

The incidence of COVID-19 infection in Canada? New survey points to over 100,000 households

Survey reinforces need for social distancing

April 8, 2020 – As Canada enters its second month of the COVID-19 crisis, a critical epidemiological and policy question concerns the incidence of this infection in the general population. Estimates of the case fatality rate associated with this virus depend on an accurate count of the number of Canadians who have been or are still infected. Furthermore, determining the number of residents who have already been infected and are now virus-free provides a glimpse into a post-lockdown world, where many Canadians can return to their daily lives in their communities without fear of contracting the virus or spreading it further.

The current published estimate of the number of coronavirus cases in Canada only counts those who have been tested. This represents a small, non-random fraction of the total population.

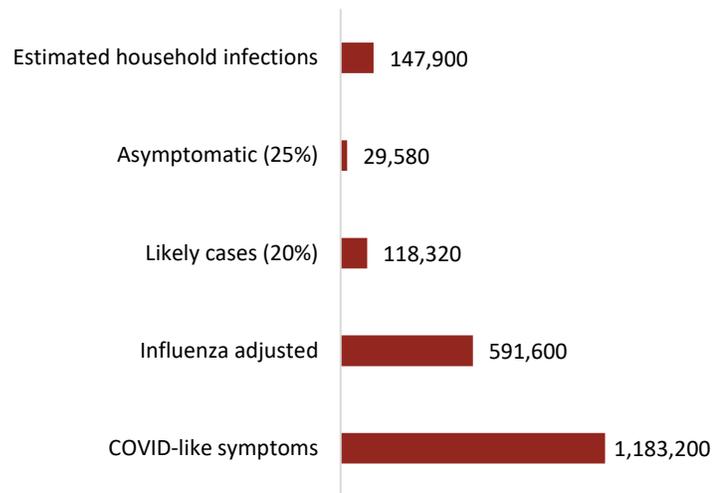
The World Health Organization estimates indicate that as many as 85 per cent of those infected with COVID-19 experience symptoms that are mild or moderate – not requiring clinical intervention. In addition, new studies suggest that between 25 and 50 per cent of all those infected may be completely asymptomatic.

Given this, how can we know the true number of Canadians outside the hospital system who have been infected with this novel coronavirus? Ideally the answer to this question would be addressed via a large-scale sample survey involving a combination of blood and nasal swab tests. Unfortunately, the technology required to mount such a survey is several months away.

Survey research methods can, however, help to clear some of the fog of uncertainty around the rate of cases in the population by addressing questions regarding COVID-19 symptoms. Put simply – how many households have recently experienced those symptoms most commonly associated with COVID infections? This method is being used with increasing frequency around the world.

A new Angus Reid Institute survey involving a large, representative sample of more than 4,200 Canadians addressed the issue of COVID-19-like symptoms among both respondents and those in their

Estimate of COVID-19 incidence in Canadians households



METHODOLOGY:

The Angus Reid Institute conducted an online survey from April 1 – 5, 2020 among a representative randomized sample of 4,240 Canadian adults who are members of [Angus Reid Forum](#). For comparison purposes only, a probability sample of this size would carry a margin of error of +/- 2 percentage points, 19 times out of 20. Discrepancies in or between totals are due to rounding. The survey was self-commissioned and paid for by ARI. Detailed tables are found at the end of this release.

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own households. This sample was drawn from the [Angus Reid Forum](#), an online panel of 50,000 Canadians.

Respondents were asked to indicate if they had experienced any of a list of eight symptoms over the past month (the survey was carried out over the first five days of April). Participants were asked to list only **new symptoms** – excluding those that might have been part of a chronic condition. Those living in households with more than one occupant were also asked if any others in the household had experienced these symptoms.

The list of symptoms and incidence as measured by self-report are shown below:

Canadians' symptoms within the past month – new symptom, not related to a chronic issue		
	Personal symptoms (n=4,240)	Symptoms of someone in household (n=3,568)
Sore throat	29%	26%
A mild dry cough	26%	26%
Frequent sneezing	25%	17%
Difficulty breathing/ shortness of breath	12%	9%
A fever	9%	12%
A severe dry cough – disruptive, keeps you awake	6%	7%
Loss of sense of smell	4%	2%
Fever with hallucinations	2%	1%
No symptoms	50%	43%

Many of these symptoms on their own aren't necessarily indicative of COVID-19. Some may be short-term irritants associated with allergies, while others may be caused by seasonal influenzas.

In order to unpack these data, attention was focused on those respondents reporting a combination of fever (with or without hallucinations) **and** difficulty breathing **or** a dry cough so severe that it disrupts their sleep **or** a loss of a sense of smell. See the table below for the frequency of this type of symptom combination:

Instance of COVID-19 symptoms in Canadian households A combination of fever (with or without hallucinations) <i>and</i> difficulty breathing <i>or</i> a dry cough so severe that it disrupts sleep <i>or</i> a loss of a sense of smell	
	All respondents (n=4,240)
Have COVID symptoms themselves and within their household (n=88)	2%
Have COVID symptoms themselves (n=122)	3%
Someone in household has COVID symptoms (n=124)	3%
No one in household has any symptoms (n=3,906)	92%
Persistence of symptoms	
Had symptoms and do not anymore (n=262)	6%
Still have symptoms (n=52)	1%

In total, 334 respondents, or about eight per cent of the sample base, met the criteria of fever and respiratory distress at a household level. These are possible COVID infections, but research suggests a significant proportion could be from households experiencing seasonal influenza.

That incidence is difficult to estimate with certainty. Health Canada publishes a weekly Flu Watch report that includes the results from surveys of non-representative samples of Canadians who report whether they have a cough and/or fever. Keeping in mind the extreme limitations of this data source, as many as half of those who report a cough and/or fever may be suffering from seasonal influenza and not COVID-19.

In the graph below, the number of households reporting COVID-like symptoms is displayed. This was calculated as eight percent of the 14.7 million households in Canada. This has been in turn adjusted downwards with the assumption that half of those reporting symptoms are experiencing seasonal influenza (per the Flu Watch estimate). This yields an estimate of just under 600,000 households with COVID-like symptoms that are probably not the result of seasonal flu.

How accurate is this estimate? The ARI survey asked respondents to indicate whether they or others in their household had received a COVID-19 test. In total, 109 of the 4,240 respondents answered in the affirmative. Using these numbers, we estimate that about 377,000 tests of one or more persons in a household have been performed. This number is consistent with information published by the Public Health Agency of Canada, which estimates that over 330,000 people have been tested [as of April 6](#).

COVID-19 Testing		
	Have been tested (n=4,240)	Have been trying to get tested, but unable (n=4,240)
Personally, and someone in their household	<1%	1%
Personally	1%	1%
Someone in household	1%	1%
No one	97%	97%

The largest unknown is the number of households with likely COVID symptoms who have actually been infected. Answering this question requires blood and/or nasal swab tests – two procedures obviously beyond the scope of this study.

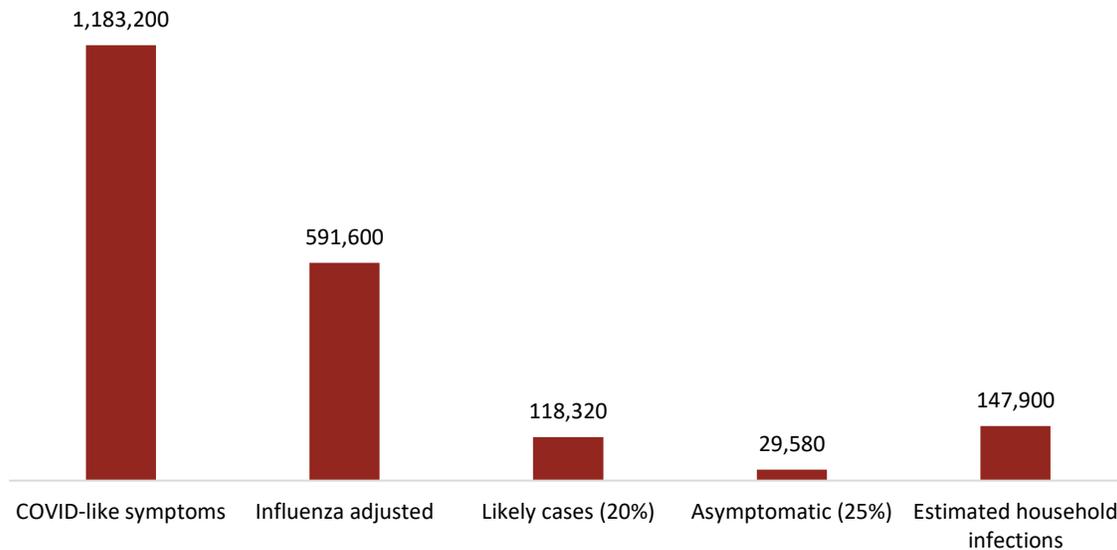
Across Canada only about 4 per cent of those tested are positive for COVID-19. If this were reflective of influenza adjusted COVID symptom households (591,600), this virus would have infected about 25,000 households. In the United States, the CDC [COVIDView Report](#) says that 14.5 per cent of the 75,000 specimens tested in the final week of March were positive. This figure, if applied to the ARI data, would suggest that there are about 85,000 COVID-positive households in Canada.

For the purpose of this analysis, a slightly higher infection rate among COVID likely households has been used. The 14.5% estimate from the CDC is probably too low because a large percentage of the specimens being tested are from non-random sources including health care workers and first responders, where the aim is more one of infection prevention and screening rather than epidemiological forecasting. Though the exact rate among the symptomatic general public is not available, this study has assumed that 20% is a reasonable estimate. Supporting this assumption is the high likelihood that persons seeking testing have more severe symptoms, while those with milder infections will be less likely to be tested.

Using the 20 per cent infection rate yields an estimate of 118,200 households in Canada where infection has occurred or is still present. The number has been further refined upwards to account for the findings from recent research which have established a minimal baseline for asymptomatic infection at 25 per cent.

Combining all of these numbers yields an estimate of 147,900 households where COVID infection was or is present. See graph below for a summary:

Estimate of COVID-19 incidence in Canadians households



The accuracy of this estimate can, of course, only be confirmed by testing. In an ideal world, each of the 334 symptomatic households in this study would contribute specimens to establish a more precise estimate of actual infection experience.

If the estimates emerging from this survey are accurate, the levels of COVID infection over the month of March in Canada are substantially higher than reported. Thus, the rate of hospitalization and mortality are likely far lower. If 10,000 people are infected and 300 die the mortality rate is three per 100. But if the number infected is 100,000 the mortality rate is three per 1,000. A very different situation.

These estimates of the spread of COVID-19 in the general population add further weight to policies aimed at social distancing. The likelihood of being in contact with someone carrying this virus, assuming 100,000 carriers, is ten times greater than if there are only 10,000.

In the longer-term, however, higher levels of infection may yield a substantial subset of the population who may be immune to reinfection.

Canadians, like most around the world, are eagerly looking at the next chapter in this pandemic. We know a lot about death rates and hospitalizations but not nearly enough about the numerator in the epidemiological equation – how many have or have had this virus?

The Angus Reid Institute study is merely a searchlight in the fog – hopefully as others join this process of discovery, the path forward will become clear.

About ARI

*The **Angus Reid Institute (ARI)** was founded in October 2014 by pollster and sociologist, Dr. Angus Reid. ARI is a national, not-for-profit, non-partisan public opinion research foundation established to advance education by commissioning, conducting and disseminating to the public accessible and impartial statistical data, research and policy analysis on economics, political science, philanthropy, public administration, domestic and international affairs and other socio-economic issues of importance to Canada and its world.*

For detailed results by age, gender, and region, [click here](#).