

Research Report

Obstacles to flu vaccination in Quebec: determining factors, consequences and potential solutions

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Table of contents

Executive Summary	3
Mandate of HEC Montreal’s Health Care Management Hub	6
Background information	9
Flu vaccination coverage in Quebec and Canada.....	9
Flu immunization programs.....	10
Developments in Quebec and the other provinces	10
Evaluation of the Universal Influenza Immunization Program: the case of Ontario	11
The burden of influenza	14
Flu-related morbidity and mortality.....	14
The risks of flu-related death	14
Use of healthcare resources (consultations, hospitalizations)	15
Absenteeism and loss of work productivity	16
Estimated direct costs of influenza in Quebec	16
Expert opinion: obstacles to vaccination and potential solutions.....	20
Obstacles to vaccination against seasonal influenza	20
The effectiveness of the vaccine is central to the public’s reluctance	20
The perception of influenza: a virus underestimated	22
Obstacles linked to people’s attitudes toward vaccination	23
Logistical challenges of vaccination campaigns.....	24
Communications	25
Potential solutions.....	27
Meeting the efficacy challenge	27
Meeting the perception challenge	27
Meeting the logistics challenge and changing people’s behaviour	28
Meeting the communications challenge.....	30
Conclusion	34
Bibliography	36

Executive Summary

Despite public awareness campaigns, immunization programs and the recommendations of public health experts, Canadian flu vaccination rates have consistently fallen short of the targets set by governments across the country. Comparative data shows that this situation is even worse in Quebec than in the other provinces.

In this second phase of our project, the research team carried out an economic assessment of the extent of the burden of influenza in Quebec, considering all the associated costs, both direct and indirect. The research team also solicited the opinions of 13 healthcare experts regarding the obstacles to seasonal flu vaccination in Quebec and feasible solutions that would enable the province to approach the targets set by the Quebec government.

The burden of influenza

Hence, it is estimated that the healthcare costs associated with doctor's office and emergency room visits amounted to \$17.2 million for the Quebec government (excluding drugs). The number of hospital admissions due to flu-related complications was estimated at 7,693 in 2022. These hospital stays resulted in estimated healthcare costs of \$84.2 million, or nearly \$11,000 per hospitalization (excluding drugs).

The research team also conducted an economic assessment of the magnitude of the indirect costs of influenza, including losses in productivity due to absence of employees from paid work, as well as the forgoing of unpaid work activities (volunteering, caregiving, household chores or childcare) for all those affected by flu infection. For 2022, the cost associated with lost working time due to influenza in Quebec is estimated at \$292.6 million.

Obstacles

Analysis of our interviews with these experts identified five major obstacles to flu vaccination.

According to the experts we consulted, **the general perception of the effectiveness of flu vaccines** is a major factor in people's reluctance to be vaccinated. There seems to be a widespread belief among Quebecers that the effectiveness of the injection varies greatly from year to year, and that the shots are not a particularly reliable way of providing adequate protection against the disease.

A second obstacle to influenza vaccination singled out by our experts is **the lack of awareness regarding the illness** and its consequences. Many people underestimate the risk both of catching the disease and of possible consequences for their health. It is more difficult to motivate people to get vaccinated when the disease we are trying to protect them against is considered trivial and commonplace.

A third category of obstacle to vaccination is connected to **individual attitudes** that can make people reluctant to get the shot. These individual motivations may involve fear of side-effects, phobias regarding needles, or simply a mistaken assessment of the risks and benefits of flu vaccination.

A fourth type of obstacle brought up by the experts concerns **the logistical aspects** of the vaccination campaign. The nature of influenza vaccine production and the variability in the peak infection period very often complicate the practical aspects involved in delivering vaccines to the public. These issues may dissuade some professionals from making vaccinations available in their pharmacy or medical clinic.

The fifth and final obstacle put forward by the experts during the interviews concerns **the numerous challenges associated with communication**. According to the experts we talked to, both uncertainty about how to obtain the vaccine and the vagueness surrounding who exactly will benefit from flu immunization programs is discouraging a certain segment of the population from getting vaccinated. This is particularly true among people considered to be at greater risk of developing complications from the disease.

Potential solutions

Our experts stressed the importance of providing easy and user-friendly access that encourages people to go and get vaccinated, and to help boost the vaccination rate. They suggested a number of initiatives that could be put in place to improve access, including the establishment of vaccination clinics in various locations that are currently underused. They also proposed an annual week dedicated to the active promotion of vaccination, and provision of an efficient and easy-to-use online service for booking vaccine appointments.

The experts underlined the fundamental role necessarily played by healthcare professionals in raising awareness and educating people regarding vaccination. In this respect, it is essential that

the medical community support the public health authority recommendations on vaccination, and that the central players within it be made fully aware of how the flu immunization program works.

Communication encouraging vaccination can also be far more compelling, said the experts, if we pay more attention to the frequency, clarity, simplicity and accuracy of the message. They also emphasized the importance of sharing reliable and truthful information based on scientific evidence and coming from credible sources.

Many of the experts we spoke to had welcomed the Quebec government's decision to offer free flu vaccinations to the entire population during the 2022 flu season and hoped that the initiative would be continued in the future. According to them, funding of the free flu immunization program is significant in that it sends out a strong message about the importance of vaccination and about the seriousness of the approach. On the other hand, some experts favour focusing our healthcare efforts more on those who will feel the greatest impact from them, i.e., the vulnerable people, rather than the population as a whole.

Mandate of HEC Montreal's Health Care Management Hub

The flu vaccination rate for people over 65 was 58.6% in Quebec in 2020. For adults aged 18 to 64 with chronic illnesses, the rate was 30.9% (Trottier and Dubé, 2022). Although these vaccination coverage statistics for “people deemed to be at risk” have improved slightly, they are still well below the target of 80% set by the Public Health Agency of Canada and the *Comité sur l'immunisation du Québec* (CIQ) of the *Institut national de santé publique du Québec* (INSPQ).

So, what explains Quebecers' reluctance to be vaccinated? What impact might this low coverage rate have, both on the health of the population and on Quebec's economy? What solutions can be implemented to improve vaccination rates and enable the province to achieve the targets it has set for itself? These are just some of the questions that the HEC Montréal Health Centre's research team has addressed over the course of a two-stage research project.¹

During the first phase of the project, the research team carried out a review of the scientific literature and surveyed Quebecers in order to gain a clearer understanding of the obstacles to vaccination in the province. The results of this first phase, incorporated into a research report published in November 2022, established a number of findings.

Firstly, the determinants of non-vaccination identified in the literature can be divided into three categories:

- **Those linked to demographic characteristics:** age and level of education both have an impact on the likelihood of getting vaccinated against influenza. The older you are and the more education you have, the more likely you are to be vaccinated.
- **Those linked to lifestyle habits:** having received a recommendation from a family doctor has a positive influence on vaccination. Conversely, using alternative healthcare solutions (naturopaths, etc.) has a negative impact on vaccination rate.
- **Those linked to individual perceptions:** the more vulnerable people think they are to the disease, the more likely they are to be vaccinated; the less likely they are to think that the vaccine is effective, or that the virus is severe, the less likely they are to be vaccinated.

¹ The research team of HEC Montreal's Healthcare Management Hub thanks Sanofi, Seqirus and Pfizer, among other organizations, for their independent financial support for this project. No organization could review the results of this study and the authors remain fully responsible for the content, including any possible errors or omissions.

Secondly, our survey of the Quebec population revealed three very different profiles of Quebecers:

- **Those who always get vaccinated** are in general people over 65 and/or people with at least one chronic illness. This profile of Quebecers usually has access to a family doctor or has a high level of trust in the vaccine information provided by scientists, governments, and the media. The survey results showed that 76% of respondents vaccinated yearly have confidence in the information provided by scientists and government authorities.

For this segment of Quebecers, the perceived seriousness of the disease outweighs apprehension regarding the obstacles (the pain of the vaccine, the time it takes to get vaccinated and the side effects). Finally, respondents with higher incomes are more likely to be vaccinated every year.

- **Those who never get vaccinated** tend to be younger and more distrustful of the information provided by scientists, governments, and the media on the subject of vaccination. Only 45% of respondents who refuse to be vaccinated admitted trusting the information provided by scientists about vaccines. This proportion drops to 41% when the info comes from governments and to 40% when it is conveyed by the media. This profile of Quebecers has a strong awareness of the obstacles paired with a weak perception of the benefits of vaccination. Finally, this is the segment that exhibits higher confidence in alternative healthcare methods than in vaccines.
- **Those who get vaccinated only occasionally** constitute the third and final category of Quebecers. This cohort is more difficult to characterize and is very similar to the second group save for one detail: the perception of obstacles to vaccination is not a significant factor. The fact of being young and in good health increases the likelihood of getting vaccinated only occasionally. This profile of Quebecers also has more confidence in vaccine information than the respondents who never get the shot, but less than those who get vaccinated annually. The same applies to the benefits of the vaccine and their perception of vulnerability. These respondents have less faith in alternative methods and are more aware of the seriousness of the disease than the second group. It should be noted that for this profile, the perception of the seriousness of the consequences of influenza is a significant determinant and increases the chances that respondents will be vaccinated occasionally.

Following these initial findings, the research team began the second phase of the project. This was aimed at obtaining the views of healthcare experts on the obstacles identified in phase one and determining how these relate to their reading of the situation in Quebec. We therefore identified a list of 34 Quebec experts and invited them to take part in the study. The invitations stated that their participation was confidential and voluntary, and a total of 13 of them were accepted. These experts all have recognized qualifications connected with immunology, virology, pharmacy, general medicine, or public health, and practise their professions in governmental or private organizations, generally not-for-profit. They were recruited using the non-probabilistic network method (Fortin and Gagnon, 2016). By sending an email prior to the interview, we were able to obtain the consent of the interviewees and to assure them that their opinions would be collected in a context of full anonymity. This research protocol was also approved by the research ethics committee of HEC Montréal.

We conducted semi-structured individual interviews, lasting 40 to 60 minutes, that took place via the TEAMS videoconferencing platform between February and April of 2023. Where consent was obtained, the experts' comments were recorded for transcription purposes, ensuring that the opinions expressed were as accurate as possible.

The findings from our analysis of these interviews, combined with an assessment of the economic burdens of influenza, constitute the subject of this second research report.

Background information

Flu vaccination coverage in Quebec and Canada

For groups deemed to be at high risk of serious complications, the annual vaccine against influenza is recommended as part of Canada's vaccination programs. The National Advisory Committee on Immunization (NACI) issues influenza vaccination recommendations in all the Canadian provinces except Quebec. For everyone aged six months and older, and with no contraindications, flu vaccination is recommended and funded in all provinces save Quebec. In Quebec, annual flu vaccination recommendations are provided by the *Comité sur l'immunisation du Québec* (CIQ). Until the autumn of 2022, the province's flu vaccinations were only funded for specific groups at high risk of serious flu-related complications (e.g., people over 75) and individuals likely to be vectors of flu transmission (e.g., healthcare workers). Since then, the province has offered a universal program on an annual basis.

Despite the public funding and provision of influenza vaccines and their extremely favourable ratio of risk to benefits, Canada's flu vaccination coverage rates have remained sub-optimal even for groups at high risk of serious complications. And the comparative data show that the situation is even worse in Quebec than in the rest of Canada (Gravagna et al., 2022). In fact, Quebec's seasonal influenza vaccination rates are still well below the targets set by the government at the program's introduction. We have nonetheless seen increases in vaccination coverage rates in recent years (Figure 1). The best progress in flu vaccination rates over the last five years has been among people aged 75 and over, and those living in residential and long-term care centres (CHSLDs). While in 2018-2019 only 36% of people aged 75 and over chose to be vaccinated, by 2022-2023 this rate had risen to 63%. For CHSLD residents, the flu vaccination coverage rates rose from 44% to 75% during this period. As for chronically ill people under 75, however, 2022-2023's vaccination rate of 15% remained well below the targets set by the government despite the slow progress made in recent years.

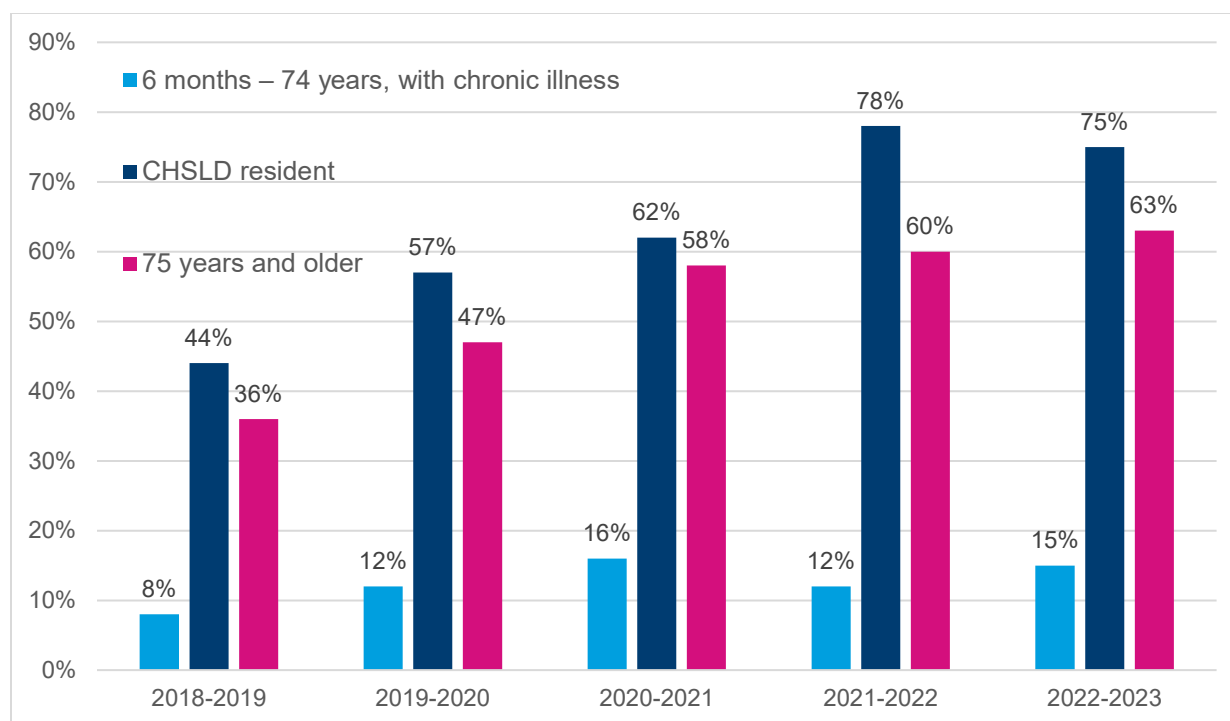


Figure 1 — Rate of flu vaccination coverage (at least one dose) for certain groups of the Quebec population targeted by the Quebec Immunization Protocol according to reason for administration, 2018-19 to 2022-23.

Source: Quebec Vaccination Registry, *Infocentre de santé publique du Québec*.

Flu immunization programs

Developments in Quebec and the other provinces

Because healthcare is a provincial responsibility in Canada, there is no harmonized flu immunization program. As a result, vaccination programs have varied in scope and generosity from province to province since their inception (Andrew and McNeil, 2021). This unique context can lead to interprovincial variations in vaccination schedules and in which vaccine products are funded. Until the Autumn 2022 vaccination campaign, every province and territory recommended, and publicly funded, universal influenza vaccination for everyone aged six months and over (in the absence of contraindications)—with the sole exception of Quebec.

The Quebec government introduced its flu vaccination program in 1971. Initially, the only people eligible for free flu shots were those aged 65 or over, those suffering from chronic illnesses or living in long-term care centres, and medical staff working with these patients. In 2000, the program was extended, now offering free vaccination to people aged 60 and over as well as anyone living with people at higher risk of complications from influenza. In 2004, young children

between 6 and 23 months-old were added to the program, as they were considered to be at greater risk of flu infection and hospitalization (Guay et al., 2007).

Last autumn, the Quebec government announced restricted coverage for the 2022-2023 season, and the INSPQ ceased to recommend influenza vaccination for children aged 6 to 23 months and healthy adults aged 60 to 74 years (Brousseau et al. 2020). Over the course of the vaccination campaign, however (November 25, 2022), the government decided to extend free coverage to everyone who requested it, as the fall of 2022 proved to be an exceptional time for the intensive spread of winter respiratory viruses. In effect, the Quebec government was looking to limit the burden on the healthcare system following the identification of three risk factors: “An extension of [the] vaccination [program] will be exceptional for this year and re-evaluated next year. This decision was made against the backdrop of the current circulation of a trio of viruses and a high volume of patients in our emergency departments. The marked increase in influenza, the presence of the respiratory syncytial virus (RSV) and the still significant presence of Covid-19, combined with the imminence of the holiday season, have justified extending access to the influenza vaccine.” (Government of Québec, 2022). This will be re-evaluated for the 2023-2024 season (Government of Canada, 2022).

So it would seem that the Universal Influenza Immunization Program (UIIP) is gradually gaining ground across the various Canadian jurisdictions. Ontario was the first province in Canada and the first such jurisdiction in the world to recommend and publicly fund the flu vaccine for all its residents. Prior to 2000, Ontario’s flu vaccination policy was in line with the traditional recommendations to fund shots only for high-risk groups, i.e., people over 65 and those with chronic conditions. Though this program was launched more to relieve emergency room congestion than as a response to an especially high burden of influenza (Ward, 2014), with resources stretched to the limit in the context of Covid-19, it seems to have struck a chord within numerous jurisdictions, including Quebec.

Evaluation of the Universal Influenza Immunization Program: the case of Ontario

As mentioned above, Ontario’s Universal Influenza Immunization Program (UIIP) was an innovative program when it was introduced in the early 2000s. It offers free access to influenza vaccination to “all individuals six months of age and older who live, work, or go to school in Ontario.” (Ontario Ministry of Health, Ministry of Long-Term Care; 2022). The program also identifies a number of groups at risk of complications from influenza. These groups are similar to those specified in Quebec (after November 25, 2022), but with the addition of essential workers

and those in the poultry industry (Ontario Ministry of Health, Ministry of Long-Term Care; 2022). Under this plan, the benefits of vaccination are promoted through extensive media campaigns, and flu vaccines are available free of charge in doctors' offices, clinics, pharmacies, through local public health units and in the workplace as well.

By now several studies have examined the results of Ontario's universal program, and the evidence for its benefits is mixed. But while the first studies were somewhat more critical of the program, those that followed (using more robust methodologies) concluded that its clinical and economic impact was positive overall. Over time, a consensus seems to have emerged that the universal program deserves to be maintained in Ontario.

The early studies that examined the impact of the UIIP in Ontario over the first five years of its implementation concluded that, despite the increased financial resources devoted to promoting and distributing vaccines to the population (Groll and Henry, 2002; Groll and Thomson, 2006), it had not actually led to a reduction in the incidence of influenza, or in emergency room visits. Among these studies, Moran et al. (2009) found that flu vaccination rates among high-risk children were below the target of 70% set by the province, and that (in 2007) the rates for children aged 6 to 23 months were lower than the average for other provinces. In another study that controlled for a variety of factors including age, income, gender, smoking status, having a regular doctor, perceived health status, and the presence of chronic illness, Polesina et al. (2012) determined that Ontario had higher overall rates of influenza vaccination in 2007-2008 than the other provinces did. However, their results also revealed that in other provinces people aged 65 or over with a chronic illness were more likely to have been vaccinated against influenza in 2007-2008 than people living with the same conditions in Ontario. According to the authors, these results are explained by the fact that in Ontario younger people (aged 12 to 24) at lower risk were much more likely to be vaccinated than in the other Canadian provinces that had no universal program at the time.

However, other researchers who evaluated the UIIP using different data samples and methodologies from their predecessors found that it did generate positive overall results. For example, Kwong et al. (2008) showed that after the introduction of universal flu immunization in Ontario, mortality, hospital admissions, and emergency room visits fell more in that province than in the rest of Canada. Following the program's introduction, influenza-associated mortality in the general population fell by 74% in Ontario, compared with only 57% in the other provinces. (It should be noted, however, that in the age-specific analyses, only the reductions in mortality

among people aged over 85 proved to be statistically significant.) The study also revealed that, overall, healthcare use associated with influenza fell more in Ontario than in the other provinces: hospital admissions were down by 75% (vs. 56% in the other provinces), the use of emergency departments was down by 69% (vs. 30%), and doctor visits decreased by 79% compared with 47% in the other provinces (mainly in the under-65 age groups). While this study suggests that most of these reductions are likely to be attributable to less severe flu seasons in Canada in the period following implementation of the program, the authors suggest that their results are also partly attributable to indirect benefits arising from the herd immunity made possible by vaccination of large groups of the population. They note, however, that the methodology of their study unfortunately makes it impossible to distinguish between the direct and indirect benefits of universal vaccination (Kwong et al., 2008).

Sander et al. (2010) conducted a study to evaluate the program's effects on influenza-associated mortality, hospitalizations, and emergency room and physician visits. They compared data from 1997 to 2004 (three years before and four years after implementation of the UIIP) with the hypothetical scenario of a targeted program—of the kind in effect in the other provinces at the time. This study revealed that the overall rate of health events associated with influenza fell by 40% to 60% more in Ontario than it did in the other provinces. These reductions were particularly significant in the under-65 age group. But in addition, and despite the other provinces showing greater increases in vaccination rates among the elderly, events associated with influenza among this older group in Ontario were either less pronounced, or the same as in the other provinces.

Slightly more recently, Ward (2014) used a database and methodology that circumvented the endogeneity problems of previous studies to show that influenza vaccination as part of Ontario's universal program generated significant indirect benefits for the unvaccinated. The results of this study indicate that people aged 65 and over benefit from increases in vaccination among younger groups, even if vaccination rates are already relatively high. The health economist underlines that vaccinating young people produces indirect benefits higher even than the direct effects of vaccination for this older group.

Furthermore, Ward's results show a 14% reduction in absences from work due to the implementation of the universal program in Ontario, which represents six fewer absences per 1,000 workers per week. They also show a 48% reduction in consultations with family doctors (which implies a reduction of 8.6 in consultations per 100,000 people per week). According to Ward, the overall benefits implicit in the program, including the indirect benefits for the elderly,

are substantial in relation to its costs. Considering only hospitalizations and productivity losses, the impact of the vaccination campaign translates into a best-case cost savings of \$241 million in a season of high vaccine effectiveness, or an expected savings of \$171 million in a season of average vaccine effectiveness. Meanwhile, the costs of the program come in at approximately \$33 million per year (Ward, 2014).

The burden of influenza

Flu-related morbidity and mortality

Every year, between 10% and 20% of Canadians on average report having been infected with the flu virus (Ting, Sander and Ungar, 2017). Among people aged over 50, this proportion is estimated to be around 20 to 25% (Waite et al., 2022). These infections can lead to complications and can exacerbate pre-existing health problems, particularly in older people and those living with chronic illnesses. Recent studies have highlighted the connection between influenza infection and increased risk of cardiovascular events such as myocardial infarction and strokes. For example, Canadian researchers have found the risk of myocardial infarction to be five to ten times higher in the seven days following infection with various strains of influenza (Kwong et al., 2018). In addition, other research has shown flu to be associated with an almost 20% increase in hospital admissions for heart failure. All of these events are more likely to occur in groups of people with existing cardiovascular disease or with co-morbidities (Macias et al., 2021).

For the elderly, influenza increases the risks of hospitalization and of being confined to bed for prolonged periods, both of which can often accelerate functional decline. In a Canadian survey of 5,014 adults aged 65 and over, 21.5% said they had had influenza or flu-like illness during the previous season. Of these, 40% said it had taken them more than two weeks to recover, and half of them admitted that their health and motor functions had declined during this period. In addition, just over 3% reported that they never fully recovered (Andrew and McNeilm, 2021). According to Macias et al. (2021), these are important, but frequently underestimated, consequences of influenza.

The risks of flu-related death

Canadian researchers have estimated the crude mortality rate attributable to influenza by averaging over 17 flu seasons prior to the 2009 A/H1N1 pandemic. They put the number of deaths attributable to seasonal influenza in Canada at 3,500 per year, a rate of 11.3 deaths per 100,000 population per year (Schanzer, Sevenhuysen, Winchester and Mersereau, 2013).

In Quebec, the INSPQ estimated that the number of deaths attributable to influenza averaged 417 per year for the flu seasons from 2011-12 to 2015-2016, representing a rate of 5.2 deaths per 100,000 people. People with chronic illnesses and those aged 75 and over are most at risk of dying from the disease, however, and experienced a death rate of 40.3 per 100,000 people for the same years in Quebec (CIQ, 2018: 30).

Use of healthcare resources (consultations, hospitalizations)

Although most cases are not fatal, it is well known that influenza and its complications can lead to a great many medical consultations, emergency room visits and hospitalizations. During the peak of the flu season, the healthcare network's professional resources are stretched to the limit, making it more difficult to meet the needs of the population.

In recent years, a number of studies have examined the impact of influenza on the use of healthcare resources. In Quebec, the INSPQ has conducted several surveys over the years to provide a picture of the flu's burden on the province. The most recent survey data put the number of annual hospitalizations attributable to flu in the province at nearly 6,200, a rate of 76 per 100,000 people. More than 75% of these hospitalizations occur among people with chronic illnesses, those most at risk of flu-related complications (CIQ, 2018: 21).

In a similar vein, a group of researchers associated with the Canadian Immunization Research Network (CIRN) measured the extent of flu-related resource use and expenditure for Canadian patients who required hospitalization during the 2010-11, 2011-12 and 2012-13 influenza seasons. To achieve this, the group conducted active surveillance for laboratory-confirmed influenza among patients aged 16 and over admitted to 17 participating hospitals in 6 Canadian provinces. For each case, detailed demographic information, surgical history, medical co-morbidities, and details of hospital care, complications and influenza outcomes were all collected by interview and review of medical records. The group also collected data on resource use before admission to hospital, during hospitalization and in the 30 days following discharge. For Quebec, the results showed that 20% of patients who contracted influenza had to visit a doctor's office before being admitted to hospital, and 11% had to visit the emergency department before being hospitalized. 85% of hospitalized patients required antibiotics, 28% suffered complications, and 14% had to be admitted to intensive care for an average of six days, given the deterioration in their state of health. The average length of stay in hospital was 12.4 days and the average cost of hospitalization was \$15,186, which is slightly above the Canadian average (Ng et al., 2018).

Absenteeism and loss of work productivity

While the impact of influenza on the use of healthcare system resources is fairly well documented, its consequences for the ability of infected people to maintain their day-to-day activities (work, volunteering, caring for others, etc.) remain relatively unknown. Only a handful of studies have provided an overview of the extent of these effects among various population groups in Canada.

Schanzer et al. (2011) examined the effects of influenza in Canada (during the period from 1999-2000 to 2009-2010) on rates of absenteeism from work, and on the number of hours of work lost. According to their estimates, an average of 12% of Canadians were absent from work each year due to seasonal flu during this period. Their flu-related absences lasted an average of 14 hours, which represents 20 working days per 100 employees.

More recently, another group of researchers found that a significant proportion of Canadians over the age of 50 who contracted the flu were forced to take time off work and reduce the number of hours they spent on volunteer activities, or as a caregiver. In fact, just over half of people nearing retirement (aged 50 to 64) who contracted the flu during the 2018-2019 and 2019-2020 seasons acknowledged having had to take time off work; these absences lasted an average of 4.4 days. Among people aged 65 and over, the rate of absenteeism due to flu was slightly lower, coming in at 47% in 2018-2019 and 40% in 2019-2020. The study also reports that the flu forced these Canadians to reduce the number of hours they volunteered in 2019-2020 by an average of 7.8 hours for those aged 50–64 and 25.3 hours for those aged 65 and over (Waite et al., 2022).

Estimated direct costs of influenza in Quebec

We wanted to measure the full extent of the burden of influenza on Quebec in our own way, using more recent data whenever available, and with consideration of both the direct and indirect costs associated with it.

With respect to the direct costs, we calculated only the number of medical consultations, emergency room visits, and hospitalizations due to influenza-related illness. Direct costs connected with the roll-out of immunization campaigns, with the purchase, and supply to the various sites, of vaccines, and with the mobilization of professional resources dedicated to vaccination were excluded.

Medical consultations, emergency room visits and hospitalizations

Based on previous INSPQ survey data (CIQ, 2018) and demographic data from the *Institut de la statistique du Québec* (ISQ), we estimate that influenza was responsible for 118,058 doctor's office and emergency room consultations in Quebec in 2022 (1,358 per 100,000 population). The healthcare costs associated with these consultations amounted to approximately \$17.2 million for the Quebec government (not including the cost of medications).

The number of hospitalizations due to flu-related complications was estimated at 7,693 in 2022 (88.5 per 100,000 population). These hospital stays resulted in estimated healthcare costs of more than \$84.2 million, or almost \$11,000 per hospitalization (again excluding drugs).

Estimated indirect costs of influenza in Quebec

Both our interviews with experts and our literature review demonstrated the importance of measuring the indirect effects of influenza. We obtain indirect benefits, for example, when vaccination creates herd immunity, i.e., when other unvaccinated people become less at risk of catching the disease and becoming ill. According to the experts we met, these benefits are more difficult to measure and only a few studies have managed to incorporate them into their analysis (see in particular Loeb et al., 2010; Ward, 2014).

Some experts also noted that a proper economic evaluation needs to take into account the wider benefits associated with influenza vaccination, whether these relate to reducing the risk of contagion and improving the health of the population (White, 2022; Sevilla, Bloom, Salmon and Bashai, 2023), increased participation in the labour market and the economy (Jit et al., 2015), or incentives for companies to invest in the development of new and more effective vaccines (Finkelstein, 2004). More specifically, they brought up the example of flu vaccines reducing the risk of cardiovascular events, a significant benefit that has been highlighted by recent studies (Behrouzi et al., 2022; Holodinsky et al., 2022).

As a complementary observation, the experts also deplored the fact that indirect costs such as absenteeism from work, overcrowding in emergency departments, and longer delays in surgery due to the mobilization of hospital staff were somehow not taken into account in the cost-benefit assessment of the flu vaccination program. When patients with influenza are hospitalized, planned surgeries often have to be postponed given the current constraints on the capacity of Quebec's hospital network. For the patients concerned, these postponements may entail costs that could be avoided through vaccination (Brassel, Neri, Schirmacher, and Steuten, 2023).

In an effort to remain conservative in our calculation of the economic burden of influenza, we have taken account of productivity losses due to absenteeism from work but have chosen to ignore productivity losses from presenteeism.

Loss of productivity

The indirect costs associated with labour productivity losses have been considered from a societal point of view using what is called the human capital method (Zhang, Bansback and Anis, 2011). These productivity losses take into account both the absence from work of people who are employed and the forgoing of unpaid work activities (volunteering, caring for family members, household chores or childcare) for all people affected by influenza. The value of lost productivity due to absenteeism was estimated using Canadian data on the duration of absence from work due to influenza, as compiled by Schanzer et al (2011), multiplied by the average hourly wage in Quebec in 2022.² The work lost was evaluated on the basis of an average gross hourly wage of \$30.96, excluding benefits. The value of the working time sacrificed by parents forced to stay at the bedside of a child sick with influenza was also measured at the average hourly wage of a Quebec worker (excluding benefits). For the cost of lost unpaid work, we used the average hourly wage, according to Statistics Canada, of family childcare and home support workers from the last quarter of 2022 (\$20.95).³

Our calculation of productivity losses took into account the fact that not all the people who contracted influenza were active in the labour market, nor those who remained at their bedside. For this purpose, we used employment rates by age group taken from Statistics Canada databases.⁴

Using the data on employment, the absenteeism rate (11.5%) and the average length of absence (14 hours) as compiled by Schanzer et al (2011), it was possible to estimate the cost associated with working time lost due to influenza each year in Quebec. In 2022, these productivity losses are estimated at \$292.6 million. This result is consistent with other studies that have estimated

² According to Zhang, Sun, Woodcock and Anis (2017), this conservative assumption may underestimate the true value of lost productivity due to absenteeism (particularly for jobs that require teamwork).

³ Statistics Canada, Table 14-10-0356-01: Job vacancies and average offered hourly wage by occupation (broad occupational category), quarterly, unadjusted for seasonality.

⁴ Statistics Canada, Table 14-10-0327-01: Labour force characteristics by sex and detailed age group, annual.

that these indirect costs represent between 70% and 90% of the overall burden of influenza (De Courville, Cadarette, Wissinger, and Alvarez, 2022).

Expert opinion: obstacles to vaccination and potential solutions

In view of the major impact that influenza can have on both individual health and the province's economy, the research team spoke to 13 experts in Quebec who agreed to discuss the findings from Phase One of our study, and share with us their understanding of the **obstacles to vaccination** against seasonal influenza in Quebec, as well as the **possible solutions** that would enable the province to move closer to the vaccination targets set by the Quebec government.

Obstacles to vaccination against seasonal influenza

Analysis of our interviews with experts on the obstacles to vaccination identified five major types. These are presented in detail in the following section.

The effectiveness of the vaccine is central to the public's reluctance

According to the experts we met with, people's perception of the effectiveness of influenza vaccines is a major factor in their reluctance to be vaccinated. A widespread perception among Quebecers seems to be that the efficacy of flu shots is highly variable, and that there are "good years" and "not so good years." Despite recent innovations, the data show that vaccine effectiveness can indeed vary significantly from one flu season to the next, going from 50% one year to 8% the next (see Figure 2).

Matching candidate vaccine strains to circulating influenza viruses can pose major challenges for manufacturers, according to the experts we spoke to. Given that the production process for flu vaccines generally extends over a period of up to six months, predictions about which viral strains are likely to circulate must be made well in advance of each flu season. Although we have seen progress in recent years in the generation of predictive models of influenza virus evolution, and in the development of new vaccine manufacturing techniques as well (Villanueva, 2023), many challenges remain (Gouma, Anderson and Hensley, 2020). In the opinion of the experts we consulted, this may partly explain the high levels of variability in the effectiveness of flu vaccines from one year to the next.

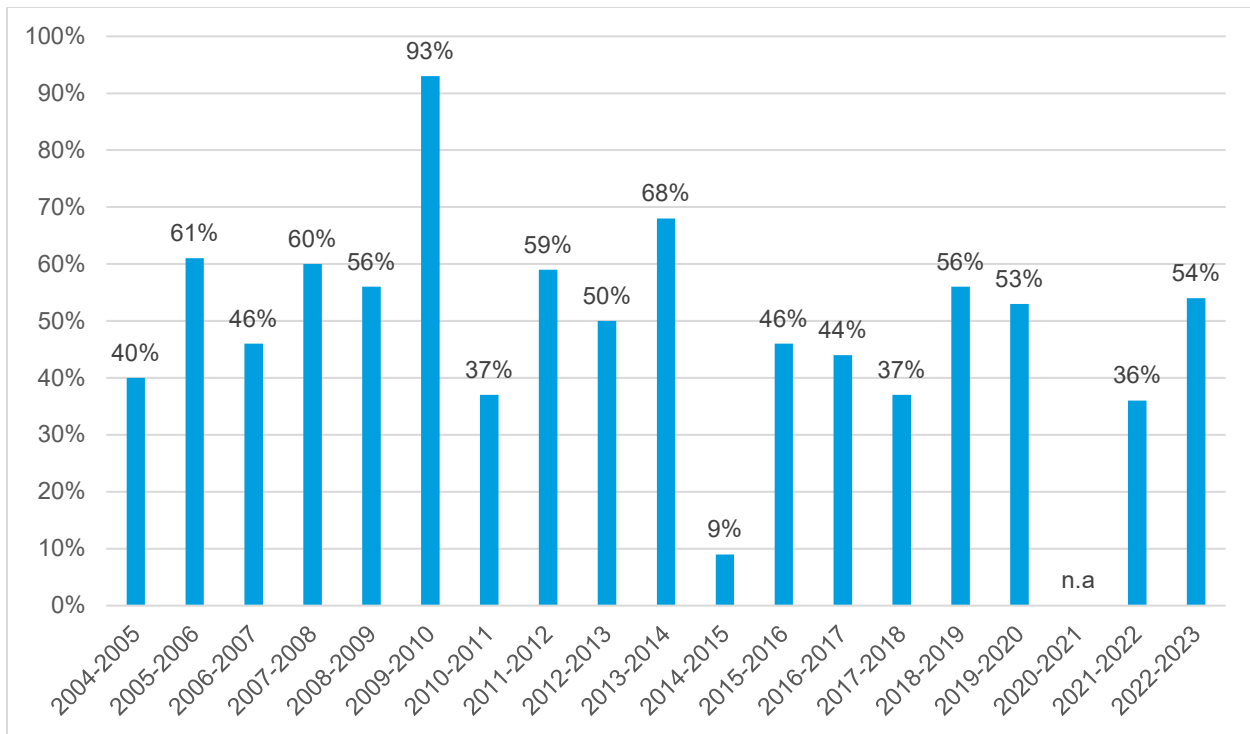


Figure 2: Rates of effectiveness of influenza vaccines in Canada, 2004-05 to 2022-23.

Source: Canadian Sentinel Practitioner Surveillance Network (SPSN).

According to the experts, the volatility of vaccine effectiveness makes Quebecers less inclined to get vaccinated on a regular basis, as they do not always recognize the usefulness of vaccines. This can be seen in the results of the survey of the Quebec population: the people who are always vaccinated, or who are vaccinated occasionally, have higher confidence that vaccines are effective in preventing disease than the people who never get vaccinated.

The experts believe, however, that this lack of consistency in efficacy rates from one year to the next can give the impression that vaccines are not all that effective, which reduces the motivation to pursue vaccination along with the sense that the shots are useful. In this way, “bad years” can lead to cynicism on the part of some people, even leading to the false impression that they’ve been fooled into getting vaccinated “for nothing.” This creates a vicious cycle, since one disappointment can lead to lack of enthusiasm in subsequent years.

According to the experts we met with, the way we communicate regarding the effectiveness of vaccines can contribute to the impression that they do not work. Indeed, the influenza vaccine is very unusual in comparison with others, and these particularities also influence its effectiveness

rate. It is not uncommon for other types of vaccine to be 90% effective, compared with, say, 50% for influenza. When Quebecers hear talk of 50% effectiveness, they are more reluctant to be vaccinated. Thus, there is a lack of understanding among the population of what a vaccine effectiveness rate really means. One expert gave the following example: “It’s as if, in people’s minds, the efficacy rate of a vaccine translated into the same logic as a 60% pass mark in an exam”. However, the way vaccination works is quite different, and getting vaccinated is still a much better way of preventing hospitalization and death than not getting vaccinated (Chen et al., 2010).

Some specialists observe that, on the other hand, this misunderstanding of how the flu vaccine works may exaggerate the feeling of protection for some people, leading them to engage in risky behaviours such as washing their hands less frequently, or increasing their exposure to the disease. Here too, an in-depth analysis of our survey of Quebecers confirms the experts’ view, showing that those who always get vaccinated are much more confident that they will avoid the flu than those who get vaccinated occasionally, or never.

One last consideration stressed by our experts is that vaccine effectiveness varies significantly from one person to another, influenced by various individual factors such as age, general health, immune status, and the risk of infection to which each individual is exposed. Accurate estimation of vaccine effectiveness remains a challenge due to these confounding factors as well as other sources of statistical bias (Ainslie, Haber and Oreinstein, 2019). According to the experts we interviewed, studies of seasonal influenza vaccine effectiveness are not conducted to influence people’s individual decision-making but are designed first and foremost to inform public health decisions (Zhao, Stirling, and Young, 2019).

The perception of influenza: a virus underestimated

The second obstacle to vaccination against influenza relates to the disease itself. According to the experts, there is a widespread lack of awareness of the illness and its consequences. Because there is no screening for influenza, and the symptoms can be confused with a cold or any other respiratory virus, it is not uncommon for people to underestimate the disease as well as their vulnerability to it.

With respect to feelings of vulnerability, the survey results reveal the same finding implied by the experts: the more vulnerable people perceive themselves to be, the more likely they are to be vaccinated on a regular basis. Thus, according to the survey results, the perception of vulnerability

is higher among those who always get vaccinated than among those who never or occasionally get vaccinated. And, in turn, those who occasionally get the vaccine see their vulnerability as higher than those who are never vaccinated. Furthermore, though the experts stressed that young people do not feel terribly concerned by this disease, and that this feeling is often reinforced by public health campaigns that focus mainly on the elderly and the vulnerable, the population survey also revealed other well-established myths that can have a major impact on the protection that can be derived from the vaccine. All these myths contribute to general misconception about the disease, and this can have a perverse effect on vaccine coverage rates. No doubt as a result of the targeted public health message, therefore, the cohort of respondents who always get vaccinated is more likely to believe that only people over 65 catch the flu. They are also more likely to believe that the vaccine will prevent them from catching the virus, which may countervail the positive effects of the shot by encouraging them to adopt more risky behaviours.

Furthermore, vaccination campaigns often warn vulnerable people of the negative effects of illness, but, as some experts point out, the very notion of vulnerability may be poorly understood, and aside from certain obvious chronic illnesses such as asthma, other chronically ill people may be unaware of their own vulnerability and remain unaffected by awareness campaigns. By the same token, parents may find it difficult to conceive of all the risks associated with influenza for even their healthy children, whether these be the risks of hospitalization or complications from bacterial superinfections. So, because the risks associated with influenza are difficult to grasp, it is harder to motivate people to get vaccinated, as they may tend to prioritize vaccination for other, more serious viruses.

Obstacles linked to people's attitudes toward vaccination

The experts we interviewed also mentioned that many hesitations may be of an individual nature. Indeed, they indicated that fears regarding side effects, or phobias about needles, even though the safety of vaccines is well established (Harris, Wong, Nair, Fediurek, and Deeks, 2016), can lead to mistaken estimates of the risk-benefit ratio associated with vaccination. These perceptual biases regarding the risks of the disease are corroborated by the scientific literature. Previous studies have shown that a non-negligible proportion of people tend to overestimate the risks and underestimate the individual benefits associated with vaccines. As a result of various biases in perception, they are less likely to choose the flu vaccine (DaCosta DiBonaventura and Chapman, 2008). Further analysis of our survey points in this same direction, since the respondents in the

group who never get vaccinated are more acutely aware of the inconveniences associated with the act of vaccination (pain, side effects, etc.) than the other two respondent groups.

Our experts also observe that people get vaccinated primarily for themselves, and not for others. As such, they do not necessarily think about protecting others through vaccination, and often only consider the impact they may suffer individually. Our survey results do, however, show a nuance to this observation. The cohorts of respondents who always vaccinate, and who never vaccinate, seem less inclined to base their decision on the effect that vaccination may have on others (protection factor). In contrast, the group of occasional vaccine recipients seems more inclined to consider the health of others in their decision-making process. The experts also identify a cultural element to this kind of behaviour: Anglo-Saxon cultures are more oriented toward civic life, the collective, respect for others and for order, so a higher rate of coverage is observed more frequently than in French-speaking cultures, which favor independence of spirit and action.

According to the experts we met with, people's individual characteristics and experiences have a significant influence on their propensity to vaccinate. One of them even mentioned that he himself had chosen to be vaccinated after experiencing a particularly virulent bout of flu in the past. This behaviour is also in line with what researchers have observed in a sample of the American population. For example, a recent study showed that among the unvaccinated, catching the flu had the effect of encouraging them to pursue vaccination the following year. Conversely, vaccinated people who still got the flu anyway had a lower tendency to get the vaccine the following year (Jin, Zhe, and Koch, 2021).

Logistical challenges of vaccination campaigns

The fourth obstacle invoked by the experts concerns the logistical aspects of the vaccination campaign. The nature of flu vaccine production is to hinge on predictions made at the beginning of the year based on which strains are prevalent in other jurisdictions. Combined with variability in the timing of peak infection, vaccine production and availability can be subject to delays, and vaccines must be ordered several months in advance (in June for use in October). This reality makes it quite complicated to estimate the quantities needed, and to plan the material (storage, cold chain maintenance, etc.) and human resources required to manage cyclical demand for vaccines. All this can discourage some professionals from making vaccines available in their pharmacies or medical clinics. Added to this is the variation in vaccination coverage programs, which exacerbates the uncertainties for the populations concerned as well as for the vaccine volumes required.

Some experts interviewed also raised the increased difficulties in making vaccination accessible in medical clinics since the law prohibiting accessory fees, which came into force in January 2017. Indeed, since the government reimburses them only for the vaccine, and they can no longer charge these fees, it follows that clinics must bear the financial burdens associated with refrigeration and administration, among other things. Experts have pointed out that in the absence of full financial support from the government to encourage vaccination in settings closer to communities, some family doctors will simply prefer to stop offering this service to their patients.

The abolition of accessory fees has also had the effect of modifying the vaccination process by adding extra steps for Quebecers; whereas in the past it was possible to obtain the prescription and the vaccine in the same place, it is now necessary to obtain the prescription and then, in a second step, make an appointment elsewhere to be vaccinated. According to our surveyed experts, these additional steps make it more difficult for patients to get vaccinated. The process is even more difficult for the segment of the population who lack access to a family doctor.

Communications

The fifth and final impediment cited by the experts during our interviews concerns the many challenges associated with communications. Indeed, among the authorities surveyed, there is general agreement regarding the efforts required to raise public awareness, not only of the vaccine (its efficacy, the consequences of vaccination, the benefits of vaccination for oneself and for others), but also of the protective behaviours to be adopted as a complement to vaccination (preventive isolation at the onset of symptoms, frequent hand-washing, etc.); vaccination is not a panacea, and the effort to protect oneself can be nullified when a vaccinated person adopts risky behaviours.

In addition, communications in connection with the vaccination campaign must include accurate, precise and concise information on the vaccination process and on the target populations who can benefit from free vaccination. However, according to the experts interviewed, there is still far too much vagueness about who is eligible and about how to obtain the vaccine. This can lead to disengagement on the part of both the general public and the populations more specifically targeted by the flu immunization program.

For some of our experts, the current public communications strategy also struggles to adequately convey all the nuances associated with vaccine efficacy and the effects of low coverage rates on society. The difficulty of effectively promoting a product with variable efficacy must be recognized,

as must the challenge of developing an effective communications strategy when data on the value of vaccines and the impact of vaccination are patchy or even absent. Indeed, even in the event of infection there is no systematic test to determine whether influenza is responsible, or some other respiratory virus. Since influenza is not a notifiable disease, it is all the more difficult to determine the proportion of sick people in the population and the disease's effects on society as a whole. Additionally, there exists very little data on social impacts such as absenteeism and presenteeism. Unlike in other jurisdictions, these elements are not taken into account in the development of vaccination guidelines.

These gaps in the data also mean that erroneous or approximate information plays a far greater role than the official data compiled by public health authorities, particularly on social networks. According to the experts we surveyed, the overabundance of information sources, the proliferation of "false experts," and the piecemeal reporting of information by both the media and social networks all contribute to the public's confusion and make it difficult for them to make sense of the situation. And furthermore, say the experts, healthcare professionals and the government often add to this confusion by failing to provide guidelines that are clear and stable over time. Instead, vaccination recommendations can change annually, which often does not give people enough time to fully understand and adjust to them.

On top of this, point out certain experts within our group, the lack of consensus among healthcare professionals contributes to the lack of confidence some may feel in vaccination. Indeed, there may be divergences of opinion between professionals, due in particular to certain inconsistencies in the messages transmitted. These inconsistencies can lead to different recommendations depending on the healthcare professional surveyed, which can in turn erode the public's trust in the practitioners. Yet the literature shows that the relationship of trust between healthcare professionals and patients is one of the key determinants of vaccination.

Lastly, a number of experts suggested that funding the influenza immunization program is crucial to sending a message about the importance of vaccination and the seriousness of the endeavour. Some of the experts added that it is much more difficult to implement effective vaccination campaigns, and to communicate and promote the importance of vaccination, when access is neither easy nor free. One of our experts offered the opinion that, "If it [flu vaccination] is not a priority for the government, why would it be so for the public?" The lack of public funding thus leads many people to mistakenly believe that flu vaccination is not important for them (Scheifele, Ward, Halperin and McNeil, 2014). An absence of public funding is, moreover, associated with

lower flu vaccination (among adults aged 18 to 64 without chronic illness) in Quebec compared with other jurisdictions (Farmanara, Sherrard, Dubé, & Gilbert, 2018).

Potential solutions

Meeting the efficacy challenge

The experts we consulted identified two key factors for addressing the issues surrounding the effectiveness of influenza vaccines.

The first factor involves the pharmaceutical industry itself, which must work to provide convincing alternatives to the vaccines currently on offer. Experts believe that to increase the agility of vaccination campaigns and provide the population with vaccines whose efficacy is both high and stable over time, it will eventually be necessary to migrate to new types of vaccines better adapted to the current epidemiological risks. The ideal solution would be the development of a universal influenza vaccine, i.e., one that does not need to be adapted to circulating variants, but that is effective against all strains of the disease. Such an innovation would vastly simplify the vaccine development process—which would not have to be reengineered every year—and the healthcare and public health professionals would not have to make the difficult annual trade-offs each year between the different choices available to them. Clinical trials are, in fact, already underway (Arevalo et al., 2022), and it is vital to the future well-being of the population that we intensify our commitment to turning this innovation into a reality as soon as possible.

Until the above is realized, the second factor has more to do with public health and the scientists who study the phenomenon. According to our experts, we need to redouble our efforts to better assess the efficacy and value of vaccines. However, as previously mentioned, actual data on influenza is available, but it is quite limited insofar as flu diagnosis is not systematic. Current data collection methods therefore underestimate the true number of influenza cases occurring each year (McCarthy et al., 2020). In light of this issue, our experts brought up several relevant mechanisms for improving the collection of accurate data: sentinel clinics, sampling by healthcare teams of hospitalized people, or mobile stations set up in senior citizens' centres.

Meeting the perception challenge

Concerning the issues of perception surrounding the virus, the experts believe that solutions mainly involve raising awareness among two specific audiences:

The first audience is our healthcare professionals, who are considered the most trustworthy people to whom people turn for relevant information about vaccination. In-depth work is therefore needed upstream of the vaccination campaign to understand why some doctors (and other healthcare professionals) are reluctant to recommend vaccination. We need to be able to grasp their questions, address their fears and, above all, equip them to provide quality vaccination advice. It is therefore vital that they be well-informed about the vaccination program, and familiar with which groups should be given priority for vaccination.

The second audience is the people who get themselves vaccinated. As we have already mentioned, vaccination alone is not enough to prevent the spread of the flu. Yet many myths about the virus and the vaccine persist—even among those who are vaccinated—and so our advisors deem it appropriate to include awareness-raising as a part of the vaccination process itself. Our literature search reveals positive spin-offs from such initiatives (Maisonneuve, Wilson, Witteman, Brehaut and Dubé, 2018). In particular, it could be useful to take advantage of the 15 minutes of compulsory post-inoculation observation to reiterate complementary health instructions such as the importance of hand washing and of isolation in the event of infection, and to revisit and debunk the most common myths associated with the disease.

Meeting the logistics challenge and changing people's behaviour

As we saw in our survey of the Quebec population, individuals tend to fall into a few different categories with respect to vaccination, and each category presents specific behaviours and beliefs. For the experts, the fears and questions of every category are legitimate and should be addressed with honesty and transparency.

Some of our experts mentioned that it is not uncommon to see some prejudice towards those who choose not to vaccinate, and suggestions that they simply do not understand anything. People who admit they do not want to be vaccinated are even often referred to as “conspiracy theorists.” This kind of prejudice can be damaging insofar as it precludes any real effort from being made to respond adequately to their fears, and this can then crystallize their resistance. Yes, the question of vaccination is complex and requires nuanced answers, but no stakeholder should skimp on their efforts to raise awareness if we want to increase the province's coverage rates and reach our vaccination targets.

The experts also stressed the need to find solutions to the frustrations of people who always get vaccinated, or who get vaccinated only occasionally. For the latter group, the question of

accessibility is paramount, and is intimately linked to the logistical challenges of the vaccination campaign. For this reason, our experts believe it would be beneficial to increase the number of vaccination sites, as well as the diversity of vaccinators, in order to improve overall access to vaccines. In addition to using vaccination centres, pharmacies, and family doctors' offices, the experts noted further alternatives that could benefit from further study. To reach the elderly, for example, it would be worthwhile to offer vaccinations systematically in senior citizens' centres with more than 50 residents. To avoid complications among the youngest members of our population, a vaccination program in schools and day-care centres, such as already exists in some Canadian provinces, would be a good way of reaching young people, while making coordination easier for parents. Another option would be to organize mobile vaccination clinics in vulnerable communities, in a similar manner to blood donation clinics. Going to people directly through such clinics would ensure that vulnerable people are reached in the environments where they live. Each of these options offers advantages and disadvantages, but it is clear that by diversifying the nature of the sites and making vaccines accessible in a timely manner, it would be possible to better meet the needs of individuals and thus reduce the disruption to their daily activities (Champredon et al. 2018).

As we have seen, changing people's behaviour also requires that they have close contact with the healthcare professionals they trust. We therefore need to make the most of all healthcare professionals and encourage greater collaboration between them. Given pharmacists' proximity to the population and their ability to take the time to educate people on the subject, many of the experts in our survey stressed the importance of them playing a greater role in vaccination in addition to family doctors. Since the passage of Bill 31 in March of 2020, pharmacists can legally administer vaccines. As a result, vaccination by pharmacists has come to enhance that offered in the rest of the healthcare network, notably in doctors' offices and CLSCs. Prior to the implementation of this new law, the only way to offer them legally in pharmacies was to delegate the vaccination service to nurses (Chadi et al., 2022). However, there is still some catching up to do with respect to other provinces, which have been allowing this practice for much longer. By involving pharmacists to a greater extent, we can increase the frequency with which messages about the importance, advantages and disadvantages of vaccination are disseminated.

Finally, for the experts, the investment required of healthcare professionals in general, and pharmacists in particular, and the need for close collaboration, undoubtedly require the introduction of fair incentives consistent with the effort required, and simplification of the supply process. Thus, in addition to the monetary aspect—covering costs other than the vaccine dose,

so as to make the experience identical for patients, regardless of the vaccination site of their choice—some experts believe that it would be appropriate for the government to look into the question of revising the vaccine supply chain so as to make it the same regardless of the professional responsible for vaccination.

Meeting the communications challenge

As we have seen, communications is a cross-disciplinary issue that requires concurrent measures.

A shared long-term vision

First and foremost, the experts believe that before increasing efforts on the vaccination promotion strategy, it behooves the government to have a long-term strategic vision, and to ensure that this vision is disseminated and shared by all the stakeholders, including the general population. Indeed, until the last vaccination campaign in autumn of 2022, Quebec was bucking the trend among other Canadian jurisdictions. Since then, the government has announced an expansion of its program, but this decision remains a one-off, to be re-evaluated before each flu season. The experts we interviewed believe that consistency in decision-making is crucial to sending a clear and consistent message to the public about the importance of flu vaccination.

According to some of our consultants, this policy of seasonal re-evaluation is explained by the fact that the value of the flu vaccination program is assessed solely on the basis of its ability to avoid healthcare costs for the government. For some, this type of assessment is too simplistic, since vaccination confers benefits that go far beyond reduced use of the public healthcare system (consultations, hospitalization, etc.) by enabling a greater number of people to remain healthy and active at work and in their communities. Taking into account the wider benefits and evaluating them appropriately might make it easier to build the case for adopting an expanded vaccination program over the long term, rather than as a simple one-off solution. Many of the experts we interviewed believe that taking such a position would have a positive effect on vaccination rates by sending a strong signal to the population about the importance of vaccination.

It should be noted that there is not necessarily a consensus on this point, and that another school of thought would prefer to focus just on vulnerable people rather than the population as a whole. For the experts adhering to this school of thought, increasing the coverage rate in these vulnerable groups alone would both reduce the risk of developing serious illnesses and hospitalizations, and avoid mobilization of healthcare professionals to vaccinate healthy people against a background

of labour shortages. This more focused approach, they argue, would avoid generating the opportunity cost whereby these professionals would be unavailable to care for other population groups whose needs are more acute.

All the same, one thing is certain: whatever the government's decision, it needs to be for the long-term so that the contribution and efforts of all those involved in vaccination campaigns can be harnessed, and a communication strategy developed to promote effectively into the future.

Reinventing the vaccination campaign

The experts' next recommendation is for the vaccine campaign's promotional tools to be adapted to today's realities. Some mentioned the importance of reinventing the communications vocabulary surrounding vaccination and placing greater emphasis on the protection aspect. Others reiterated the importance of redoubling communication efforts and reviewing the frequency, clarity, simplicity, and accuracy of the message conveyed. Many concurred that the communication strategy must be tailored to the target audience, and that special efforts must be made to answer people's questions according to which survey cohort they belong to. Communication should not just focus on who should be vaccinated, but also on why and how: at present, the information is still far too vague for many Quebecers. It should be noted that our in-depth analyses of the survey of Quebecers showed that it is just as important to communicate the benefits of vaccination as it is the consequences of contracting influenza. In fact, understanding the consequences of contracting influenza only has a positive effect on people's vaccination intentions if they also understand the benefits of the vaccine. Otherwise, the perception of the consequences of catching the flu has a negative effect on the intention to get vaccinated.

To this end, a number of experts have advanced the idea of stimulating vaccination among the Quebec population by organizing an annual awareness-raising event ahead of the campaign itself. This themed week in support of vaccination would be an opportunity for the various players involved to communicate all the important information relating to the flu season, and to remind people of the significant impacts that influenza can have on individuals and society as a whole.

Engaging overlooked stakeholders

Lastly, our panel observes that, while local healthcare professionals (family doctors, pharmacists, etc.) clearly play a crucial role in convincing people to be vaccinated, it is important not to underestimate the influence of other players. To communicate effectively, they continue, the message must come from multiple complementary sources of influence.

They recommend, therefore, that the first circle of influence, i.e., family, friends, and anyone with influence over personal decisions, be harnessed as well, as this group may be more persuasive than big players such as the government. This will enable the pro-vaccination message to be more broad-based than just the bare bones generally communicated in traditional campaigns, e.g., the target population and the campaign start dates. The more comprehensive the message, the better equipped these ambassadors will be to relay the right information. It should be noted that the in-depth analysis of our survey results tends to temper this perception, since this factor seems to have only mild influence on the intention to be vaccinated when compared with other factors. Thus, for those who are occasionally vaccinated, support from family members is less motivating than the vaccine's effectiveness, the recommendation of an expert or the duration of the vaccine's protection (the three factors with the greatest effect on the intention to be vaccinated). That said, this factor does still have a greater impact than opinions on social networks. And for those who have never been vaccinated, the conclusion is the same: the vaccine's effectiveness, side-effects, and duration of protection have a greater influence on their intention to be vaccinated than the support of family members. But this last factor remains more influential than social networks or the number of people already vaccinated.

The second circle of influence identified by the experts is employers, who, it turns out, are relevant to the vaccination issue on several fronts. In addition to raising employee awareness of the virus and its impact on health and productivity, employers have the potential to play a central role by compiling data on influenza-related presenteeism and absenteeism, as well as on the many costs associated with the illness. It should be stressed, however, that experts believe employers cannot do this alone, lest they be accused of being opportunistic. In order for them to make the largest and most credible contribution possible, this type of involvement must take place in consultation with multiple stakeholders.

The final circle of influence identified by our experts consists of the various media. By their lights, given the current context in which misinformation is on the increase—particularly on social networks—the media must do their jobs carefully, staying aware of their responsibility for transmitting scientifically accurate information to the public. The experts recognize that this task is complex and that the press, etc., often have to navigate a balance between entertaining their readership and maintaining their mission to inform the public. In such complex environments, it is important to take a nuanced approach even when reporting news stories: they must be carefully situated in context and must offer a general view, otherwise the message conveyed may work counter to all the other efforts being made in relation to vaccination communications. Although

journalists across the country do generally support the scientific consensus that flu vaccination is a very beneficial intervention, sometimes articles focus too much on the low vaccine efficacy without mentioning the many valuable contributions of vaccination (Murdoch and Caufield, 2018). As a result, public health has an additional responsibility to correct the information being conveyed by the media.

Conclusion

For many years, influenza vaccination rates have been significantly lower in Quebec than in the other Canadian provinces, both for the population in general and for the elderly in particular. Seasonal flu vaccination coverage is **crucial to the overall health of the public, to the productivity of organizations, and to the smooth running of the economy as a whole**, yet, as we have seen, this vaccination coverage still languishes below the targets set by government authorities. Based on Canadian survey data from the scientific literature and official data from the INSPQ, we estimated that productivity losses due to influenza-related absence from work amounted to **\$292 million in 2022**. This amount is in addition to the direct costs associated with medical consultations, emergency room visits, and hospitalizations due to influenza, which themselves represent an economic burden of **\$101 million in 2022**.

Our study has enabled us to derive a number of conclusions.

Firstly, our survey of the Quebec population revealed **three very different categories of Quebecers**, each with separate beliefs, questions, and concerns. The experts underlined the importance of developing personalized communication strategies to better respond to each set of expectations and fears in the hope of convincing them to get vaccinated, while at the same time **reinforcing general awareness-raising efforts, since many myths associated with the virus and vaccination still endure**.

Secondly, **the logistics of the vaccination campaign are complex**, and every effort must be made to simplify them. This requires the joint contribution of several key players. On the one hand, **the pharmaceutical industry must work to develop universal vaccines** that reduce the yearly uncertainty of the epidemic and increase effectiveness against the disease. On the other hand, the government must **simplify the vaccine purchasing process** and work to **identify collaborative solutions that facilitate more local vaccination** within communities.

Lastly, we must remain mindful that achieving the targets that the province has set for itself requires **the involvement and coordination of all the players**. This coordination cannot be achieved without a long-term strategic vision from the government that sends a strong, clear signal to the various stakeholders and the public. Evaluation of the overall economic burden of influenza—a total of \$394 million in 2022—suggests that we need to **broaden the decision-making criteria by focusing as much on the societal impact as on the cost to the health and social services network**.

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