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On April 27, after more than a month of lockdown, Premier François Legault announced its plan to gradually reopen schools and economic activities in Québec starting on May 4. One of the main arguments raised to support this decision is that the number of COVID-related deaths outside elderly homes has remained stable, and therefore that the disease is under control in the general population. To what extent is this an appropriate characterization of the COVID-19 epidemic in the province?

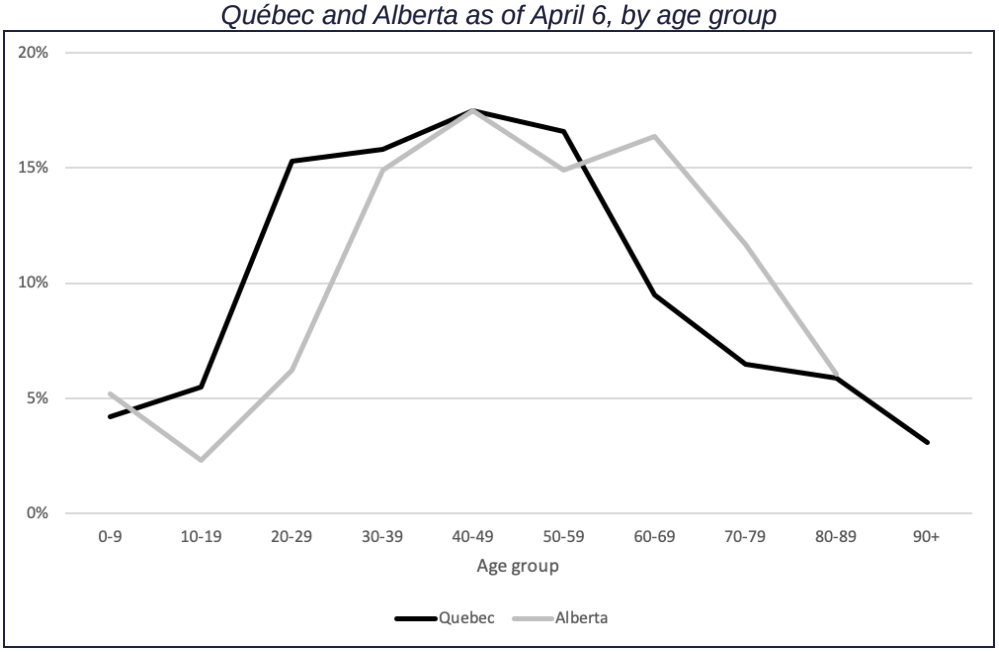
The two phases of the COVID-19 epidemic in Québec

After two weeks of travel-related transmission following March break [*1*], the COVID-19 epidemic in Québec entered its first phase of sustained community transmission in the third week of March. On March 23, this prompted the provincial government to expand the lockdown measures first introduced on March 13 by halting all non-essential in-person business and commercial activity [*2*]. As in many other countries, this approach aimed to "flatten the curve" of infections in order to avoid overwhelming the health care system [*3*]. Following the model of South Korea, the main strategy to achieve this goal was testing widely for the disease. Drive-through screening clinics were set up in Québec City and Montréal [*1*]. Until early April, Québec was thus the second province for the number of tests performed in Canada, after Alberta.

Québec followed the recommendations of the World Health Organization, and tested only individuals symptomatic with fever, cough, and difficulty breathing. This was different from Alberta, where until April 11 testing targeted high risk groups (high risk patients and health care workers, including those in elderly homes). The implications

of these different testing strategies can be appreciated by comparing the age distributions of COVID-19 confirmed positive cases in the two provinces (figure 1). Despite the older age structure of Québec's population, the age distribution of positive cases was younger in Québec than in Alberta. Indeed, Québec's strategy was able to identify infections among young adults returning from foreign travel during March break, but it did not detect cases at older ages, notably in elderly homes. Although early lockdown measures and wide testing seem to have helped the goal of flattening the curve [*4*], the COVID-19 epidemic in Québec entered its second phase when widespread outbreaks in elderly homes started to emerge.

Figure 1. Share of COVID-19 confirmed positive cases in Québec and Alberta as of April 6, by age group



Sources: INSPQ, Alberta Health.

Not just a problem in elderly homes

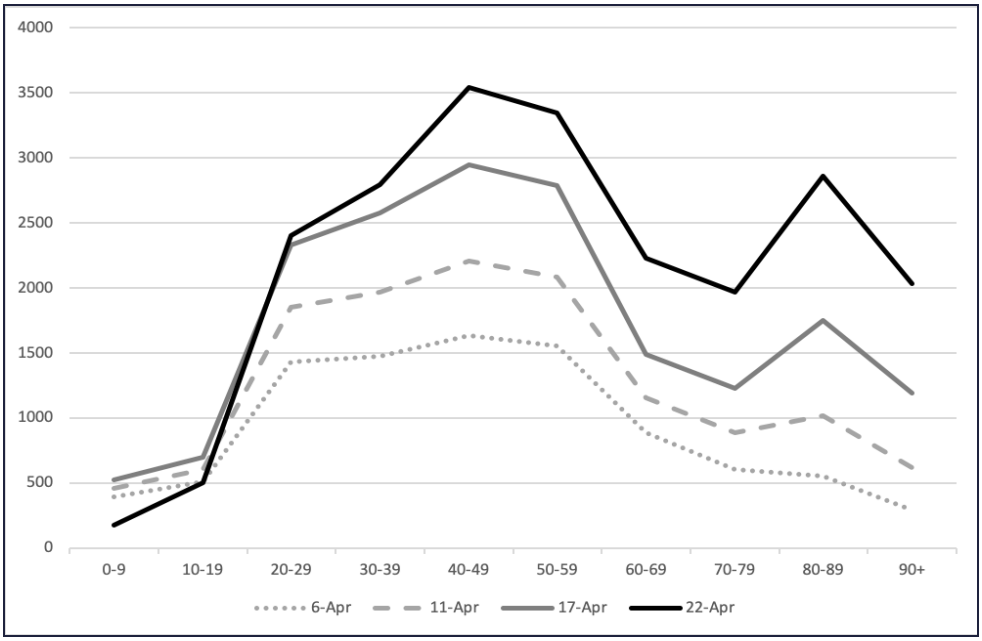
For the past three weeks, the official characterization of COVID-19 in Quebec has been that of a problem which is limited to outbreaks in elderly homes, where most COVID-19-related deaths is found. It is difficult, however, to verify if COVID-19 is under control outside elderly homes, as the provincial government claims, because publicly available data are limited.

First, since no data on overall mortality for 2020 has been released, it is not possible to assess the excess mortality due to COVID-19 both in and outside elderly homes, that is, the degree to which mortality for all causes is above 'normal' levels observed in previous years. This has been shown to be an important indicator for evaluating the severity of COVID-19 in large metropolitan areas and countries that have successfully dealt with the epidemic so far like Germany and the Netherlands [*5*].

Second, no accessible information exists on the number and characteristics of infections in elderly homes among residents vis-à-vis health care personnel. The latter group is one of the categories with the highest probability of retransmission of the virus and should be closely monitored. In Montréal, where the majority of COVID-19 confirmed positive cases is found, there is growing evidence that outbreaks in elderly homes have spilled over to certain neighborhoods via the health care personnel [*6*]. This spillover could ignite additional clusters of infections even if lockdown measures are maintained. Careful monitoring is necessary before reopening the economy to make sure this situation has been addressed.

Third, since April 11, Québec's testing strategy for COVID-19 has changed. It is now limited to symptomatic cases requiring hospitalization and to high-risk groups (including health care personnel and people in elderly homes), while symptomatic individuals who do not require hospitalization are no longer tested. Figure 2 shows that, because of this strategy, the peak of infections at age 80 and above has become increasingly pronounced after April 11. Importantly, however, the cumulative number of infections as of April 17 and April 24 shows that, as we found in other countries [*7*], the largest proportion of COVID-19 infections remain concentrated in older working-age groups. These findings are in line with Premier Legault's suggestion that there are two COVID-19 realities in Québec - one in the elderly homes and one in the general population. Nonetheless, the number of confirmed positive cases in the working-age population (20-69 years) is much larger than in the 70+ age group. Furthermore, the number of cases that each infected person will cause (the reproduction number of the disease or R_0) in each group is unknown. This is of concern because it is the key determinant of the course of the epidemic.

Figure 2. Cumulative number of COVID-19 confirmed positive cases in Québec, by age group, various dates



Sources: INSPQ.

The public health argument for reopening the economy is a black box

In conjunction with the announcement of the gradual reopening of the economy, the INSPQ published two sets of post-lockdown projections. Projections of the total number of COVID-19 cases and deaths based on epidemiological modelling were carried out in collaboration with a team of researchers at the Université Laval [*4*]. The two proposed scenarios concerning the possible evolution of the epidemic if lockdown measures are gradually released after May 11 depend on assumptions made on the number of contacts between individuals, which determines the disease reproduction number. Yet the authors explicitly indicate that this key parameter has not yet been estimated for Québec, even though most other countries do so on a regular basis. The INSPQ also released projections of the number of hospitalizations [*8*]. These are based on the extrapolation of the daily increase in the number of hospitalizations and show a wide interval of variation.

Neither set of projections take into account the evolution of the epidemic in elderly homes. Since there is evidence of spillover effects outside elderly homes, the projected number of cases, deaths and hospitalizations in these studies is likely underestimated. The data used in both set of projections are not accessible to external researchers, so it is not possible to evaluate the bias introduced by these limitations to the estimated scenarios.

Conclusions

This is not the time to fly blind. As Canada's Chief Public Health Officer Dr Theresa Tam aptly said, "Good data can mean the difference between life and death – or, in the case of a pandemic, tens of thousands of deaths."

Limited publicly available data at the provincial and municipal level make it impossible to evaluate when, where and how Québec should reopen.

Due to the limited data accessible at the provincial and municipal level in Québec, it is currently not possible to carry out analyses that are essential for determining when, how and where Québec should reopen, and what control systems need to be put into place to avoid a second wave of infections. The lack of accessible data has already been stressed by many researchers who have the will and the skills to contribute to the current fight against COVID-19 in Québec [*9*]. The provincial government should make accessible as much timely information as possible to take advantage of this opportunity and reopen the economy with the highest likelihood of success.

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