

EVIDENCE BRIEF

Economic Impacts Related to Public Health Measures in Response and Recovery during the COVID-19 Pandemic

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Key Messages

- In the context of public health measures for control of the Coronavirus Disease 2019 (COVID-19) pandemic, a number of modelling studies have illustrated that multiple short-term lockdowns over time are more economically harmful than a single, longer lockdown targeted to achieve low levels of community transmission.
- Longer lockdowns without provision of income support; however, may have significant negative impacts that increase wealth inequity.
- Economic analyses identified for this evidence brief were based on modelling with a limited scope of inputs; thus, real-world economic impacts could be very different.
- Modelling suggests that variants of concern (VOC) will increase the required duration of a lockdown to be effective in reducing transmission.
- To support a sustainable transition from response to recovery as vaccination rates increase in the province and society works towards entering the next stage of the pandemic, a data-driven, regional or provincial approach is recommended, rather than a reactive and local approach, the latter which is not expected to be sufficient to manage a VOC surge.

Issue and Research Question

In the management of public health emergencies, the recovery stage can be seen as a continuum between response and preparedness. The World Health Organization Strategic Framework for Emergency Preparedness describes a first principle for emergency preparedness as “safeguarding, maintaining and restoring the health and wellbeing of communities.”¹ While vaccination rates in Ontario are expected to increase during Spring 2021, risks of a concerning third COVID-19 pandemic wave persist in Ontario communities with high transmission levels in many jurisdictions, a steadily increasing proportion of VOC,² and low vaccination coverage. A significant third wave prior to widespread vaccination and/or herd immunity is expected to lead to unnecessary morbidity, mortality and critically compromising our health system, and further delaying societal recovery. Given the stringent and extended duration of measures enacted in countries such as England and Ireland in order to respond to a VOC surge, prevention of a third wave may reduce the direct health impacts from COVID-19, as well as

mitigate the health and non-health indirect impacts, such as economic, from stringent measures where possible.³

In public health, evidence on the economic benefits of investing in prevention has been demonstrated by modelling studies that present returns over the long-term.⁴ In the context of the COVID-19 pandemic, the public health measures that constitute the most stringent measures or 'lockdown' interventions vary across jurisdictions but share many similarities including significant direct and indirect economic costs (e.g., workplace closures).^{3,5-8} In March 2020, Gross Domestic Product (GDP) in Canada dropped significantly and continued to rise through to the end of 2020; however, it still remained about 3% below pre-pandemic rates from February 2020.⁹ Industries that produced goods (e.g., wholesale trade, manufacturing and construction sectors) saw increases in December 2020/January 2021, while service-producing industries declined during this period.⁹

With increasing prevalence of VOC in Ontario, it is important to consider the ongoing risks of a third wave in Ontario and the predicted impact on morbidity, mortality and health system impacts² in relation to recovery using a whole-of-society approach.¹ Cautious reopening coupled with swift, intense and scalable re-implementation of measures based on worsening epidemiology could support prevention of a third wave.³ Using a prevention-based approach may further support a more stable societal recovery that allows safe and sustainable opening of settings.

This evidence brief provides an overview of the short- and long-term economic impacts using a public health lens in considering lockdown public health measures based on the least long-term economic harm.

Methods

This evidence brief was informed by published PHO epidemiological reports for Ontario context; reviews on public health measures on other jurisdictions; articles identified by hand-searching; data from subject matter experts; and keyword searches for recent reviews on economic impacts of lockdowns. Articles were included if the authors provided a comparison of economic impacts of different lockdown approaches. Additional relevant articles were identified (February 25, 2021) by taking each article of interest and scanning the reference list as well as identifying other resources that cite the article. A formal database search was not conducted due to feasibility, thus some relevant articles may have been missed.

Main Findings

Ontario Context

CURRENT CONTEXT

- The daily epidemiological summary in Ontario reported by Public Health Ontario (PHO) as of March 4, 2021 indicated:
 - Compared to the day prior, confirmed cases have increased by 25.8% (from 994 to 1,250), deaths have increased 120% (from 10 to 22), and resolved cases have increased by 8.0% (from 1,072 to 1,159);¹⁰

- As of mid-February 2021, variant of concern lineage B.1.1.7 had been detected in all geographic regions of Ontario except the North West region, which highlights concerns for future rates of COVID-19 cases growing fast without sufficient control measures due to the increased transmission of lineage B.1.1.7;¹¹
- In the COVID-19 projections of the provincial Science Advisory and Modelling Consensus Tables February 25, 2021 report it is noted that:²
 - The recent public health measures in Ontario, including the provincial lockdown and stay at home order had a significant impact on reduction of daily cases and slowing the spread of new variants
 - Variant growth has matched trends in other countries
 - Future case growth will heavily depend on monitoring and control measures implemented now and in the future
- In Ontario, as of March 4, 2021, 784,828 doses of approved vaccines have been administered and 3.5% of Ontarians have received at least one dose.¹²
- In terms of economic impacts, unemployment rates have increased significantly in Ontario beginning in January 2020 and have not yet returned to pre-pandemic rates. Women and those with some or no post-secondary education were impacted to a greater extent compared to men and those with post-secondary education, respectively.¹³

ONTARIO'S RECOVERY AFTER COVID-19 PANDEMIC WAVES 1 AND 2

In the first wave, stringent public health measures implemented in Ontario in mid-March 2020 were maintained until the end of May, when some slow reopening of lower risk settings began across the province.¹⁴ A regional approach to reopening began in June, with jurisdictions that had achieved low levels of community transmission opening first, followed by jurisdictions whose rates were slower to return to lower transmission levels.¹⁵

By the end of July 2020 and end of the first wave stringent public health measures, all jurisdictions corresponding with Ontario's public health units had returned to low community transmission levels (i.e. similar to Green-Prevent in the Ontario framework). The epidemiology of Ontario public health units in July and August 2020 is displayed in Figure 1 of Appendix A. Consistent low levels of community transmission across the province enabled a lower risk setting for increased size of social gatherings and travel across the province given similarly favourable epidemiology.

Ontario's use of stringent, provincially-applied public health measures in the second wave of the COVID-19 pandemic was in response to increasing incidence rates, mortality, and health care system capacity compromise leading to cancellation of scheduled health care.¹⁶ Distinct from recovery from the first wave of the pandemic, the second wave provincial intervention was shorter in duration, with local jurisdictions reopening settings while still at moderate and high transmission levels¹⁷ (i.e. corresponding with orange, red and grey levels of the provincial framework).¹⁸

Currently, the province's public health units are assigned to different risk levels of the provincial colour-coded framework, with generally varied colours even within the larger Ontario health regions.¹⁹ The recent epidemiology during reopening after the provincial shutdown is displayed in Figure 2 of Appendix A. Thus, in the presence of community transmission of VOC in many jurisdictions of the province, the

heterogeneous epidemiological context and measures present risks for resurgence. It remains uncertain in the current context, when broader reopening and recovery for the entire province (E.g., resumption of wider travel and tourism)²⁰ will be supported by the favourable health system indicators and epidemiology similar to the first wave.

Studies Examining the Economic Impact of Lockdown

Few studies have been published to model the potential impacts of lockdown and comparing different lockdown approaches. The following section describes several identified studies. Due to the variability among the modelling studies and the level of detail reported, it was not possible to categorise various public health measures across the studies by level of strictness.

- A preprint from Barlow et al. conducted a modelling study using British Columbia as a case study to look at optimal lockdown strategies for COVID-19, balancing economic and mortality costs.²¹ They examined two scenarios balancing economic costs and deaths using two different methods. They found that in both cases, for most parameter values, the optimal policy was to implement an initially significant lockdown level that reduces the reproductive number to close to 1. This lockdown level can be reduced when a vaccination program is implemented. They also note that **policies that oscillate between strict and mild lockdowns are less effective than policies that maintain a moderate stringency lockdown level.** A more gradual decrease in lockdown level/restrictions would result in smaller overall costs.
- Atolia et al. conducted a modelling study to explore the consequences of re-opening after a lockdown including the trade-offs between: (i) the speed of re-opening the economy, (ii) the spreading and persistence of the virus, and (iii) the consequences for economic performance.²² They concluded that while rapidly re-opening the economy can reduce GDP loss in the short-term, it can cause larger GDP losses in the long-term. **Substantial long-run losses may occur if the re-opening is rapid and the virus has not been eradicated.**²² **Taking time to reduce virus transmission and thus slowing re-opening the economy can increase the long-run income inequality,** highlighting the need to carefully balance the direct conflict between the effects on GDP and wealth distribution.²²
- A preprint published by Scherbina et al. describes a cost-benefit analysis of a possible lockdown in the United States (US) by comparing the benefits from reducing the number of future infections to the costs that a lockdown would have on the economy.²³ They conducted cost-benefit analyses for a number of different scenarios and found that overall, under various combinations of plausible assumptions and parameters, lockdowns were shown to be a valuable non-pharmaceutical intervention that will help save a large number of lives and reduce the overall cost of the pandemic.²³ They estimated that the optimal duration of lockdown (balancing incremental savings and costs) to be four weeks and will generate a net benefit up to \$508 billion, or 2.4% of GDP. They further suggest that **with more transmissible VOC, the pandemic will have more devastating impacts and is projected to cost more than \$2 trillion, even with the vaccination program in place. In this scenario, a lockdown is projected to provide greater net benefits, of up to \$1.4 trillion, and the optimal lockdown duration will increase to up to seven weeks.**²³
- A preprint from Brzezinski et al. conducted a modelling study combining data from mobile devices with a controlled SIR model to estimate the medical and economic costs under different policy scenarios.²⁴ **Overall, they found that implementing lockdowns leads to lower overall**

economic costs that staying open. They note that the economic costs arising from lockdown policies are small compared to their large benefits in terms of reduced medical costs; the authors note that this is true at various estimates of lockdown efficiency and voluntary response strength. Specifically, **they estimated that in the US, lockdowns reduce the costs of the pandemic by 0.8% of annual GDP per capita, compared to purely voluntary responses.** They further conclude that the reluctance of some governments to implement lockdowns is unwarranted as it was guided by a concern over the economic costs.

- König and Winkler examined the impact of mandatory social distancing imposed by lockdowns and voluntary social distancing triggered by COVID-19 fatality rates on GDP growth in the first three quarters of 2020 for a sample of 42 countries.²⁵ They found that **more restrictive measures lead to lower GDP growth in the same quarter but were associated with a positive, catching-up effect in the following quarter.** They further conclude that strict government measures may have a negative impact on economic activity but they also reduce fatality rates which can also support economic activity. Thus, lockdowns may be a beneficial approach as they reduce the economic damage associated with high fatality rates (e.g., reduced tourism due to high fatality rates in the region).
- An analysis by Limestone Analytics considers the economic impact of new variants in two scenarios in Canada.²⁶ In the Limestone Analytics report, the authors model outcomes related to economic impacts where strict measures to control spread of variants are in place early (January 2021 at the time of the report) versus delaying implementation (until a time in March 2021) that allows a longer period of unmitigated circulation of the more transmissible new variants (see the Canadian Shield summary described in the “Near Zero Community Transmission versus Continued Mitigation” section below). **The two month delay in action related to increasing transmission of variants results in a five month delay in release from lockdowns. Further, the deficit in full time equivalent employment is increased by 35% and the GDP loss is increased by 33% from Q1 to Q4 of 2021 if measures are delayed.** Lastly, as a result of the increased transmissibility of new variants, previous control measures suggested by the COVID Strategic Choices Group are assumed to be less effective and the new measures proposed by the Limestone Analytics report are inherently stricter to control the new variants. **The initial impacts on employment and GDP caused by early implementation of restriction measures are quickly recouped within a month of the delayed implementation of strict measures.**
- Miles et al. conducted a cost-benefit analysis of continued lockdown for three months versus rapid easing of measures over three months in the United Kingdom (UK) during the summer when rates were lowest since the initial wave of the pandemic (around 1,000 new cases per day or less).²⁷ The authors considered the balance of loss in GDP in continued lockdown versus rapid easing of lockdown scenarios against cost savings from lives saved (based on the assigned cost of quality adjusted life years (QALYs)). Their scenarios indicated that the loss of GDP even after including savings from reducing the number of expected deaths in a continued lockdown scenario was significantly higher than if lockdown was rapidly eased and deaths increased by 15% each week. The authors stated that the point at which continued lockdown would have been equally effective would have required that the National Institute of Health and Care Excellence standard for QALY value for policy decision-making would have to be at least 7 times greater. Thus, **their analyses suggest that strategies should be employed to appropriately ease lockdown measures and not maintain a continuously strict set of measures over the long-term. A limitation of the analysis is that it does not take into account costs associated with**

prolonged presence of virus transmission in the community due to easing measures that may not as rapidly extinguish transmission than strict lockdown measures.

No studies were found that reported comparing the timing of initiating lockdown based on different indicators (e.g., increasing reproductive number above a threshold versus doubling rating of cases exceeding a threshold). This lack of findings may be due to the limited search parameters.

Near-zero Community Transmission versus Continued Mitigation

A recent report on the Canadian Shield policy and the economic impacts in Ontario highlights that:²⁸

- “More intense early-year lockdowns can be less costly for the economy than less-intense, shorter duration lockdowns spread across a longer period of time. We show that this is the case even under an expectation that vaccinations will be widely available in the second half of the year, facilitating a more robust recovery in the fall and winter even without an early-year lockdown. This is because full economic activity does not immediately resume with the lifting of economic restrictions; rather the economy takes time to fully recover. **This means that an intense lockdown that allows for full reopening afterwards may result in fewer overall jobs lost and a lower decline in GDP than on-again, off-again lockdowns where new restrictions are required every few months before the economy has a chance to fully recover from the previous round of restrictions.** Understanding how various lockdown policies are likely to impact the economy is essential for Canada’s policy response.”²⁸

The PHO report titled *Lockdown Duration and Re-opening including Considerations for COVID-19 Variants of Concern* recommends the following:³

- Based on the evidence that exists, longer duration lockdowns (e.g. 42-60 days) appear to be more effective at reducing COVID-19 cases than shorter interventions.
- **A low reproduction number and a low incidence of infection (before re-opening) are important to successfully re-open after a lockdown.** Commonly reported strategies to mitigate risk for resurgence on re-opening include: social distancing, testing, contact tracing and isolation, supports for at-risk individuals, and gradual (vs. abrupt) release from lockdown.
- The emergence of VOC with increased transmissibility and possibly more frequent fatality outcomes across all age groups (e.g., B.1.1.7 lineage, also known as VOC 202012/01, or 20I/501Y.V1, or the UK Variant) **requires that swift and stricter decision thresholds be considered for easing and reinforcing public health measures than would have previously been applied to non-variant strains of COVID-19.** A prevention-based strategy maintaining low case numbers has been suggested.³

Discussion and Conclusions

Towards a goal of achieving control of the COVID-19 pandemic, lockdowns are an effective way to reduce transmission and the related morbidity, mortality and health system impacts, although lockdowns have resulted in important societal disruption. The evidence identified from primarily modelling studies, however, demonstrates economic benefits of lockdowns. Some studies have found that implementing lockdowns leads to lower overall economic costs in the long-term than staying open, and strategies should be employed to appropriately ease lockdown measures. Proactive intervention to

implement restrictions before significant transmission occurs allows costs associated with earlier lockdown measures to be recouped later on.

In terms of an optimal lockdown strategy, to minimize economic costs, policies that oscillate between strict and mild lockdowns are less effective than policies that maintain a moderate lockdown level. A more gradual decrease in lockdown level/restrictions would lead to smaller overall costs. Optimal durations of lockdowns (balancing savings and costs) are expected to be longer with the increased transmissibility of VOC. One paper suggested that the economic costs of strict lockdown exceed the benefits gained from lives saved when case counts became relatively low compared to the peak of the first wave of the pandemic; however, they did not take into account the prolonged presence of virus transmission in the community due to easing measures that may not as rapidly extinguish transmission than strict lockdown measures. Support must be in place to ensure that disparities in wealth are not further exacerbated by lockdowns. This can involve providing a basic income for individuals who have lost employment due to the pandemic. Understandably, there are many additional factors that may not have been taken into account by the studies reviewed in this evidence brief.

Political leaders and public health experts within Ontario have cautioned against re-opening too quickly, suggesting that it may be better to delay re-opening and open gradually when there is certainty that the timing is right, to prevent having to subsequently shut down again prior to more favourable epidemiology, health care capacity and widespread vaccination.^{29,30} There is evidence to support that earlier action with stringent public health measures/lockdowns can be less costly for the economy than multiple less-intense, shorter duration lockdowns spread across a longer period of time.²⁸ A working draft of a report from the COVID Strategic Choices Group suggests that the next three months are critical for controlling variants and acting quickly to prevent a significant increase in cases and resultant need for prolonged, strict measures.³¹ They highlight that instead, areas with VOC will need to act quickly to avoid another wave and subsequent strict and extended lockdowns.

After experiencing a catastrophic third VOC wave, the UK recently announced that they will be using a data-driven approach to the re-opening of their economy, noting their decisions for re-opening will be made based on data rather than dates.³² The country will progress through a four-stage plan to ease England's lockdown if strict conditions are met.³³ The four conditions that must be met for easing the lockdown include: the vaccine program goes as planned; evidence shows that vaccines are reducing the number of deaths and hospitalizations; infection rates do not risk surge in hospital admissions; and new variants do not change the risk of lifting restrictions.³³ For the Ontario context, the Public Health Ontario report entitled *Using COVID-19 Data to Inform Reopening Decision-making in the Context of Variants of Concern* describes an approach to reopening in Ontario that leverages data as well as learning from recovery from wave 1 (see Appendix).³⁴ It is important to acknowledge that rapid re-implementation of stringent measures will be critical to achieve control and mitigate morbidity, mortality and health system impacts. However, using early signals such as effective reproduction number and implementing public health action swiftly, can serve to prevent severe surges in winter and spring 2021, while population vaccination rates increase over time, to support sustainable societal recovery.

Evidence from modelling studies supports the use of stringent public health measures to achieve control rapidly, which in turn can positively impact longer term economic indicators. At the current time, there is evidence to support a proactive and preventive approach to a VOC surge, based on experiences in other jurisdictions.³ With vaccination anticipated to accelerate in Canada, prevention likely offers the greatest benefit towards earlier more sustained societal recovery supported by increasing vaccination rates by summer, than the stringent, longer duration measures into Spring 2021 that are expected to be required to manage a VOC surge and related impacts on the health of Ontarians.

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Appendix A: Ontario Epidemiological Data

Figure 1. Ontario COVID-19 Weekly Incidence Rates by Public Health Unit during Recovery from Wave 1 (July to August 2020)

Public Health Unit Name	Cases Rate (per 100,000)	Cases Rate (per 100,000)	Cases Rate (per 100,000)	Cases Rate (per 100,000)	Cases Rate (per 100,000)
	Reported Week 28 (July 5 - July 11)	Reported Week 29 (July 12 - July 18)	Reported Week 30 (July 19 - July 25)	Reported Week 31 (July 26 - August 1)	Reported Week 32 (August 2 - August 8)
Algoma Public Health	0.9	1.7	0	0	0
Brant County Health Unit	5.2	3.9	1.9	5.8	1.3
Chatham-Kent Public Health	4.7	13.2	39.5	39.5	53.6
City of Hamilton Public Health Services	2.2	2	1.5	2	2.2
Durham Region Health Department	4.9	4.4	2	2.9	1.8
Eastern Ontario Health Unit	1	1.9	1.4	2.4	0
Grey Bruce Health Unit	0	0	1.8	1.2	0.6
Haldimand-Norfolk Health Unit	0	1.8	7.9	7	2.6
Haliburton, Kawartha, Pine Ridge District Health Unit	1.1	3.7	1.6	0.5	2.1
Halton Region Public Health	4.5	3.2	2.1	0.5	2.1
Hastings Prince Edward Public Health	0	0	0	0.6	0
Huron Perth Public Health	0	2.9	2.1	5.7	5
Kingston, Frontenac and Lennox & Addington Public Health	0	0.5	1.4	0	0
Lambton Public Health	0	2.3	3.1	19.1	2.3
Leeds, Grenville & Lanark District Health Unit	0.6	0	0	0	0
Middlesex-London Health Unit	1.8	1.6	3.2	2.6	1.2
Niagara Region Public Health	3	4.4	6.3	7.8	6.8
North Bay Parry Sound District Health Unit	0	0	0	0	0
Northwestern Health Unit	1.1	0	2.3	0	0
Ottawa Public Health	3.8	7	19	12.2	7.2
Peel Public Health	13.6	13.4	8	5.2	5.7
Peterborough Public Health	0	0	0	2.7	0
Porcupine Health Unit	1.2	1.2	1.2	1.2	1.2
Public Health Sudbury & Districts	0	0	2	9	1.5
Region of Waterloo Public Health and Emergency Services	3.4	2.7	4.6	1.2	1.7
Renfrew County and District Health Unit	0	0	1.8	0.9	0
Simcoe Muskoka District Health Unit	1.3	4	2.8	1.5	1.2
Southwestern Public Health	0.9	2.4	7.1	28.4	17.5
Thunder Bay District Health Unit	0	0.7	0.7	2.7	0.7
Timiskaming Health Unit	0	0	0	0	0
Toronto Public Health	8	7.1	5.3	3.3	4.3
Wellington-Dufferin-Guelph Public Health	3.5	4.8	3.8	1.9	1.6
Windsor-Essex County Health Unit	31.3	38.4	50.4	36.2	8
York Region Public Health	5.5	5	3.8	3.1	3.2
Ontario	5.8	6.3	6.7	5.4	4

Figure 2. Ontario COVID-19 Weekly Incidence Rates by Public Health Unit during Recovery from Wave 2 (February 2021)

Public Health Unit Name	Cases Rate (per 100,000) Reported Week 5 (January 31 - February 6)	Cases Rate (per 100,000) Reported Week 6 (February 7 - February 13)	Cases Rate (per 100,000) Reported Week 7 (February 14 - February 20)	Cases Rate (per 100,000) Reported Week 8 (February 21 - February 27)
Algoma Public Health	14	9.6	1.7	3.5
Brant County Health Unit	43.2	33	39	94.7
Chatham-Kent Public Health	76.2	35	9.4	10.3
City of Hamilton Public Health Services	66.9	39	51.8	56.4
Durham Region Health Department	50.1	35	41.8	32
Eastern Ontario Health Unit	36	26	24.4	26
Grey Bruce Health Unit	10	9.4	5.9	4.7
Haldimand-Norfolk Health Unit	31	14	19.3	30
Haliburton, Kawartha, Pine Ridge District Health Unit	33	24.9	19.6	13.2
Halton Region Public Health	60.7	39	36	38
Hastings Prince Edward Public Health	3	8.9	5.9	11.9
Huron Perth Public Health	32	22.9	14.3	19.3
Kingston, Frontenac and Lennox & Addington Public Health	4.2	11.3	4.7	4.7
Lambton Public Health	29	60.3	55.7	58
Leeds, Grenville & Lanark District Health Unit	8.7	8.7	5.2	6.4
Middlesex-London Health Unit	38	27	14	17.1
Niagara Region Public Health	63.3	35.6	23.7	25
North Bay Parry Sound District Health Unit	5.4	26.2	21.6	2.3
Northwestern Health Unit	18.2	67.3	108.4	47.9
Ottawa Public Health	33.1	27.3	36.5	34.7
Peel Public Health	121.4	98.9	85.2	91.4
Peterborough Public Health	10.1	11.5	21	18.9
Porcupine Health Unit	22.8	15.6	21.6	16.8
Public Health Sudbury & Districts	9.5	16.1	8	27.1
Region of Waterloo Public Health and Emergency Services	57.5	53.2	48.4	60.2
Renfrew County and District Health Unit	4.6	4.6	7.4	24.9
Simcoe Muskoka District Health Unit	49.2	35.7	46.5	41.9
Southwestern Public Health	41.1	22.2	11.8	35.9
Thunder Bay District Health Unit	60.7	76.7	113.4	192.7
Timiskaming Health Unit	6.1	0	0	6.1
Toronto Public Health	101.9	79.5	73.1	70.9
Wellington-Dufferin-Guelph Public Health	48.1	41.7	27.3	45.8
Windsor-Essex County Health Unit	50.1	56.5	41	54.1
York Region Public Health	73.9	68.4	68.8	52.4
Ontario	65.4	52.7	49.9	51.3

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