Public Health Ontario | Santé publique Ontario

Epidemiological Summary

Evolution of COVID-19 Case Growth in Ontario

This report includes the most current information available from the integrated Public Health Information System (iPHIS) as of **4 p.m. June 24, 2020**, and from the Toronto Public Health Coronavirus Rapid Entry System (CORES), the Ottawa Public Health COVID-19 Ottawa Database (The COD), and the Middlesex-London COVID-19 Case and Contact Management tool (CCMtool) as of **2 p.m. June 24, 2020**.

Purpose

This report provides a summary on the growth of COVID-19 confirmed cases and deaths in Ontario created in iPHIS, CORES, The COD, and CCMtool from March 8 to June 23, with a specific focus on case growth and estimates of the reproduction number, which signal whether or not transmission is under control in Ontario.

Highlights

- In Ontario, the growth rate of cases is stable. The average daily percent increase in provincial cases from the most recent complete week was 0.5% (June 17 – June 23). This compares to 0.5% in the prior reporting period (June 14 – June 20).
    - The absolute number of new cases from June 17 – June 23 was higher than the prior reporting period in Ontario (1,207 versus 1,189), although the growth rate remained stable.
    - The average daily increase ranged from 0.2% in the Eastern region to 1.0% in the South West.
    - Case growth rates remained stable in all regions of Ontario except the Northern region the week of June 17 – June 23, as compared to the prior reporting period.
- The reproduction number is the average number of secondary cases generated by an index case. A reproduction number greater than 1 means that the epidemic is growing, while a reproduction number less than one means the epidemic is coming under control.
- The median estimated effective reproduction number for the most recent complete week (i.e., the rolling average of 7 days) in Ontario is 1.0 [95% CI: 0.9 – 1.0] (June 17 – June 23). This compares to 0.9 [95% CI: 0.8 – 0.9] in the prior reporting period (June 14 – June 20).
    - The median reproduction number ranged from 0.8 in Toronto to 2.1 in the Northern region.
    - The median reproduction number remained stable in Toronto; and increased in the Northern, Eastern, Central East, Central West, and South West regions for June 17 – June 23, compared to the prior reporting period.

Methods

- Analyses are based on case data extracted from the integrated Public Health Information System (iPHIS), the Toronto Public Health Coronavirus Rapid Entry System (CORES), the Ottawa Public Health COVID-19 Ottawa Database (The COD), and the Middlesex-London COVID-19 Case and Contact Management tool (CCMtool). All analyses were conducted using R statistical software.

- Analyses were conducted using the case creation date, which corresponds to the date that cases were entered into iPHIS, CORES, The COD, or CCMtool. One additional day was added so that the date corresponded closely to the date cases were publicly reported in Ontario. This is referred to as the "public reporting date" or "public reporting period" in this document.

    - In order to account for certain instances when there were long lags between when a case's specimen was collected and when their data is entered within iPHIS, CORES, The COD, or CCMtool, we replaced the public reporting date with the specimen collection date + 3 days (the mode of the distribution from specimen collection to public reporting date) when the delay between specimen collection and case creation was between seven and 90 days. In rare circumstances when this delay was more than 90 days, we used the case creation date + 1 day.

- Due to smaller case counts, we have combined the North West and North East regions into a North region in this report.

- Growth rates: 7-day growth rates were estimated using a linear model of the logarithm of the cumulative number of cases, applied to 7-day rolling windows.

    - We also provide the most recent estimate for growth and reproduction number for the last seven days. As such, there is some overlap between the seven days included in the two most recent estimates. The sum of the number of cases for each time period will not equal the total number of cumulative cases in the province due to this overlap.

- Reproduction number: The reproduction number was measured using the EpiEstim package in R.[1] The procedure uses daily reported case counts and a 7-day rolling window for estimation. The mean serial interval was set at 4.5 days with a standard deviation of 2.5 days, as adapted from published esimates.[2,3] EpiEstim uses a Markov Chain Monte Carlo sampling procedure, and the median represents the middle of the distribution of most probable values of the reproduction number. Estimates of the reproduction number were not provided for regions with fewer than 12 cases in the reporting period due to instability of the estimate as a result of small case counts.

Limitations

- This report includes confirmed cases of COVID-19 as per the Ontario Ministry of Health case definition, which may change over time. Case detection is strongly influenced by the provincial testing strategy and will be unlikely to capture infections in population groups not prioritized for testing (i.e., are under-estimating the total number of infections).

- The data only represent cases reported to public health and recorded in iPHIS, CORES, The COD, or CCMtool. As a result, the number of reported cases as well as case details are subject to

underreporting owing to factors such as illness awareness, illness severity, medical care seeking behaviour, clinical practice, laboratory testing algorithms and reporting practices.

- Data on deaths are likely under-reported as these events may occur after the completion of public health follow up of cases. Cases that died after follow-up was completed may not be captured in iPHIS, CORES, The COD, or CCMtool.

- iPHIS, CORES, The COD, and CCMtool are dynamic disease reporting systems, which allow ongoing updates to data previously entered. As a result, data extracted represent a snapshot at the time of extraction and may differ from previous or subsequent reports.

- Case data may be transferred between systems (e.g., iPHIS and CORES), which would result in changes to the case created date. The case created date may not reflect case entry following initial notification in these instances.

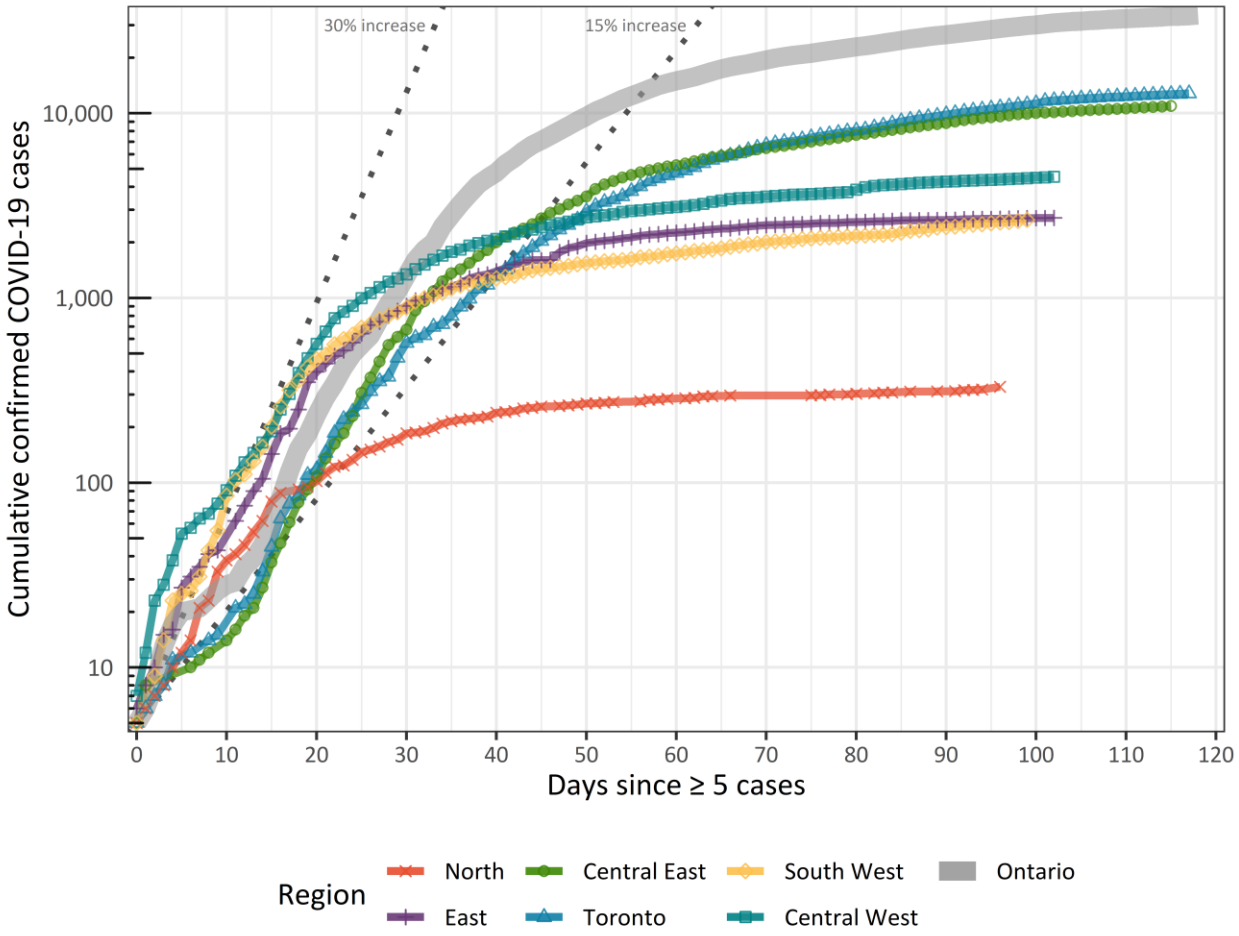
- Weekly case counts may be underestimates of the true counts due to delays in data entry. The public reporting date lags infection date by approximately 14 days (five days from infection to symptom onset and an additional nine days, due to delays in case presentation, lab processing, and reporting). As such, public reporting dates between March 8 and 14 likely represent infections that occurred between February 24 and March 1 (i.e., before the implementation of public health measures).

- For reproduction number analyses, all cases since initial importation were presumed to be locally transmitted.

- The estimates of the reproduction number are influenced by the choice of serial interval. As such, the reported estimates in the analysis are subject to change as additional data on the estimated serial interval are published.

Case Growth over Time by Region

Figure 1. Cumulative Confirmed COVID-19 Cases over Time, by Region (N=33,950)



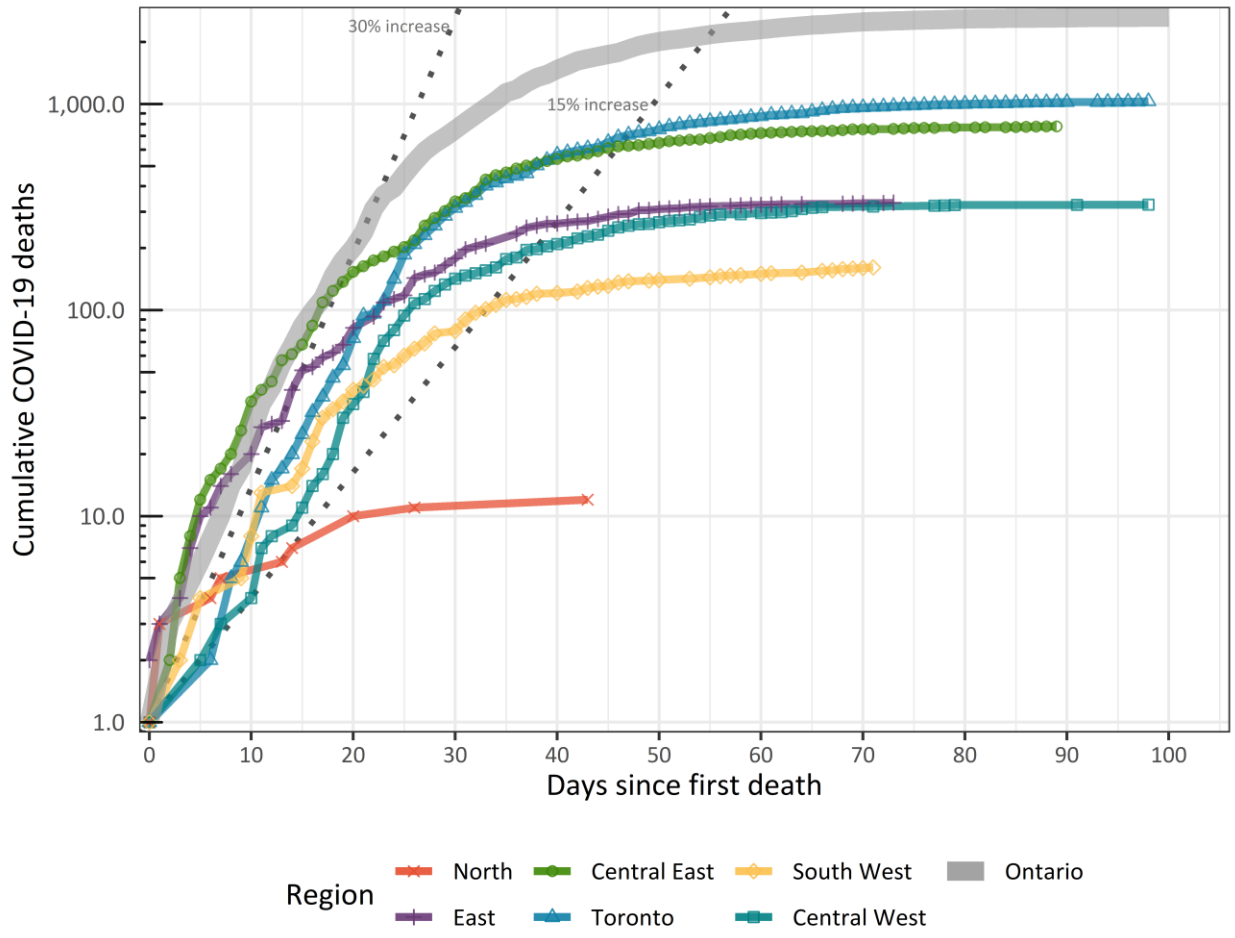
Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

Table 1. Average Daily Increase (%) in Confirmed COVID-19 Cases over Time, by Region

Public reporting period	Ontario	North	Eastern	Central East	Toronto	South West	Central West
March 8 – March 14	21.6	26.5	52.8	14.5	22.0	3.1	20.5
March 15 – March 21	26.6	13.7	45.5	25.0	22.2	39.6	26.0
March 22 – March 28	17.1	24.2	16.6	20.8	12.8	28.0	15.3
March 29 – April 4	12.0	15.5	8.2	13.5	8.3	17.4	14.8
April 5 – April 11	8.1	5.8	8.4	7.9	9.1	7.7	7.3
April 12 – April 18	6.4	4.9	4.7	6.6	7.9	5.2	5.5
April 19 – April 25	4.4	2.8	3.4	4.8	5.4	2.8	2.9
April 26 – May 2	2.8	2.0	4.1	2.3	3.3	2.0	2.2
May 3 – May 9	1.9	0.8	1.5	1.9	2.5	1.2	1.4
May 10 – May 16	1.6	0.7	1.0	1.7	1.9	1.4	1.2
May 17 – May 23	1.5	0.6	0.9	1.5	2.1	1.4	0.8
May 24 – May 30	1.1	0.0	0.4	1.2	1.5	1.0	0.5
May 31 – June 6	1.1	0.3	0.4	1.1	1.2	0.6	1.6
June 7 – June 13	0.7	0.4	0.2	0.6	0.7	1.5	0.5
June 14 – June 20	0.5	0.5	0.2	0.6	0.4	1.0	0.5
June 17 – June 23*	0.5	0.7	0.2	0.6	0.4	1.0	0.5

Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Overlaps with prior reporting period as estimates are calculated for 7-day periods.

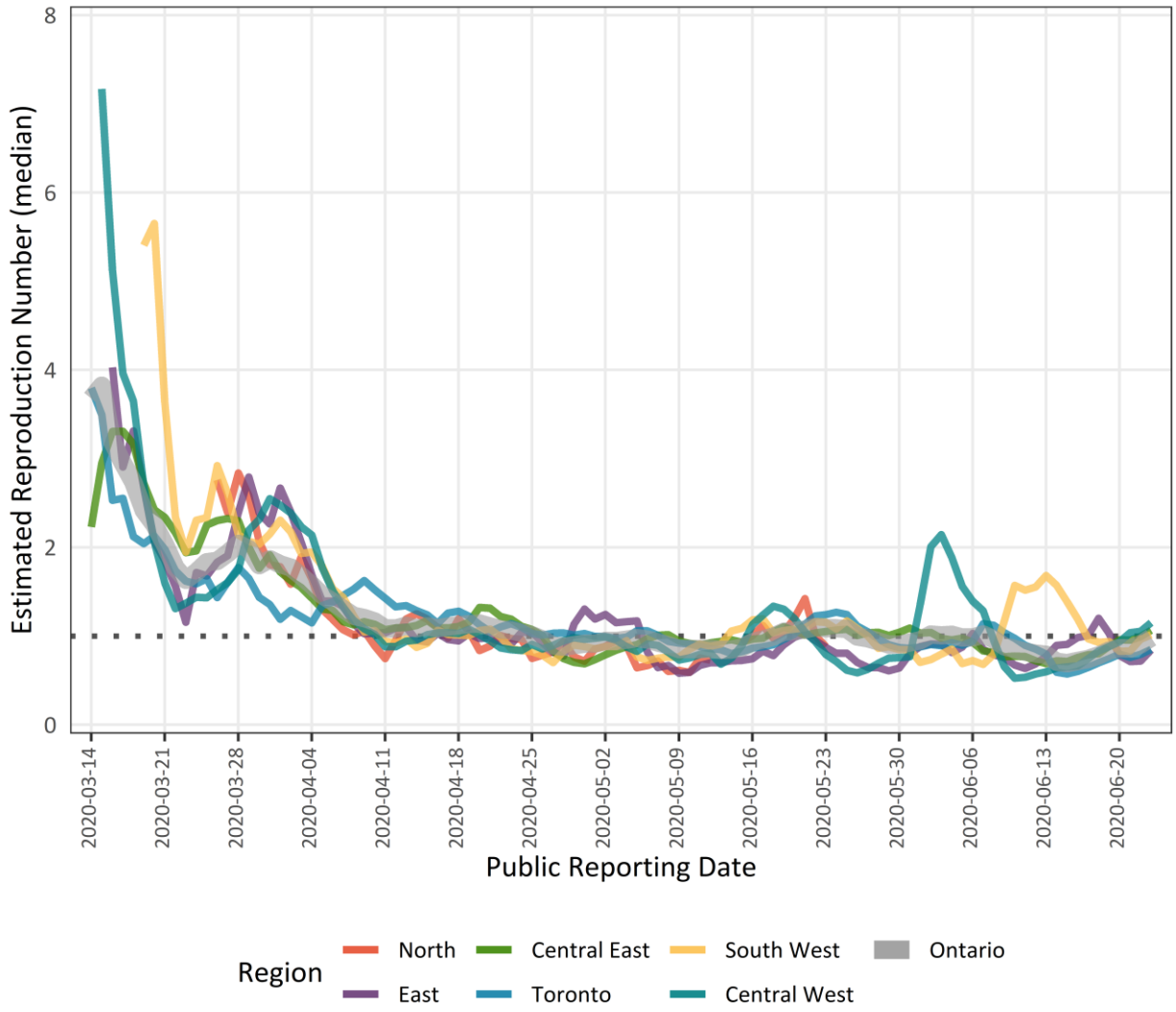
Figure 2. Cumulative Confirmed COVID-19 Deaths over Time, by Region (N=2,639)



Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

Reproduction Number

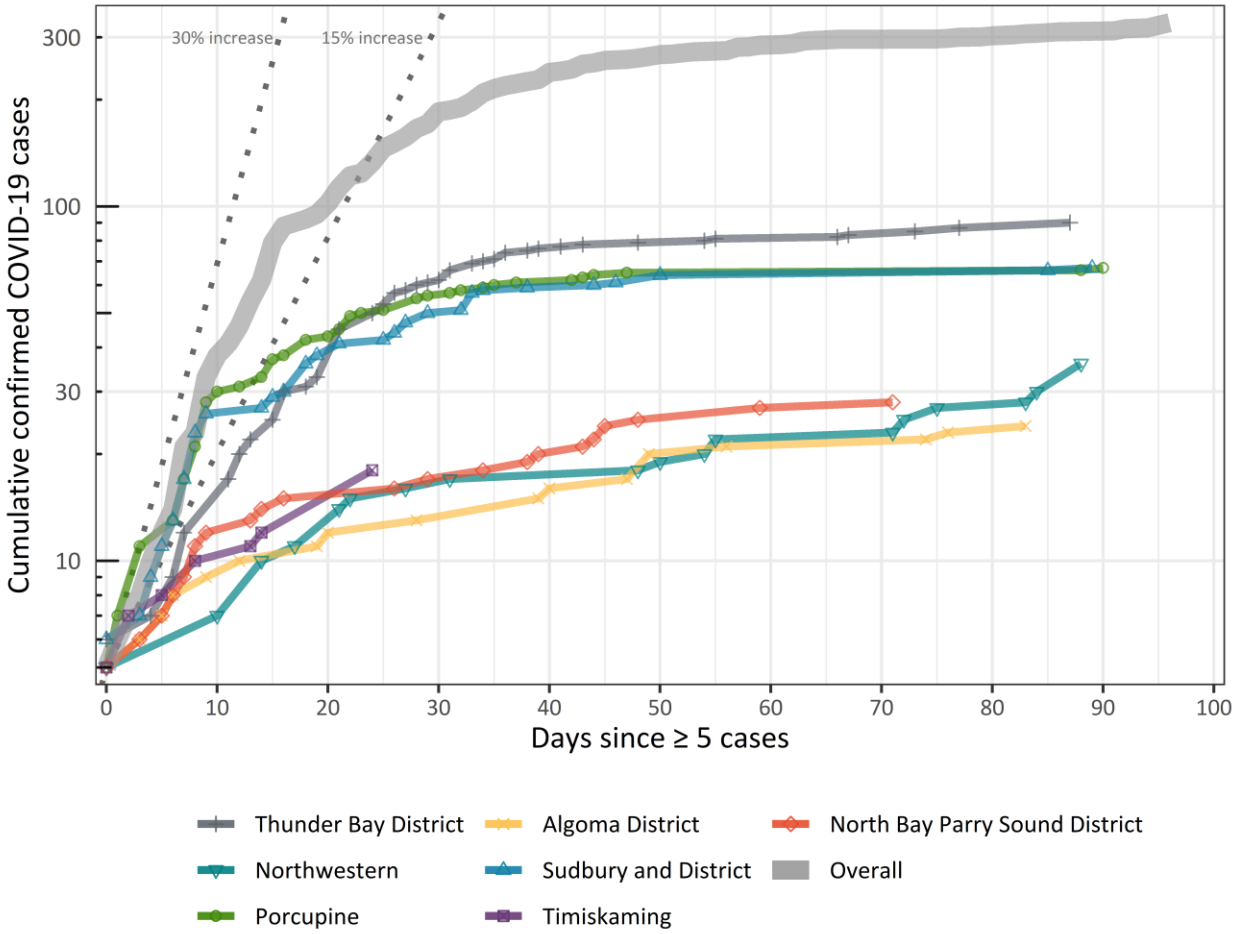
Figure 3. Estimated effective reproduction number in Ontario, by week and region*



Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Estimates for the reproduction number were not provided if there were <12 cases reported for a region within the 7 days prior to the public reporting date.

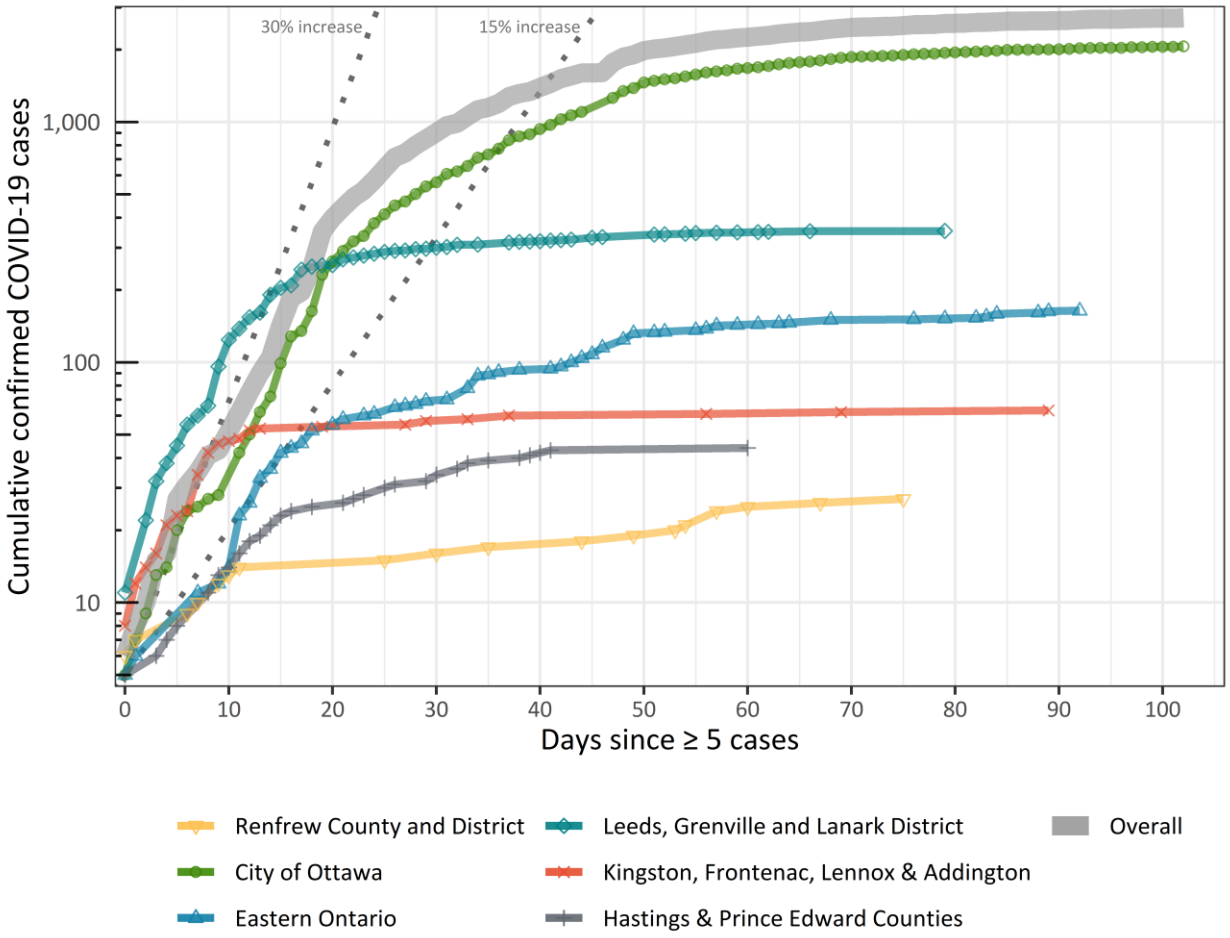
Cases over Time by Region

Figure 4. Cumulative Confirmed COVID-19 Cases over Time, by Public Health Unit in the North Region (n=330)



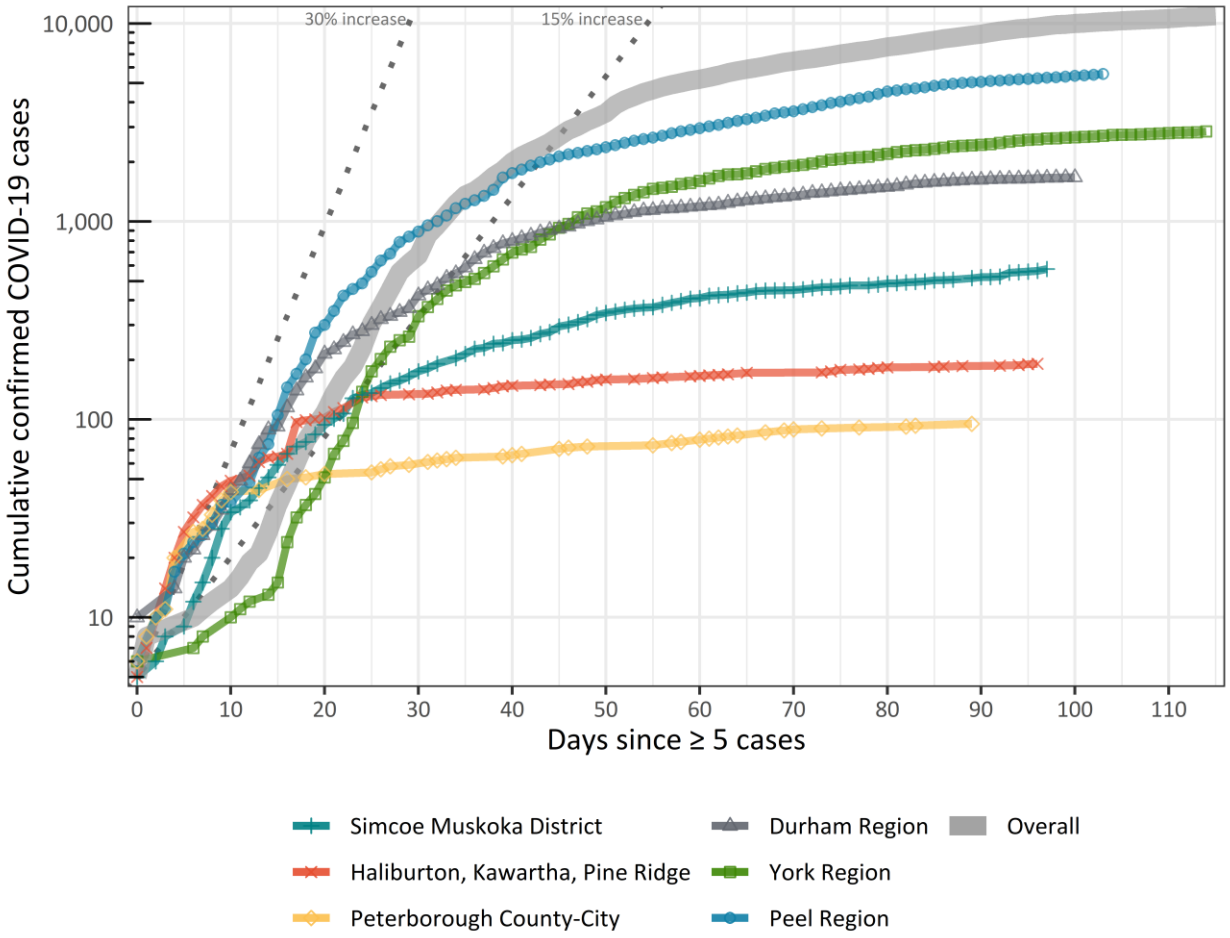
Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

Figure 5. Cumulative Confirmed COVID-19 Cases over Time, by Public Health Unit in the Eastern Region (n=2,711)



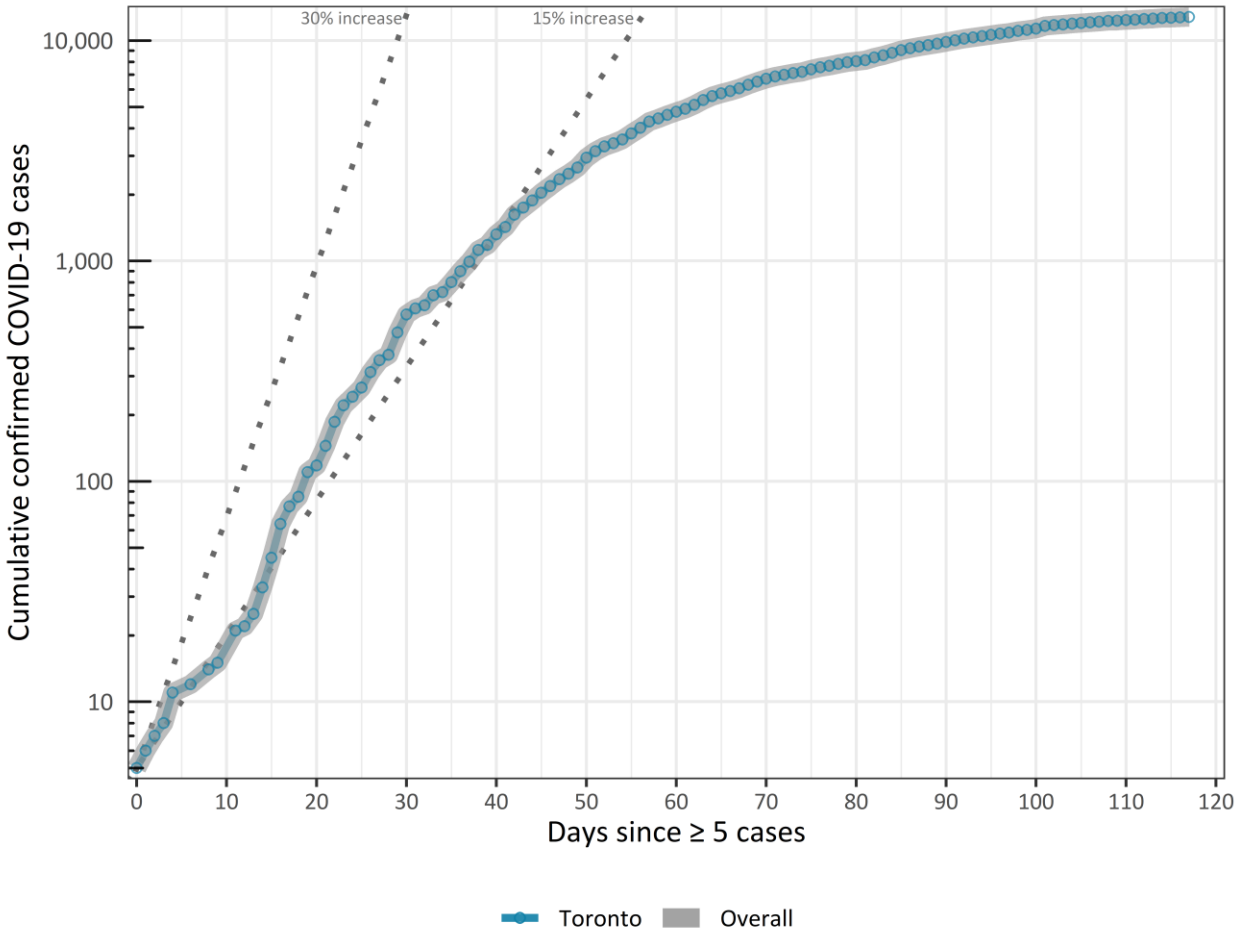
Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

Figure 6. Cumulative Confirmed COVID-19 Cases over Time, by Public Health Unit in the Central East Region (n=10,939)



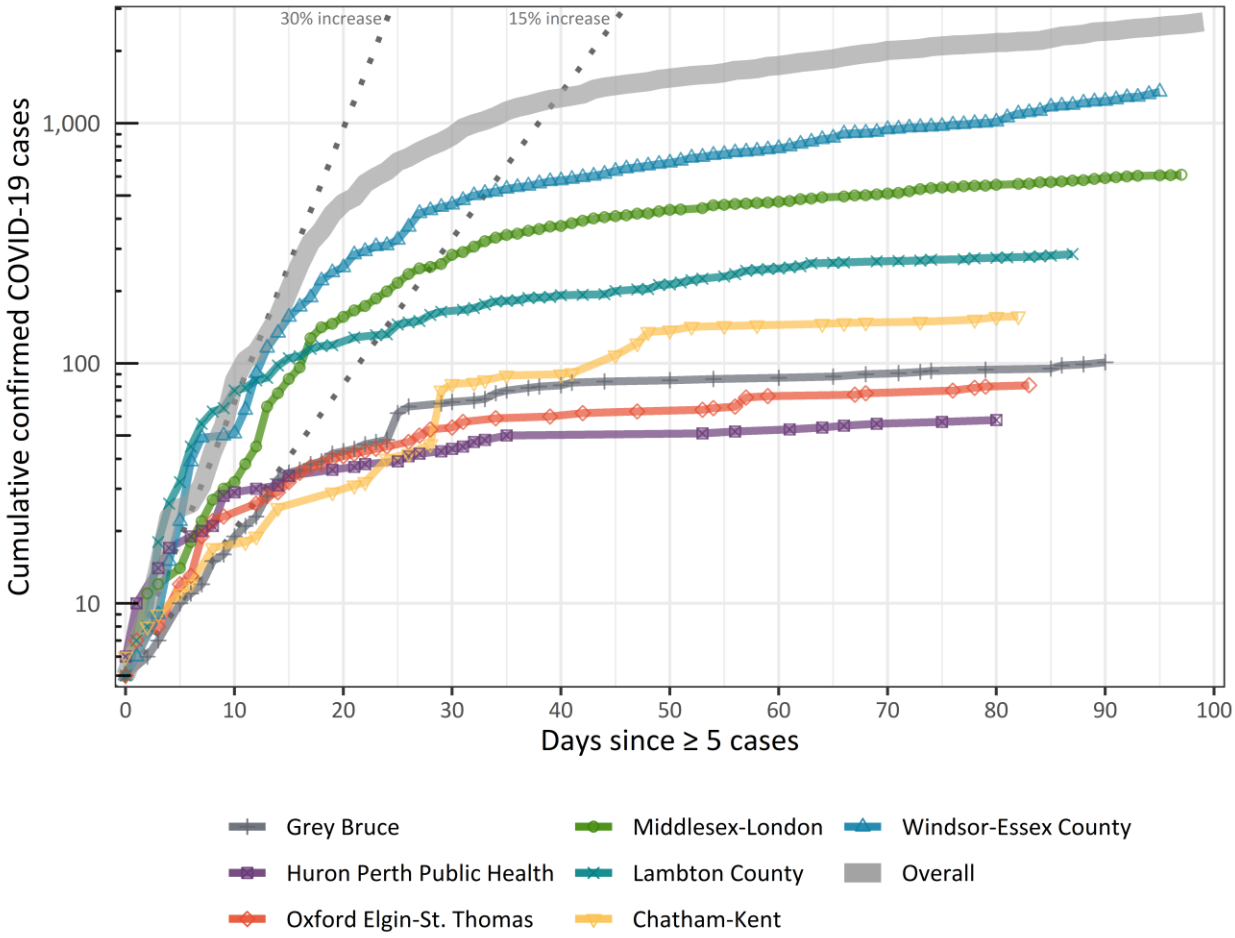
Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

Figure 7. Cumulative Confirmed COVID-19 Cases over Time, by Public Health Unit in the Toronto Region (n=12,802)



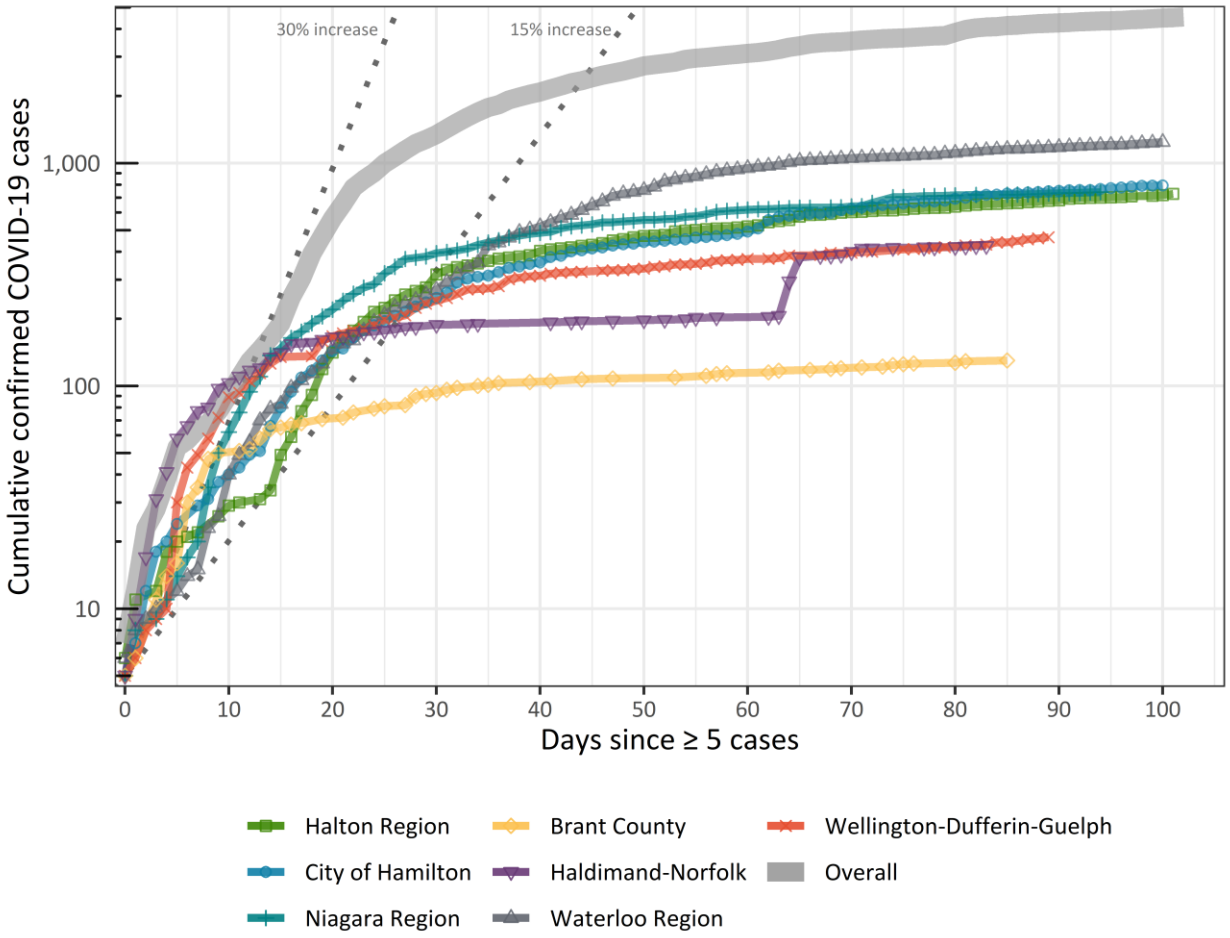
Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

Figure 8. Cumulative Confirmed COVID-19 Cases over Time, by Public Health Unit in the South West Region (n=2,645)



Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

Figure 9. Cumulative Confirmed COVID-19 Cases over Time, by Public Health Unit in the Central West Region (n=4,523)



Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).

Growth over Time Provincially and by Region

Table 2: Number of New Cases, Cumulative Cases, Average Daily Increase (%) in Confirmed COVID-19 Cases, and Estimated Reproduction Number over Time in Ontario

Public reporting period	New cases (N)	Cumulative cases (N)	Average daily growth (%)	Estimated Reproduction Number [95% CI]
March 8 – March 14	90	126	21.6	3.3 [2.6 – 4.0]
March 15 – March 21	535	661	26.6	2.5 [2.3 – 2.7]
March 22 – March 28	1,335	1,996	17.1	1.7 [1.6 – 1.8]
March 29 – April 4	2,311	4,307	12.0	1.4 [1.4 – 1.5]
April 5 – April 11	3,079	7,386	8.1	1.2 [1.1 – 1.2]
April 12 – April 18	4,021	11,407	6.4	1.2 [1.1 – 1.2]
April 19 – April 25	4,110	15,517	4.4	1.0 [1.0 – 1.0]
April 26 – May 2	3,212	18,729	2.8	0.9 [0.9 – 0.9]
May 3 – May 9	2,587	21,316	1.9	0.8 [0.8 – 0.9]
May 10 – May 16	2,389	23,705	1.6	1.0 [0.9 – 1.0]
May 17 – May 23	2,574	26,279	1.5	1.0 [1.0 – 1.1]
May 24 – May 30	2,176	28,455	1.1	0.9 [0.8 – 0.9]
May 31 – June 6	2,301	30,756	1.1	1.0 [1.0 – 1.0]
June 7 – June 13	1,507	32,263	0.7	0.8 [0.7 – 0.8]
June 14 – June 20	1,189	33,452	0.5	0.9 [0.8 – 0.9]
June 17 – June 23*	1,207	33,950	0.5	1.0 [0.9 – 1.0]

Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Overlaps with prior reporting period as estimates are calculated for 7-day periods.

Table 3: Number of New Cases, Cumulative Cases, Average Daily Increase (%) in Confirmed COVID-19 Cases, and Estimated Reproduction Number over Time in the North Region

Public reporting period	New cases (N)	Cumulative cases (N)	Average daily growth (%)	Estimated Reproduction Number [95% CI]*
March 8 – March 14	2	2	26.5	N/A
March 15 – March 21	5	7	13.7	N/A
March 22 – March 28	26	33	24.2	2.8 [1.9 – 4.1]
March 29 – April 4	57	90	15.5	1.7 [1.3 – 2.1]
April 5 – April 11	37	127	5.8	0.7 [0.5 – 1.0]
April 12 – April 18	64	191	4.9	1.2 [0.9 – 1.5]
April 19 – April 25	33	224	2.8	0.7 [0.5 – 1.0]
April 26 – May 2	30	254	2.0	0.9 [0.6 – 1.3]
May 3 – May 9	15	269	0.8	0.6 [0.4 – 1.0]
May 10 – May 16	13	282	0.7	1.0 [0.6 – 1.6]
May 17 – May 23	12	294	0.6	0.9 [0.5 – 1.5]
May 24 – May 30	2	296	0.0	N/A
May 31 – June 6	5	301	0.3	N/A
June 7 – June 13	10	311	0.4	N/A
June 14 – June 20	9	320	0.5	N/A
June 17 – June 23**	18	330	0.7	2.1 [1.3 – 3.1]

Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Estimates for the reproduction number were not provided if there were <12 cases reported for a region within the 7 days prior to the public reporting date.
**Overlaps with prior reporting period as estimates are calculated for 7-day periods.

Table 4: Number of New Cases, Cumulative Cases, Average Daily Increase (%) in Confirmed COVID-19 Cases, and Estimated Reproduction Number over Time in the Eastern Region

Public reporting period	New cases (N)	Cumulative cases (N)	Average daily growth (%)	Estimated Reproduction Number [95% CI]*
March 8 – March 14	8	8	52.8	N/A
March 15 – March 21	82	90	45.5	3.2 [2.6 – 4.0]
March 22 – March 28	185	275	16.6	1.5 [1.3 – 1.7]
March 29 – April 4	221	496	8.2	1.1 [1.0 – 1.3]
April 5 – April 11	369	865	8.4	1.3 [1.2 – 1.4]
April 12 – April 18	342	1,207	4.7	0.9 [0.8 – 1.0]
April 19 – April 25	363	1,570	3.4	1.0 [0.9 – 1.2]
April 26 – May 2	419	1,989	4.1	1.2 [1.1 – 1.4]
May 3 – May 9	215	2,204	1.5	0.6 [0.5 – 0.7]
May 10 – May 16	146	2,350	1.0	0.7 [0.6 – 0.9]
May 17 – May 23	136	2,486	0.9	0.9 [0.7 – 1.0]
May 24 – May 30	67	2,553	0.4	0.6 [0.5 – 0.8]
May 31 – June 6	76	2,629	0.4	1.0 [0.8 – 1.3]
June 7 – June 13	39	2,668	0.2	0.8 [0.5 – 1.0]
June 14 – June 20	33	2,701	0.2	0.8 [0.5 – 1.1]
June 17 – June 23**	33	2,711	0.2	0.9 [0.6 – 1.2]

Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Estimates for the reproduction number were not provided if there were <12 cases reported for a region within the 7 days prior to the public reporting date.
**Overlaps with prior reporting period as estimates are calculated for 7-day periods.

Table 5: Number of New Cases, Cumulative Cases, Average Daily Increase (%) in Confirmed COVID-19 Cases, and Estimated Reproduction Number over Time in the Central East Region

Public reporting period	New cases (N)	Cumulative cases (N)	Average daily growth (%)	Estimated Reproduction Number [95% CI]
March 8 – March 14	18	30	14.5	2.1 [1.3 – 3.2]
March 15 – March 21	128	158	25.0	2.6 [2.2 – 3.1]
March 22 – March 28	451	609	20.8	1.9 [1.8 – 2.1]
March 29 – April 4	791	1,400	13.5	1.4 [1.3 – 1.5]
April 5 – April 11	882	2,282	7.9	1.1 [1.0 – 1.1]
April 12 – April 18	1,215	3,497	6.6	1.2 [1.1 – 1.3]
April 19 – April 25	1,459	4,956	4.8	1.0 [1.0 – 1.1]
April 26 – May 2	914	5,870	2.3	0.8 [0.7 – 0.9]
May 3 – May 9	827	6,697	1.9	0.9 [0.9 – 1.0]
May 10 – May 16	789	7,486	1.7	1.0 [0.9 – 1.0]
May 17 – May 23	834	8,320	1.5	1.0 [1.0 – 1.1]
May 24 – May 30	735	9,055	1.2	0.9 [0.8 – 1.0]
May 31 – June 6	811	9,866	1.1	1.1 [1.0 – 1.1]
June 7 – June 13	465	10,331	0.6	0.7 [0.6 – 0.8]
June 14 – June 20	423	10,754	0.6	1.0 [0.9 – 1.1]
June 17 – June 23*	444	10,939	0.6	1.1 [1.0 – 1.2]

Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Overlaps with prior reporting period as estimates are calculated for 7-day periods.

Table 6: Number of New Cases, Cumulative Cases, Average Daily Increase (%) in Confirmed COVID-19 Cases, and Estimated Reproduction Number over Time in the Toronto Region

Public reporting period	New cases (N)	Cumulative cases (N)	Average daily growth (%)	Estimated Reproduction Number [95% CI]
March 8 – March 14	50	68	22.0	3.7 [2.7 – 4.8]
March 15 – March 21	202	270	22.2	2.3 [2.0 – 2.6]
March 22 – March 28	357	627	12.8	1.5 [1.3 – 1.6]
March 29 – April 4	459	1,086	8.3	1.2 [1.1 – 1.3]
April 5 – April 11	985	2,071	9.1	1.5 [1.4 – 1.6]
April 12 – April 18	1,506	3,577	7.9	1.4 [1.3 – 1.4]
April 19 – April 25	1,532	5,109	5.4	1.0 [0.9 – 1.0]
April 26 – May 2	1,261	6,370	3.3	0.9 [0.8 – 0.9]
May 3 – May 9	1,126	7,496	2.5	0.9 [0.8 – 1.0]
May 10 – May 16	971	8,467	1.9	0.9 [0.9 – 1.0]
May 17 – May 23	1,178	9,645	2.1	1.2 [1.1 – 1.2]
May 24 – May 30	1,080	10,725	1.5	0.9 [0.9 – 1.0]
May 31 – June 6	901	11,626	1.2	0.9 [0.8 – 0.9]
June 7 – June 13	620	12,246	0.7	0.8 [0.7 – 0.8]
June 14 – June 20	423	12,669	0.4	0.8 [0.7 – 0.9]
June 17 – June 23*	367	12,802	0.4	0.8 [0.7 – 0.9]

Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Overlaps with prior reporting period as estimates are calculated for 7-day periods.

Table 7: Number of New Cases, Cumulative Cases, Average Daily Increase (%) in Confirmed COVID-19 Cases, and Estimated Reproduction Number over Time in the South West Region

Public reporting period	New cases (N)	Cumulative cases (N)	Average daily growth (%)	Estimated Reproduction Number [95% CI]*
March 8 – March 14	1	3	3.1	N/A
March 15 – March 21	30	33	39.6	4.5 [3.1 – 6.3]
March 22 – March 28	119	152	28.0	2.1 [1.7 – 2.5]
March 29 – April 4	285	437	17.4	1.7 [1.5 – 1.9]
April 5 – April 11	300	737	7.7	1.0 [0.9 – 1.1]
April 12 – April 18	304	1,041	5.2	1.0 [0.9 – 1.1]
April 19 – April 25	249	1,290	2.8	0.8 [0.7 – 0.9]
April 26 – May 2	188	1,478	2.0	0.9 [0.7 – 1.0]
May 3 – May 9	128	1,606	1.2	0.8 [0.7 – 0.9]
May 10 – May 16	180	1,786	1.4	1.1 [1.0 – 1.3]
May 17 – May 23	168	1,954	1.4	1.2 [1.0 – 1.4]
May 24 – May 30	148	2,102	1.0	0.9 [0.7 – 1.0]
May 31 – June 6	91	2,193	0.6	0.7 [0.6 – 0.9]
June 7 – June 13	210	2,403	1.5	1.7 [1.5 – 1.9]
June 14 – June 20	158	2,561	1.0	0.8 [0.7 – 1.0]
June 17 – June 23**	178	2,645	1.0	1.0 [0.9 – 1.2]

Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Estimates for the reproduction number were not provided if there were <12 cases reported for a region within the 7 days prior to the public reporting date.
**Overlaps with prior reporting period as estimates are calculated for 7-day periods.

Table 8: Number of New cases, Cumulative Cases, Average Daily Increase (%) in Confirmed COVID-19 Cases, and Estimated Reproduction Number over Time in the Central West Region

Public reporting period	New cases (N)	Cumulative cases (N)	Average daily growth (%)	Estimated Reproduction Number [95% CI]*
March 8 – March 14	11	15	20.5	N/A
March 15 – March 21	88	103	26.0	2.2 [1.7 – 2.6]
March 22 – March 28	197	300	15.3	1.5 [1.3 – 1.7]
March 29 – April 4	498	798	14.8	1.8 [1.7 – 2.0]
April 5 – April 11	506	1,304	7.3	1.0 [0.9 – 1.1]
April 12 – April 18	590	1,894	5.5	1.0 [1.0 – 1.1]
April 19 – April 25	474	2,368	2.9	0.9 [0.8 – 1.0]
April 26 – May 2	400	2,768	2.2	0.9 [0.8 – 1.0]
May 3 – May 9	276	3,044	1.4	0.8 [0.7 – 0.9]
May 10 – May 16	290	3,334	1.2	1.1 [1.0 – 1.2]
May 17 – May 23	246	3,580	0.8	0.8 [0.7 – 0.9]
May 24 – May 30	144	3,724	0.5	0.7 [0.6 – 0.9]
May 31 – June 6	417	4,141	1.6	1.4 [1.3 – 1.6]
June 7 – June 13	163	4,304	0.5	0.6 [0.5 – 0.7]
June 14 – June 20	143	4,447	0.5	1.0 [0.8 – 1.1]
June 17 – June 23**	167	4,523	0.5	1.1 [1.0 – 1.3]

Data Source: integrated Public Health Information System (iPHIS), Coronavirus Rapid Entry System (CORES) database, The COVID-19 Ottawa Database (The COD), COVID-19 Case and Contact Management tool (CCMtool).
*Estimates for the reproduction number were not provided if there were <12 cases reported for a region within the 7 days prior to the public reporting date.
**Overlaps with prior reporting period as estimates are calculated for 7-day periods.

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For Further Information

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