R
cently, the World Health
Organization has exhorted
countries to fight the Covid-19
pandemic with other interventions
in addition to vaccines. But for
countries to mount a comprehen-
sive and effective response, more
than exhortation is needed. Policy-
makers must understand the bene-
fits and burdens associated with
various policy options. They also
have to be equipped to rigorously
and systematically compare these
benefits and burdens, both when
evaluating individual policies and
when determining which policies
to include in a legislative or regu-
latory package.

Policymakers often use eco-

demic evaluations to weigh the
costs and benefits of health poli-
cies. Some Covid-related policies
and interventions are similarly
amenable to assessment. Policies
that have been adopted or discussed
during the Covid-19 response in-
clude improving ventilation in
indoor spaces; monitoring waste-
water; increasing the availability
of vaccines, therapies, testing, or
face coverings; providing finan-
cial incentives for vaccination;
requiring vaccination, testing, or
face coverings; investing in the de-
velopment of new vaccines, thera-
pies, or tests; enforcing capacity
restrictions for certain venues;
ensuring isolation of people who
test positive; providing financial
support for people who must iso-
late or who experience economic
disruption; closing certain spac-
es; restricting domestic or inter-
national travel; and issuing stay-
at-home orders. The amount and
quality of evidence available on
the costs and benefits of these in-
terventions vary. For example, the
efficacy of Covid-19 vaccines has
been extensively studied, and cost-
effectiveness analyses have been
conducted for vaccination.1 In
contrast, improving ventilation is
believed to help reduce Covid-19
transmission, but its effects are
less well understood.

Furthermore, making Covid-
related policy decisions requires
considering not only trade-offs be-
 tween health outcomes and the
direct costs of interventions such
as providing tests or vaccines, but
additional dimensions related to
economic activity, distributive jus-
tice, and individual liberty. Wheth-
ether economic evaluations consider
all societal effects or effects on
only the health care system will
influence the benefits and costs
that are identified and how they
are assessed. Creating an “impact
inventory,” as recommended by the
Second Panel on Cost-Effective-
ness in Health and Medicine, is
one way that analysts can be


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Background data shown in red in the
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### Types of Comparative Evaluation for Covid-19 Policies and Interventions.

<table>
<thead>
<tr>
<th>Analysis Type</th>
<th>Outcomes Reported</th>
<th>Challenges and Level of Aggregation</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Direct costs, potentially indirect costs</td>
<td>No measures of effectiveness are included; approach is best suited for evaluating interventions with similar effectiveness</td>
<td>Comparing costs between adding an air purifier and updating an HVAC system to improve ventilation</td>
</tr>
<tr>
<td>Comparative-effectiveness</td>
<td>Common unit of effectiveness (e.g., Covid-19 cases averted, Covid-19 deaths averted)</td>
<td>No measures of costs are included; outcomes typically aren’t aggregated into a single measure</td>
<td>Comparing expected Covid-19 cases averted for adding an air purifier vs. updating an HVAC system</td>
</tr>
<tr>
<td>Cost-consequence</td>
<td>Costs and various measures of effectiveness (e.g., Covid-19 deaths averted, Covid-19 hospitalizations averted, direct and indirect intervention costs)</td>
<td>Outcomes are reported separately with no aggregation; a dashboard showing outcomes for each option is provided for decision makers</td>
<td>Comparing costs and expected Covid-19 cases averted for adding an air purifier vs. updating an HVAC system</td>
</tr>
<tr>
<td>Cost-effectiveness</td>
<td>Costs and a common unit of effectiveness, often a metric that combines length and quality of life into a single measure (e.g., QALYs or DALYs)</td>
<td>Relative “bang for buck” is quantified for each option; optimal choice depends on willingness to pay for health</td>
<td>Assessing the cost per QALY saved for adding an air purifier vs. updating an HVAC system</td>
</tr>
<tr>
<td>Benefit–cost</td>
<td>Costs and monetized benefits</td>
<td>Optimal choice has highest monetary value; reasonable estimates are required to monetize all outcomes</td>
<td>Assessing the net monetized benefits of adding an air purifier vs. updating an HVAC system</td>
</tr>
<tr>
<td>Extended cost-effectiveness</td>
<td>Costs, a common unit of effectiveness, and an outcome related to health equity (e.g., new cases of poverty averted)</td>
<td>Equity-related outcomes are reported separately with no aggregation; a dashboard showing outcomes for each option is provided for decision makers</td>
<td>Assessing the cost per QALY saved, and per other outcome (e.g., new cases of poverty averted), of adding an air purifier vs. updating an HVAC system</td>
</tr>
<tr>
<td>Distributional cost-effectiveness</td>
<td>Costs and equity-weighted health outcomes (weights based on societal aversion to inequities in the distribution of health)</td>
<td>Optimal choice is based on equity-weighted outcomes and costs; requires reasonable estimates to monetize health outcomes and quantitative estimates of societal preferences regarding the equitable distribution of health</td>
<td>Assessing the equally distributed equivalent (a metric that aggregates the distributions of health and cost outcomes) of adding an air purifier vs. updating an HVAC system</td>
</tr>
</tbody>
</table>

* HVAC denotes heating, ventilation, and air conditioning, QALY quality-adjusted life-year, and DALY disability-adjusted life-year.

The magnitude of benefits and burdens, decision makers benefit from having information about relative certainty regarding the effects of various policies. Some interventions, such as Covid-19 vaccination, have been assessed in randomized trials that provide a reasonable degree of certainty regarding their effects, although real-world complications such as the arrival of new variants can introduce uncertainty. Other interventions, such as financial incentives for vaccination, have been analyzed primarily in observational trials. Still others are based on only biologic or other forms of scientific plausibility. For all interventions, there is some degree of uncertainty about long-term effects, given the relatively short course of the Covid-19 pandemic and the inherent difficulty involved in quantifying the effects of interacting policies, rather than considering policies in isolation. Such evaluations should describe whether and how non-linear effects (whereby policies have different results in combination than they do independently) were modeled and in what direction assumptions about these effects might push the results.

Along with reporting the benefits and costs that were quantified as part of an analysis, economic evaluations can include explanations regarding whether or how data related to various outcomes were aggregated. Disaggregated data could be most appropriately used to create dashboards of results that policymakers can consult to support decision making. In contrast, results based on aggregated outcomes (which combine separate outcomes into a single metric) should reflect the weight that society assigns to each component — for example, the extent to which society is willing to trade improved health for decreased spending or improved overall population health for the equitable distribution of health outcomes. The table describes types of economic evaluation, which vary in their methods of quantifying results and their approaches to aggregation.

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in projecting likely outcomes with or without intervention.

Economic evaluation offers various options for addressing uncertainty. Economists can conduct value-of-information analyses to quantitatively assess whether the value of additional research into specific inputs, such as the effectiveness of vaccine-uptake strategies, is worth the costs of conducting such studies. Other types of uncertainty, such as uncertainty regarding the potential burdens associated with imposing longer isolation periods, are harder to quantify. In such cases, dashboards of disaggregated data can note uncertainties and highlight information — such as the likely direction of a policy’s effects — that may be important for early decision making. In this way, economic evaluation differs from null-hypothesis–based decision making. Economic evaluations consider both the probabilities of various outcomes affected by policy choices and their consequences and provide results in the form of expected values or a distribution of possible outcomes (including the probability of a worst-case scenario being realized, for example). Such evaluations can also clarify when results depend on factors that may change over time or differ by location, such as Covid-19 transmissibility or prevalence.

Policymakers don’t need to wait until economic evaluations are complete to act. Rather, they can make initial decisions without full information and revise policies later, depending on the outcomes of evaluations. This approach should be coupled with clear messaging explaining that initial policies are provisional and subject to change as new information arrives. Research has described the challenges associated with “disinvestment” from ineffective medical interventions, and similar issues may arise when public health policies are initially adopted (or rejected) and decisions are subsequently reversed. The expected costs of changing course should therefore be included in the analysis of any policy that involves deviating from the status quo.

Critics of this type of approach might argue that in the midst of a pandemic that is still killing thousands of people globally every day, we don’t have time to engage in economic evaluation — that we should do the best we can, without fully weighing the costs and benefits of the options under consideration. In contrast, we believe the severity of the pandemic makes the need for evaluation all the more urgent. Choosing optimal interventions is associated with a bigger payoff when risks are higher. Acknowledging trade-offs is a more transparent approach than analyzing only outcomes that can be measured — or worse, only outcomes that will reaffirm an investigator’s or a policymaker’s preexisting beliefs.

Decision makers, even when armed with empirical and model-based assessments, must also make normative decisions about how various outcomes should be weighed on the basis of their value to society and whether to explicitly consider factors related to the distribution of costs and benefits within a population. Some forms of evaluation, such as traditional cost-effectiveness and benefit-cost analyses, weigh all benefits and burdens equally, regardless of how they are distributed, and evaluate them on a single scale. Certain newer approaches, such as distributional cost-effectiveness analysis, weigh outcomes for certain beneficiaries (for example, members of marginalized communities) more heavily than outcomes for other beneficiaries.

Other approaches, such as extended cost-effectiveness analysis, can be used to evaluate options relative to their performance on multiple objectives, such as health promotion and financial-risk protection.

Although policymakers and investigators still struggle to quantify and compare the effects of various Covid-related interventions, we are steadily amassing data that could help inform choices. The pandemic’s medical, social, and economic harms have been immense, and they warrant a continuous policy response. All decision makers use some type of mental model to weigh the pros and cons of various policy options. Rigorous economic evaluation formalizes this process. Value judgments will still be required, but economic evaluation can make the decision-making process more systematic, comprehensive, and transparent.

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