



Canadian Primary Care Sentinel Surveillance Network
Réseau canadien de surveillance sentinelle en soins primaires

The Prevalence of Common Chronic Conditions Seen in Canadian Primary Care

Results from the Canadian Primary Care Sentinel Surveillance Network

May 2021

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About the Canadian Primary Care Sentinel Surveillance Network

The Canadian Primary Care Sentinel Surveillance Network (CPCSSN) is an independent not-for-profit university-based consortium with an international reputation as a trusted source of primary care electronic medical record (EMR) data. Established in 2008, CPCSSN has developed a pan-Canadian primary care EMR data repository.¹ CPCSSN has successfully built trusting relationships between primary care clinicians and researchers over the past 12 years. As of 2020, CPCSSN consisted of a network of 13 community-based primary care research and learning networks based in eight Canadian provinces (British Columbia, Alberta, Manitoba, Ontario, Quebec, Nova Scotia, Newfoundland) and one territory (Northwest Territories).

CPCSSN draws on technological expertise to securely extract EMR data from primary care practices and includes close to 1,500 participating family physicians, nurse practitioners and other primary care clinicians. CPCSSN applies standardized ontologies and terminologies to transform data from various EMR vendors into a common data schema. The source EMR data undergoes an extract, transform and load process that results in a de-identified, cleaned and harmonized set of pan-Canadian data that can be used for research, communicable and non-communicable disease surveillance and quality improvement at local and national levels. CPCSSN has also developed processes that allow participating clinics to securely re-identify and view their own data to enable them to prepare customized lists of patients in specific risk populations.² CPCSSN goes to great lengths to protect privacy and was recognized in 2013 with a privacy innovation award for being a leader in maintaining the security of health information.

CPCSSN is supported through a diverse array of funding from peer-reviewed grants from federal agencies such as the Canadian Institutes of Health Research and the Public Health Agency of Canada, as well as other profit and not-for-profit organizations. CPCSSN is also supported with in-kind and direct funding support from the Canadian universities that host the regional networks.

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Executive Summary

Purpose

The purpose of this report is to describe the burden of chronic disease in Canadian primary care using data held within the Canadian Primary Care Sentinel Surveillance Network (CPCSSN).

We describe the demographic and risk factor characteristics of people obtaining primary care and provide prevalence estimates for 11 common chronic conditions. We also provide prevalence estimates of those who have multiple chronic conditions. Last, we describe how often people with one or more chronic conditions used primary care services over a period of one year.

Findings

Chronic conditions in adults and children

- Sixty-five percent of the adults (aged 19 years and older) in our sample have at least one chronic condition.
- The most common chronic condition in both males and females is dyslipidemia, followed by depression, obesity, and hypertension.
- Adult males have a higher prevalence of diabetes, dyslipidemia and hypertension compared to females.
- Adult females have a higher prevalence of chronic kidney disease, depression and osteoarthritis compared to males.
- Twenty-two percent of children (aged 0-18 years) have at least one chronic condition.
- The most common chronic condition amongst children is asthma.
- Male children have a higher prevalence of asthma and obesity than females.

Multiple chronic conditions in adults

- Thirty-seven percent of adults have two or more chronic conditions.
- Adult males have a slightly higher prevalence of having two or more chronic conditions compared to females.

Frequency of primary care use

- Female patients with chronic conditions use primary care services more often than their male counterparts.

Key points and recommendations

Chronic conditions remain an important source of overall health care burden in Canada. Our results underscore that, regardless of chronic condition, adult females use primary care services more often than adult males. It therefore remains important that disease surveillance and research reports regarding chronic conditions in Canada continue to consider sex-based analysis/stratification.

Introduction

Chronic conditions in Canadian primary care

Primary care, often considered first contact care, delivers a broad range of services in community-based offices and clinics. These services focus on episodic illness treatment, injury prevention and health promotion.³ Primary care providers also play a central role in the management of chronic conditions by providing diagnoses, ongoing treatment, managing consultations or referrals to specialists and other community based care and long-term follow-up.

The burden of chronic conditions in Canada, and around the world, cannot be overstated. In Canada, the direct and indirect costs associated with chronic conditions is upwards of \$190 billion per year.⁴ About 44% of the Canadian adult population has at least one of 10 common chronic conditions⁵ and about three-quarters of all deaths can be attributed to chronic conditions.⁶ The main purpose of this report is to describe the burden of chronic conditions in Canadian primary care using data held within the Canadian Primary Care Sentinel Surveillance Network (CPCSSN). The specific objectives are to:

1. Describe the demographic and risk factor characteristics of people with and without chronic conditions who have visited primary care at least once in the past two years;
2. Report the prevalence of 11 of the most common chronic conditions (chronic kidney disease, chronic obstructive pulmonary disease, dementia, depression, diabetes mellitus, dyslipidemia, epilepsy, hypertension, obesity, osteoarthritis, and Parkinson’s Disease) and the prevalence of multiple common chronic conditions; and
3. Report the frequency of primary care use for people with these common chronic conditions.

Methods

Study sample

Data from the [CPCSSN data repository](#) were used for this report. Our sample included all patients who had at least one encounter with a participating CPCSSN primary care clinician between January 1, 2018 and December 31, 2019. All patients who had a year of birth and sex recorded in their medical record were eligible for the study. Based on previous work, we used a two-year contact group to determine a reasonable estimate of the “active practice” in Canadian primary care.⁷ Details of the study flow can be found in Figure 1. Primary care patients were categorized as adults (19 years of age and older) or children (0-18 years).

Data source

CPCSSN works with consenting primary care clinicians and electronic medical record (EMR) vendors to extract, clean and transform EMR data. The architecture and approach has been previously described, including data flow, quality, mapping, cleaning and de-identification.⁸ The extracted data include socio-demographic information, encounters, health conditions and risk factors, biometrics, laboratory results, procedures, medications and referrals. Use of the data were approved by the CPCSSN standing research and surveillance committee. All procedures and analyses of data were approved by the Queen's University Human Research Ethics Board.

Primary outcome variables

CPCSSN has developed a number of EMR case definitions for chronic conditions (herein CPCSSN chronic conditions), typically from the following chart areas: health condition, encounter, diagnosis, medication and laboratory tests. All CPCSSN chronic conditions reported here have been validated against an acceptable reference standard from which diagnostic accuracy test measures can be calculated with an acceptable level of precision.^{9,10} In adults, these conditions are: chronic kidney disease,¹¹ chronic obstructive pulmonary disease,¹² dementia,¹³ depression,¹⁴ diabetes mellitus,¹⁵ dyslipidemia, epilepsy, hypertension,¹⁶ obesity, osteoarthritis¹⁷ and Parkinson's disease. In children, these include asthma, diabetes mellitus and obesity.

In this report, we examine the aforementioned chronic conditions separately, multiple chronic conditions and primary care use. *Multiple chronic conditions* are defined as any patient who had two or more CPCSSN validated chronic conditions categorized as: without CPCSSN validated chronic conditions, 1, 2, or >3 chronic conditions. For *primary care use* we calculated the number of days a patient had at least one billing by their provider over the last calendar year (January 1, 2019 to December 31, 2019). This is an estimate of the number of times an individual came into contact with their health care provider or clinic in the last year. This measure includes virtual (e.g., email, telephone call, video), in-person and out of office visits (e.g., house call).

Demographic and risk factor variables

We examined demographic and risk factors by chronic condition (Table 1).

Table 1: Patient demographic and risk factor descriptions

Variable	Definition
<i>Demographic characteristics</i>	
Age	Children: 0-4, 5-18 years; Adults: 19-39, 40-64, ≥65 years
Sex	Female, male
Geographic location	Rural, urban*
<i>Risk factors</i>	
Smoking status	Current, past or never
Body mass index (BMI)	Based on most recent height/weight
Average systolic blood pressure (mm Hg)	Based on three most recent blood pressure readings in last two years**
Average diastolic blood pressure (mm Hg)	Based on three most recent blood pressure readings in last two years**

All variables are calculated based on the latest year of data.

*Categorized using the second digit of the patient's postal code.

**Based on availability. If the last three readings were not available the average of the last two or the last available was used.

Analysis

We used descriptive statistics to report demographic characteristics and risk factors. T-tests for continuous variables and chi-square tests for proportions were calculated for all descriptive variables between males and females. We reported sex specific and age standardized prevalence of the chronic conditions. We calculated the 95% confidence intervals for all estimates of prevalence. We also calculated chi-square statistics to detect statistically significant differences in the prevalence of chronic conditions between males and females.

Primary care use is typically skewed and we expect healthy patients to have fewer visits and those with chronic conditions to have more visits.¹⁸ Therefore, we calculated the median, interquartile range and the upper and lower quartiles (Q1 and Q3 respectively). The Wilcoxon rank sum test was used to detect differences in the median number of primary care interactions between males and females. Further detail on chronic disease prevalence and primary care visits can be found in Appendix 1.

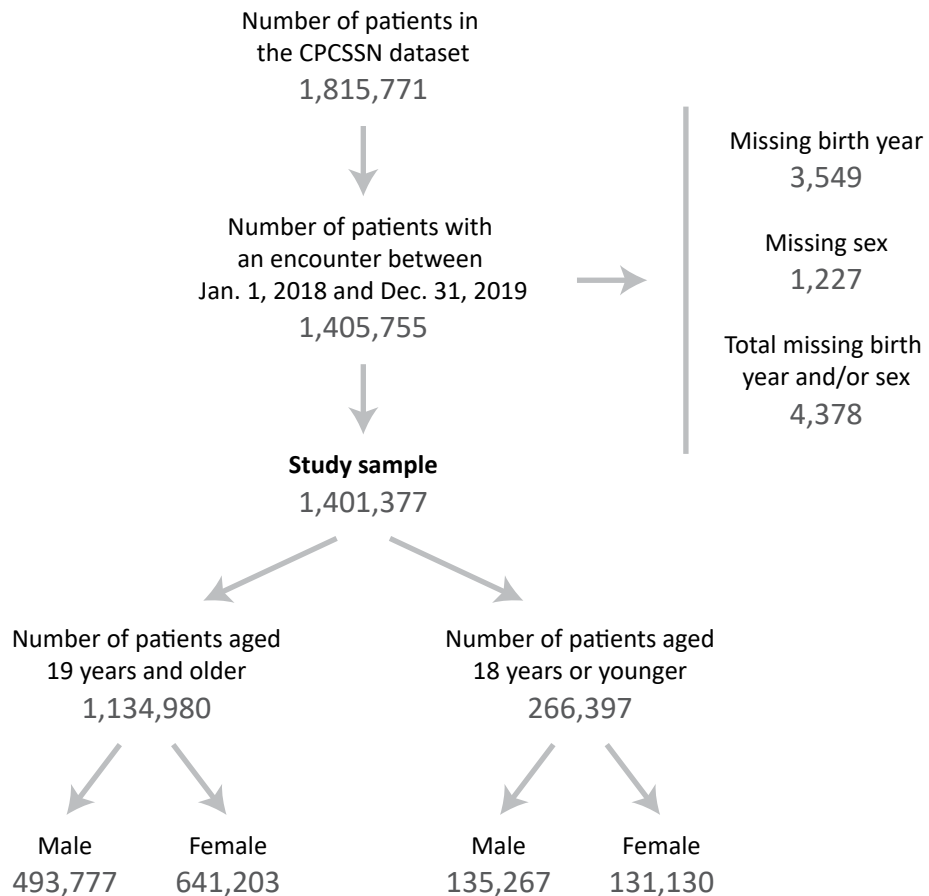
A similar strategy was used to report age standardized prevalences of multiple conditions and median number of primary care interactions in adults and children. All age standardization was calculated using the 2016 Canadian Census as the reference population.¹⁹ Figures 1-8 present an overview of our results. Supplementary tables that provide the exact proportions, expressed as percentages, and summary statistics used to generate the figures can be found in Appendix 1. All analyses were completed using SAS version 9.4 TS.²⁰

Results

Sample

As of December 31, 2019, the CPCSSN dataset held the EMR information of 1,815,771 people. Over 1.4 million patients had an encounter with a primary care provider in the previous two years (Figure 1). After removing 4,378 patients who had no year of birth or sex recorded, we are left with a study sample consisting of 1,134,980 adults and 266,397 children.

Figure 1. Study sample



Data: Canadian Primary Care Sentinel Surveillance Network (CPCSSN), Q4-2019.

CPCSSN patient characteristics

The mean age of adults is 51 years of age and the majority (57%) are female. Table 2 provides adult patients' demographic and risk factor characteristics. Most adults (84%) live in an urban area. Average blood pressure increases by age category for both sexes. Almost half (46%) of adults were classified as either overweight or obese. One in five (21%) are current smokers. Males are more likely to be current smokers, and have higher BMI and blood pressure than females (all p-values < 0.0001). Importantly, there is a substantial amount of missing smoking (50%), body mass index (31%) and both systolic and diastolic blood pressure information (19%).

Table 2: CPCSSN adult patient demographic and selected risk factor characteristics

	Male (n=493,777)	Female (n=641,203)	All (n=1,134,980)
<i>% of patients</i>			
Age group			
19-39 years	30%	33%	32%
40-64 years	43%	41%	42%
≥ 65 years	26%	26%	26%
Rural status			
Rural	17%	15%	16%
Urban	83%	85%	84%
Smoking status			
Current	25%	18%	21%
Past	41%	41%	41%
Never	34%	40%	38%
BMI			
Underweight (<18.5)	1%	1%	1%
Normal (18.5-24.9)	24%	16%	22%
Overweight (25-29.9)	39%	26%	23%
Obese (>30)	35%	23%	23%
<i>Mean (SD)</i>			
Systolic blood pressure (mm Hg)			
19-39 years	122.5 (13.5)	115.2 (12.9)	118.0 (13.6)
40-64 years	128.1 (14.5)	123.2 (15.9)	125.3 (15.7)
≥ 65 years	130.8 (17.1)	132.3 (17.7)	131.6 (17.5)
Diastolic blood pressure (mm Hg)			
19-39 years	76.1 (9.8)	73.3 (9.6)	74.4 (9.8)
40-64 years	80.8 (9.7)	76.9 (9.9)	78.4 (9.9)
≥ 65 years	76.1 (9.8)	74.5 (10.3)	74.7 (10.3)

Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019. 7% had no rural status recorded, 50% had no smoking status recorded, 31% had no available BMI, and 19% had no available blood pressure. All tests were significant (p = <0.0001) for all variables between males and females. T test for continuous variables and chi-sq test for proportional comparisons.

Table 3 provides pediatric patients' demographic and risk factor characteristics. The mean age is 9 and there are equal proportions of male and females. Most (78%) children live in an urban area. Average blood pressure is higher amongst older children (104/65) than younger children (101/63) and just over one in 10 (11%) children were classified as either overweight or obese. Similar to the adult data, there is a substantial amount of missing BMI and blood pressure information: 59% of pediatric patients had no available BMI and 67% had no available blood pressure measure.

Table 3: CPCSSN pediatric patient demographic and selected risk factor characteristics

	Male (n=135,267)	Female (n=131,130)	All (n=266,397)
<i>% of patients</i>			
Age group			
0-4 years	27%	27%	27%
5-18 years	73%	74%	73%
Rural status			
Rural	16%	16%	16%
Urban	78%	78%	78%
BMI*			
Underweight	3%	2%	2%
Normal	28%	28%	28%
Overweight	5%	6%	6%
Obese	6%	5%	6%
<i>Mean (SD)</i>			
Systolic blood pressure (mm Hg)			
0-4 years	101.5 (20.2)	100.3 (20.5)	100.9 (20.3)
5-18 years	104.5 (15.0)	103.8 (14.3)	104.1 (14.6)
Diastolic blood pressure (mm Hg)			
0-4 years	63.1 (13.1)	62.6 (13.2)	62.9 (13.2)
5-18 years	64.6 (10.2)	65.2 (10.0)	64.9 (10.1)

Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019. 6% of patients had no rural status recorded, 59% had no available BMI and 67% had no available blood pressure.

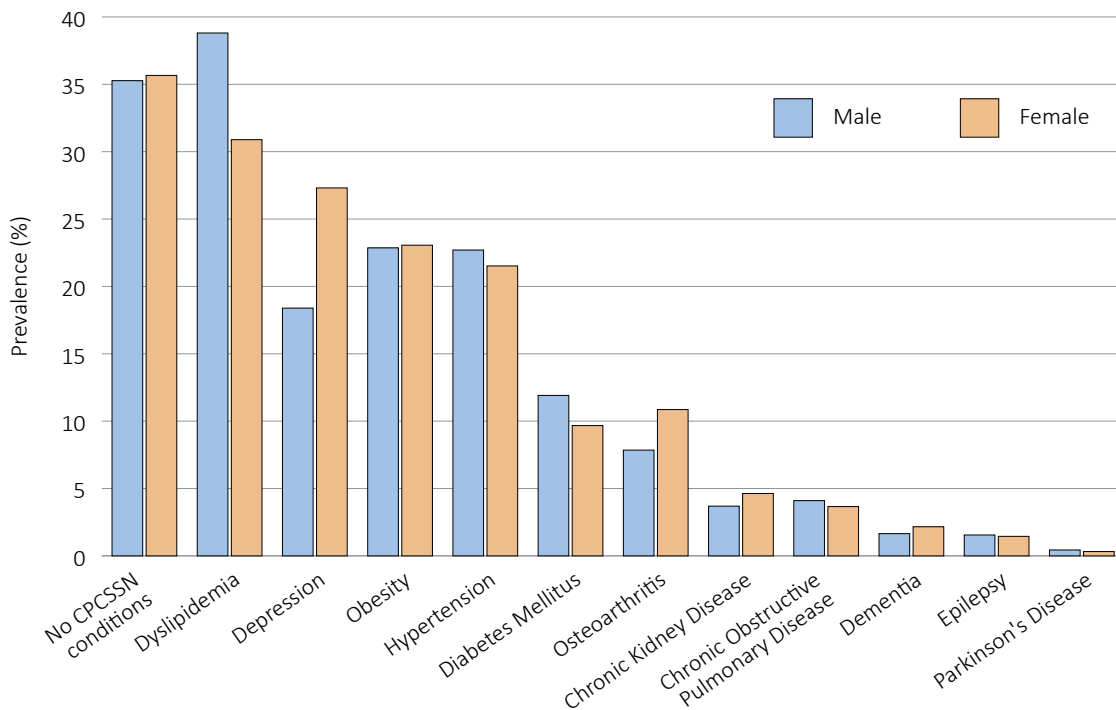
*BMI-for-age cut points were used, defined as: underweight equal to less than the 5th percentile, normal or healthy weight as the 5th percentile to less than the 85th percentile, overweight as 85th to less than the 95th percentile, and obese as equal to or greater than the 95th percentile.

Chronic conditions

Prevalence of one chronic condition

Figure 2 provides an overview of CPCSSN validated chronic conditions amongst adults stratified by sex. The majority (65%) of adults in our sample have at least one chronic condition. The most common chronic condition is dyslipidemia followed by depression, obesity and hypertension. Amongst adults, females have notably higher prevalence of depression, osteoarthritis, and chronic kidney disease; whereas, males have notably higher prevalence of dyslipidemia, hypertension, and diabetes. Sex based comparisons for all conditions in adults are statistically significant ($p < 0.0001$).

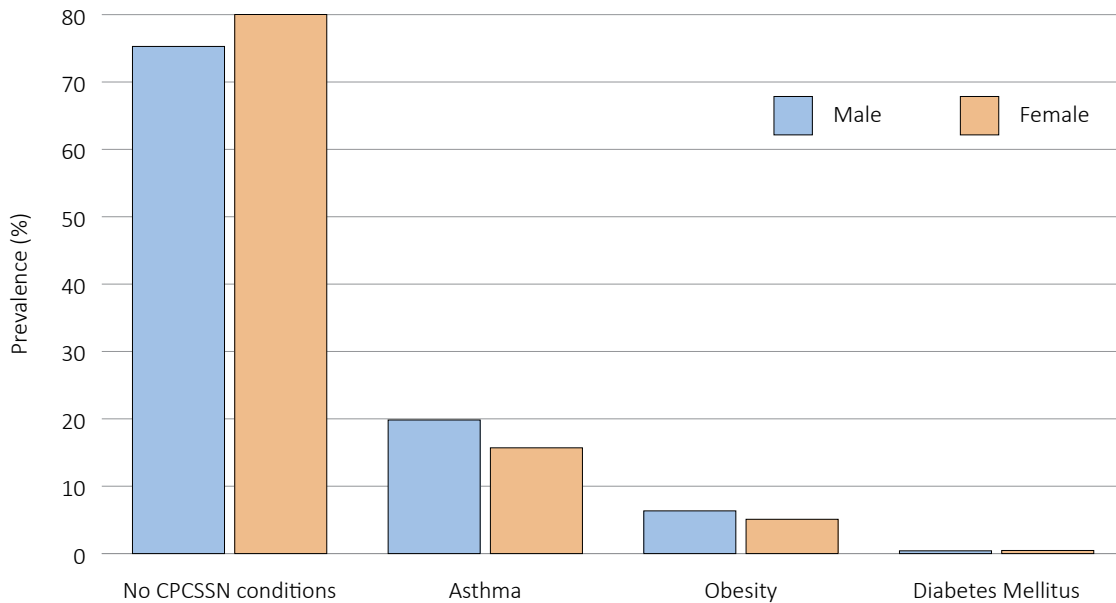
Figure 2: Sex-specific and age-standardized prevalence of CPCSSN validated chronic conditions in adults



Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019.
Reference population: 2016 Canadian Census.

Figure 3 provides an overview of CPCSSN validated chronic conditions amongst children stratified by sex. Almost one quarter (22%) of children have at least one chronic condition. The most common chronic condition amongst pediatric patients is asthma. Males have a higher prevalence of asthma and obesity. Sex based comparisons for all conditions in children are statistically significant ($p < 0.001$).

Figure 3: Sex-specific and age-standardized prevalence of CPCSSN validated chronic conditions in children



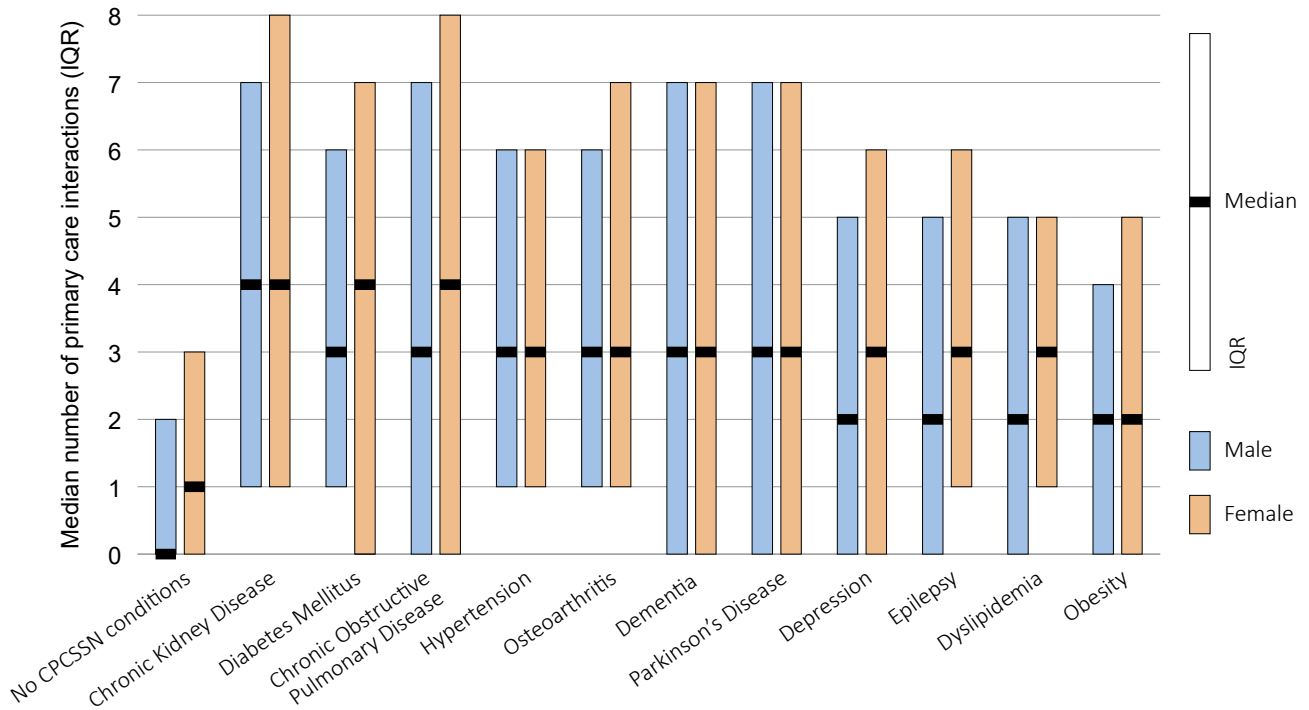
Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019.
Reference population: 2016 Canadian Census.

Primary care use among those with one chronic condition

Figure 4 provides an overview of the median number of encounters for adults during 2019. Patients in our sample with no CPCSSN validated chronic condition had a median of one encounter within one year. The median number of encounters for adults with CPCSSN validated chronic conditions ranged from two to four in the same time frame. Females with COPD, depression, diabetes, dyslipidemia, and epilepsy had a median of one additional encounter in the last year compared to males ($p < 0.0001$).

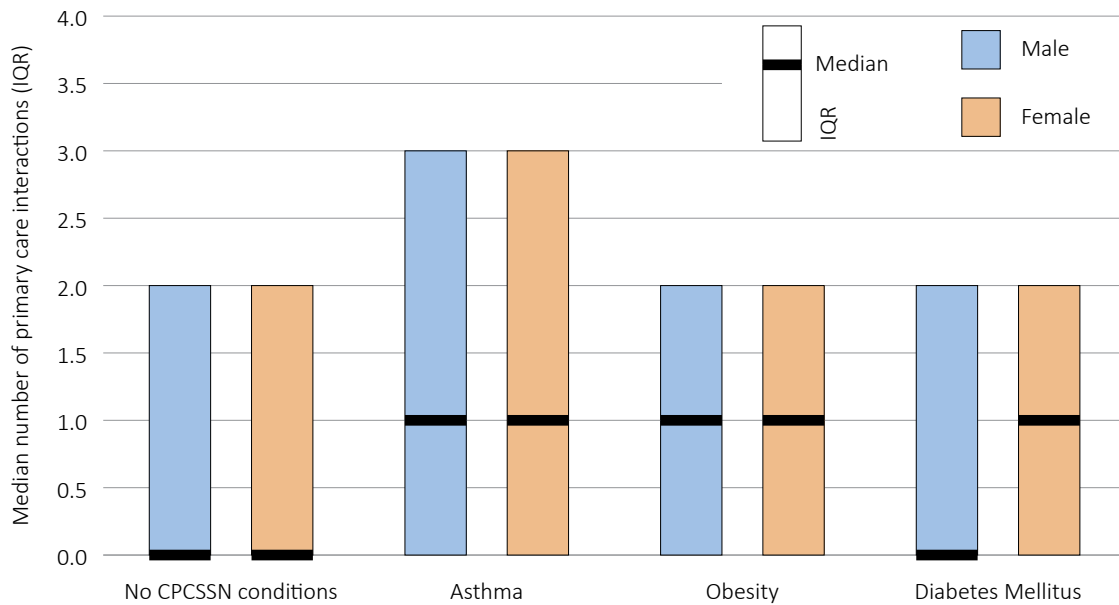
Figure 5 provides an overview of the median number of days where children had at least one primary care encounter. Children with no CPCSSN validated chronic conditions had a median of one encounter in the last year. Those with asthma and obesity had a median of one encounter in the last year. Females with diabetes had median of one more encounter than males with diabetes (1 vs. 0 respectively, $p < 0.0001$). There were no observable differences in the median number of visits between male and female children with asthma or obesity.

Figure 4: Median number of primary care encounters between Jan. 1, 2019 and Dec. 31, 2019 in adults with CPCSSN validated conditions



Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019. IQR: Interquartile range.

Figure 5: Median number of primary care encounters between Jan. 1, 2019 and Dec. 31, 2019 in children with CPCSSN validated conditions



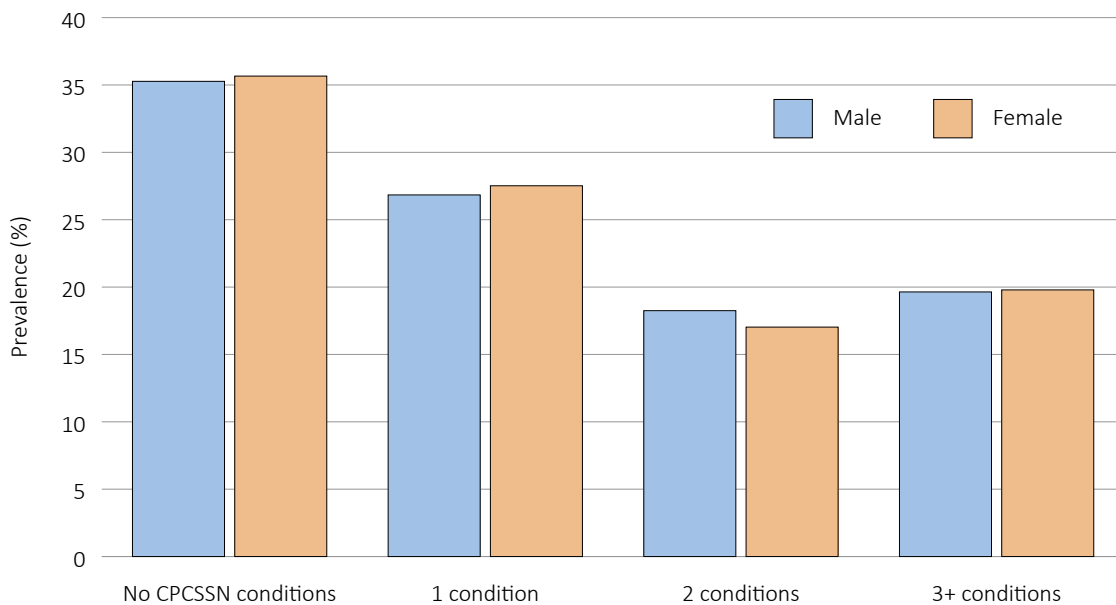
Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019. IQR: Interquartile range.

Multiple chronic conditions

Prevalence of multiple chronic conditions

Figure 6 provides an overview of the sex stratified and age standardized distribution of adults with multiple chronic conditions. Over one-third (37%) of adults have two or more chronic conditions. Males have a slightly higher prevalence of having two or more multiple chronic conditions compared to females (38% vs 37% respectively). Sex based comparisons for all multiple chronic condition categories in adults were statistically significant ($p < 0.001$).

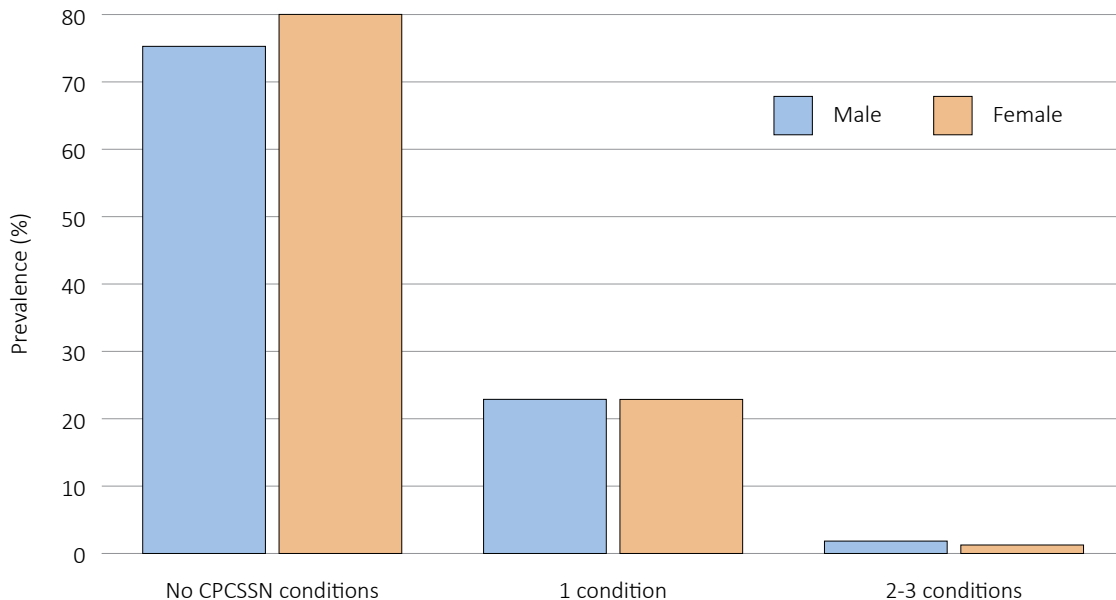
Figure 6: Sex-specific and age-standardized prevalence of multiple chronic conditions in adults



Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019.
Reference population: 2016 Canadian Census.

Figure 7 provides an overview of the sex stratified and age standardized distribution of pediatric patients with multiple chronic conditions. A small proportion of children had more than two chronic conditions (2%, $p < 0.0001$). Only 40 children in our sample had three or more conditions.

Figure 7: Sex-specific and age-standardized prevalence of multiple chronic conditions in children



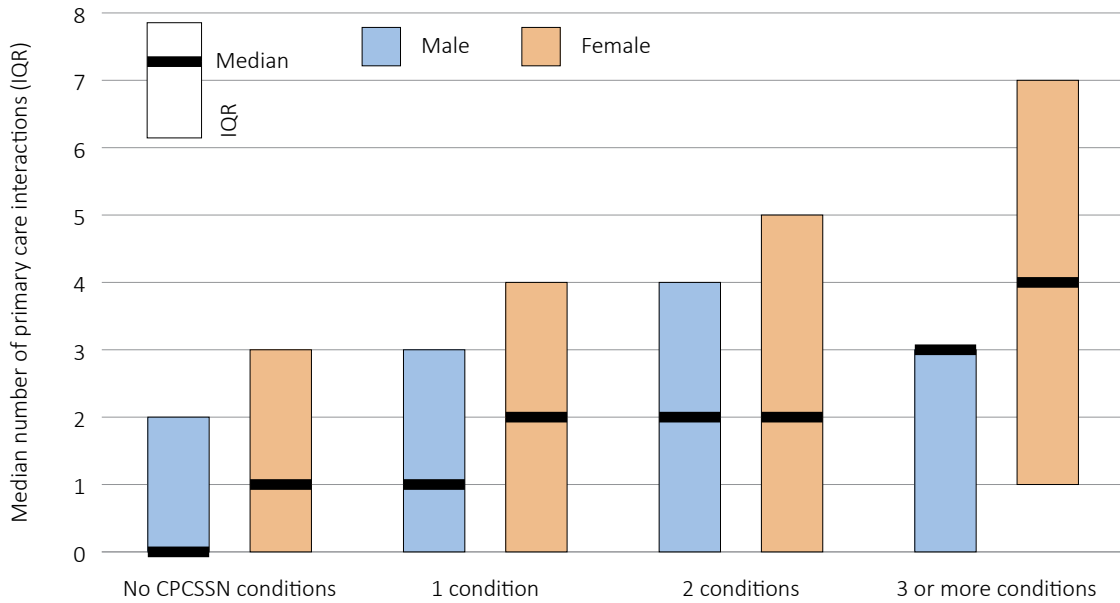
Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019.
Reference population: 2016 Canadian Census.

Primary care use among those with multiple chronic conditions

Figure 8 provides an overview of the median number of days that adult patients with multiple chronic conditions had at least one primary care encounter between January 1, 2019 and December 31, 2019. The median number of encounters for adults with two CPCSSN validated chronic conditions was two and the median number of encounters for adults with three CPCSSN validated chronic conditions was three ($p < 0.0001$). There were no observable differences in the median number of visits between males and females with two or more chronic conditions.

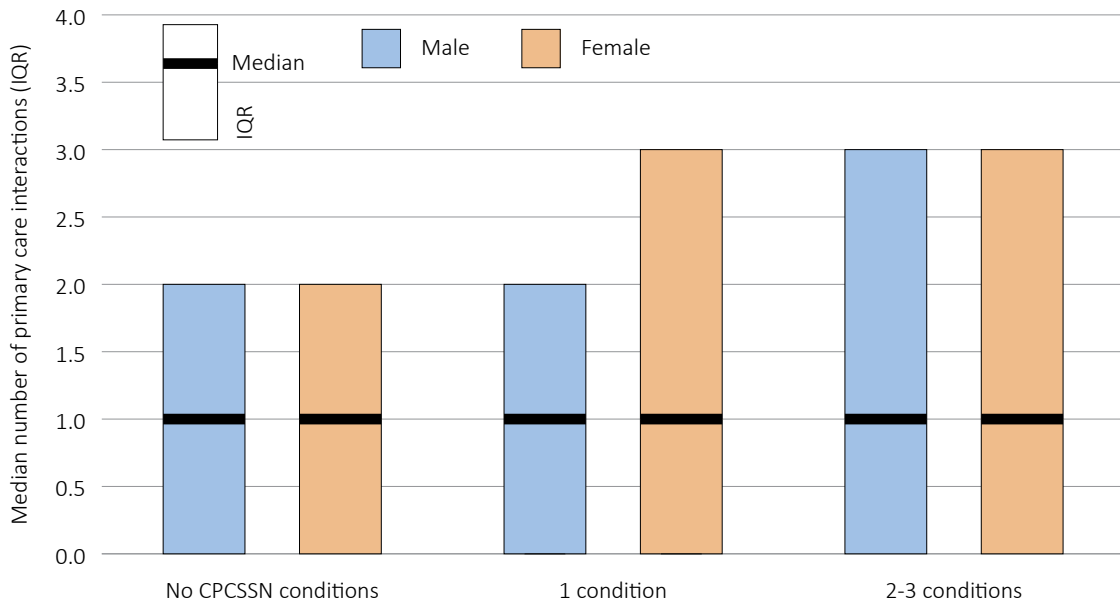
Figure 9 provides an overview of the median number of days that children with multiple chronic conditions had at least one primary care encounter between January 1, 2019 and December 31, 2019. For both male and female pediatric patients with two or more chronic conditions the median number of encounters was one.

Figure 8: Median number of primary care encounters from Jan. 1, 2019 to Dec. 31, 2019 for adults with multiple chronic conditions



Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019. IQR: Interquartile range.

Figure 9: Median number of primary care encounters from Jan. 1, 2019 to Dec. 31, 2019 for children with multiple chronic conditions



Data source: CPCSSN Q4-2019. Patients with at least one clinical encounter between Jan 1, 2018 and Dec 31, 2019. IQR: Interquartile range.

Discussion

This report provides information on the prevalence of chronic conditions amongst individuals who have visited primary care in Canada.

Prevalence of one chronic condition

Almost two-thirds (65%) of adults and one-quarter (22%) of children seen in primary care have at least one of the 11 CPCSSN validated chronic conditions.

Our finding that 65% of adult CPCSSN patients have at least one chronic condition differs from that reported by the Public Health Agency of Canada (PHAC) (44%).⁵ PHAC reports the prevalences of 10 common conditions with data derived from the 2016 Canadian Community Health Survey (CCHS)²¹ and the Canadian Chronic Disease Surveillance System (CCDSS)²²: asthma (11%), cancer (8%), chronic obstructive pulmonary disease (10%), dementia (7%), diabetes (11%), hypertension (25%), ischemic heart disease (8%), osteoarthritis (14%) osteoporosis (12%), and mood and/or anxiety disorders (13%). Currently, the CCDSS reports are limited to the adult population only. It is important to note that the list of conditions that are reported by PHAC and CPCSSN differ. Notably the CCDSS does not report on chronic kidney disease, dyslipidemia, epilepsy, obesity, and Parkinson's disease; whereas, CPCSSN does not report on cancer, ischemic heart disease or osteoporosis. Neither report on stroke.

We think that differences in prevalence estimates reported by CPCSSN are largely due to differences in the conditions included and the way the data are collected and reported. This makes direct comparisons challenging. For example, the CPCSSN data are derived from clinical data from patients who are attending primary care, whereas the CCDSS relies largely on population based self-report data. Prevalence estimates produced by CPCSSN are not likely to be the same as that of the Canadian general population as they represent a care seeking population. This report also focuses on all age prevalence whereas the PHAC data (and past CPCSSN condition specific epidemiological reports) present prevalence in clinically relevant age bands.^{12, 14, 15, 17, 23–26} For example, CPCSSN reports that the prevalence of COPD amongst adults aged 19 years of age and older is 4%, whereas PHAC reports the prevalence of COPD amongst those aged 35 and over is 10%. Notably, CPCSSN prevalence estimates for hypertension (22%) and diabetes (11%) are close to the estimates reported by PHAC, perhaps because both report on all adults. Future CPCSSN reports can be tailored to focus on specific conditions with much greater attention paid to clinically relevant age groups.

Our results also confirm important differences in the prevalence of chronic diseases between males and females. Adult females in our data are more likely to have chronic kidney disease, depression and osteoarthritis whereas adult males are more likely to have diabetes, dyslipidemia and hypertension.

The most common childhood chronic condition in CPCSSN data are asthma (18%), followed by obesity (6%) and diabetes (0.4%). Our estimates of obesity and asthma are higher than that reported in other

literature. The CPCSSN estimate of the prevalence of asthma is double the estimate reported using data from the Canadian Community Health Survey (8%).²⁷ Compared to our estimate of 6%, estimates of childhood obesity in the Canadian clinical literature vary from 3% to 13%.^{28, 29} Our estimate of childhood diabetes prevalence is below that of the latest report from Statistic Canada (0.7%).³⁰ As with CPCSSN estimates of chronic condition prevalences in adults, estimate differences are likely due to the nature of CPCSSN data: clinical data from a selected non-random population compared to self-report from a population-based sample. Importantly, we are reporting on only three CPCSSN validated pediatric chronic conditions. CPCSSN continues to expand its validated case definitions for other childhood chronic conditions such as attention deficit hyperactivity disorder (ADHD) and allergic conditions and will soon be validating the definition of epilepsy in children. Users of CPCSSN data should recognize that CPCSSN estimates differ from existing self-report data that is commonly collected by PHAC and Statistics Canada because the populations under consideration differ. Using both sources of information is recommended to more clearly understand the burden of childhood chronic conditions in Canada.

Primary care use among those with chronic conditions

Consistent with known health seeking patterns, we found that adult female patients with at least one chronic condition utilize the primary care system more often than their male counterparts (median of two versus one encounters within one year). Most of the current and past literature agrees that, in general, females utilize health care services more than males, especially in older age groups.^{31–33} Additionally, a recent study published in 2020 evaluated the frequency of encounters patients enrolled in Medicare had with primary care physicians.¹⁸ The authors reported that on average females had one more encounter per year than males, which gives us confidence in our observation.¹⁸ This also held true for pediatric female patients with diabetes who also utilize the primary care system more often than pediatric male patients with diabetes.

Prevalence of multiple chronic conditions

More than one third of adult patients in the CPCSSN dataset have two or more chronic conditions. Adult males have a slightly higher prevalence of two or more chronic conditions than females (38% and 37%, respectively). This observation is almost double the prevalence observed by Roberts et al. using data from the Canadian Community Health Survey who report that adult males have a lower prevalence of having two or more conditions than females (10 vs 15%, respectively).³⁴ As stated above, the differences in prevalences observed between other data sources is likely driven by methodological differences in the way the data are collected (clinical records vs. self-report), sampling methods (random sample of the general population compared with non-random sample from patients attending primary care clinics) and especially the number/type of chronic conditions considered in a multiple chronic condition analysis.³⁵ The prevalence of two or more chronic conditions amongst children was 1.6% and males had a higher prevalence than females (1.8% vs 1.3% respectively). At the time of the writing of this report we could find no similar data in Canadian children for comparison.

Primary care use among those with multiple chronic conditions

We observed similar primary care use between males and females. On average adults with two CPCSSN validated chronic conditions used primary care twice within a year and adults with three CPCSSN validated chronic conditions used primary care three times within a year. We detected no differences in primary care use between male and female children. Those with two or more chronic conditions used primary care once within a year. At the time of the writing of this report we could find no similar data in Canadian children for comparison.

Limitations

There are important limitations to the CPCSSN data and by extension the descriptive analysis in this report. The CPCSSN data are limited by the quality of data captured within the source EMRs: in our data we are missing large proportions of information on important risk factors such as smoking, alcohol use, blood pressure and BMI. Although it appears likely that in the case of alcohol use and smoking a patient classified as “current”, “past” or “never” is likely to be accurate, we cannot be sure of the correct classification of those who have no information. CPCSSN is developing methods of dealing with these missing information to maximize the utility of our data.^{36,37}

We report here only on chronic conditions that have been validated within CPCSSN. Users of CPCSSN data are cautioned that the choice of what chronic conditions to include in a multiple chronic condition analysis can influence multimorbidity and co-morbidity prevalence estimates.³⁵ It is important to note that patients with records in CPCSSN may also have other chronic conditions (such as cancer, stroke, or heart disease) and that we report on only three pediatric conditions (asthma, obesity and diabetes). CPCSSN is not considered a population-based sample since it is made up of clinicians who voluntarily join a regional network. Therefore, it is important to consider standardizing for age and sex when attempting to measure population prevalence estimates and when making comparisons to other sources of Canadian chronic conditions data.³⁸

Conclusion

CPCSSN remains the only pan-Canadian EMR database that provides comprehensive clinical information on close to two million patients. Our results underscore that, regardless of chronic illness, adult females use primary care services more often than males: a possible reflection of systematic differences in health seeking behaviors that differ between males and females.^{32,33,40} It therefore remains important that disease surveillance and research reports regarding chronic conditions in Canada continue to consider sex-based analysis/stratification.

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Appendix 1: Supplementary tables

Appendix 1 is available for download at: <http://cpcssn.ca/wp-content/uploads/2021/05/cpcssn-chronic-conditions-report-appendix.pdf>

CPCSSN



RCSSSP

Canadian Primary Care Sentinel Surveillance Network
Réseau canadien de surveillance sentinelle en soins primaires