


Fourth report: Summer 2024

COVID-19: Longer-term symptoms among Canadian adults

Factors associated with limitations in daily activities among adults in Canada with post COVID-19 condition, January 2020 to August 2022

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Highlights

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Context

Coronavirus Disease 2019 (COVID-19), caused by an infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has had a substantial impact on the health and well-being of Canadians. In addition to symptoms experienced during the acute phase of infection, some people continue to experience persistent, recurring, or new symptoms. These longer-term, wide-ranging symptoms, which can negatively impact daily activities, work and school, are commonly known as “post COVID-19 condition” (PCC) or “long COVID” when not resolved within three months of infection. Some of the more commonly reported symptoms include:

- fatigue
- coughing
- shortness of breath
- brain fog
- general weakness

Considering the average infection-acquired SARS-CoV-2 seroprevalence in Canada’s 10 provinces was 81.8% as of the end of October 2023 (Swail et al., 2023), the potential burden of PCC on afflicted individuals and their families, the healthcare system and the economy, through lost productivity, could be substantial.

The Canadian COVID-19 Antibody and Health Survey – Cycle 2 (CCAHS-2), a key surveillance initiative of the Public Health Agency of Canada (PHAC), was launched during the COVID-19 pandemic. CCAHS-2 was developed in collaboration with Statistics Canada and the COVID-19 Immunity Task Force to estimate the prevalence of PCC and provide

information on symptoms (including severity and duration), risk and protective factors, and effects on daily life. Although a wide range of longer-term symptoms may affect individuals after infection with SARS-CoV-2, little is known about how these symptoms impact daily functioning and daily life in the Canadian general population.

In this report, we used CCAHS-2 data to describe the limitations in daily activities experienced by adults with PCC and determine which sociodemographic, health status, and infection-related factors were associated with these limitations. We defined PCC as persistent, recurring, or new symptoms present 3 or more months after a confirmed or suspected SARS-CoV-2 infection; this included symptoms from the initial infection that lasted 3 or more months or symptoms that developed after an initial recovery. This definition aligns with the World Health Organization's clinical case definition for PCC, with the exception that the latter requires a symptom duration of at least 2 months. Daily activities included preparing meals, everyday housework, heavier household chores, getting to appointments and running errands, looking after personal finances, personal care and basic medical care at home, and moving around inside one's residence. Adults who responded to the survey were asked how often their PCC symptoms limited their daily activities using a five-point scale which was trichotomized as follows for analysis: never or rarely, sometimes, often or always.

The findings in this publication contribute to an evidence base that can be used to inform decision making and policies focussing on the functional limitations experienced by adults in Canada with PCC.

Overall impact of post COVID-19 condition on daily activities

Among adults reporting having had a confirmed or suspected SARS-CoV-

2 infection, 16.7% (95% confidence interval (CI): 15.5%, 18.0%) experienced PCC.

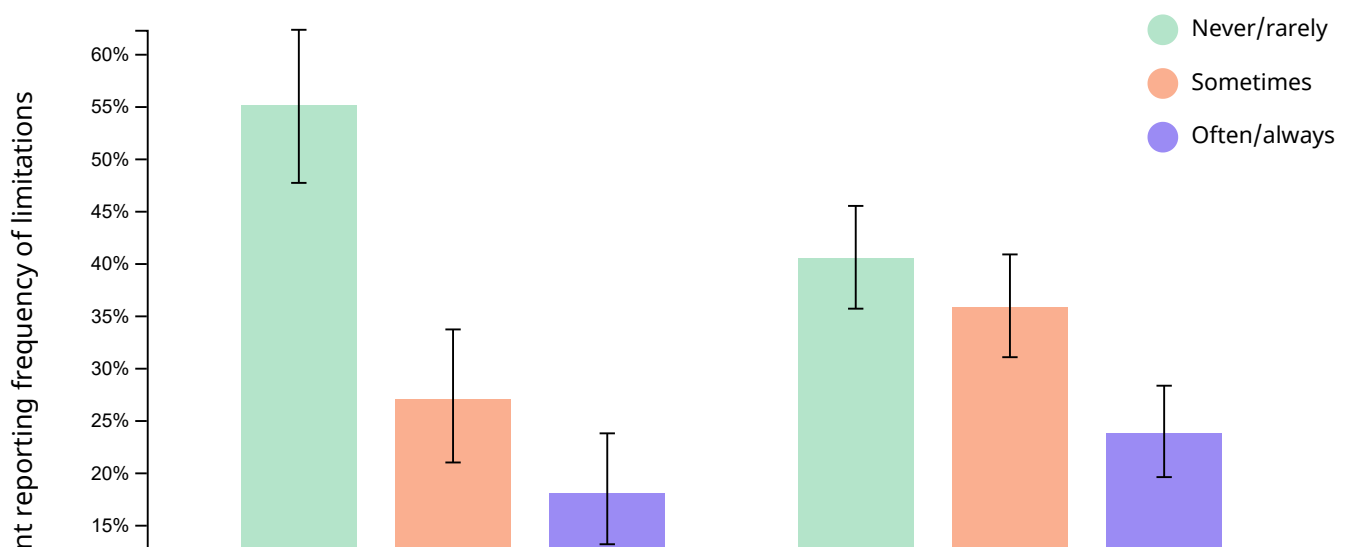
Over half of adults dealing with PCC reported noticeable limitations in daily activities:

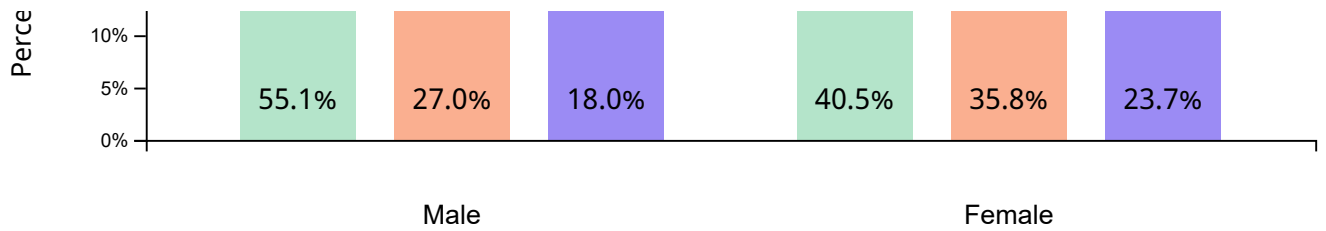
- 21.7% (95% CI: 18.4%, 25.2%) were often or always limited
- 32.7% (95% CI: 28.9%, 36.6%) were limited sometimes
- 45.7% (95% CI: 41.6%, 49.8%) were never or rarely limited

Associations between socio-demographic factors and limitations in daily activities among adults with post COVID-19 condition

Sex at birth, age, neighbourhood income, residential instability and situational vulnerability were all associated with limitations in daily activities. Males reported fewer limitations in daily activities than females: 55.1% (95% CI: 47.7%, 62.3%) of males were never or rarely limited compared to 40.5% (95% CI: 35.6%, 45.5%) of females (Figure 1).

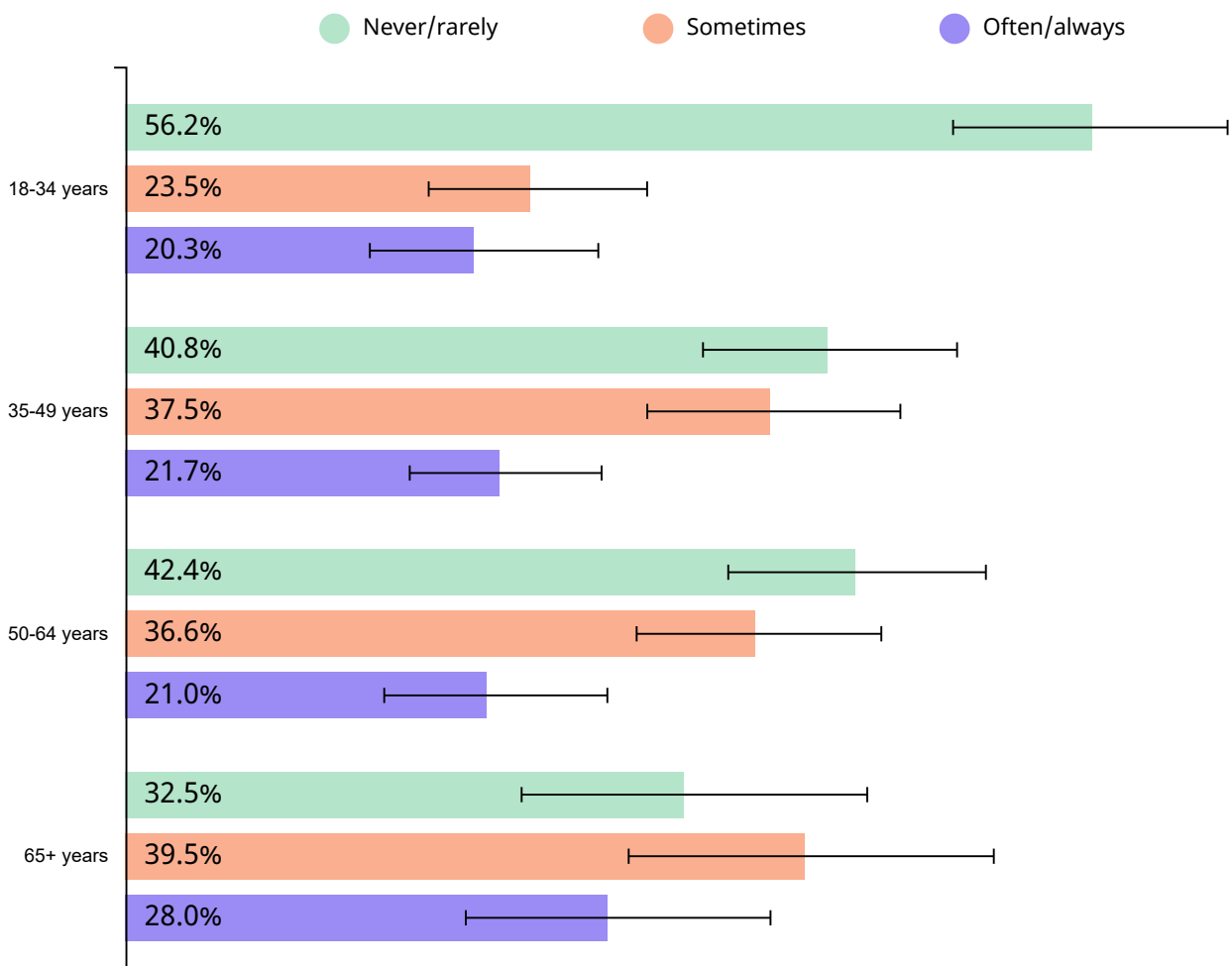
Figure 1: Percentage of adults (aged 18+) with post COVID-19 condition reporting limitations in daily activities by sex at birth, Canada, January 2020 to August 2022

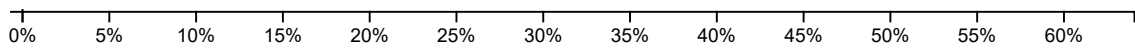




Younger adults reported fewer limitations than older adults: 56.2% (95% CI: 48.1%, 64.1%) of 18- to 34-year-olds were never or rarely limited compared to 32.5% (95% CI: 23.0%, 43.1%) of those aged 65 or older (Figure 2).

Figure 2: Percentage of adults (age 18+) with post COVID-19 condition reporting limitations in daily activities by age group, Canada, January 2020 to August 2022

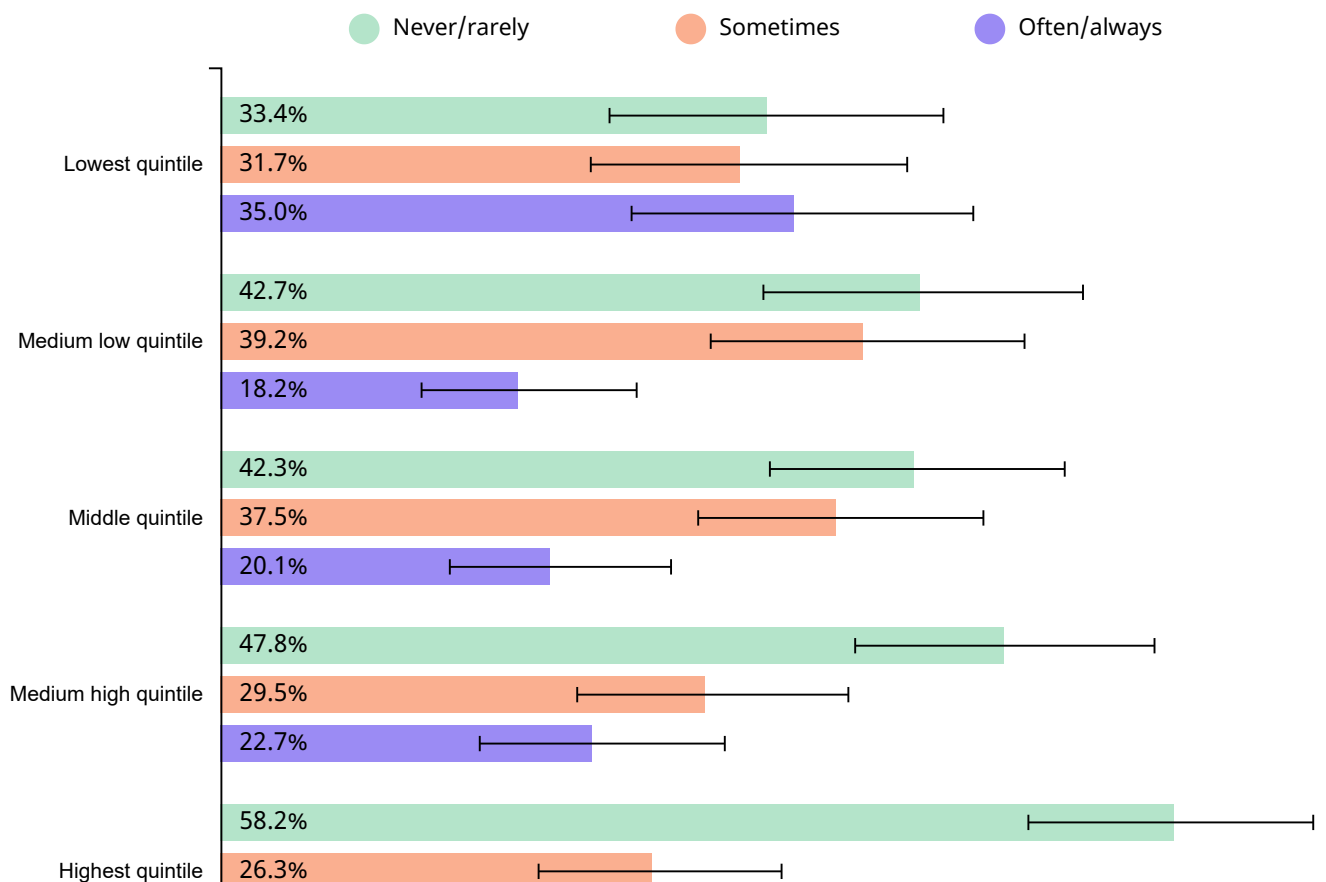


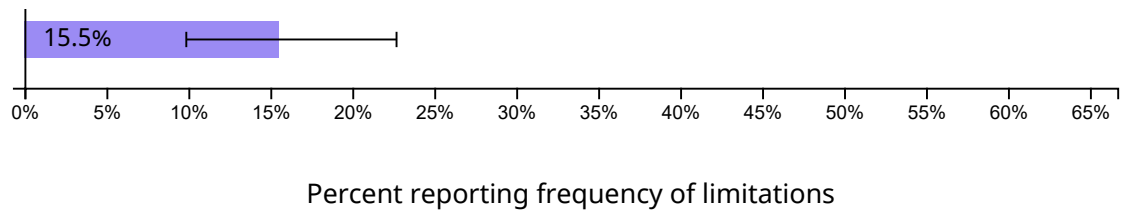


Percent reporting frequency of limitations

Adults residing in higher neighbourhood income quintiles reported fewer limitations in daily activities compared to those residing in lower neighbourhood income quintiles: 58.2% (95% CI: 49.3%, 66.7%) of adults in the highest neighbourhood income quintile reported never or rarely being limited compared to 33.4% (95% CI: 23.7%, 44.1%) of those in the lowest quintile (Figure 3).

Figure 3: Percentage of adults (age 18+) with post COVID-19 condition reporting limitations in daily activities by neighbourhood income quintile, Canada, January 2020 to August 2022





Two dimensions of the Canadian Index of Multiple Deprivation were associated with limitations in daily activities: residential instability and situational vulnerability. Residential instability is based on five indicators measured at the neighbourhood level:

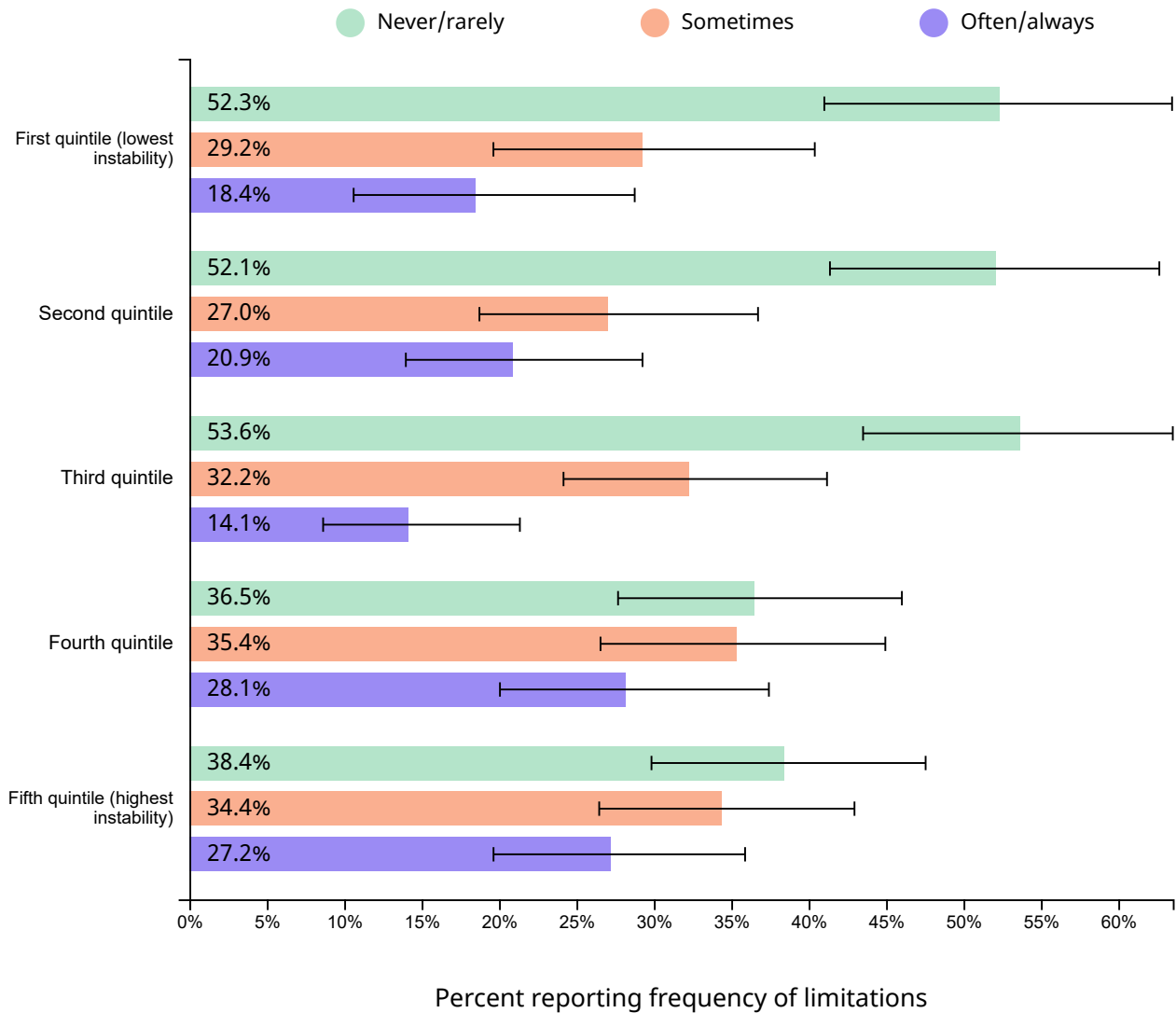
- proportion of dwellings that are apartment buildings
- proportion of dwellings that are not owned
- proportion of persons living alone
- proportion of the population who moved within the past five years
- proportion of the population that is not married or common-law

It measures the tendency of neighbourhood inhabitants to fluctuate over time, taking into consideration both housing and familial characteristics.

Adults residing in neighbourhoods with lower residential instability reported fewer limitations than those residing in neighbourhoods with higher residential instability: 52.3% (95% CI: 41.0%, 63.5%) of adults in the lowest residential instability quintile were never or rarely limited compared to 38.4% (95% CI: 29.8%, 47.6%) of those in the highest quintile (Figure 4).

Figure 4: Percentage of adults (age 18+) with post COVID-19 condition reporting limitations in daily activities by residential

instability quintile, Canada, January 2020 to August 2022



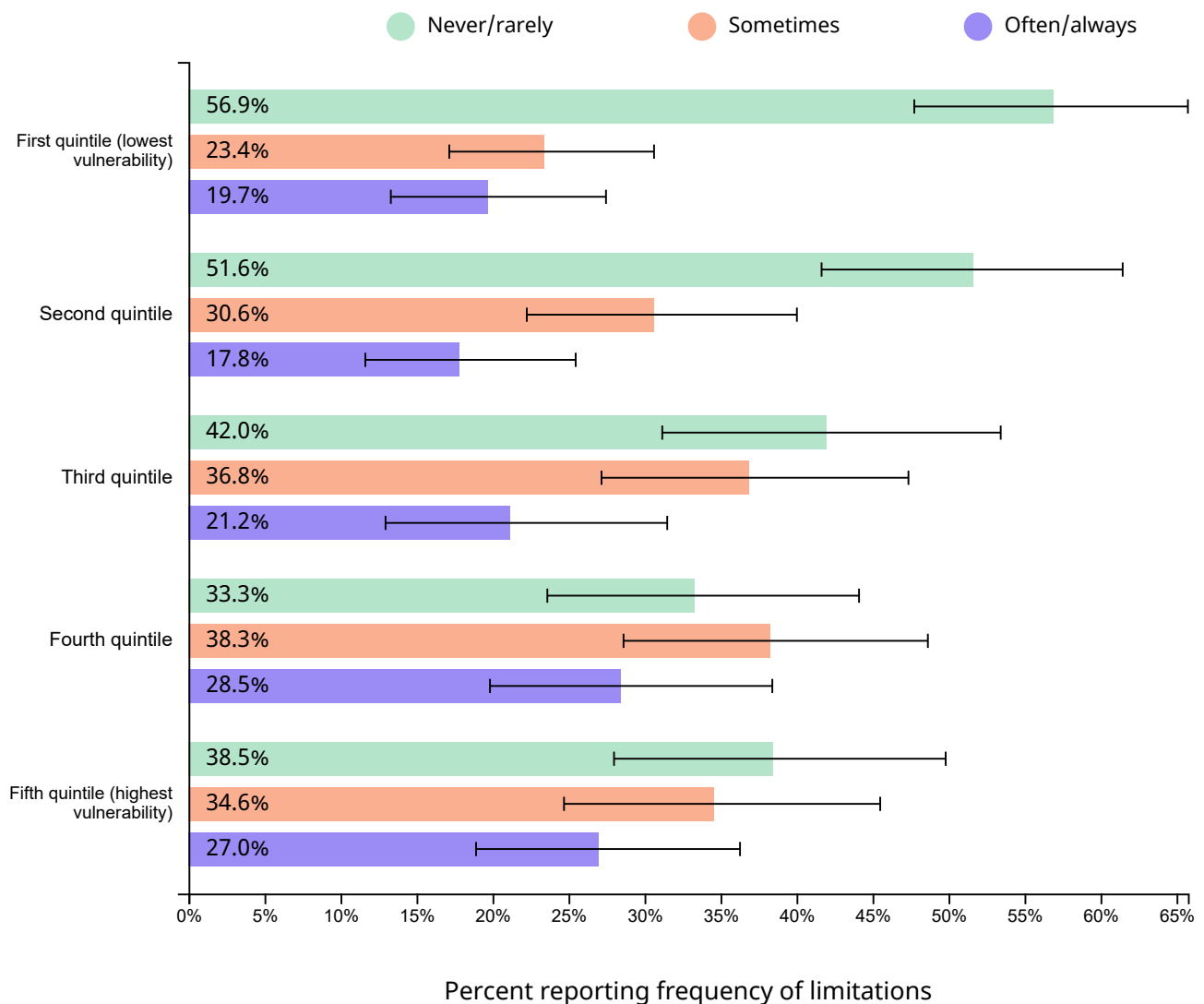
Situational vulnerability is comprised of three indicators measured at the neighbourhood level:

- proportion of the population aged 25 to 64 years without a high-school diploma
- proportion of the population identifying as Indigenous
- proportion of dwellings needing major repairs

Adults residing in neighbourhoods with lower situational vulnerability

reported fewer limitations than those residing in neighbourhoods with higher situational vulnerability: 56.9% (47.7%, 65.7%) of adults in the lowest situational vulnerability quintile were never or rarely limited compared to 38.5% (95% CI: 28.0%, 49.8%) of those in the highest quintile (Figure 5).

Figure 5: Percentage of adults (age 18+) with post COVID-19 condition reporting limitations in daily activities by situational vulnerability quintile, Canada, January 2020 to August 2022

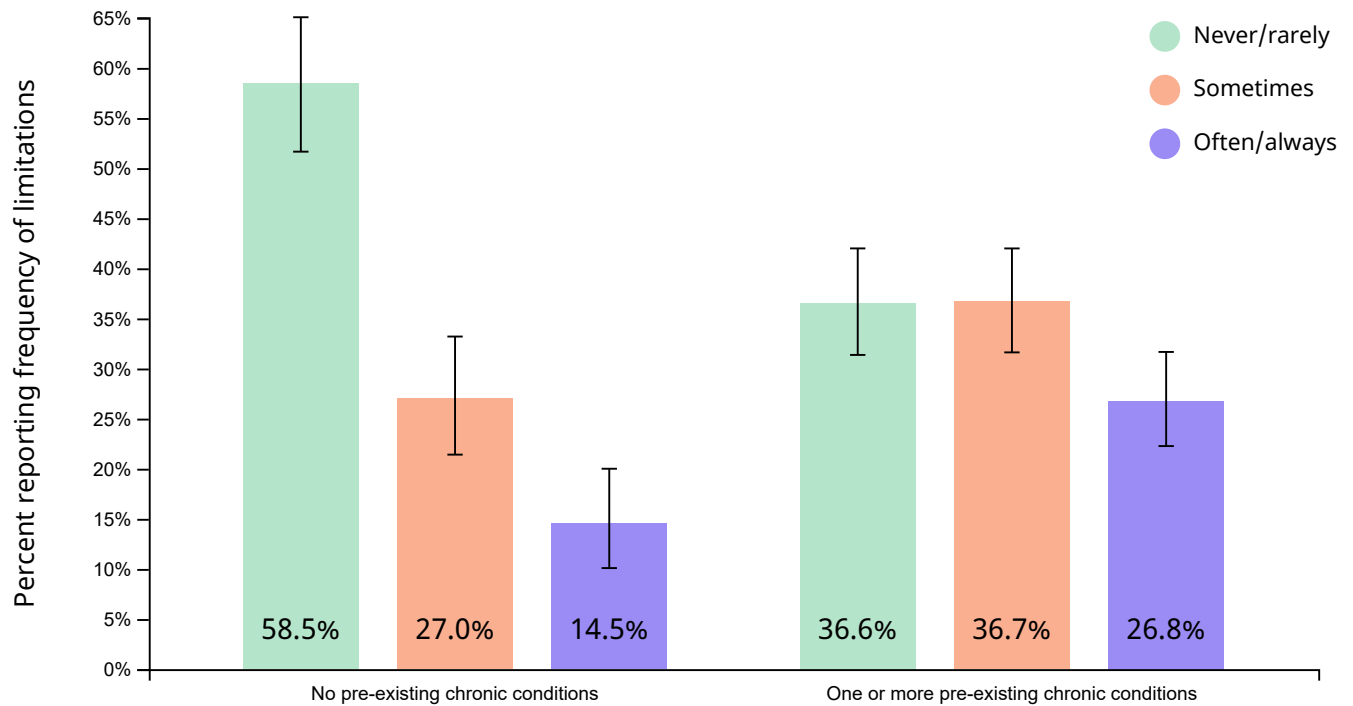


Associations between pre-existing chronic conditions and limitations in daily activities among adults with post COVID-19 condition

Pre-existing chronic conditions were defined as health conditions, lasting or expected to last at least 6 months, that were first diagnosed prior to and including the month of self-reported SARS-CoV-2 infection. CCAHS-2 captured information on 21 self-reported chronic conditions diagnosed by a health professional (see technical notes). Adults with no pre-existing chronic conditions reported fewer limitations in daily activities compared to those with one or more pre-existing chronic conditions: 58.5% (95% CI: 51.6%, 65.1%) of adults with no pre-existing chronic conditions were never or rarely limited compared to 36.6% (95% CI: 31.4%, 42.0%) of those with one or more pre-existing chronic conditions (Figure 6).

Figure 6: Percentage of adults (age 18+) with post COVID-19 condition reporting limitations in daily activities by pre-existing

chronic conditions status, Canada, January 2020 to August 2022



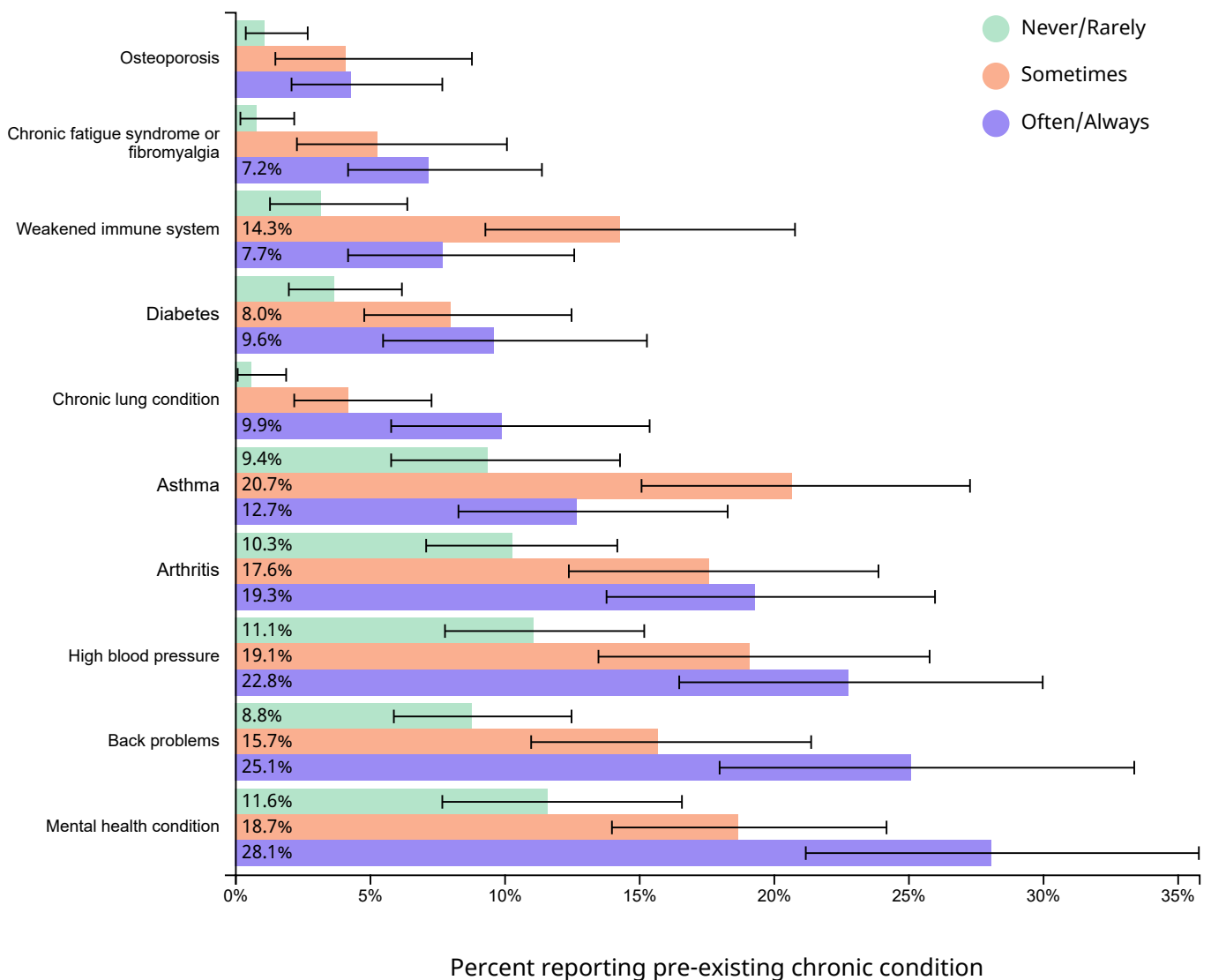
When examining specific pre-existing chronic conditions that occurred frequently enough for analysis, 10 were found to be associated with greater limitations in daily activities (Figure 7):

- mental health condition
- back problems
- high blood pressure
- arthritis
- asthma
- chronic lung condition
- diabetes
- weakened immune system
- chronic fatigue syndrome or fibromyalgia
- osteoporosis

For example, the percentage of adults reporting a pre-existing mental health condition increased with limitations:

- 11.6% (95% CI: 7.7%, 16.6%) among those never or rarely limited
- 18.7% (95% CI: 14.0%, 24.2%) among those limited sometimes
- 28.1% (95% CI: 21.2%, 35.8%) among those often or always limited

Figure 7: Percentage of adults (age 18+) with post COVID-19 condition reporting specific pre-existing chronic conditions by frequency of limitations in daily activities, Canada, January 2020 to August 2022



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Association between severity of initial infection and limitations in daily activities among adults with post COVID-19 condition

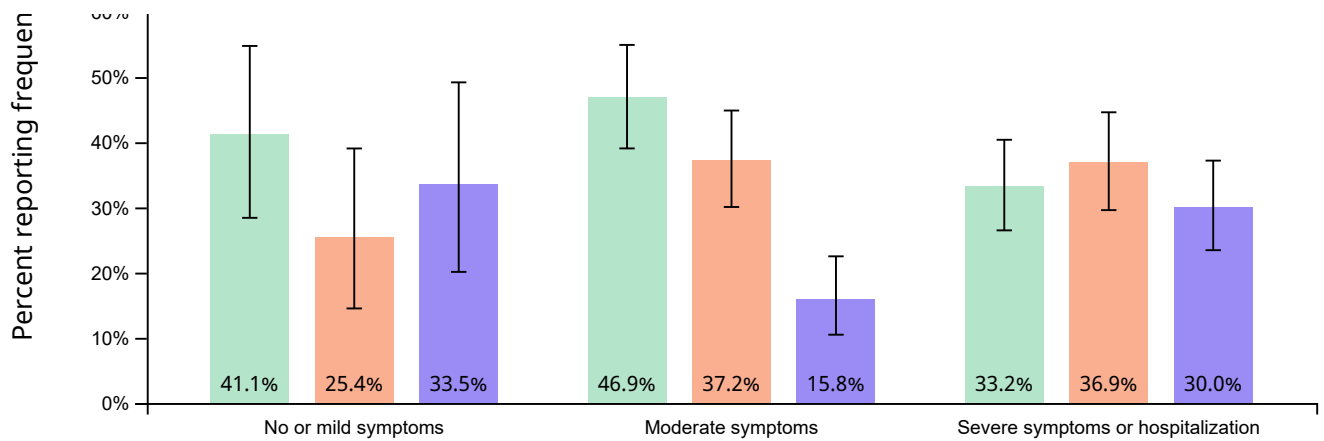
Severity of initial SARS-CoV-2 infection symptoms was categorized as follows:

- no or mild symptoms (didn't affect my daily life)
- moderate symptoms (some effect on my daily life)
- severe symptoms or hospitalized (significant effect on my daily life)

Generally, adults experiencing less severe infection symptoms reported fewer limitations compared to those with more severe infection symptoms: 57.2% (95% CI: 46.8%, 67.1%) of adults with no or mild symptoms reported never or rarely being limited compared to 40.9% (95% CI: 34.8%, 47.3%) of those with severe symptoms. When males and females were examined separately, however, limitations in daily activities did not consistently increase with severity of infection symptoms (Figure 8).

Figure 8: Percentage of females (age 18+) with post COVID-19 condition reporting limitations in daily activities by severity of initial infection, Canada, January 2020 to August 2022



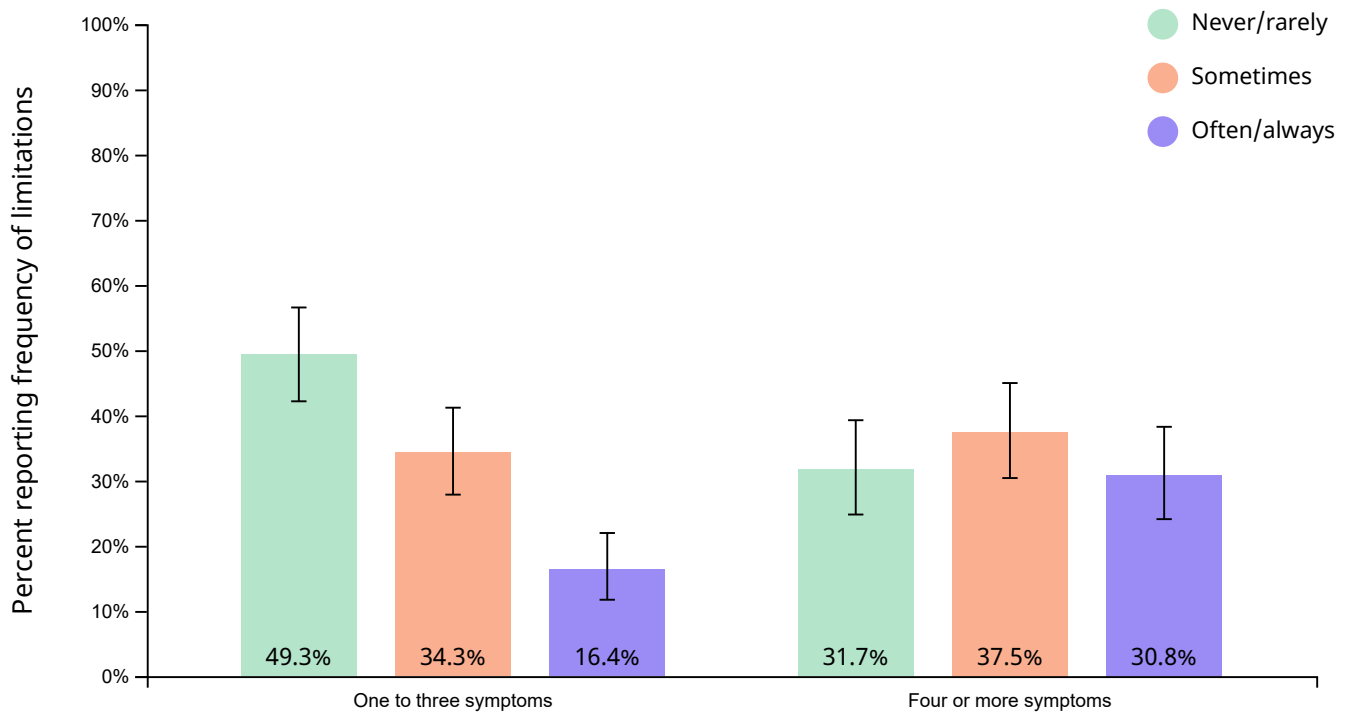


Associations between post COVID-19 condition symptoms and limitations in daily activities

CCAHS-2 captured information on the occurrence of 14 PCC symptoms (see Figure 10 for list of symptoms). Having fewer symptoms was associated with fewer limitations: 55.6% (95% CI: 49.7%, 61.3%) of adults with fewer than 4 symptoms reported never or rarely being limited compared to 33.9% (95% CI: 28.1%, 40.2%) of those with 4 or more symptoms. Both males and females demonstrated a similar pattern (Figure 9).

Figure 9: Percentage of females (age 18+) with post COVID-19 condition reporting limitations in daily activities by number of post COVID-19 condition symptoms, Canada, January 2020 to

August 2022



When examining specific PCC symptoms, several symptoms were associated with greater limitations in daily activities (Figure 10):

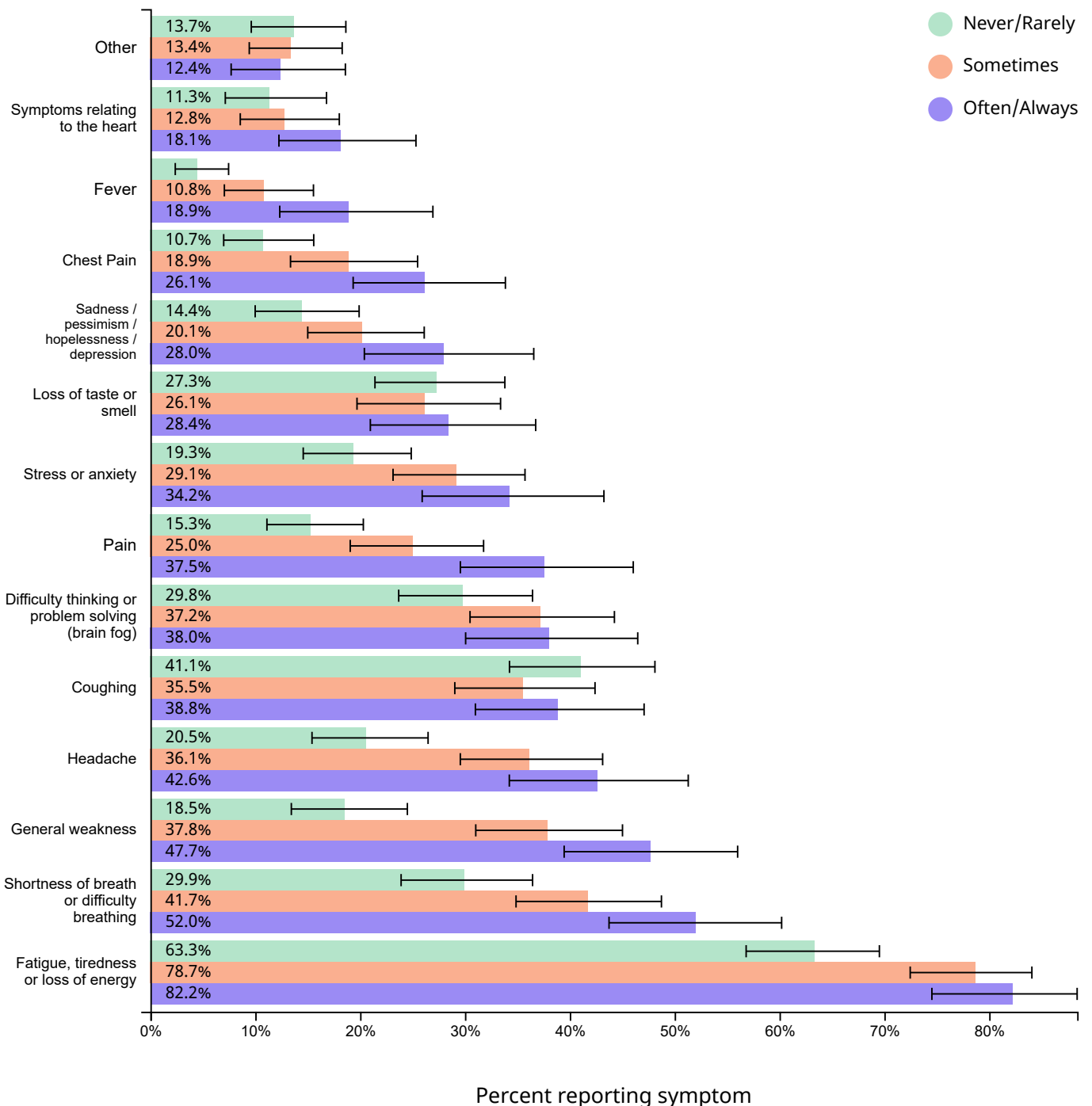
- fatigue
- tiredness or loss of energy
- shortness of breath or difficulty breathing
- general weakness
- headache
- pain
- stress or anxiety
- sadness, pessimism, hopelessness or depression
- chest pain
- fever

For example, the percentage of adults reporting shortness of breath or

difficulty breathing increased with limitations:

- 29.9% (95% CI: 23.9%, 36.5%) among those never or rarely limited
- 41.7% (95% CI: 34.9%, 48.7%) among those limited sometimes
- 52.0% (95% CI: 43.7%, 60.2%) among those often or always limited

Figure 10: Percentage of adults (age 18+) with post COVID-19 condition reporting specific post COVID-19 symptoms by frequency of limitations in daily activities, Canada, January 2020 to August 2022



i Some labels cannot be clearly displayed. Please see the text description below to see all data.

Summary and future work

Over half of adults dealing with PCC reported noticeable limitations in daily activities with more than 1 in 5 being often or always limited. Several socio-demographic, health, and infection-related characteristics were associated with limitations in daily activities in people with PCC. The following were all associated with greater limitations in daily activities:

- female sex
- older age
- greater deprivation
- pre-existing chronic conditions
- a more severe initial infection
- a greater number of PCC symptoms, as well as certain PCC symptoms

Our findings are generally consistent with other research. A systematic review including 35 studies found that COVID-19 survivors experienced reductions in physical function, ability to perform activities of daily living, and health-related quality of life 1 to 6 months after infection, but direct comparisons with our findings are limited because of methodological differences. Specifically, the studies included in the meta-analysis used different methods to measure limitations in daily activities, examined hospitalized patients, and did not limit outcomes to those occurring 3 or more months after infection (de Oliveira Almeida, 2023).

Our findings are congruent with other population-based probability surveys. The Australian COVID-19 Impact Monitoring Survey and UK Coronavirus (COVID-19) Infection Survey found that 21.6% and 20%, respectively, of those with self-reported long COVID indicated being “limited a lot” in their ability to undertake day-to-day activities compared to our estimate of 21.7% of adults with PCC being often or always limited (Biddle and Kirda, 2022; Office for National Statistics, 2023).

It is important to note that the factors examined in this report may be related to each other, and this may obscure or exaggerate the importance attributed to any one factor examined in isolation. Future work will assess these factors using multivariable models to determine which factors are most strongly and independently associated with limitations in daily activities. In addition, data from the recently released CCAHS follow-up questionnaire ([CCAHS-FQ](#)) will be used to further explore PCC’s impact on daily life including work and school.

Technical notes

CCAHS-2 is a cross-sectional multi-stage probability sample of the Canadian adult population, aged 18+ years, living in private dwellings in the 10 provinces. The following groups were excluded from the survey:

- persons living on reserves and other Indigenous settlements in the provinces
- members of the Canadian Forces living on a base
- the institutionalized population and residents of certain remote regions

Between April and August 2022, 105,998 adults were invited to participate and 32,527 completed at least part of the CCAHS-2 electronic questionnaire for an overall response rate of 30.7%. Analyses in this report are based on a share file containing 26,859 respondents agreeing

to share their data with PHAC.

Since the share file contains a subset of all respondents, estimates in this report may differ somewhat from those produced using all respondents contained in the master file. Differences from previously released estimates by PHAC may also occur because previous publications were based on provisional data and thus subject to change.

All results are based on self-report. CCAHS-2 data about SARS-CoV-2 infections relate to the first infection with a positive test result or, in the absence of a positive test result, the first suspected infection. The survey does not account for multiple infections in the same person. Further, the results may not reflect the experiences of all infected Canadians — not everyone who acquired COVID-19 may have been aware or tested.

To ensure estimates pertaining to adults with PCC were accurate, all respondents who self-reported infections less than 83 days prior to questionnaire completion were excluded because of inadequate follow up to satisfy our definition of PCC.

Income was measured using area-based neighbourhood income quintiles, which are based on a ranking of neighbourhood incomes within each census metropolitan area, census agglomeration and residual neighbourhoods within a province.

CCAHS-2 captured information on the following 21 chronic conditions: chronic lung condition, asthma, sleep apnea, diabetes, high blood pressure, chronic heart disease, the effects of a stroke, chronic neurological disorder, Alzheimer's disease or other dementia, mental health condition, chronic blood disorder, weakened immune system, chronic kidney disease, liver disease, chronic fatigue syndrome or fibromyalgia, osteoporosis, arthritis, back problems, urinary incontinence, bowel disorder, and other long-term health condition. The year conditions were first diagnosed was collected and, for those

diagnosed in 2020 to 2022, the month of diagnosis was also captured. Chronic conditions diagnosed prior to and including the month of self-reported SARS-CoV-2 infection were defined as pre-existing. Adults not completing the chronic condition section were assumed to have none of the conditions. When the date of diagnosis of a chronic condition was completely missing, the chronic condition was assumed to be pre-existing. Partial dates were used, when possible, to establish the temporality of chronic condition diagnosis and infection.

Analytical methods

To ensure the representativeness of the sample and minimize potential biases from non-response and respondents not consenting to share their data, survey weights were employed. Although the survey weights have been adjusted for non-response and respondents declining to share their data, and calibrated using auxiliary information, the substantial non-response rate and exclusion of individuals not consenting to share their data increases the risk of remaining bias in estimates derived from the survey data.

Since the estimates in this report were based on a sample from the eligible Canadian adult population, repeated sampling could lead to varying estimates. The 95% CI represents a range of values within which we can be 95% confident that the true value lies, in the absence of bias. The width of the CI reflects estimate precision, with narrower intervals indicating greater precision. Caution is advised when interpreting wide CIs due to the broad range of values within which the true value may lie.

All analyses were performed using SAS 9.4 Software with a two-tailed alpha level of 0.05. SAS survey procedures and bootstrap weights provided by Statistics Canada were used for producing estimates, 95% CIs and tests of association while acknowledging the complex survey design using the bootstrap method. CIs for weighted proportions

employed the Clopper-Pearson (exact) method. The design-based first-order Rao-Scott test was used to test for associations.

Acknowledgement

The data used in this study were made possible through a collaboration between the Public Health Agency of Canada, Statistics Canada, and the COVID-19 Immunity Task Force.

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