INSPQ INSTITUT NATIONAL DE SANTÉ PUBLIQUE DU QUÉBEC

Substance-Related Disorders: Mortality Surveillance

CHRONIC DISEASE SURVEILLANCE NUMBER 41

SUMMARY

HIGHLIGHTS

The mortality rate in the population with SRDs (substance-related disorders) decreased significantly over a 15-year period, from 32.4 per 1,000 in 2001-2002 to 21.6 per 1,000 in 2016-2017. A similar, but less pronounced, trend is also observable in the general population with no SRD, with the mortality rate dropping from 9.0 per 1,000 in 2001-2002 to 6.8 per 1,000 in 2016-2017.

Temporal trends in the mortality rate ratios of the population with an SRD versus the general population with no SRD shows that the risk of dying went from 3.6 times higher (in 2001-2002) to 3.2 times higher (in 2016-2017) for a person diagnosed with an SRD compared to a person with no SRD. The gap between the two populations is gradually narrowing over time.

Individuals diagnosed with an SRD are 9.4 times more likely to die by suicide than Individuals never diagnosed with an SRD. This increase in risk is statistically higher for women (18.3 times) than for men (6.5 times).

Québec

1 INTRODUCTION

As identified and described in the DSM-5, substance-related disorders (SRDs) are a set of health problems that can result from the use of a psychoactive substance[1] [1]. The broad category of SRDs in the DSM-5 encompasses 1) substance use disorders (SUDs; i.e., abuse or dependence, where the patterns of use themselves become problematic), 2) intoxication (e.g., alcoholic coma or overdose), and 3) withdrawal and other induced disorders (e.g., secondary psychotic disorders, etc.). Although Québec physicians generally use the DSM-5 to classify mental disorders in their clinical practice, the Régie de l'assurance maladie du Québec (RAMQ) compiles diagnostics based on the International Classification of Diseases (ICD). Despite the differences between these two classification systems, a hybrid terminology has been adopted in this report to take nosographic systems in use in Québec into account both.

In Canada, it is estimated that substance use contributed to the loss of approximately 75,000 lives in 2017 [2]. According to international data, individuals with an SRD have higher mortality rates than individuals in the general population [3–10]. The mortality rate is even higher for persons with both an SRD and an associated or concurrent mental disorder [11] or an acute or chronic physical disease [12]. There are several causes of these deaths, ranging from situations that arise very rapidly following an instance of use (overdoses, accidental or traumatic injuries) to situations that arise after several years of use have contributed to the development of chronic physical diseases.

1.1 Deaths due to overdose and traumatic injury

From January 2016 to March 2021 in Canada, 22,828 deaths potentially related to an opioid overdose were reported, 98% of which were classified as accidental [13]. Although no data on opioid overdose deaths were collected nationally prior to 2016, some provinces have nonetheless been observing a dramatic year-over-year increase in these deaths for over a decade [14]. In 2021, again in Canada, the majority of overdose deaths were observed among men and persons aged 20 to 49 [13]. Despite the media coverage of the opioid crisis in Canada over the past decade [15], an analysis of Québec coroner's reports reveals that opioids were not the only substances that led to overdose deaths [16]. For example, among the 242 men who died in 2017, 69% of deaths involved a central nervous system depressant (alcohol, quetiapine, etc.), 66% a stimulant, 57% an opioid, 34% a benzodiazepine, and 27% a hallucinogens. Among the 98 women who died in that same year, 80% of deaths involved a central nervous system depressant (other than opioids and benzodiazepines), 40% a stimulant, 50% an opioid, 57% a benzodiazepine and 14% a hallucinogens. Additionally, according to data from the Québec Coroner's Office available at the time of writing this report, the annual rate for deaths related to suspected intoxication by an opioid or other drug was 5.1 per 100,000 individuals in 2018, 4.9 in 2019, and 6.4 in 2020; the number of deaths was higher among men and persons aged 40-59 [17].

[1] In this text, a substance is said to be psychoactive if it has a direct effect on the central nervous system and alters cognition, emotions and behaviour. In this publication we refer to hallucinogens as it includes alcohol, cannabis, cocaine and other psychostimulants, hallucinogens, opioids, sedatives or hypnotics, and volatile solvents.

Accidental injury deaths can also occur as a result of substance use [18]. Recent use of a psychoactive substance can increase the likelihood of road collisions or other types of accidents (e.g., falls, burns, etc.) caused, in particular, by impaired cognitive and psychomotor abilities. In 2017, among Canadian men who died from accidental injuries attributable to substance use, 96% of deaths were attributable to opioids (49%), alcohol (39%), or cocaine (8%) [2]. In Canada, alcohol- and drug-related collisions are the leading criminal cause of death. In 2016, 612 Canadians were killed in alcohol-related collisions and 441 of the drivers who died tested positive for a substance other than alcohol, including cannabis (46% of the 441 drivers), central nervous system depressants (41%), and stimulants (32%) when toxicology tests were performed [19]. Although this seems a relatively small number of deaths compared to the 267,213 deaths in Canada in 2016 [20], it should be noted that these road collisions resulted in the premature death of nearly 1,000 individuals, when these deaths could have been prevented. In the United States, Denmark, and Norway, accidents, traumatic injuries, suicides, overdoses, and homicides are the leading causes of death for persons with an SRD, beyond chronic physical diseases [9, 21, 22].

1.2 Deaths due to an acute or chronic physical disease

Beyond accidental deaths, high mortality rates among people with an SRD are also explained by the emergence after a certain amount of time of various physical diseases, such as cardiovascular diseases, gastrointestinal diseases or acute or chronic viral infections [9, 23]. These can contribute to premature mortality. With regard to alcohol, it is difficult to assess the long-term risk of developing a serious disease because there is some evidence of the health benefits of moderate drinking, particularly with respect to diabetes and certain heart diseases. Nevertheless, the risk of developing these diseases increases with any increase in the long-term average daily consumption [24].[2] According to Butt et al. (2011), hazardous drinking, which they define as any amount exceeding Canadian guidelines (e.g., more than five drinks on a single occasion), is entirely responsible for many serious medical conditions, including alcoholic psychosis, nervous system degeneration, alcoholic polyneuropathy, alcoholic myopathy, alcoholic cardiomyopathy, alcoholic gastritis, alcoholic liver diseases and hepatitis, alcohol induced pancreatitis, and fetal alcohol syndrome [24]. With regard to other substances, recurrent use of psychostimulants promotes the emergence of cardiovascular disease [25–27]. In addition, injection of opioids or of psychostimulants can contribute to the development of viral infections such as hepatitis C or HIV, reducing the life expectancy of the individuals in question [28–30].

[2] At the time of writing this report, Health Canada and the Canadian Centre on Substance Use and Addiction were conducting work to update the guidelines for low-risk drinking. The level of hazardous consumption and the notion that health benefits are linked to moderate consumption are under review. Therefore, this statement must be interpreted with the caution demanded by the constant evolution of knowledge.

1.3 Purpose of the report

The surveillance of mortality among Quebecers with SRDs seems relevant, considering that most of these premature deaths are preventable, whether they are accidental or due to a physical disease that may be attributable to substance use. Moreover, for the purposes of this report, an SRD is considered a chronic disorder that can affect mortality rates and ratios. Calculating mortality rate ratios and identifying causes of death provide key indicators that can guide preventive measures aimed at reducing mortality among persons with an SRD. These indicators can differ from country to country, or even from region to region, depending on the enforcement of impaired driving laws, the availability of psychosocial services, or the medical management of this population. Thus, although several studies and surveys have been conducted in Canada and around the world, it is essential to collect data specific to Québec. In response to the concerns of the Ministère de la Santé et des Services sociaux (MSSS) and the Institut national de santé publique du Québec (INSPQ), the objective here is therefore to determine the mortality rates and mortality rate ratios of persons diagnosed with an SRD from 2001 to 2017, relative to persons never diagnosed with an SRD.

2 METHODOLOGY

2.1 Data sources

The data used are drawn from the Québec Integrated Chronic Disease Surveillance System (QICDSS), which links five health administrative databases from the Régie de l'assurance maladie du Québec (RAMQ) and the Ministère de la Santé et des Services sociaux (MSSS) du Québec [31]. Four databases were used for the analyses carried out for this report, namely:

1) the Fichier d'inscription des personnes assurées (FIPA) (Québec's health insurance registry), which contains mainly demographic data (age, gender), as well as periods of eligibility for the RAMQ;
2) the Fichier des services médicaux rémunérés à l'acte (the medical fee-for-service database), which includes all principal diagnoses made and medical procedures performed by physicians in non-hospital settings and paid for by the RAMQ;
3) the Fichier de maintenance et d'exploitation des données pour l'étude de la clientèle hospitalière (MED-ÉCHO) (the hospital inpatient and day surgery database), which provides information on primary and secondary diagnoses, as well as services received during hospitalizations;
4) the Fichier des décès du Registre des événements démographiques (the vital statistics death database), which provides the necessary information surrounding mortality and causes of death.

2.2 Definition of cumulative cases of SRD

An individual enrolled in the FIPA is considered to have an SRD if, at any time between April 1, 1996, and March 31 of the fiscal year of reference, they met either of the following criteria, namely:

a) have a principal or secondary diagnosis of an SRD recorded in the MED-ECHO database;

or

b) have a principal diagnosis of an SRD recorded in the Fichier des services médicaux rémunérés à l'acte.

The International Classification of Diseases (ICD) 9th and 10th revision codes are used to identify SRD diagnoses:

	ICD-9	ICD-10-CA
SRD-alcohol only	291, 303, 305.0, 357.5, 425.5, 535.3, 571.0-571.3, 980.0, 980.1, 980,8, 980.9	F10, K70.0-K70.4, K70.9, G62.1, I42.6, K29.2, K85.2, K86.0, E24.4, G31.2, G72.1, O35.4, T51.0, T51.1, T51.8, T51.9
SRD-other drugs only	292, 304.0, 304.9, 305.2-305.7, 305.9, 965.0, 965.8, 967.0, 967.6, 967.8, 967.9, 969.4-969.9, 970.8, 982.0, 982.8	F11-F16, F18-F19, T40, T42.3, T42.4, T42.6, T42.7, T43.5, T43.6, T43.8, T43.9, T50.9, T52.8, T52.9
SRD-alcohol **AND** SRD-other drugs	To be considered to have an SRD-alcohol and other drugs, the individual must have received at least one code for an SRD-alcohol **AND** at least one other code for an SRD-other drugs. These two codes can be recorded during the same medical visit or at an interval of several years.	
All SRDs	Any code associated with an SRD-alcohol **OR** an SRD-other drugs.	

Depending on which criterion is met first, the case identification date is either the date of hospital discharge in the MED-ECHO database or, for medical services, the date for the first service. Further details on the development of indicators for identifying cases of SRD are available in previous publications [32, 33].

The cumulative prevalence of SRD cases is prioritized in this report, because it includes both recent and long-standing cases (i.e., since April 1, 1996), whereas annual prevalence includes only individuals who met the criteria for case definition during the year of reference. The cumulative prevalence is also preferred since mortality can occur several years after the medical diagnosis of an SRD is received. Using the annual prevalence would also minimize recognition of the chronic nature of SRDs. Indeed, some authorities, including a former United States Surgeon General, have called for SRDs to be considered chronic diseases [34].

2.3 Identification of causes of death

The following ICD-9 and ICD-10 codes are used to define the various leading causes of death:

- Infectious and parasitic diseases (ICD-9: 0-139; ICD-10: A00-A99, B00-B99, U04);
- Neoplasms (cancers) (ICD-9: 140-239; ICD-10: C00-C99, D00-D49);
- Endocrine, nutritional and metabolic diseases (ICD-9: 240-279; ICD-10: E00-E99);
- Diseases of the nervous system (ICD-9: 320-293; 294, 310; ICD-10: G00-G99, H00-H99);
- Dementia (ICD-9: 290, 293, 294, 310; ICD-10: F00-F09);
- Diseases of the circulatory system (ICD-9: 390-459; ICD-10: I00-I99);
- Diseases of the respiratory system (ICD-9: 460-519; ICD-10: J00-J99);
- Diseases of the digestive system (ICD-9: 520-579; ICD-10: K00-K99);
- Injury (ICD-9: 800-999; ICD-10: S00-S99, T00-T99, V00-V99, W00-W99, X00-X99 [except X60-X84], Y00-Y99 [except Y870]):
    - Suicide ICD-10: X60-X84, Y870;
- SRD: persons whose cause of death is a code previously specified in "Definition of cumulative cases of SRD";
- Other causes of death: all other ICD codes not listed above (e.g., blood diseases, eye diseases, etc.).

2.4 Mortality rates

All-cause and cause-specific mortality rates were estimated separately for the population with an SRD and the population without an SRD. The all-cause mortality rate (expressed in per 1,000) represents the number of persons who died in a 12-month period out of the total eligible population[3] during the same period. The cause-specific mortality rate (per 100,000) represents the number of persons who died of a given cause in a 12-month period out of the total eligible population during the same period. The eligible population is either persons who have been diagnosed with an SRD since April 1, 2001[4] or the general unaffected population. For each mortality rate, the 99% confidence interval is also calculated. Statistically significant differences are detected when the 99% confidence intervals of rates do not overlap. Considering the very large sample sizes and near complete coverage of the study populations, this method was preferred over statistical testing to reduce the likelihood that clinically irrelevant differences would be interpreted as significant [35]. Some rates had to be rounded to ensure respect for confidentiality agreements regarding the disclosure of the number of persons with a given condition. Therefore, the rate values presented correspond to an approximate estimate rather than an exact calculation.

2.5 Mortality rate ratios

The mortality rate ratio captures the magnitude of the difference between the mortality rate of the population with an SRD and the population without an SRD for the same cause of death. A mortality rate ratio is estimated by dividing the mortality rate for the population with an SRD by the rate for the population without an SRD for the same cause. An overall mortality rate ratio, i.e., for all causes combined, can also be determined. A mortality rate ratio greater than 1 suggests that the mortality rate is higher for the population with an SRD as compared to the population without an SRD.

[3] The eligible population can be one of the following five categories: 1) "SRD – alcohol only"; 2) "SRD – other drugs only"; 3) "SRD – alcohol and SRD – other drugs"; 4) "All SRDs" (which represents the first three categories taken together); 5) "No SRD." Thus, the denominator used to calculate the mortality rate differs according to the eligible population.

[4] Although the data have been available since 1996, a 5-year burn-in period was necessary to stabilize the data.

2.6 Periods covered

The mortality analyses cover the period from 2001-2002 to 2016-2017. Although the study population was identified through SRD diagnostics recorded since 1996, mortality estimates were obtained from data compiled over a 12-month period in the fiscal year of reference. Comparisons over time are made using age-adjusted measures. These measures are obtained using the direct standardization method based on the age structure of the Québec population derived from the 2011 census. The most recent complete set of data is from the 2016-2017 year.

2.7 Other associated variables

The data presented are also cross-tabulated with other demographic variables. The terms men and women used throughout this document refer to sex assigned at birth rather than gender identity, although the sex indicated in the RAMQ (and therefore in the QICDSS) may be subject to change when the Directeur de l'état civil issues a change of sex designation certificate.

Age groups are broken down as follows: 12-17 years, 18-24 years, 25-39 years, 40-54 years, 55-64 years, 65-74 years, 75-84 years, 85 years and older.

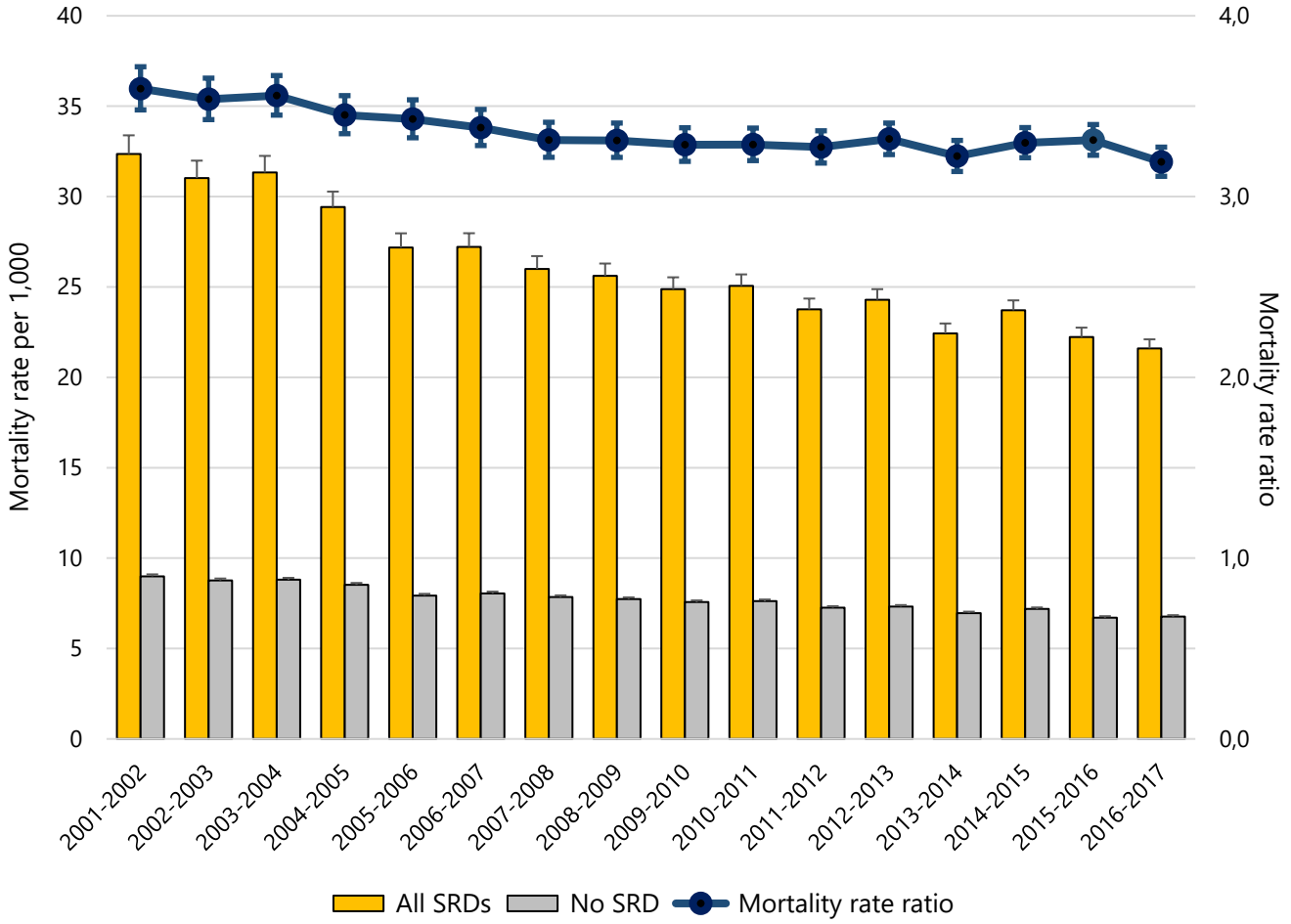
Data will also be presented by health region (région sociosanitaire, or RSS), with the exception of the Outaouais, Nord-du-Québec, Nunavik and Cree Territory of James Bay regions, due to known underestimates related to the delivery of care services influenced by geographic issues, such as proximity to Ontario. Services rendered outside Québec are not included in the QICDSS data.

3 RESULTS

Figure 1 presents an overall portrait of all-cause mortality rates in the populations with and without an SRD (left scale), mortality rate ratios (right scale), and the absolute number of deaths (inside the corresponding histogram bar).

The mortality rate for the general population without an SRD decreased statistically significantly from 9.0 [99%CI = 8.9 – 9.1] per 1,000 individuals in 2001-2002 to 6.8 [6.8 – 6.9] per 1,000 in 2016-2017. The absolute number of persons who died in the general population without an SRD is 47,730 out of the 6,169,040 Quebecers aged 12 and over in 2001-2002, and there were 51,475 deaths among the 6,661,180 Quebecers in 2016-2017. A statistically significant decrease is also observed in the population of persons with an SRD, which went from 32.4 [31.4 – 33.4] per 1,000 in 2001-2002 (i.e., 6,985 deaths among 211,830 individuals with an SRD) to 21.6 [21.1 – 22.1] per 1,000 in 2016-2017 (i.e., 13,175 deaths among 499,290 individuals with an SRD). Thus, mortality rates among those diagnosed with an SRD at any time between 2001 and 2017 are statistically higher than those of the general population throughout the study period. Note that mortality rates decline over time more significantly for the population with an SRD than for the general population without an SRD. This is evident from the narrowing of the gap in the risk of dying between these two populations, as represented by the mortality rate ratios. Indeed, in 2001-2002, persons with a diagnosis of an SRD were 3.6 [3.5 – 3.7] times more likely to die than those without a diagnosis of an SRD; the mortality rate ratio decreased statistically significantly to 3.2 [3.1 – 3.3] in 2016-2017.

Figure 1 **Annual age-adjusted all-cause mortality rates and mortality rate ratios for the population aged 12 years and older with and without diagnosis of an SRD, Québec, 2001-2002 to 2016-2017**



Note: The numbers in each bar of the histogram correspond to the absolute number of persons who died in the SRD or non-SRD group for the year of reference.

Figure 2 **Annual age-adjusted all-cause mortality rates (per 1,000 individuals) for men and women aged 12 years and older, by SRD diagnostic category, Québec, 2001-2002 to 2016-2017**

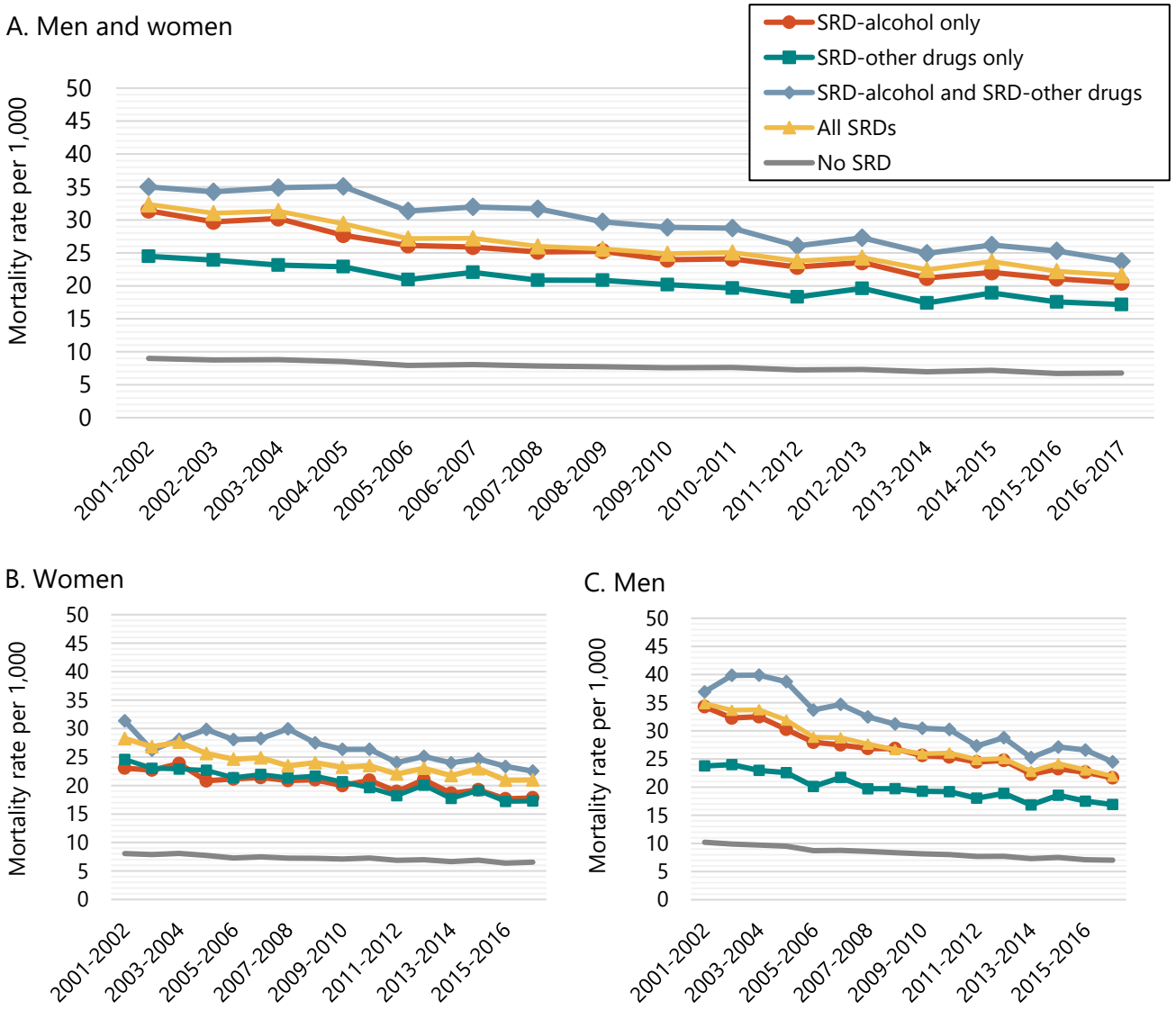
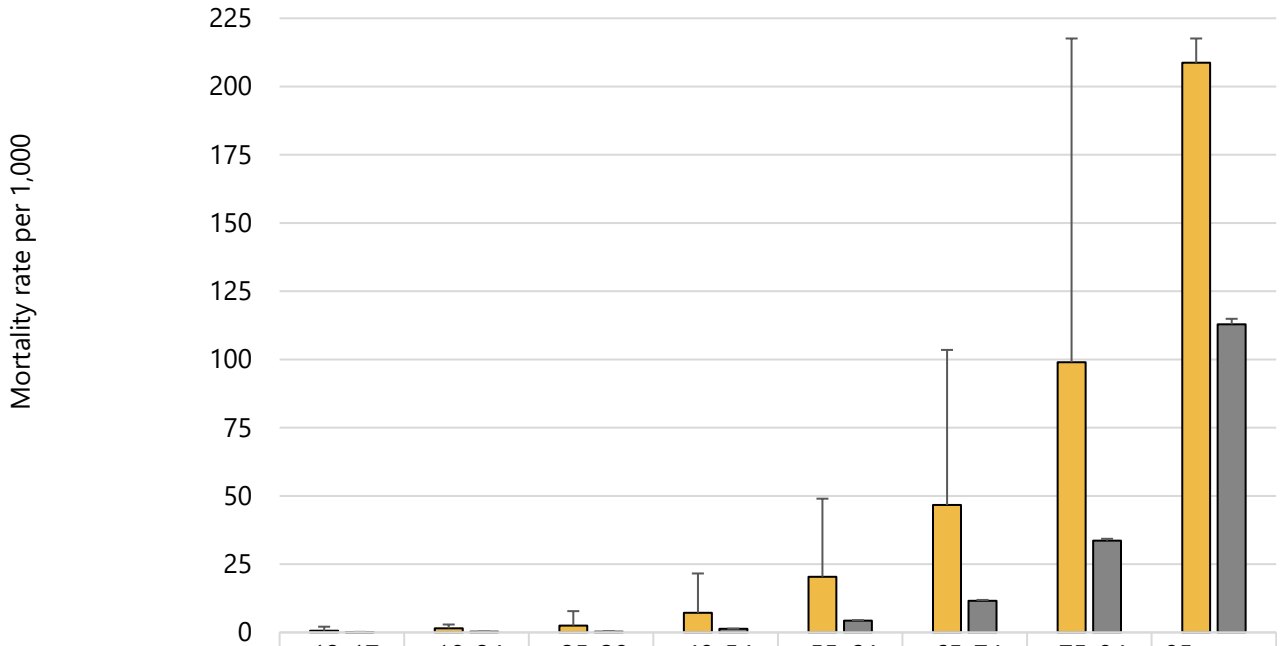


Figure 2A shows that age-adjusted mortality rates are higher during the entire period covered for persons diagnosed with both an SRD – alcohol and an SRD – other drugs. For example, in 2016-2017, this population had a rate of 23.7 [22.3 – 25.5] per 1,000, compared to those diagnosed with an SRD – alcohol only (20.5 [19.7 – 21.3] per 1,000) and compared to those diagnosed with an SRD – drugs only (17.2 [16.3 – 18.0] per 1,000). For women diagnosed with an SRD (Figure 2B), the mortality rate decreased from 28.3 [26.8 – 29.8] per 1000 in 2001-2002 to 21.0 [20.3 – 21.8] per 1000 in 2016-2017. For men (Figure 2C), the rate went from 34.8 [33.5 – 36.2] in 2001-2002 to 22.0 [21.3 – 22.6] in 2016-2017. While men diagnosed with an SRD had a significantly higher mortality rate (34.8 [33.5 – 36.2]) than women with an SRD (28.3 [26.8 – 29.8] per 1,000) in 2001-2002, this difference was no longer

statistically significant in 2016-2017 (men: 22.0 [21.3 – 22.6]; women: 21.0 [20.3 – 21.8]). It should be noted that there is a significant difference in mortality rates between men diagnosed with an SRD – alcohol only and those with an SRD – drugs only, whereas no significant difference is observed between these two diagnoses for women for most of the years covered.

Figure 3 **All-cause mortality rates (per 1,000) and 99% confidence intervals for the population aged 12 years and older by SRD diagnostic status by age, Québec, 2016-2017**

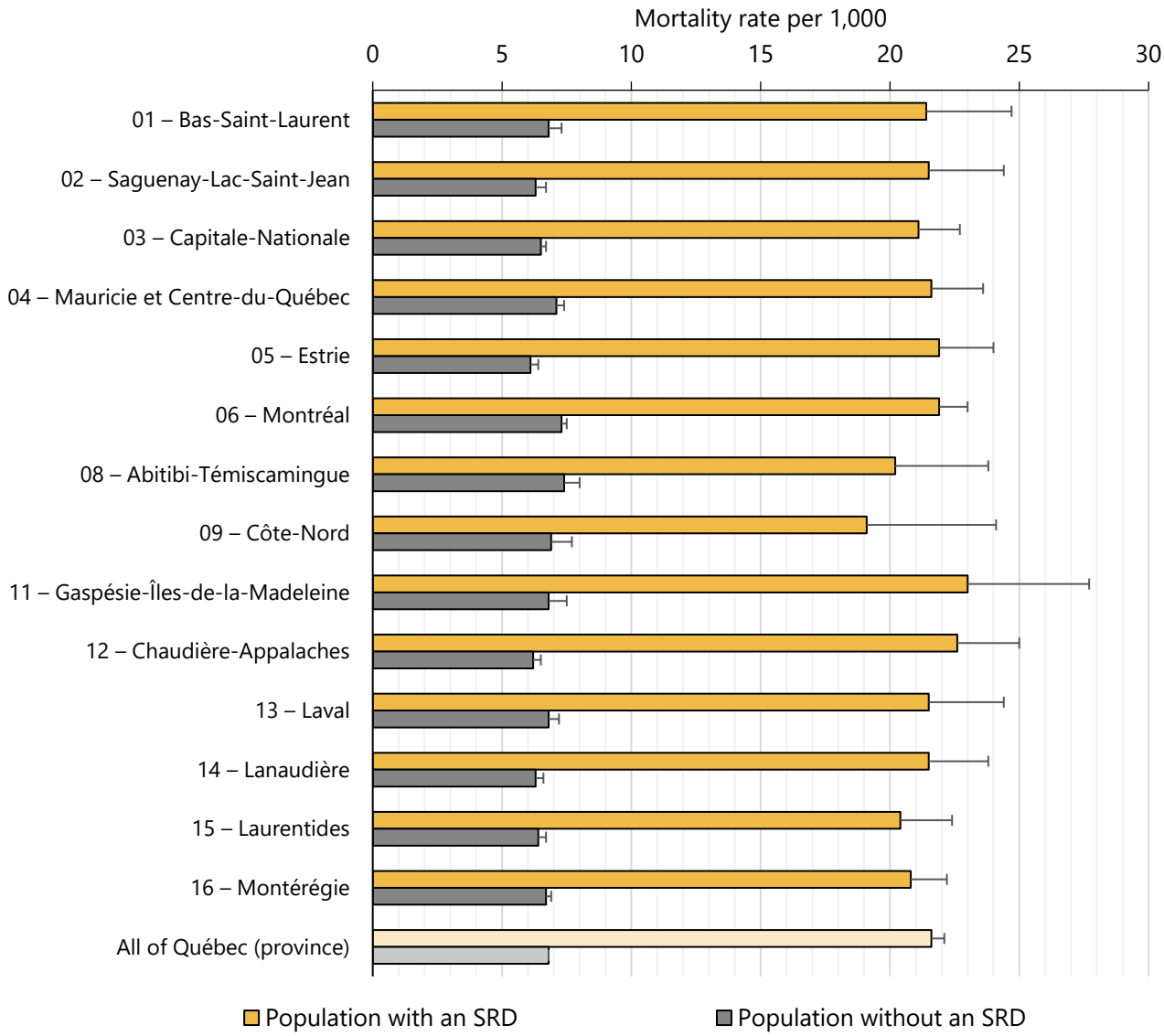


	12-17 years	18-24 years	25-39 years	40-54 years	55-64 years	65-74 years	75-84 years	85 years and older
Population with an SRD	0,6	1,5	2,5	7,2	20,4	46,7	99,0	208,7
Population without an SRD	0,1	0,3	0,3	1,3	4,3	11,6	33,6	112,9

Figure 3 presents the distribution of mortality rates (per 1,000) according to age and shows that mortality rates increase with age in both the population with an SRD and that without an SRD. Across all SRDs, each age group has a higher mortality rate than the age group preceding it, but these differences are not statistically significant. With the exception of 12-17 year olds, within a given age group, mortality rates are higher for persons with an SRD than for persons in the general population without an SRD. This finding is even more pronounced for the group with both an SRD – alcohol and an SRD – other drugs (Appendix 1).

A more detailed analysis of mortality rate ratios according to age group can be found in Appendix 2. Briefly, from 2016 to 2019, the difference in mortality risk between those diagnosed with an SRD and those never diagnosed with an SRD was greatest for those aged 25-39, followed by those aged 18-24 and those aged 40-54. From this age group on, the gap narrows as age increases.

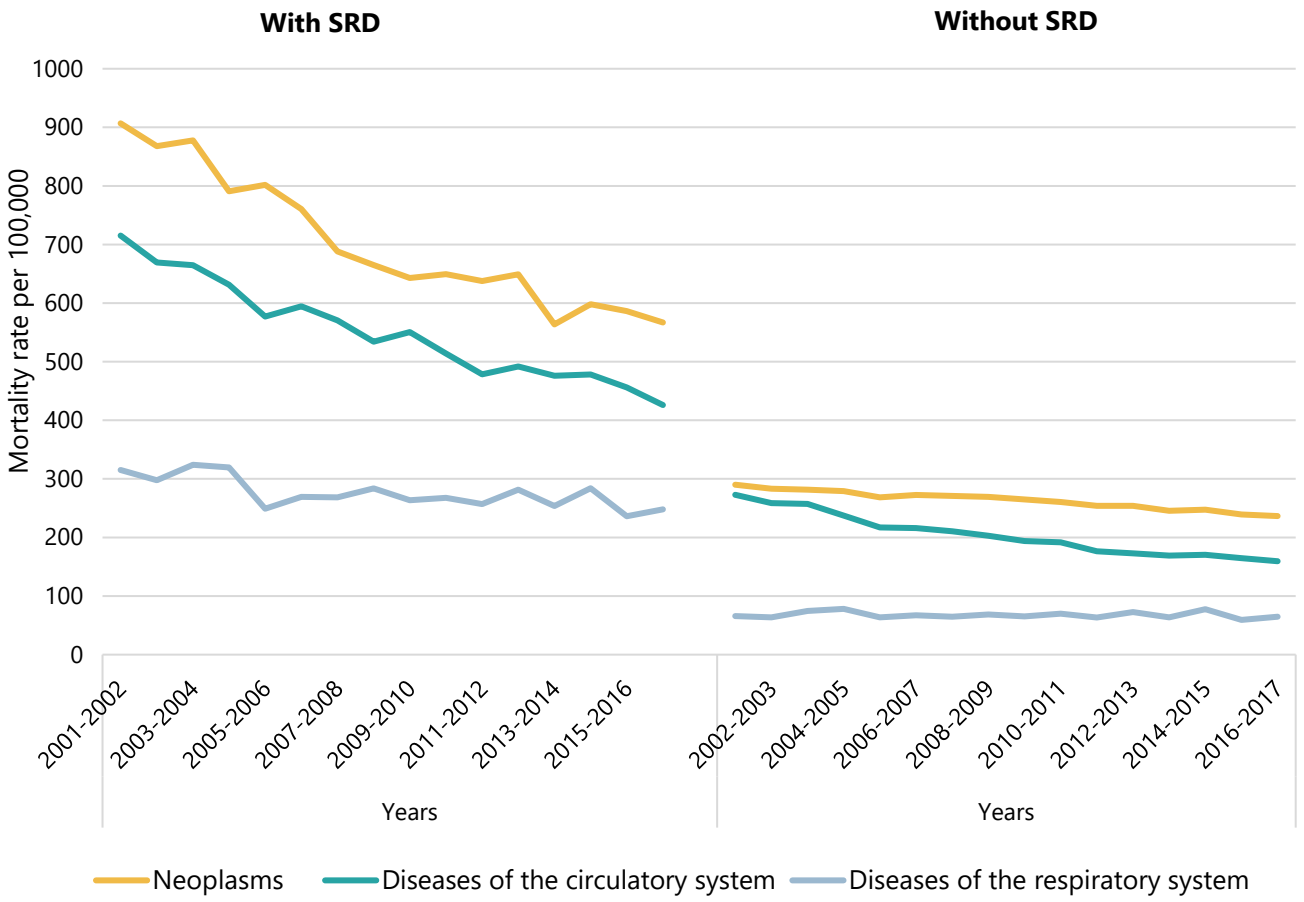
Figure 4 **Age-adjusted all-cause mortality rates (per 1,000) and 99% confidence intervals for the population aged 12 years and older by SRD diagnostic status by health region, Québec, 2016-2017**



Note: Results for the Outaouais (07), Nord-du-Québec (10), Nunavik (17) and Cree Territory of James Bay (18) regions are not presented because their data are incomplete, but they contribute to the measure for Québec as a whole. The paler bars represent the mortality rates for the entire province of Québec.

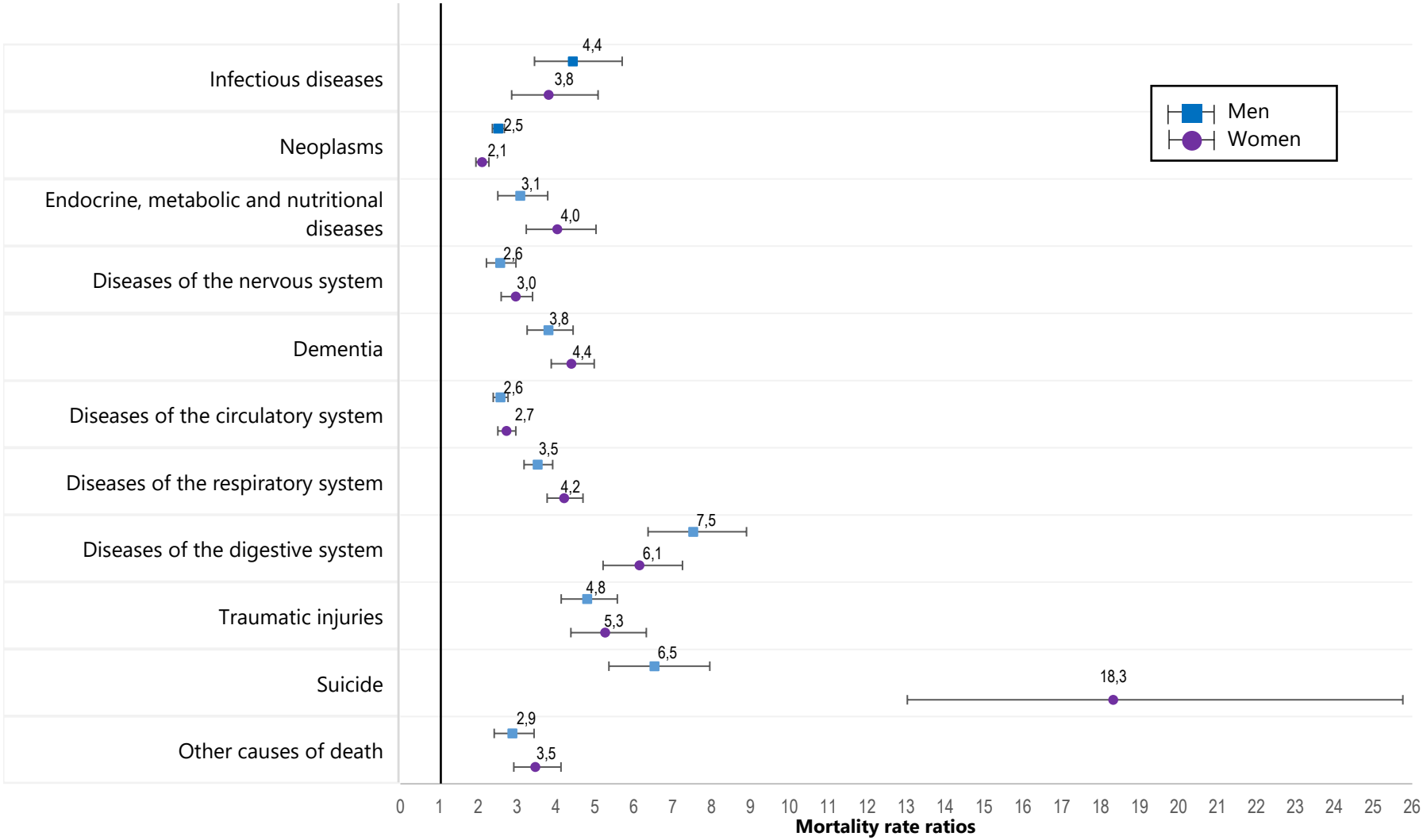
Figure 4 shows the distribution of mortality rates (per 1,000) according to health region in 2016-2017. It is also possible to compare the mortality rates of each region to the mortality rate of Québec as a whole. Thus, for the population with an SRD, there was no statistically significant difference between the regional and province-wide mortality rates. The distribution of mortality rates by health region according to SRD diagnostics is detailed in Appendix 3.

Figure 5 **Annual age-adjusted mortality rates (per 100,000) for the three leading specific causes of death in the population aged 12 years and older with and without a diagnosed SRD, Québec, 2001-2002 to 2016-2017**



Overall, Figure 5 shows the same temporal trend in cause-of-death mortality rates for persons with and without an SRD from 2001 to 2017. Indeed, neoplasms (cancers), diseases of the circulatory system and diseases of the respiratory system are the three leading causes of death in both categories of the population. However, regardless of the cause, mortality rates are much higher for persons with an SRD. Appendix 4 presents the trends in mortality rates for all the causes analyzed.

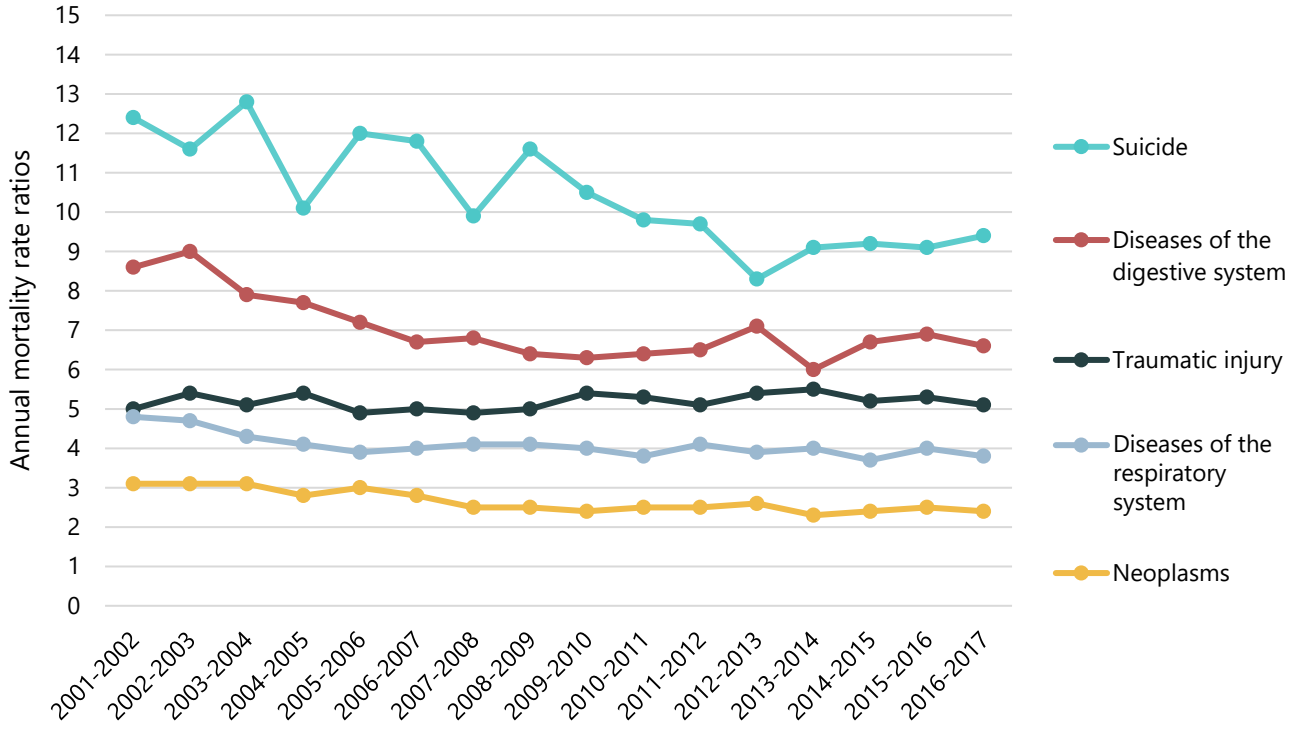
Figure 6 Mortality rate ratios (cumulative SRDs: non-SRDs) and 99% confidence intervals by leading cause of death and by sex in the population aged 12 years and over, Québec, 2016-2017



Note: A mortality rate ratio greater than 1 means that the population with an SRD has a higher risk of death than the general population without an SRD.

Figure 6 shows mortality rate ratios and 99% confidence intervals by cause of death and by sex in 2016-2017. Ratios for men and for women are comparable except for those for suicide and neoplasms. Women diagnosed with an SRD are 18.3 times more likely to die by suicide than those not diagnosed with an SRD, compared to 6.5 times more likely for men. Men diagnosed with an SRD have a higher risk (2.5 [2.4 – 2.7]) of dying from neoplasms than women (2.1 [1.9 – 2.3]).

Figure 7 **Annual mortality rate ratios for the five causes of death (other than SRDs) showing the largest differences between persons with and without an SRD in the population aged 12 years and over, Québec, 2001-2002 to 2016-2017**



Individuals diagnosed with an SRD between 2001 and 2017 have a significantly higher risk of dying from a condition caused by an SRD,[5] although this risk decreased between 2001-2002 (236.3 times higher risk) and 2016-2017 (171.0 times higher risk) (data detailed in Appendix 5). Overall, as shown in Figure 7, mortality rate ratios for neoplasms (3.1 vs. 2.4) and respiratory diseases (4.8 vs. 3.8) decreased statistically significantly between 2001-2002 and 2016-2017.

Finally, for other causes of death in 2016-2017, results show that persons diagnosed with an SRD were 9.4 times more likely to die by suicide, 6.6 times more likely to die from digestive system diseases, and 5.1 times more likely to die from an injury. The annual mortality rate ratios by cause of death for the entire study period are detailed in Appendix 5.

[5] As a reminder, this includes use disorders (abuse/dependence), acute intoxication, overdoses, physical diseases such as cirrhosis of the liver due to alcohol, etc.

4 DISCUSSION

4.1 A decrease in mortality rates over time

From 2001 to 2017, the mortality rate for persons diagnosed with an SRD decreased more significantly than that of the general population. This trend suggests that the management of persons in Québec presenting with an SRD has proven effective in recent decades. Various studies including those conducted by researchers affiliated with RISQ (Recherche et intervention sur les substances psychoactives – Québec) have demonstrated the effectiveness of interventions involving persons with an SRD and a concurrent mental disorder [36]. The results of this study demonstrate that the mortality rate in the population diagnosed with an SRD has decreased over time, although the number of deaths in this population almost doubled over 15 years. Nevertheless, the number of deaths (numerator) increased less rapidly than the number of persons with a lifetime diagnosis of an SRD (denominator). The definition of SRDs as lifetime cases allows their chronic nature to be taken into account. On the other hand, assigning lifetime status to SRD cases over a long period of time may increase the number of false positives. This may have contributed to the decrease over time in the mortality rate among persons diagnosed with an SRD, as well as the decrease in mortality rates ratios comparing the population with and without a diagnosis of an SRD.

Despite this rapid decrease, the mortality rate among persons diagnosed with an SRD remains higher than that of the general population, as has also been reported in several international studies [3–10]. Thus, deaths in the population with an SRD remain a significant concern. On the other hand, the evolution of the mortality rate ratio demonstrates that the gap between the mortality rates for the population with an SRD versus the general population without an SRD is gradually narrowing over time. It is worth noting that the mortality ratio in Québec is comparable to that reported in a Danish study, which found a ratio of 3.9, for the period from January 1, 1995 to December 31, 2015 [9]. Elsewhere, a Norwegian team found a ratio of 3.4 for persons with an SRD–alcohol only and a ratio of 5.2 for those who had concurrent disorders related to multiple substances, for the period from 1997 to 2016 [12]. However, a Finnish study reported a non-significant increase in the all-cause mortality rate ratio, which rose from 4.46 in 1996-1998 to 5.33 in 2018-2010 [7]. Nevertheless, these mortality rate ratios remain lower than those previously reported during the 1990s in eight major European cities where the lowest ratios were reported in Lisbon (6.3 for men and 16.7 for women) and the highest in Barcelona (21.1 for men and 53.7 for women), in part due to the HIV/AIDS crisis that struck hard in the late 20th century among persons using injection drugs [3]. Thus, mortality rate ratios provide a better basis for understanding excess mortality among the population with an SRD over time, and the potential influence of social and health-related changes within society.

According to the Institut de la statistique du Québec (ISQ), the overall decrease in mortality in the Québec population is mainly due to a decline in cardiovascular diseases, as well as tumours and external causes (accidents, suicides, etc.), especially among men [37]. The data in this report are consistent with those of the ISQ, in that the decrease in mortality in the both the populations with and without an SRD is related primarily to a decrease in neoplasms and circulatory system diseases. Specifically regarding diseases of the circulatory system, the decrease in deaths can be explained in different ways, including with reference to a reduction in associated risk factors (poor diet, physical inactivity, smoking, stress, etc.) and better management of hypertension and diabetes [38, 39]. With respect to neoplasms, the reduction in mortality may be the result of public health efforts over the past few decades to reduce smoking in society [40]. Indeed, it is estimated that 17.5% of cancers diagnosed in Canada in 2015 were attributable to tobacco use [41]. It should be noted that tobacco use is generally higher among psychoactive substance (PS) users than in the general population and that they have a higher probability of dying from neoplasms, and from circulatory and respiratory diseases attributable to smoking [42]. Finally, it is possible that the Low-Risk Alcohol Drinking Guidelines (LRDG) or the advertising campaign regarding drinking standards conducted by Éduc'Alcool (2017) may have supported this decrease. According to the World Health Organization, alcohol is the leading cause of cancer in Europe, and even the smallest amount of alcohol increases the risk of developing cancer [44]. In consideration of this, a recent Canadian consultation has called for updates to the LRDG that better inform the public about the multiple impacts of alcohol on mental health, physical health and on people's lives, with respect to violence, sexual assault and absenteeism from work or school [45].

4.2 Variation in risk of death according to substances used

As evidenced in this report, in recent years, mortality rates have been higher for persons with a combination of alcohol-related disorders and disorders related to other drugs. The physiological effects of alcohol on the body are well known, especially the effects on the digestive system [46–48]. Alcohol consumption can induce the development of certain physical diseases or exacerbate existing conditions [24]. Combining alcohol and another PS can potentiate health problems resulting in death. It should be noted that not all PSs are associated with the same health risks and that the mode of administration (injection, inhalation, ingestion, etc.) can be a factor that influences the risk of death. For example, psychostimulants tend to affect the circulatory system more than other substances [25, 27]. With respect to opioids, these induce significant respiratory depression during overdoses [49]. In addition, the injection of opioids or psychostimulants promotes the emergence of infections [50]. Thus, various mechanisms of action associated with PSs can lead to death, especially if they are combined, as for example when alcohol and another PS are used together.

There is no denying the increase in overdose deaths that has been observed in recent years in North America, including in Québec. One would expect to see mortality rates in the population with an SRD increasing in recent years, due to the current crisis linked to opioids and other PSs that began over a decade ago [51]. Moreover, the ISQ reports that deaths due to accidental poisoning increased over the study period (2001-2017), resulting in a small negative impact on changes in life expectancy [37].

At first glance, the mortality rate data do not seem to reflect this reality; it becomes more apparent when we consider the significant increase in the absolute number of deaths. Given that the population identified as having an SRD covers all PSs, whereas alcohol and cannabis are the most commonly used substances in Québec [52], it is likely that better management of the diseases caused by these two substances reduces the number of deaths and contributes to a decrease in the overall mortality rate. Another factor that may help explain the mortality rates observed in the SRD population may be the free distribution of naloxone kits by Québec public health workers, particularly to those at risk. This would have helped to reduce the extent of the overdose crisis in Québec. In addition, it should be noted that the period studied does not cover the period marked by a significant increase in overdose deaths in Québec, i.e., following 2016-2017. It should also be noted that persons with an SRD who died from an overdose may have gone undiagnosed by medical services during the past two decades.

4.3 Variation in mortality rates according to sociodemographic factors

With respect to differences between men and women, it appears that the initial gap between the sexes, indicating a higher mortality rate for men than for women, has narrowed in recent years. It is apparent that, from 2001 to 2012, in the general Québec population, men had a greater gain in life expectancy (3.2 years) than women (1.9 years) [37]. For the population with an SRD, note that the decrease in the mortality rate is more apparent among men with alcohol-related diagnoses (with or without other drugs), possibly suggesting better management of alcohol-related health complications and of treatment for this form of use disorder. In other words, although the mortality rate remains higher for men, it is possible that the narrowing of the gap between men's and women's usage patterns may help explain the absence of a difference in mortality rates in 2016-2017. It should be noted that the effects of consumption, particularly of alcohol, are more severe and occur more rapidly for women than for men [24].

In terms of trends by age group, the increase in mortality rates is most apparent from age 40 onward, which is also the time of onset of symptoms of chronic physical diseases. This trend is expected, as the likelihood of dying naturally increases with age, given the accumulation of physical health problems. In contrast, analysis of mortality ratios suggests the presence of "excess premature mortality." Indeed, persons with an SRD in the youngest age groups (e.g., 18-24 years and 25-39 years) have higher mortality risk ratios than those in older groups. Thus, the gap between persons with an SRD and those without an SRD narrows with age. This can be interpreted as an excess of preventable deaths among younger adults due to injury as well as to the early emergence of health problems that can lead to premature aging of the body.

The QICDSS data were also used to determine the mortality rate by health region. This may be useful and relevant to regional public health actors who wish to obtain a portrait specific to their jurisdiction. In order to better explain the absence of marked differences between health regions in the mortality rates associated with all SRDs, it would be necessary to examine geographic variations and the interactions among regions in terms of sociodemographic and socioeconomic characteristics, available health and social services, and region-specific public health policies, which is beyond the scope of this report.

4.4 Risk of death according to specific causes

Our data are in keeping with those reported by, among others, a Danish team, one of the few, to our knowledge, to have examined cause-specific mortality rate ratios based on a sample covering almost the entire general population. Indeed, similar trends emerge with respect to mortality rate ratios, and similar trends are observed between men and women, as concerns infectious diseases, neoplasms, diseases of the respiratory system, and diseases of the digestive system. However, according to data from Plana-Ripoll et al. (2019), injury and trauma appear to be considerably more significant causes of death in Denmark than in Québec. Nevertheless, the risk of dying from injury or trauma is five times higher in the Québec population with an SRD, indicating the significance of this cause of death. These types of deaths are generally preventable, especially fatal collisions caused by impaired driving [53–55] or other traumatic injuries caused, for example, by fatal falls [56].

The mortality rate ratio for suicide decreased non-significantly from 2001-2002 to 2016-2017. It should be noted that efforts to detect and treat mental disorders and to encourage seeking counselling have helped decrease suicide deaths in both the SRD and non-SRD populations, particularly among those 50 years old and younger, since the start of the 21st century [57]. However, compared with other causes of death (excluding SRDs per se), suicide remains the cause of death associated with the largest gap between the mortality rates of persons with and without an SRD.[6] The associations between suicide and SRDs have often been reported in previous studies [58]. In Canada, about one-quarter of suicide deaths were attributable to alcohol. As regards suicide deaths attributable to other drugs, the rate ranged from 3% to 10% for women and from 5% to 14% for men [59]. The data in this report are comparable to those reported in the Danish study by Plana-Ripoll et al. (2019), which reports that the mortality rate ratio for suicide is 9.8 for men with an SRD (versus men without an SRD) and 18.9 for women with an SRD (versus women without an SRD), highlighting a strong gender disparity. Also in Denmark, another team reported that, compared to the group with no history of an SRD or of psychiatric care, the mortality rate ratio for suicide was higher both for persons with an SRD–other drugs and no history of psychiatric care (mortality rate ratio=7.1) and for those with an SRD–other drugs as well as a history of psychiatric care (mortality rate ratio=13.5) [60]. The concomitance of SRDs accompanied by mental disorders [59, 61] and the causes of accidental death attributable to substance use [2] have been documented. Finally, because of the associations between suicide and SRDs, the Ministère de la Santé et des Services sociaux du Québec has instituted the use of the *Grille d'estimation de la dangerosité d'un passage à l'acte suicidaire*, a chart for estimating the danger of a person resorting to the act of suicide, developed by Suicide Action Montréal and the Centre Dollard-Cormier (now the Centre de réadaptation en dépendance de Montréal of the CIUSSS Centre-Sud-de-l'Île-de-Montréal). This empirically sound tool, which has been validated in Québec, is used to detect and prevent suicide deaths in addiction facilities [62, 63]. Thus, it is possible that such management has contributed to the downward trend in the mortality rate ratio for suicide.

[6] In fact, SRDs as the cause of death produce the highest mortality rate ratios. However, the very definition of the two populations being compared is based on the presence or absence of an SRD.

Finally, the *Plan d'action interministériel en santé mentale 2022-2026*, Québec's interdepartmental mental health action plan, rightly recommends and will fund the Centre d'expertise et de collaboration en troubles concomitants (a centre focused on concurrent disorders), to promote training and coordination among actors specialized in mental health and those specialized in addiction, in each region of Québec [64]. The implementation of this plan could thus help further reduce suicide deaths among persons presenting SRDs concurrently with mental disorders in the coming years.

4.5 Limitations

SRDs were only identified among health system users who had consulted physicians. Persons who exclusively consulted other health professionals (psychologists, nurses, etc.) cannot be identified as cases by the QICDSS. This may result in an underestimation of the number of persons with an SRD diagnosis. However, using a cumulative case definition increases the likelihood of capturing persons presenting with an SRD by using a larger time window for case identification. Some would argue that a person diagnosed with a disorder in 2001 might be free of the disorder in 2017, which would inflate the number of cases identified as current. However, it should be considered that SRDs are often chronic and that the negative consequences for health can persist over time, despite the disorder having been in complete remission for several years. In addition, international studies based on administrative databases suggest that the ICD codes used to identify persons with an SRD have very high specificity but moderate sensitivity. In other words, the rate of false positives, i.e., persons identified as having an SRD when they do not, would be very low, whereas there is a greater probability of having a non-negligible rate of false negatives, i.e., persons identified as not having an SRD when they do have one. However, considering the very large sample size of the general population without an SRD, of the order of several million individuals, the inclusion of such false negatives in this group is not likely to significantly impact the results.

Also related to case identification, in 2016, the RAMQ modernized its medical fee-for-service billing system. The new system resulted in the recording of fewer diagnostic codes in the medical fee-for-service database. Consequently, the number of SRD cases occurring since 2016 may be underestimated compared to previous years. Note that the data presented in this report does not go beyond 2016-2017. As a result, the period covered by the study does not allow for an evaluation of the impact on mortality rates of the overdose crisis, which worsened in Québec subsequent to 2016.

It is important to note that the specific cause of death of persons in the group with an SRD is not systematically or directly attributable to their substance use. The data generated reveal observable associations and risk probabilities, but do not allow for inference of causality between the use of a given substance and the cause of death.

Another important limitation is that only fee-for-service claims are recorded in the medical services database. However, certain regions, where a greater proportion of physicians are paid on a salary or flat fee basis, may be less well represented in the medical fee-for-service database. This results in an underestimation of the number of SRD cases or a delay in their identification. This is the case for the

Nord-du-Québec, Nunavik and Cree Territory of James Bay regions, whose results cannot be released. This is also the case for some local service networks in other regions, which can include isolated communities where physicians are not paid on a fee-for-service basis. It is therefore important to interpret results with caution when comparing territories or regions to each other.

In addition, the way an SRD diagnosis is made in practice may differ depending on the type of setting (e.g., emergency department, private practice, etc.) and on the physician's specialization (e.g., family physician, psychiatrist, gastroenterologist, etc.). Indeed, knowledge related specifically to PSs and SRDs is likely to vary across regions and medical specializations, considering the varying degree of exposure to these realities.

Finally, because of the exclusive use of ICD-9 in the medical fee-for-service database, it was not always possible to identify the specific PS, apart from alcohol, for many of the substance-induced disorders, such as withdrawal or secondary psychotic disorders. Thus, it was not always possible to know whether the person had developed a secondary psychosis due to cannabis or to a hallucinogen. As of April 1, 2019, the Régie de l'assurance maladie du Québec is also accepting ICD-10 diagnostic codes when physicians bill for services. The transition to ICD-10, or better, to ICD-11, will allow identification of the other PSs associated with substance-induced disorders, thus taking into consideration the fact that not all PASs have equivalent effects and consequences.

5 CONCLUSION

This report provides a portrait of the mortality observed among individuals diagnosed with an SRD from 2001-2002 to 2016-2017. It shows that mortality rates appear to decrease over this period for the population with an SRD as well as for the general population, and that the gap between these two populations is gradually narrowing due to a more rapid reduction of the mortality rate of the population with an SRD. This temporal trend seems to be mostly tied to a decline in cardiovascular disease and neoplasms. Nevertheless, the population with an SRD has a heightened risk of violent death, due to significantly elevated risks of dying by suicide or by accidental injury and trauma. Thus, efforts should continue to be made to prevent suicide and motor vehicle accidents and thus further reduce the observed gap between persons with an SRD and the general population without an SRD. Given the higher rates of death due to various physical diseases among persons with an SRD, it is desirable to pursue efforts to better manage and monitor the physical health of persons with an SRD. Finally, the data in this report suggest that targeted efforts in Québec to prevent deaths in the population with an SRD, such as the Éduc'alcool initiative aimed at reducing alcohol-related harm, appear to be successful and should be maintained.

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APPENDIX 1 ALL-CAUSE MORTALITY RATES (PER 1,000) AND 99% CONFIDENCE INTERVALS FOR MEN AND WOMEN AGED 12 YEARS AND OLDER BY SRD DIAGNOSTIC STATUS BY AGE, QUÉBEC, 2016-2017

		12-17 years	18-24 years	25-39 years	40-54 years	55-64 years	65-74 years	75-84 years	85 years and older
SRD – alcohol only	Men	-	1.6 [0.6 - 3.5] [a]	3.3 [2.4 - 4.3] [a]	10.1 [8.8 - 11.6] [b]	26.1 [23.9 - 28.5] [c]	**53.1 [49.3 - 57.1]** [d]	96.8 [89.0 – 105.0] [e]	204.9 [183.7 - 227.9] [f]
	Women	-	1.0 [0.2 - 2.9] [a]	2.5 [1.6 - 3.7] [a]	8.4 [6.7 - 10.3] [b]	20.9 [18.0 - 24.2] [c]	**40.5 [35.1 - 46.5]** [d]	82.7 [71.4 - 95.3] [e]	159.6 [135.5 - 186.7] [f]
	Total	-	1.4 [0.6 - 2.6] [a]	3.0 [2.3 - 3.7] [a]	9.4 [8.4 - 10.5] [b]	24.5 [22.7 - 26.4] [c]	49.5 [46.4 - 52.9] [d]	92.8 [86.4 - 99.6] [e]	187.1 [170.9 - 204.4] [f]
SRD - other drugs only	Men	-	2.4 [1.3 - 3.9] [a]	3.3 [2.6 - 4.0] [a]	7.8 [6.7 - 8.9] [b]	21.2 [18.8 - 23.9] [c]	44.7 [39.0 – 51.0] [d]	71.4 [59.5 - 85.0] [e]	162.2 [130.1 - 199.5] [f]
	Women	-	1.6 [0.6 - 3.4] [a]	2.6 [1.8 - 3.5] [a]	7.1 [5.8 - 8.7] [b]	18.0 [15.2 - 21.2] [c]	34.3 [28.7 - 40.5] [d]	76.4 [64.4 - 89.9] [e]	168.1 [144.0 – 195.0] [f]
	Total	1.2 [0.3 - 3.3] [a]	2.1 [1.3 - 3.2] [a]	3.0 [2.5 - 3.6] [a]	7.6 [6.7 - 8.5] [b]	20.0 [18.1 - 22.0] [c]	40.1 [36.0 - 44.5] [d]	74.0 [65.4 - 83.4] [e]	166.0 [146.5 - 187.4] [f]
SRD – alcohol + SRD – other drugs	Men	-	5.1 [2.3 - 9.5] [a]	4.7 [3.5 - 6.3] [a]	11.6 [9.7 - 13.7] [b]	29.9 [26.0 - 34.1] [c]	65.0 [56.0 - 75.1] [d]	119.1 [96.6 - 145.2] [e]	229.7 [170.6 - 302.1] [f]
	Women	-	2.8 [0.6 - 8.1] [a]	5.1 [3.4 - 7.4] [a]	10.9 [8.5 - 13.7] [b]	23.8 [19.4 - 28.9] [c]	46.7 [37.6 - 57.2] [d]	98.5 [78.1 - 122.6] [e]	201.3 [161.5 - 247.7] [f]
	Total	-	4.2 [2.2 - 7.3] [a]	4.9 [3.8 - 6.1] [a]	11.3 [9.8 – 13.0] [b]	27.9 [24.9 - 31.1] [c]	57.6 [51.0 - 64.8] [d]	108.7 [93.2 - 125.9] [e]	209.8 [176.2 - 247.7] [f]
All SRDs	Men	1.1 [0.2 - 3.2] [a]	1.9 [1.2 - 2.8] [a]	2.8 [2.4 - 3.4] [a]	7.8 [7.0 - 8.7] [b]	**22.2 [20.6 - 23.8]** [c]	**51.2 [48.3 - 54.3]** [d]	**105.4 [99.4 - 111.6]** [e]	**227.1 [212.9 - 242.1]** [f]
	Women	-	1.0 [0.5 - 1.9] [a]	2.1 [1.6 - 2.7] [a]	6.1 [5.3 - 7.1] [b]	**17.3 [15.6 - 19.1]** [c]	**39.8 [36.6 - 43.3]** [d]	**90.9 [84.7 - 97.5]** [e]	**197.0 [186.2 - 208.2]** [f]
	Total	0.6 [0.1 - 2.1] [a]	1.5 [1.0 - 2.9] [a,b]	2.5 [2.2 - 7.8] [b,c]	7.2 [6.6 - 21.6] [c,d]	20.4 [19.2 - 49.0] [d,e]	46.7 [44.5 - 103.5] [e,f]	99.0 [94.7 - 217.6] [f,g]	208.7 [200.0 - 217.6] [g]
General population without an SRD	Men	0.2 [0.1 - 0.3] [a]	**0.4 [0.3 - 0.5]** [a,b]	**0.4 [0.4 - 0.5]** [b]	1.5 [1.3 - 1.6] [c]	**4.8 [4.6 - 5.1]** [d]	**13.6 [13.1 - 14.1]** [e]	**39.9 [38.7 - 41.1]** [f]	**125.2 [121.5 - 129.0]** [g]
	Women	0.1 [0.0 - 0.2] [a]	**0.1 [0.1 - 0.2]** [a]	**0.3 [0.2 - 0.3]** [a]	1.2 [1.1 - 1.3] [b]	**3.9 [3.7 - 4.1]** [c]	**9.7 [9.4 - 10.1]** [d]	**28.8 [27.9 - 29.7]** [e]	**106.9 [104.6 - 109.4]** [f]
	Total	0.1 [0.1 - 0.2] [a]	0.3 [0.2 - 0.3] [a,b]	0.3 [0.3 - 0.4] [b]	1.3 [1.2 - 1.4] [c]	4.3 [4.2 - 4.5] [d]	11.6 [11.3 - 11.9] [e]	33.6 [32.9 - 34.3] [f]	112.9 [110.9 - 114.9] [g]

Note: For comparisons between age groups, columns do not share the same letter when their values are statistically significantly different from each other. For comparisons between men and women within the same diagnostic category, values are indicated in bold when the difference is statistically significant. Two values are considered statistically significantly different when the confidence intervals do not overlap.

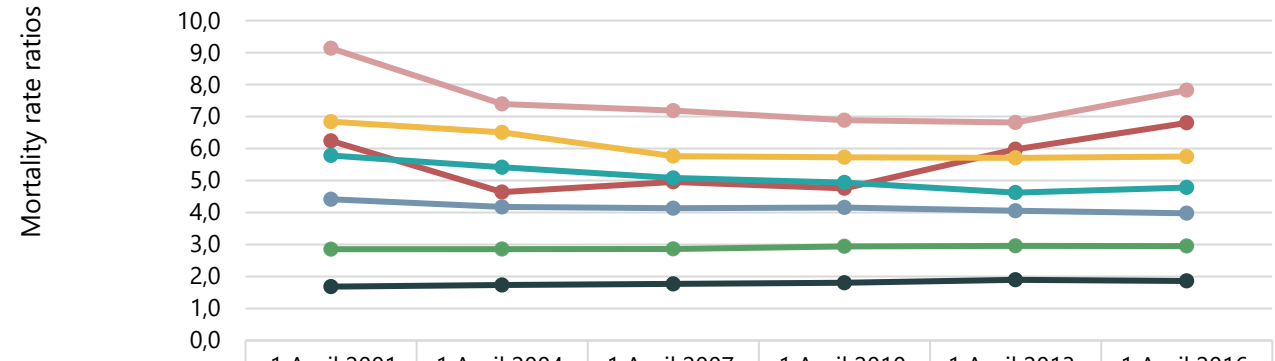
When rates are examined by specific gender, a significant difference is observed when an age group is compared to the previous group for the age groups 40-54, 55-64, 65-74, 75-84, and 85 and older. From age 55 onward, a statistically significant difference is also observed between men and women having received at least one diagnosis of an SRD, with higher mortality rates for men than for women.

Among those diagnosed with an SRD-alcohol only, the mortality rate is similar for the 18-24 years and the 25-39 years age groups, for both men and women. In contrast, we see a statistically significant difference between the 40-54, 55-64, 65-74, 75-84 and 85 and older age groups. Thus, a cut-off point is observed following the age of 40. The finding is the same for persons diagnosed with an SRD-other drugs only, as well as for persons diagnosed with both an SRD-alcohol and an SRD-other drugs.

Among those diagnosed with an SRD-alcohol only, men are comparable to women, except in the 65-74 age group, where the mortality rate is higher for men than for women. No significant differences between men and women within the same age group were detected for those diagnosed with an SRD-other drugs only or with both an SRD-alcohol and an SRD-other drugs.

In the general population without an SRD, men have a higher mortality rate than women in the 18-39 age group and from 55 years onward. There were no significant differences between men and women in the under-25 or 40-54 age groups.

APPENDIX 2 ALL-CAUSE MORTALITY RATE RATIOS (CUMULATIVE CASES OF SRD: NON-SRD) BY THREE-YEAR PERIODS BY AGE GROUP, QUÉBEC



	1 April 2001 to 31 March 2004	1 April 2004 to 31 March 2007	1 April 2007 to 31 March 2010	1 April 2010 to 31 March 2013	1 April 2013 to 31 March 2016	1 April 2016 to 31 March 2019
18-24 years	6,2	4,6	5,0	4,8	6,0	6,8
25-39 years	9,1	7,4	7,2	6,9	6,8	7,8
40-54 years	6,8	6,5	5,8	5,7	5,7	5,7
55-64 years	5,8	5,4	5,1	4,9	4,6	4,8
65-74 years	4,4	4,2	4,1	4,2	4,1	4,0
75-84 years	2,9	2,9	2,9	2,9	3,0	2,9
85 years and older	1,7	1,7	1,8	1,8	1,9	1,9

Note: Fiscal years were aggregated over a three-year period.

Data for 12-17 year olds are not presented because of the instability engendered by rounding very low mortality rates and to avoid excessive interpretation bias.

To take into account the relatively low annual mortality rates among those under 24 years of age, while still examining temporal trends in mortality rate ratios by age group, rates were calculated over a three-year period, as shown in the figure and the table above. The instability caused by rounding the very low mortality rates for adolescents led to their being excluded from the graph, in order to avoid excessive interpretation bias.

Among the six time periods studied, 25-39 year olds had the highest mortality rate ratios compared to other age groups. From age 25 onward, mortality rate ratios decreased as age increased, for all time periods. The risk of mortality for 18-24 year olds appears to range from 4.6 [3.8 – 5.7] to 6.8 [5.5 – 8.4] times higher for persons with an SRD than for those without an SRD, but the mortality rate ratio in this age group does not differ significantly over time when the time periods are compared. In contrast, a significant decrease is observed among 25-39 year olds when the period April 1, 2004 to March 31, 2007 (7.4 [6.7 – 8.2]) is compared to the period April 1, 2001 to March 31, 2004 (9.1 [8.3 – 10.1]); subsequent periods remained at rates comparable to those observed in the 2004 to 2007 period.

Among 40-54 year olds, a significant reduction in the mortality rate is observed between 2004-2007 (with a relative risk of 6.5 [6.2 – 6.9]) and 2007-2010 (with a relative risk of 5.8 [5.5 – 6.1]). For those aged 55-64, although the mortality rate ratio for a given period does not differ from the one immediately preceding or succeeding it, a gradual decrease occurs, with the risk going from 5.8 [5.5 – 6.1] in 2001-2004 to 4.8 [4.6 – 5.0] in 2016-2019. The same is observed for those aged 65-74, with a gradual reduction from 4.4 [4.2 – 4.6] in 2001-2004 to 4.0 [3.9 – 4.1] in 2016-2019. No significant difference is observed between the different periods for those aged 75-84 or 85 years and older.

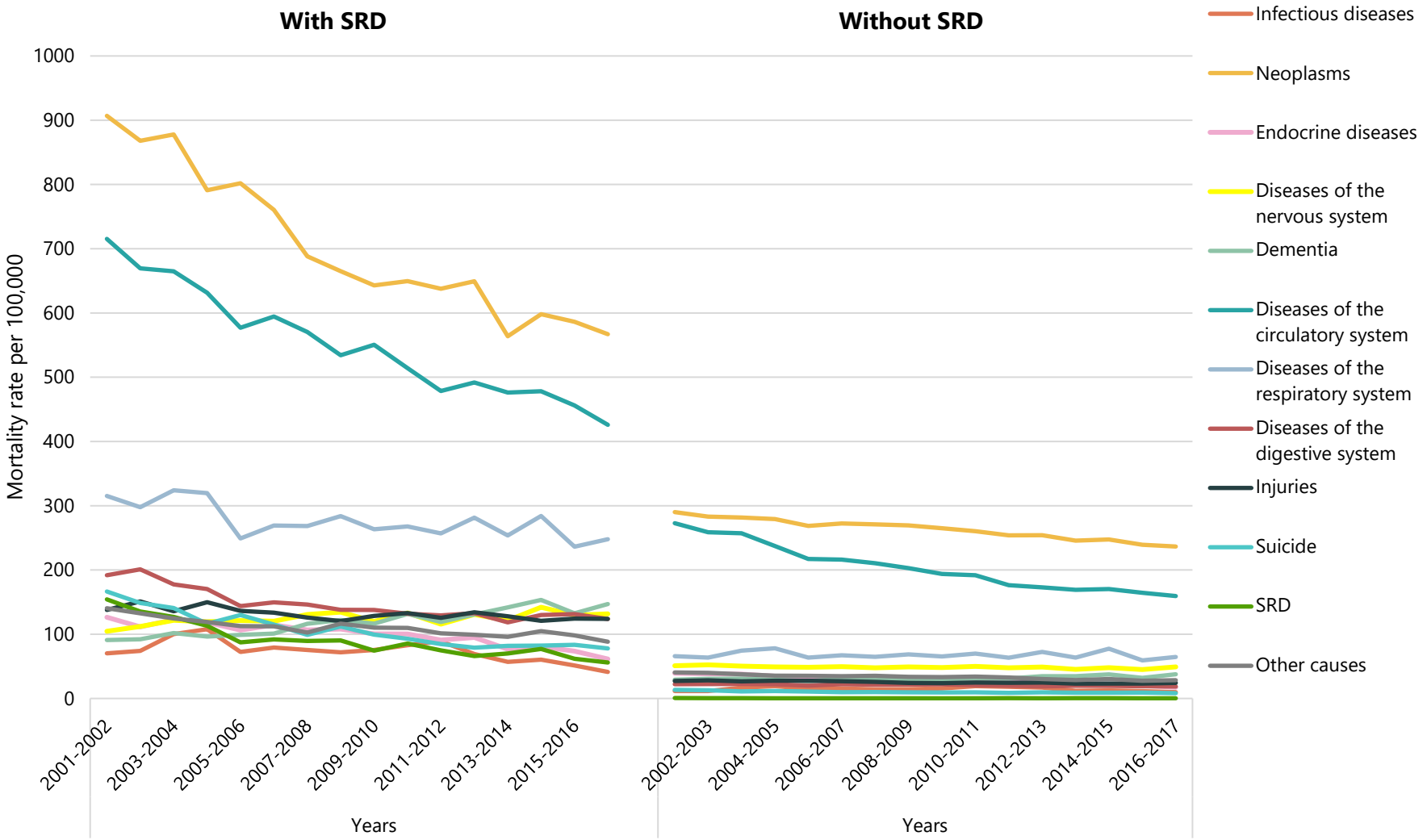
APPENDIX 3 ALL-CAUSE MORTALITY RATE (PER 1,000) AND 99% CONFIDENCE INTERVALS FOR THE POPULATION AGED 12 YEARS AND OVER BY SRD DIAGNOSIS BY HEALTH REGION, QUÉBEC, 2016-2017

RSS	SRD – alcohol only	SRD – other drugs only	SRD – alcohol and SRD – other drugs	All SRDs	No SRD
01 – Bas-Saint-Laurent	18.2 [14.8 – 30.6]	17.8 [12.8 – 24.8]	21.8 [14.6 – 63.3]	21.4 [18.8 – 24.7]	6.8 [6.4 – 7.3]
02 – Saguenay–Lac-Saint-Jean	21.1 [17.9 – 29.3]	19.1 [14.8 – 24.9]	24.6 [18.4 – 40.1]	21.5 [19.2 – 24.4]	**6.3 [5.9 – 6.7]***
03 – Capitale-Nationale	18.7 [16.6 – 24.5]	15.0 [12.6 – 17.9]	21.1 [17.5 – 29.7]	21.1 [19.6 – 22.7]	**6.5 [6.2 – 6.7]***
04 – Mauricie et Centre-du-Québec	19.0 [16.5 – 23.7]	16.6 [13.3 – 20.5]	22.1 [17.4 – 32.4]	21.6 [19.8 – 23.6]	**7.1 [6.8 – 7.4]***
05 – Estrie	19.6 [17.0 – 24.3]	14.7 [11.5 – 19.1]	20.9 [16.1 – 34.9]	21.9 [20.0 – 24.0]	**6.1 [5.8 – 6.4]***
06 – Montréal	22.0 [20.4 – 24.2]	17.3 [15.7 – 19.1]	25.9 [20.3 – 33.2]	21.9 [20.8 – 23.0]	**7.3 [7.1 – 7.5]***
08 – Abitibi-Témiscamingue	18.1 [14.3 – 28.3]	19.6 [13.4 – 27.8]	23.7 [15.1 – 50.8]	20.2 [17.2 – 23.8]	**7.4 [6.8 – 8.0]***
09 – Côte-Nord	19.7 [14.9 – 37.9]	16.0 [9.8 – 26.2]	25.5 [15.4 – 63.9]	19.1 [15.6 – 24.1]	6.9 [6.2 – 7.7]
11 – Gaspésie–Îles-de-la-Madeleine	18.1 [13.6 – 50.7]	24.3 [17.1 – 33.9]	26.3 [16.2 – 112.0]	23.0 [19.4 – 27.7]	6.8 [6.2 – 7.5]
12 – Chaudière-Appalaches	20.2 [17.0 – 26.6]	19.7 [15.9 – 24.1]	24.8 [18.9 – 39.4]	22.6 [20.5 – 25.0]	**6.2 [5.9 – 6.5]***
13 – Laval	21.4 [17.8 – 29.2]	20.3 [16.0 – 26.2]	28.4 [20.7 – 83.0]	21.5 [19.3 – 24.4]	6.8 [6.5 – 7.2]
14 – Lanaudière	19.5 [16.7 – 24.8]	17.7 [13.9 – 22.2]	21.8 [15.8 – 39.0]	21.5 [19.5 – 23.8]	**6.3 [6.0 – 6.6]***
15 – Laurentides	20.9 [18.3 – 26.8]	15.0 [12.1 – 18.7]	25.3 [19.7 – 45.6]	20.4 [18.7 – 22.4]	**6.4 [6.2 – 6.7]***
16 – Montérégie	19.8 [18.0 – 22.8]	15.5 [13.5 – 17.8]	20.0 [16.5 – 29.4]	20.8 [19.6 – 22.2]	6.7 [6.5 – 6.9]
All of Québec (province)	20.5 [19.7 - 21.3]	17.2 [16.3 – 18.0]	23.7 [22.3 – 25.5]	21.6 [21.1 – 22.1]	6.8 [6.7 – 6.8]

Note: Regional rates in bold followed by an asterisk (*) differ significantly from the rate for the province as a whole.

Results for the Outaouais (07), Nord-du-Québec (10), Nunavik (17) and Cree Territory of James Bay (18) regions are not presented because their data are incomplete, but they contribute to the measure for Québec as a whole.

APPENDIX 4 ANNUAL MORTALITY RATES (PER 100,000) BY SPECIFIC CAUSES OF DEATH FOR THE POPULATION AGED 12 YEARS AND OVER WITH AND WITHOUT DIAGNOSIS OF AN SRD, QUÉBEC, 2001-2002 TO 2016-2017



APPENDIX 5 ANNUAL MORTALITY RATE RATIOS (CUMULATIVE CASES OF SRD: NON-SRD) BY LEADING CAUSE OF DEATH AND 99% CONFIDENCE INTERVALS FOR THE POPULATION AGED 12 YEARS AND OVER, QUÉBEC, 2001-2002 TO 2016-2017

	Infectious diseases	Neoplasms	Endocrine diseases	Diseases of the nervous system	Dementia	Diseases of the circulatory system	Diseases of the respiratory system	Diseases of the digestive system	Injuries	Suicide	SRD as cause of death	Other causes
2001-2002	6.1 [4.8 - 7.7]	3.1 [2.9 - 3.3]	3.2 [2.7 - 3.8]	2.0 [1.7 - 2.4]	3.1 [2.6 - 3.8]	2.6 [2.4 - 2.8]	4.8 [4.3 - 5.3]	8.6 [7.4 - 10.0]	5.0 [4.3 - 5.9]	12.4 [10.5 - 14.6]	236.3 [149.2 - 374.4]	3.5 [3.0 - 4.1]
2002-2003	6.3 [5.1 - 7.9]	3.1 [2.9 - 3.3]	2.9 [2.4 - 3.4]	2.1 [1.8 - 2.5]	3.0 [2.5 - 3.6]	2.6 [2.4 - 2.8]	4.7 [4.2 - 5.2]	9.0 [7.8 - 10.3]	5.4 [4.6 - 6.3]	11.6 [9.8 - 13.7]	220.2 [137.4 - 353.0]	3.3 [2.8 - 3.9]
2003-2004	5.9 [5.0 - 7.1]	3.1 [2.9 - 3.3]	3.2 [2.8 - 3.8]	2.4 [2.1 - 2.8]	3.3 [2.8 - 3.9]	2.6 [2.4 - 2.8]	4.3 [3.9 - 4.8]	7.9 [6.8 - 9.0]	5.1 [4.4 - 5.9]	12.8 [10.8 - 15.1]	256.5 [154.2 - 426.7]	3.3 [2.8 - 3.9]
2004-2005	5.6 [4.8 - 6.6]	2.8 [2.7 - 3.0]	3.4 [2.9 - 4.0]	2.4 [2.1 - 2.8]	3.3 [2.8 - 3.9]	2.7 [2.5 - 2.8]	4.1 [3.7 - 4.5]	7.7 [6.7 - 8.9]	5.4 [4.7 - 6.2]	10.1 [8.5 - 12.0]	304.2 [170.1 - 544.1]	3.4 [2.9 - 3.9]
2005-2006	4.8 [4.0 - 5.8]	3.0 [2.8 - 3.2]	3.3 [2.8 - 3.8]	2.5 [2.2 - 2.9]	3.7 [3.1 - 4.3]	2.7 [2.5 - 2.8]	3.9 [3.5 - 4.3]	7.2 [6.2 - 8.3]	4.9 [4.3 - 5.7]	12.0 [10.1 - 14.3]	242.4 [135.1 - 435.0]	3.2 [2.8 - 3.7]
2006-2007	5.1 [4.3 - 6.1]	2.8 [2.6 - 2.9]	3.4 [3.0 - 3.9]	2.4 [2.1 - 2.8]	3.3 [2.9 - 3.9]	2.8 [2.6 - 2.9]	4.0 [3.6 - 4.4]	6.7 [5.9 - 7.7]	5.0 [4.3 - 5.7]	11.8 [9.9 - 14.0]	239.7 [137.3 - 418.7]	3.2 [2.8 - 3.7]
2007-2008	5.3 [4.4 - 6.3]	2.5 [2.4 - 2.7]	3.6 [3.1 - 4.2]	2.7 [2.4 - 3.1]	4.1 [3.5 - 4.7]	2.7 [2.5 - 2.9]	4.1 [3.8 - 4.5]	6.8 [6.0 - 7.8]	4.9 [4.2 - 5.6]	9.9 [8.4 - 11.8]	255.2 [142.8 - 456.0]	2.9 [2.5 - 3.4]
2008-2009	5.0 [4.2 - 5.9]	2.5 [2.3 - 2.6]	3.7 [3.2 - 4.3]	2.7 [2.4 - 3.1]	4.1 [3.6 - 4.7]	2.6 [2.5 - 2.8]	4.1 [3.8 - 4.5]	6.4 [5.6 - 7.3]	5.0 [4.3 - 5.7]	11.6 [9.8 - 13.7]	223.0 [130.8 - 380.3]	3.5 [3.0 - 4.0]
2009-2010	4.8 [4.1 - 5.7]	2.4 [2.3 - 2.6]	3.6 [3.1 - 4.2]	2.5 [2.2 - 2.8]	3.9 [3.4 - 4.4]	2.8 [2.7 - 3.0]	4.0 [3.7 - 4.4]	6.3 [5.5 - 7.1]	5.4 [4.7 - 6.1]	10.5 [8.9 - 12.4]	292.8 [151.3 - 567.0]	3.3 [2.9 - 3.8]
2010-2011	4.3 [3.7 - 5.0]	2.5 [2.4 - 2.6]	3.6 [3.1 - 4.1]	2.7 [2.4 - 3.0]	4.2 [3.7 - 4.7]	2.7 [2.5 - 2.8]	3.8 [3.5 - 4.2]	6.4 [5.6 - 7.3]	5.3 [4.7 - 6.1]	9.8 [8.2 - 11.6]	289.2 [157.8 - 530.0]	3.2 [2.8 - 3.7]
2011-2012	4.9 [4.2 - 5.6]	2.5 [2.4 - 2.6]	3.4 [3.0 - 3.9]	2.4 [2.1 - 2.7]	3.8 [3.4 - 4.3]	2.7 [2.6 - 2.9]	4.1 [3.7 - 4.4]	6.5 [5.7 - 7.4]	5.1 [4.5 - 5.8]	9.7 [8.2 - 11.5]	169.9 [103.3 - 279.6]	3.1 [2.7 - 3.5]
2012-2013	4.1 [3.5 - 4.8]	2.6 [2.4 - 2.7]	3.7 [3.2 - 4.2]	2.7 [2.4 - 3.0]	3.8 [3.4 - 4.2]	2.8 [2.7 - 3.0]	3.9 [3.6 - 4.2]	7.1 [6.2 - 8.0]	5.4 [4.8 - 6.1]	8.3 [7.0 - 9.9]	233.7 [127.2 - 429.3]	3.3 [2.9 - 3.7]
2013-2014	4.7 [4.0 - 5.6]	2.3 [2.2 - 2.4]	3.3 [2.9 - 3.8]	2.7 [2.4 - 3.0]	4.1 [3.7 - 4.6]	2.8 [2.7 - 3.0]	4.0 [3.7 - 4.3]	6.0 [5.3 - 6.8]	5.5 [4.9 - 6.3]	9.1 [7.6 - 10.8]	144.1 [90.2 - 230.3]	3.4 [2.9 - 3.8]
2014-2015	4.8 [4.1 - 5.6]	2.4 [2.3 - 2.5]	3.6 [3.2 - 4.2]	3.0 [2.7 - 3.3]	4.1 [3.7 - 4.5]	2.8 [2.7 - 3.0]	3.7 [3.4 - 3.9]	6.7 [5.9 - 7.5]	5.2 [4.6 - 5.9]	9.2 [7.8 - 10.9]	132.4 [86.8 - 202.0]	3.5 [3.1 - 3.9]
2015-2016	4.5 [3.8 - 5.4]	2.5 [2.3 - 2.6]	3.6 [3.1 - 4.2]	2.9 [2.6 - 3.2]	4.1 [3.7 - 4.6]	2.8 [2.6 - 2.9]	4.0 [3.7 - 4.3]	6.9 [6.1 - 7.7]	5.3 [4.7 - 6.0]	9.1 [7.7 - 10.8]	156.0 [94.8 - 256.9]	3.6 [3.1 - 4.0]
2016-2017	4.2 [3.5 - 5.0]	2.4 [2.3 - 2.5]	3.5 [3.0 - 4.1]	2.7 [2.4 - 3.0]	3.9 [3.5 - 4.3]	2.7 [2.5 - 2.8]	3.8 [3.6 - 4.1]	6.6 [5.9 - 7.4]	5.1 [4.6 - 5.7]	9.4 [7.9 - 11.1]	171.0 [99.0 - 295.3]	3.1 [2.8 - 3.5]

Substance-Related Disorders: Mortality Surveillance

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The reviewers were asked to comment on the pre-final version of this document and as a result did not review or endorse the final content.

The authors and reviewers duly completed their declarations of interest. Declared potential conflict of interest risks, as well as comments or suggestions made concerning this report, were reported during the publication process and forwarded to the project lead for the report. After analysis, no bias was detected.

ACKNOWLEDGEMENTS

The INSPQ wishes to thank the Réseau québécois sur le suicide, les troubles de l'humeur et les troubles associés (RQSHA) for its financial support for the development of projects involving mining of the data in administrative databases.

The translation of this publication was made possible with funding from the Public Health Agency of Canada

This document is available in its entirety in electronic format (PDF) on the website of the Institut national de santé publique du Québec at: http://www.inspq.qc.ca

The French version is entitled Les troubles liés aux substances psychoactives : surveillance de la mortalité and is also available on the web site of the Institut national de santé publique du Québec at: http://www.inspq.qc.ca/publications/3240

Legal Deposit – 1st quarter 2023
Bibliothèque et Archives nationales du Québec
ISBN: 978-2-550-92983-3 (French PDF)
ISBN: 978-2-550-94330-3 (PDF)

Publication No.: 3311

Institut national de santé publique Québec