them.**

6.5.19 Further reading

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6.6 How to write up your research

Authors

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6.6.1 Learning objectives

To understand the practical steps involved in preparing a report of your research, including:

1. Identifying and targeting the relevant audience for better impact, use and uptake of your research findings.
2. Prioritizing what needs to be in the manuscript and identifying an appropriate journal.
3. Preparing an outline of the manuscript.
4. Developing the manuscript in accordance with the guidelines of the targeted journal and relevant reporting guidelines.
5. Getting the manuscript accepted and published.

6.6.2 Introduction

The foremost priority in health emergency and disaster risk management (Health EDRM) is serving and saving the lives of affected people. However, priorities change at different phases of the emergency cycle: prevention, preparedness, response and recovery. Public interests of safety, survival and well-being take precedence over research interests in the acute phase of emergency response (1). Nevertheless, it is important to conduct research, while making best use of available time and resources, in order to improve Health EDRM practices (2). It is also then vital that this research is made available to others, which usually means publication in an appropriate scientific journal.

Conducting research in an emergency setting is not an easy task, amidst competing and fast changing priorities. The findings of such research are therefore precious and worth reporting – provided they add and further inform the existing body of literature. Earlier chapters have shown you how to design and conduct a research study; this chapter takes you through the processes involved in synthesizing research findings in such a way that they are accepted as scientific evidence. It describes some generic steps that you can follow to prepare your manuscript and get it published in an appropriate journal.

6.6.3 Choosing a journal

The first step in preparing a report of your research is to think about and decide on the intended audience or readers of your report. If you have focused your research work on emergency preparedness and response, or any other specific subject pertaining to Health EDRM, then you would like professionals who work in this area to know about your research results.

There are tens of thousands of scientific journals online. However, around 80 journals focus on disasters, hazards, risks, emergency management, response and humanitarian issues. Some are peer-reviewed journals that are indexed in bibliographic databases, such as those mentioned in Chapter 6.2, while others are non-indexed journals. Indexed journals are generally considered to be of higher scientific quality than non-indexed journals *(3)*, and their content will be more easily retrieved by people searching the bibliographic databases. Furthermore, if you want to ensure a wider audience for your research, you should choose an open access journal, which will allow unrestricted distribution of your research article. If your research received external funding, then those funders might also prefer that it should be published open access, to influence a wider audience. However, open access journals usually ask for publication charges and if you do not have the funding, it may be difficult to get a place in such journals despite the quality of your report.

In choosing a journal, you should look at the editorial team to give you an idea about its composition, including whether its members are drawn from a specific region or from across the world. Look for the specific themes that the journal focuses on and consider how your research will fit with these. Looking at the types of articles published by the journal in recent issues will give you an idea of whether your research falls within the scope of the journal.

It takes dedication, time and hard work to do research and come up with research evidence, so the report of that research should be able to find a place in an indexed journal with a good impact factor. This will give it a higher probability of being noticed, cited by others and translated into practice by policy makers, administrators, practitioners and other stakeholders. The impact factor is an indicator of the prestige and popularity of the journal *(4)*: the higher the impact factor, the more competitive the process of acceptance of a manuscript in that journal will be. Be mindful of your ambitions in targeting a journal according to their impact factor. You should try to have an objective assessment of the quality of your research. Usually, high-quality research can be submitted to a high impact factor journal, but a lower quality study will usually have a higher chance of being accepted by a journal with a low impact factor. If the research findings are meaningful only for a local setting or single country, it might be better to target a national journal, even if it has a comparatively low impact factor.

Check the authors' guidelines from your chosen journal carefully – you will need to follow these instructions for structuring your manuscript. It is vital that you format your manuscript (headings, subheadings, citations, references and so on) consistently, correctly and in compliance with the style of the journal. This is a sign of professionalism that editors and reviewers note and appreciate. Do not forget to check the submission and

review process for the journal. It is helpful to know how much time the journal is likely to take from receiving your manuscript to its review and, if accepted, final publication. Some journals complete their review process within weeks, while some may take many months. The speed of the process depends on the willingness of potential referees to review a manuscript. A correct title and a good abstract will increase the likelihood that referees will want to review the paper. A poorly written abstract and an ungrammatical title may dramatically reduce this likelihood. Review by scientific peers can be an open or closed process and you should decide based on your preferences.

Despite all your hard work on your research study and description of its findings, sometimes a journal may decide not to publish your manuscript. As a backup plan, identify an alternative journal that you may consider submitting your manuscript to, in case you need to switch from your first choice.

6.6.4 Plan writing up your research

A clear understanding of what and how you want to publish, whom you want the findings to reach and how it will be translated into practice will provide you with a good orientation and context for writing about your research. Writing style, the amount of contextual information you provide and how you present your findings may vary according to your target audience.

To keep yourself focused, write down in one or two paragraphs the main points as to how your research adds value to existing work and the recommendations it lead to for the future. This will help you to summarize your work as a 'conclusion'. It can also help if the journal wants you to provide details on why your research work is important.

As discussed in other chapters, when doing and reporting your research, you should do so in a spirit of transparency, objectivity, honesty and equal opportunities for all. Local people who helped should be given the opportunity to get involved fully in doing and synthesizing findings of the research. There should be a clear understanding among all those involved about who will be an author and the sequencing of authorship, which might be based on the actual contribution to the study. In deciding the order of authors on the manuscript, the researcher who has conceptualized the research and prepared the first draft of the manuscript is likely to be listed as the first author. Traditionally, the last author will be the person who closely supervised the research, mentored the team or provided key advice in finalizing the manuscript, but this is not always the case.

Depending on the scope of your research (for example, whether it focused on one issue or more than one), you, your colleagues and other stakeholders involved in the research can decide whether to present all the findings and analysis in a single, major publication or to split the work across more than one article, with each focusing on a different topic.

6.6.5 Choose a title

The title of the manuscript should be short, grammatically correct and reflect the essence of the research. It should be phrased in such a way that it catches the attention of readers and gives them a clear indication of what the research article contains. Follow the journal's guidelines on the style of the title, which may also include stating the study design.

6.6.6 Outline and develop your manuscript

Various guidelines exist for the preparation of reports for a wide range of types of research study. Many of these reporting guidelines have been collated by the Equator Network and are listed on their website (www.equator-network.org). You should follow the relevant reporting guidelines when preparing your manuscript. For example, there are the STROBE guidelines for observational studies *(5)*, the CONSORT guidelines for randomized trials *(6)* (Chapter 4.1), the PRISMA guidelines for systematic reviews *(7)* (Chapter 2.6), and RECORD guidelines for studies using routinely collected health data *(8)* (Chapter 2.4), among many others. Table 6.6.1 shows the usual structure of a research manuscript, regardless of the study design.

Table 6.6.1 Structured outline of a scientific manuscript

Title
Authors' names with their affiliations
Corresponding author with contact details
Abstract
Key Words
Introduction and/or background
Materials and methods
Results
Discussion
Conclusion
Acknowledgements
Conflicts of interest
References
Annexes and supplementary material

Introduction and/or background: This section should demonstrate your awareness of the problems or issues, existing research, possible solutions and best practices on the topic. Highlight the identified problems or gaps that necessitated your research. Provide an overview of the context of your research for readers of your article. If you quote data or phrases from other papers, always cite these sources and do so in the style recommended by the intended journal. Statements of fact that you make in the report should be supported by the relevant evidence and references. You should state the objectives of the study in the last paragraph of this section.

6.6

Materials and methods: Write a succinct description of the methods you used to conduct your research. Be meticulous and accurate *(9)*. Readers will be interested in knowing what the research design was and who the participants or subjects of the research were. If you are writing a review article, mention the research databases that you searched, including the terms used and any restrictions by language or publication year. If ethics approval was required, this should have been obtained before the study started (Chapter 6.4) and, if so, this should be explicitly mentioned in the manuscript.

Results: In this section, you should objectively present data, facts and observations from your research, along with brief interpretation. Quantitative data might be summarized in tables and graphs, with data to show the imprecision of the analysis (such as statistical significance and confidence intervals) (Chapter 4.2). Always keep in mind the intended audience of your report when deciding on how to present your findings. Always remember that null or negative results can be just as important as positive results to let others know that interventions are ineffective or harmful, or that associations do not exist between variables. Presenting important results graphically may garner more attention, but the number of tables and figures allowed in a report is usually limited by the journal and you must comply with its guidelines. Details about your methods or your interpretation of the results should not go in this section, but should go into the Discussion section.

Discussion: The findings and main observations relating to your research question and study objectives should be discussed in this section, along with what is already known on the topic. The section should not merely repeat your results or the information you provided in the introduction section. Rather, it should be written to provide readers with clarity on how the findings of your research support the arguments you develop for discussion. Avoid statements that are not supported by the findings of your research or other evidence. If there are limitations in interpreting and applying your research findings, be self-critical and describe these limitations so that readers can be cautious when interpreting your results and inferences. In addition to describing the limitations, you can also highlight the advantages of the research you conducted. If you think it would be helpful to highlight key learnings from your research (and this is acceptable to the journal), write these in bullet points in a box with an appropriate title.

Conclusions: This section should summarize your findings and key inferences and provide direction for future practice and further research in the topic area. It should provide a clear, simple and crisp message to show how the research will be useful and influence practice and policies. It is usually best to keep this section to a few paragraphs or less and, in some journals, it can be the last paragraph of the discussion section.

Acknowledgements: Remember to acknowledge those who participated in your research work, funded the study or who helped you prepare the report.

Conflicts of interest: All authors should declare any conflicts of interest relating to the conduct and publication of their research findings. If there are none, write something such as ‘No known conflicts of interest’. This

transparency helps readers to ascertain the objectivity of the statements you make in your research article.

References: You should list all references mentioned in the text of the manuscript in the style required by the journal, so check their guidelines again. There are multiple referencing styles but two of the most common are:

- *Harvard style*: this is also known as 'author-date style'. The in-text call out or citation is usually shown in brackets in the body of the text or in footnotes. Full details are listed in alphabetical order in the reference list.
- *Vancouver style*: this is also known as 'numeric referencing style'. Each in-text call out or citation is shown as a number, which corresponds to the order it appears in the text. If the same source is cited more than once, the same number is used. References are then listed in numeric order in the reference list.

Only relevant evidence and information should be quoted in the text and listed in the references, so that interested readers can check the quoted argument, statement or data.

Annexes and supplementary material: Tables or graphics that you want to include in the text are usually placed at the end of the manuscript you send to a journal. The journal then places these in the correct place if they accept it, and before publishing the report. Some journals also allow you to provide supplementary material for the manuscript, which might be published alongside it on the journal website *(10)*. Some journals also provide data repositories and hyperlinks or might require you to provide links to the data on which study is based.

Abstract: Having written the full manuscript, including your conclusions, you should be very clear about the key things to put into a summary of that main text, which would become its abstract. A common error in writing an abstract is to make it an introduction, when it should be a summary. The usual structure of an abstract is similar to that for the article itself: background, methods and materials, results and conclusion. An abstract is usually around 250 words long *(11)*. Together with the title, it will act as an advertisement for the article's content and, if the article is included in a bibliographic database, the abstract should help readers to find your research and decide whether to read the full paper. So, make the abstract simple, interesting and informative, without using technical jargon and abbreviations.

Key words: The journal might also ask you to provide some key words to make it easier for people to find your research article. Choose key words that capture the essence of your research (for example, if you are writing about health emergency and disaster risk management, use words such as risk management, and disaster risk reduction or DRR).

As you start writing these sections of your manuscript, we hope that you will find that your words start falling into place. It is always better to write with your original thoughts. In preparing a first draft, do not worry too much about the exact phrasing or the word limit of the journal. Instead, keep writing, making sure that you consider relevance, coherence and the applicability of your research findings.

6.6

Share the first draft with your co-authors for their input. This may lead to a series of revisions and further draft versions before it becomes your finally agreed manuscript, which will need to be within the word limit for the target journal. This step is important because all authors involved need to be willing to take responsibility for the submitted manuscript. You might also want to share the almost final version of the manuscript with other colleagues or friends for proofreading, in order to help ensure that it is clear to them and to pick up anything that needs correcting before it goes to the journal. However, if you share the manuscript outside the author team, you need to be clear that they must not disclose the findings or pass the manuscript to anyone else without your permission. When you receive comments and suggestions from your colleagues or friends, do not ignore them. Consider them carefully because if they had difficulty in understanding some text, the journal editors, peer reviewers and eventual readers of the article will probably also have difficulties with it.

One valuable tip is to keep a print copy of the final version on your desk for at least one week before submitting it. Engage yourself in other activities and try to forget about the manuscript. Then when you return to it, you might identify ways to improve it further with a fresh eye.

6.6.7 Seeking clearances for your manuscript

Depending on your employment status or the practices of the organization or institution that you work in, you may need to obtain administrative clearances and approval from your department. You may also need to obtain formal approval from those that were involved in your research study, if you do not already have this. In some cases, this may require approval from a government department in the country where the research was done. It is important to get this if you need it, and it may be helpful to involve someone from the relevant department in the author team. This has the added advantage of building local research capacity as well as receiving faster approval. Likewise, you should mention the name of any ethics committee that approved your research (see Chapter 6.4) and share a copy of the manuscript with it, if required.

It is a common misconception that editors are responsible for copyright clearance. This should be sought from authors and publishers. The latter may have systems on their websites to make the process easy. Reuse of diagrams, data and long quotations requires copyright clearance to be obtained from publishers, even if the material was the author's own. However, material published under Creative Commons licenses requires only citation of the author and origin of the work.

6.6.8 Submitting your manuscript

Your manuscript is now ready for submission to your intended journal. However, merely submitting it to a journal is not enough to get it published. It will be reviewed by the journal editorial team and your peers. As you submit it, most journals will require all the authors to sign a statement taking public responsibility for the content in their manuscript. One of the authors will also need to be identified as the corresponding author. Although this is usually the first author, it might be another co-author who has been engaged in the research and will be able to answer questions about it.

If the journal is sufficiently interested in your manuscript, they will probably send it to one or more peer reviewers. Some journals will do this after removing the names of the authors and their institutional affiliations. You should be ready to respond to any comments provided by the peer reviewers. You will be expected to address the issues raised by revising the manuscript and responding to any suggestions for changes. Be polite and respectful when you respond, even if you disagree with a reviewer's comments and have not acted on them. Provide clarification if they misunderstood a point or provide additional information if necessary. If you feel that a reviewer's criticism is unfair, or some of the suggested amendments in the manuscript are unwarranted, you have right to make a representation to the editor and set out a rationale for not following the reviewer's instruction. The revised manuscript should be re-submitted to the journal, usually with a detailed response to each of the comments from the editors and the peer reviewers.

In some cases, the journal may tell you that it will not be considering your manuscript for publication. There is no need to feel discouraged. This does not necessarily mean that your research and manuscript are not worth publishing; sometimes, journals have their own focus or plans for upcoming issues that your manuscript does not fit with. Whatever the reason, consider any comments from the editors and peer reviewers carefully, revise the manuscript if you wish to and submit it to an alternative journal.

6.6.9 Finalizing your manuscript and publication

When a journal confirms that your manuscript has been accepted for publication, the editorial team will send you a formatted version, showing how it will look in the journal, and may ask for some further clarifications or changes. This version of the manuscript is often called the "proofs" and it is your last chance to check the manuscript for any errors before it is published. You will usually be given only a few days to respond, so check it carefully and quickly, and reply to the journal with necessary adjustment of any formatting or typing deficiencies and correction of the proofs. The more accurate the final submitted manuscript is, the fewer the corrections that will be required at the copy-editing and proof stages.

6.6.10 Conclusions

Generating, doing and reporting research – especially research relating to Health EDRM – makes an important contribution to the improvement of the health of people at risk. It should be well planned and conducted in a systematic way. Research is considered complete once it can be used by the stakeholders and policy formulators, and when its recommendations start being translated into actions. This will only happen if the research is fully and clearly reported, and if a research article reporting the research is accessible to those who need it.

6.6

6.6.11 Key messages

- **Preparing and publishing findings of research relating to Health EDRM is a valuable contribution to strengthening the humanitarian development nexus.**
- **Be clear about the new evidence you have generated and how it can make a positive difference.**
- **Prepare your manuscript in accordance with the guidelines for authors of the chosen journal, the relevant reporting guidelines for the type of study you did and the expectations of your target audience.**
- **Ensure that the final version of your manuscript gives a clear account of the research that will be understandable to readers.**
- **Ideally, submit the manuscript to an open-access journal, which will ensure its wide distribution, use by others and uptake of your findings.**

6.6.12 Further reading

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6.6.13 References

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6.7 Doing research in Health EDRM

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6.7.1 Learning objectives

To understand key factors to consider when doing research in health emergency and disaster risk management (Health EDRM) and be able to:

1. Outline the main purpose of doing research in Health EDRM.
2. Explain various aspects that influence the choice of the topic to investigate, and the characteristics that this topic must have.
3. Discuss the contrasts between the approaches of systemic disaster risk with those of the environmental approach to health associated with biological risks.
4. Explain the importance of the Theory of Change and an Evidence-based Research Strategy, and why they can be complementary to research in Health EDRM.

6.7.2 Introduction

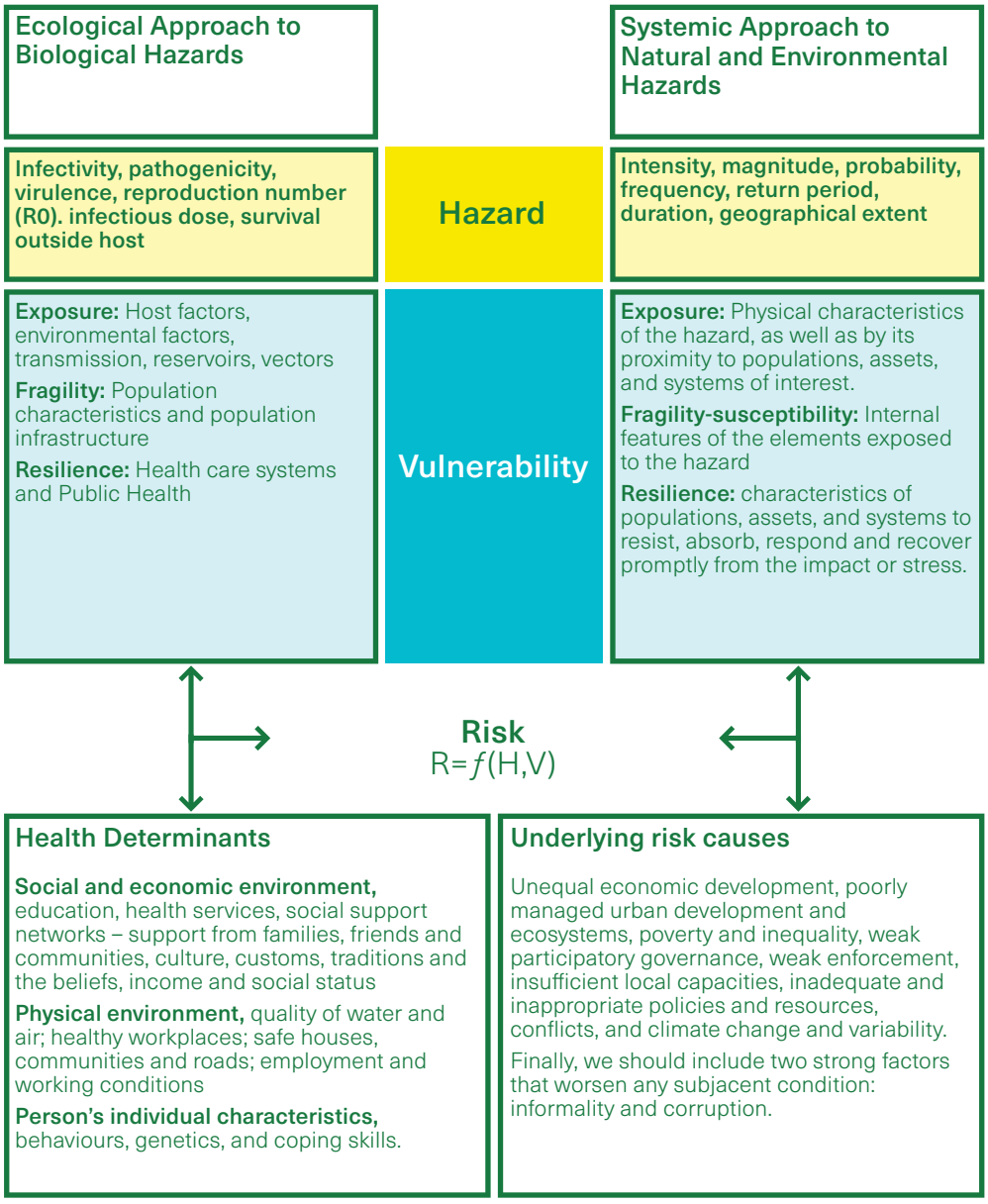
Conducting research in Health EDRM presents unique and diverse opportunities, given the complexities of the concepts of health, risks and disasters described throughout this book. The main purpose of Health EDRM research is to generate high quality knowledge that can be used to promote, restore and maintain the health status and health equity of individuals and communities exposed to disaster risk, or during and after emergency or disaster situations.

This chapter has been organized around five questions: What? How? Where? When? and Who? Each is important to conducting research in the field, highlighting issues described in more details in other chapters of this book. 'What?' refers to the choice of research topic (Section 3); 'How?' refers to the approach or strategy to be used as well as the methodologies and technologies to be followed (Section 4); 'Where?' raises the question of the geographical scope and coverage of the study;' When?' covers the considerations of time in the study; and 'Who?' helps to identify the target audience, the research team, and other actors directly or indirectly involved in the study.

6.7.3 The research topic – what?

Choosing the topic to investigate is conditioned by aspects such as curiosity, health needs, research gaps, benefits or opportunities that arise. The selected topic must be feasible, interesting, novel, ethical, and relevant *(1)*. Selecting the topic means answering the question of what to investigate. To visualize possible research topics, Figure. 6.71 contrasts an ecological approach to risks to health associated with biological hazards with the systemic approach, drawing on concepts of hazard, vulnerability and risk.

Figure 6.7.1. Ecological approach to biological hazards *(2).*



This visualization highlights convergences and specificities in the two approaches, creating a rich analysis framework that can be used to select topics, relationships, factors and contexts that can be considered in Health EDRM research.

6.7

6.7.4 Approach or strategy – how?

Two approaches in particular facilitate the approach to the problem to be solved: the Theory of Change (Chapter 4.10) and the Evidence-based Research Strategy (Chapter 3.6). The Theory of Change is an approach aimed at planning and evaluating social change interventions, going beyond the association between an intervention and its outcome, looking for ways to acquire knowledge about causation, context and assumptions *(3)*. The Theory of Change allows problems to be associated with goals, identifying trajectories, domains of change, fundamental elements to define what should be evaluated, focus on key information, and prioritize what really needs to be known and why.

The Evidence-based Research Strategy is the systematic use of previous research to inform a new study so that it answers key questions about effectiveness, efficiency, accessibility and sustainability *(4)*. Sarmiento *(5)* identifies seven stages for the design of an evidence-based research strategy:

i. identify relevant interventions
ii. prepare evaluation questions
iii. select evidence sources and implement a search strategy
iv. appraise evidence and identify gaps
v. create and implement evaluation design
vi. apply the evidence
vii. evaluate the evidence application.

Case Study 6.7.1 shows how an evidence-based research strategy was used by WHO to establish the state-of-the-art guidelines for risk communication for public health emergencies.

Case study 6.7.1
Communicating risk in public health emergencies: A WHO guideline for emergency risk communication policy and practice

Recent public health emergencies, such as the Ebola virus disease outbreak in West Africa (2014–2016) and the emergence of the Zika virus syndrome in 2015–2016, have highlighted major challenges and gaps in how risk is communicated during epidemics and other health emergencies. The challenges include the rapid transformation in communications technology, the widespread use and increasingly powerful influence of digital media and its impact on 'traditional' media (newspapers, radio and television), resulting in changes in how people access and trust health information. Existing gaps include considerations of context – the social, economic, political and cultural factors influencing people's perception of risk and their risk-reduction behaviours.

Although there were already principles, good practices and training in the area of emergency risk communication, there was no comprehensive evidence-based WHO guidance on this topic. In 2015, WHO prepared comprehensive evidence-based guidance on how risk communication should be practiced in crisis, emergencies and disasters *(6)*. The guidance also provides the best approaches for strengthening emergency risk communication capacity and sustaining this for potential health emergencies.

These guidelines were preceded by the definition of twelve research questions, covering trust and community participation, integrating emergency risk communications into health and emergency response systems, and emergency risk communication practices. These questions were developed in terms of potential searches, using the SPICE Framework (Setting, Perspective, phenomenon of Interest, Comparison, Evaluation of impact) and were used to guide systematic reviews of the existing literature by different institutions.

The Theory of Change and the Evidence-based Research Strategy approaches are not mutually exclusive. They complement each other, particularly when multiple interventions need to be assessed for effectiveness, efficiency and sustainability. In some cases, studies on Health EDRM require more process-oriented and short-term results, in which the actors involved use common methods such as case studies, lessons learned and good practices. Studies using these methods have some analytical limitations, remaining descriptive at best, and few reach the level of theoretical, indicative or causal analysis *(7)*.

Case studies in health can have different approaches and are widely used in Health EDRM. In fact, there are numerous studies that have become important references for academia, institutions and practitioners. A case study is a research strategy and an empirical inquiry that investigates a phenomenon within its real-life context. There are four different types of case studies: illustrative, exploratory, cumulative, and critical. Illustrative case studies are considered descriptive and are designed to elucidate a particular situation. Exploratory case studies are used to identify research questions and methods for complex study. Cumulative case studies correspond to a compilation of case studies already completed on a

specific topic. Finally, case studies of critical cases are used to understand what happened with a single event or challenge *(8)*.

Lessons learned

Lessons learned can be defined as knowledge or understanding gained through experience or reflection on a process. This experience or process can be positive or negative. In order to be relevant and useful, 'lessons learned' must be:

- Applicable, because they have actual or potential impact on operations or processes.
- Valid, because they are based on facts.
- Significant, because they identify processes or decisions that reduce or eliminate failures or reinforce positive outcomes.

Lessons learned help to (i) identify success factors (effectiveness, efficiency, sustainability); (ii) identify gaps (shortcomings) in policies, strategies, programmes, projects, processes, methods and techniques; (iii) identify and solve problems through new courses of action; and (iv) improve decision making and serve as a model for other interventions.

Case Study 6.7.2 shows the application of the lessons learned methodology on the health response after the 2010 earthquake in Haiti.

Case study 6.7.2
Health Response to the Earthquake in Haiti, January 2010: Lessons to be learned for the next massive sudden-onset disaster

After the January 2010 earthquake in Haiti, the Pan American Health Organization/WHO prepared a report about the health effects of the earthquake and the effectiveness of national and international health relief efforts *(9)*. The magnitude 7.0 earthquake had a devastating impact, leaving more than 220 000 dead, over 300 000 injured and 1.3 million forced into temporary shelters. This catastrophic outcome was the result of both socioeconomic and seismic factors: the vulnerability of Haitian housing and construction, the shallow hypocentre of the earthquake, and its proximity to the country's most important urban centre. Rural areas in the West and South-East departments were also badly affected.

The report indicates that Haitians themselves responded swiftly and effectively, saving many lives before foreign help could arrive. However, the domestic response was severely limited by the destruction of the country's capital and the impact on government staff and facilities. The international community responded quickly and with solidarity, including not only the traditional donor nations, but practically all the Latin American and Caribbean countries. Unfortunately, the response showed the same chaotic tendency as in past disasters: insufficient information, improvised decisions not based on evidence, and a marked lack of sector coordination. The health emergency and disaster risk management problems recorded in previous events were repeated and even amplified in Haiti. The humanitarian community could not put into practice the lessons learned, and that is why the subtitle of report says: "Lessons to be learned for the next massive sudden-onset disaster."

Good practices

Good practices can be defined as efficient solutions to solve or tackle a problem. These practices have been validated through extensive use, obtaining positive outcomes in various contexts, which are confirmed by evaluations. In short, 'good practices' are those that:

- have been implemented with proven effectiveness
- can be replicated and applied in different contexts achieving similar results
- have met or exceeded the expected objectives and have delivered the expected outputs
- are sustainable over time.

6.7.5 Geographical scope, scale, and coverage – where?

An indispensable aspect to consider when planning Health EDRM research in the field is the geographical scope and the coverage that is intended to be achieved. Territory and health are intrinsically linked. The spatial context affects the configuration of environmental risks, as well as influencing other health effects. Social, built and natural environments affect health and well-being in ways that are directly relevant to health research. The geographical scope, scale and coverage sought in a health study should be directly related to the available resources, as well as the expected specificity and depth.

A study about underlying risk factors of local communities in Chile *(10)* illustrates a type of research on risk factors (Chapter 3.2) or social determinants of health with a particular focus on disaster risk. The study includes 60 municipalities (20% of total municipalities in Chile), encompasses 41 variables grouped in four categories: governance, territorial planning, socio-economic and demographic conditions, and climate change and natural resources. Using a multicriteria statistical processing method, the study captured the different features that shape vulnerability and guide effective disaster risk management at the local level. Studies such as this one reflect the importance of identifying and measuring the physical attributes of the territory at different scales, as well as the qualitative attributes, such as poverty and governance, that contribute decisively to constructing the vulnerability of individuals and communities.

6.7.6 Time considerations – when?

Cross-sectional studies analyse the situation or conditions at a given time (for example, a study on the health impact of the population exposed to the violent eruption of a volcano), while longitudinal studies or cohort studies follow the same sample of people over time (for example, a study on the evolution of the population health conditions chronically exposed to volcanic activity). Another view of the time factor in health research can be observed when addressing aspects associated with different stages of emergency and disaster management: before, during, or after an adverse event. It could also include studies in prospective risk management as a

particular consideration of time in the study. In this case, stochastic modelling methods are used to explore possible future scenarios, which may or may not have statistics or historical records (for example, epidemics generated by unknown germs, technological accidents, and cyber-attacks).

Other less frequent approaches to the time factor in research include retrospective studies which look backward and examine exposures to suspected risk or protection factors in relation to an outcome that is established at the start of the study (for example, a retrospective study of acute health effects due to volcanic ash exposure during a volcanic eruption).

6.7.7 Study stakeholders – who?

The stakeholders of a study include the target audience, the research team, partners, alliances and people and institutions who might be involved in the design and implementation of the study.

Research in Health EDRM generates scenarios conducive to the performance of interdisciplinary groups, as well as alliances between different research groups. According to WHO *(1)*, health research traditionally contemplates the involvement of three categories of sciences:

- biomedical sciences (such as biological, medical and clinical research, and the generation of biomedical products)
- population sciences (such as epidemiology, demography and socio-behavioural)
- health policy sciences (such as research in health policy, health systems and services, and population health).

In Health EDRM, other science categories have a clear role, particularly those associated with natural hazards: earth sciences (such as geology, meteorology, oceanography, and astronomy). The scope of the research ranges from biomedical research, epidemiological studies, health services research, perception and behaviour studies, community assessments and social, cultural, environmental and economic risk factors that directly affect health.

Case Study 6.7.3 describes a study on climate variability and climate change, and its effects on human health *(11)*. It illustrates how research can influence practice or policy.

Case Study 6.7.3
The impacts of climate change on human health in the USA *(11)*

This extensive study is the result of the work of several interdisciplinary teams composed of more than 100 experts from eight US Federal agencies (including employees, contractors, and affiliates). It was subject to a rigorous peer review process by public and scientific experts inside and outside government, including a special committee of the US National Academies of Sciences, Engineering and Medicine.

The study investigated how climate change is already affecting human health and the changes that may occur in the future. The objective is to provide a comprehensive, evidence-based and, when possible, quantitative estimate of the health impacts related to climate change observed and projected in the USA.

The report does assess scientific literature describing the role of adaptive capacity in creating, moderating, or exacerbating vulnerability to health impacts where appropriate. The report also cites analyses that include modelling parameters that make certain assumptions about emissions pathways or adaptive capacity in order to project climate impacts on human health. This scientific assessment of impacts helps build the integrated knowledge base needed to understand, predict, and respond to these changes, and it may help inform mitigation or adaptation decisions and other strategies in the public health arena.

According to the study, as the climate continues to change, the risks to human health will grow, worsening existing health hazards resulting in new public health challenges (for example, increases in human exposure; excessive heat; more frequent, severe or longer-lasting extreme weather events; degraded air quality; foodborne, waterborne, and vector-borne diseases). Some special populations of concern, such as children, the elderly, outdoor workers and those living in disadvantaged communities, will be more vulnerable.

The document not only seeks to inform public health officials and professionals in the health sector, but also aims to reach out to urban planners, disaster risk and emergency managers, decision makers, as well as others within and outside the government who are interested in better understanding the risks that climate change presents to human health.

6.7.8 Conclusions

Overall, research in Health EDRM has to take an interdisciplinary approach, integrating the natural, social, and health sciences to look at as many direct and indirect factors as affect health. Existing frameworks and theories can guide the process to anticipate, understand, and formulate a conceptual construct geared to the formalized design and development of field research, especially to answer the five questions (what, how, where, when, and who) when planning the study. Choosing which research approach to implement depends on many things, including the local risk and health factors, available resources, applicability and allotted time. It is also important to consider how the research will be presented afterwards such as publications, policy briefs, and dissemination back to the research community.

6.7

6.7.9 Key messages

- **The main purpose of Health EDRM research is to generate high quality knowledge that can be used to promote, restore and maintain the health status and health equity of individuals and communities exposed to disaster risk, or during and after emergency or disaster situations.**
- **Health EDRM research requires an interdisciplinary vision.**
- **The ecological approach to health and systemic disaster risk approach generate a broad space for research in disaster risk management and health emergencies.**
- **The Theory of Change and the Evidence-based Research Strategy complement each other, particularly when multiple interventions need to be assessed for effectiveness, efficiency and sustainability.**

6.7.10 Further reading

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6.7.11 References

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