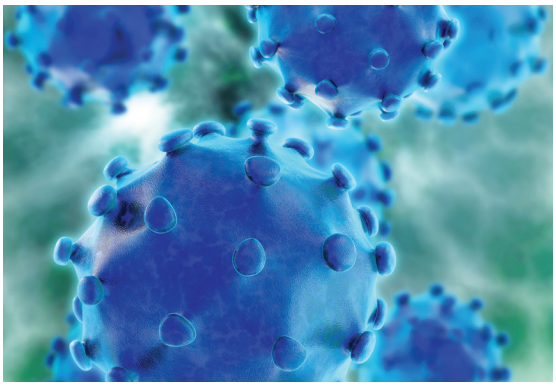
HEPATITIS B IN CANADA: 2005–2011 SURVEILLANCE REPORT



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Également disponible en français sous le titre :
L'hépatite B au Canada : Rapport de surveillance de 2005–2011

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Publication date: December 2014

Suggested citation: Public Health Agency of Canada. Hepatitis B in Canada: 2005–2011 Surveillance Report. Centre for Communicable Diseases and Infection Control, Infectious Disease Prevention and Control Branch, Public Health Agency of Canada; 2014.

Cat.: HP40-129/2014E-PDF
ISBN: 978-1-100-25486-9
Pub.: 140395

HEPATITIS B IN CANADA: 2005–2011 SURVEILLANCE REPORT

NOTE TO THE READERS OF HEPATITIS B IN CANADA: 2005–2011 SURVEILLANCE REPORT

The Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada (the Agency), is pleased to present *Hepatitis B in Canada: 2005–2011 Surveillance Report*. This report is intended to provide information on trends in cases and rates of hepatitis B virus (HBV) infection reported between 2005 and 2011 to those who are concerned with the public health implications of this disease (program managers, policy makers, researchers, etc.).

HBV infection has been notifiable in Canada since 1969. The primary data sources for this report are the Canadian Notifiable Disease Surveillance System (CNDSS) and the Enhanced Hepatitis Strain Surveillance System (EHSSS). Both surveillance systems are based on diagnosed cases of HBV reported by provincial and territorial health authorities. The CNDSS consists of HBV cases diagnosed across Canada and collects basic demographic data on each case; by comparison, the EHSSS (active between 1998 and 2012), collected more detailed epidemiologic data (including risk behaviours and exposures associated with HBV) from selected sentinel sites. More detailed information on these surveillance systems is available in Appendix B.

In this report, distinct analyses of the rates of reported cases of acute HBV and of chronic HBV will be presented. Due to changes in reporting practices over the time frame included in this report, as well as variability in the capacity to differentiate between acute and chronic HBV across provinces and territories, there are notable limitations to the analyses presented. Despite said limitations, discrete presentation of acute HBV data provides insight into potential current trends in transmission, while chronic HBV data offers a more accurate representation of the potential burden of disease in Canada. Moreover, hepatitis B data disaggregated by infection status allows for international comparison as several countries use similar outcome measures.

This report consists of five sections:

1. Section One provides a brief overview of global HBV infection estimates as well as HBV prevention, transmission, clinical manifestations and treatment.
2. Section Two provides an overview of hepatitis B reporting in Canada, with emphasis on changes in reporting practices across jurisdictions over the 2005–2011 time frame.
3. Section Three presents rates and trends of acute HBV infection based on the CNDSS 2005–2011 surveillance data, summarized by age group, sex and jurisdiction. Demographic factors and other characteristics associated with cases of newly acquired HBV infection reported through the EHSSS in 2011 are also described.

4. Section Four presents rates and trends of chronic HBV infection based on the CNDSS 2009–2011 surveillance data, summarized by age group, sex and jurisdiction.
5. Section Five discusses the limitations and public health implications of the findings of this report, including an overview of rates of acute and chronic HBV in Canada in relation to those in Australia, England and the United States.

HBV data were not available for Nunavut from 2007 onwards. In order to interpret national trends over time, HBV cases from Nunavut were not included in national counts from 2005–2011 and the population of Nunavut was removed from the denominator when calculating national HBV rates. In Sections Three and Four, only those provinces and territories that consistently provided data on acute or chronic HBV infection were included in annual rates, with denominators adjusted accordingly (see Box 1 and 2 for further detail). At the request of Prince Edward Island, its data were suppressed in any table presenting provincial and territorial specific data where counts were less than five, as per provincial Chief Public Health Office reporting guidelines.

Technical notes and explanatory details specific to provincial/territorial and international surveillance are presented at the end of this report.

ACKNOWLEDGEMENTS

The publication of this report would not have been possible without the collaboration of epidemiological units in all provinces and territories as well as agencies and researchers comprising the EHSSS in Canada, whose continuous contribution to the national HBV surveillance is appreciated and gratefully acknowledged.

This report was prepared by the Centre for Communicable Diseases and Infection Control, Infectious Disease Prevention and Control Branch, Public Health Agency of Canada.

EXECUTIVE SUMMARY

This report offers an analysis of hepatitis B virus (HBV) 2005 to 2011 surveillance data in Canada. Hepatitis B cases reported through the Canadian Notifiable Disease Surveillance System (CNDSS) are separated, where possible, into acute or chronic cases. Information about acute HBV offers valuable insight into current transmission trends and patterns while cases of chronic HBV infection represent the potential burden of disease in Canada. Trends by age group, sex and over time are presented separately for acute and chronic HBV. Additional demographic factors and select risk exposures and behaviours for acute HBV cases are also highlighted based on data collected in 2011 by the Enhanced Hepatitis Strain Surveillance System (EHSSS).

Analysis of acute HBV data reported through the CNDSS demonstrates that acute HBV rates decreased by 35.9% between 2005 and 2011, from 1.0 to 0.6 per 100,000. Over this seven year time frame, acute HBV rates decreased among males of all age groups, while among females acute HBV rate increases and decreases were observed in different age groups. In 2011, rates of reported cases of acute HBV ranged from 0.0 to 1.2 per 100,000 across all jurisdictions. Rates of reported cases above the national rate of 0.6 per 100,000 were observed in Saskatchewan, New Brunswick and Ontario.

The EHSSS data from 2011 suggest that rates of acute HBV are higher among Aboriginal persons as well as persons born outside of Canada. With respect to behaviours or exposures associated with risk of infection, heterosexual activity, surgery, dental surgery, sexual contact with a HBV/HCV positive person and body piercing were most commonly identified among individuals newly diagnosed with acute HBV. Due to the EHSSS study design, individuals could report more than one risk behaviour or exposure. Thus findings may simply reflect the most common activities, and not necessarily the mode of HBV transmission for EHSSS cases.

For chronic hepatitis B, shorter term trends between 2009 and 2011 are presented, as reporting of chronic HBV infection was variable across provinces and territories in previous years, making interpretation of earlier trends difficult. Between 2009 and 2011, the rate of reported cases of chronic HBV decreased by 19.1%, from 14.1 to 11.4 per 100,000. Overall in 2011, the rates of chronic HBV were higher in males than in females, although in some age groups (15 to 19 and 25 to 29), rates were higher in females. For both males and females, the highest rates of reported chronic HBV were among those aged 30 to 39. In 2011, the highest rate of reported cases of chronic HBV was observed in British Columbia (22.4 per 100,000), while rates above the national average of 11.4 per 100,000 were also observed in Alberta and Yukon (15.0 and 14.1 per 100,000, respectively).

National HBV rates are heavily influenced by variations in temporal and geographical reporting practices and should therefore be interpreted with caution. Provinces and territories differ in their capacity to distinguish HBV cases by infection status; as a result, HBV reporting is not uniform across the country and many hepatitis B cases are reported as unspecified. Moreover, the rates presented in this report likely underestimate the true burden of infection in Canada as HBV infection is asymptomatic in most individuals, who therefore may not present to a health care practitioner for testing. There are various other potential factors that may explain

the trends described in this report. For example, Canada's universal immunization program targeted at newborns and/or school-age children and, in some jurisdictions, high-risk populations, has likely contributed to declining rates of acute HBV.

Comparisons of acute HBV rates in Canada to those in the United States, Australia and England demonstrate that the observed trends are not unique to Canada. In all four countries, acute HBV infection rates decreased or remained stable between 2005 and 2011. With respect to chronic HBV infection, the rates drawn from the CNDSS data were substantially lower as compared to the United States and Australia.

Despite the limitations of the data collected by the CNDSS and the EHSSS, the observed HBV rates and trends from 2005–2011 substantiate the need for continued HBV prevention and management efforts in Canada. As reporting of acute and chronic HBV becomes more harmonized across the country, over time, available data will be more representative of the true burden of hepatitis B infection. Continued surveillance of HBV infection, coupled with research into the reasons for the observed trends is requisite in order to inform future public health efforts.

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1.0 BACKGROUND

Hepatitis B is a condition that results from infection with the hepatitis B virus (HBV). HBV is a DNA virus of the *Hepadnaviridae* family that mainly infects liver cells but has also been found in a variety of tissues and organs, including kidneys, pancreas and mononuclear cells (1,2). Initial HBV infection may be asymptomatic or lead to acute illness; chronic HBV infection may also result, with age at exposure a significant determinant of the likelihood of developing chronic infection. Symptomatic disease resulting from acute HBV infection occurs in less than 10% of children and 30–50% of adults; when present, symptoms may include jaundice, fatigue, loss of appetite, nausea, and joint and/or abdominal pain. Approximately 10% of infants infected at birth, and over 90% of adults will recover completely from HBV; the rest develop chronic HBV infection, which, over time, may result in liver cirrhosis, hepatocellular carcinoma, decompensated liver disease and premature death (3).

Globally, it has been estimated that two billion people have been infected with HBV and that approximately 360 million individuals are chronically infected carriers at risk of severe illness and death (4). HBV carrier rates vary from less than 1% to 10% within individual countries (5). In Canada, between 1998 and 2008, liver cancer accounted for the greatest increase in prevalence among the most common cancers observed over this time period. This is possibly explained by a rise in liver cancer incidence due to increased immigration to Canada from countries where hepatitis B and C infections are endemic (6).

Transmission of HBV occurs through contact with infected blood and body fluids, most commonly through sexual or close personal contact with an infected person, use of contaminated drug injection equipment, and vertical (mother-to-child) transmission during pregnancy or birth. The patterns of HBV transmission are somewhat different in developing and developed countries, with vertical transmission and exposure through close family contacts being of significant importance in developing countries, while sexual transmission and injection drug use are the predominant patterns in developed countries such as Canada (7,8). HBV can survive outside the body for up to seven days and has been implicated in both nosocomial transmission (via contaminated medical or dental equipment) and occupational exposure among health care workers (5).

It is not possible to differentiate HBV infection from hepatitis caused by other viral agents based on clinical manifestations alone and, as a result, collection of blood samples for laboratory confirmation is required. Infection markers present in the blood can also be used to help distinguish between acute and chronic HBV infection. Acute HBV infection is characterized by the presence of the hepatitis B surface antigen (HBsAg) and immunoglobulin M antibodies to the hepatitis B core antigen (anti-HBc IgM). Chronic infection is characterized by the presence of antibodies to the hepatitis B core antigen (anti-HBc) and HBsAg for over six months. The presence of HBeAg, an antigen characteristic of the initial phase of acute infection and which may be present during chronic infection, indicates that the infected individual is highly contagious (4,9). In contrast, anti-HBe appears during recovery from acute infection and its presence during chronic infection generally indicates reduced viral replication and low infectivity (9).

A vaccine against hepatitis B has been available globally since 1982 (5). In Canada, all provinces and territories have had a universal newborn and/or childhood HBV vaccination program since the 1990s (10). Programs vary by jurisdiction with respect to the recommended dosages and schedules as well as the age groups targeted; all provinces and territories offer HBV immunization to infants and/or school-aged children (9). In addition, some jurisdictions offer HBV vaccine to individuals who are at increased risk of infection (e.g. people who inject drugs or who engage in high-risk sexual practices) (11). The National Advisory Committee on Immunization recommends routine testing for HBsAg during pregnancy or at the time of delivery; infants born to infected mothers are put on an immediate immunization schedule in an effort to reduce risk of HBV infection (12).

Although hepatitis B is a vaccine-preventable disease, immunization coverage varies across population groups. In a 2004 survey that provided estimates of immunization coverage among 2-, 7- and 17-year old Canadians, 14%, 4% and 60% of participating parents reported immunization of their children (with three doses or greater) against hepatitis B, respectively (13). In a similar survey conducted in 2006 among non-institutionalized Canadians 18 years and older, it was found that 30% of those who participated reported having been vaccinated against hepatitis B; among those who reported being vaccinated against hepatitis B, nearly 60% reported receiving more than one dose (14). Vaccination was negatively associated with age; the highest rates of reported vaccination were observed among 18- to 24-year olds while the lowest rates were observed among persons over 65 years. Vaccination coverage also varied across jurisdictions (14).

There is no treatment for acute HBV infection; care is focused on alleviating symptoms, preventing hepatic complications and reducing the spread of infection through counseling (5,9). Among persons with chronic HBV, interferon injections and antiviral medications are the approved treatments to prevent the development of cirrhosis, liver failure and liver cancer. However, only some individuals with chronic HBV are eligible for treatment depending on age, concentrations of serum aminotransferase and HBV DNA, and severity of liver disease (9).

2.0 HEPATITIS B REPORTING IN CANADA

Hepatitis B cases reported through the Canadian Notifiable Disease Surveillance System (CNDSS) are disaggregated where possible by stage of infection, namely acute, chronic and unspecified (refer to Appendix C for the CNDSS case definition of confirmed acute, confirmed chronic and unspecified HBV infection). However, provinces and territories differ in their capacity to distinguish HBV cases by infection status; as a result, HBV reporting is not uniform across the country and many hepatitis B cases are reported to the CNDSS as unspecified HBV infection. As only acute and chronic HBV cases are analysed in detail in this report, the data presented are not inclusive of all HBV cases reported to the CNDSS. Despite these limitations, discrete presentation of acute HBV data provides insight into potential current trends in transmission, while chronic HBV data offers a more accurate representation of the potential burden of disease in Canada. In addition, the number of cases and rates of all hepatitis B cases, including acute, chronic and unspecified HBV, reported to the CNDSS between 2005 and 2011 are presented in Appendix D.

Also of note is that in many jurisdictions, reporting practices were not consistent over the 2005–2011 time frame, thereby rendering it difficult to interpret trends in hepatitis B over time. In many provinces and territories, chronic HBV did not become notifiable until recent years; in other cases, provinces and territories did not consistently provide chronic HBV data to the CNDSS over the 2005–2011 time frame. Reporting of chronic HBV infection became more consistent across jurisdictions in 2009; for this reason, trend analysis of chronic HBV is restricted to 2009–2011. In order to account for changes in reporting practices across jurisdictions, acute and chronic HBV analyses presented in this report are restricted to those provinces and territories that consistently provided acute and/or chronic HBV data to the CNDSS over the time frame under question (refer to Sections Three and Four, Box 1 and 2 for further detail).

3.0 ACUTE HBV INFECTION

This section of the report presents the rates and trends of acute HBV infection in Canada. Only those provinces and territories that consistently provided data on acute HBV infection over the 2005–2011 time frame are included in national acute HBV rates, with denominators adjusted accordingly (see Box 1 for further details regarding analyses in this section). In addition, select demographic factors as well as exposures and behaviours associated with risk of infection are presented in this section based on the Enhanced Hepatitis Strain Surveillance System (EHSSS) 2011 data.

BOX 1. Provincial/territorial reporting of acute HBV infection

- Newfoundland and Labrador as well as Prince Edward Island did not specify infection status for HBV cases reported over the 2005–2011 time frame; HBV cases reported by these two provinces were thus not included in national counts and their populations were removed from the denominator when calculating national acute HBV rates.
- Nova Scotia did not consistently report acute HBV cases to the CNDSS between 2005 and 2008; HBV cases reported by this province was thus not included in 2005–2011 trend analyses (Figures 1–3) and the population was removed from the denominator when calculating national acute HBV rates in these figures. However, Nova Scotia was included in analyses consisting solely of 2011 data (Figure 4 and Table 1).
- Nunavut data were not available from 2007 onwards; HBV cases from Nunavut were not included in national acute HBV counts from 2005–2011 and the population of Nunavut was removed from the denominator when calculating national acute HBV rates.

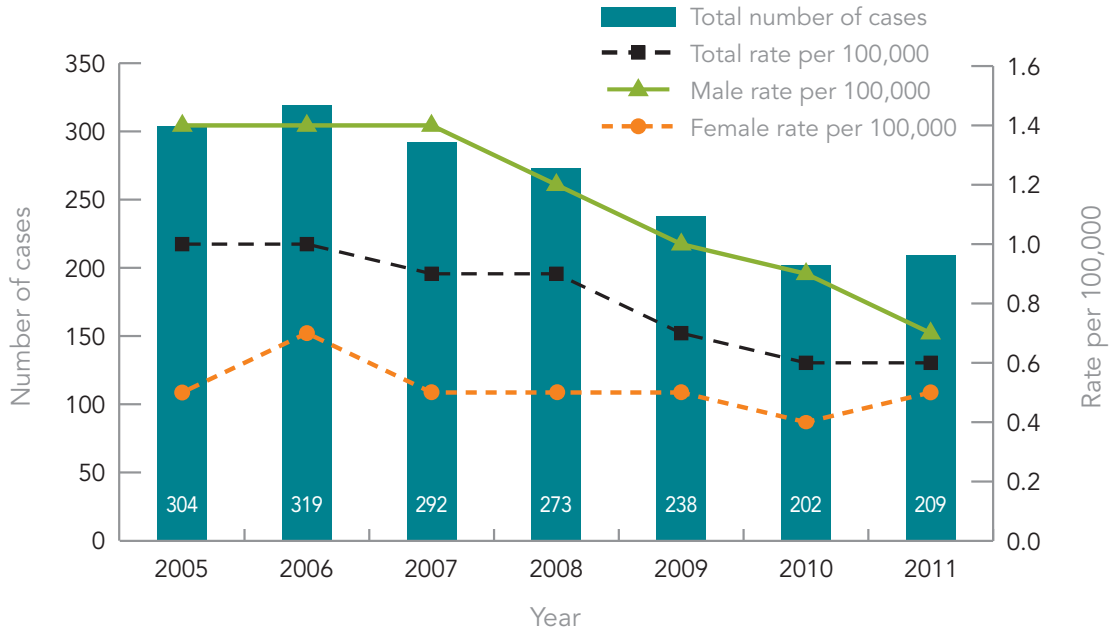
HBV cases that are identified as acute according to the CNDSS case definition (see Appendix C) approximate incident cases (i.e. those that have been recently acquired). Discrete presentation of acute HBV data therefore offers valuable insight into current transmission trends and patterns. However, rates of reported acute HBV cases underestimate the true incidence of HBV infection due to underdiagnosis of recently acquired cases, particularly those that are asymptomatic. Though in some instances a reported acute case may become a carrier at a later time, this was not assessed in the present report and data provided to the Agency by provinces and territories were considered final for the respective reporting year.

Trends over time

The rate of reported cases of acute HBV infection decreased steadily between 2005 and 2011. In 2005, a total of 304 cases of acute HBV infection were reported through the CNDSS, corresponding to the overall rate of 1.0 per 100,000 (Figure 1). In 2011, 209 cases were reported, corresponding to the overall rate of 0.6 per 100,000 and a 35.9% rate decrease from 2005 (Figure 1).

Between 2005 and 2011, rates of reported cases of acute HBV were consistently higher among males than females. However, rates among males consistently decreased over this time frame by 48.1%; among females, rates were more variable from year to year but an overall decrease of 5.5% between 2005 and 2011 was observed (Figure 1).

FIGURE 1. Reported number of cases and rates of acute HBV infection in Canada* by sex, CNDSS, 2005–2011

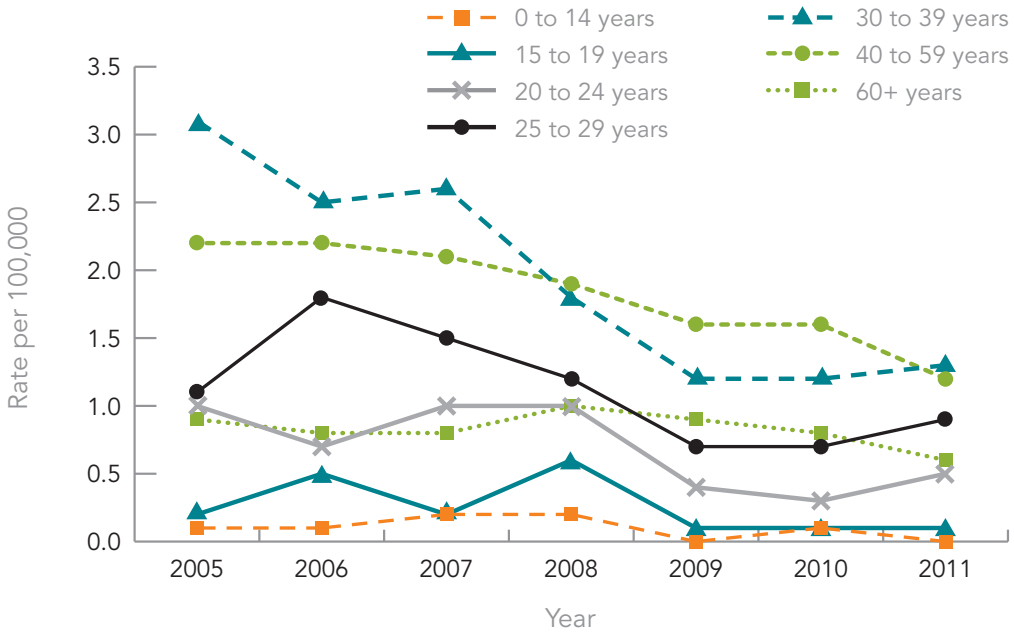


*Includes BC, AB, SK, MB, ON, QC, NB, YT, NT.

Trends by age group and sex

Between 2005 and 2011, the rates of reported cases of acute HBV in males decreased across all age groups, with rate decreases ranging from 37.1% in the 60 and over age group, to 100.0% in the 0 to 14 age group. However, due to the small number of acute HBV cases reported in the 0 to 14 age group, estimates should be interpreted with caution. Excluding males in the 0 to 14 age group, males in the 30 to 39 age group experienced the greatest rate decrease of 57.7%, from 3.1 to 1.3 per 100,000 (Figure 2).

FIGURE 2. Rates of reported cases of acute HBV in Canadian* males by age group and year, CNDSS, 2005–2011

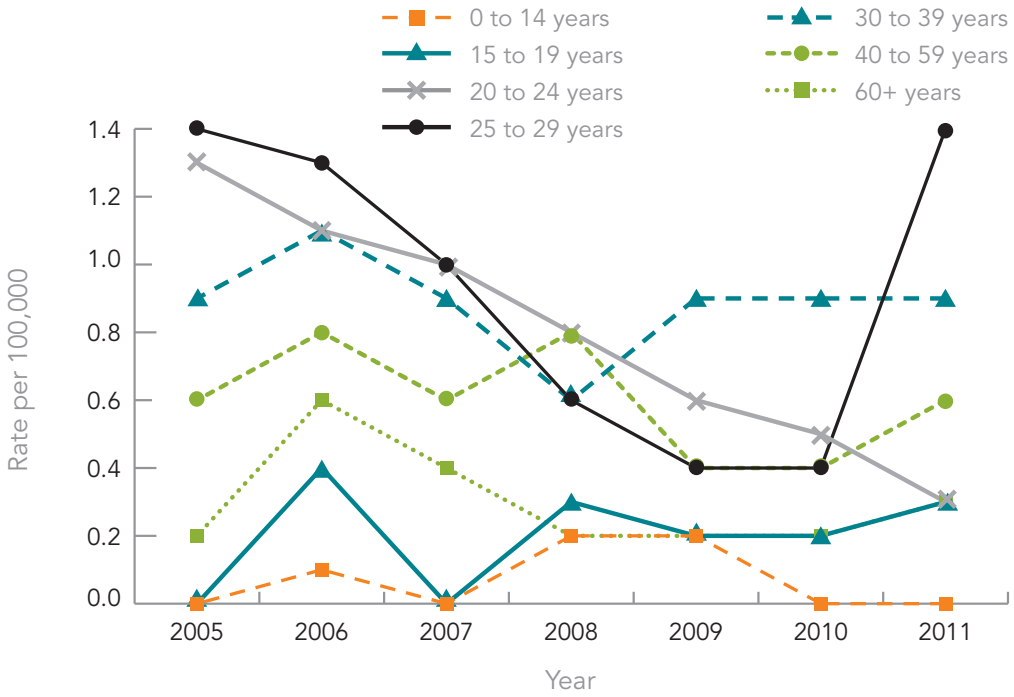


*Includes BC, AB, SK, MB, ON, QC, NB, YT, NT.

Between 2005 and 2011, rates of reported cases of acute HBV in females were variable and both rate increases and decreases were observed. Most changes in rates over this time period were marginal, with the exception of females in the 20 to 24 age group who experienced a rate decrease of 78.5%, from 1.3 to 0.3 per 100,000 (Figure 3).

The large rate increase observed among females in the 25 to 29 age group between 2010 and 2011 can be largely explained by the small number of cases reported among females of this age group and the consequent potential for fluctuation in rates. Between 2010 and 2011, the number of cases reported among females aged 25 to 29 increased from 4 to 16; the additional cases in 2011 were distributed across multiple jurisdictions and thus do not indicate any clustering in any one particular region. Continued monitoring of subsequent years of data will be useful in identifying any emerging trends in this group (Figure 3).

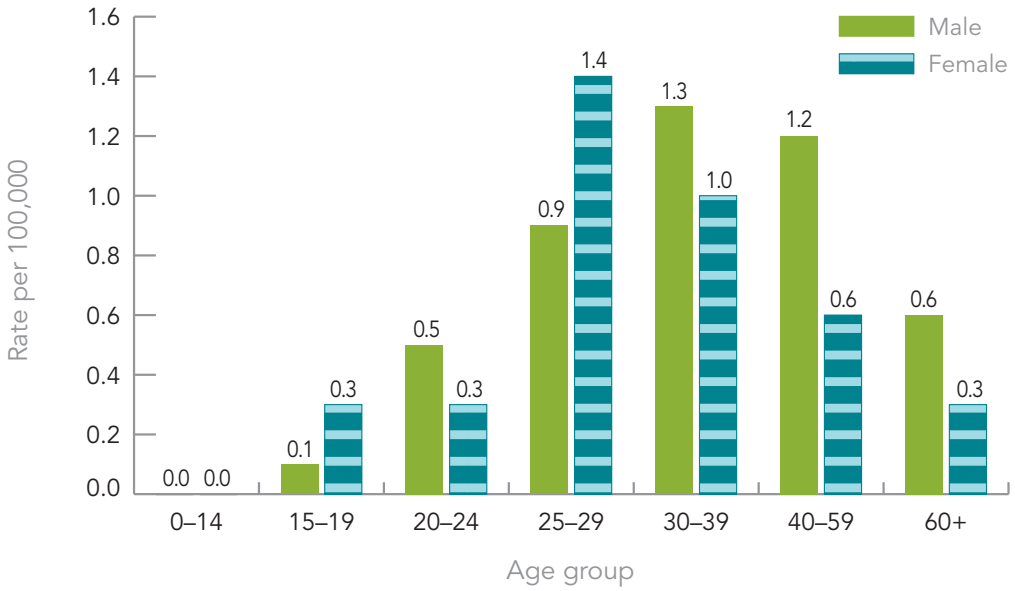
FIGURE 3. Rates of reported cases of acute HBV in Canadian* females by age group and year, CNDSS, 2005–2011



*Includes BC, AB, SK, MB, ON, QC, NB, YT, NT.

In 2011, the highest rate of reported cases of acute HBV was observed among females in the 25 to 29 age group, followed by males in the 30 to 39 age group. Overall, rates of acute HBV were higher among those aged 25 to 59 years, with lower rates observed among both younger and older age groups (Figure 4).

FIGURE 4. Rates of reported cases of acute HBV in Canada* by age group and sex, CNDSS, 2011



*Includes BC, AB, SK, MB, ON, QC, NB, NS, YT, NT.

Acute HBV infection across provinces and territories

In 2011, rates of reported cases of acute HBV were low in all jurisdictions, reflecting a low frequency of endemic transmission of HBV in Canada (Table 1); however, these findings may be partially attributable to underdiagnosis of acute cases due to the asymptomatic nature of the disease. In 2011, Saskatchewan reported 13 acute HBV cases, corresponding to the highest acute HBV rate of 1.2 per 100,000. Acute HBV rates above the national average of 0.6 per 100,000 were also noted in New Brunswick and Ontario (1.1 and 0.9 per 100,000, respectively).

TABLE 1. Reported number of cases and rates of acute HBV infection by province/territory in Canada, CNDSS, 2011

	CANADA	NL*	PE*	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	NU**
Cases	214	N/A	N/A	5	8	24	122	6	13	21	15	0	0	N/A
Rate per 100,000	0.6[1]	N/A	N/A	0.4	1.1	0.3	0.9	0.5	1.2	0.6	0.3	0.0	0.0	N/A

[1] The populations of Prince Edward Island, Newfoundland and Labrador and Nunavut were excluded from the denominator when calculating the 2011 national rate of acute HBV.

* Prince Edward Island and Newfoundland and Labrador did not specify infection status for the HBV cases reported in 2011.

** HBV data for Nunavut were not available in 2011.

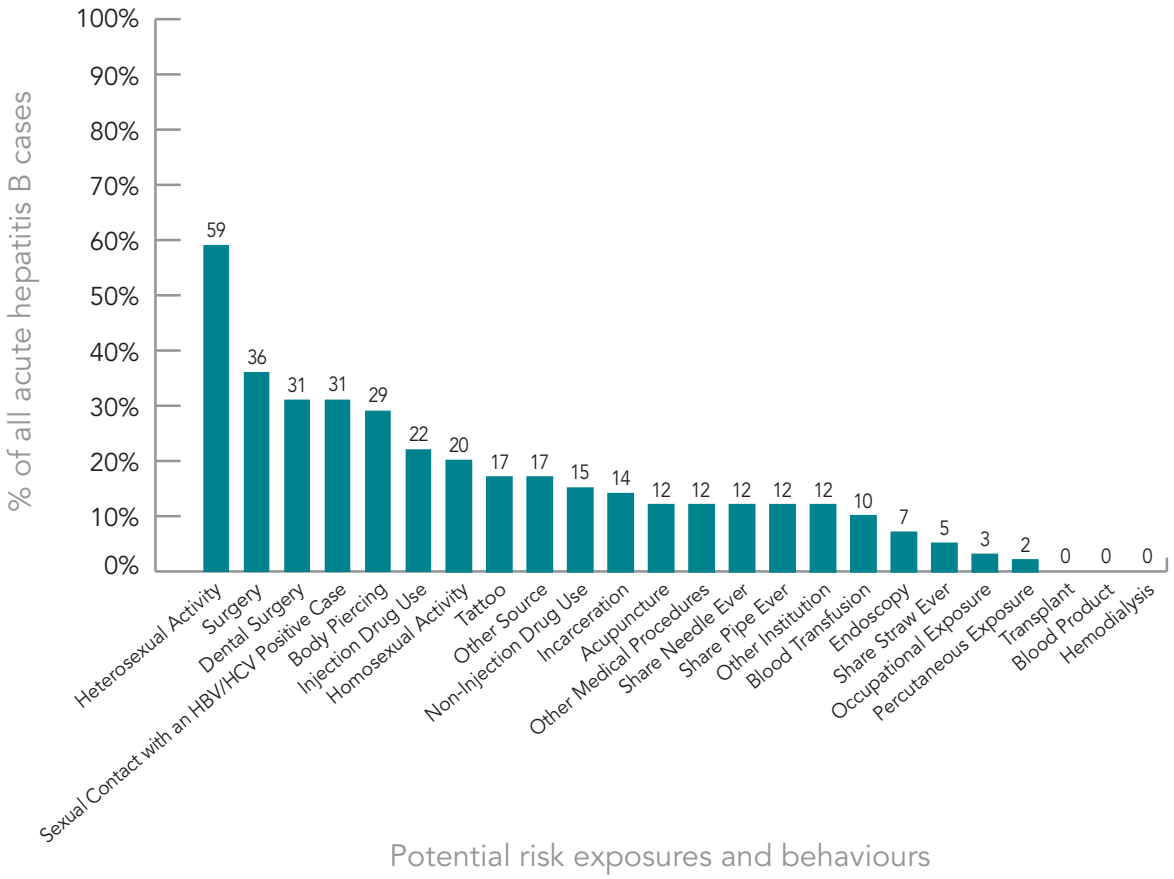
Selected risk factors of acute HBV infection

Information on select characteristics of acute HBV cases diagnosed in 2011 is available through the EHSSS (See Appendix B for further description of EHSSS). As per EHSSS, confirmed acute HBV infection is defined as an acute illness with: discrete onset of symptoms (e.g. nausea, malaise, fatigue, dark urine, loss of appetite, abdominal discomfort), and jaundice or elevated serum aminotransferase. Individuals identified with acute HBV at any of the EHSSS participating sentinel sites in 2011 were interviewed with respect to demographics and history of exposure to various factors associated with risk of transmission (e.g., surgery, injection drug use, sexual activity). The findings presented below are based on 59 acute cases of HBV collected in 2011 from select sites across Canada; as a result, the data may not be representative of all acute HBV cases in Canada. However, inclusion of the EHSSS 2011 data provides valuable information not available through the CNDSS, and offers insight into the risk factors associated with acute HBV infection.

A substantially higher rate of acute HBV infection was observed among Aboriginal persons, as compared to non-Aboriginal persons in the jurisdictions that participated in the EHSSS in 2011 (1.7 and 0.2 per 100,000, respectively). A higher infection rate was also observed among individuals born outside of Canada, as compared to Canadian-born individuals (0.6 and 0.3 per 100,000, respectively).

In 2011, the potential risk exposures/behaviours most commonly reported by individuals identified with acute HBV infection were heterosexual activity (59%), surgery (36%), dental surgery (31%), sexual contact with an HBV/HCV positive person (31%) and body piercing (29%) (Figure 5). Individuals were asked to report all lifetime risk exposures and/or behaviours that applied to them and were able to report more than one risk behaviour/exposure. In light of this survey design, these findings should be interpreted with the recognition that the aforesaid risk factors may be reflective of the exposures/behaviours that are most common among all population groups, rather than those most strongly or recently associated with risk of HBV infection. In addition, the lack of an uninfected control group limits the ability to estimate the impact of each potential exposure on the risk of infection.

FIGURE 5. Self-reported risk behaviours and exposures among individuals with acute HBV, EHSSS, 2011



4.0 CHRONIC HBV INFECTION

As highlighted in Section Two, provinces and territories did not consistently report chronic HBV cases between 2005 and 2011 and it is thus difficult to interpret trends in chronic HBV rates over this time period. As many provinces and territories only began reporting chronic HBV to CNDSS in recent years, shorter-term trends from 2009–2011 are presented in this section; these trends are based on CNDSS data submitted by those provinces and territories that consistently provided chronic HBV data over this three year time frame, with denominators adjusted accordingly (see Box 2 for further detail).

BOX 2. Provincial/territorial reporting of chronic HBV infection

- Newfoundland and Labrador as well as Prince Edward Island did not specify infection status for HBV cases reported over the 2009–2011 time frame; HBV cases reported by these two provinces were thus not included in national counts and their populations were removed from the denominator when calculating national chronic HBV rates.
- Prior to 2010 Yukon did not report chronic and unspecified cases. Consequently, chronic HBV cases from Yukon was not included in the analyses over the 2009–2011 time frame and the population was excluded from the denominator used to calculate annual rates of chronic HBV. However, Yukon was included in analyses consisting solely of 2011 data (Figure 7 and Table 2).
- Chronic HBV infection is not reportable in Ontario; the population of Ontario was thus excluded from the denominator when calculating annual rates of chronic HBV for analyses over the 2009–2011 time frame.
- The Northwest Territories does not report chronic or unspecified cases of HBV. The population of the Northwest Territories was thus excluded from the denominator when calculating annual rates of chronic HBV for analyses over the 2009–2011 time frame.
- In 2011, chronic and unspecified HBV cases reported by Manitoba were combined in one category and were therefore unable to be differentiated. Thus, HBV cases reported by Manitoba were not included in national counts and its population was removed from the denominator when calculating national chronic HBV rates between 2009 and 2011.
- Data for Nunavut were not available from 2007 onwards; the population of Nunavut was therefore removed from the denominator when calculating national chronic rates for analyses over the 2009–2011 time frame.

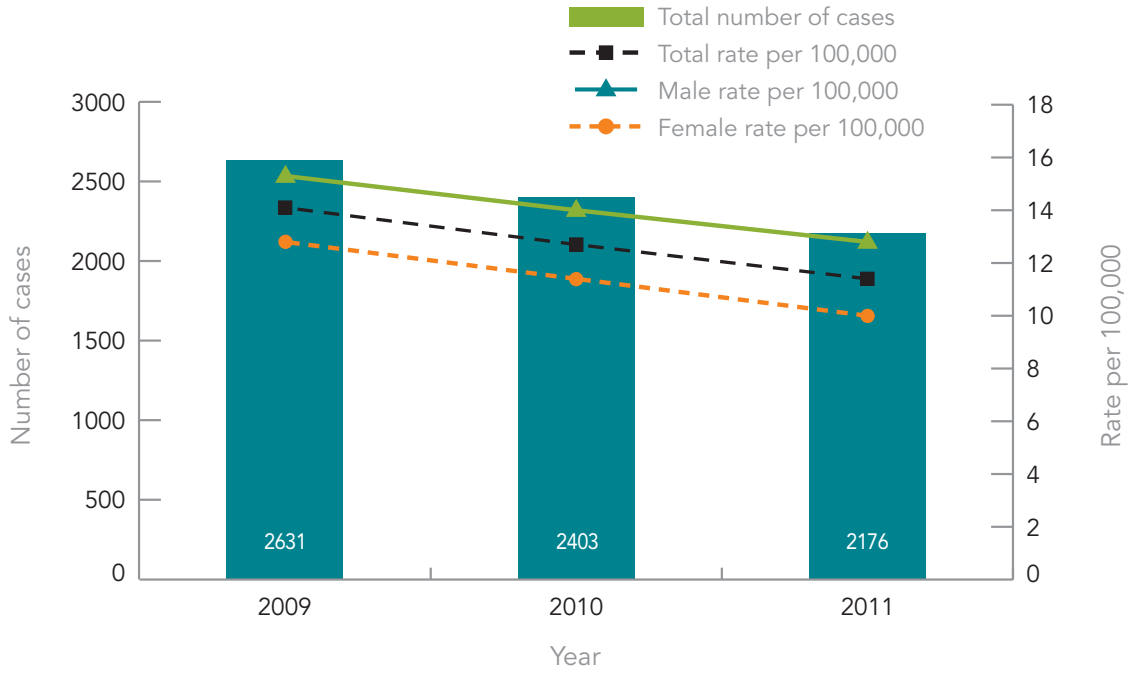
At present, there is a lack of adequate data on chronic hepatitis B in Canada (15). Understanding the magnitude of chronic HBV infection in Canada is important; due to the potential for long-term sequelae such as decompensated cirrhosis and liver cancer. Reported cases of chronic HBV infection represent the potential burden of disease in Canada resulting from the prolonged inability to clear the infection or cases occurring among immigrants to Canada from countries where HBV is endemic. Furthermore, individuals with chronic HBV are more likely to transmit the infection to others, as compared to persons with acute HBV, due to the longer period of infectivity (15). Though there are limitations to the analyses presented in this section due to inconsistent reporting practices, the rates presented partially address a significant knowledge gap. Moreover, it is anticipated that in future years, as reporting of acute and chronic HBV becomes more harmonized across the country, available data will be more representative of the true burden of hepatitis B infection.

Trends over time

The rate of reported cases of chronic HBV infection decreased between 2009 and 2011. In 2009, a total of 2631 cases of chronic HBV were reported, corresponding to an overall chronic HBV rate of 14.1 per 100,000. In 2011, a total of 2176 cases of chronic HBV were reported, resulting in a rate of 11.4 per 100,000 and a 19.1% rate decrease from 2009 (Figure 6).

Chronic HBV rates were consistently higher among males as compared to their female counterparts between 2009 and 2011, though rate decreases were observed in both sexes. Among males, rates decreased by 16.7%, from 15.3 to 12.8 per 100,000, while chronic HBV rates in females decreased by 22.2%, from 12.8 to 10.0 per 100,000 (Figure 6).

FIGURE 6. Reported number of cases and rates of chronic HBV infection in Canada* by sex, CNDSS, 2009–2011

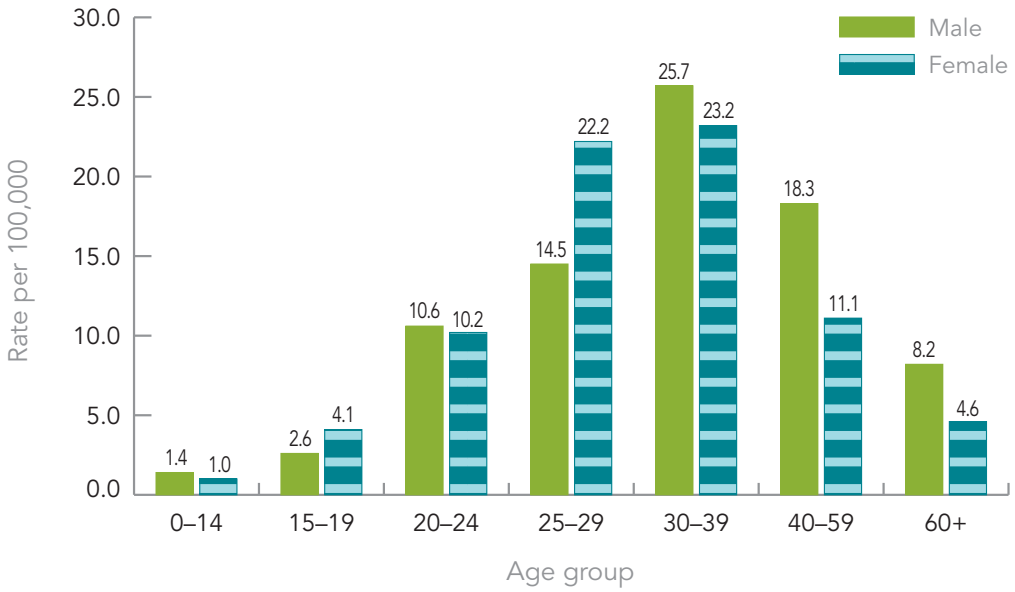


*Includes BC, AB, SK, QC, NB, NS.

Trends by age group and sex

In 2011, rates of chronic HBV in males of all age groups were higher than those in females, with the exception of the 15 to 19 and 25 to 29 age groups where male rates were lower than their female counterparts. Overall, the highest rates of reported cases of chronic HBV in 2011 were observed among males in the 30 to 39 age group, followed by females in the 30 to 39 age group (25.7 and 23.2 per 100,000, respectively). Chronic HBV rates in 2011 were higher among individuals between the ages of 20 and 59, with lower rates observed in both males and females of younger (<20 years) and older (60 plus) age groups (Figure 7).

FIGURE 7. Rates of reported cases of chronic HBV in Canada* by age group and sex, CNDSS, 2011



*Includes BC, AB, SK, QC, NB, NS, YT.

Chronic HBV infection across provinces and territories

The reported number of chronic HBV cases and corresponding rates in 2011 are presented in Table 2. In 2011, British Columbia reported the highest number of cases (1,025 chronic HBV cases), also corresponding to the highest rate of chronic HBV across Canada of 22.4 per 100,000. The majority of the chronic HBV infections identified in British Columbia in 2011 were among persons who have emigrated from a country where HBV is endemic (16). Chronic HBV rates above the national average of 11.4 per 100,000 were also noted in Alberta and Yukon (15.0 and 14.1 per 100,000, respectively).

TABLE 2. Reported number of cases and rates of chronic HBV infection by province/territory in Canada, CNDSS, 2011

	CANADA	NL*	PE*	NS	NB	QC	ON	MB**	SK	AB	BC	YT	NT*	NU***
Cases	2181	N/A	N/A	4	24	483	N/A	N/A	73	567	1025	5	N/A	N/A
Rate per 100,000	11.4[1]	N/A	N/A	0.4	3.2	6.1	N/A	N/A	6.9	15.0	22.4	14.1	N/A	N/A

[1] The populations of Newfoundland and Labrador, Prince Edward Island, Ontario, Manitoba, the Northwest Territories and Nunavut were excluded from the denominator when calculating the 2011 national rate of chronic HBV.

* Newfoundland and Labrador, Prince Edward Island and the Northwest Territories did not specify infection status for the HBV cases reported in 2011.

** HBV cases that were not classified as acute according to laboratory confirmation in Manitoba were reported to the CNDSS as unspecified HBV cases in 2011.

*** HBV data for Nunavut were not available in 2011.

5.0 DISCUSSION

Data from the CNDSS indicate a decrease of 35.9% from 1.0 to 0.6 per 100,000 in the rate of reported cases of acute HBV infection between 2005 and 2011 in Canada. Acute HBV rates were consistently higher among males than females, though both sexes, and particularly males, experienced rate decreases over this time frame. In 2011, the highest rate of reported cases of acute HBV was observed among females 25 to 29 years old, followed by males 30 to 39 years old. Due to variable reporting of chronic HBV cases by provinces and territories between 2005 and 2008, analysis of chronic HBV trends over time was restricted to the time period between 2009 and 2011. Over this time frame, rates of chronic HBV decreased by 19.1%, from 14.1 to 11.4 per 100,000. As seen with acute HBV, chronic HBV rates were consistently higher among males than females and rate decreases were observed across both sexes. In 2011, the highest rates of reported cases of chronic HBV were observed among males in the 30 to 39 age group, followed by females in the 30 to 39 age group.

Due to the challenges associated with accurate diagnosis and reporting of hepatitis B, prevalence estimates cannot be derived directly from cases reported to the CNDSS. However, based on testing of blood samples collected during cycles 1 (2007–2009) and 2 (2009–2011) of Canadian Health Measures Survey (CHMS), including 8,434 participants between the ages of 14 to 79, the seroprevalence of HBV infection and vaccine-induced immunity in Canada was estimated. Blood samples were not tested for anti-HBc IgM and it was therefore not possible to distinguish acute from chronic HBV infection. The resulting seroprevalence of current HBV infection, inclusive of acute and chronic infection, was 0.4%, accounting for an estimated 111,800 individuals 14 to 79 years old in Canada. Serological evidence of a previous HBV infection was identified among 4.2% of participants, representing almost 1.1 million individuals in Canada. Of those previously infected with HBV, 79% or 853,400 individuals demonstrated complete resolution and protective immunity. Overall, vaccine-induced immunity was identified among 29% of the population and an inverse relationship with age was observed (17). Seroprevalence estimates should be interpreted with caution as data are based on a household sample and therefore exclude populations at high risk of HBV infection (e.g., homeless persons, First Nations living on reserves). Refer to (17) for further discussion of CHMS findings and to (18) and (19) for further explanation of CHMS data collection, analysis and limitations.

Declining rates of acute HBV have been similarly observed in countries with comparable population structure, health status and public health infrastructure, as evidenced by data from routine and/or enhanced surveillance. For example, the rate of acute HBV fell from 1.2 to 0.8 per 100,000 between 2005 and 2011 in Australia, from 1.2 to 1.1 per 100,000 between 2008 and 2011 in England, and from 1.8 to 0.9 per 100,000 between 2005 and 2011 in the United States (20–23). With respect to chronic HBV infection, Canadian rates were considerably lower than those observed in other countries, though cross-country comparison is difficult due to differences in reporting practices. Australia reports only unspecified HBV cases; in 2011, the rate of unspecified HBV in Australia was 29.3 per 100,000 (22). Although the United States reports the rate of chronic HBV infection, data are drawn from an enhanced surveillance system involving select sentinel sites; in 2011, the chronic HBV rate in the United States was 28.6 per 100,000 (20). Note that England does not report chronic or unspecified HBV infection.

Differences in rates of reported cases of HBV among Canada, Australia, England and the United States should be interpreted with caution due to differences in case definitions, reporting sources, screening programs and screening rates (refer to Appendix C for the case definitions used by each comparison country). Also of note is that the burden of chronic HBV in Canada is underestimated in this report due to the unavailability of chronic HBV data from Ontario, where a significant proportion of the Canadian population reside, many of whom are immigrants from countries where HBV is endemic (24). A recent assessment of liver disease conducted by the Canadian Liver Foundation estimated that approximately 50% of individuals with chronic HBV in Canada reside in Ontario (15). Furthermore, interpretation of these variations in rates across countries is difficult without a more detailed analysis of respective reporting differences and public health programs such as immunization.

The low rates of acute HBV observed in Canada may be attributable to routine HBV vaccination programs implemented in all provinces and territories in the 1990s (10).These programs are offered to infants and/or school-aged children and, in some jurisdictions, high-risk populations. The largest decreases in acute and indeterminate HBV have been previously observed among the cohort of children for whom routine vaccination recommendations applied (27). Refinement in blood screening and improved infection prevention and control practices in health care settings have also likely contributed to Canada's decreasing rates of acute HBV infection.

From a public health planning and policy development perspective, identifying the populations that are disproportionately affected by HBV as well as the behaviours and exposures associated with risk of transmission is of utmost importance. The EHSSS data from 2011 suggest that newly acquired HBV rates are higher among Aboriginal persons and persons born outside of Canada. Although the EHSSS data are not representative of the entire country due to the small number of sites involved and due to exclusive reporting of newly diagnosed acute cases, these findings have been substantiated elsewhere, albeit the number of recent Canadian studies is limited. Previous serosurveys among Canadian Inuit have documented a prevalence of HBV infection of 5%, 20 times that of non-Aboriginal Canadians (25).

High rates of chronic HBV infection among persons born outside of Canada have also been documented. Based on a systematic search of the literature, Greenaway et al. (26) concluded that most immigrants (>70% of 250,000/year) who have arrived in Canada over the last 40 years have originated from countries where prevalence of hepatitis B is either intermediate (2 to 7%) or high (>8%). The researchers also suggested that approximately 4% of immigrants in Canada are chronically infected with HBV (26). Similar findings have been reported in the United States, where it is estimated that approximately half of all chronic HBV infections are among persons born in Asia or among Asian-Americans who were born to HBV-infected mothers in the United States (20).

Though HBV infection rates are generally low among the general population in Canada, past research has demonstrated that certain factors are strongly associated with risk of infection, including high-risk sexual activity, injection drug use, having an HBsAg carrier as a family member and history of blood transfusion (27) and body piercing and tattooing (27,28). Due to such risk factors, some vulnerable populations experience higher than average rates of HBV. For example, in a study involving 533 street-involved youth living in Winnipeg,

Manitoba, serologic evidence of HBV exposure was present in 12% of participants, well above the general population (29). Using Canadian data collected by the Agency's Enhanced Surveillance of Street Youth, Huang et al. demonstrated that although vaccine-induced immunity has increased over the last few decades, it is still much lower among street-involved youth compared to the general adolescent population. These findings demonstrate the need for more focused prevention efforts among certain high-risk populations, such as street-involved youth (30).

There are notable limitations to the findings presented in this report. For example, analyses of the CNDSS data are restricted to select variables, including age, sex, year of diagnosis, and reporting province/territory. While inclusion of EHSSS data provides some insight into other demographic characteristics as well as behaviours and exposures associated with risk of acute HBV infection, findings must be interpreted with caution as only select sites across Canada are included in the EHSSS. Findings are therefore not necessarily generalizable to the rest of the Canadian population and such a small number of cases may undermine the reliability of the findings. Moreover, risk behaviour and exposure data relied on self-reports, which can be affected by social desirability bias and may result in underreporting in some cases.

Furthermore, reporting practices did not remain consistent over the time frame included in this report and, as a result, certain provinces and territories were excluded from acute and/or chronic HBV analyses (see Box 1 and 2 for details). Although reporting of acute HBV was somewhat more consistent over the 2005–2011 time frame, reporting of chronic HBV across jurisdictions between 2005 and 2011 was more variable. Due to said changes in reporting practices, chronic HBV data received by the Agency prior to 2009 were excluded from analyses and it is therefore difficult to interpret longer-term trends of chronic HBV in Canada. Also of note is that many provincial and territorial surveillance systems struggle to accurately distinguish acute from chronic HBV infection and therefore report unspecified HBV cases to the CNDSS. However, analyses presented in this report were restricted to acute and chronic HBV infection as these cases are representative of current trends in transmission and of the burden of disease. While the analyses are therefore not inclusive of all hepatitis B cases reported through the CNDSS, Appendix D presents all hepatitis B cases reported over the 2005–2011 time frame, disaggregated by infection status and reporting jurisdiction.

Observed trends over time may also be reflective of changes in screening practices or improved diagnostic capability, resulting in increased detection of persons with hepatitis B, many of whom likely acquired the infection well before the time of diagnosis. Additionally, these trends may be attributable to the heightened ability to distinguish acute from chronic infection; improved duplicate removal; and shortened reporting delay. Also of note is that rates based on small numbers are more prone to fluctuations over time.

Finally, the HBV rates presented in this report are likely an underestimation of the true burden of infection in Canada. As acute HBV infection is asymptomatic in over 90% of children and 50–70% of adults, the majority of individuals recently infected will not present to a health care practitioner for testing and therefore will not be reported to the CNDSS as an acute case of HBV. Results from the 2007–2009 and 2009–2011 CHMS suggest that more than half of the survey participants with laboratory-confirmed HBV were unaware of their infections (17).

Additionally, HBV infection often occurs in hard-to-reach populations who may not have access to a trusted health care provider or who may exhibit low health care seeking behaviour. These limitations notwithstanding, the data presented are useful for detecting major trends in acute and chronic HBV in Canada.

Given the potential for HBV infection to progress to more serious sequelae, such as cirrhosis, hepatocellular carcinoma and liver decompensation, and the consequent potential for strain on Canada's health care system, continued monitoring of HBV infection rates is requisite. Monitoring must be coupled with research into the reasons for observed trends, with the ultimate goal of contributing to the development and amelioration of tailored HBV interventions in Canada. The HBV rates and trends presented in this report substantiate the need for continued HBV prevention and management efforts in Canada. Moving forward, increasing the capacity of all jurisdictions to differentiate between acute and chronic HBV will facilitate a more thorough understanding of trends in transmission and of the burden of hepatitis B infection in Canada.

APPENDIX A: TECHNICAL NOTES

Case reporting: Currently, some jurisdictions report to the Agency using aggregate case counts instead of case-by-case reporting. Selected variables submitted by all reporting jurisdictions are: age at diagnosis, year of diagnosis, province/territory of diagnosis, and sex. As such, national reporting is limited to analyses of these variables.

Under-diagnosis/Underreporting: The number of reported cases likely underestimates the true burden of infection in a given population for a variety of reasons. For example, it is estimated that the infection is asymptomatic in the majority of people infected with HBV, who therefore may not present to a health care practitioner for testing.

Time period: Until recently, surveillance data reported to the Canadian Notifiable Disease Surveillance System (CNDSS) by most provinces and territories did not distinguish between acute and chronic HBV infection. In order to examine trends over time, HBV analyses were restricted to provinces and territories that consistently provided acute and/or chronic HBV data to the CNDSS over the entire time frame used. A number of provinces and territories began reporting acute HBV cases in 2005; however, chronic HBV infection reporting only became more consistent in 2009.

Trends over time: Observed trends must be interpreted with caution since there are a number of factors that can contribute to changes:

- Rates based on small numbers are more prone to fluctuation over time; and
- Improved diagnostic capabilities, improved duplicate removal, shortened reporting delay and changes in reporting practices at the jurisdictional level

Calculations: Rates, percentages, and percent change in rates were calculated using unrounded numbers, thus presented rounded numbers may not sum to the total.

Population data source: Statistics Canada, Demography Division, Demographic Estimates Section, July Population Estimates. 2005 final intercensal estimates, 2006–2009 final postcensal estimates, 2010–2011 updated postcensal estimates.

APPENDIX B: OVERVIEW OF HEPATITIS B SURVEILLANCE IN CANADA

The epidemiological data presented in this report are drawn from the Canadian Notifiable Disease Surveillance System (CNDSS) and the Enhanced Hepatitis Strain Surveillance System (EHSSS).

Canadian Notifiable Disease Surveillance System

In Canada, national surveillance of notifiable infectious diseases is generally conducted according to longstanding procedures between the provinces/territories (P/Ts) and the Agency. Hepatitis B has been a notifiable disease in Canada since 1969. Provinces and territories collect and manage surveillance data and submit these data to the Agency on a regular basis. The content of the various data submissions depends on each jurisdiction's ability to collect the data elements, and also on privacy legislation and technological capacity. Data are submitted in a variety of formats, validated with the submitting P/T and loaded into the CNDSS database by Agency personnel.

Extracts from the CNDSS are used as the basis of national data tables and surveillance reports. Adjustments made to P/T data post-validation may not be reflected in that year's national data, but will be updated for subsequent reports. Therefore, small discrepancies between Agency and provincial or territorial numbers are expected as a result of comparing dynamic databases. National reports are used by federal and P/T public health stakeholders, researchers, media, and the general public.

Enhanced Hepatitis Strain Surveillance System

The EHSSS was established in 1998 by the Agency in order to overcome some of the limitations associated with the CNDSS data on hepatitis B and C. The EHSSS was discontinued in 2012. The overall objective of the EHSSS was to monitor the epidemiological and laboratory trends of hepatitis B and C in Canada. Twelve public health jurisdictions from across Canada, including Vancouver Coastal Health, British Columbia Centre for Disease Control, Calgary Health Region (now Alberta Health Services), Edmonton Capital Health (now Alberta Health Services), Ottawa Public Health, New Brunswick Department of Health, Montreal Public Health Department, Middlesex-London Health Unit, City of Hamilton-Public Health & Social Services, Toronto Public Health, Saskatoon Health Region and Thunder Bay District Health Unit, participated in the EHSSS for at least part of the time that the surveillance system was in operation.

The EHSSS captured information on acute/newly acquired and chronic cases of hepatitis B or C diagnosed in one of the participating sites. Through application of a voluntary questionnaire, demographic information and self-reported data on select risk behaviours and exposures were collected for each newly diagnosed hepatitis B and C case. Data on viral genotype were also gathered using laboratory test results. Collected data for each case were inputted into the EHSSS database on a regular basis.

Extracts from the EHSSS are used as a supplement to the CNDSS data to develop national hepatitis B and C surveillance reports.

APPENDIX C: CASE DEFINITIONS USED BY CANADA, AUSTRALIA, ENGLAND AND THE UNITED STATES

COUNTRY	ACUTE HBV CASE DEFINITION	CHRONIC AND/OR UNSPECIFIED HBV CASE DEFINITION
Canada	**Confirmed acute HBV infection:** • HBsAg and anti-HBc IgM positive in the context of a compatible clinical history or probable exposure OR • Clearance of HBsAg in a person who was documented to be HBsAg positive within the last six months in the context of a compatible clinical history or probable exposure (30)	**Confirmed chronic HBV infection:** • A person being HBsAg positive for more than 6 months OR • Detection of HBsAg in the documented absence of anti-HBc IgM OR • Detection of HBV DNA for more than 6 months **Unspecified HBV infection:** • Serological profile not in line with either acute or chronic case definition and HBsAg positive OR • Detection of HBV DNA (31)
Australia	**Newly acquired HBV:** • Detection of hepatitis B surface antigen (HBsAg) in a patient shown to be negative within the last 24 months OR • Detection of HBsAg and IgM to hepatitis B core antigen, in the absence of prior evidence of hepatitis B virus infection OR • Detection of hepatitis B virus by nucleic acid testing, and IgM to hepatitis B core antigen, in the absence of prior evidence of hepatitis B virus infection (32)	**Unspecified HBV:** Detection of hepatitis B surface antigen (HBsAg), or hepatitis B virus by nucleic acid testing, in a patient with no prior evidence of hepatitis B virus infection (31).
England	**Acute HBV:** HBsAg positive and anti-HBc IgM positive and abnormal liver function tests with a pattern consistent with acute viral hepatitis. Those cases classified as acute hepatitis by the Health Protection Unit (HPU) or the laboratory and with a documented positive anti-HBc IgM were classified as acute infections. Those classified as acute infections by the HPU but without anti-HBc IgM results, or not classified but with a positive anti-HBc IgM were assumed to be probable acute cases (33).	Not reported

United States	**Acute HBV** **Clinical:** Acute hepatitis is defined as acute illness with 1) discrete onset of symptoms (e.g., nausea, anorexia, fever, malaise, and abdominal pain) and 2) jaundice or elevated serum alanine aminotransferase (ALT) >200 IU/L. **Laboratory:** • IgM antibody to hepatitis B core antigen (anti-HBc) positive, OR hepatitis B surface antigen (HBsAg) positive AND • IgM anti-HAV negative (if performed) (20)	**Chronic HBV** **Clinical:** No symptoms are required. Persons with chronic HBV infection may have no evidence of liver disease or may have a spectrum of disease ranging from chronic hepatitis to cirrhosis or liver cancer. **Laboratory:** • IgM anti-HBc negative AND • A positive result on one of the following tests: HBsAg, HBeAg, or HBV DNA OR • Two positive tests for HBsAg, HBV DNA, or HBeAg when tests are performed at least 6 months apart (any combination of these tests performed 6 months apart is acceptable) (20)

APPENDIX D: REPORTED CASES AND RATES OF HEPATITIS B (ACUTE, CHRONIC AND UNSPECIFIED), 2005–2011, CNDSS

YEAR			HEPATITIS B												
			NL[1]	PE[2]	NS[3]	NB	QC	ON[4]	MB	SK	AB[5]	BC[6]	YT[7]	NT[8]	NU[9]	TOTAL[10]
2005	Cases	Acute	N/A	N/A	N/A	6	46	155	2	11	26	58	0	0	0	304
		Chronic	N/A	N/A	N/A	15	657	N/A	N/A	80	N/A	N/A	N/A	N/A	1	753
		Unspecified	29	7	15	7	353	N/A	N/A	0	0	N/A	N/A	N/A	2	413
		Total	29	7	15	28	1056	155	2	91	26	58	0	0	3	1470
	Rates[11]	Acute	N/A	N/A	N/A	0.8	0.6	1.2	0.2	1.1	0.8	1.4	0.0	0.0	0.0	1.0
		Chronic	N/A	N/A	N/A	2.0	8.7	N/A	N/A	8.1	N/A	N/A	N/A	N/A	3.3	8.7
		Total	5.6	5.1	1.6	3.7	13.9	1.2	0.2	9.2	0.8	1.4	0.0	0.0	9.9	4.6
2006	Cases	Acute	N/A	N/A	N/A	4	40	183	7	13	30	42	0	0	0	319
		Chronic	N/A	N/A	N/A	28	744	N/A	N/A	68	N/A	N/A	N/A	N/A	5	845
		Unspecified	13	*	9	3	247	N/A	N/A	0	0	N/A	N/A	N/A	0	275
		Total	13	N/A	9	35	1031	183	7	81	30	42	0	0	5	1439
	Rates[11]	Acute	N/A	N/A	N/A	0.5	0.5	1.4	0.6	1.3	0.9	1.0	0.0	0.0	0.0	1.1
		Chronic	N/A	N/A	N/A	3.8	9.7	N/A	N/A	6.9	N/A	N/A	N/A	N/A	16.2	9.8
		Total	2.5	N/A	1.0	4.7	13.5	1.4	0.6	8.2	0.9	1.0	0.0	0.0	16.2	4.4
2007	Cases	Acute	N/A	N/A	N/A	8	45	169	4	7	18	41	0	0	N/A	292
		Chronic	N/A	N/A	N/A	28	692	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	720
		Unspecified	26	*	12	5	248	N/A	N/A	0	0	N/A	N/A	N/A	N/A	294
		Total	26	N.A	12	41	985	169	4	7	18	41	0	0	N/A	1306
	Rates[11]	Acute	N/A	N/A	N/A	1.1	0.6	1.3	0.3	0.7	0.5	1.0	0.0	0.0	N/A	1.0
		Chronic	N/A	N/A	N/A	3.8	9.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.5
		Total	5.1	N/A	1.3	5.5	12.8	1.3	0.3	0.7	0.5	1.0	0.0	0.0	N/A	4.0

YEAR			HEPATITIS B												
			NL[1]	PE[2]	NS[3]	NB	QC	ON[4]	MB	SK	AB[5]	BC[6]	YT[7]	NT[8]	NU[9]	TOTAL[10]
2008	Cases	Acute	N/A	N/A	N/A	4	44	144	5	14	33	29	0	0	N/A	273
		Chronic	N/A	N/A	N/A	26	702	N/A	N/A	N/A	713	N/A	N/A	N/A	N/A	1441
		Unspecified	27	5	24	4	249	N/A	N/A	0	0	N/A	N/A	N/A	N/A	309
		Total	27	5	24	34	995	144	5	14	746	29	0	0	N/A	2023
	Rates[11]	Acute	N/A	N/A	N/A	0.5	0.6	1.1	0.4	1.4	0.9	0.7	0.0	0.0	N/A	0.9
		Chronic	N/A	N/A	N/A	3.5	9.1	N/A	N/A	N/A	19.8	N/A	N/A	N/A	N/A	11.9
		Female	5.3	3.6	2.6	4.6	12.9	1.1	0.4	1.4	20.8	0.7	0.0	0.0	N/A	6.1
2009	Cases	Acute	N/A	N/A	3	8	34	131	4	8	26	26	0	1	N/A	241
		Chronic	N/A	N/A	5	30	716	N/A	102	81	612	1187	N/A	N/A	N/A	2733
		Unspecified	24	9	15	0	205	N/A	118	0	0	162	N/A	N/A	N/A	533
		Total	24	9	23	38	955	131	224	89	638	1375	0	1	N/A	3507
	Rates[11]	Acute	N/A	N/A	0	1.1	0.4	1.0	0.3	0.8	0.7	0.6	0.0	2.3	N/A	0.7
		Chronic	N/A	N/A	0.5	4.0	9.2	N/A	8.4	7.9	16.7	26.6	N/A	N/A	N/A	13.7
		Total	4.7	6.4	2.4	5.1	12.3	1.0	18.4	8.6	17.4	30.8	0.0	2.3	N/A	10.4
2010	Cases	Acute	N/A	N/A	1	4	23	126	2	11	23	11	1	1	N/A	203
		Chronic	N/A	N/A	6	32	559	N/A	131	86	574	1146	4	N/A	N/A	2538
		Unspecified	23	6	14	0	295	N/A	104	0	0	183	0	N/A	N/A	625
		Total	23	6	21	36	877	126	237	97	597	1340	5	1	N/A	3366
	Rates[11]	Acute	N/A	N/A	0.1	0.5	0.3	1.0	0.2	1.1	0.6	0.2	2.9	2.3	N/A	0.6
		Chronic	N/A	N/A	0.6	4.3	7.1	N/A	10.6	8.2	15.4	25.3	11.6	N/A	N/A	12.6
		Total	4.5	4.2	2.2	4.8	11.2	1.0	19.2	9.3	16.0	29.6	14.4	2.3	N/A	9.9

YEAR			HEPATITIS B												
			NL[1]	PE[2]	NS[3]	NB	QC	ON[4]	MB	SK	AB[5]	BC[6]	YT[7]	NT[8]	NU[9]	TOTAL[10]
2011	Cases	Acute	N/A	N/A	5	8	24	122	6	13	21	15	0	0	N/A	214
		Chronic	N/A	N/A	4	24	483	N/A	N/A	73	567	1025	5	N/A	N/A	2181
		Unspecified	29	8	6	0	359	N/A	237	0	0	127	0	N/A	N/A	766
		Total	29	8	15	32	866	122	243	86	588	1167	5	0	N/A	3161
	Rates[11]	Acute	N/A	N/A	0.4	1.1	0.3	0.9	0	1.2	0.6	0.3	0.0	0	N/A	0.6
		Chronic	N/A	N/A	1.6	3.2	6.1	N/A	N/A	6.9	15.0	22.4	14.1	N/A	N/A	11.4
		Total	5.7	5.5	1.6	4.2	11.0	0.9	19.4	8.1	15.6	25.5	14.1	0.0	N/A	9.2

[1] NL did not specify infection status for all hepatitis B cases reported to the Agency between 2005 and 2011.

[2] PE did not specify infection status for all hepatitis B cases reported to the Agency between 2005 and 2011.

[3] NS did not begin disaggregating its hepatitis B cases by infection status until 2009.

[4] Chronic hepatitis B infection is not reportable in ON, therefore the province exclusively reports acute HBV cases to the CNDSS.

[5] Chronic HBV infection became notifiable in AB in 2008.

[6] BC began reporting chronic and unspecified HBV cases to the CNDSS in 2009.

[7] YT began reporting chronic and unspecified HBV cases to the CNDSS in 2010.

[8] NT exclusively reports acute HBV cases to the CNDSS.

[9] Data reported by Nunavut prior to 2007 are preliminary. 2007–2011 Nunavut data are not available.

[10] National rates (per 100,000) are adjusted to include only those provinces/territories that reported data in the corresponding year. Rates were calculated using only those jurisdictions in the numerator and denominator.

[11] Rate per 100,000 population. Population estimates provided by Statistics Canada. (Source: Statistics Canada, Demography Division, Demographic Estimates Section, July Population Estimates, 2005 final intercensal estimates, 2006–2009 final postcensal estimates, 2010–2011 updated postcensal estimates).

N/A: Not Available (i.e. cases were not reported by the corresponding province/territory for that year)

* As per provincial Chief Public Health Office reporting guidelines, PEI data are suppressed where counts are less than five.

Note: Small variability may exist between data reported by the provinces/territories and the Public Health Agency of Canada. Provincial/territorial data are definitive should a discrepancy exist.

Source: Centre for Communicable Diseases and Infection Control, Public Health Agency of Canada, 2014.

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