

To: Members of Board of Health

From: Dr. Matt Strauss, Acting Medical Officer of Health

Date: October 5, 2022

Re: Acting Medical Officer of Health Update

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In follow up to my verbal update at the Monday September 26, 2022 Health and Social Services Advisory Committee meeting.

**Re: Covid-19**

There is increasing interest in 'the end of the pandemic' in the news media since such was declared by the US President last week.

I believe we have talked about this at previous meetings, but to recap, pandemic is defined as "an epidemic covering much/most of the globe."

Poitras's Dictionary of Epidemiology defines epidemic this way:

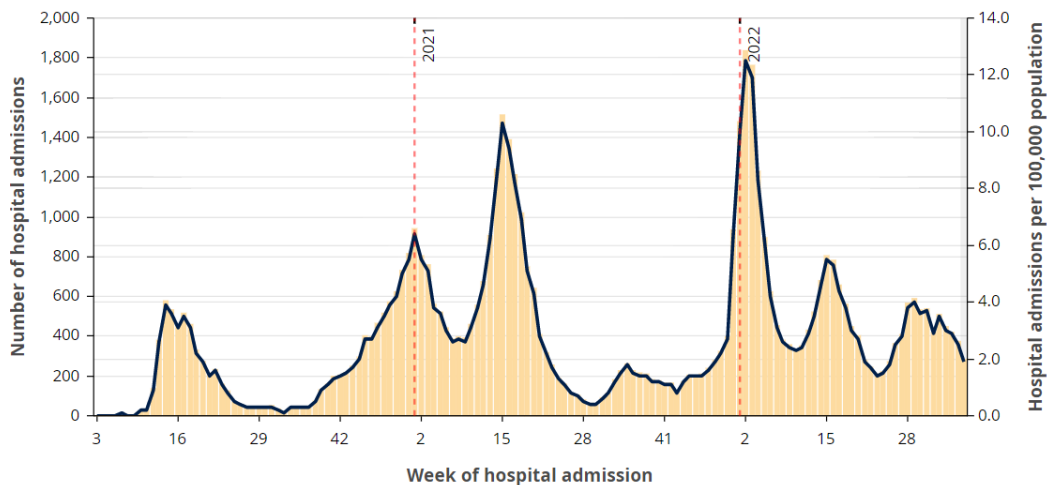
**EPIDEMIC** [from the Greek *epi* (upon), *dēmos* (people)] The occurrence in a community or region of cases of an illness, specific health-related behavior, or other health-related events clearly in excess of normal expectancy.

The community or region and the period in which the cases occur must be specified precisely. The number of cases indicating the presence of an epidemic varies according to the agent, size, and type of population exposed; previous experience or lack of exposure to the disease; and time and place of occurrence. Epidemicity is thus relative to usual frequency of the disease in the same area, among the specified population, at the same season of the year.

So the definition depends on "what one would normally expect." This is why there is likely to be significant disagreement on this point. Even as the virus changes, so might our expectations of its behavior. Furthermore, every jurisdiction and every person in that jurisdiction might have different expectations

My expectation, which I disclosed to this body after the large winter Omicron wave was that we could continue to see smaller waves come and go, and that each would stress our health care system less than the last.

Here is a chart of Covid hospital admissions since January, 2020:



(please note, this chart does not delineate between incidental Covid positive tests and Covid causing admission.)

The virus has met my expectations from March, which is why I am comfortable to say that it no longer meets the strict definition of pandemic. I stress however that this certainly does not mean that Covid is eradicated (it never will be) nor that we should stop doing everything in our power to prevent and treat significant illness that arises out of Covid infection.

As more people, such as the US President, find that the virus is meeting their expectations, more people will acknowledge the end of the pandemic. This is a sociocultural process and not a biological process.

As we conclude the pandemic period, I have been interested to evaluate the outcome of my approach to battling it in this jurisdiction. As this committee is well aware, I advocated for a traditional public health approach that emphasized individual consent and evaluation of the scientific evidence base, rather than a post-2020 “kitchen sink” approach that emphasized cumbersome mandates and closures.

To this end, I personally commissioned Hawkins Consulting Corporation, an actuarial firm, to prepare a report on Covid-19 mortality in Haldimand-Norfolk, neighboring communities and the province. The report includes data up to September 1, 2022. The reports are attached, here are some critical tables.

Table 2 - Haldimand Norfolk COVID-19 Relative to Provincial Average (Jan 2020 to Aug 2022, Annualized)										
Age Group	Population	Cases			Hospitalization			Death		
		Actual	Expected	A / E	Actual	Expected	A / E	Actual	Expected	A / E
0-19	25,116	570	747	76%	4.9	6.5	75%	0.00	0.06	0%
20-39	27,477	1,263	1,404	90%	8	13	65%	0.8	0.4	207%
40-59	30,756	1,095	1,270	86%	26	35	75%	2	3	79%
60-79	30,754	643	810	79%	52	90	58%	12	20	59%
80+	5,905	281	312	90%	34	59	58%	22	30	74%
Total	120,008	3,851	4,542	85%	125	202	62%	38	54	70%

Table 1 - COVID-19 Rates of Health Units Relative to Provincial Average (Jan 2020 to Aug 2022)											
Age Group	Health Unit	Population	Cases			Hospitalization			Death		
			Actual	Expected	A / E	Actual	Expected	A / E	Actual	Expected	A / E
0-19	Brant County	36,165	2,305	2,633	88%	32.0	23.0	139%	0.00	0.22	0%
	Haldimand-Norfolk	25,116	1,395	1,828	76%	12.0	16.0	75%	0.00	0.15	0%
	City of Hamilton	125,006	9,606	9,100	106%	59.0	79.5	74%	0.00	0.76	0%
	Niagara Region	95,428	6,062	6,947	87%	104.0	60.7	171%	0.00	0.58	0%
	Southwestern	52,251	2,474	3,804	65%	38.0	33.2	114%	0.00	0.32	0%
	Total	333,965	21,842	24,312	90%	245.0	212.4	115%	0.00	2.03	0%
20-39	Brant County	39,561	4,343	4,950	88%	44	44	99%	2.0	1.4	144%
	Haldimand-Norfolk	27,477	3,094	3,438	90%	20	31	65%	2.0	1.0	207%
	City of Hamilton	163,103	24,212	20,409	119%	217	183	119%	5.0	5.7	87%
	Niagara Region	117,535	15,493	14,707	105%	167	132	127%	4.0	4.1	97%
	Southwestern	52,288	4,813	6,543	74%	47	59	80%	2.0	1.8	109%
	Total	399,964	51,955	50,046	104%	495	448	111%	15.0	14.1	107%
40-59	Brant County	39,876	3,601	4,032	89%	104	110	94%	7	10	71%
	Haldimand-Norfolk	30,756	2,681	3,109	86%	64	85	75%	6	8	79%
	City of Hamilton	151,124	17,913	15,279	117%	527	419	126%	27	37	72%
	Niagara Region	124,685	12,531	12,606	99%	310	345	90%	22	31	72%
	Southwestern	56,922	4,234	5,755	74%	137	158	87%	17	14	121%
	Total	403,363	40,960	40,781	100%	1,142	1,117	102%	79	99	79%
60-79	Brant County	31,398	1,709	2,025	84%	227	224	101%	33	50	66%
	Haldimand-Norfolk	30,754	1,574	1,984	79%	128	219	58%	29	49	59%
	City of Hamilton	114,757	8,463	7,402	114%	1,069	818	131%	207	184	112%
	Niagara Region	115,670	6,966	7,461	93%	668	825	81%	163	185	88%
	Southwestern	47,018	2,404	3,033	79%	297	335	89%	72	75	95%
	Total	339,598	21,116	21,904	96%	2,389	2,422	99%	504	545	93%
80+	Brant County	6,558	812	848	96%	194	159	122%	56	83	68%
	Haldimand-Norfolk	5,905	687	763	90%	83	143	58%	55	74	74%
	City of Hamilton	27,732	3,828	3,585	107%	778	674	115%	366	349	105%
	Niagara Region	28,409	3,764	3,673	102%	596	690	86%	381	357	107%
	Southwestern	10,429	1,189	1,348	88%	206	253	81%	85	131	65%
	Total	79,033	10,280	10,218	101%	1,857	1,920	97%	943	995	95%
Total	Brant County	153,558	12,770	14,487	88%	601	561	107%	98	144	68%
	Haldimand-Norfolk	120,008	9,431	11,123	85%	307	495	62%	92	132	70%
	City of Hamilton	581,722	64,022	55,775	115%	2,650	2,173	122%	605	577	105%
	Niagara Region	481,727	44,816	45,393	99%	1,845	2,053	90%	570	578	99%
	Southwestern	218,909	15,114	20,482	74%	725	838	87%	176	223	79%
	Total	1,555,924	146,153	147,261	99%	6,128	6,119	100%	1,541	1,655	93%

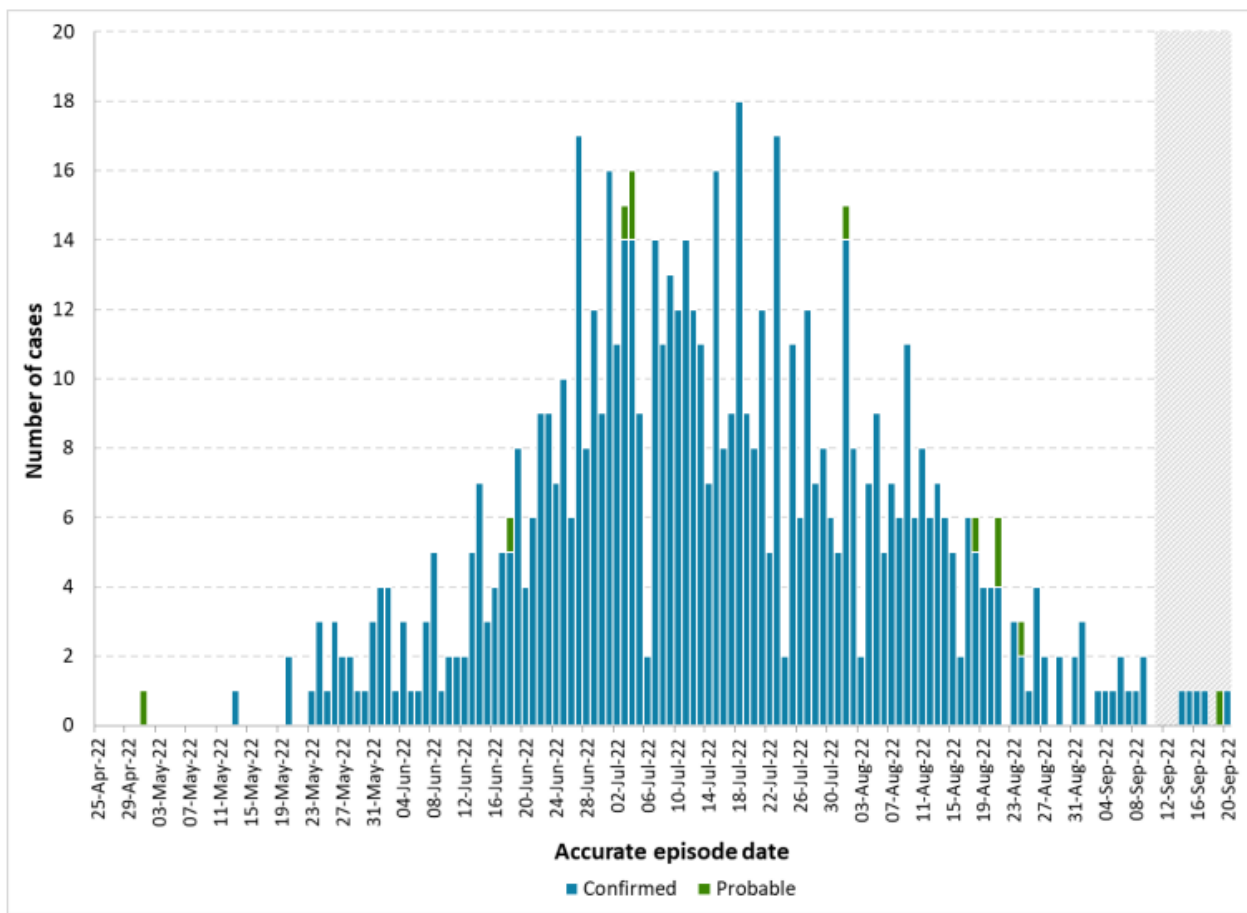
As you see, Haldimand-Norfolk has done very well, with 30% fewer Covid deaths than the provincial average.

This is what I came here to do. I am grateful to the community for the opportunity to do it.

**Re: Monkey Pox**

We have not had a case of monkey pox in Haldimand Norfolk for over 2 months. This is consistent with [the provincial trend](#). I am grateful to every member of this community who managed their risk and got vaccinated.

**Figure 1. Monkeypox cases by accurate episode date and case classification**



**Re: Public Health Restructuring**

There have been persistent rumors going on years, but intensified since the last provincial election, that the public health units will soon be reorganized and consolidated. It has been presumed that there will be many fewer MOHs in the province following the restructuring.

I have not formally alerted the advisory council about this matter up to this point, as rumours are just that, rumours.

However, it has now been confirmed by ministry officials that the final proposal for restructuring has been put forward and lies on the minister's desk.

Myself, having done what I came to, I am quite comfortable about the possibility of returning to full-time work in the ICU. Between now and a ministerial announcement, I will advocate that any restructuring of public health service delivery in Haldimand and Norfolk is done in such a way as to adhere to the communities' values and preserves the opportunity for community feedback.

# Mortality Impact of COVID-19: Ontario, Canada Haldimand-Norfolk & Neighbouring Health Units

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Contact: Michael Hawkins, mh@hawconsult.com

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Michael Hawkins is president of Hawkins Consulting Corporation. Previously, he was a consultant to the life insurance industry at a large international consulting company and a senior analyst at a multi-national life insurance company. Mr. Hawkins is an actuary who is enrolled as a Fellow of the Society of Actuaries (FSA) and holds the designation of Fellow of the Canadian Institute of Actuaries (FCIA). Mr. Hawkins is trained as a mathematician. A graduate of the University of Waterloo, Mr. Hawkins was granted a Bachelor of Mathematics degree in Honours Actuarial Science (BMath), graduating With Distinction, Dean's Honour List. Mr. Hawkins has been qualified by the Tax Court of Canada as an expert on individual life insurance, individual annuities and reinsurance at the request of the Department of Justice, Canada. Hawkins Consulting Corporation was engaged by Dr. Matthew Strauss to prepare this publication.

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Our publication "Mortality Impact of COVID-19: Ontario, Canada" dated October 6, 2021 used data for the entire Province of Ontario. Public health units within the Province of Ontario have data that is distinct from the province as a whole. This document exams Haldimand-Norfolk Health Unit and its neighbouring health units for the period January 15, 2020 to August 27, 2022.<sup>1</sup> Differences by health unit and by age grouping are analyzed.

Table 1 presents actual incidences compared to expected incidences if these health units had similar experiences to the province as a whole.<sup>2</sup> Table 2 presents the same data converted to annualized rates per 1000.<sup>3</sup>

Niagara Region and Brant County health units had hospitalizations in line with the provincial average. City of Hamilton health unit had a higher rate of hospitalization. Niagara Region and City of Hamilton health units had death rates in line with the provincial average. Haldimand-Norfolk and Southwestern health units had hospitalizations and deaths well below the provincial average with Brant County also having a death rate well below the provincial average.

For children and youth age 0-19, in the two and one-half years of exposure, provincial data suggests 2.03 COVID-19 deaths in the five health units combined and there were actually 0.

For adults age 20-39, provincial data suggests 14.1 COVID-19 deaths would be expected in the five health unit combined and there was actually 15.

Deaths are highly correlated with age. 61% of deaths in these health units were lives age 80 and older (943 out of 1,541 total deaths) who represent just 5% of the population (79,033 out of 1,555,924 lives). Those age 80 and older have experienced a COVID-19 death rate of 4.87 per 1000 per annum versus those 79 and younger experiencing a rate of 0.17 per 1000 per annum. Rates of death for the younger age groups are even lower, e.g., for those 39 and younger COVID-19 death rate was 0.008 per 1000 per annum or 1 death per annum per 120,000 lives.

Similarly, hospitalizations are highly correlated with age though to a lesser degree than deaths. 30% of hospitalizations in these health units are among lives age 80 and older (1,857 out of 6,128 total hospitalizations) who represent just 5% of the population. Those age 80 and older have experienced a COVID-19 hospitalization rate of 9.59 per 1000 per annum versus those 79 and younger experiencing a rate of 1.18 per 1000 per annum. Rates of hospitalization for the

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<sup>1</sup> Government of Ontario is source of data for province as a whole and for health unit.

<sup>2</sup> Cases are included in Table 1. Case monitoring practices have varied over time and is presently of questionable accuracy, however, it is information that the user may find of interest for comparative purposes.

<sup>3</sup> Annualization uses the start date as March 15, 2020 as there was little exposure in the first two months.

younger age groups are even lower, e.g., for those 39 and younger COVID-19 hospitalization rate was 0.41 per 1000 per annum or 1 hospitalization per annum per 2,430 lives.

Table 3 presents expected deaths from all causes and relates both actual COVID-19 deaths and expected COVID-19 deaths to the larger total.<sup>4</sup> In terms of proportionality, COVID-19 deaths would be expected to be a small portion of deaths if the health units had followed provincial averages. If following the province, COVID-19 deaths in the health units would have been expected to have been 5.2% of deaths overall. In a normal year, it would be expected that there would be 13,094 deaths in these health units. Actual COVID-19 deaths in these health units being 676 represents 4.8% of this total which is lower than the provincial average.

COVID-19 deaths as a portion of all causes deaths varied from 3.5% for Brant County, 3.6% for Haldimand-Norfolk, 4.1% for Southwestern, 5.1% for Niagara Region and 5.4% for City of Hamilton.

Again there is an age correlation with higher age groupings having COVID-19 deaths represent a higher portion of all causes deaths: in these health units, age 80 and older COVID-19 deaths represent 5.4% of total deaths whereas ages 39 and younger COVID-19 deaths represent 1.8% of total deaths.

As another tool for perspective, the more familiar infectious diseases of influenza and pneumonia are compared to COVID-19. Of the expected total deaths of 13,094 in a normal year for these five health units, 366 of these would be expected to be caused by influenza or pneumonia.<sup>5</sup> Actual COVID-19 deaths were 1.7 times the normal number of influenza and pneumonia deaths: less than double for City of Hamilton and Niagara Region (1.9 and 1.8 times respectively); about 1.5 times for Southwestern; and 1.3 times for Brant County and Haldimand-Norfolk.

Year-to-year variation in the rate of death caused by influenza and pneumonia from 2015-2019 experience is a range of 317 to 414 expected deaths for these five health units; annualized COVID-19 deaths at 629 have been above the range of a normal year of influenza and pneumonia deaths, 263 deaths higher than the average of the 5-year range but just 215 deaths higher than the high year within the 5-year range. The relationship is not uniform across health units:

<u>Health Unit</u>	<u>COVID-19 Deaths in Excess of Average Influenza &amp; Pneumonia Deaths</u>	<u>COVID-19 Deaths in Excess of 5-year Range of Influenza &amp; Pneumonia Deaths</u>
Brant County	9	4
Haldimand-Norfolk	9	5
City of Hamilton	119	102
Niagara Region	103	87
Southwestern	23	17

### **Caution with respect to Biases**

Please review section in the October 6, 2021 research paper discussing biases. The data of the Government of Ontario contains biases that may materially overstate the impact of the COVID-19 virus on mortality. Data available has been used. The reader is cautioned that the biases in the data result in an overstatement of the severity of outcomes from the COVID-19 virus.

<sup>4</sup> All causes of death rates are 2019 rates from Statistics Canada using Canadian average rates within age groupings.

<sup>5</sup> Influenza and pneumonia rates of death are Canadian average for 2015-2019 from Statistics Canada.

Table 1 - COVID-19 Rates of Health Units Relative to Provincial Average (Jan 2020 to Aug 2022)											
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	Southwestern	52,251	2,474	3,804	65%	38.0	33.2	114%	0.00	0.32	0%
	Total	333,965	21,842	24,312	90%	245.0	212.4	115%	0.00	2.03	0%
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	Niagara Region	481,727	44,816	45,393	99%	1,845	2,053	90%	570	578	99%
	Southwestern	218,909	15,114	20,482	74%	725	838	87%	176	223	79%
	Total	1,555,924	146,153	147,261	99%	6,128	6,119	100%	1,541	1,655	93%



Table 2 - COVID-19 Rates per 1000 of Health Units Relative to Prov. Avg. (Jan 2020 to Aug 2022, annualized)

Age Group	Health Unit	Population	Hospitalization			Death		
			Actual	Expected	A / E	Actual	Expected	A / E
0-19	Brant County	36,165	0.36	0.26	139%	0.0000	0.0025	0%
	Haldimand-Norfolk	25,116	0.20	0.26	75%	0.0000	0.0025	0%
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	Niagara Region	95,428	0.44	0.26	171%	0.0000	0.0025	0%
	Southwestern	52,251	0.30	0.26	114%	0.0000	0.0025	0%
	Total	333,965	0.30	0.26	115%	0.0000	0.0025	0%
20-39	Brant County	39,561	0.45	0.46	99%	0.021	0.014	144%
	Haldimand-Norfolk	27,477	0.30	0.46	65%	0.030	0.014	207%
	City of Hamilton	163,103	0.54	0.46	119%	0.013	0.014	87%
	Niagara Region	117,535	0.58	0.46	127%	0.014	0.014	97%
	Southwestern	52,288	0.37	0.46	80%	0.016	0.014	109%
	Total	399,964	0.51	0.46	111%	0.015	0.014	107%
40-59	Brant County	39,876	1.06	1.13	94%	0.07	0.10	71%
	Haldimand-Norfolk	30,756	0.85	1.13	75%	0.08	0.10	79%
	City of Hamilton	151,124	1.42	1.13	126%	0.07	0.10	72%
	Niagara Region	124,685	1.02	1.13	90%	0.07	0.10	72%
	Southwestern	56,922	0.98	1.13	87%	0.12	0.10	121%
	Total	403,363	1.16	1.13	102%	0.08	0.10	79%
60-79	Brant County	31,398	2.95	2.91	101%	0.43	0.65	66%
	Haldimand-Norfolk	30,754	1.70	2.91	58%	0.39	0.65	59%
	City of Hamilton	114,757	3.80	2.91	131%	0.74	0.65	112%
	Niagara Region	115,670	2.36	2.91	81%	0.58	0.65	88%
	Southwestern	47,018	2.58	2.91	89%	0.63	0.65	95%
	Total	339,598	2.87	2.91	99%	0.61	0.65	93%
80+	Brant County	6,558	12.08	9.92	122%	3.49	5.14	68%
	Haldimand-Norfolk	5,905	5.74	9.92	58%	3.80	5.14	74%
	City of Hamilton	27,732	11.45	9.92	115%	5.39	5.14	105%
	Niagara Region	28,409	8.57	9.92	86%	5.48	5.14	107%
	Southwestern	10,429	8.07	9.92	81%	3.33	5.14	65%
	Total	79,033	9.59	9.92	97%	4.87	5.14	95%
Total	Brant County	153,558	1.60	1.49	107%	0.26	0.38	68%
	Haldimand-Norfolk	120,008	1.04	1.68	62%	0.31	0.45	70%
	City of Hamilton	581,722	1.86	1.53	122%	0.42	0.40	105%
	Niagara Region	481,727	1.56	1.74	90%	0.48	0.49	99%
	Southwestern	218,909	1.35	1.56	87%	0.33	0.42	79%
	Total	1,555,924	1.61	1.61	100%	0.40	0.43	93%

Table 3 - COVID-19 Deaths of Health Units Relative to All Causes (Jan 2020 to Aug 2022, annualized)

Age Group	Health Unit	Population	All Causes Expected Deaths	Actual COVID-19 Deaths	Ratio: Actual COVID-19 / All Causes Expected	Expected COVID-19 Deaths	Ratio: Expected COVID-19 / All Causes Expected
0-19	Brant County	36,165	5.9	0.00	0.0%	0.09	1.5%
	Haldimand-Norfolk	25,116	4.1	0.00	0.0%	0.06	1.5%
	City of Hamilton	125,006	20.4	0.00	0.0%	0.31	1.5%
	Niagara Region	95,428	15.6	0.00	0.0%	0.24	1.5%
	Southwestern	52,251	8.5	0.00	0.0%	0.13	1.5%
	Total	333,965	54	0.00	0.0%	0.83	1.5%
20-39	Brant County	39,561	29	0.8	2.8%	0.6	2.0%
	Haldimand-Norfolk	27,477	20	0.8	4.1%	0.4	2.0%
	City of Hamilton	163,103	119	2.0	1.7%	2.3	2.0%
	Niagara Region	117,535	86	1.6	1.9%	1.7	2.0%
	Southwestern	52,288	38	0.8	2.1%	0.8	2.0%
	Total	399,964	291	6.1	2.1%	5.7	2.0%
40-59	Brant County	39,876	105	3	2.7%	4	3.8%
	Haldimand-Norfolk	30,756	81	2	3.0%	3	3.8%
	City of Hamilton	151,124	399	11	2.8%	15	3.8%
	Niagara Region	124,685	329	9	2.7%	13	3.8%
	Southwestern	56,922	150	7	4.6%	6	3.8%
	Total	403,363	1,066	32	3.0%	41	3.8%
60-79	Brant County	31,398	427	13	3.2%	21	4.8%
	Haldimand-Norfolk	30,754	418	12	2.8%	20	4.8%
	City of Hamilton	114,757	1,560	85	5.4%	75	4.8%
	Niagara Region	115,670	1,573	67	4.2%	76	4.8%
	Southwestern	47,018	639	29	4.6%	31	4.8%
	Total	339,598	4,618	206	4.5%	222	4.8%
80+	Brant County	6,558	586	23	3.9%	34	5.7%
	Haldimand-Norfolk	5,905	528	22	4.3%	30	5.7%
	City of Hamilton	27,732	2,479	149	6.0%	142	5.7%
	Niagara Region	28,409	2,540	156	6.1%	146	5.7%
	Southwestern	10,429	932	35	3.7%	54	5.7%
	Total	79,033	7,065	385	5.4%	406	5.7%
Total	Brant County	153,558	1,153	40	3.5%	59	5.1%
	Haldimand-Norfolk	120,008	1,051	38	3.6%	54	5.1%
	City of Hamilton	581,722	4,578	247	5.4%	235	5.1%
	Niagara Region	481,727	4,543	233	5.1%	236	5.2%
	Southwestern	218,909	1,769	72	4.1%	91	5.1%
	Total	1,555,924	13,094	629	4.8%	676	5.2%

Table 4 - Deaths: All Causes / Influenza &amp; Pneumonia / COVID-19 (Jan 2020 to Aug 2022, Annualized)

Age Group	Health Unit	Population	All Causes Expected Deaths	Expected Influenza & Pneumonia Deaths	Expected COVID-19 Deaths	Actual COVID-19 Deaths	Ratio: Actual COVID-19 / Expected Flu & Pneu
0-19	Brant County	36,165	5.9	0.12	0.09	0.00	0%
	Haldimand-Norfolk	25,116	4.1	0.09	0.06	0.00	0%
	City of Hamilton	125,006	20.4	0.43	0.31	0.00	0%
	Niagara Region	95,428	15.6	0.33	0.24	0.00	0%
	Southwestern	52,251	8.5	0.18	0.13	0.00	0%
	Total	333,965	54.5	1.15	0.83	0.00	0%
20-39	Brant County	39,561	29	0.2	0.6	0.8	381%
	Haldimand-Norfolk	27,477	20	0.1	0.4	0.8	548%
	City of Hamilton	163,103	119	0.9	2.3	2.0	231%
	Niagara Region	117,535	86	0.6	1.7	1.6	256%
	Southwestern	52,288	38	0.3	0.8	0.8	288%
	Total	399,964	291	2.2	5.7	6.1	282%
40-59	Brant County	39,876	105	1	4	3	197%
	Haldimand-Norfolk	30,756	81	1	3	2	219%
	City of Hamilton	151,124	399	6	15	11	200%
	Niagara Region	124,685	329	5	13	9	198%
	Southwestern	56,922	150	2	6	7	335%
	Total	403,363	1,066	15	41	32	220%
60-79	Brant County	31,398	427	7	21	13	188%
	Haldimand-Norfolk	30,754	418	7	20	12	168%
	City of Hamilton	114,757	1,560	26	75	85	322%
	Niagara Region	115,670	1,573	26	76	67	252%
	Southwestern	47,018	639	11	31	29	273%
	Total	339,598	4,618	78	222	206	265%
80+	Brant County	6,558	586	22	34	23	102%
	Haldimand-Norfolk	5,905	528	20	30	22	111%
	City of Hamilton	27,732	2,479	95	142	149	158%
	Niagara Region	28,409	2,540	97	146	156	160%
	Southwestern	10,429	932	36	54	35	97%
	Total	79,033	7,065	270	406	385	142%
Total	Brant County	153,558	1,153	31	59	40	127%
	Haldimand-Norfolk	120,008	1,051	29	54	38	131%
	City of Hamilton	581,722	4,578	128	235	247	193%
	Niagara Region	481,727	4,543	129	236	233	180%
	Southwestern	218,909	1,769	49	91	72	147%
	Total	1,555,924	13,094	366	676	629	172%

# Mortality Impact of COVID-19: Ontario, Canada Haldimand-Norfolk Health Unit, Jan-2020 to Aug-2022

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Our publication "Mortality Impact of COVID-19: Ontario, Canada" dated October 6, 2021 used data for the entire Province of Ontario. Public health units within the Province of Ontario have data that is distinct from the province as a whole. This document exams Haldimand-Norfolk Health Unit for the period January 15, 2020 to August 27, 2022.<sup>1</sup>

Relative to the province as a whole, Haldimand-Norfolk Unit has experienced significantly lower incidences of COVID-19 attributed hospitalizations and deaths. Table 1 presents actual incidences compared to expected incidences if this health unit had similar experiences to the province as a whole.<sup>2</sup>

For children and youth age 0-19, in the two years of exposure, provincial data suggests 0.15 COVID-19 deaths would be expected in this health unit and there were actually 0. For adults age 20-39, provincial data suggests 1.0 COVID-19 deaths would be expected in this health unit and there was actually 2. Overall, COVID-19 deaths have been lower in this health unit relative to the provincial experience, just 70% of expected.

Table 1 - Haldimand Norfolk COVID-19 Relative to Provincial Average (Jan 2020 to Aug 2022)										
Age Group	Population	Cases			Hospitalization			Death		
		Actual	Expected	A / E	Actual	Expected	A / E	Actual	Expected	A / E
0-19	25,116	1,395	1,828	76%	12.0	16.0	75%	0	0.15	0%
20-39	27,477	3,094	3,438	90%	20	31	65%	2	1.0	207%
40-59	30,756	2,681	3,109	86%	64	85	75%	6	8	79%
60-79	30,754	1,574	1,984	79%	128	219	58%	29	49	59%
80+	5,905	687	763	90%	83	143	58%	55	74	74%
Total	120,008	9,431	11,123	85%	307	495	62%	92	132	70%

Table 2 presents the data and statistics annualized; mortality is normally examined on an annual basis.

Table 3 presents expected deaths from all causes and relates both actual COVID-19 deaths and expected COVID-19 deaths to the larger total.<sup>3</sup> In terms of proportionality, COVID-19 deaths would be expected to be a small portion of deaths if the health unit had followed provincial averages. If following the province, COVID-19 deaths in the health unit

<sup>1</sup> Government of Ontario is source of data for province as a whole and for health unit.

<sup>2</sup> Cases are included in Table 1 and Table 2. Case monitoring practices have varied over time and is presently of questionable accuracy, however, it is information that the user may find of interest for comparative purposes.

<sup>3</sup> All causes of death rates are 2019 rates from Statistics Canada using Canadian average rates within age groupings.

would have been expected to have been 5.1% of deaths overall. In a normal year, it would be expected that there would be 1,051 deaths in this health unit. Actual COVID-19 deaths being 38 represents 3.6% of this total.

Table 2 - Haldimand Norfolk COVID-19 Relative to Provincial Average (Jan 2020 to Aug 2022, Annualized)										
Age Group	Population	Cases			Hospitalization			Death		
		Actual	Expected	A / E	Actual	Expected	A / E	Actual	Expected	A / E
0-19	25,116	570	747	76%	4.9	6.5	75%	0.00	0.06	0%
20-39	27,477	1,263	1,404	90%	8	13	65%	0.8	0.4	207%
40-59	30,756	1,095	1,270	86%	26	35	75%	2	3	79%
60-79	30,754	643	810	79%	52	90	58%	12	20	59%
80+	5,905	281	312	90%	34	59	58%	22	30	74%
Total	120,008	3,851	4,542	85%	125	202	62%	38	54	70%

Table 3 - Haldimand Norfolk COVID-19 Deaths Relative to All Causes (Jan 2020 to Aug 2022, Annualized)						
Age Group	Population	All Causes Expected Deaths	Actual COVID-19 Deaths	Ratio: Actual COVID-19 / Expected All Causes	Expected COVID-19 Deaths	Ratio: Expected COVID-19 / Expected All Causes
0-19	25,116	4.1	0.00	0.0%	0.06	1.5%
20-39	27,477	20	0.8	4.1%	0.4	2.0%
40-59	30,756	81	2	3.0%	3	3.8%
60-79	30,754	418	12	2.8%	20	4.8%
80+	5,905	528	22	4.3%	30	5.7%
All Ages	120,008	1,051	38	3.6%	54	5.1%

As another tool for perspective, the more familiar infectious diseases of influenza and pneumonia are compared to COVID-19. Of the expected total deaths of 1,051 in a normal year for the health unit, 29 of these would be expected to be caused by influenza or pneumonia.<sup>4</sup> Expected COVID-19 deaths were 1.9 times the normal number of influenza and pneumonia deaths. However, actual COVID-deaths in this health unit were just 1.3 times normal influenza and pneumonia deaths (somewhat higher). Year-to-year variation in the rate of death caused by influenza and pneumonia from 2015-2019 experience is a range of 24 to 33 deaths for this health unit; COVID-19 deaths at 38 have been 5 deaths above the range of a normal year of influenza and pneumonia deaths.

Table 4 - Haldimand Norfolk All Causes / Influenza & Pneumonia / COVID-19 (Jan 2020 to Aug 2022, Annualized)					
Age Group	Population	All Causes Expected Deaths	Expected Influenza & Pneumonia Deaths	Expected COVID-19 Deaths	Actual COVID-19 Deaths
0-19	25,116	4.1	0.09	0.06	0.0
20-39	27,477	20	0.1	0.4	0.8
40-59	30,756	81	1	3	2
60-79	30,754	418	7	20	12
80+	5,905	528	20	30	22
All Ages	120,008	1,051	29	54	38

### Caution with respect to Biases

Please review section in the October 6, 2021 research paper discussing biases. The data of the Government of Ontario contains biases that may materially overstate the impact of the COVID-19 virus on mortality. Data available has been used. The reader is cautioned that the biases in the data result in an overstatement of the severity of outcomes from the COVID-19 virus.

<sup>4</sup> Influenza and pneumonia rates of death are Canadian average for 2015-2019 from Statistics Canada.