

PERSPECTIVE

An introduction to economic studies, health emergencies, and COVID-19

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Abstract

The COVID-19 pandemic has created widespread harm and disruption. Countries have implemented unprecedented measures to protect the lives and livelihoods of their inhabitants. The scope and composition of these responses are shaped, in part, by research and analysis about the estimated economic impacts of the COVID-19 Pandemic and proposed responses to it. This analysis outlines basic features and principles involved in economic studies, specifically economic impact studies and economic evaluations, which have formed a significant part of the ever-increasing evidence base about COVID-19. This analysis introduces economic studies in this context, highlighting what they can do, their limitations, and key steps involved in conducting them. It highlights examples of economic analysis focused on COVID-19 and on health emergencies and disasters more broadly. Knowing how economic studies are conducted, and their limitations, will help introduce how their findings can be a useful, usable, and used part of efforts to tackle this global health crisis.

KEYWORDS

COVID-19, disaster risk management, economic evaluation, economic impact study, health emergency

1 | INTRODUCTION

The COVID-19 pandemic has created widespread harm and disruption across the world, with countries accelerating the use of unprecedented public health and economic measures to protect the lives and livelihoods of their inhabitants. Responses are being shaped, in part, by analysis about the existing and expected consequences of and responses to this global health crisis.¹ Many studies are focusing on the economic impacts associated with the COVID-19 pandemic, and the costs and consequences of responses targeted to minimize them.² Prior to the COVID-19 pandemic, the economics of sudden-onset health emergencies and disasters was a rather under-investigated research area.³⁻⁵ This is no longer the case.⁶ Economic studies focused on the COVID-19 pandemic will likely continue to be a significant area of research for some time.

This paper aims to offer an introduction to economic studies within the context of health emergency and disaster risk management.⁷ Specific focus is given to examples of analyses of public health emergencies, given the context of the COVID-19 pandemic. The content in this article draws upon established guidance and relevant examples of economic studies. Table 1 presents a sample of these resources.

2 | WHAT ECONOMIC STUDIES CAN DO

Economic studies help decision-makers manage competing spending priorities and maximize the impact of their financial resources. The findings of economic studies can inform prevention, preparedness, response, and recovery activities in health emergency and disaster risk management.⁷ These activities include disease suppression to manage epidemics, maintaining treatment for non-communicable diseases during health service disruption, and repairing infrastructure after extreme weather events.²⁶

This analysis discusses what economic studies can do by describing the two main categories of economic studies, how they help evaluate impacts on households, health systems and the economy as a whole, and some of the key challenges in this research area.

2.1 | What types of economic studies are there?

There are two main types of economic studies: economic impact studies and economic evaluations. Economic impact studies quantify the costs (resource use) or consequences (effects) involved in past or potential events, such as an infectious disease outbreak or

TABLE 1 Samples of available resources

Resources	Contents
Guidance for economic studies	<ul style="list-style-type: none"> • Drummond and colleagues (2015) Methods for the economic evaluation of healthcare programmes.⁸ • International Decision Support Initiative (iDSI) (2016) Reference case for economic evaluation.⁹ • World Health Organization (WHO) (2019) WHO guide on standardisation of economic evaluations of immunisation programmes.¹⁰
Costing tools	<ul style="list-style-type: none"> • Centre for Disease Control Priority Actions Costing Tool (PACT).¹¹ • International Health Regulations Costing Tool (Georgetown University).¹² • One Health Tool (Avenir Health).¹³ • WHO National Action Planning for Health Security (NAPHS) planning and costing tool.¹⁴ • Review of available tools: Lee and colleagues (2020) Action-based costing for national action plans for health security.¹¹
Economic impact studies	<p>COVID-19</p> <ul style="list-style-type: none"> • Chen and colleagues (2020) The impact of the COVID-19 pandemic on consumption: learning from high frequency transaction data.¹⁵ • Eichenbaum and colleagues (2020) The macroeconomics of epidemics.¹⁶ <p>General</p> <ul style="list-style-type: none"> • Bartsch and colleagues (2015) The cost of an Ebola case.¹⁷ • Fonseca and colleagues (2009) Impact of a natural disaster on diabetes.¹⁸ • Joo and colleagues (2019) Economic impact of the 2015 MERS outbreak on the Republic of Korea's tourism-related industries.¹⁹
Economic evaluations	<p>COVID-19</p> <ul style="list-style-type: none"> • De Walque and colleagues (2020) How two tests can help contain COVID-19 and revive the economy.²⁰ • Wang and colleagues (2020) Effectiveness and cost-effectiveness of public health measures to control COVID-19: a modelling study.²¹ <p>General</p> <ul style="list-style-type: none"> • Carrasco and colleagues (2011) Strategies for antiviral stockpiling for future influenza pandemics.²² • Dorratoltaj and colleagues (2017) Epidemiological and economic impact of pandemic influenza in Chicago: priorities for vaccine interventions.²³ • Wong and colleagues (2016) Economic evaluation of individual school closure strategies: the Hong Kong 2009 H1N1 pandemic.²⁴
Evidence reviews	<ul style="list-style-type: none"> • Huber and colleagues (2018) The economic and social burden of the 2014 Ebola outbreak in West Africa.⁴ • Ott and colleagues (2013) Influenza vaccines in low and middle income countries: a systematic review of economic evaluations.²⁵ • Pasquini-Descomps and colleagues (2017) Value for money in H1N1 influenza: a systematic review of the cost-effectiveness of pandemic interventions.³

heatwave. Economic evaluations explicitly compare the costs and consequences of a programme or policy with an alternative course of action.

Economic studies can be used within more comprehensive decision-making tools, such as health technology assessment or multicriteria decision analysis (MCDA). MCDA combines economic study findings with additional decision-making factors, such as budget constraints or fairness.

Government agencies, private companies, and civil society groups can use economic studies to inform their evaluation of past events, management of current challenges, or planning for future risks. This includes tools used by agencies, such as WHO, to estimate the costs of emergencies response plans or the investments needed to improve health emergency and disaster risk management across several countries.^{27,28} Economic studies also describe impacts across population groups, which can help identify inequality and hardship linked to socioeconomic and demographic characteristics such as income status, gender, and age.²⁹

2.2 | How can they help us understand economic impacts?

Health emergencies and disasters create economic impacts on households, health systems, and the economy as a whole (Table 2). These impacts spread between communities and countries based on the size and scope of a health emergency or disaster, such as whether it originates from a localized extreme weather event or an infectious disease outbreak which could spread across many countries, as well as how the impacts cascade through communities.

The COVID-19 pandemic has catalyzed crises across the globe that will have severe impacts on people's health and wellbeing.³⁰ Economic studies can help to measure and manage these impacts—through better policymaking and improved risk management activities.

2.3 | What are the limitations?

The potential for economic studies to inform improved prevention, preparedness, response, and recovery for health emergencies and

TABLE 2 Three ways health emergencies and disasters lead to economic impacts

Ways	Economic impacts
Household impacts	<ul style="list-style-type: none"> Healthcare costs, through spending on health services or medicines, create direct economic impacts. Substantial healthcare costs can force households to limit other essential expenditures or require funds be obtained through potentially distressing means, such as incurring financial debt.^{31,32} An inability to work, due to individual illness or caring for another person, can create indirect economic impacts through income losses and associated financial distress.³³
Health system impacts	<ul style="list-style-type: none"> Health emergencies and disasters create increased demand for healthcare services, which can limit the availability of services to those in need. Damage to infrastructure, constrained workforce capacities, and disruption to physical supply-chains can further limit the availability and accessibility of those healthcare services.³² Restricted healthcare services can mean that illness and injury are not treated, leading to worse health outcomes and higher health-related costs in the long term.^{18,34}
Macroeconomic impacts	<ul style="list-style-type: none"> Health emergencies and disasters can disrupt the functioning of government institutions, private organizations, and the overall economy—negatively impacting both people's lives and livelihoods.⁸ Approaches to estimating macroeconomic impacts include examining losses to consumption or economic output more broadly.^{35,36}

disasters is limited by a lack of studies and a lack of comparability between available studies. Further limitations are discussed in evidence reviews of existing research (examples listed in Table 1).

There are significant evidence gaps around the economics of health emergency and disaster risk management. Of the economic studies available before the onset of the COVID-19 pandemic, many did not incorporate economic evaluations, use a societal perspective, or focused on settings in low- and middle-income countries.³⁻⁵ In the few cases where research projects have been set up to rapidly respond to the emergence of health emergencies, economic studies have been conspicuously absent.³⁷

There is a lack of comparability between available studies due to the variety of methods used to estimate results, methods that often differ based on the availability of data, research capacity, and the motivations for conducting the research. This limits the ability of researchers and policymakers to compare results from one study with the results from otherwise similar studies. In part, this is because there is no established guidance for conducting economic impact studies or economic evaluations to inform health emergency and disaster risk management. Section 4 outlines some guidance which could be adapted for use in this topic area.

Table 3 presents some of the several methodological challenges involved when conducting economic studies. These challenges are not unique to health emergencies and disasters, but can be harder to address in such settings.

3 | HOW TO DO ECONOMIC STUDIES

This section outlines key actions involved in conducting an economic study, including those linked to disasters or health emergencies such as the COVID-19 pandemic. This outline aims to introduce key aspects involved in conducting economic studies and offers a complement, rather than a substitute, to in-depth information provided in established recommendations and guidance on conducting economic studies.^{8-10,41,42}

3.1 | Define the question

From the outset, an economic study should have a clear outline of what is being investigated, including the population, event/intervention, comparison, and costs and consequences under examination (Table 4).

3.2 | Gather the data

Costs and consequences are estimated in an economic study based on a mixture of available primary data and secondary data. Primary data are collected through conducting new research on novel or existing data sources. Sources include experimental and nonexperimental research (e.g. surveys, clinical trials). Secondary data are adapted or synthesized from past research. Sources include previous primary research, evidence syntheses (e.g. systematic reviews, meta-analyses), and databases of information hosted by national and international organizations.

It is important to ask questions about the origin, relevance, and reliability of this data, such as: How was the data obtained and synthesized for use in the economic study? How relevant is the data for use in the economic study? Are their units comparable? Could any factors, such as sample size, bias, or completeness, influence the data's reliability?

Depending on the estimation methods, it may be necessary to estimate the monetary values of specific costs and consequences (Table 5). These may be based on market values or non-market values. Market values are prices for goods and services (e.g. drug costs, nurses' wages). It may be important to account for the difference between costs incurred and prices charged for a good or service. Non-market values are values applied to untraded goods and services (e.g. unpaid work, volunteer work).

3.3 | Estimate results

Input data will be combined, via statistical modelling, to provide estimates of the costs and/or consequences examined in an economic study. Economic impact studies examine costs or consequences of

TABLE 3 Challenges in conducting economic studies on health emergencies and disasters

Challenges	Contents
Attributing consequences to interventions	<ul style="list-style-type: none"> It is difficult to precisely attribute an economic impact or health outcome to a specific cause, particularly if researchers cannot establish a clear counterfactual for comparison. Health emergencies and disasters can make this even more challenging, due to their complex and cascading impacts.³⁸
Measuring the economic value of consequences	<ul style="list-style-type: none"> It is difficult to measure and create a combined economic value to reflect people's preferences for both health and non-health consequences. Some comparison measures exist, like willingness to pay or quality-adjusted life years (see Table 5), but they offer imperfect reflections of a person's health and wellbeing.³⁹
Accounting for net impact over time	<ul style="list-style-type: none"> It is difficult to immediately account for potential indirect harms or negative spillover effects associated with a specific health emergency and the responses that are implemented under pressure to save lives.³⁰ Accounting for different impacts over time comes with challenges, such as how to deal with increasing levels of uncertainty or how to account for discounting, which reflects the difference in preferences for an immediate outcome versus one further in the future.⁴⁰

TABLE 4 Key study components

Components	Contents
Populatio	<p>Define the size and key demographic, geographic, or socioeconomic characteristics of the study population:</p> <ul style="list-style-type: none"> Characteristics include age, gender, income status, and where people live. <p>Clarify if people are directly affected or indirectly affected by the health emergency or disaster:</p> <ul style="list-style-type: none"> Directly affected people include those 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.⁴³ Indirectly affected people include those who have suffered consequences other than or in addition to direct effects, over time. These may be due to disruption or changes in economy, critical infrastructure, basic services, commerce, or work, and include social, health, and psychological consequences.⁴³
Event/Intervention	<p>For economic impact studies:</p> <ul style="list-style-type: none"> Define the specific past, current, or potential intervention or health emergency/disaster which is being examined. <p>For economic evaluations:</p> <ul style="list-style-type: none"> Define the specific programme or policy implemented to influence the impacts of a past, current, or potential health emergency or disaster.
Comparison	<p>For economic impact studies:</p> <ul style="list-style-type: none"> For a past, current, or potential event, define the status quo to which it is compared. <p>For economic evaluations:</p> <ul style="list-style-type: none"> Specify the alternative course of action, which may be no action, to which the programme or policy is compared.
Costs and consequences	<p>Choose the set of costs and consequences that the study will measure (the "perspective").</p> <ul style="list-style-type: none"> This decision should account the amount of time/effort available to complete the study and the intended study audience. <p>Payer perspectives focus specifically on costs and consequences linked to using (and paying for) healthcare.</p> <ul style="list-style-type: none"> Medical costs and consequences may include: payments for access to care, medical supply costs, salaries for health workers, and expected future healthcare costs. Non-medical costs and consequences may include: spending on transport, accommodation, and food by individuals receiving care, and informal nursing care provided by their families. <p>Societal perspectives focus on a broader set of costs and consequences for society.</p> <ul style="list-style-type: none"> Consequences may include impacts on: economic consumption, employment, and financial stability. Costs and consequences linked to healthcare use are still accounted for.

a given action or event. Economic evaluations use costs and consequences to compare one or more programmes and/or policies.

Statistical methods for estimating results vary; one common approach involves the use of Markov models. Markov models offer a framework to consider several people with specific health status (e.g. disease susceptible, infected, recovered) in a particular time period

(e.g. a day, a month), and, based on probabilities obtained from primary or secondary data, estimate their future health status and associated use of resources in subsequent periods.

Estimates of costs and consequences can then be adjusted, via discounting, to account for the tendency of individuals to place a lower value on a cost or consequence that occurs in the future, compared to

TABLE 5 Calculation methods in economic evaluations

Category	Methods
Cost benefit	<ul style="list-style-type: none"> Costs and benefits are combined to calculate a costbenefit ratio or a measure of netbenefit (benefits minus costs). Cost benefit analysis provides a monetary comparison of estimated costs and benefits; negative consequences contribute to costs and positive consequences contribute to benefits. Requires that costs and consequences can be expressed in monetary terms.
Cost consequence	<ul style="list-style-type: none"> Costs and consequences are placed into discrete categories for comparison and are not combined to create a single measure or ratio. Cost consequence analysis provides a way for research users to make their own interpretations about the relative value of different costs and consequences. Does not require that both costs and consequences are expressed in monetary terms.
Cost effectiveness	<ul style="list-style-type: none"> Costs are measured in monetary terms and compared with consequences measured in natural units. Cost effectiveness analysis provides a way to make a relative comparison, based on the relative differences between costs and the standardized units used to measure consequences. Examples of natural units for health-related outcomes include clinical endpoints, such as end of viral infection, alleviation of symptoms of depression, or lifeyears gained (additional number of years of life lived as a result of receiving a treatment).
Cost minimisation	<ul style="list-style-type: none"> Costs are measured in monetary terms; consequences are not compared. Cost minimization analysis provides a way to make a comparison when the alternative courses of action being compared have the same effect/consequence and only differ in costs.
Cost utility	<ul style="list-style-type: none"> Costs are measured in monetary terms and linked to consequences based on a standard measure of health gain or 'utility'. Examples of utility measures include: <ul style="list-style-type: none"> Quality Adjusted Life Years (QALYs) - Measure of change in life expectancy combined with the health-related quality of those years of life. Disability Adjusted Life Years (DALYs) - Measure of life expectancy combined with "healthy years" lost due to morbidity and/or of a health issue. Costutility analysis provides a way to make a relative comparison that accounts for people's health preferences.
Return on investment	<ul style="list-style-type: none"> Netbenefit (see "Costbenefit") is expressed as a proportion of costs. Return on investment analysis provides an estimate of the relative size of costs and net consequences (positive minus negative). Typically, return on investment analyses only consider costs and consequences that can easily be expressed in monetary terms.

one that occurs immediately—such as receiving a health or financial benefit now versus one of similar value five years in the future. Discounting involves the use of discount rates. Discount rates may have a small impact initially, but compound in value over time and can have substantial impacts on the finding of an economic study. Recommendations for the size of discount rates vary and are a common topic of debate linked to economic studies.⁴⁰ It may also be appropriate to adjust monetary costs and consequences for inflation, to reflect the change in average prices over time.

Results are then combined to compare costs and consequences. Table 5 presents calculation methods used in economic evaluations to compare the costs and consequences of a health programme or policy, these include: costbenefit analysis, cost consequence analysis, cost-effectiveness analysis, cost minimization analysis, costutility analysis, and return on investment analysis.

It is important to acknowledge the uncertainty that comes with the results of any economic study. Approaches to examine uncertainty include: analyzing statistical variance within population-level estimates, examining differences in results between different population subgroups, or evaluating how changing the values of

individual inputs impacts the estimated results, via a "sensitivity analysis".

3.4 | Present findings

Study conclusions should be summarized clearly and answer questions such as: (1) How do the study's methods and findings compare to those of similar studies? (2) Are the results generalizable to other emergency scenarios or different populations? (3) How does uncertainty influence the strength of conclusions? (4) What are the policy and resource implications of the study? (e.g. budget impacts) (5) What factors could influence decision making based on the findings? (e.g. equity) (6) Is further research needed, and, if so, what should further research focus on?

These questions, and other steps involved in conducting economic studies, can help the users of research understand the relevance and reliability of what they're reading, which is critical at a time when research is both rapidly evolving and being adapted into policymaking.

Table 6 lists a sample of economic impact studies and economic evaluations focused on the COVID-19 pandemic and topics related to health emergency and disaster risk management.

TABLE 6 Samples of economic studies focused on COVID-19 and additional topics

Types of study	Samples
Economic Impact Studies	<p>COVID-19</p> <ul style="list-style-type: none"> • Chen and colleagues (2020) The impact of the COVID-19 pandemic on consumption: learning from high frequency transaction data.¹⁵ • Eichenbaum and colleagues (2020) The macroeconomics of epidemics.¹⁶ <p>Additional Studies</p> <ul style="list-style-type: none"> • Bartsch and colleagues (2015) The cost of an Ebola case.¹⁷ • Fonseca and colleagues (2009) Impact of a natural disaster on diabetes.¹⁸ • Joo and colleagues (2019) Economic impact of the 2015 MERS outbreak on the Republic of Korea's tourism-related industries.¹⁹
Economic Evaluations	<p>COVID-19</p> <ul style="list-style-type: none"> • De Walque and colleagues (2020) How two tests can help contain COVID-19 and revive the economy.²⁰ • Wang and colleagues (2020) Effectiveness and cost-effectiveness of public health measures to control COVID-19: a modelling study.²¹ <p>Additional Studies</p> <ul style="list-style-type: none"> • Carrasco and colleagues (2011) Strategies for antiviral stockpiling for future influenza pandemics.²² • Dorratoltaj and colleagues (2017) Epidemiological and economic impact of pandemic influenza in Chicago: priorities for vaccine interventions.²³ • Wong and colleagues (2016) Economic evaluation of individual school closure strategies: the Hong Kong 2009 H1N1 pandemic.²⁴

4 | CONCLUSIONS

Economic studies can help us understand the impacts of health emergencies and disasters, such as the direct impacts of outbreaks of COVID-19 on people's health and livelihoods. They will also help us understand the vast disruptions and spillover effects which need to be addressed in prevention, preparedness, response, and recovery.³⁰

As the COVID-19 pandemic continues, it is important to understand the economic impact studies and economic evaluations that are driving research priorities and informing policy responses. These studies have a reasonable foundation to build upon, but it remains important to acknowledge how economic studies are conducted and their limitations. Doing so can help ensure that their findings can be useful, usable, and used in efforts to tackle this global health crisis.

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