4.7 Evaluating economic impacts in health emergency and disaster risk management

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4.7.1 Learning objectives

The learning objectives of this chapter are to:

1. Understand how economic evaluations and economic impact studies can support decision making in health emergency and disaster risk management (Health EDRM).
2. Know the methods available to researchers conducting these studies.
3. Be aware of research limitations, including evidence gaps and methodological challenges.

4.7.2 Introduction

Economic evaluations and economic impact studies are important because they can help decision makers manage competing spending priorities and maximize the value of their financial budgets. Economic impact studies quantify the costs and consequences of past or potential events. Economic evaluations are a structured way to evaluate costs and consequences of a programme or policy compared to an alternative course of action. Conducting these studies and applying their findings can be part of prevention, preparedness, response and recovery activities in Health EDRM.

This chapter provides an introduction to economic evaluations. It outlines the value of evaluating economic impacts, key concepts involved in conducting economic evaluations, and current limitations in the context of Health EDRM. In this chapter, the term “researchers” refers to individuals and groups undertaking economic studies.

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4.7.3 Why conduct economic evaluations and economic impact studies?

Economic studies describe and explain the implications of a specific event or health issue, and potential risk management actions, in terms of financial and non-financial resources. This information can help justify the size of overall spending and support specific resource allocation decisions about which policies and programmes to use to improve health outcomes *(1)*.

4.7.4 Informing decision making

Economic studies that can help inform Health EDRM include economic evaluations and economic impact studies. Economic evaluations explicitly compare the costs (use of resources) and consequences (effects) of a programme or policy with an alternative course of action *(2)*. This alternative may incorporate another programme or policy, or simply reflect the current situation. Economic impact studies evaluate actual or potential economic outcomes related to a specific intervention, event or health-related issue, such as those associated with a heatwave or an infectious disease outbreak. Findings from both economic evaluations and economic impact studies can be inputs for decision-making tools that account for broader economic and non-economic evidence, such as multi-criteria decision analysis (MCDA). In such cases, MCDA combines findings from economic studies with additional decision-making factors, such as budget constraints or implications for equity and fairness *(3)*.

Various stakeholders can use the information created by economic studies to evaluate past events, manage current challenges or plan for future risks. These stakeholders include government agencies, private companies and civil society groups. For example, findings from economic studies can inform the costing tools used to plan and implement measures to prevent, prepare, respond to and recover from health emergencies and disasters *(4)*. Economic studies also help to describe inequality and hardship, which might link to socioeconomic and demographic characteristics such as income status, gender and age. Section 4.7.5 “Understanding the economic impact of health emergencies and disasters” discusses these topics further.

Economic evaluations help support population-level decisions about which health services, medicines and other medical technologies should be funded and made available. Economic studies can help offer a reference point for balancing and aligning different stakeholders’ priorities, such as those of patients and the public, taxpayers and politicians, insurance providers, healthcare providers, and health technology producers *(5)*. The term “health technology” refers to the application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives *(6)*.

4.7.5 Understanding the economic impact of health emergencies and disasters

Health emergencies and disasters lead to economic impacts on households, health systems and the economies as a whole (macroeconomic impacts). Economic studies help describe these impacts.

Illness or injury can create healthcare costs and income losses that put stress on families and households. Healthcare costs create direct economic impacts through spending on health services or medicines, which limit funds available for other household expenditures or create the need for raising additional funds, potentially via incurring financial debt. An inability to work, due to illness or caring for others who are sick, can create indirect economic impacts (see 4.7.7) through income losses and associated financial distress.

Proactive policies to guarantee healthcare access and support wellbeing can help reduce household and community impacts and hardship, which may be distributed inequitably between different socioeconomic and demographic groups *(7–8)*. For example, after Super Typhoon Yolanda devastated parts of the Philippines in 2013, the response included rapidly adapting existing healthcare funding systems. The national insurance agency (PhilHealth) guaranteed hospital services to all affected persons seeking access, regardless of whether insurance policies already covered the person's healthcare costs *(9)*. This meant that people who did not have the necessary health insurance could still access healthcare, without concern about further typhoon-related hardship due to additional costs.

Damage and disruption can restrict healthcare services and, at the same time, create increased demand due to direct and indirect health impacts (see 4.7.7). Damage to infrastructure, constrained workforce capacities and disruption to physical supply-chains can limit the availability and accessibility of health care *(10)*. This can mean that illness and injury are not treated, leading to worse health outcomes and higher long-term health-related costs *(11–12)*. Economic studies can support proactive risk management policies, ensuring that healthcare services can adapt to restrictions and meet sudden increases in healthcare requirements *(13)*.

Disasters and emergencies also create macroeconomic impacts, by disrupting the functioning of government institutions, private organizations and the overall economy. Government institutions are stressed by responses to challenging public priorities, while private organizations lose potential revenues from the goods and services they produce, and the supplies of labour and other inputs needed to produce them. This disruption will negatively impact both economic output and people's general welfare *(14)*. Examples of research into the macroeconomic impacts of climate change, natural hazards, and infectious disease outbreaks have found that climate change-related increases in exposure to extreme heat in South-East Asian countries may restrict feasible annual working hours by 15% to 20% by 2030 *(15)*, that disasters due to natural hazards lead to impacts to wellbeing and losses to economic consumption that result in over US$520 billion in economic losses per year *(16)*, and a severe pandemic outbreak of infectious disease could reduce global economic output by US$500 billion if there were 720 000 associated deaths in a single year (forecast conducted in 2017) *(17)*.

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Table 4.7.1 provides examples of the sorts of economic impact studies that can inform decision makers and help address economic impacts on households, health systems, and the economy as a whole. These studies were obtained from two evidence reviews of economic studies and are a sample of the (limited) available economic evidence in health emergency and disaster risk management published prior to 2020 *(18-19)*. Two studies focused on infectious disease outbreaks (Ebola Virus Disease) and four focused on extreme weather events (hurricanes and heatwaves). Some of these studies offer a range of estimates, which reflects their accounting of potential uncertainty in their findings (see 4.7.10 Ten steps to conducting an economic evaluation).

Table 4.7.1 Examples of economic impact studies

Infectious disease outbreaks: Ebola Virus Disease (EVD) in West Africa (2014-2016)

Bartsch and colleagues *(20)* estimated costs associated with individual patient cases of EVD.

- The authors looked at individuals who survived and who died after receiving care for EVD, in Guinea, Liberia and Sierra Leone during the 2014-2016 outbreak. Estimates of costs included supportive care, personal protective equipment, wages for health workers, and productivity losses linked to health-related absence from work.
- They compiled costs associated with 17 908 cases of EVD and 6373 deaths caused by EVD, as of December 2014, to estimate total societal costs of between US$82 million and US$356 million.

Kirigia and colleagues *(21)* estimated economic losses associated with EVD deaths.

- The authors focused on individuals who died in Guinea, Liberia, Mali, Federal Republic of Nigeria and Sierra Leone during the 2014-2016 outbreak. They measured losses based on expected overall losses of economic outputs, excluding those related to the provision of health care.
- They compiled costs associated with 11 234 deaths from 27 543 EVD cases, as of 28 June 2015, and estimated that cumulative future economic losses would be over US$155 million.

Extreme weather events: Hurricanes in the USA

Fonseca and colleagues *(11)* forecast economic impacts associated with hurricane-related disruption to health care.

- The authors focused on individuals with diabetes impact by Hurricane Katrina, which made landfall in the USA in August 2005. Estimates of health outcomes included measures of blood sugar, blood pressure and lipids. They drew on a previous study to combine these measures to estimate life expectancy, quality-adjusted life expectancy, and future costs of diabetes-related complications *(22)*.
- They forecast that disruption to diabetes patients' access to healthcare services and supplies because of the damage to the health system might lead to US$504 million in additional healthcare costs over the lifetimes of affected individuals.

Zahran and colleagues *(23)* assessed mental health resilience and related economic impacts for individuals exposed to hurricanes.

- The authors focused on population impacts, specifically for single mothers, of two hurricanes which made landfall in the USA in 2005: Hurricane Katrina and Hurricane Rita.
- They measured costs by calculating expected declines in productivity and wages following the hurricane events. The authors found that, following the hurricane events, single mothers had over three times more poor mental health days and five times more days absent from work than the general population. These effects were linked to economic losses of US$4200 per person and a total of US$130 million for all single mothers in the affected population.

Extreme weather events: Heatwaves in Australia and the USA

Toloo and colleagues *(24)* forecast healthcare costs associated with more common and more intense heatwaves.

- The authors focused on emergency department use by individuals impacted by heatwaves in Brisbane, Australia. They estimated emergency department use for a younger and older age group and linked use to health issues such as exacerbated cardiovascular issues, diabetes, and renal complaints. They estimated costs by combining data from 2012 and 2013, which described the costs of excess emergency department visits with forecasts for extreme temperature prevalence in 2030 and 2060.
- They forecast that expected heatwaves could increase emergency healthcare costs in Brisbane by between AU$78 000 and AU$260 000 in 2030 and between AU$215 000 and AU$1 985 000 in 2060, without adjusting for inflation.

Lin and colleagues *(25)* forecast healthcare costs associated with hospital admissions linked to a range of different heatwave scenarios.

- The authors focused on respiratory-related hospital admissions in New York, USA. They combined estimates of daily hospitalization costs with excess days of hospitalization per year attributable to extreme heat, using a range of scenarios forecast by the Intergovernmental Panel on Climate Change (IPCC).
- They estimated that heatwave-related annual admissions created additional costs of US$0.64 million per year from 1991-2004, with estimated excess costs of between US$5.5 and US$7.5 million per year from 2045-2065, and between US$26 and US$76 million per year from 2080-2099.

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4.7.6 Key concepts involved in conducting economic evaluations

This section introduces the key concepts and steps involved in conducting an economic evaluation and offers some guidance on how to conduct an economic evaluation in the context of Health EDRM. Although the focus is on economic evaluations, some of the concepts discussed under the headings of 'Population' and 'Economic Outcomes' are relevant to researchers conducting economic impact studies. This information is a complement to, rather than a substitute for, established guidance on conducting and reporting economic evaluations *(26–27)*.

The following sections outline three elements involved in economic evaluations comparing the value for money of alternative programmes or policies: the target population, the economic outcomes, and the comparison methods. Other important elements include the interventions, comparison groups, and the time horizon for evaluating outcomes; as discussed in other chapters in this book. Specific concerns for researchers conducting economic evaluations are highlighted in the "Research limitations" section of this chapter (4.7.11).

4.7.7 Population

An economic evaluation focuses on the outcomes of a specific group of individuals, namely the study's target population. Researchers can define this population by its size and using factors such as the socioeconomic or demographic characteristics (such as income status or age) of the people within it, the interventions they receive and geographic area covered by the population. Researchers should also consider whether they define this population based on whether a health emergency or disaster directly or indirectly affected the people in the population. The meanings of "directly affected" and "indirectly affected" are outlined below.

Directly affected
People who have suffered injury, illness or other health effects; who were evacuated, displaced or relocated or have suffered direct damage to their livelihoods, economic, physical, social, cultural and environmental assets *(28)*. Examples of direct health effects include immediate illness due to an infectious disease or injuries such as wounding, blunt force trauma, and burns *(10)*.

Indirectly affected
People who, over time, have suffered consequences other than or in addition to direct effects. These may be due to disruption or changes in economy, critical infrastructure, basic services, commerce or work, and include social, health and psychological consequences *(28)*. Examples of indirect health effects include post-emergency sanitation issues leading to infectious disease outbreaks and disrupted access to healthcare services leading to untreated health issues *(10)*.

4.7.8 Perspective

Researchers use a variety of measures to estimate costs and consequences. One way to group these measures is to take a "payer perspective", which focuses on healthcare use. Another way is to use a "societal perspective", which accounts for a broader set of economic impacts *(2)*. The choice as to which economic outcomes should be included in a study is influenced by the amount of time and effort required to conduct the study, due to analysis requirements and the intended audience for the results of the study. For example, a payer perspective may meet the needs of a health insurance company focused on managing healthcare costs, whereas a government agency may prefer to take a societal perspective to account for broader impacts on health, wellbeing, and economic welfare. The choice of perspective for a study is often discussed in terms of the range of costs considered, but can also account for consequences considered.

Payer Perspective

Payer perspective focuses on costs and consequences linked to the use of (and payment for) healthcare. Payers can include a variety of actors directly involved in the provision and receipt of healthcare services. The main payers are usually government agencies or health insurers, depending on how healthcare is organized and financed in the country concerned. However, in many settings, patients and family members will incur costs associated with accessing or receiving health care. Medical costs and consequences may involve payments for access to care, medical supply costs, salaries for health workers and expected future healthcare costs related to changes in health outcomes. Non-medical costs and consequences may involve spending on transport, accommodation, and food by individuals receiving care and informal nursing care provided by their families.

Societal perspective

Societal perspective focuses on the costs and consequences, including but not limited to those measured in a payer perspective, which can be linked to health outcomes and healthcare use. Societal costs and consequences include broader societal concerns – such as employment, labour productivity, and consumption of goods and services other than health care.

Economic costs and consequences are measured based on the value of market or non-market resources. Market resources are purchased with money and have a defined price. They include wages for health workers and the cost of drugs. Non-market resources are not purchased with money and do not have a defined price. These include household work, volunteer services, and donated medical supplies. One way that researchers can estimate the economic outcomes associated with non-market resources is by using a proxy measure. A proxy is a variable that is more readily measurable and can act as a substitute estimate of costs and consequences, such as values of similar goods and services.

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Figure 4.7.1 Components of an economic evaluation of a healthcare programme (adapted from *(2)*)

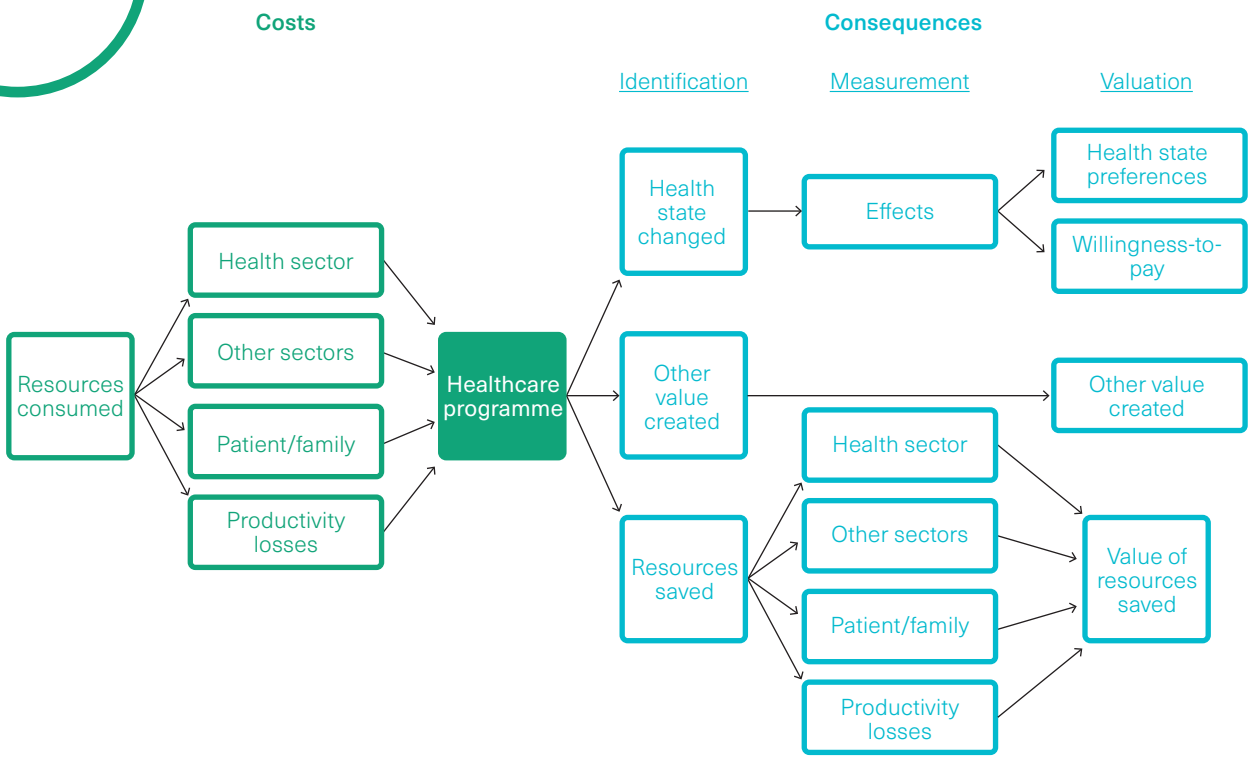

Figure 4.7.1 displays key pathways involved when estimating the costs and consequences involved in an economic evaluation of a healthcare programme. Costs reflect resource use across different sectors to deliver the programme, consequences reflect outcomes related to the programme's impacts on health and wellbeing. For example, costs for a vaccination programme might involve vaccine manufacture, delivery of vaccines to a health facility, and health workers providing vaccination services. Consequences for this programme might include immunization preventing future healthcare costs and losses to labour productivity. Researchers can adapt these pathways and the interaction between different nodes to vary their study perspective and focus on prevention, preparedness, response or recovery activities in Health EDRM.

4.7.9 Comparison Methods

There are several established methods for combining data on costs and consequences to evaluate economic outcomes *(2)*. The following paragraphs outline some of them. Other approaches to evaluating economic outcomes, not discussed in detail here, include extended cost-effectiveness analysis and the use of social welfare functions *(1)*.

Cost-benefit analysis

Cost-benefit analysis combines costs, positive consequences, and negative consequences to calculate a cost-benefit ratio or measure of net-benefit (benefits minus costs). Both costs and benefits are measured in monetary terms. This approach provides a clear estimate of relative economic outcomes, but only if it is possible to estimate the monetary value of costs and consequences.

Cost-consequence analysis
Cost-consequence analysis compares costs and outcomes by placing them in discrete categories. Estimates are not combined to create a single measure or ratio. This approach allows the user of the research to make their own interpretation about the relative importance of different costs and consequences.

Cost-effectiveness analysis
Cost-effectiveness analysis compares costs measured in monetary terms with outcomes measured via natural units. Examples of natural units for health-related outcomes include clinical endpoints (see Chapter 2.2), such as end of viral infection or alleviation of symptoms of depression, or life-years gained (which is the additional number of years of life that a person lives as a result of receiving a treatment). Case Study 4.7.1 summarizes a study that used cost-effectiveness analysis to compare antiviral stockpiling approaches for pandemic influenza preparedness.

Cost-minimization analysis
Cost-minimization analysis compares interventions based on costs measured in monetary terms. This approach does not measure consequences and is only appropriate if the compared interventions have the same effect.

Cost-utility analysis
Cost-utility analysis compares costs measured in monetary terms with consequences measured via a measure of health gain or 'utility'. Examples of utility measures include:

- **Quality-Adjusted Life-Years (QALYs)** are a measure of additional life expectancy combined with the health-related quality of life. QALY measures are determined by surveying people's evaluations of being in different health states, accounting for factors such as pain or mobility, through surveys and instruments such as the EQ-5D *(2)*.
- **Disability-Adjusted Life-Years (DALYs)** are a measure of life expectancy combined with years of healthy life lost due to mortality and/or morbidity associated with a health issue. DALY measures reflect the difference between a given health state and a benchmark that is based on the experience of a healthy life that reaches full life expectancy.

Return on investment analysis
Return on investment analysis calculates the size of the difference between positive consequences and costs. Return on investment involves calculating net consequences (positive consequences minus negative consequences) and then expressing this figure as a proportion of costs. Typically, these studies consider only those costs and consequences that can easily be expressed in monetary terms. Case Study 4.7.2 describes a return on investment calculation for vaccine interventions, focusing on the resource costs and savings of a potential flu outbreak in Chicago, USA.

4.7

Case Study 4.7.1
Comparing the value of stockpiling approaches

Carrasco and colleagues (*29)* conducted an economic evaluation to assess arrangements for stockpiling antiviral medicines in anticipation of an influenza pandemic across ten high- and middle-income countries. They examined different stockpile sizes and impacts on eligible recipients of antivirals for prophylaxis and treatment. They focused on estimates of mortality associated with infectious disease outbreaks and the costs of antiviral stockpiles. Health risks were estimated by forecasting morbidity and mortality associated with pandemic risks over a 30-year time horizon, accounting for factors including seasonality and development of an effective vaccine. Economic outcomes included treatment costs and work absenteeism.

The authors estimated that stockpiles in higher income countries had a greater potential avoidance of expected costs, while stockpiles in lower income countries had more potential avoidance of mortality. Their findings showed that the USA could potentially avert potential future costs by US$22 billion, and that improved stockpiling in Indonesia could reduce expected mortality by more than 9 million deaths.

Case Study 4.7.2
Preparing for public health emergencies

Dorratoltaj and colleagues *(30)* conducted an economic evaluation to understand vaccination priorities and economic outcomes during disease outbreaks. They examined vaccine use versus a base case scenario of no vaccine intervention during moderate, strong, and catastrophic influenza outbreaks. They focused on people living in Chicago, USA and examined impacts across different population sub-groups based on age and levels of health risk. They estimated economic outcomes by linking expected health impacts associated with an influenza-like illness with healthcare costs and productivity costs taken from another study *(31)*.

The authors included cost-benefit and return on investment methods in their analysis. High-risk people under 19 years of age had the highest return on investment in a catastrophic influenza pandemic scenario, with US$249.16 saved for each US$1 invested in vaccinations. The lowest return on investment in a catastrophic influenza pandemic scenario was among non-high risk people aged between 20 and 64 years, with US$5.64 saved for each US$1 invested in vaccinations. Net benefits were highest among high-risk people aged between 20 and 64 years in all pandemic scenarios.

Having identified and implemented a comparison method, researchers can account for uncertainty their economic study results by conducting sensitivity analyses. A sensitivity analysis measures variations in results based on changes to the inputs informing the costs and consequences in an economic evaluation. Changes can involve varying the value of an input (such as implementation cost or population characteristics) or other features of the study, such as the time horizon (number of months or years over which costs and consequences are estimated).

Variance in results displayed by sensitivity analyses, can help decision makers to understand how the variance in their input values affects the results of their economic evaluation and help researchers to reduce uncertainty in their inputs data (such as intervention effectiveness or costs). Researchers may also compare findings from different statistical models to help understand how different approaches to estimating costs and consequences will impact their results.

4.7.10 Ten steps to conducting an economic evaluation

The process of conducting an economic evaluation can be set out as a series of ten steps. These steps, adapted from questions created to help guide assessments of economic evaluations, are outlined below *(2)*.

These steps complement guidance elsewhere in this book on study design, such as in Chapter 3.5 on determining the research question. They can also be considered alongside other published, and well-established, recommendations for conducting economic evaluations *(2, 32-36)*.

Step 1: Define a research question (see also Chapter 3.5) which:

- identifies the population involved;
- outlines the costs and consequences of the compared courses of action over an appropriate time horizon;
- defines the analytic perspective and decision-making context.

Step 2: Describe the interventions and identify any that were not considered, such as specific interventions for population subgroups (see also Chapter 3.3).

Step 3: Establish the effectiveness of the intervention or policy. Note how data were synthesized and any factors that may influence the reliability of primary data. If no primary data are available, researchers could draw upon relevant evidence syntheses, such as a systematic review and meta-analysis, to inform estimates of effectiveness (see also Chapter 2.6).

Step 4: Describe the relevant costs and consequences for each alternative intervention or policy.

Step 5: Measure relevant inputs, for costs and consequences, using appropriate and comparable units. Justify the included measures and their information sources.

Step 6: Estimate values for costs and consequences. Record the source of these values and whether they are market values (such as specified drug costs), or non-market values (such as unpaid work) and if values were adjusted, this is often done to account for differences between costs that healthcare providers actually incur, versus the amount they charge.

Step 7: Adjust estimates of costs and consequences to account for their changing value over time. This is also known as discounting. Discounting involves individuals placing a lower value on a future cost or consequence versus an immediate one, such as a health benefit today versus one obtained five years in the future. Recommended discount rates vary

between countries and organizations. It may also be appropriate to first adjust for inflation, which is the rate of change in average prices over time.

Step 8: Compare the costs and consequences of different interventions by combining estimates using an established analysis method. Examples include the incremental cost-effectiveness ratio used in a cost-effectiveness analysis or net benefit used in a cost-benefit analysis.

Step 9: Describe uncertainty in estimates of costs and consequences by:

- analysing statistical variance within population level estimates (if available);
- accounting for heterogeneity in results between different population subgroups (if applicable);
- assessing the effect of altering the values of inputs to measures of costs and consequences on overall study findings (via sensitivity analysis).

Step 10: Describe results and discuss:

- basing conclusions on an overall index (such as a value in US dollars) or ratio of costs and consequences (such as cost-effectiveness ratio);
- differences between the methods and findings of the study with those in comparable studies;
- the generalizability of results to other settings and populations;
- important factors influencing decision making, such as equity implications;
- wider resource implications, such as budgetary impacts;
- implications of any uncertainty in the study's findings, including the need for future research.

4.7.11 Research limitations

Evidence gaps and methodological challenges have limited the prevalence and use of evaluations of economic impacts in Health EDRM research. Reviews of research on infectious disease outbreak preparedness and the impacts of extreme weather events have identified several gaps in economic evidence *(18, 37–38)*. These gaps include a lack of studies that incorporate economic evaluations (most are economic impact studies), use a societal perspective for economic outcomes, or are set in low- and middle-income countries. Addressing evidence gaps is important, especially for those populations that are expected to suffer most from increasing hazard risks, such as heat stress in South Asia *(39)*.

Researchers often use different methods, or adapt methods to their needs. These actions can limit the ability of others to compare the findings of a study with otherwise similar studies. However, from the researchers perspective, it can be difficult to strike a balance between adhering to standardized approaches (to ensure comparability across different economic studies) and adapting to constraints (because of the availability of data, research aims, and resource limitations).

Methodological challenges include attributing outcomes to interventions, measuring the economic value of outcomes and accounting for how preferences for outcomes vary over time. Addressing these for Health EDRM can draw upon research areas with similar methodological challenges, such as economic studies of public health activities and of natural environment interventions *(40–42)*.

- **Attributing outcomes:** In many circumstances it may not be feasible to use a randomized trial (see Chapters 4.1 and 4.3) to attribute and measure outcomes associated with interventions in Health EDRM. This increases the difficulty involved in conducting a robust economic evaluation. However, if sufficient data can be collected, researchers may be able to create a quasi-experimental study (see Chapter 4.5) by using natural variation in people's exposure to interventions.
- **Measuring economic outcomes**: It is difficult to measure different stakeholders' preferences for health and non-health outcomes and to create a combined measure of economic outcomes. Population preferences for these outcomes may also change over time and need to be accounted for. Future research may expand the scope of existing measures, such as recent efforts to adapt the QALY approach to better account for broader wellbeing *(43)*.
- **Time variance:** It is important to consider how to apply discount rates in economic studies in Health EDRM, given the potential (in) frequency of a given health emergency or disaster. A discount rate accounts for the difference in stakeholder preferences for an outcome today versus one in the future, as well as uncertainty and the time value of money, and discounts the expected value of an intervention appropriately. Recommended time horizons and discount rates are available for specific contexts and uses, but there is persistent debate on the most appropriate values to use *(44–45)*.

4.7.12 Conclusions

Researchers use economic evaluations and economic impact studies to identify and explain the costs and consequences involved in policies and programmes that support Health EDRM. Practitioners and policymakers can then use the evidence generated by these studies to guide their decision making on specific issues and broader strategic planning.

Established methods and concepts are available to researchers to synthesize and improve the current evidence base of economic studies, although there are challenges to expanding research in this area. Nevertheless, there are opportunities for economic studies to fill knowledge gaps and to address the ongoing needs of decision makers. Researchers and stakeholders can use these opportunities to advocate for putting greater effort into assessing and addressing the economic aspects of past, present, and future health emergencies and disasters *(46)*.

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4.7.13 Key messages

- **Evaluating economic impacts in Health EDRM can inform and improve prevention, preparedness, response and recovery activities.**
- **Economic evaluations and economic impact studies are established ways to evaluate the impacts of interventions and events. Researchers can draw upon standardized methods and knowledge built by existing communities of expertise.**
- **Current research gaps mean that researchers have the opportunity to develop specific guidance on how to examine economic outcomes in the context of Health EDRM and to conduct more research that incorporates economic evaluations, uses a societal perspective for economic outcomes, and is set in low- and middle-income countries – all of which can offer useful and usable information to improve Health EDRM practices.**

4.7.14 Further reading

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