



# HIV in Canada—Surveillance Report, 2016

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## Abstract

**Background:** Human immunodeficiency virus (HIV) continues to be a global public health concern, with 2.1 million people newly infected in 2015. Although many high-income countries have noted decreasing rates of HIV, between 2013 and 2015 Canada's rates had stabilized at 5.8 per 100,000 population.

**Objective:** To provide a descriptive overview of reported cases of HIV in Canada up until 2016 by geographic location, sex, age group, exposure category and race/ethnicity, with a focus on the most recent data.

**Methods:** The Public Health Agency of Canada (PHAC) monitors HIV through the national HIV/AIDS Surveillance System (HASS), Immigration, Refugees and Citizenship Canada (IRCC), and the Canadian Perinatal HIV Surveillance Program (CPHSP). HASS is a passive, case-based system that collates non-nominal data voluntarily submitted by all Canadian provinces and territories. Data were also received from the IRCC and the CPHSP. Data were collated, tables and figures were prepared, then descriptive statistics were applied by PHAC and validated by each province and territory.

**Results:** A total of 2,344 new diagnoses of HIV were reported in 2016 in Canada, with a cumulative total of 84,409 cases since 1985. The national diagnosis rate increased from 5.8 per 100,000 population in 2015 to 6.4 per 100,000 population in 2016. Saskatchewan reported the highest provincial diagnosis rate in 2016 (15.1 per 100,000 population). In 2016, 76.6% of reported HIV cases were among males. Adults aged 30-39 years old accounted for 28.7% of all reported cases. There was a similar age distribution of HIV cases between sexes with notable increases in the proportion of the 50 years and over age group over the past five years. The "men who have sex with men" exposure category continued to represent the largest number and proportion of all reported HIV cases in adults (44.1%). White (40.4%), Black (21.9%) and Indigenous (21.2%) race/ethnicity categories represented the largest proportions of cases.

**Conclusion:** In 2016, Canada saw a slight increase in the number and rate of reported HIV cases compared with previous years. Although the diagnostic rate was lower than in all years prior to 2012, it is the highest of the past five years. While a number of possibilities exist to explain this increase, further investigation and additional data are needed in order to determine the cause and significance.

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## Introduction

Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) are a continuing international epidemic. Though there has been tremendous progress in international efforts to end the HIV/AIDS epidemic over the last 15 years (1), an estimated 2.1 million new (incident) cases were reported in 2015 (2). Despite this, the number of new HIV cases in high-income countries is relatively low with an average diagnostic rate of 6.3 per 100,000 for the Organisation for Economic Co-operation and Development (OECD) countries included in the 2014 HIV and AIDS surveillance report (3). While Canada's rate of new diagnoses has been lower than the average of OECD countries, it still lags behind other countries such as the Netherlands, Germany, Sweden and Finland.

The Public Health Agency of Canada (PHAC) works in partnership with provincial and territorial governments, other federal departments and non-governmental organizations to address HIV/AIDS in Canada, contribute to the global efforts to eliminate HIV/AIDS, and monitor progress towards Canada's *Federal Initiative to Address HIV/AIDS*. The annual publication of HIV surveillance data is part of PHAC's mandate to collect, analyze and report on surveillance data at the national level (4).

The objective of this report is to provide a descriptive overview of the epidemiology of all reported diagnoses of HIV in Canada up to 2016 by geographic location, sex, age group, exposure category and race/ethnicity, as well as data on the number of infants perinatally exposed to HIV and the proportion of these infants receiving antiretroviral therapy (ART). In the past, HIV



data, in combination with AIDS surveillance data, were published annually by PHAC in a stand-alone report entitled *HIV and AIDS in Canada—Surveillance Report* (3). This is the first iteration of the report to be published under a new title in the *Canada Communicable Disease Report* (CCDR). Note that a separate surveillance report for 2016 AIDS cases also appears in this issue of CCDR (5). The data in these reports replace all previously published data in the HIV and AIDS surveillance series as they represent the most recent information available. Supplementary information, including data tables and exposure category definitions are available online in a web supplement on the CCDR website (6).

## Methods

Data used to prepare this HIV surveillance report came from three different sources: the national HIV/AIDS Surveillance System (HASS) maintained by PHAC, the data collected through immigration medical screening for HIV by Immigration, Refugees and Citizenship Canada (IRCC) and the Canadian Perinatal HIV Surveillance Program (CPHSP).

### HIV/AIDS Surveillance System

HASS is a passive, case-based surveillance system that collates non-nominal data on people diagnosed with HIV infection. Details on HASS's methods, including data collection processes, data management, data quality control, analysis and the classification and categorization of population subgroups have previously been described (3). In short, data, including but not limited to, age, sex, race/ethnicity and risks associated with the transmission of HIV (exposure categories) are voluntarily submitted to PHAC from all provincial and territorial public health authorities. Several limitations are present with regards to race/ethnicity and exposure category data submitted by the provinces. In particular, Quebec does not submit exposure category or race/ethnicity information for HIV cases to PHAC. For Ontario, limited exposure category information was available for reported HIV cases before 2009 and no race/ethnicity data were available for reported HIV cases before 2009. Race/ethnicity data for British Columbia were not submitted for the current reporting year and all historic ethnicity data have been removed at their request pending a review of reporting practices of these data.

Cases reported to PHAC must meet the national case definition (7). Provinces and territories provide data through the *National Case Reporting Form* (3) or through a secure electronic dataset transmission. All raw data (paper forms and electronic datasets) are retained in compliance with the *Directive for the collection, use and dissemination of information relating to public health* (PHAC, 2013, unpublished document). Assessment of the quality of data, such as the detection of duplicate entries, is handled by the provinces and territories prior to submission to PHAC. The data presented in this surveillance report represent HIV cases diagnosed on or before December 31, 2016 that were submitted by provincial and territorial surveillance programs to PHAC up to June 7, 2017.

In this surveillance report, the term "cases" or "reported cases" refers to individuals diagnosed by a province or territory in

a given year and reported to PHAC. Since surveillance data describe only the diagnosed portion of the epidemic, statistical modelling and additional sources of information are used to produce estimates that describe the overall HIV epidemic in Canada, including people with diagnosed and undiagnosed HIV infection (8).

### Immigration medical screening for HIV

All foreign nationals applying for permanent residence and some applying for temporary residence must undergo an immigration medical examination (IME), either in Canada or overseas administered by the IRCC. The IRCC conducts mandatory routine HIV screening on all applicants 15 years of age and older, as well as those under the age of 15 who have certain risk factors (9). The IRCC provides PHAC with non-nominal data collected during the IME, including demographic information as well as the year of testing (for those tested in Canada) or the year the applicant landed in Canada (for those tested overseas). Data relating to HIV diagnosed through an IME were extracted in January 2017; however, due to reporting delays only data up to the end of 2015 were provided.

### Canadian Perinatal HIV Surveillance Program

National data on the HIV status of infants exposed perinatally to HIV infection are collected through the CPHSP, an initiative of the Canadian Pediatric AIDS Research Group (CPARG). The CPHSP is a sentinel-based surveillance system that collects data on all identified infants and children in Canada born to mothers who are known to be infected with HIV, including those born outside Canada who are receiving care for HIV infection. Data were obtained through a national, non-nominal, confidential survey of infants known to participating pediatricians in tertiary care centres and specialists in HIV clinics across Canada. Additional information on CPHSP methodology has been described previously (3). The data relating to perinatal surveillance until the end of 2016 presented in this surveillance report were extracted from CPHSP's database in July 2017.

### Analysis

Microsoft Excel 2010 and SAS Enterprise Guide (SAS EG) v5.1 software were used for data cleaning and analysis. Standardized data recoding procedures were applied to all submitted provincial and territorial datasets to create a national dataset for analysis. No statistical procedures were used for comparative analysis, nor were any statistical techniques applied to account for missing data. It is worth noting that different HIV reporting requirements and practices exist across the country (10) and that completeness of some epidemiological information varies between provinces and territories; as such, when percentages were calculated, missing data were excluded.

The term "adult" is used throughout the report when examining specific variables such as exposure category. For the purposes of this report, an "adult" is anyone aged 15 years or older.

With the exception of cases where data suppression was requested by the province or territory, data in tables with small cell sizes ( $n \leq 5$ ) were not suppressed, since disclosure is not deemed to pose any risk of identifying individual cases. These

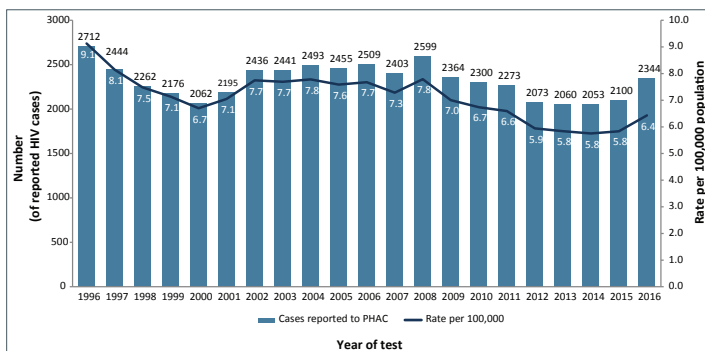


procedures are in line with PHAC's Directive for the collection, use and dissemination of information relating to public health. The data were verified by the provinces and territories to ensure accuracy. Key findings are summarised in this manuscript. Additional tables can be found in the web supplement (6).

### Results

A total of 2,344 new cases of HIV were reported in Canada in 2016, representing an 11.6% increase from the number of cases reported in 2015 (2,100 cases). This is the highest number of annual HIV cases reported since 2009 (2,364 cases) and corresponds to an increase in the national diagnosis rate from 5.8 per 100,000 population in 2015 to 6.4 per 100,000 population (Figure 1).

Figure 1: Number of reported HIV cases, including diagnostic rate, by year of test—Canada, 1996-2016



Abbreviation: PHAC, Public Health Agency of Canada  
Disaggregated data by year are not available before 1995 for some jurisdictions

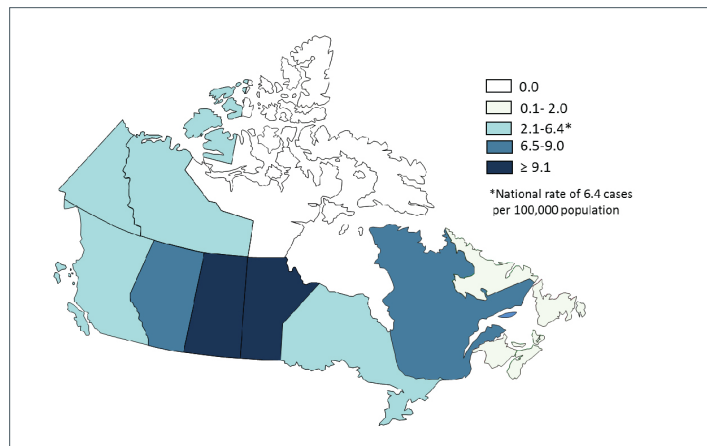
In Canada, a cumulative total of 84,409 cases of HIV have been reported to PHAC since HIV reporting began in 1985. A steady decrease of reported HIV cases was observed up until the year 2000 (2,062 cases) and then a short rise until a plateau from 2002 to 2008, when the annual number of reported HIV cases fluctuated between 2,403 and 2,599. The number of reported HIV cases then gradually declined from 2008 to 2014, followed by an increase in 2015 and 2016.

### Geographic distribution

In 2016, Ontario accounted for the highest number and proportion of reported HIV cases (n=881, 37.6%), followed by Quebec (n=593, 25.3%) and Alberta (n=282, 12.0%).

The provincial and territorial HIV diagnosis rates reveal notable variations across the country. In 2016, Saskatchewan, which accounted for 7.4% (n=174) of the total reported new HIV cases, continued to have the highest diagnosis rate of HIV at 15.1 per 100,000 population, more than double that of the overall Canadian rate. Manitoba, representing 5.4% (n=126) of the 2016 HIV cases, accounted for the next highest diagnosis rate of HIV at 9.5 per 100,000 population, followed by Quebec (7.1 per 100,000 population) and Alberta (6.6 per 100,000 population). The diagnosis rates in all other provinces and territories were below the national rate of 6.4 per 100,000 population (Figure 2, Supplementary Tables 1-3) (6).

Figure 2: HIV diagnosis rate (per 100,000 population) by province and territory—Canada, 2016



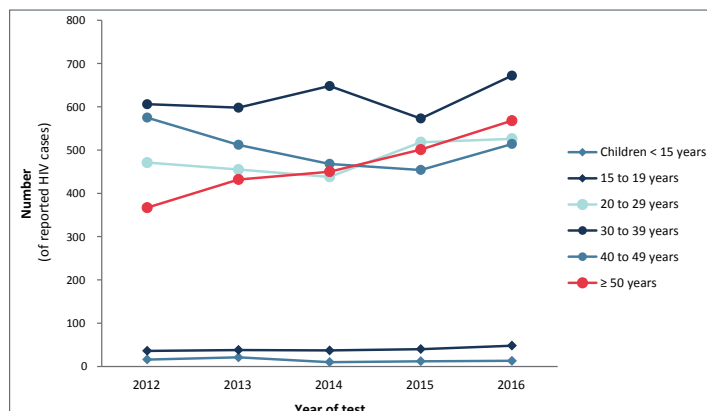
Population data source: Annual Demographic Statistics, Demography Division, Statistics Canada, October 2016

### Age group and sex distribution

Data on age groups were available for 99.9% of reported HIV cases for 2016. Since 1985 in Canada, 37.2% of reported HIV cases have been diagnosed among people 30-39 years old. In 2016, those 30-39 years old still represented the group with the most new HIV cases (28.7%) but at a lower proportion than previous years. Cases 30-39 years old experienced the highest increase from 2015 to 2016 at 17.3%, followed closely by those 50 years of age or older at 13.4%.

For the past five years, the largest increase with respect to the proportion of HIV cases by age was observed in cases 50 years of age and older, increasing 6.6% from 2012 to 2016 (17.7% to 24.3%). The largest decline was found among those 40-49 years old, decreasing 5.8% from 2012 to 2016 (27.8% to 22.0%). Youth aged 15-19 years old represented 2.1% of cases in 2016. This group has experienced a small but steady increase in the number of HIV cases reported for the past five years, while HIV cases reported in children (<15 years of age) has remained fairly consistent over the same time period when compared with all other age groups (Figure 3; Supplementary Tables 3,6) (6).

Figure 3: Proportion of reported HIV cases by age group and year of test—Canada, 2007-2016





Data on sex were available for 99.6% of reported HIV cases in 2016. In Canada, males have consistently accounted for a larger percentage of reported HIV cases than females. Over the past decade, the annual proportion of reported HIV cases among female adults (≥ 15 years) has remained stable at approximately one quarter of new cases. This trend was also observed in 2016 with females comprising 23.3% of all reported cases (Supplementary Tables 2, 4-6) (6).

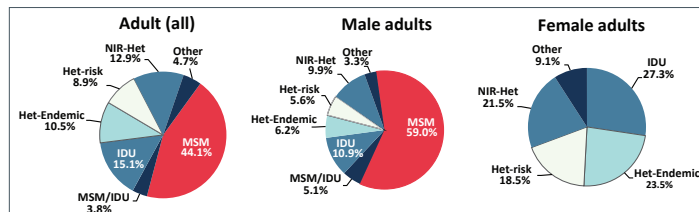
Over the past few years there have been increases in the proportion of HIV cases in the older age groups for both sexes. This trend continued in 2016, with a large proportion of cases aged 50 years and older for both sexes, specifically 25.6% in males and 20.3% in females (Figure 4). There has also been a shift over time in the age distribution for both sexes. While historically, HIV cases have been more frequent in younger age groups for females and older age groups for males, there has been an 11.3% decrease among females aged 20–29 and an increase of 7.5% in the corresponding male age group since 2001. In both sexes, cases aged 30–39 were still the highest proportion of HIV cases accounting for 27.7% and 31.8% of males and females respectively in 2016 (Figure 4).

### Exposure category distribution

The men who have sex with men (MSM) exposure category continued to represent the largest number and proportion of all reported HIV cases in adults. In 2016, among adults whose exposure category was known (61.6% of all cases), slightly less than half (44.1%) were attributed to the MSM exposure category. The second highest reported exposure category was heterosexual contact (32.3%), with a fairly even distribution of HIV cases attributed to heterosexual contact among people

born in a country where HIV is endemic (Het-Endemic, 10.5%), heterosexual contact with a person at-risk (Het-Risk, 8.9%) and heterosexual contact with no identified risk (NIR-Het, 12.9%). The third-most frequently reported exposure category among adults was injection drug use (IDU), accounting for 15.1% of reported HIV cases (Figure 5, Supplementary Table 7) (6). No major changes in the proportions in exposure categories were noted between 2015 and 2016.

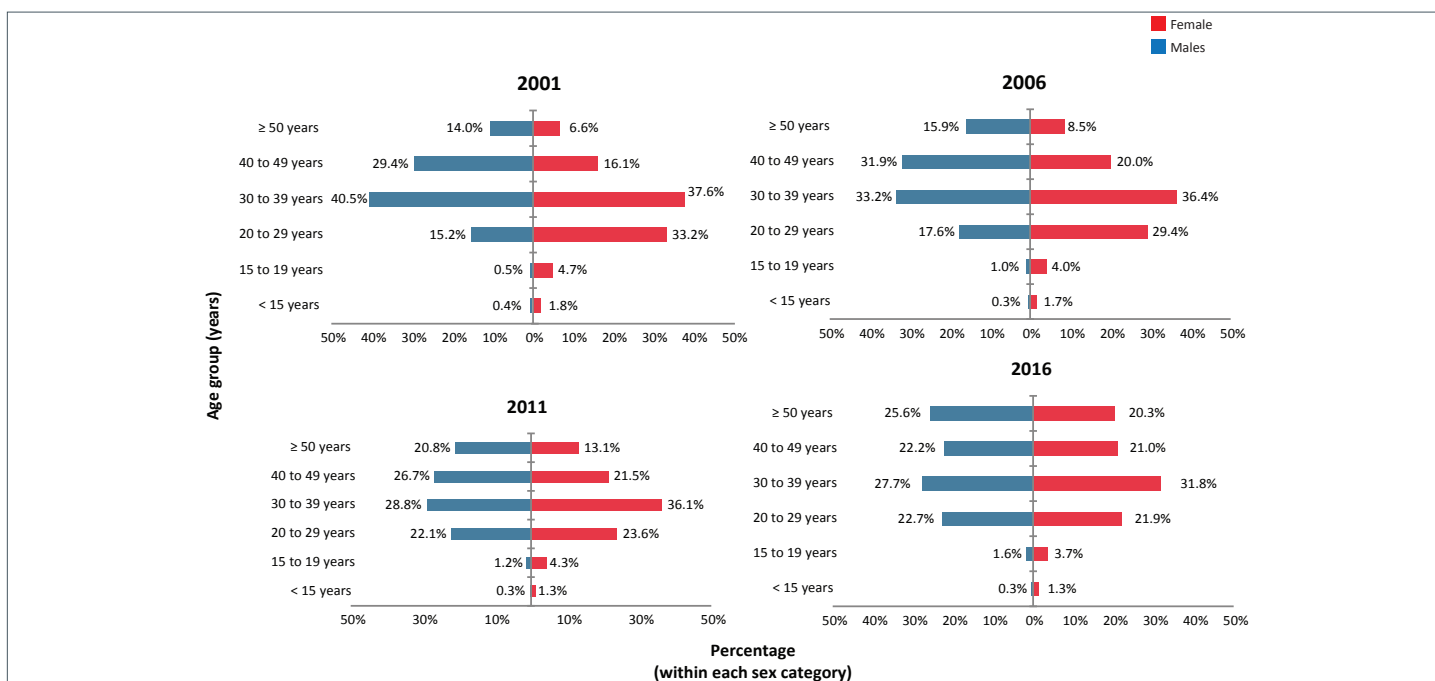
**Figure 5: Proportion of reported HIV cases among all adults (≥ 15 years old), adult males and adult females by exposure category—Canada, 2016**<sup>1,2</sup>



Abbreviations: Het-Endemic, heterosexual contact among people born in a country where HIV is endemic; Het-Risk, heterosexual contact with a person at-risk; IDU, injection drug use; MSM, men who have sex with men; MSM/IDU, men who have sex with men and use injection drugs; NIR-Het, heterosexual contact with no identified risk  
<sup>1</sup> Percentages are based on the total number of reported cases excluding "NIR" and "not reported" cases. Note that exposure category data were not available for Quebec. Both male and female charts exclude HIV cases where sex was not reported or reported as transsexual or transgender  
<sup>2</sup> "Other" includes recipient of blood/clotting factor, unspecified exposure routes listed as "other" and Alberta, cases identified as "out of country"

The distribution of HIV cases among adult males and females varied with respect to exposure category. In 2016, the MSM exposure category continued to account for the greatest

**Figure 4: Age group distribution of reported HIV cases by sex—Canada, 2016**<sup>1</sup>



<sup>1</sup> Denominators used to calculate percentages exclude "sex not reported/transsexual/transgender" and "age group not reported"



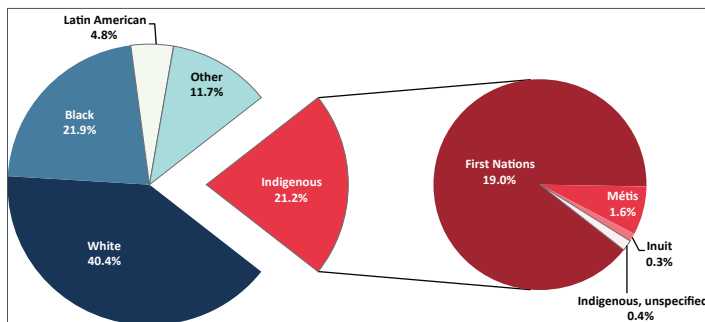


proportion (59.0%) of reported HIV cases among adult males, followed by any type of heterosexual contact (21.6%) and IDU (10.9%). Among adult females, heterosexual contact accounted for 63.5% of reported cases (23.5% Het-Endemic, 21.5% NIR-Het and 18.5% Het-Risk), followed by IDU (27.3%). With respect to heterosexual contact, there was a substantial difference between males and females in the Het-Endemic exposure category. Het-Endemic cases among males accounted for 6.2% compared with 23.5% among females. The IDU exposure category accounted for slightly over one-quarter of adult female HIV cases (27.3%), compared with 16.0% of adult male HIV cases (10.9% via IDU exposure and up to 5.1% in the MSM/IDU exposure category (Figure 5, Supplementary Tables 8–11) (6).

### Race/ethnicity distribution

In 2016, information on race/ethnicity was available for nearly half (48.6%) of reported HIV cases. Since 1998, when race/ethnicity data were first collected, the White race/ethnicity has accounted for the largest proportion of new HIV cases in Canada for all ages and sexes (44.4%). In 2016, less than half of the reported HIV cases with a known race/ethnicity were White (40.4%), followed by Black (21.9%) and Indigenous (21.2%). The Indigenous race/ethnicity was further broken down to 19.0% First Nations, 1.6% Métis, 0.4% Indigenous-unspecified and 0.3% Inuit. Between 2015 and 2016 the First Nations race/ethnicity subgroup experienced the largest increase (29.9%) in case counts of all reported races/ethnicities and Indigenous subgroups (Figure 6, Supplementary Table 12) (6).

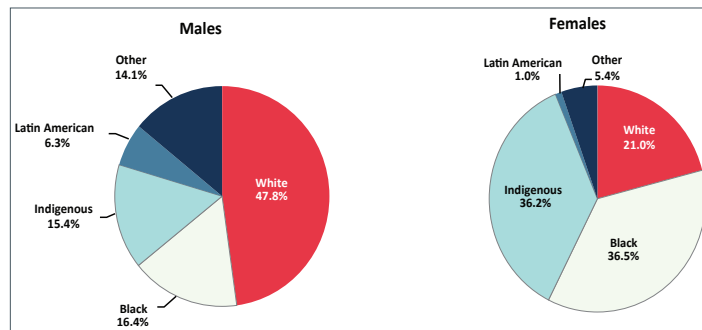
Figure 6: Proportion of reported HIV cases (all ages) by race/ethnicity (including the Indigenous subgroups)—Canada, 2016 1,2,3,4



1 Race/ethnicity information was not available for Quebec and British Columbia  
2 Excludes cases where race/ethnicity was not reported  
3 "Latin American" includes, for example, Mexican, Central American and South American  
4 "Other" includes, for example, Pakistani, Sri Lankan, Bangladeshi, Armenian, Egyptian, Iranian, Lebanese, Moroccan, Chinese, Japanese, Vietnamese, Cambodian, Indonesian, Laotian, Korean, Filipino, Somali, Haitian and Jamaican

Variations were also observed in the race/ethnicity distribution by sex. In 2016, the majority of reported cases among males were of White race/ethnicity (47.8%), followed by Black (16.4%) and Indigenous (15.4%). By comparison, just over one-third of females were identified as Black (36.5%), followed by Indigenous (36.2%) and White (21.0%) (Figure 7, Supplementary Tables 13,14) (6).

Figure 7: Proportion of reported HIV cases (all ages) by sex and race/ethnicity—Canada, 2016 1,2,3,4

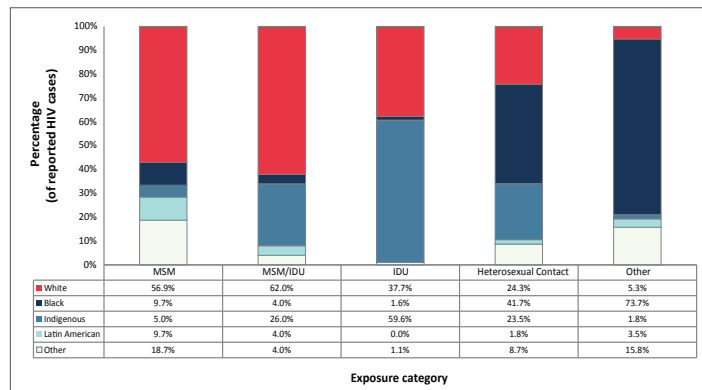


1 Race/ethnicity information is not available for Quebec and British Columbia  
2 Denominators used to calculate percentages exclude HIV cases where race/ethnicity was "not reported" and HIV cases where sex was "not reported" or "reported" as transsexual or transgender  
3 Latin American includes, for example, Mexican, Central American and South American  
4 Other includes, for example, Pakistani, Sri Lankan, Bangladeshi, Armenian, Egyptian, Iranian, Lebanese, Moroccan, Chinese, Japanese, Vietnamese, Cambodian, Indonesian, Laotian, Korean, Filipino, Somali, Haitian and Jamaican

### Race/ethnicity and exposure category distribution

Information on both race/ethnicity and exposure category was available for 47.4% of reported cases in 2016. In 2016 the majority of cases were reported as White within the MSM exposure category (56.9%). Of the cases attributed to IDU, almost all of the HIV cases were either Indigenous (59.6%) or White (37.7%). The main racial/ethnic group among reported cases attributed to heterosexual contact was Black (41.7%), 84.3% of whom were reported as Het-Endemic exposure (Figure 8, Supplementary Table 15) (6).

Figure 8: Proportion of reported HIV cases (all ages) by exposure category and race/ethnicity—Canada, 2016 1,2,3,4,5



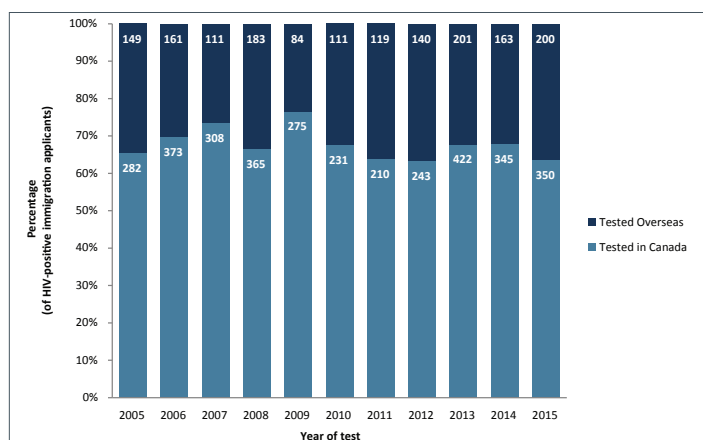
Abbreviations: IDU, injection drug use; MSM, men who have sex with men; MSM/IDU, men who have sex with men and use injection drugs  
1 Race/ethnicity information is not available for Quebec and British Columbia  
2 Excludes HIV cases where race/ethnicity or exposure category was "not reported"  
3 Latin American includes, for example, Mexican, Central American and South American  
4 Other race/ethnicity includes, for example, Pakistani, Sri Lankan, Bangladeshi, Armenian, Egyptian, Iranian, Lebanese, Moroccan, Chinese, Japanese, Vietnamese, Cambodian, Indonesian, Laotian, Korean, Filipino, Somali, Haitian and Jamaican  
5 Other exposure category includes recipient of blood/clotting factor and unspecified exposure routes listed as "other"



## Immigration medical screening for HIV

In 2015, there were 550 applicants for Canadian residency who tested positive for HIV. Of the 550, 350 underwent an IME in Canada and 200 underwent an IME overseas. Note that the data do not distinguish between those who eventually established residency in Canada and those who did not (Figure 9, Supplementary Table 16) (6).

**Figure 9: Proportion of HIV-positive immigration applicants by testing location and year of test, 2005–2014**<sup>1,2</sup>



<sup>1</sup> Immigration, Refugees and Citizenship Canada, IRCC HIV Database as of July 2017. Immigration, Refugees and Citizenship Canada, IRCC HB Post-Arrival Health Public Health Liaison Unit Provincial Notifications - Overseas Notifications Database as of July 2017. Reproduced and distributed with the permission of Immigration, Refugees and Citizenship Canada

<sup>2</sup> For applicants tested in Canada, the year refers to the year of the test. For applicants tested overseas, the year refers to the year the applicant landed in Canada

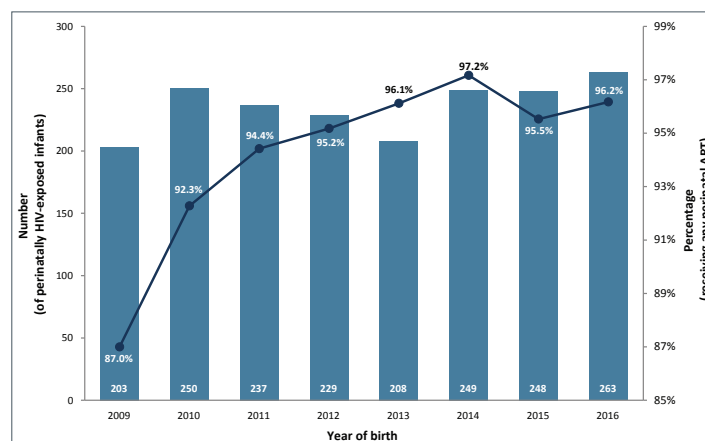
Of applicants who underwent an IME in Canada from 2002 to 2015, a total of 4,364 were diagnosed with HIV infection, at an average of 312 diagnoses per year (range: 210 to 422). In total, 57.1% of these HIV-positive applicants were male. The majority of all applicants who tested positive in Canada were either in the 30–39 years old (41.9%) or 40–49 years old (25.0%) age group. The greatest proportion of these HIV-positive applicants were tested in Ontario (54.7%), Quebec (25.2%), British Columbia (8.7%) and Alberta (7.6%) (Supplementary Table 17) (6).

Of applicants screened overseas from 2005 to 2015 who landed in Canada, 1,622 were diagnosed with HIV infection, at an average of 147 per year (range: 84 to 201). Just over half (51.4%) were female. The majority (40.0%) were 30 to 39 years old, followed by those 20 to 29 years old (25.3%). Ontario was the most common intended province of residence (33.4%), followed by Quebec (25.0%), Alberta (14.4%), British Columbia (12.9%) and Manitoba (8.7%). Among these HIV-positive applicants, 72.1% were born in HIV-endemic countries (Supplementary Table 17) (6).

## Canadian Perinatal HIV Surveillance Program

From 1984 to 2016, 4,849 infants in Canada were identified as being perinatally HIV-exposed to HIV. The number of HIV-exposed infants reported per birth year between 2009 and 2016 fluctuated from a low of 203 in 2009 to a high of 263 in 2016 (Figure 10, Supplementary Table 18–22) (6).

**Figure 10: Number of perinatally HIV-exposed infants and proportion of perinatally HIV-exposed infants receiving perinatal antiretroviral therapy by year of birth—Canada, 2009–2016**



Abbreviation: ART, antiretroviral therapy

Of the 263 perinatally-exposed infants born in 2016, one HIV transmission was confirmed in a mother not receiving any perinatal antiretroviral therapy (ART). The percentage of HIV-positive mothers receiving ART has increased over time and has been fairly stable since 2011, ranging between 94.4% (2011) to 97.2% (2014); in 2016, the percentage was slightly lower than 2014 at 96.2% (Figure 10, Supplementary Table 18) (6).

A review of all perinatally-exposed infants from 1984 to 2016 showed that 73.8% were born to mothers who acquired HIV infection through heterosexual contact (71.0% in 2016) and 22.8% were attributed to IDU exposure (22.3% in 2016) (Supplementary Table 19) (6).

With respect to the race/ethnicity distribution of perinatally-exposed infants from 1984 to 2016, 49.8% were reported as Black, 23.8% as White and 17.8% as Indigenous. In 2016, the Black race/ethnicity remained the most frequently reported race/ethnicity with a proportion (48.7%) similar to that seen in 1984–2016. The proportion of infants of Indigenous race/ethnicity has progressively increased reaching a high of 25.5% in 2016 and the proportion of infants of White race ethnicity has decreased to a low of 11.8% (Supplementary Table 20) (6).

Maternal region of birth for the majority of infants from 1984–2016 was North America (42.4%), Africa (38.2%) or the Caribbean (9.8%) (Supplementary Table 21). For the same time period, the highest proportion of perinatally HIV-exposed infants was reported in Ontario (34.6%), followed by Quebec (25.7%) and Alberta (14.1%) (Supplementary Table 22) (6).

## Discussion

In 2016, there was an 11.6% increase in the number of HIV diagnoses compared with 2015 and this represents the highest rate since 2011. A number of possibilities exist to explain this increase in cases including increased testing due to the implementation of provincial testing initiatives (11–13).



The majority of increases were observed in Quebec, Alberta, Manitoba and Ontario although, overall, Saskatchewan had the highest absolute rate. Across age, sex and race/ethnicity, the greatest increases were observed among those 30–39 years old, the adult male sex and First Nations ethnicity respectively. It is also important to note that for Quebec, the reported increase can in part be explained by a partial shift in 2016 to nominal testing from non-nominal testing as non-nominal cases were not all previously captured for federal reporting.

At the national level, the differences previously observed between the age distribution of males and females have been reduced over the past five years, resulting in a similar age distribution between sexes for 2016. This effect is due to increased proportions diagnosed within older age groups for both sexes. The proportion of HIV diagnoses among Canadians 50 years and older has been increasing gradually since 1985. It is possible that the observed change has been driven by a population with unique risk factors such as higher proportions of widowed and divorced people engaging in new relationships, lower proportions of protected sex due to lack of pregnancy concerns, and a stronger stigma associated with discussion of sexual and drug habits with doctors in this older age group (14).

At the national level, differences continued to be observed between males and females with respect to exposure category and race/ethnicity distribution. Men who have sex with men, the most frequent exposure category in males, was associated with the White race/ethnicity, while heterosexual contact and IDU, the two most predominant exposure categories in females, were associated with people of Black and Indigenous races/ethnicities respectively. Although the White race/ethnicity was the most common racial/ethnic group, both Indigenous and Black people were disproportionately represented as they each make up less than 5% of the population in Canada (15,16), but account for more than 20% individually of the newly reported HIV cases. Of note, however, ethnicity data were available in only about half of reported cases.

Trends in exposure category have shifted since HIV reporting began in 1985. In the early stages of the epidemic, over 80% of all reported HIV cases with known exposure category were attributed to MSM and although this exposure category is still predominant in Canada, the proportion has decreased over the years. Heterosexual contact and IDU exposure remained the second and third most predominant HIV exposure categories in Canada respectively.

### Strengths and limitations

The 2016 *HIV in Canada – Surveillance Report* is the primary source of national data on reported new HIV cases in Canada. The data contained within this report provide information for policy and program development and assessment, as well as public health action. While details regarding the data limitations of HASS have been previously published (3), several limitations should be highlighted. First, data in this report are deemed provisional and may be subject to change in future HIV surveillance reports, as data are updated. Differences between the data published in this report and the data issued in previous national, provincial and territorial surveillance reports may be due to reporting delays or differences in when the data were

extracted from the various surveillance databases. Where such differences are noted, it is recommended that data from the most recent provincial and territorial reports be used.

Second, HASS is a passive, case-based surveillance system that collates data submitted voluntarily to PHAC, on a yearly basis, from all provincial and territorial public health authorities, as opposed to active case solicitation. As a result, it is difficult to ascertain whether all individuals with HIV infection are being identified and reported. The accuracy of the data is partially a function of timely reporting and updates to PHAC from the provinces and territories. Some degree of lag does occur, creating a reporting delay. In addition, reporting of HIV cases for individuals younger than two years of age and those diagnosed prior to immigration also varies among provinces and territories. Occasionally there can be changes to provincial reporting practices which can impact the data.

Third, the identification and removal of duplicate reports of new diagnoses is difficult due to the non-nominal nature of HIV reporting in some jurisdictions. Where possible, provinces and territories review and assess the inclusion of duplicate reports in order to provide as accurate a picture as possible of the number of new individuals who have tested positive for HIV. Some provinces (e.g., Quebec), take a conservative approach to removing potential duplicates, including the exclusion of results from anonymous tests. For jurisdictions that use such an approach, the data presented in this report reflect the minimum number of new HIV diagnoses in that jurisdiction.

Fourth, across the provinces and territories, there is no standardized approach to the handling of HIV cases previously diagnosed out of country or out of province/territory, with some provinces and territories counting them as new cases and others excluding them. Additionally, varying approaches are also applied to HIV diagnoses under the age of two. As a result of both of these, there exists the possibility for small over- or under-reporting of new diagnoses depending on the provincial/territorial rules.

Finally, there are several limitations associated with the reporting of exposure category and race/ethnicity. As noted, little to no exposure category or race/ethnicity information for HIV cases is available from Quebec and Ontario, and no race/ethnicity information is available from British Columbia. Therefore national trends presented in this report may not be fully representative and must be interpreted with caution.

### Conclusion

Canada experienced an increased number and rate of reported HIV cases in 2016. Although this diagnostic rate was lower than in all years prior to 2012, it is the highest of the past five years. Further investigation and additional data are needed to determine the significance and cause of this increase. PHAC will continue to collect and report on HIV surveillance data to observe trends and monitor progress toward the goal of reducing the burden of HIV infection in Canada and internationally.



## Authors' statement

ACB—conceptualization, writing—original draft, review and editing, supervision  
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 LJ—software, validation, data curation, writing—review and editing  
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 WS—writing—review and editing, project administration, supervision

## Conflict of Interest

None.

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# AIDS in Canada—Surveillance Report, 2016

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## Abstract

**Background:** Although there continues to be a global epidemic of people living with human immunodeficiency virus (HIV) there has been a decrease in the number of people dying of acquired immunodeficiency syndrome (AIDS), largely due to successful treatment with antiretroviral therapy.

**Objective:** To provide a descriptive overview of the reported cases of AIDS in Canada by identifying trends by geographic location, sex, age group and mortality. While the descriptive analysis focuses on the year 2016, results are presented for reported cases from the beginning of national AIDS surveillance in 1979.

**Methods:** The Public Health Agency of Canada (PHAC) monitors AIDS in Canada through the national HIV/AIDS Surveillance System (HASS) and Statistics Canada. HASS is a passive, case-based surveillance system that maintains non-nominal data on cases of HIV and AIDS provided voluntarily by the Canadian provinces and territories. Of note, AIDS is no longer a reportable disease in Newfoundland and Labrador (as of 2009) and in Prince Edward Island (as of 2012). Data were also retrieved on annual deaths attributed to HIV/AIDS from Statistics Canada. Data were collated, tables and figures were prepared, then descriptive statistics were applied by PHAC and validated by each province and territory.

**Results:** A total of 114 AIDS cases were reported in 2016, with a cumulative total of 24,179 since 1979. These numbers represent a steady decline in the number of reported AIDS cases per year of diagnosis in Canada since 1993. Of reporting provinces, the greatest numbers of cases in 2016 were reported by Ontario, Saskatchewan and Alberta. Males accounted for 72.8% of reported AIDS cases and adults aged 50 years and older accounted for the greatest proportion by age group (36.0%). For all reporting years combined, the age distribution of AIDS cases is similar by sex, though a larger proportion of female cases were under the age of 30 years old. Limited data were reported for ethnicity and risk factors. The numbers of annual deaths attributed to AIDS infection have been declining since 1995. There were a record low of 241 AIDS-related deaths reported in 2013—the most recent year for which data were available. The number of AIDS-related deaths in Canada has declined 86.2% since 1995.

**Conclusion:** The number of AIDS cases reported by participating provinces and territories and the number of AIDS-related deaths reported by Statistics Canada has declined. While this represents a promising trend, the data should be interpreted with caution given the limitations of the dataset which could lead to an underestimate of the magnitude of the disease.

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## Introduction

Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) are a continuing international epidemic. There has been tremendous progress in international efforts to end the HIV/AIDS epidemic over the last 15 years (1) and the Joint United Nations Programme on HIV/AIDS (UNAIDS) has set a global commitment to ending the AIDS epidemic by 2030 (2). Since treatment targets were set in 2003, global annual AIDS-related deaths have decreased by 43%. While internationally an estimated one million people died from AIDS-related deaths in 2016, in high-income countries, the number of people living with AIDS and dying from AIDS-related deaths is markedly lower (3). Due in part to declining numbers of AIDS cases, some countries (for example, Australia) have ceased to include data on AIDS in their annual surveillance reports (4,5).

The Public Health Agency of Canada (PHAC) works in partnership with other federal agencies, provincial and territorial governments, and other non-governmental organizations to address HIV and AIDS in Canada. This surveillance report is based on case reports of new diagnoses of AIDS submitted to PHAC by all participating provinces and territories, and also presents data received from Statistics Canada (6). The annual publication of AIDS data is part of PHAC's mandate to collect, analyze and report on surveillance data at the national level.

The objective of this report is to provide a descriptive overview of the reported cases of AIDS from participating provinces by identifying trends by geographic location, sex, age group and mortality. Previously, AIDS data were published annually, in combination with HIV data, in a stand-alone document

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entitled *HIV/AIDS in Canada: Surveillance Report*. This is the first iteration of this report to be published under a new title, *AIDS in Canada—Surveillance Report, 2016* in the *Canada Communicable Disease Report (CCDR)*. Note that a separate surveillance report for HIV cases, entitled *HIV in Canada—Surveillance Report, 2016* also appears in this issue of *CCDR* (7).

### Methods

This report presents data from two different sources relating to HIV and AIDS: the national HIV/AIDS Surveillance System (HASS) and Statistics Canada’s *Vital Statistics Death Database*. HASS is a passive, case-based surveillance system that collates and maintains data voluntarily submitted to PHAC from all provincial and territorial public health authorities. Details regarding data collection, data management, data quality and population group classification have been previously described (8). In short, the HASS database captures non-nominal data on people diagnosed with AIDS and includes, but is not limited to, reporting province or territory, year of test, age group, sex, risk factors (also known as exposure category) and race/ethnicity. In this surveillance report, the term “cases” or “reported cases” refers to individuals diagnosed by a province or territory in a given year and reported to PHAC. AIDS cases are counted by the date that the reporting jurisdiction confirmed the diagnosis of AIDS.

Reported AIDS cases must meet the Canadian surveillance case definition as described in PHAC’s *CCDR* publication *Case definitions for communicable diseases under national surveillance* (9). Provinces and territories that provide the data to HASS do so through the *National Case Reporting Form* (8) or through a secure electronic dataset transmission. All raw data (paper forms and electronic datasets) are retained in compliance with the *Directive for the collection, use and dissemination of information relating to public health* (Public Health Agency of Canada, 2013, unpublished document). Details regarding the HIV/AIDS exposure categories are available in the Web Exclusive of this issue (10).

AIDS data and the completeness of epidemiological information collected and submitted to PHAC vary by jurisdiction. With respect to AIDS reporting, there have been some changes that have occurred over time that affect the completeness of AIDS surveillance data. Ontario data on exposure category and race/ethnicity were not available after 2004 and Quebec AIDS data were not available after June 30, 2003. AIDS is no longer a reportable disease in Newfoundland and Labrador (as of 2009) and in Prince Edward Island (as of 2012). Due to expected delays associated with reporting of AIDS cases from British Columbia, there is a one-year lag in publication of AIDS data (e.g., 2015 AIDS data were published in the 2016 surveillance report). British Columbia race/ethnicity information for HIV/AIDS cases has been suppressed for all years while a review of this information is being undertaken by the province.

The data presented represent reported AIDS cases by participating jurisdictions diagnosed on or before December 31, 2016, that were submitted to PHAC by June 7, 2017. The data were extracted from the HASS database later in June 2017. Standardized data recoding procedures were applied to all submitted provincial and territorial datasets to create a national dataset for analysis. The descriptive and comparative analyses focus on the year 2016; however, data from 2015 are also highlighted since, due to infrastructure improvements to the HASS database, jurisdictions had not been previously asked

to submit AIDS data for 2015. Data on cases reported since the beginning of AIDS surveillance in 1979 are also presented.

The complete data regarding annual deaths attributed to HIV/AIDS are available from Statistics Canada (6).

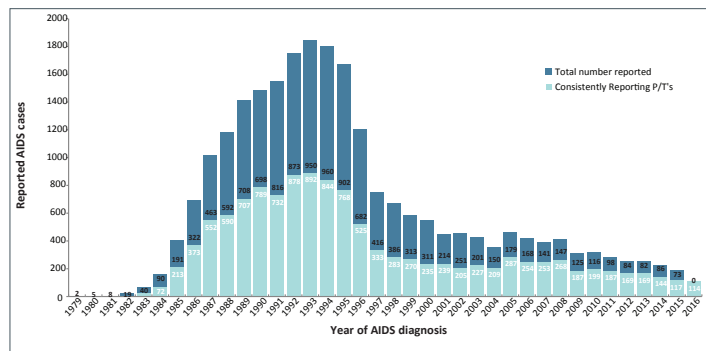
Microsoft Excel 2010 and SAS Enterprise Guide (SAS EG) v5.1 software were used for data cleaning and analysis. No statistical procedures were used for comparative analyses, nor were any statistical techniques applied to account for missing data.

With the exception of cases where data suppression was requested by the province or territory, data in tables with small cell sizes (n≤5) were not suppressed, since disclosure was not deemed to pose any risk of identifying individual cases. These procedures are in line with PHAC’s *Directive for the collection, use and dissemination of information relating to public health (unpublished document)*. The data were verified by the provinces and territories to ensure accuracy. Supplementary information, including data tables can be found in the Web Exclusive (10).

### Results

The number of reported AIDS cases per year of diagnosis in Canada has decreased steadily since the mid-1990s (Figure 1). In 2016, there were 114 AIDS cases reported to PHAC; down from 190 reported in 2015. It is, however, important to note that Quebec, Newfoundland and Prince Edward Island no longer report AIDS, and the number of new AIDS cases in 2016 in BC was not yet available at the time of publication of this report. This number of reported AIDS cases per year represents an 87.2% decrease relative to 1993, when the highest number of cases for these provinces and territories that have continuously reported AIDS was reported (n=892). From 1979 to the end of 2016, a total of 24,179 AIDS cases were reported to PHAC.

Figure 1: Number of reported AIDS cases by year of diagnosis—Canada, 1979–2016



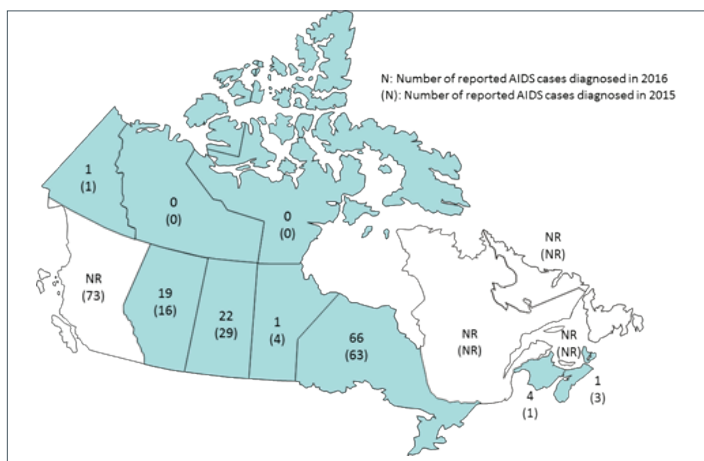
Abbreviation: P/T, province or territory  
Legend: The upper section of the figure represents the cases reported by any P/T that has stopped reporting AIDS over time, or did not report in 2016 (QC (2003), NL (2009), PE (2012), and BC (2016)). The lower portion of each bar represents the cases reported by provinces that have consistently reported AIDS cases to PHAC since 1979

### Geographic distribution

Among the provinces and territories reporting AIDS cases in 2016, the largest numbers of cases reported were in Ontario (n=66), Saskatchewan (n=22) and Alberta (n=19). In 2015 the largest numbers of AIDS cases were reported in British Columbia (n=73), followed by Ontario (n=63) and Saskatchewan (n=29) (Figure 2; Supplementary Table 1) (10).



**Figure 2: Number of reported AIDS cases diagnosed by province/territory in 2015 and 2016**

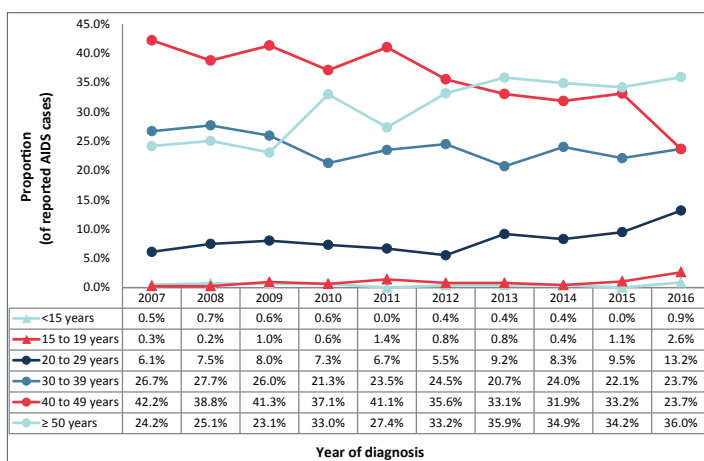


Abbreviation: NR, not reported

### Age and sex distribution

Data on age group and sex were available for all reported AIDS cases in 2016; the greatest proportion of cases was among those 50 years and older (36.0%), followed by cases aged 30 to 39 years old and 40 to 49 years old (each 23.7%) (Figure 3). One AIDS case was reported in a child less than one year old.

**Figure 3: Proportion of AIDS diagnoses by age group, by year—Canada, 2007–2016**



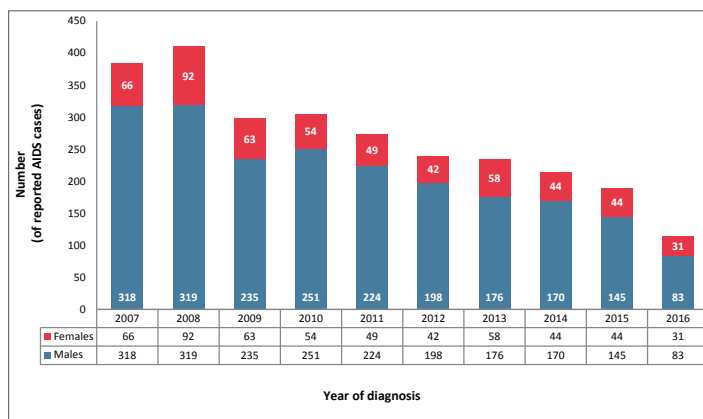
Note: Quebec AIDS data have not been available since June 30, 2003. British Columbia AIDS data were not available for 2016. AIDS is no longer a reportable disease in Newfoundland and Labrador as of 2009 and in Prince Edward Island as of 2012. This also excludes AIDS cases for which age was not reported

In 2016, the majority of reported AIDS cases were male (72.8%). Over all reporting years (1979-2016) the age distribution of AIDS cases is somewhat similar by sex, though a larger proportion of female cases were under the age of 30 (Figure 4; Supplementary Tables 1-6) (10).

### Exposure category

In 2016, 37.7% of reported AIDS cases had information on exposure category. Of the available 2016 data (from Yukon, Northwest Territories, Alberta, Saskatchewan, Manitoba, Nova Scotia, and New Brunswick), the largest proportions of exposure

**Figure 4: Number of reported AIDS diagnoses by sex—Canada, 2007–2016**



Note: Quebec AIDS data have not been available since June 30, 2003. British Columbia AIDS data were not available for 2016. AIDS is no longer a reportable disease in Newfoundland and Labrador as of 2009 and in Prince Edward Island as of 2012. This also excludes AIDS cases for which sex was not reported or was reported as transsexual or transgender

categories reported, among adults, were injection drug use (IDU) (35.0%) and sexual contact with a person at risk (20.0%). This differs from 2015 (which includes British Columbia data), where proportions for the “men who have sex with men” and IDU exposure categories were similar at 23.7% and 27.8% respectively (Supplementary Tables 7-11) (10).

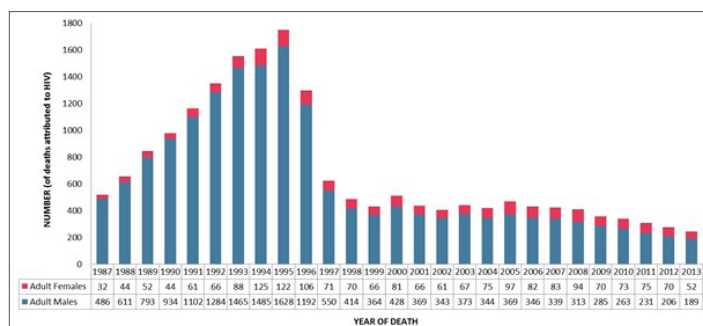
### Race/ethnicity

In 2016, 38.6% of reported AIDS cases had information on race/ethnicity. Of the available 2016 data (from Yukon, Northwest Territories, Alberta, Saskatchewan, Manitoba, Nova Scotia and New Brunswick), the largest proportions of races/ethnicities reported, for all age groups, were Indigenous (50.0%), White (29.5%) and Black (13.6%) (Supplementary Table 12) (10).

### AIDS mortality

Data from the *Vital Statistics Death Database* show that the numbers of annual deaths attributed to HIV infection have been declining since 1995 (Figure 5). The lowest recorded number of deaths attributed to HIV infection (n=241) was reported in 2013, the most recent year for which data were available. Of these reported AIDS-related deaths, there were more males than females (Supplementary Tables 13-15) (10).

**Figure 5: Number of deaths attributed to HIV infection among adults (≥15 years old) by year of death and sex—Canada, 1987–2013**



Note: From Statistics Canada. Canadian Vital Statistics, Birth and Death Databases (8)





## Discussion

The number of reported AIDS cases in Canada has experienced an overall decline since the mid-1990s, with a total of 114 AIDS cases reported from participating provinces and territories in 2016. This is the lowest number of AIDS cases reported in one year since 1985 (10). Of provinces reporting in 2016, the highest count of AIDS cases were attributed to Ontario (n=66). Injection drug use (35.0%) and the over 50 year old age group (36.0%) continued to be the exposure category and age group with the largest proportion of new cases. In 2016, AIDS cases were most common in men (72.8%) and those reported as being of Indigenous race/ethnicity (50.0%). It is important to note that the total AIDS case counts across all reporting years tend to overstate the decrease from the highest year (1993) to 2016 due to a number of provinces removing AIDS as a reportable disease since 2003. Still, when examining only the provinces who submitted 2016 AIDS data, there remains an 87.2% decrease in AIDS cases from 1993 to 2016.

With the exclusion of British Columbia (n=73), the highest counts of AIDS cases in 2015 were attributed to Ontario (n=63), Saskatchewan (n=29) and Alberta (n=16). No changes to this trend were noted in 2016, with the highest AIDS case counts found in Ontario (n=66), Saskatchewan (n=22) and Alberta (n=19). Of the reported cases in 2016, adults aged 50 years and older accounted for the largest proportion of AIDS cases (36.0%) with the increase over the past five years in proportion to newly diagnosed HIV cases in this age group (11). Over all reporting years, when comparing males to females, there was a greater proportion of AIDS cases in the older age groups (30-50+ years old) for males than females, while females made up a greater proportion of cases in the younger age groups (0-29 years old). This is consistent with the proportions of age groups in cumulative HIV cases across all reporting years; however, it is possible that the distribution of female AIDS cases will shift to older age groups over time, as a similar trend has been noted in HIV cases in recent years (11).

Based on the most comprehensive dataset from Statistics Canada, the number of annual deaths attributed to HIV infection in Canada has been declining since 1995, with the most recent data showing 241 deaths in 2013—the lowest number yet. Of these, 78.4% were adult males and 21.6% were adult females, with no reported deaths in children (<15 years).

## Limitations and data quality

The data in this report are deemed provisional and may be subject to change in future iterations of the AIDS in Canada surveillance report. Differences between the data published in this report and the data published in previous national, provincial and territorial surveillance reports may be due to reporting delays or differences in when the data were extracted from the various surveillance databases. Where such differences are noted, it is recommended that data from the most recent provincial and territorial reports be used.

Several limitations need to be considered. First HASS is a passive, case-based surveillance system, so it is not possible to ascertain whether all individuals with AIDS infection are being identified and reported from participating provinces. AIDS cases may be underreported for a number of reasons. Since AIDS results from an advanced HIV infection and since HIV is a chronic infection with a long latency period, many individuals who are newly infected in a given year may not receive a diagnosis of HIV for months or years (12). Additionally, not all jurisdictions

report AIDS cases to PHAC, and many physicians fail to report AIDS-defining illness for those patients already living with HIV. A second limitation is that three provinces no longer report AIDS cases. Third, reporting is not always complete; for example, exposure category or ethnicity data are submitted for fewer than 40% of cases. Fourth, data on deaths attributed to HIV infection are available only from 1987 onward and most recent available data are from 2013. Finally, the identification and removal of duplicates is difficult due to the non-nominal nature of HIV reporting in some jurisdictions. Where possible, provinces and territories review and assess the inclusion of duplicate reports in order to provide as accurate a picture as possible. Further details regarding data limitations have been published previously (3).

## Conclusion

Canada has seen consistent reductions in reported AIDS cases and AIDS-related deaths, with 2016 representing the lowest annual counts to date for both. While this represents a promising trend, the data should be interpreted with caution given the limitations of the dataset, which could lead to an underestimation of the magnitude of the disease. As the primary source of national data on AIDS cases, the data within this report provide information for public health action and allow for the monitoring of Canadian and global efforts to end the AIDS epidemic by 2030.

## Authors' statement

LJ—conceptualization, software, validation, visualization, writing—original draft, review and editing  
ACB—writing—review and editing, supervision  
ME—methodology, software, validation, data curation, visualization, writing—original draft, review and editing  
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## Conflict of Interest

None.

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The Public Health Agency of Canada would like to acknowledge the following individuals from the provincial and territorial HIV/AIDS programs for their contribution and participation:

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