

3-5 Determining the research question

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Learning objectives

Understand key factors to consider when determining the research question to resolve an uncertainty in health emergency and disaster risk management (Health EDRM), including:

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

Deciding on the broad topic

Research studies can be:

- observational
- experimental
- computer-based simulation

Example: the Great East Japan Earthquake (2011)

Observational research might be done to:

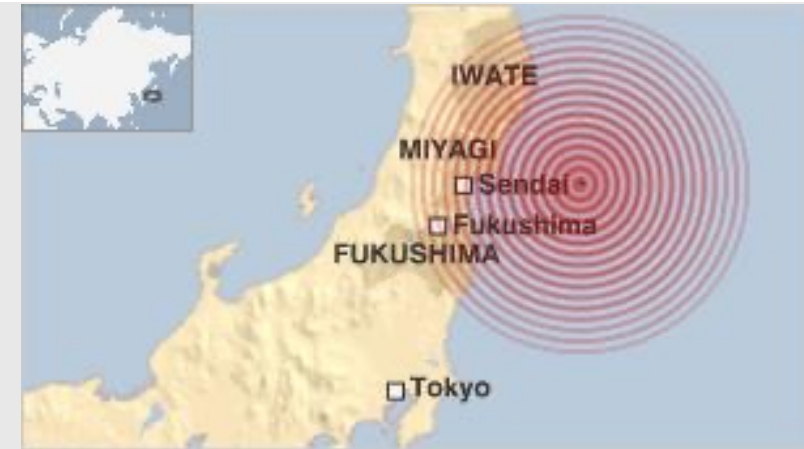
- Identify the number and types of injury caused
- Determine subsequent mental health conditions
- Determine the consequences of mass evacuation

Experimental research might be done to:

- Evaluate different ways of treating injuries or mental health problems
- Evaluate different methods for risk communication

Computer-based simulation might be done for rare events (eg Chernobyl and Fukushima) to:

- Predict the likely impact of policies such as 'shelter in place'



Defining the research question

The research question needs to be formulated correctly because it will

- underpin the choice of the type of study
- make what is being investigated clear and obvious
- ensure that the correct measurement tools are chosen
- help avoid potential biases (eg any that might arise if the study's accumulating findings lead to unplanned changes)
- ensure that the completed study will provide a clear answer



Case study: *Inpatients and deaths in the West China Hospital of Sichuan University following the Wenchuan earthquake (2008)*

Research questions:

“What were the gender, age, source, distribution of admission time and types of injury of the patients admitted to the hospital?”

“What were the causes of death among patients admitted to hospital?”



Defining the research question and choosing the study design

Example: using fish oil to treat people with PTSD following a disaster



Defining the research question and choosing the study design

Question: *"Does taking fish oil have more or less benefit than not taking it?"*

Study: Fish oil versus control

What's missing: This will not show if taking fish oil is better, worse or the same as taking a different therapy or using a different type of intervention



Defining the research question and choosing the study design

Question: *"Does taking fish oil have more or less benefit than an alternative intervention (eg counselling)?"*

Study: Fish oil versus counselling

What's missing: This will not show if fish oil might provide further benefit when given in addition to the counselling



Defining the research question and choosing the study design

Question: *"Does fish oil bring any additional benefit when given with other interventions for PTSD (eg counselling)?"*

Study: Counselling plus fish oil versus counselling alone

What's missing: This will not show if fish oil should be taken immediately or in the future



Defining the research question and choosing the study design

Question: *"Does fish oil have similar effects if given immediately after the disaster or at some point in the future?"*

Study: Immediate fish oil versus delayed fish oil

What's missing: Many other questions and permutations for the study.



Avoiding research waste

Research that is not necessary wastes resources and can cause harm.

To avoid research waste, a new study needs to:

- Answer a question that has not already been answered by previous research
- Be a priority for Health EDRM

Is the answer already out there?

Before conducting a new study, the existing research should be reviewed to ensure that the research question has not been answered already.

The researcher might need to do this themselves in a scoping review (chapter 3.6) or systematic review (chapter 2.6), or by finding a recent review done by others (chapters 3.7 and 6.2).

Reviewing existing research can also help when designing the new study, by identifying practical lessons from previous studies.

Case study: *Health effects of electric fans during heatwaves (systematic review)*

A systematic review done to inform England's national heatwave plan before the 2012 Olympics in London, highlighted important uncertainties about whether electric fans improve or worsen morbidity and mortality during heatwaves.

It provided the basis for the design of a randomized trial.



Case study: *Health effects of electric fans during heatwaves (randomized trial)*

Study design: Randomized trial, possibly a cluster trial across specific settings (eg care homes) or regions

Comparison: Electric fan versus routine care

Population: During a heatwave, adults who are likely to be representative of a general population, with a particular focus on those ≥ 65 years in residential or care homes

Outcome measures: Use of healthcare services, heat-related illnesses, deaths and self-reported comfort



Is the research a priority?

Identifying research priorities is challenging but there is guidance (chapter 2.7).

Health EDRM example: Radiological/Nuclear Threat Countermeasures Working Group identified and prioritized 18 areas for radiological or nuclear threat countermeasures

Methods for a rapid research needs appraisal have been developed for infectious disease outbreaks.

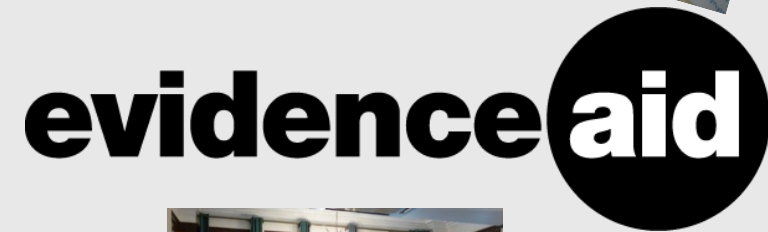
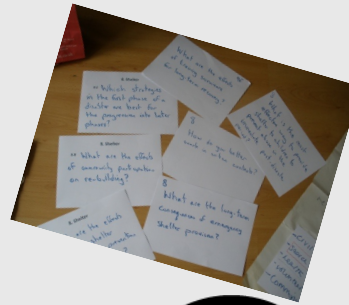
UNICEF, 2011: *"The efficiency of knowledge generation and dissemination at both the global and country levels is diminished by a lack of coordinated, systematic planning and rigorous evaluations. Insufficient coordination ... in establishing research priorities and planning evaluations detracts from development of a focused research agenda in early childhood development."*

Case study: *Identifying priorities for systematic reviews in humanitarian action*

Evidence Aid and partners did a priority setting exercise for systematic reviews of Health EDRM interventions

Initial needs assessment identified hundreds of relevant research questions, which were grouped under 43 themes

10 themes were prioritized in an online survey and questions attached to these themes were discussed in a face-to-face meeting in May 2013, producing a list of 30 highest priority questions



Framework for planning an impact evaluation (1)

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

Framework for planning an impact evaluation (2)

Use of existing evidence when prioritizing individual impact evaluations	Consider whether to focus on areas with little or no existing research or areas with a relatively large amount of research that is not sufficiently reliable or robust.
Creating review standards	Review the existing evidence to confirm that there is sufficient uncertainty to justify a new study and, when it is complete, place its findings in the context of other relevant studies, to provide users with an up-to-date summary of the evidence base.

Framework for planning an impact evaluation (3)

Choosing the interventions to evaluate – innovation

Consider whether to focus on innovative interventions or those that are already in wide use.

Choosing the interventions to evaluate – relationship with the development sector

Consider whether to focus on interventions where there is considerable overlap with the development sector.

Framework for planning an impact evaluation (4)

Choosing the interventions to evaluate – uncertainty, controversy and debate

Consider whether to focus on policies or interventions with considerable uncertainty, controversy or debate about their relative effects.

Choosing the populations to study

Consider whether to focus on particular subgroups of people (such as vulnerable or disadvantaged), or the population as a whole.

Framework for planning an impact evaluation (5)

	Settings for the impact evaluations	Consider whether to focus on sudden-onset disasters (possibly with the need to put some impact evaluations ‘on the shelf’ for future events) or for ongoing protracted emergencies.
	Phases for the impact evaluations	Consider whether to focus on impact evaluations in resilience, risk reduction, immediate short-term response, or prolonged response or engagement.

Framework for planning an impact evaluation (6)

Choosing the outcomes to measure

Consider whether an existing core outcome set should be used, or a new one developed (see below). In the absence of a core outcome set, identify and measure those outcomes that will be most helpful to future decision makers.

Methodology research

Consider whether research into the methods to be used in the study could be embedded in the study, for example in a SWAT (Study Within A Trial).

Framework for planning an impact evaluation (7)

Impact evaluation of the impact evaluations	Consider whether the study should include an evaluation (either by the research team working on the study or by someone independent) of the impact of the study on future policy, practice and outcomes.
Dissemination and implementation of findings	Consider having an implementation or knowledge translation plan, which should include how best to reach key decision makers and how the findings might be made available to those who took part in the study.

Choosing the right outcomes to measure

Outcomes measured in the study need to answer the research question and be useful to decision makers

Inconsistent measurement and reporting of outcomes is research waste

Core outcome sets reduce this waste by providing agreed, standardized sets of outcomes for research

COMET Initiative provides support for the development and uptake of core outcome sets for health

Health EDRM example: template with 15 data elements to collect and report for acute disaster medical response

Case study: *Template for uniform data reporting of acute medical response in disasters*

Academy for Emergency Management and Disaster Medicine brought together 16 experts from research, education, ethics and operational aspects of disaster medical management from 8 countries

Produced a template for uniform data reporting of acute disaster medical response at Utstein Abbey, on the island of Mosterøy (Norway) in November 2010.

Template contains 15 data elements with indicators that can be used for research and quality improvement



Being research ready

Scoping reviews can help plan a piece of research (chapter 3.6)

A pilot or feasibility study can help develop the methods for a definitive study

Sudden-onset disasters might need to have plans for a new study 'on the shelf', pre-prepared and ready to be activated

UK's National Institute for Health Research has a portfolio of such studies in place for an influenza pandemic, include a randomized trial of steroids for the critically ill

Key messages

- A clear research question, including any comparisons that will be made, is vital for a research study to fill an evidence gap for Health EDRM.
- Outcomes to be measured and reported should be chosen carefully, allowing the study to answer the research question and provide evidence that will influence decision makers
- Review of the existing evidence will help to ensure that the study is a priority and that the research question has not been answered by existing research
- If the study will need to be implemented rapidly (eg in a sudden-onset disaster), a pilot or feasibility study may be necessary, and it will be important to have the design 'on the shelf' and ready to activate.

Further readings

Clarke M, et al (2014). What evidence is available and what is required, in humanitarian assistance? 3ie Scoping Paper 1. New Delhi: International Initiative for Impact Evaluation (3ie).

https://www.3ieimpact.org/sites/default/files/2019-01/3ie_scoping_paper_1-humanitarian-top.pdf

Scoping paper that should help researchers and others to identify topics in the humanitarian sector that are likely to benefit from new research (in particular, impact evaluations). Based on a 2013-2014 study that used an online survey and semi-structured interviews with experts from the humanitarian sector to identify their evidence needs and mapped these needs to available evidence.

Sigfrid L, et al. A rapid research needs appraisal methodology to identify evidence gaps to inform clinical research priorities in response to outbreaks - results from the Lassa fever pilot. BMC Medicine. 2019;17:107.

Methodology for a rapid research needs appraisal which could be used to quickly identify important evidence gaps that might be filled by new studies, illustrated with a pilot exercise for Lassa fever.

References

This chapter: Clarke M, Zhang Y. Chapter 3.5: Determining the research question.

Wenchuan earthquake case study: answers to the research questions are in Journal Evidence-Based Medicine 2008;1:20-6

Randomized trial of fish oil to prevent PTSD: Psychotherapy and Psychosomatics 2012;81:315-7

Avoidance of research waste: Lancet 2014;383:156-65

Health effects of electric fans during heatwaves: Cochrane Database of Systematic Reviews 2012;(7):CD009888

Radiological/Nuclear Threat Countermeasures Working Group priorities: Radiation Research 2005;163:115-23

Rapid research needs appraisal: BMC Medicine 2019;17:107

UNICEF report: Evaluation of UNICEF's Early Childhood Development Programme with Focus on Government of Netherlands Funding (2008-2010): Global Synthesis Report. New York 2011.

Evidence Aid priority setting: www.ncbi.nlm.nih.gov/pmc/articles/PMC3805831

Framework for impact evaluations: www.3ieimpact.org/sites/default/files/2019-01/3ie_scoping_paper_1-humanitarian-top.pdf

Study Within A Trial (SWAT): Trials 2018;19:139

COMET initiative: www.comet-initiative.org

Template for uniform data reporting of acute disaster medical response: www.ncbi.nlm.nih.gov/pmc/articles/PMC3461975

NIHR pandemic influenza portfolio: BMJ 2012;344:e2982

ASAP randomized trial of steroids for critically ill influenza patients: Health Technology Assessment 2015;19(16):1-78.

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