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# Health-related concerns and precautions during the COVID-19 pandemic: A comparison of Canadians with and without underlying health conditions

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# Health-related concerns and precautions during the COVID-19 pandemic: A comparison of Canadians with and without underlying health conditions

by Pamela L. Ramage-Morin and Jane Y. Polsky

## Abstract

**Background:** The risk of experiencing adverse outcomes from the coronavirus disease 2019 (COVID-19), such as hospitalization, admission to intensive care units and death, is elevated for older individuals and those with certain underlying health conditions including diabetes, chronic conditions affecting lungs, heart or kidneys, and a compromised immune system.

**Data and methods:** Data collected between March 29 and April 3, 2020 from the Canadian Perspectives Survey Series 1: Impacts of COVID-19 (n=4,627) were used to estimate the prevalence of underlying health conditions, health concerns and precautionary behaviours among Canadians aged 15 or older living in the provinces. Multivariate analyses examined associations between these variables after accounting for age, sex and education.

**Results:** Close to 1 in 4 Canadians (24%) had an underlying health condition that increased their risk of adverse outcomes from COVID-19. Overall, 36% of the population were very or extremely concerned about the impact of COVID-19 on their own health. Individuals with underlying health conditions had higher odds (odds ratio: 2.0, 95% confidence interval: 1.6 to 2.5) of being highly concerned than those without these conditions, after adjustment for demographic characteristics. High percentages of Canadians took precautions to reduce the risk of infection regardless of whether or not they had underlying health conditions.

**Interpretation:** Health status was associated with higher levels of concern for one's own health in the early period of the COVID-19 pandemic. Most Canadians were taking precautions recommended by public health authorities to protect themselves and others.

**Keywords:** Pandemics; infectious diseases; SARS-CoV-2; comorbidity; coronavirus infections

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The risk of experiencing adverse outcomes from the coronavirus disease 2019 (COVID-19), such as hospitalization, admission to intensive care units and death, is elevated for older individuals and those with certain underlying medical conditions.<sup>1-5</sup> As of early May 2020, 67% percent of Canadians who were hospitalized due to COVID-19 and 63% of those admitted to intensive care units were aged 60 or older.<sup>1</sup> The vast majority (95%) of those who have died from the disease were also in this older age group. Most of the cases (74%) who were hospitalized with COVID-19 reported one or more pre-existing chronic conditions. The susceptibility of older individuals and those with underlying health conditions has been reported across the globe.<sup>2-9</sup>

Lessons from past pandemics, such as the 2009 H1N1 influenza outbreak, emphasize that public cooperation is essential to help limit the spread of disease.<sup>10</sup> Adoption of precautionary behaviours, such as hand washing and social (physical) distancing, can be critical to the effectiveness of the pandemic response, particularly in the early stages of an outbreak. Public cooperation requires that individuals are well informed and depends on their understanding of the perceived risk of infection and seriousness of the disease and its adverse consequences.<sup>10</sup>

This study examines Canadians' concerns about the impact of COVID-19 on their own health and the health of others, and the precautions individuals have taken to avoid infection. Comparisons are made between those who are more or less susceptible to adverse outcomes from COVID-19 due to the

presence or absence of underlying health conditions, namely, having a compromised immune system, diabetes or a chronic condition affecting the lungs, heart or kidneys. Age is incorporated into the analyses to account for the greater susceptibility of older adults.

## Methods

### Data source

#### *Canadian Perspectives Survey Series 1: Impacts of COVID-19 (CPSS1)*

The cross-sectional CPSS1 collected COVID-19-related information concerning labour market impacts, behaviours and health impacts for the Canadian population 15 years of age or older living in the ten provinces. The CPSS1 sample was selected from four Labour Force Survey (LFS) rotation groups that answered the LFS for the last time in April, May, June or July of 2019. Excluded from the LFS coverage are: persons living on reserves and other Aboriginal settlements in the provinces; full-time members of the Canadian Armed Forces; the institutionalized population; and households in extremely remote areas with very low population density. These groups together represent an exclusion of less than 2% of the Canadian population aged 15 or older. One household member was selected at random for the CPSS1. Data were collected from March 29 to April 3, 2020. Of the 7,242 CPSS participants that were invited to complete the CPSS1, 4,627 people responded for a 63.9% response

rate. The sample of 4,627 Canadians (2,155 males, 2,472 females) represents a population of 31 million. Detailed documentation for the [Canadian Perspectives Survey Series](#) is available at: <https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&Id=1280240>.

## Definitions

Respondents who answered “yes” to either or both of the following questions were classified as having an *underlying health condition* that increased their risk of adverse outcomes from COVID-19: “Do you have a compromised immune system?”; “Do you have diabetes or a chronic condition affecting your lungs, heart or kidneys?”.

Concern about the impacts of COVID-19 referred to: my own health; member of the household’s health; vulnerable people’s health; Canadian population’s health; world population’s health; overloading the health system. Responses were classified as *high concern* (“very” or “extremely”) versus low concern (“not at all” or “somewhat”).

Respondents selected all that applied from a list of precautions they had

taken to reduce their risk of exposure to COVID-19. These precautions included: avoided leaving the house for non-essential reasons; used social distancing when out in public; avoided crowds and large gatherings; washed your hands more regularly; avoided touching your face. Of note, “physical distancing” has evolved as the preferred term over “social distancing” as it clarifies the need for physical separation without sacrificing important social connections.<sup>11</sup>

Respondents’ level of education was classified as high school graduation of lower, some post-secondary education (e.g., trade certificate, college diploma), and bachelor’s degree or higher.

Age groups were: 15 to 34, 35 to 49, 50 to 64, 65 to 74, and 75 or older.

## Analytical techniques

Weighted frequencies and cross-tabulations were calculated to examine the prevalence of having an underlying health condition that increased the risk of adverse outcomes from COVID-19 by age group. The prevalence of COVID-19 health-related concerns and precautionary behaviours were examined

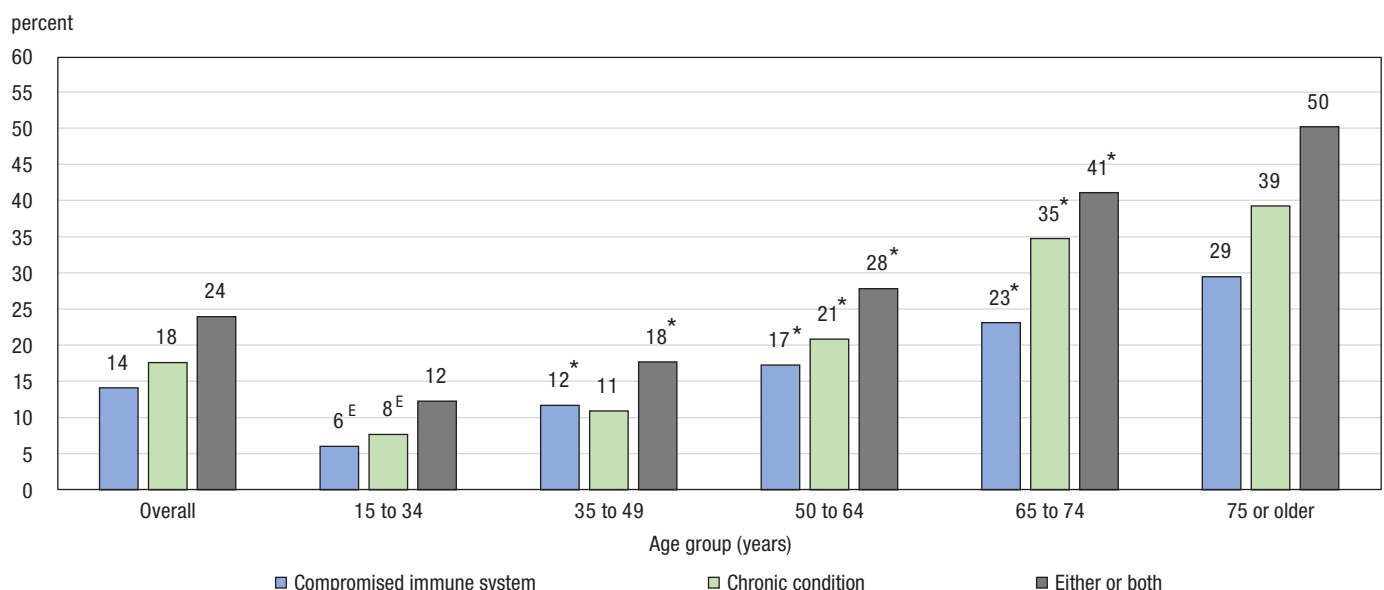
comparing those with and without underlying health conditions. Multivariate logistic regression was used to determine if bivariate associations persisted when sex, age and education were taken into account. Bootstrap weights were applied using SAS-Callable SUDAAN 11.0 to estimate standard errors. Statistical significance was set at  $p < 0.05$ .

## Results

### Underlying medical conditions

Almost 1 in 4 Canadians (24%) aged 15 years or older had an underlying health condition that increased their risk of adverse outcomes from COVID-19 (Figure 1). These individuals had either a compromised immune system (14%) or a chronic condition of particular concern identified by the Public Health Agency of Canada,<sup>12</sup> that is, diabetes or a chronic condition that affects the lungs, heart or kidneys (18%). Susceptibility increased with age, ranging from 12% among younger adults aged 15 to 34 to 44% (95% CI: 38.9 to 48.6) among seniors aged 65 or older.

**Figure 1**  
**Percentage with underlying health conditions by age group, household population aged 15 or older, Canada excluding territories, 2020**



<sup>E</sup> use with caution

\* significantly different from previous age group ( $p < 0.05$ )

**Note:** Chronic condition is diabetes or chronic condition affecting lungs, heart or kidneys.

**Source:** 2020 Canadian Perspectives Survey Series 1: Impacts of COVID-19 (CPSS1).

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**COVID-19 health-related concerns**

An estimated 36% of Canadians reported that they were very or extremely concerned about the impact of COVID-19 on their own health (Table 1). Among those with underlying health conditions, 52% expressed high levels of concern about their own health compared with 31% of people without underlying conditions. The association between susceptibility due to underlying conditions and high concern for one’s own health persisted when demographic characteristics were taken into account: Canadians with heightened susceptibility had two-fold higher odds (OR: 2.0, 95% CI 1.6 to 2.5) of reporting high levels of concern for their own health compared with those less susceptible (Table 2). High concern also increased with age, particularly among those aged 75 or older, independent of underlying conditions, education and sex.

Canadians reported high levels of concern about the impact of COVID-19 on the health of other household members (55%) (Table 1). High concern was more

commonly expressed among those who were themselves more susceptible to adverse outcomes from COVID-19, even when demographic characteristics were taken into account (Table 2). High concern was also reported about the impact of COVID-19 on the Canadian and the world population’s health (70%) as well as the health of vulnerable people (81%) (Table 1). The term “vulnerable people” was not defined in the survey question—it was left to the interpretation of respondents.

**Precautionary behaviours**

The majority of Canadians took precautions to reduce their exposure to the virus that causes COVID-19 (Table 1). These included personal hygiene measures, such as washing hands more regularly (92%), limiting physical contact with others by staying home as much as possible (90%), and physical distancing when out in public (87%). Canadians took these precautions whether or not they were themselves susceptible to a severe course of COVID-19. Those with an undergraduate degree or higher

were consistently more likely to report engaging in precautionary behaviours than Canadians with lower levels of formal education (Table 3).

**Discussion**

The COVID-19 pandemic is unprecedented for the speed at which it developed, the severity of the disease, and its global scale resulting in widespread illness, loss of life and profound societal and economic disruptions.<sup>13</sup> Pandemic management aims to limit the spread of SARS-CoV-2, the virus that causes COVID-19, which requires the public to rapidly engage in precautionary behaviours, such as frequent hand washing, physical distancing and staying at home. Lessons from earlier pandemics indicate that perceived susceptibility to the disease, an understanding of the seriousness of the disease and trust in authorities can play important roles in shaping public cooperation to adopt precautionary measures.<sup>10,14</sup>

No one is immune to SARS-CoV-2 and there is currently no proven treatment or vaccine available. Yet in the early weeks of the national pandemic response, almost two-thirds of Canadians reported low levels of concern about the impact of COVID-19 on their own health: they were somewhat concerned or not concerned at all. Even among those with an underlying health condition that makes them more susceptible to a severe course of COVID-19, close to half reported a low level of concern for their health. One explanation may be the optimism bias which leads people to underestimate their risk of adverse outcomes relative to others;<sup>15</sup> optimism bias was commonly observed in multiple populations during the 2009 H1N1 flu pandemic.<sup>16-17</sup> This study provides evidence that while many Canadians may not feel that their own health is threatened, they nevertheless reported high levels of concern about the impact of COVID-19 on the health of national and global populations, as well as health system overcapacity. Canadians’ trust in government authorities and the scientific

**Table 1  
Prevalence of high concern about impact of COVID-19 on own and others’ health, and precautions, by presence of underlying health condition, household population aged 15 or older, Canada excluding territories, 2020**

Concern / precaution	Underlying health condition								
	Overall			Yes			No		
	%	95% confidence interval		%	95% confidence interval		%	95% confidence interval	
	%	from	to	%	from	to	%	from	to
<b>High concern</b>									
Own health	36.3	34.2	38.5	52.0*	47.6	56.4	31.4	29.0	33.9
Others’ health									
Household member	55.2	52.8	57.5	61.1*	56.5	65.5	53.3	50.5	56.1
Vulnerable people	80.9	79.2	82.5	76.5*	72.5	80.2	82.2	80.3	84.0
Canadian population	70.0	67.8	72.2	71.4	67.2	75.3	69.6	66.9	72.1
World population	69.8	67.5	72.1	70.4	66.2	74.4	69.7	66.9	72.3
Overloading health system	84.4	82.6	86.1	86.1	82.8	88.8	83.9	81.7	85.9
<b>Precaution</b>									
Avoided leaving house for non-essential reasons	90.3	88.6	91.7	91.3	88.3	93.6	90.0	87.8	91.8
Used physical distancing when out in public	86.8	85.1	88.4	84.2	80.6	87.3	87.7	85.6	89.5
Avoided crowds and large gatherings	87.2	85.4	88.8	86.6	83.2	89.3	87.4	85.1	89.4
Washed hands more regularly	92.0	90.4	93.3	91.1	87.8	93.6	92.2	90.4	93.8
Avoided touching face	69.8	67.6	72.0	71.8	67.7	75.6	69.2	66.6	71.7

\* significantly different from estimate for no underlying health condition (p < 0.05)

**Note:** Underlying health condition is a compromised immune system, diabetes, or chronic condition affecting lungs, heart or kidneys.

**Source:** 2020 Canadian Perspectives Survey Series 1: Impacts of COVID-19 (CPSS1).

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**Table 2**

**Adjusted odds ratios of high concern about impact of COVID-19 on own and others' health by underlying health condition and demographic characteristics, household population aged 15 or older, Canada excluding territories, 2020**

Characteristics	Others' health																	
	Own health			Member of household			Vulnerable people			Canadian population			World population			Overloading health system		
	Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to	
<b>Underlying health condition</b>																		
Yes	2.0*	1.6	2.5	1.4*	1.1	1.8	0.9	0.7	1.2	1.0	0.7	1.2	1.0	0.7	1.2	1.3	0.9	1.8
No <sup>†</sup>	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...
<b>Demographic characteristics</b>																		
<b>Sex</b>																		
Male <sup>†</sup>	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...
Female	1.2	0.9	1.4	0.9	0.8	1.2	1.1	0.9	1.4	1.5*	1.2	1.8	1.4*	1.1	1.7	1.3	1.0	1.7
<b>Age group (years)</b>																		
15 to 34 <sup>†</sup>	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...
35 to 49	1.6*	1.1	2.2	1.2	0.9	1.7	0.7	0.5	1.0	1.3	1.0	1.7	1.0	0.8	1.4	0.9	0.6	1.3
50 to 64	1.8*	1.3	2.5	0.9	0.7	1.2	0.6*	0.4	0.8	1.4*	1.0	1.8	1.2	0.9	1.6	0.7*	0.5	0.9
65 to 74	1.9*	1.3	2.7	0.7*	0.5	1.0	0.3*	0.2	0.4	1.7*	1.2	2.3	1.5*	1.1	2.2	0.8	0.5	1.1
75 or older	2.3*	1.4	3.8	1.1	0.7	1.7	0.3*	0.2	0.4	2.1*	1.2	3.5	1.3	0.7	2.4	0.6	0.3	1.5
<b>Education</b>																		
High school graduation or less <sup>†</sup>	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...
Some post-secondary	1.0	0.7	1.3	0.7*	0.5	0.9	1.0	0.7	1.3	1.1	0.9	1.5	1.0	0.8	1.3	1.0	0.7	1.4
Undergraduate degree or more	0.9	0.7	1.1	0.7*	0.5	0.8	1.3	1.0	1.8	1.2	0.9	1.5	1.2	0.9	1.6	1.8*	1.3	2.6

... not applicable

\* significantly different from reference category (p &lt; 0.05)

<sup>†</sup> reference category**Note:** Underlying health condition is a compromised immune system, diabetes, or chronic condition affecting lungs, heart or kidneys.**Source:** 2020 Canadian Perspectives Survey Series 1: Impacts of COVID-19 (CPSS1).**Table 3**

**Adjusted odds ratios of precautionary behaviour by underlying health condition and demographic characteristics, household population aged 15 or older, Canada excluding territories, 2020**

Characteristics	Precautionary behaviour														
	Avoided leaving house for non-essential reasons			Used physical distancing when out in public			Avoided crowds and large gatherings			Washed hands more regularly			Avoided touching face		
	Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to		Odds ratio	95% confidence interval from to	
<b>Underlying health condition</b>															
Yes	1.3	0.8	2.0	0.9	0.6	1.3	1.1	0.8	1.6	0.9	0.6	1.3	1.1	0.9	1.4
No <sup>†</sup>	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...
<b>Demographic characteristics</b>															
<b>Sex</b>															
Male <sup>†</sup>	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...
Female	1.4*	1.0	2.1	1.0	0.7	1.3	1.0	0.7	1.4	1.2	0.8	1.9	1.7*	1.4	2.1
<b>Age group (years)</b>															
15 to 34 <sup>†</sup>	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...
35 to 49	1.0	0.6	1.6	0.9	0.6	1.4	0.8	0.5	1.4	1.2	0.7	2.0	1.4*	1.0	1.8
50 to 64	1.1	0.7	1.8	0.8	0.5	1.3	0.9	0.6	1.4	1.1	0.6	1.9	1.6*	1.2	2.2
65 to 74	0.9	0.5	1.6	0.8	0.5	1.3	0.7	0.4	1.1	1.3	0.7	2.5	1.3	0.9	1.8
75 or older	0.6	0.2	1.7	0.3*	0.2	0.6	0.4*	0.2	0.8	1.1	0.5	2.5	0.8	0.5	1.4
<b>Education</b>															
High school graduation or less <sup>†</sup>	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...	1.0	...	...
Some post-secondary	1.1	0.7	1.6	1.2	0.8	1.7	0.8	0.6	1.2	1.4	0.8	2.2	1.2	0.9	1.6
Undergraduate degree or more	2.0*	1.3	3.2	2.3*	1.6	3.5	1.7*	1.1	2.6	2.2*	1.3	3.7	1.3	1.0	1.7

... not applicable

\* significantly different from reference category (p &lt; 0.05)

<sup>†</sup> reference category**Note:** Underlying health condition is a compromised immune system, diabetes, or chronic condition affecting lungs, heart or kidneys.**Source:** 2020 Canadian Perspectives Survey Series 1: Impacts of COVID-19 (CPSS1).

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evidence on which pandemic management is based<sup>18</sup> has likely contributed to an understanding of both the threat posed by COVID-19 and the enactment of precautionary behaviours, even in the absence of feeling personally at high risk.

The majority of Canadians reported taking multiple precautions to avoid infection—whether or not they had an underlying health condition, thereby protecting themselves as well as other household and community members. Experience from recent pandemics indicates that a higher level of perceived susceptibility is associated with a higher likelihood of adopting precautionary behaviours,<sup>10,14</sup> although this association may evolve over the course of a pandemic.<sup>16-17</sup> The current study examines actual susceptibility to adverse outcomes from COVID-19 based on the presence of underlying health conditions; future work could examine the relative contributions of actual and perceived susceptibility. Ongoing monitoring of real and perceived risk and response behaviours in the context of the COVID-19 pandemic may be prudent.

It is notable from this study that people with higher levels of formal education were consistently more likely to take precautions. Higher engagement in precautionary behaviours by people with more education was observed in the context of recent pandemics in some populations but not others.<sup>10</sup> Being more likely to engage in precautionary behaviours may reflect greater opportunities to comply with public health recommendations. For example, many jobs that require higher levels of education can be done from home unlike those, which, although they provide essential services,

such as cleaning, waste disposal and grocery store services, typically do not require a high level of education. Indeed, in the early weeks of the pandemic response, working from home was much more common for Canadians with higher levels of education, who are more likely to be employed in professional or managerial occupations.<sup>19</sup> The World Health Organization emphasizes the need for structure and organization at all levels of society to support individuals' efforts at reducing the spread of COVID-19.<sup>13</sup> Future studies could explore additional factors that may be related to the adoption of precautionary behaviours, such as occupation and type of dwelling. A geographic assessment could aid our understanding of how regional variations in disease prevalence, public health messaging and government interventions are associated with individuals' concerns and precautionary behaviours.

### **Strengths and limitations**

Surveys such as the CPSS are an important tool during this rapidly evolving pandemic for providing timely information on the perceptions and behaviours of Canadians. A key strength of the CPSS is that it is representative of the general Canadian population residing in the ten provinces. Limitations include the exclusion of the territories from the CPSS1, as well as segments of the population that are more likely to live in overcrowded environments and have underlying health conditions, such as residents of long-term care homes and other institutions, and persons living on reserves and in other Aboriginal settlements in the provinces.<sup>20-22</sup> Additionally, the presence of underlying medical con-

ditions was self-reported and could not be corroborated by any other source.

### **Conclusion**

In the early weeks of Canada's COVID-19 pandemic response, older Canadians and those with underlying health conditions were more likely than younger and less susceptible individuals to report high levels of concern about the impact of COVID-19 on their own health. Despite the differing levels of concern and regardless of whether or not they had an underlying health condition, the majority of Canadians reported having taken precautions such as hand washing and physical distancing. This is consistent with the idea that even when individuals do not feel personally threatened, they will be motivated to take action to help protect the broader community when there is trust in the authorities providing information and direction. Public health messages to adopt precautionary measures appear to be reaching the entire population rather than select groups, thereby helping to maximize the impact of critical population-wide measures to contain the COVID-19 pandemic. However, because public perceptions and behaviours can evolve over a short period of time, there is need for their continual monitoring in the population.

### **Acknowledgement**

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