



# Using Health Economics to Inform Immunization Policy Across All Levels of Government

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Accepted: 1 June 2022 / Published online: 13 July 2022  
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## Abstract

Publicly funded immunization programs have grown in both complexity and scope, resulting in increased costs and more complex programmatic decision making. Economic evaluations can provide crucial information to support informed decision making. While very few countries have National Immunization Technical Advisory Groups that analyze economic information, many have started to develop processes for this purpose. Since these guidelines are being developed at the national level, we propose that regional jurisdictions, especially those responsible for healthcare (e.g., provinces, territories, states), need clear processes for incorporating this information into their immunization decision making and program implementation. We interviewed Canadian vaccine experts involved in provincial vaccine policy decision making to identify current practices, perceptions, and recommendations around incorporating economic analysis into that process. Based on these interviews, we make five recommendations: (1) economic evidence should be routinely incorporated into the decision making process; (2) economic experts should sit on, or be available to, regional advisory committees; (3) efforts should be made to build on regional expertise by increasing educational opportunities on economic evaluation; (4) processes should include guidelines for when economic analysis is not required; and (5) clarification on the role of regional advisory groups in economic analysis is needed in relation to national expertise. The information presented here provides a starting point for regional health policy experts and decision makers to work collaboratively with national partners to create transparent and effective approaches to incorporating economic analysis into vaccine decision making.

## Key Points for Decision Makers

Economic evidence should be routinely incorporated into vaccine decision making at the regional level.

Economic experts should be at the disposal of regional immunization advisory committees.

The discrete but complementary roles of regional and national advisory committees should be clearly articulated.

## 1 Introduction

Immunization programming, both globally and within Canada, continues to increase in complexity, with a growing number of vaccines and a diversity of vaccine products being considered for public funding. In Canada, the provinces and territories (P/Ts) are largely responsible for managing immunization programs. Moreover, metrics on vaccines are constantly shifting, with P/Ts needing to monitor vaccine effectiveness (including waning of immunity) and adverse events following immunization (AEFIs). With evolving programmatic complexity, accompanied by the advent of more technologically advanced vaccines, costs associated with vaccines have also increased in recent years [1]. Under these conditions, it is not surprising that the number of economic evaluations of vaccines, along with guidelines and methods to inform economic research in the area [1–9], have increased over time.

Economic evaluations provide a quantitative estimate of the costs and/or benefits of an immunization program, thereby producing evidence for funding decisions. When

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a vaccine program will impact disease transmission, it is important that the vaccine economic evaluations model the spread of a disease in a population with and without the immunization program. These models should account for vaccine effectiveness (e.g., primary vaccine failure, waning of immunity, prevention of severe infection), AEFIs, vaccine uptake in the population, as well as costs and outcomes (e.g., morbidity/mortality, quality-adjusted life-years) associated with having and not having the infection. The World Health Organization (WHO) identifies economic and financial attributes of immunization programs as one of the key “principles and considerations for adding a vaccine to a national immunization programme” [10]. The WHO further recognizes a continued need to develop processes for the economic evaluation of vaccines at both the national and regional levels, with vaccine technical advisory groups working with Ministries of Health to ensure they are providing the decision makers and program implementers with the support they need to make evidence-informed policy [10].

In 2019, the National Advisory Committee on Immunization (NACI), which provides technical advice on vaccines at the national level in Canada, expanded its mandate to include “consideration of programmatic factors in developing evidence-based recommendations to facilitate timely decision-making for publicly funded vaccine programs” [11]. To support this, NACI developed a framework for the systematic consideration of ethics, equity, feasibility, and acceptability in immunization programming decisions (EEFA Framework [12]), and is developing a process for submission and review of vaccine economic evaluations [13]. However, in Canada, like many countries, immunization and other health programs are administered at a regional level. Provincial and territorial Ministries of Health develop and implement vaccine policy, often with input from regional vaccine advisory committees.

These regional vaccine advisory committees consist of vaccine experts, including, but not limited to, adult and pediatric infectious disease physicians, microbiologists,

pharmacists, medical officers of health, and immunization program administrators from the regional health authorities responsible for implementing public immunization programs. These committees provide essential evidence to decision makers on the safety, effectiveness, and equity issues associated with immunization programs and make recommendations to the Ministry of Health on vaccine types, schedules and timing, eligible populations, and other issues. Health Ministries and regional vaccine advisory groups had started to make important strides in the incorporation of economics into their decision making prior to the coronavirus disease 2019 (COVID-19) pandemic. However, the prolonged response to the COVID-19 pandemic has, unsurprisingly, drawn resources from this work. Options for the incorporation of economic evidence into provincial and territorial decision making include reviewing and adopting NACI recommendations, or conducting provincial- or territorial-level ad hoc economic evaluations of vaccines.

To better understand how a regional jurisdiction incorporates national vaccine economic recommendations into the decision-making process, we explored the process in one Canadian province (Alberta, population 4.5 million). The Alberta Ministry of Health (the Ministry) utilizes a provincial vaccine advisory committee, which is supported by Secretariat staff from the Ministry. We conducted semi-structured interviews with clinical experts and vaccine program and policy experts in the province ( $n = 8$ ). Interviews were conducted in person or via teleconferences between 22 October 2019 and 20 January 2020 (see the electronic supplementary material for the interview guide). Following transcription, two analysts conducted a thematic analysis of the interviews [14]. All results were discussed until consensus was reached on the findings. Based on a summary of these expert perspectives, we propose that economic evidence should play a larger role in vaccine policy decision making, and recommend action items to improve the process for regional jurisdictions incorporating national recommendations (Table 1).

**Table 1** Recommendations for incorporating economic analysis into regional vaccine decision making

1	Economic analysis is an important factor in vaccine decision making and should be routinely incorporated into the recommendation process within the region’s broader immunization framework
2	A local economic expert should sit on regional committees or be more readily available to advise the committee on an ad hoc basis. Local data and expertise is required to appropriately tailor national recommendations to the provincial or territorial context
3	There is a desire/need to improve basic economic literacy of vaccine advisory committee members. This will help to address common misconceptions about economic analyses and facilitate communication with healthcare decision makers as well as the public
4	A clear, systematic and routine process for incorporating economic analysis into the provincial or territorial decision-making process is required, including clear guidelines and criteria for when economic evaluations are not relevant, when available economic evidence is sufficient, and when more localized analyses may be needed
5	Specific roles and responsibilities for each party (national and regional) should be identified, recognizing opportunities for synergy between stakeholders

## 2 Incorporating Economics into Decision Making: Value and Role

All provincial experts we consulted viewed economic analysis as an important element in vaccine decision making, providing additional insight necessary to clarify the value of a new vaccine or immunization program, with the potential to facilitate communication with both healthcare decision makers and the public. Pragmatically, vaccine experts pointed to increased pressure on health system budgets and their responsibility to ensure healthcare resources are used in an efficient and effective manner. Experts also recognized that economic factors play an important role in implementation choices made by decision makers. Thus, incorporating economic analysis into the recommendation process would better address the information needs of decision makers, facilitating communication between the two groups. This enhanced communication would improve their efforts to advocate for vaccine programs and expand their understanding of vaccine implementation decisions. By being more engaged in all aspects of the decision making process, experts felt their ability to communicate program decisions to the public would improve.

Some experts were concerned that decision makers would put too much weight on the economics, overshadowing considerations for safety, effectiveness, and equity. However, it is noteworthy that safety and effectiveness can, and should, be incorporated into any vaccine economic evaluation, as they play a key role in programmatic outcomes. While methods for explicitly incorporating equity into economic evaluations are being developed, they are still in their infancy. As such, economic evaluations need to be considered in the context of equity, for instance using the NACI EEFA Framework [12]. The EEFA Framework helps immunization experts answer questions about whether there are any ethical or equity concerns in terms of implementation and accessibility of the immunization program, the immunization program can be implemented feasibly, and there is high acceptability and demand for the immunization program [12].

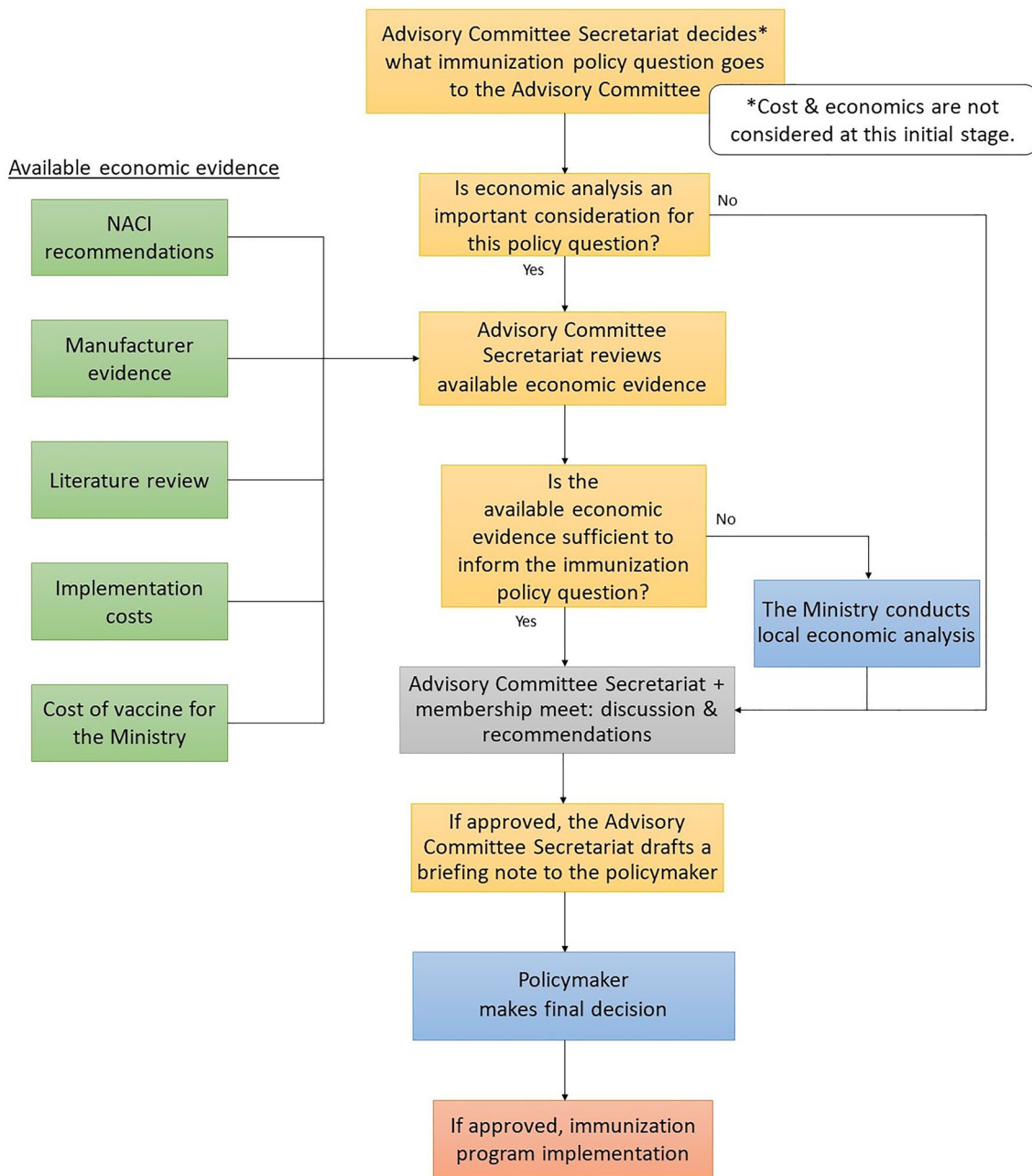
## 3 Processes for Incorporating Economics in Vaccine Decision Making at the Provincial Level

Although the Ministry has a process for incorporating economic data into provincial vaccine decision making (Fig. 1), the vaccine policy and clinical experts from outside the Ministry that we interviewed had questions about

when this process was being initiated and how the Ministry decides if economic analyses are warranted. Currently, the Ministry conducts its own provincial economic evaluations of vaccines on an ad hoc basis following a review of the available evidence. This has been common practice when adding a new vaccine (e.g., shingles vaccine) or shifting coverage to include a large subset of the population (e.g., human papillomavirus vaccine for boys). This targeted use led to a misconception among many experts that economic analysis should only be considered for expensive additions and/or changes to vaccine programming. While these elements may help decision makers to prioritize supplemental economic analyses, we argue it is important to evaluate the economics of both ongoing and lower cost immunization programs. Similarly, there was a lack of clarity on what constitutes ‘sufficient evidence’ and when the Secretariat should commission additional, local analysis. Clear criteria are required to determine when economic information is not necessary for the decision-making process or additional provincial-level analysis is needed.

The consulted experts had differing opinions over who should be responsible for evaluating and synthesizing economic evidence. A couple of experts believed that the regional advisory committee should focus on the safety and effectiveness of the immunization program and leave economic considerations to the Ministry, while most of the experts believed the vaccine advisory committee should be directly involved. One of the experts further suggested that the regional vaccine advisory committee could provide two recommendations, one with and one without consideration of cost effectiveness. However, the majority of experts agreed that NACI should play a central role in conducting economic evaluations, highlighting the importance of synergy between the national and regional technical advisory groups, as well as policy advisors and decision makers. Without role clarity, there is potential for duplication of responsibilities and/or analyses, or even omission of key evidence. We recommend the decision making process be reviewed to include clear roles and responsibilities for all parties, with a focus on national–regional collaboration.

When the time comes that NACI’s secretariat more consistently produces or summarizes economic analyses, provincial and territorial resources can shift to focus on any additional local analyses required (e.g., if the rate of infection in the P/T is higher/lower than what was included in the NACI analysis). Cultivating local economic expertise will be crucial for weighing national recommendations and analyses considering the specific provincial or territorial context. Provincial/territorial-based analysis, with support of local expertise, would enhance experts’ ability to communicate any recommendations/decisions to the public, especially those that deviate from national recommendations.



**Fig. 1** Current process for incorporating economics in vaccine decision making at the provincial level. *NACI* National Advisory Committee on Immunization

Local expertise is essential to ensuring capacity for consideration and/or conduct of provincial- and territorial-level economic analysis. Many of the expressed misgivings of our interviewed experts about vaccine-related economic analysis could be attributed to misconceptions about the information an economic analysis can incorporate/provide. For example, some experts expressed concerns that an economic evaluation could not adequately assess benefits associated with disease prevention, or that analyses focused on

the cost effectiveness of a particular vaccine may miss other relevant financial pressures (e.g., operational expenses). This concern can be abated by awareness that best practice guidelines specify that vaccine-related economic analyses should include considerations for both direct and indirect benefits of immunization, as well as program implementation and operating costs [2]. While the vaccine advisory committee and the Secretariat often possess considerable knowledge of health economics, we propose that a local economic expert

should sit on regional committees or be at the committee's direct disposal to advise the committee on an ad hoc basis. This would allow for full consideration of economics in immunization program decision making and appropriate evaluation of the evidence as it becomes available, as well as an opportunity to further improve the economic evaluation literacy of the vaccine advisory committee.

## 4 Summary

The vaccine experts we consulted recommended a routine and systematic process for incorporating economic analysis in vaccine policy decision making. Many of the vaccine experts have been focused on the COVID-19 immunization programs over the last few years; however, prior to this they were developing plans to build economic expertise at the local level and it is important this continues in the coming years. By sharing processes, challenges, and recommendations, we hope to create an opportunity for regional health authorities and advisors to work collaboratively with national partners, creating transparent and effective approaches to incorporating economic analysis into vaccine decision making across all levels of government.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s41669-022-00347-1>.

## Declarations

**Funding** Ellen Rafferty was supported by a Health Systems Impact Fellowship from the Canadian Institutes of Health Research (CIHR).

**Conflict of interest** At the time of this study, Ellen Rafferty was a post-doctoral fellow at the University of Alberta. She is currently employed with the Institute of Health Economics, a not-for-profit that offers health economic evaluations to academic, private and public sectors. Laura Reifferscheid, Ali Assi and Shannon E. MacDonald have no conflicts of interest to declare.

**Ethics approval** The University of Alberta Health Research Ethics Board approved the study.

**Consent to participate** Informed consent was obtained from all individuals who participated.

**Consent for publication** The consent to participate included consent to disseminate findings.

**Availability of data and material** The original individual-level data are not available as it includes identifying information on interviewees. Please contact the authors for additional aggregate data.

**Code availability** Not applicable.

**Author contributions** ER and SM conceptualized the study; ER and AA completed data acquisition; ER, AA and LR completed data synthesis; and ER and LR drafted the manuscript. All authors contributed to critical revision of the manuscript and approved the final version of the paper.

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