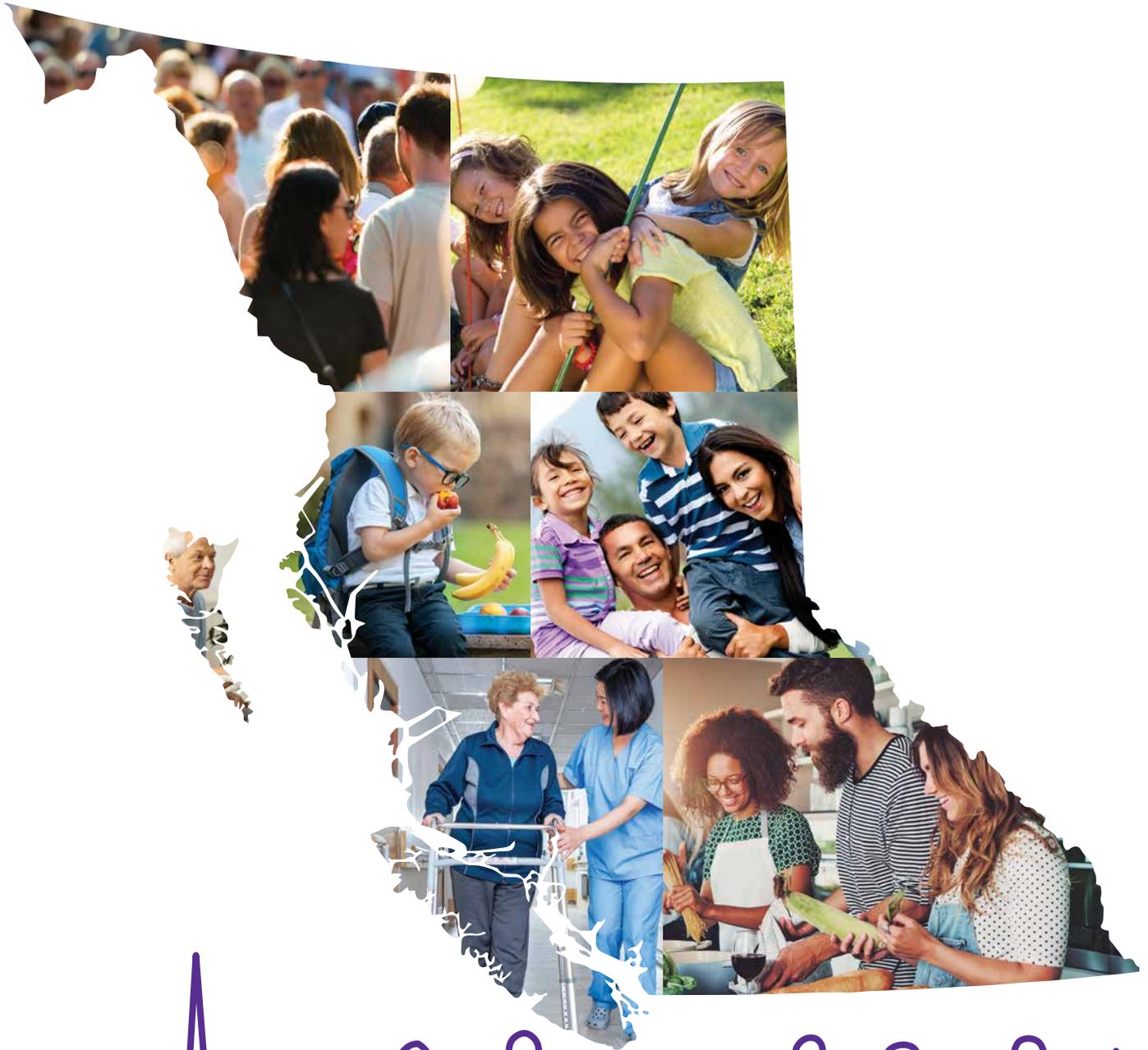


TAKING THE PULSE OF THE POPULATION

AN UPDATE ON THE HEALTH OF BRITISH COLUMBIANS

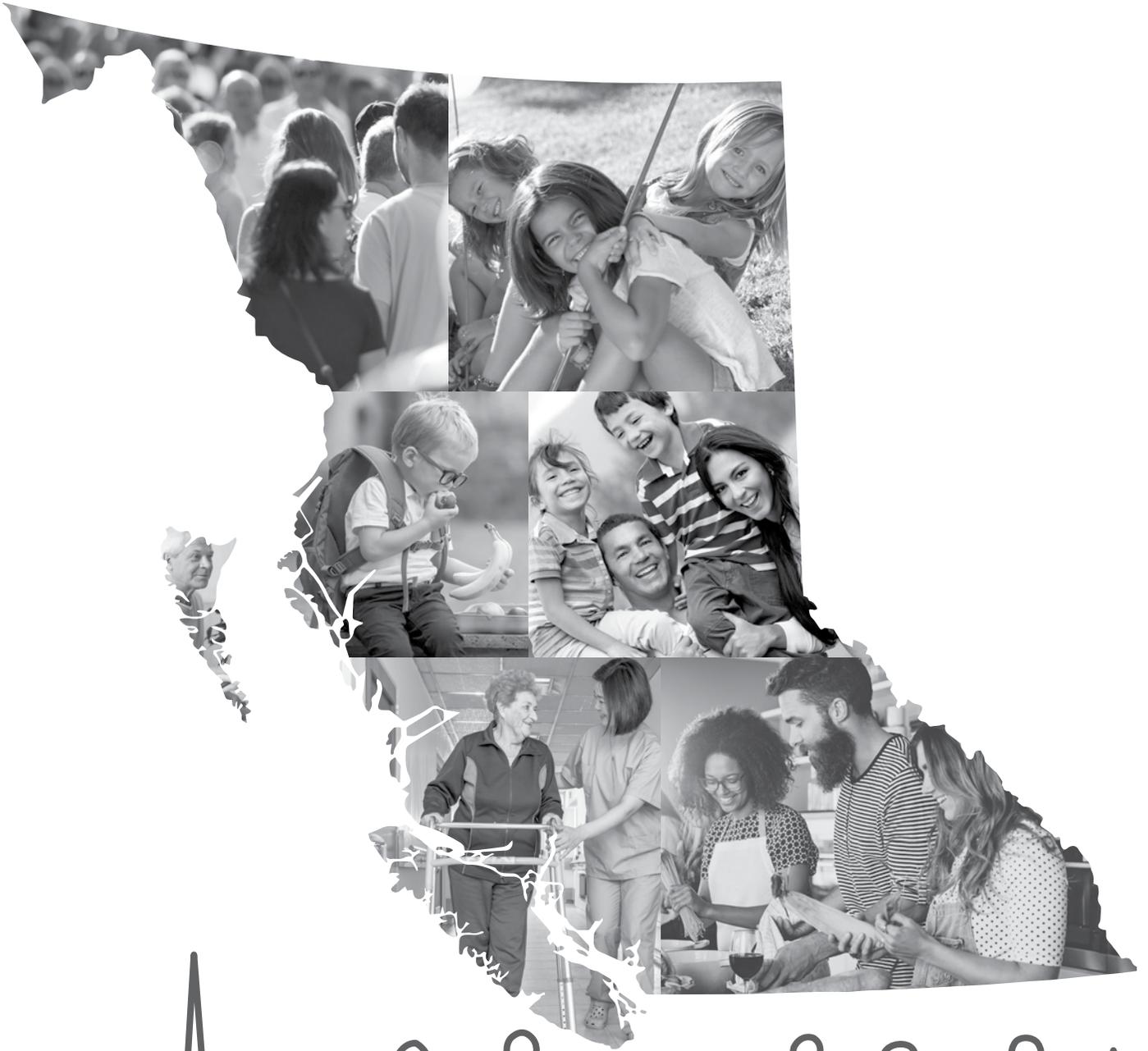


Office of the
Provincial Health Officer

**PROVINCIAL HEALTH OFFICER'S
ANNUAL REPORT**

TAKING THE PULSE OF THE POPULATION

AN UPDATE ON THE HEALTH OF BRITISH COLUMBIANS



Office of the
Provincial Health Officer

**PROVINCIAL HEALTH OFFICER'S
ANNUAL REPORT**

Ministry of Health
Victoria, BC

January 2019

The Honourable Adrian Dix
Minister of Health

Sir:

I have the honour of submitting this Provincial Health Officer's Annual Report.

Sincerely,

A handwritten signature in black ink, appearing to read "Bonnie Henry". The signature is fluid and cursive, with a prominent initial "B" and a long, sweeping tail.

Bonnie Henry
MD, MPH, FRCPC
Provincial Health Officer

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- Fraser Health
- Interior Health
- Island Health
- Northern Health
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- Vancouver Coastal Health

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Summary of Key Findings

Under Section 66 of the *Public Health Act*, the Provincial Health Officer (PHO) has the authority and responsibility to monitor the health of the population in BC, and to provide independent advice on public health issues and the need for legislation, policies, and practices respecting those issues.

This PHO's report examines progress made in advancing health and well-being in BC in light of the BC Ministry of Health strategic document *Promote, Protect, Prevent: Our Health Begins Here. BC's Guiding Framework for Public Health* (the Guiding Framework). The Guiding Framework, released by the Ministry of Health in 2013, set seven overarching goals for the public health system, with corresponding 10-year targets for 36 health-related performance measures to be achieved by 2023.

The report begins by examining overarching measures that reflect the overall health status of the population. Each subsequent chapter examines one of the seven goal areas established in the Guiding Framework: Healthy Living & Healthy Communities; Maternal, Child, & Family Health; Positive Mental Health & Prevention of Substance Harms; Communicable Disease Prevention; Injury Prevention; Environmental Health; and Public Health Emergency Management. Each performance measure is analyzed by age, sex, and health authority. This report does not provide analyses of Indigenous health status, as there are a number of reports currently underway in partnership with the First Nations Health Authority and Métis Nation BC that will report specifically on the health and wellness of Indigenous peoples in BC. The goal chapters are followed by a discussion of

progress made towards improving public health surveillance. The final chapter discusses where progress has been made and where more work is needed, and presents seven recommendations to continue advancing the health status of British Columbians.

Summary

Overarching Measures

In addition to the targets set for specific performance measures within the goal areas of the Guiding Framework, six broad overarching measures that capture the combined effects of the goal areas were also included. These performance measures provide valuable information on the overall health of the population and the effectiveness of the health system.

The overarching measures include geographic disparity in life expectancy between local health areas; age-standardized incidence rate for diabetes; health-adjusted life expectancy (HALE); infant mortality rate; age-standardized rate of mortality due to preventable causes; and the percentage of British Columbians who report that they are very satisfied with life. Progress towards the targets set for these overarching measures is varied. The age-standardized rates for diabetes incidence and for mortality due to preventable causes are both projected to achieve and surpass their targets. The HALE and infant mortality measures are trending in the right direction but are not likely to meet their targets. Finally, the measures of geographic disparity in life expectancy, and the percentage of British Columbians who report being satisfied with life are worsening and are not on track to meet the targets set in the Guiding Framework.

Further analyses presented in this report show several trends among sub-populations in BC. For example:

- The gap in life expectancy between regional health authorities is now greater than the gap between males and females.
- The populations in Fraser and Northern consistently have the highest rates of diabetes incidence among health authority populations. Males consistently have a higher incidence rate of diabetes than females.
- HALE is highest in Vancouver Coastal and lowest in Northern for both males and females.
- There is geographic variation in both the rates and trends for infant mortality.
- The gap between males and females has narrowed for the age-standardized rate of mortality due to preventable causes, but the male rate remains double the female rate.
- Life satisfaction among people age 12 and up is highest in the youngest and oldest age groups in BC and lower for people age 20 to 59.

Goal 1 – Healthy Living & Healthy Communities

Healthy lifestyles and healthy communities are central to the prevention of chronic disease. There is a substantial health burden from chronic diseases in BC, with attendant human and financial costs. Many chronic diseases can be prevented by targeting modifiable risk factors, through education, awareness, prevention activities, and environmental changes. Healthy communities—environments where we live, work, learn, and play—support British Columbians to engage in healthy behaviours.

The targets in this goal area focus on fruit and vegetable consumption; physical activity; smoking rates; and students reporting that they learn to stay healthy at school. These performance measures give an overall impression of how well we are doing in BC in creating healthy

communities and supporting healthy lifestyles. Currently, fruit and vegetable consumption and the percentage of students learning to stay healthy are moving away from the targets set in the Guiding Framework. The measures for physical activity and smoking are moving in the right direction, but more work will be needed to reach the targets by 2023.

For these performance measures some gender and geographic disparities exist. For example:

- There is a downward trend in fruit and vegetable consumption for both males and females, but more females than males consume fruit and vegetables at least five times per day.
- Males are more likely to report physical activity during leisure time than females, and there is an inverse relationship between age and physical activity, with activity decreasing with age.
- Males are more likely to report smoking cigarettes (daily or occasionally) than females.
- Younger students are more likely than older students to report that they are learning to stay healthy at school, but for all ages, sexes, and health authority populations, the trend is declining over time.

Goal 2 – Maternal, Child, & Family Health

The Guiding Framework goal area of Maternal, Child, & Family Health focuses on ensuring that families have the capacity to achieve and maintain good health at all stages of child development. The first few years of life are recognized as a critical time when important foundations for health throughout life are established. Maternal health during pregnancy, childbirth, and the postpartum period also plays a central role in this.

In this goal area, the established performance measures focus on low weight births; the rate of new mothers who smoke during pregnancy; the rate of hazardous drinking among women of reproductive age; and children’s developmental

vulnerability. As shown in this report, the rate of low birth weight singleton births has not substantially declined and is not currently moving toward the target identified in the Guiding Framework. The measures on hazardous drinking among women of reproductive age, and the percentage of kindergarten children who are not vulnerable on any Early Development Instrument (EDI) dimensions, are trending away from the Guiding Framework targets. Finally, the percentage of women who reported smoking during pregnancy is currently decreasing and is projected to reach the 2023 target.

Other notable trends identified among these performance measures include the following:

- Mothers in the lowest and highest age groups have the highest rate of low birth weight infants among singleton live births, while those in the middle age group (age 30–34) have the lowest.
- The youngest age groups of mothers (under 20 and 20–24) are most likely to smoke during pregnancy. There is also substantial regional variation for this measure, with the percentage in Northern being almost nine times that of Vancouver Coastal in 2014/15.
- Hazardous drinking among women age 20 through 44 has increased, with those in the 20–24 age group reporting the highest rate, and those in the 30–34 age group showing the most substantial increase. Women in Fraser consistently have the lowest percentage of hazardous drinking among women of reproductive age, and women in Interior the highest.
- Interior has the highest percentage of non-vulnerable kindergarten students according to EDI dimensions, while Vancouver Coastal and Northern have the lowest for all points in time. Analyses by health service delivery areas (HSDA) show even greater disparity: there is a 15 percentage point difference between the HSDAs with the highest and lowest percentage of non-vulnerable kindergarten students.

Goal 3 – Positive Mental Health & Prevention of Substance Harms

Positive mental health is an important aspect of overall well-being. It helps citizens achieve their full potential and make positive contributions to society. Many of the skills needed to cope with life stressors and to build resiliency are formed in childhood and adolescence; therefore, several of the measures for this Guiding Framework goal focus on children and youth. Additionally, there are measures that look at problematic substance use, which has detrimental effects on health and well-being.

The performance measures for this Guiding Framework goal area include positive mental health; social development of children; emotional development of children; alcohol and cannabis use before age 15; and the rate of hazardous drinking. Four of the five measures are moving away from provincial targets: the proportion of British Columbians reporting positive mental health; hazardous drinking; the proportion of kindergarten children being identified as “not vulnerable” in terms of social development; and the proportion of kindergarten children who are “not vulnerable” in terms of emotional development. However, both components of the measure for student alcohol and cannabis use before age 15 are projected to be better than the provincial targets by 2023, if the current rates of decline persist.

Observations for the sub-populations for these performance measures include the following:

- For most years shown, younger people (age 12–19 and 20–34) were more likely to rate their mental health positively than older people (age 45–64 and 65 and up). There has been a decrease for this indicator across all health authority populations.
- Regional variations in cannabis use before age 15 are similar to those of alcohol use before age 15: Interior, Island, and Northern had the highest rates of early initiation in the most recent survey year, while Vancouver Coastal and Fraser had the lowest rates.

- More males than females reported engaging in hazardous drinking, but neither sex is achieving reductions in this rate. British Columbians age 20–34 have the highest percentage of hazardous drinking. Interior and Northern have had the highest percentage in most years, while Fraser and Vancouver Coastal have had the lowest.

Goal 4 – Communicable Disease Prevention

Communicable diseases are spread directly or indirectly from one person to another and are caused by bacteria, viruses, parasites, or fungi. Common strategies to prevent and control communicable disease are immunization, community health promotion and prevention, harm reduction, and treatment as prevention programs. This goal area is focused on reducing communicable disease transmission and associated morbidity and mortality.

Performance measures in the Guiding Framework for this goal include immunization coverage up-to-date by age two; hepatitis C incidence; newly diagnosed cases of HIV with CD4 at diagnosis greater than 500; condom use among sexually active adolescents; and the percentage of young women tested for chlamydia. The measures of hepatitis C incidence among repeat testers, and the percentage of young women who have been tested for chlamydia in the previous year, have improved and are currently projected to meet the provincial targets. Two measures have shown some improvement over the years examined, but not enough to meet targets by 2023: the percentage of children with up-to-date immunizations by their second birthday and the percentage of newly diagnosed HIV cases with CD4 count greater than 500 at diagnosis. The final measure for this goal area—the percentage of sexually active adolescents who reported using condoms—has not changed over the time of this report and is not projected to meet the target.

Among these performance measures, a few of the trends observed in analyses of sub-populations include the following:

- The rate of immunization coverage (up-to-date by a child’s second birthday, in accordance with the routine childhood immunization schedule) has decreased in Interior, Island, and Northern, but increased in Fraser.
- Hepatitis C incidence rates among repeat testers have converged for males and females. Improvement has been observed for all age groups, although repeat testers under age 29 and 30–39 have the highest incidence rates.
- Females are showing improvement in earlier diagnosis of HIV but males are not. The highest percentage of early diagnosis is among those age 29 and under, and this decreases for each subsequent age cohort.
- A greater proportion of males report using condoms than females.
- There is substantial regional variation in the percentage of young females (age 18–24) being tested for chlamydia, with a difference of 14 percentage points from the lowest health authority (Fraser) to the highest (Northern) in 2015.

Goal 5 – Injury Prevention

Unintentional injuries are one of the leading causes of death for British Columbians age 1–44. Many unintentional injuries are preventable. Public health programs can address the causes and minimize the impact of injuries through education, enforcement, engineering, environmental design, and engagement.

The Guiding Framework set targets for the following measures related to injury prevention: age-standardized hospitalization rate for unintentional injuries; age-standardized mortality rate from unintentional injuries; age-standardized rate of fall-related hospitalizations (age 75 and up). The trends for hospitalizations and mortality

due to unintentional injuries are moving in a positive direction, but at a much slower pace than is needed to reach the established provincial targets. Hospitalizations for falls (age 75 and up) has not shown meaningful change in either direction over time and likely will not meet the target by 2023.

For these performance measures the following disparities were identified:

- Males have a higher rate of hospitalizations due to unintentional injury than females. The majority of hospitalizations due to unintentional injuries were among people over age 70. The leading causes of unintentional injury are falls and transport-related incidents. Interior and Northern have the highest rates of hospitalizations, and Vancouver Coastal and Fraser have the lowest.
- Falls are responsible for the largest proportion (41.0 per cent) of deaths due to unintentional injuries, followed by poisoning (26.2 per cent), and transport-related injuries (21.5 per cent). Males in BC have a substantially higher rate of mortality due to unintentional injuries—more than double the rate of females.
- Females age 75 and up have a much greater burden of injury due to falls for all years analyzed.

Goal 6 – Environmental Health

The environment in which we live is an important determinant of health. The air we breathe, the water we drink, and the food we eat all contribute to our health. Environmental health is a branch of public health that focuses on assessing, correcting, controlling, and preventing factors in the environment that can negatively affect human health.

The Guiding Framework set targets for the crude rates of three enteric diseases: shigatoxigenic *E. coli*, listeriosis, and salmonellosis. It also established targets for the percentage of households with municipal water supplies

that report that they have boiled water in the past 12 months to make it safe to drink, and the percentage of persons residing in licensed community care facilities rated as low risk. Analyses in this report show that the rate of shigatoxigenic *E. coli* infections has improved; however, this rate of decline is currently insufficient to reach the provincial target by 2023. The crude rates of listeriosis and salmonellosis are both trending in the wrong direction and moving away from the respective provincial targets. There has not been a meaningful or sustained reduction in the percentage of households on municipal water supplies who report boiling their water to make it safe to drink, and this measure is currently not projected to meet its target by 2023. While we currently do not have the ability to report on the proportion of individuals in licensed community care facilities rated as low risk, the proportion of facilities that are rated as high risk in BC decreased from 2015 to 2016.

Goal 7 – Public Health Emergency Management

Public health plays an important role in ensuring that the health system is prepared for and able to respond to health-related emergencies, such as influenza pandemics, and the health aspects of other emergencies, such as floods, forest fires, and earthquakes. This requires working with other government ministries, organizations, and agencies to reduce the health impact of disasters that cross jurisdictions and government areas of responsibility.

The performance measures used for this goal area include health authorities developing pandemic influenza response plans and participating in emergency exercises that have a public health component. These measures have already met the Guiding Framework target or are well on their way to meet the target. By June 2017, six out of seven health authorities had developed pandemic influenza response plans; the seventh (First Nations Health Authority) is currently working to develop their plan. All health authorities (including the First Nations

Health Authority) report having participated in an emergency exercise with a public health component in the last two years.

Health Surveillance

Public health surveillance provides crucial information for planning, implementation, and evaluation of public health services. Surveillance includes the collection, analysis, interpretation, and dissemination of health-related data for health events and the determinants of health, disease, illness, and injury, in order to guide action. Within BC, public health surveillance is more established in certain areas, such as communicable disease. As public health surveillance developed in a fragmented and uncoordinated manner, limitations exist in access and availability of data across areas of the province.

The Guiding Framework set targets to develop and implement a plan to improve public health surveillance in BC. Since the Guiding Framework was released, considerable work has been done to achieve these targets. A public health surveillance plan was developed collaboratively by the Ministry of Health, the PHO, the five regional health authorities, the Provincial Health Services Authority, and the First Nations Health Authority. Part 1, released in 2014, assesses the current state of population health surveillance in BC. Part 2, released in 2015, outlines an implementation strategy to address the gaps found in Part 1. Recommendations included capacity building and the development of a public health observatory to enable more coordinated surveillance efforts.

As part of the implementation of the surveillance plan, the BC Observatory for Population and Public Health was established in fiscal 2015/16. The Observatory is based out of the BC Centre for Disease Control and provides collaborative leadership for advancing provincial and regional surveillance capacity in the areas of non-communicable diseases, injuries, risk and protective factors, and environmental health.

Discussion & Recommendations

Discussion

This report shows that the population of British Columbia is healthy by many metrics and progress towards the Guiding Framework targets is being made for many of the performance measures. For example, there has been progress in diabetes incidence; age-standardized mortality due to preventable causes; smoking during pregnancy; and hepatitis C incidence among repeat testers. Other performance measures will require more work in the coming years to meet the 2023 targets, including the gap in life expectancy at birth between local health areas; early child development performance measures; fruit and vegetable consumption; children learning to stay healthy in school; positive mental health and life satisfaction; and hazardous drinking. Some performance measures have variable trends, with some headed in a positive direction yet not making sufficient progress to meet the targets. For a full summary of performance measures showing progress or challenges, see Appendix C.

Health is mostly the result of broad determinants, including access to financial resources, education, nutritious food, and safe housing in a sustainable community. Working “upstream”—reducing inequities and improving the social determinants of health (e.g., poverty reduction strategies, increased access to safe, affordable housing)—will help to address “the causes of the causes” and mitigate some of the challenges faced by British Columbians. Multiple tools of influence—legislation and regulation, taxation and pricing, education and information, programs and services—present the greatest opportunity to affect change and improve the overall population health of British Columbians.

This report examines sex, age, and geographic disparities within the population. The overall health of the population would be further

improved by addressing related disparities, as well as by focusing on disparity and equity issues faced by children and families. Working to improve health equity in BC will require collaboration and partnerships across health systems and all sectors and all levels of government.

Recommendations

To improve the health status of British Columbians and continue to make progress towards the goals set in the Guiding Framework, the Provincial Health Officer proposes the following seven recommendations:

Recommendation 1: Establish a legislated health in all policies approach in BC, utilizing a health impact assessment model that includes a requirement for assessing health and equity impacts for all proposed, new, or revised policy, legislation, or programming across the BC Government.

Recommendation 2: Develop and implement a comprehensive health promotion strategy in BC that recognizes sex- and gender-specific health needs, and supports all gender identities and sexual orientations through appropriately targeted interventions.

Recommendation 3: Increase support for programs and policies across government that focus on health among women (including pregnant and postpartum women), children, youth, and families in BC.

Recommendation 4: Increase the focus on illness and injury prevention and health promotion for British Columbians living in rural and remote areas of BC.

Recommendation 5: Develop a more robust and meaningful population and public health surveillance system for BC. This includes reviewing the Guiding Framework performance measures, identifying new or revised measures, and establishing regular and ongoing public health reporting.

Recommendation 6: Establish more relevant and applicable performance measures to monitor environmental health in BC.

Recommendation 7: Commit to increasing the proportion of health authority budgets allocated to population and public health to 6 per cent.

Conclusion

This report evaluates the progress made towards the 10-year targets set in *Promote, Protect, Prevent: Our Health Begins Here. BC's Guiding Framework for Public Health*. The targets, by necessity, focus on a small number of performance measures, which do not measure all the domains of health in our population. They do, however, give a sense of areas of progress and areas of health disparities. To date, progress towards these targets is mixed. While improvements have been made in many domains, there are still areas where more work must be done. For many performance measures, geographic, sex, and age-related disparities persist, and additional interventions and programming will be needed to meet the 2023 targets. The information and recommendations provided in this report are intended to help decision-makers, health authorities, communities, and British Columbians better understand and take action to improve the health of all.

1

Population & Public Health in BC

The health of the people is really the foundation upon which all their happiness and all their powers as a state depend. – Benjamin Disraeli

The overall health of the population of British Columbia is very good by many accepted measures. We rank first in life expectancy in Canada¹ and compare favourably both nationally and internationally on other indices.² In other measures, we have more work to do.

Since 1993, the Provincial Health Officer (PHO) has been required by provincial legislation to report annually on the health status of British Columbians and on the need for policies and programs that will improve health. Under Section 66 of the *Public Health Act*, the PHO has the authority and responsibility to monitor the health of the population in BC, and to provide independent advice on public health issues and the need for legislation, policies, and practices respecting those issues. Some reports produced to date have given a broad overview of health status, while others have focused on specific topics. The most recent reports have focused on women's health, gambling, Human Immunodeficiency Virus (HIV) testing and control, road safety and motor vehicle crashes, and the health and well-being of children and youth. It has been 15 years since the

Office of the PHO reported on the overall health of the population of BC.³

British Columbia is a large province with diverse geography, population, and health priorities. Health status and health needs differ substantially for sub-populations across the province; as a result, population-based and public health actions can be complex. As will be discussed later in this chapter, over the last five years, several strategic health policy reports have been released that help establish a foundation for ongoing monitoring and improvement of key population and public health measures in BC. This report focuses on one of these policy reports—*Promote, Protect, Prevent: Our Health Begins Here. BC's Guiding Framework for Public Health* (the Guiding Framework).⁴ First released in 2013, then updated and released in 2017, the Guiding Framework established long-term direction for the public health system in BC, reinforced partnerships for population health, solidified strategic areas for prioritization, and identified seven visionary goals with 36 performance



measures to monitor progress on these goals over the following 10 years. This PHO report uses the same 36 measures and associated 10-year targets provided in the updated Guiding Framework to examine the population health status of British Columbians. They are not a comprehensive set of performance measures for the health of the population of BC; instead, they provide a proxy measure of the impact that population and public health programming and policies have on health outcomes in BC.

The World Health Organization defines **health**^a as “...a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”⁵ Good health depends on much more than health services and disease treatment. It includes supportive living and working conditions; opportunities for healthy choices; strong family and community connections; healthy and safe environments; injury prevention; and improved health for **underserved populations** such as Indigenous peoples. Initiatives in these areas include health promotion, disease prevention, and health protection. **Health promotion** refers to “...the process of enabling people to

increase control over, and to improve, their health. It moves beyond a focus on individual behaviour towards a wide range of social and environmental interventions.”⁶ **Health protection** refers to the development of legislation, regulation, and policy that aim to ensure the population has access to safe food and water, sanitation, and clean air, and is protected from environmental threats, injury, and infectious disease.⁷ Intersectoral collaboration and engagement with partners are essential to effectively advance health promotion, disease prevention, and health protection, and to respond effectively to public health emergencies.

This chapter discusses a selection of measures of health and well-being in BC, including how BC compares to other jurisdictions. It describes the determinants of health and population and public health, and then provides a more comprehensive discussion of the Guiding Framework, including its development, its role in population health strategies, and how it fits into the larger health system strategy in BC. This chapter concludes with a discussion of methodology and data sources used in this report.

^a Bolded text throughout this report indicate glossary terms, which are defined in Appendix A.

Health & Well-being in BC

National Context

BC has had the longest life expectancy in Canada since the mid-to-late 1990s,⁸ and as of 2011 was third in the world behind Switzerland and Japan.⁹

Life expectancy is used around the world as a basic indicator of a population's ability to live a long life, be healthy, have adequate food and access to health care, and be protected from disease and other threats that shorten life span. It is a measure of quantity of life rather than quality; nonetheless, it is an effective summary measure of population health.³

As shown in Figure 1.1, among Canadian provinces, BC has the longest life expectancy at birth. This figure also shows considerable disparities based on sex in BC and across Canada. BC's overall longevity relative to other provinces and countries is largely a product of higher life expectancy rates in the more populated urban areas of the province. As will be explored in this report, lower life expectancies persist in the more rural and remote areas of the province. While overall BC has the longest life expectancy at birth in Canada, Figure 1.2 shows that from 2014 to 2017, life expectancy in BC decreased by 0.6 years of life—a downward trend not seen in recent decades. Further analyses are underway to determine the extent to which the current overdose crisis in BC is the cause of this change, and will be the subject of an upcoming PHO report. A more thorough examination of life expectancy trends in BC will be provided in Chapter 2.

Compared to other provinces, BC does very well for some measures. A 2015 Conference Board of Canada report gave BC first place overall among Canadian provinces on a series of health indicators, including life expectancy, premature mortality, and infant mortality, among others.^{b,2} In addition, among the provinces, BC has the

highest rate of physical activity^c (2015–2016), the lowest rate of smoking (2015–2016), and the lowest rate of heavy drinking in the general population (2015–2016).¹⁰ BC also has the second highest reported frequency of fruit and vegetable consumption (2015–2016)¹⁰—although it is decreasing, as will be discussed in Chapter 2—and the second lowest rate of infant mortality (2015).¹¹

In other measures, and depending on the year, BC does not fare as well compared to other provinces. For example, according to Statistics Canada, in 2013, BC rated second lowest among provinces for the percentage of people who rated their mental health as very good or excellent,¹² and for the percentage of people who self-reported being satisfied or very satisfied with their life in general.¹³ In the same year, BC ranked sixth among provinces for the percentage of people who rated their overall health as very good or excellent.¹⁴ Additionally, while the 2015 Conference Board of Canada report showed BC doing well in many areas, it also identified areas for improvement, ranking BC near the bottom among provinces in both self-reported health and self-reported mental health.²

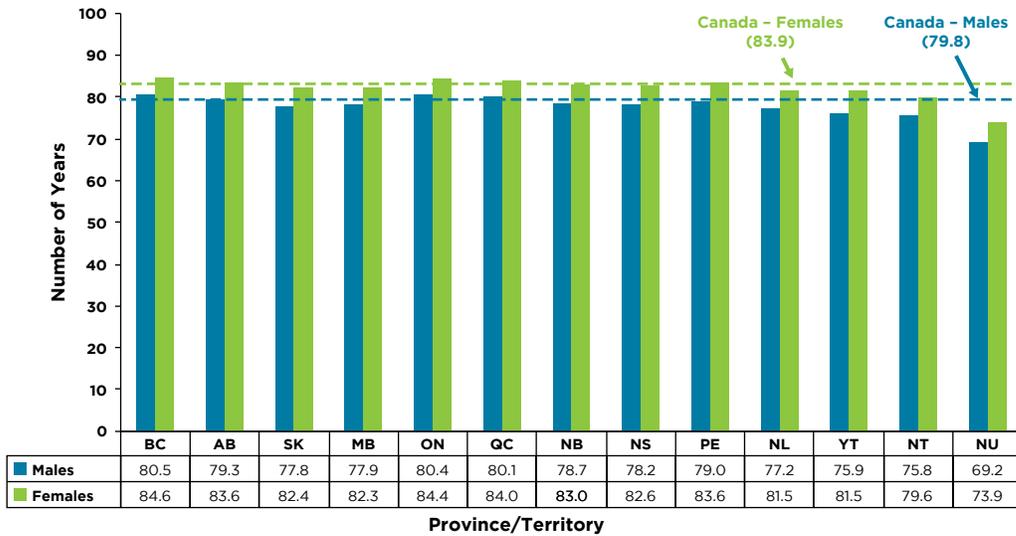
The Burden of Disease in BC

There have been notable changes in the burden of disease in BC over the last four to five years. Internal analyses in the Office of the PHO show that the age-standardized **incidence rates** for cerebrovascular disease, acute myocardial infarctions, depression, asthma, and osteoporosis are declining.¹⁵ Favourable trends are also being observed for ischemic heart disease, adult-onset diabetes, and chronic obstructive pulmonary disease.¹⁵ Unfortunately, incidence rates have been increasing for chronic kidney disease.¹⁵ Incidence rates are important in this context because they reflect the rate at which new cases are occurring and, consequently, are a primary

^b The full list of indicators used in the Conference Board of Canada ranking are as follows: life expectancy; premature mortality; infant mortality; self-reported health; self-reported mental health; mortality due to cancer; mortality due to heart disease and stroke; mortality due to respiratory diseases; mortality due to diabetes; mortality due to nervous system diseases; and suicides.

^c 150 minutes per week, for those age 18 and up.

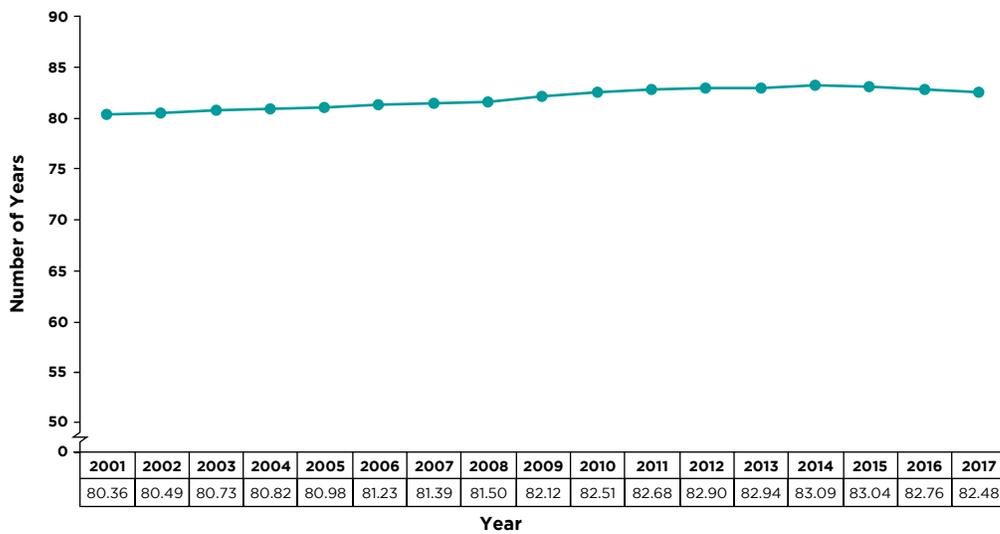
FIG 1.1 Life Expectancy at Birth, by Sex and Province/Territory, Canada, 2013-15



Notes: "Life expectancy" is the expected number of years of life remaining at a given age; in this case, at birth. See Appendix B for more information about this data source.

Source: Statistics Canada, Demography Division. Life Tables, Canada, Provinces & Territories, 2013 to 2015 [CANSIM Table 053-0003]. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, February 2018.

FIG 1.2 Life Expectancy at Birth, BC, 2001 to 2017



Notes: "Life expectancy" is the expected number of years of life remaining at a given age; in this case, at birth. See Appendix B for more information about this data source.

Source: BC Vital Statistics Agency. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, February 2018.

measure of the effects of prevention and the adoption of healthier lifestyles among British Columbians. Additionally, the current overdose crisis in BC is still worsening, causing death and injury to many individuals across the province—primarily young males and Indigenous people.^{16,17} This is now negatively affecting life expectancy in BC, which will be discussed further in Chapter 2.

Public health programs focus on upstream interventions that aim to influence the main risk and protective factors for preventable disease and mental illness. Some interventions will have measurable outcomes in relatively short timeframes (e.g., healthy birth weight, injury prevention), while it can take years for other population-level interventions to have measurable impacts on health outcomes (e.g., those dependent on individual or community behavioural changes). Interventions must be applied at an appropriate dose, using multiple tools of influence in various key settings—including meaningful intersectoral partnerships at all levels—over a sustained period of time in order to be effective.

Causes of Good & Ill Health

Determinants of Health

“Health” includes more than physical well-being or the absence of disease. It is a resource for life and a comprehensive state of well-being that

includes physical health and well-being; spiritual, mental, and emotional health and well-being; positive and supportive social relationships; economic and material well-being; cognitive development; and healthy aging. Good health and healthy lifestyles are rooted in our homes and schools, in our workplaces, and within our communities. This means that good health comes from a variety of factors and influences, most of which are not related to the health care system. In fact, it is estimated that only 25 per cent of the health of the population can be attributed to the health care system; the remaining 75 per cent can be attributed to other factors including socio-economic conditions and demographic factors (50 per cent), biological and genetic factors (15 per cent), and the physical environment (10 per cent)¹⁸ (see Figure 1.3).

The Public Health Agency of Canada identifies the following as key health **determinants**:²⁰

- income and social status
- social support networks
- education and literacy
- employment/working conditions
- social environments
- physical environments
- personal health practices and coping skills
- healthy child development
- biology and genetic endowment
- health services
- gender, and
- culture.



FIG 1.3 Canada's Social Determinants of Health



Source: Adapted from: Canadian Medical Association. Health equity and the social determinants of health. 2012.¹⁹ Original data source: Standing Senate Committee on Social Affairs, Science and Technology. The health of Canadians – the federal role. Volume 1 – the story so far; 2001.¹⁸

At a population level, the health of British Columbians requires positive and supportive living and working contexts and conditions; opportunities to develop individual capacities and skills and to make healthy choices; diverse, sustainable, healthy, and safe physical environments; effective and efficient health services; and prevention of diseases and injuries. Supporting good health in BC also includes addressing health inequalities and health inequities. **Health inequalities** are “...differences in health status or in the distribution of health determinants between different population groups.”⁶⁰ **Health inequities** “...refer to the subset of health inequalities that are deemed to be unfair or unjust, that arise from the systematic and intentional or unintentional marginalization of certain groups, and that are likely to reinforce or exacerbate disadvantage and vulnerability.”²¹ For example, the gap in health status faced by Indigenous people in BC and beyond, in which

they continue to face health inequities as a result of the social and institutional legacies of colonialism and systemic racism.

Health authorities and the public health system do not have sole influence over the outcomes of many of the 36 measures established in the Guiding Framework and reported on here. Collaboration across sectors is required to create supportive environments and to address the broad underlying factors that influence health across the whole population. Taking action on these determinants of health has the greatest potential to improve health outcomes by addressing the upstream causes of illnesses and injuries before they occur. While there is much debate around “social engineering,” and many are ready to raise the spectre of the “nanny state”, public health experts posit that it is the government’s role to develop robust public policies that help make the healthy choice the easier choice, and that address health inequities.

The benefits of healthy public policy extend beyond improved health status and reduced health disparities, to fostering economic growth, productivity, and prosperity. This report does not directly address these determinants but recognizes their fundamental importance in driving the trends toward the targets laid out in the Guiding Framework.

The “Causes of the Causes”

In a lecture on health inequalities in 2016, Sir Michael Marmot, president of the World Medical Association and director of the Institute of Health Equity, talked about “the causes of the causes.” He defined them as follows: “...the causes of the causes are the social determinants of health and they influence not only lifestyle, but stress at work and at home, the environment, housing and transport.”²² This upstream view is reflected in Figure 1.4a, based on a 2008 visualization of this concept. It shows that while health behaviours are proximal determinants of health, they are, in turn, outcomes of broader features of society, environmental factors, and socio-economic influences. This underscores the need to work across all sectors of government in order to effectively influence health outcomes, and to focus on all levels of influence in order to improve individual and population health.

Figure 1.4b shows how this model could be linked to some of the current public health programming provided in British Columbia through initiatives such as Healthy Families BC, among others. The most impactful framework for action will incorporate the roles of both upstream factors (e.g., the societal, environmental, and socio-economic parameters that individuals live and work in and that affect their behaviour choices) and more direct or downstream risk factors (e.g., obesity, smoking, and inactivity).

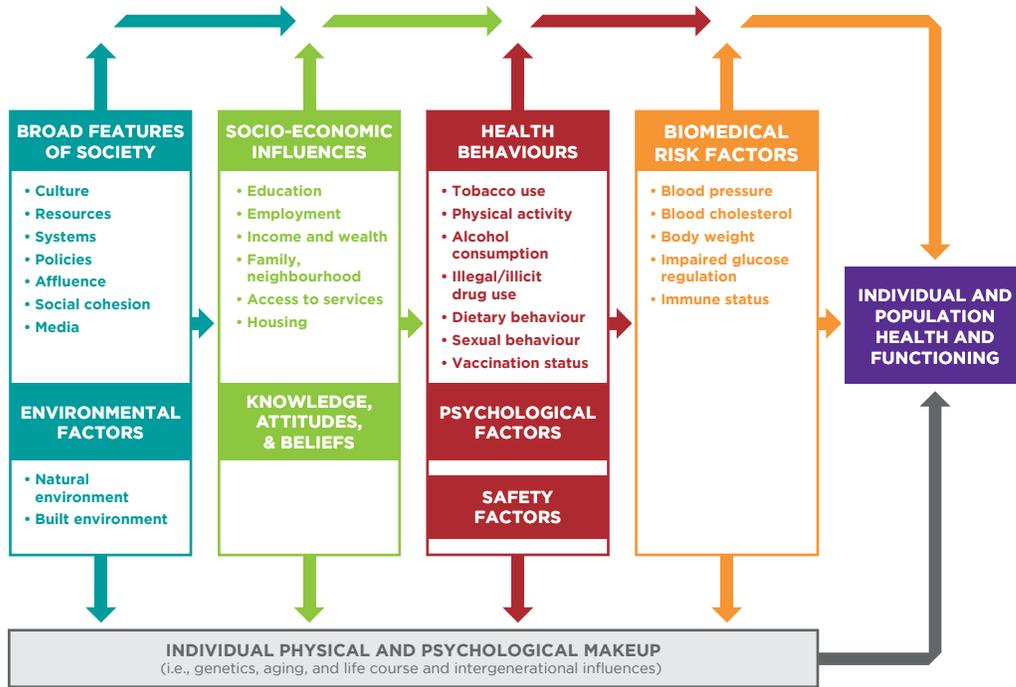
Monitoring Health & Wellness of Indigenous Peoples in BC

According to the 2011 National Household Survey, over 230,000 Indigenous people live in BC, making up 5 per cent of the total BC population²⁴—of these, 67 per cent identify as First Nations, 30 per cent as Métis, and just under 1 per cent as Inuit.²⁵

The PHO has reported on the health of the Indigenous population in BC since 2001.²⁶ In the 2005 *Transformative Change Accord (TCA)*,²⁷ the Government of British Columbia committed to improving health outcomes for First Nations peoples in BC. The subsequent *Transformative Change Accord: First Nations Health Plan (TCA:FNHP)*²⁸ identified seven health indicators and set out targets to reduce gaps in health status between Indigenous people and other BC residents by 2015. The TCA:FNHP included a commitment by the PHO to report on those seven indicators every two years. Since 2015, these reports have been produced in collaboration with the First Nations Health Authority (FNHA),^d and provide a report on progress toward targets for those seven indicators.²⁹ The most recent joint report, released in December 2018, identifies whether the targets were met for the seven TCA:FNHP indicators, and introduces the next 10-year plan and a related suite of new indicators. These new indicators for Indigenous health and wellness were developed through a collaborative process between the Office of the PHO and FNHA, with input from First Nations leaders. The Office of the PHO is also developing a similar partnership with Métis Nation BC, to collaborate on monitoring and reporting on the health of the Métis population in BC.

^d The FNHA was established in October 2013. One of its roles is to improve the health of communities by advancing the quality of health care, health promotion, and chronic disease/injury prevention programs delivered to and by BC First Nations and other Indigenous peoples in BC.

FIG 1.4a The “Causes of the Causes” of Health and Illness



Source: Adapted from Australian Institute of Health and Welfare. Australia's health 2008.²³

FIG 1.4b Mapping Population and Public Health Initiatives to the “Causes of the Causes” (Examples)

BROAD FEATURES OF SOCIETY & ENVIRONMENTAL FACTORS	SOCIO-ECONOMIC INFLUENCES & KNOWLEDGE, ATTITUDES, & BELIEFS	HEALTH BEHAVIOURS; PSYCHOLOGICAL FACTORS, & SAFETY FACTORS	BIOMEDICAL RISK FACTORS
<p>Examples:</p> <ul style="list-style-type: none"> Aboriginal Youth FIRST Junior Eagle Program Regulations for tobacco and vapour products sales, advertising, and use Age-friendly communities Healthy communities Healthy Schools BC Guidelines for Food and Beverage Sales in BC Schools Trans Fat Regulation Supervised consumption services Overdose prevention services 	<p>Examples:</p> <ul style="list-style-type: none"> Five Ways to Well-being Food Skills for Families Action Schools! BC BC School Fruit and Vegetable Nutritional Program Farm to School BC Healthy Start Farmers' Market Nutrition Coupons Printed resources for parents (e.g., <i>Baby's Best Chance</i>, safe sleep resources) Informed Dining 	<p>Examples:</p> <ul style="list-style-type: none"> Appetite to Play Choose to Move Dietitian and Physical Activity Services (HealthLinkBC) Smoking cessation programs Journey to Perinatal Well Being 	<p>Examples:</p> <ul style="list-style-type: none"> Immunization programs Newborn screening, including hearing screening HIV screening and testing Type 2 diabetes screening Cancer screening (cervical, colorectal, breast)

Note: This is only a sample, and not a comprehensive list of Population and Public Health programs and initiatives.

This shift to joint reporting with FNHA and Métis Nation BC is an important one. It enables reporting that is *with* Indigenous people instead of *about* them. It fosters reconciliation, as new relationships and partnerships are being forged between government and Indigenous communities, represented by the FNHA and Métis Nation BC—relationships based on greater cultural understanding and awareness than in the past. It also allows for reporting that is more culturally appropriate and meaningful, through the incorporation of Indigenous “ways of knowing” into the standard indicators of population health. An example of this is through the incorporation of the First Nations Perspective on Health and Wellness, produced by the FNHA (see Figure 1.5). This traditional First Nations perspective breaks from traditional government illness-based approaches, instead offering a strength-based and holistic view of health and well-being. It incorporates four dimensions of wellness—physical, emotional, spiritual, and mental—influenced by multiple levels of contextual health factors such as land, families, and communities, and social, economic, and cultural environments.

Because of this joint work underway to report specifically on the health and wellness of Indigenous peoples in BC, these analyses are not included in this report.

Population & Public Health in BC

This report incorporates both a population health approach and a public health perspective. Although population and public health are separate concepts, they are closely interrelated.

Population health

...refers to the health of a population as measured by health status indicators and as influenced by social, economic and physical environments, personal health practices, individual capacity and coping skills, human biology, early childhood development, and health services.³¹

It focuses on monitoring and improving the health of the broader population, and reducing health disparities between groups within the larger population. To achieve this, population health seeks to understand and address the causes of underlying inequities, including determinants of health and health outcomes. For example, this approach involves trying to explain and address why some geographic areas have different health outcomes than others.

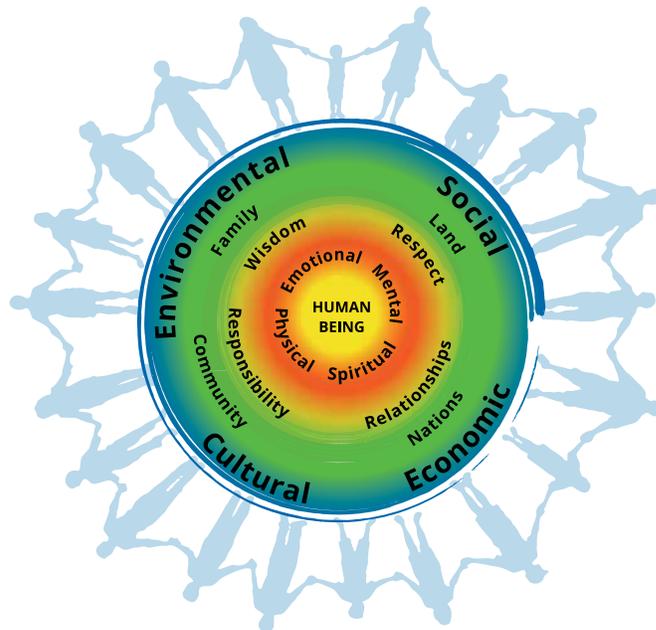
Public health has been described as

[a]n organized activity of society to promote, protect, improve, and when necessary, restore the health of individuals, specified groups, or the entire population. It is a combination of sciences, skills, and values that function through collective societal activities and involve programs, services, and institutions aimed at protecting and improving the health of all the people.³²

Public health refers to efforts that focus on health promotion, disease and injury prevention, and protection of the health of the population as a whole. It is an “upstream” approach and includes initiatives such as immunization programs, drinking water protection, injury prevention, management of disease **outbreaks**, and much more. It recognizes the relationship between individuals and their environment, and how they work together to influence health. **Epidemiology** is the cornerstone of public health and is the study of the patterns, causes, and effects of health and disease conditions in defined populations.

The term “public health” is often confused with the publicly funded health care system in Canada. Public health is one important part of this publicly funded system.³³ Public health interventions are delivered in a variety of settings (e.g., home, school, workplace, community, business).³⁴ In BC, **health authorities** are responsible for delivering a full range of health services, including public health programs and services, to meet the needs of the population in their regions.³⁴ This

FIG 1.5 First Nations Perspective on Health and Wellness



Note: Reproduced with the permission of First Nations Health Authority.

Source: First Nations Health Authority. First Nations perspective on health and wellness; [cited 2018 Mar 21].³⁰

includes five geographic health authorities, the Provincial Health Services Authority (PHSA), and FNHA. The Ministry of Health sets the strategic direction for the health system and provides a legislative, regulatory, and policy framework to allow it to function smoothly. The ministry provides leadership, direction, and support to its partners in the delivery of health services, including public health programs and services, and sets province-wide goals, standards, and expectations for the health system.³⁵

Population Health Strategies in BC

Public Health Renewal

The public health system tends to operate in the background, unless there is a public health event that brings it to the public's attention, such as an outbreak. Public health events that took place in the early 2000s (such as the outbreak of Severe

Acute Respiratory Syndrome (SARS) in Canada in 2003, or the waterborne disease outbreak in Walkerton, Ontario in 2000; see sidebar on the following page for more information) highlighted the need for a more effective public health system. *Learning from SARS: Renewal of Public Health in Canada* (also known as the Naylor report) arose out of the SARS outbreak and reinforced the idea that "...an effective public health system is essential to preserve and enhance the health status of Canadians, to reduce health disparities, and to reduce the costs of curative health services."³⁶ BC undertook public health renewal starting in 2003, including defining a set of core public health functions and developing consistent, modern legislation. As public health renewal moved forward, emphasis shifted over time from communicable disease to chronic disease and injury prevention. In 2005, ActNow BC was launched as a catalyst for cross-sectoral collaboration on chronic disease prevention.

Examples of Public Health Events in the Early 2000s

Severe Acute Respiratory Syndrome (SARS) outbreak – SARS was a droplet-spread viral illness that emerged in China in late 2002. In the course of a few weeks, SARS spread across the globe. Canada was hit hard by SARS—as of August 2003, there were 438 probable and suspect cases of SARS in Canada, including 44 deaths. A review of the response to SARS identified many systemic deficiencies, including lack of surge capacity in the clinical and public health systems; lack of protocols for data or information sharing among levels of government; lack of capacity for epidemiologic investigation of the outbreak; and weak links between public health and the rest of the health system.³⁶

Walkerton Waterborne Disease outbreak – In 2000, an outbreak of waterborne illness due to contamination of the drinking water supply infected an estimated 2,700 people and killed seven in Walkerton, Ontario. An inquiry into the outbreak revealed major deficiencies in oversight of the water system. Not only was one of the town’s wells vulnerable to contamination, but there was a lack of proper training of individuals working for the local public utilities commission. Operating practices were not consistently followed, and there was a lack of communication between officials and with the public.³⁷

Other strategic initiatives and programs were also being developed to address a range of public health issues (e.g., *Healthy Minds, Healthy People*, to address mental health and substance use; and BC’s Tobacco Control Strategy, to address tobacco use in BC). An overarching strategic vision was needed to help make sense of and prioritize public health actions. This resulted in the development of *Promote, Protect, Prevent: Our Health Begins Here. BC’s Guiding Framework for Public Health* (the Guiding Framework).

The Guiding Framework

The Population and Public Health Division in the BC Ministry of Health released the Guiding Framework in March 2013 and an updated version in March 2017.⁴ The Guiding Framework established a long-term direction for the public health system, reinforced the strategic partnerships required to improve the health of the population, and established a strategic process

for developing and implementing priorities in the future. It identified seven visionary goals for the public health system that are intended to support the overall vision for public health in BC: “Vibrant communities in which all people achieve their best health and well-being where they live, work, learn and play” (see Figure 1.6). Each goal in the Guiding Framework has objectives that describe key areas for public health action.⁴

The seven goals outlined in the Guiding Framework represent seven key areas of focus for public health.⁴

- **Goal 1: Healthy Living & Healthy Communities** – creating supportive environments in order to make it easier for people to make healthy choices.
- **Goal 2: Maternal, Child & Family Health** – maximizing the healthy physical, emotional, and social development of women, children, infants, and youth.

FIG 1.6 Visionary goals, objectives, and measures of BC's Guiding Framework



Source: BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health; 2013 Mar.⁴

- **Goal 3: Positive Mental Health & Prevention of Substance Harms** – promoting positive mental health, preventing mental health problems, and reducing harms associated with psychoactive substances.
- **Goal 4: Communicable Disease Prevention** – preventing and reducing communicable disease transmission and reducing associated morbidity and mortality.
- **Goal 5: Injury Prevention** – reducing the incidence of injuries among children, youth, and seniors, and building a culture of safety.
- **Goal 6: Environmental Health** – optimizing the physical environment to support good health.
- **Goal 7: Public Health Emergency Management** – increasing preparedness and responsiveness of the public health system and reducing the impact of outbreaks and health risks from natural or human-made disasters.

There are performance measures set out in the Guiding Framework to help monitor each of these seven goals, plus a set of overarching measures to monitor the public health system overall. The measures were taken mainly from existing strategies to align efforts and to ensure that data were available.⁴ These performance measures can also be used to assess the impact of new interventions, to monitor and report on progress over time, and to ensure continuous quality improvement. Each performance measure was assigned a target value for BC to achieve by 2023.⁴

The updated Guiding Framework³⁸ (2017) provides updated baseline values and targets for the original measures, adjusted to account for updates to available data sources. This PHO report uses the same 36 performance measures and their associated baselines and targets from the updated (2017) Guiding Framework to assess the status of, and report on progress in advancing, public health in BC.³⁸

Key Health Priority-setting Documents in BC

In February 2014, the Ministry of Health released its health system strategy document, entitled *Setting Priorities for the B.C. Health System* (the Health System Strategy). One of the eight priority areas for service delivery action in that strategy document is prevention and health promotion. In April 2014, the Ministry released *B.C. Health System Strategy Implementation: A Collaborative and Focused Approach*. This document outlined the need to pursue continuous quality improvement across the health system using a performance management framework. A key area of focus is “...enabling and supporting the population to stay healthy through effective public health policy, services and healthy living strategies.”³⁹

In 2015, the Ministry of Health developed a series of policy papers focused on several key health priorities to help reshape the system to better meet the needs of patients.⁴⁰ These priorities rest on a foundation of improving and maintaining the health status of the population, identified within the Health System Strategy as an area for continuous quality improvement.

This message was further strengthened through the ministry’s Mandate Letter to the health authorities in 2017/18. The Mandate Letter reinforced the importance of the Guiding Framework as “...the provincial framework for supporting the overall health and well-being of British Columbians and a sustainable public health system...”⁴¹ It also focused on the Healthy Families BC Policy Framework, which will be discussed in the next section. Under this direction, health authorities have a key accountability to provide public health and primary care services that improve the health of the population, and to work with individuals and communities to foster healthy behaviours.

One of the key components of the Health System Strategy is the commitment to establish a clear performance management accountability framework built on public reporting. This report, produced by the PHO under section 66 of the *Public Health Act*, assesses the status of population and public health in British Columbia. This is done through a review of progress on the performance measures established in the Guiding Framework, the strategic directional document for the public health system. This work can then be used to develop a performance management framework for the public health system (see Chapter 11 for further discussion).

Healthy Families BC Policy Framework

Priority 2 in the Health System Strategy involves implementing “...targeted and effective primary prevention and health promotion through a co-ordinated delivery system.” This system was to be built on the structure of the existing Healthy Families BC platform.⁴² Healthy Families BC is the province’s health promotion plan to encourage British Columbians to make healthier choices.⁴³ In May 2014, the Ministry of Health released the *Healthy Families BC (HFBC) Policy Framework*. The HFBC Framework operationalizes four of the seven goals in the Guiding Framework (Goals 1, 2, 3, and 5), and uses performance measures and targets set out in the Guiding Framework.⁴⁴ It represents a more focused, detailed approach to prevention initiatives and to reducing avoidable illness and injury, and the associated care and treatment costs.



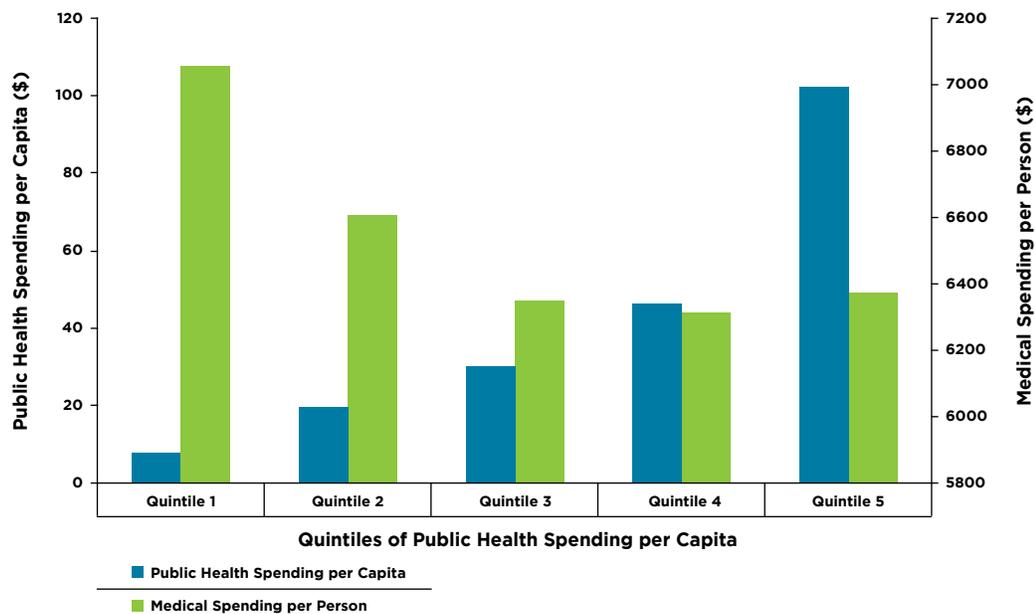
Investing in Population & Public Health

In BC, the largest proportion of total health care costs is directly or indirectly attributable to chronic disease.⁴⁴ It is estimated that a significant fraction of these diseases have behavioural antecedents that can be modified (e.g., lung cancer and smoking, Type 2 diabetes and diet, obesity and diet). People with highly complex chronic conditions use the most hospital, PharmaCare, and home and community care services, and are also high users of general practitioner and specialist services.⁴⁵ Additionally, mental illness accounts for substantial costs to the Canadian economy in terms of lost productivity—the annual cost is \$51 billion, and BC’s share of this burden is an estimated \$6.6 billion each year.⁴⁶

In addition to increasing the public’s level of health and well-being, investment in public health—including health promotion and disease prevention initiatives—offers substantial benefits for health care system expenditures. For example, it is estimated that a one percent annual reduction in risk factor prevalence (smoking, excess weight, and physical inactivity) until 2036 could result in a cumulative \$15 billion in direct and indirect health care costs avoided in BC.⁴⁷

While savings accrued in different parts of a health care system or broader provincial system are not always quantifiable, research has been able to quantify some of the savings associated with investment in public health. For example, every one dollar spent on immunizing children with measles, mumps, and rubella vaccine saves a potential \$16 in health care costs,⁴⁸ one dollar

FIG 1.7 Public Health Spending



Notes: Analyses used the local public health agency and the community it serves as the unit of analysis. For the analysis, communities were grouped into quintiles based on the measure of local public health spending per capita in 2005 (quintile 1 = lowest level of public health spending; quintile 5 = highest level).
Source: Adapted from Mays GP, Smith SA. Geographic variation in public health spending: correlates and consequences; 2009 Oct.⁵⁶

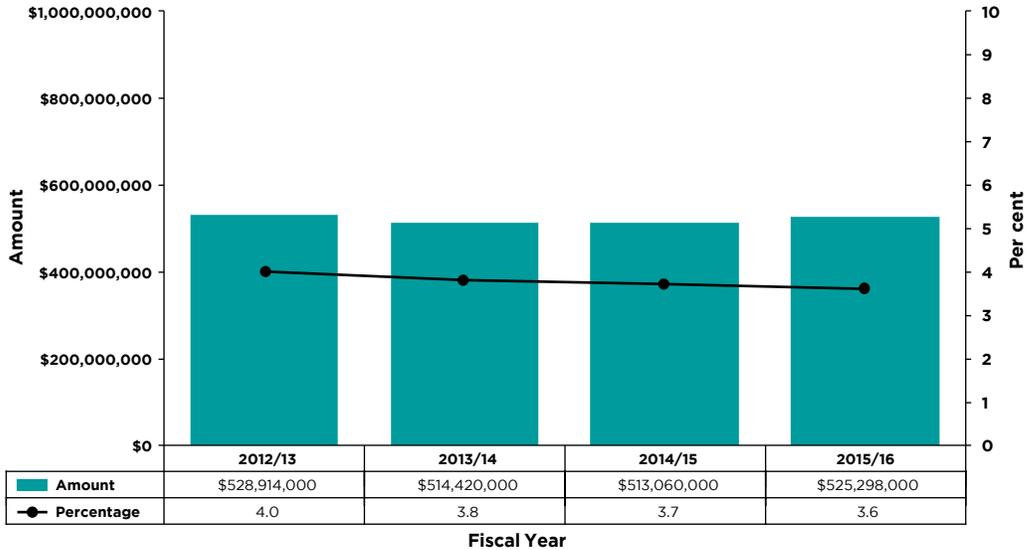
spent on tobacco prevention programs saves up to \$20 in future health care costs;⁴⁹⁻⁵¹ one dollar spent on early childhood development and care saves up to \$9 in future spending on health, social, and justice services;^{52,53} and one dollar spent on car and booster seats saves \$40 in avoided medical costs.⁵⁴ Research in the United States looked at how spending on public health affected spending on medical services, and found that increased spending on public health resulted in reduced spending on medical services:⁵⁵ increasing public health spending from \$10 to \$45 per capita reduced medical costs from \$7,100 to \$6,200 per person (see Figure 1.7).

Figure 1.8a shows the expenditures allocated to population health and wellness in BC based on health authority budgeting. The expenditure category “population health and wellness” is defined by the Office of the Auditor General of BC in *Health Funding Explained 2*⁵⁷ as budget items that “...focu[s] on health promotion

and disease prevention.” As this figure shows, the amount and proportion of expenditures allocated to population health and wellness have not increased over time, and in fact have decreased. This is despite the fact that in 2004, the BC Legislative Assembly’s Select Standing Committee on Health recommended investing in a “full ounce of prevention”, by increasing spending on population and public health from 3 per cent to 6 per cent of the health budget.⁵⁸ The committee reiterated this recommendation for additional resources for public health in a subsequent report in 2006,⁵⁹ but the recommendation has not yet been implemented.

Figure 1.8b shows how those health authority expenditures were distributed in BC from 2012/13 to 2015/16, and illustrates how population health and wellness consistently receives the smallest proportion of health authority funding compared to other budget areas.

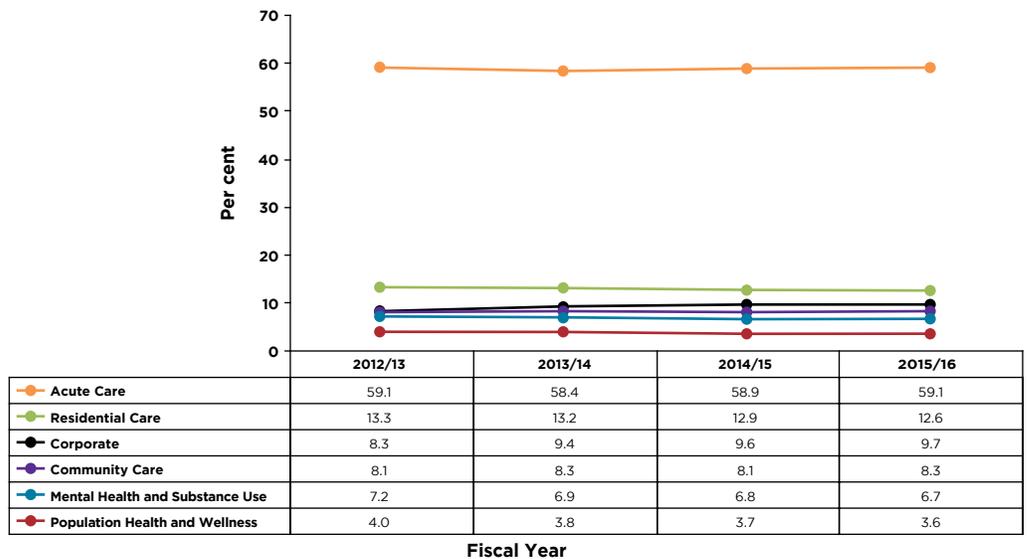
FIG 1.8a Health Authority Expenditures for Population Health and Wellness, Amount and Percentage of Budget, BC, 2012/13 to 2015/16



Notes: Data include the five regional health authorities and the Provincial Health Services Authority. "Population Health and Wellness" focuses on health promotion and disease prevention.

Source: Data are taken from yearly audited financial statements available on health authority websites. Adapted from unpublished spreadsheet; prepared by Population and Public Health Division and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 1.8b Health Authority Expenditures, Percentage of Budget, by Spending Category, BC, 2012/13 to 2015/16



Notes: Data include the five regional health authorities and the Provincial Health Services Authority. "Population Health and Wellness" focuses on health promotion and disease prevention.

Source: Data are taken from yearly audited financial statements available on health authority websites. Adapted from unpublished spreadsheet; prepared by Population and Public Health Division and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

Figure 1.9 provides the amount and percentage of expenditures that each health authority allocated to population health and wellness for 2015/16. This breakdown reveals that the majority of health authorities allocate proportionately less than the overall picture of health expenditures in BC suggests, with expenditure amounts and percentages in Northern and especially the Provincial Health Services Authority (PHSA) working to skew the overall picture in BC shown in Figures 1.8a and 1.8b.

Methodology & Data Sources

Methodology

This report explores each of the 36 performance measures established in the Guiding Framework. Each performance measure is presented with its associated baseline value, current status,^e and 2023 target. Analyses include an examination of whether there has been progress toward the target since the baseline, and whether progress is currently sufficient for BC to reach the associated 10-year target by 2023. Whenever possible, analyses based on sex, age, and health authority are provided to identify disparities between sub-populations and geographic areas. This can assist in targeting enhanced supports and interventions more effectively, particularly for performance measures that, according to the current trajectory, are not projected to meet their targets.

Performance measures and the associated targets set out in the Guiding Framework were established through extensive consultation with stakeholders, and were intentionally ambitious to motivate action and encourage strong partnerships.⁴

Data Sources

Data for this report were obtained from a variety of sources, including provincial and

national sources, as well as regional health authorities. This includes data at the Ministry of Health: the Discharge Abstract Database, Chronic Disease Registry, and Vital Statistics Agency. BC regional health authorities provided data about boil water advisories from their health region-specific data management systems. Partner health organizations also provided key data, including the BC Centre for Disease Control, BC Injury Research and Prevention Unit, Perinatal Services BC, and BC Stats. This report also uses data provided by the BC Ministry of Education (the Student Satisfaction Survey), the Human Early Learning Partnership (the Early Development Instrument), and the McCreary Centre Society (the Adolescent Health Survey). National data were derived from Statistics Canada, including its CANSIM database, Canadian Community Health Survey, and Households and the Environment Survey.

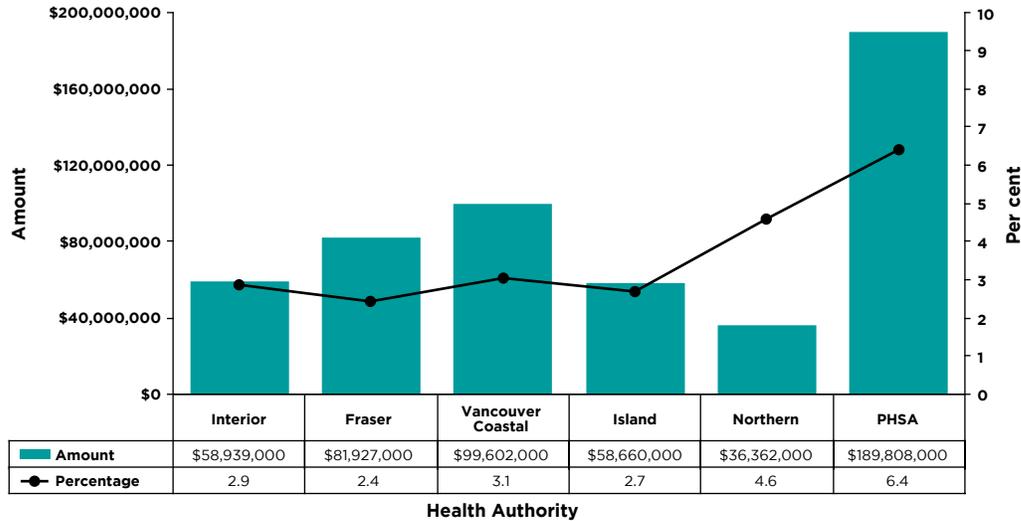
For additional details about these data sources, see Appendix B.

Organization of this Report

This report provides an overview of the health of British Columbians, and the status of population and public health in British Columbia, using the 36 performance measures established in the Guiding Framework, the strategic direction for the public health system. In doing so, the report identifies current successes, challenges, and opportunities to improve the health of the population of BC. Chapter 2 examines the overarching health system performance measures, while Chapters 3 to 9 examine the performance measures within each of the Guiding Framework goal areas, in turn. Chapter 10 looks at health surveillance, one of the foundational supports for public health. The final chapter discusses the main findings presented in this report, and offers a comprehensive set of recommendations that support efforts underway

^e Data presented in these figures show the most current data available at the time of publication, which varies based on data source.

FIG 1.9 Health Authority Expenditures for Population Health and Wellness, Amount and Percentage of Budget, by Health Authority, BC, 2015/16



Notes: Data include the five regional health authorities and the Provincial Health Services Authority (PHSA). "Population Health and Wellness" focuses on health promotion and disease prevention.

Source: Data are taken from yearly audited financial statements available on health authority websites. Adapted from unpublished spreadsheet; prepared by Population and Public Health Division and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

to improve population and public health in BC. Appendix A defines glossary terms used in this report (denoted by bolded text). Appendix B provides information regarding data sources used in this report. Appendix C provides an overall dashboard of performance measures examined in this report.

Conclusion

This chapter has shown that for some performance measures of health and well-being, BC ranks favourably when compared across Canada and internationally. It has discussed the determinants of health, and the need to examine and address causes of good health and illness that are even further upstream—the “causes of the causes”—to best support health outcomes. This chapter has provided an overview of

population and public health and related health strategies in BC, and shown how investment in public health and prevention initiatives can create improved health, as well as avoid health care costs.

The next chapter will explore overarching health topics using the six health system performance measures of the Guiding Framework.

REFERENCES

- ¹ Statistics Canada. Life tables, Canada, Provinces and Territories, 2009 to 2011. Ottawa, ON: Minister of Industry; 2013.
- ² Conference Board of Canada. How Canada performs. Health [Internet]. Ottawa, ON: Conference Board of Canada; 2015 Feb [cited 2017 Aug 3]. Available from: <http://www.conferenceboard.ca/hcp/provincial/health.aspx>.
- ³ BC Provincial Health Officer. The health and well-being of people in British Columbia. A report on the health of British Columbians. Provincial Health Officer's annual report 2002. Victoria, BC: BC Ministry of Health Planning; 2003.
- ⁴ BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ⁵ World Health Organization. Constitution of the World Health Organization. New York: World Health Organization; 1946 [cited 2018 Jan 23]. Available from: http://www.who.int/governance/eb/who_constitution_en.pdf.
- ⁶ World Health Organization. Health topics: health promotion [Internet]. Geneva: World Health Organization; 2018 [cited 2018 Jan 23]. Available from: http://www.who.int/topics/health_promotion/en/.
- ⁷ BC Ministry of Health. Public health 101: the fundamentals. Module 3: how does public health work? Victoria, BC: BC Ministry of Health; 2014 Apr [cited 2018 Mar 14]. Available from: <http://urls.bccampus.ca/4qb>.
- ⁸ Statistics Canada. Table 102-0512 Life expectancy, at birth and at age 65, by sex, Canada, provinces and territories, annual (years) (table). CANSIM (database). Ottawa, ON: Statistics Canada; [modified 2012 May 31; cited 2016 Dec 12]. Available from: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=1020512&pattern=&csid=>.
- ⁹ Conference Board of Canada. How Canada performs. Life expectancy. Ottawa, ON: Conference Board of Canada; 2016 [cited 2016 Dec 5]. Available from: <http://www.conferenceboard.ca/hcp/provincial/health/life.aspx>.
- ¹⁰ Statistics Canada. Table 105-0509 Canadian health characteristics, two year period estimates, by age group and sex, Canada, provinces, territories, health regions occasional (table). CANSIM (database). Ottawa, ON: Statistics Canada; [cited 2018 Jan 25]. Available from: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=1050509&pattern=&stByVal=1&p1=1&p2=50&tabMode=dataTable&csid=>.
- ¹¹ Statistics Canada. Infant mortality rates, by province and territory (both sexes) (summary table). CANSIM database. Ottawa, ON: Statistics Canada; [modified 2018 Feb 23; cited 2018 Apr 11]. Available from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health21a-eng.htm>.
- ¹² Statistics Canada. Perceived mental health by sex, by province and territory (very good or excellent (%)) (summary table). CANSIM (database). Ottawa, ON: Statistics Canada; [modified 2016 Mar 7; cited 2016 Dec 8]. Available from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health11b-eng.htm>.
- ¹³ Statistics Canada. Life satisfaction, satisfied or very satisfied, by age group and sex, by province and territory (percentage) (summary table). CANSIM (database). Ottawa, ON: Statistics Canada; [modified 2016 Mar 7; cited 2016 Dec 8]. Available from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health88b-eng.htm>.
- ¹⁴ Statistics Canada. Perceived health by sex, by province and territory (very good or excellent (%)) (summary table). CANSIM (database). Ottawa, ON: Statistics Canada; [modified 2016 Mar 7; cited 2016 Dec 8]. Available from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health109b-eng.htm>.
- ¹⁵ BC Ministry of Health, Population Health Surveillance and Epidemiology. Chronic disease estimates; 2016 Dec 8. See Appendix B for more information about this data source.
- ¹⁶ British Columbia Coroners Service. Fentanyl-detected illicit drug overdose deaths January 1, 2012 to December 31, 2017. Burnaby, BC: Office of the Chief Coroner; 2018 [cited 2018 Apr 10]. Available from: <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/death-investigation/statistical/fentanyl-detected-overdose.pdf>.
- ¹⁷ First Nations Health Authority. Overdose data and First Nations in BC: preliminary findings. Vancouver, BC: First Nations Health Authority; 2017 [cited 2018 Apr 10]. Available from: http://www.fnha.ca/newsContent/Documents/FNHA_OverdoseDataAndFirstNationsInBC_PreliminaryFindings_FinalWeb.pdf.
- ¹⁸ Standing Senate Committee on Social Affairs, Science and Technology. The health of Canadians – the federal role. Volume I – the story so far. Ottawa, ON: Standing Senate Committee on Social Affairs, Science and Technology; 2001 Mar [cited 2017 Aug 3]. Available from: <https://sencanada.ca/content/sen/Committee/371/pdf/interim-soci-e.pdf>.

- ¹⁹ Canadian Medical Association. Health equity and the social determinants of health. Ottawa, ON: Canadian Medical Association; 2012 [cited 2018 Mar 14]. Available from: <https://www.cma.ca/En/Pages/health-equity.aspx>.
- ²⁰ Public Health Agency of Canada. What makes Canadians healthy or unhealthy? [Internet]. Ottawa, ON: Public Health Agency of Canada; [modified 2003 Jun 16]. Available from: <https://www.canada.ca/en/public-health/services/health-promotion/population-health/what-determines-health/what-makes-canadians-healthy-unhealthy.html>.
- ²¹ World Health Organization. Social Determinants of Health: Key Concepts. Geneva, Switzerland: World Health Organization. [cited 2018 Oct 26]. Available from: https://www.who.int/social_determinants/thecommission/finalreport/key_concepts/en/.
- ²² ABC News. Boyer Lectures: Sir Michael Marmot highlights health inequalities and 'causes of the causes' [Internet]; [updated 2016 Sep 11; cited 2017 Mar 23]. Available from: <http://www.abc.net.au/news/2016-09-03/boyer-lecture-sir-michael-marmot-highlights-health-inequalities/7810382>.
- ²³ Australian Institute of Health and Welfare. Australia's health 2008. Canberra: Australia Institute of Health and Welfare; 2008 [cited 2018 Jan 04]. Available from: http://library.bsl.org.au/jspui/bitstream/1/975/1/Australia's_Health_2008.pdf.
- ²⁴ Statistics Canada. Aboriginal Peoples: fact sheet for British Columbia. Ottawa, ON: Statistics Canada; [2016 Mar 14; cited 2017 Aug 10]. Available from: <http://www.statcan.gc.ca/pub/89-656-x/89-656-x2016011-eng.htm>.
- ²⁵ Government of British Columbia. Aboriginal People [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Aug 10]. Available from: <http://www2.gov.bc.ca/gov/content/governments/aboriginal-people>.
- ²⁶ Provincial Health Officer. The health and well-being of Aboriginal people in British Columbia. Provincial Health Officer's annual report 2001. Victoria, BC: BC Ministry of Health Planning.
- ²⁷ Government of British Columbia, Government of Canada, The Leadership Council Representing the First Nations of British Columbia. Transformative Change Accord; 2005 Nov 25.
- ²⁸ Government of British Columbia, British Columbia Assembly of First Nations, First Nations Summit, Union of British Columbia Indian Chiefs. Transformative Change Accord: First Nations Health Plan; [cited 2016 Dec 9]. Available from: http://www.health.gov.bc.ca/library/publications/year/2006/first_nations_health_implementation_plan.pdf.
- ²⁹ Provincial Health Officer, First Nations Health Authority. First Nations health and well-being: interim update. Victoria, BC: Office of the Provincial Health Officer; 2015 Nov [cited 2016 Dec 9]. Available from: <http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/special-reports/first-nations-health-and-well-being-interim-update-nov-2015.pdf>.
- ³⁰ First Nations Health Authority. First Nations perspective on health and wellness [Internet]. Vancouver, BC: First Nations Health Authority; [cited 2018 Mar 21]. Available from: <http://www.fnha.ca/wellness/wellness-and-the-first-nations-health-authority/first-nations-perspective-on-wellness>.
- ³¹ Federal/Provincial/Territorial Advisory Committee on Population Health. Towards a healthy future: second report on the health of Canadians. Ottawa, ON: Minister of Public Works and Government Services of Canada; 1999 Sep.
- ³² Last JM, editor. A dictionary of public health. New York: Oxford University Press; 2007.
- ³³ Government of British Columbia. What is public health [Internet]. Victoria, BC: Government of British Columbia; [cited 2016 Dec 9]. Available from: <http://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/about-public-health/for-the-public#what-is-public-health>.
- ³⁴ BC Ministry of Health, Population and Public Health Division. Public health 101: the fundamentals. Module 1: what is public health? Victoria, BC: BC Ministry of Health; 2014 Apr [cited 2016 Dec 9]. Available from: <http://solr.bccampus.ca:8001/bcc/items/14abb1d8-e023-4c4b-90b6-933553ad52c3/1/>.
- ³⁵ BC Ministry of Health, Population and Public Health Division. Public health 101: the fundamentals. Module 4 how is the public health system organized in Canada? Victoria, BC: BC Ministry of Health; 2014. [cited 2018 Jan 25] Available from: http://solr.bccampus.ca:8001/bcc/file/14abb1d8-e023-4c4b-90b6-933553ad52c3/1/BC_PublicHealth101_Module_04_v02.pdf.
- ³⁶ National Advisory Committee on SARS and Public Health. Learning from SARS: Renewal of public health in Canada. Ottawa, ON: Health Canada; 2003 Oct [cited 2017 Mar 13]. Available from: <http://www.phac-aspc.gc.ca/publicat/sars-sras/naylor/index-eng.php>.

- ³⁷ BC Provincial Health Officer. Drinking water quality in British Columbia: the public health perspective. Provincial Health Officer's annual report 2000. Victoria, BC: BC Ministry of Health Planning; 2001 Oct [cited 2017 Mar 13]. Available from: <http://www2.gov.bc.ca/assets/gov/environment/air-land-water/phoannual2000.pdf>.
- ³⁸ BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health. March 2017 update. Victoria, BC: BC Ministry of Health; 2017 Mar.
- ³⁹ BC Ministry of Health. B.C. health system strategy implementation: a collaborative and focused approach. Victoria, BC: BC Ministry of Health; 2014 Apr.
- ⁴⁰ Government of British Columbia. Setting priorities for B.C. health [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Aug 11]. Available from: <http://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-system/health-priorities/setting-priorities-for-bc-health>.
- ⁴¹ BC Ministry of Health. Mandate letter to health authorities 2017/18. Victoria, BC: 2017 Feb 22.
- ⁴² BC Ministry of Health. Setting priorities for the B.C. health system. Victoria, BC: BC Ministry of Health; 2014 Feb.
- ⁴³ Healthy Families BC. About us [Internet]. Victoria, BC: Healthy Families BC; 2012 [cited 2016 Dec 9]. Available from: <https://www.healthyfamiliesbc.ca/home/about-us>.
- ⁴⁴ BC Ministry of Health. Healthy families BC policy framework. A focused approach to chronic disease and injury prevention. Victoria, BC: BC Ministry of Health; 2014 Mar.
- ⁴⁵ BC Ministry of Health. Enabling effective, quality population and patient-centred care: a provincial strategy for health human resources. Cross-sector policy discussion paper. Victoria, BC: Ministry of Health; 2015.
- ⁴⁶ BC Ministry of Health Services, Ministry of Children and Family Development. Healthy minds, healthy people: a 10-year plan to address mental health and substance use in British Columbia. Victoria, BC: Ministry of Health Services, Ministry of Children and Family Development; 2010.
- ⁴⁷ Krueger H, Rasali D, Pennock M, Gustin S. The economic benefits of risk factor reduction in British Columbia: excess weight, physical inactivity and tobacco smoking. Vancouver, BC: Provincial Health Services Authority; 2015 Jul [cited 2018 Mar 13]. Available from: http://krueger.ca/wp-content/uploads/edd/2015/12/Economic_Benefits_of_Risk_Factor_Reduction_in_BC.pdf.
- ⁴⁸ Public Health Agency of Canada. Canadian immunization guide – cost savings achieved through selected immunization programs. Ottawa, ON: Public Health Agency of Canada; 2016 [cited 2017 Mar 14]. Available from: <https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-1-key-immunization-information/page-3-benefits-immunization.html#p1c2t2>.
- ⁴⁹ Ontario Chronic Disease Prevention Alliance. Make Ontario the healthiest province in Canada. A statement to Ontario political party leaders. Toronto, ON: Ontario Chronic Disease Prevention Alliance; [cited 2017 Mar 14]. Available from: http://www.ocdpa.on.ca/sites/default/files/publications/ADV_Election%20Brief%20FINAL_03MR10.pdf.
- ⁵⁰ Tobacco Strategy Advisory Group. Building on our gains, taking action now: Ontario's Tobacco Control Strategy for 2011-2016. Toronto, ON: Ministry of Health Promotion and Sport; 2010 Oct 18 [cited 2017 Mar 14]. Available from: <http://otru.org/wp-content/uploads/2012/06/TSAGReport.pdf>.
- ⁵¹ National Center for Chronic Disease Prevention and Health Promotion. The power of prevention: chronic disease... the public health challenge of the 21st century. Atlanta, GA: Centers for Disease Control and Prevention; 2009 [cited 2017 Mar 14]. Available from: <https://www.cdc.gov/chronicdisease/pdf/2009-power-of-prevention.pdf>.
- ⁵² Chief Public Health Officer. The Chief Public Health Officer's report on the state of public health in Canada (2009): growing up well – priorities for a healthy future. Ottawa, ON: Public Health Agency of Canada; 2009 [cited 2017 Mar 14]. Available from: <http://www.phac-aspc.gc.ca/cphorsphc-respcacsp/2009/fr-rc/pdf/cphorsphc-respcacsp-eng.pdf>.
- ⁵³ Rolnick A, Grunewald R. A proposal for achieving high returns on early childhood development. Minneapolis, MN: Federal Reserve Bank of Minneapolis; 2006 Mar [cited 2017 Mar 14]. Available from: <https://www.minneapolisfed.org/~media/files/publications/studies/earlychild/highreturn.pdf>.
- ⁵⁴ Children's Safety Network. Injury prevention: what works? A summary of cost-outcome analysis (2012 update). Waltham, MA: Children's Safety Network; 2012 [cited 2017 Mar 14]. Available from: <http://www.injurycenter.umich.edu/sites/default/files/documents/Injury%20Prevention%20Cost-Outcome%20Analysis%20of%20Programs.pdf>.

- ⁵⁵ Mays GP, Smith SA. Geographic variation in public health spending: correlates and consequences. *Health Serv Res.* 2009 Oct;44(5 Pt 2):1796-817. Cited by G Mays. The status of public health services & systems research in the U.S.: implications for British Columbia. British Columbia Public Health Systems Research Think Tank, Vancouver, BC; 2014 Feb 13.
- ⁵⁶ Mays GP, Smith SA. Geographic variation in public health spending: correlates and consequences. *Health Serv Res.* 2009 Oct;44(5 Pt 2):1796-817.
- ⁵⁷ Office of the Auditor General of British Columbia. Health funding explained 2. Victoria, BC: Office of the Auditor General of British Columbia; 2017 Mar [cited 2017 Aug 11]. Available from: http://www.bcauditor.com/sites/default/files/publications/reports/FINAL_HFE2_2.pdf.
- ⁵⁸ Select Standing Committee on Health. The path to health and wellness: making British Columbians healthier by 2010. Victoria, BC: Legislative Assembly of British Columbia; 2004 [cited 2018 Feb 26]. Available from: <https://www.leg.bc.ca/content/legacy/web/cmt/37thparl/session-5/health/reports/PDF/Rpt-HEALTH-37-5-1stRpt-PathToHealthWellness-2004-NOV-25.pdf>.
- ⁵⁹ Select Standing Committee on Health. A strategy for combatting childhood obesity and physical inactivity in British Columbia. Victoria, BC: The Legislative Assembly of British Columbia; 2006 [cited 2018 Mar 13]. Available from: <https://www.leg.bc.ca/content/legacy/web/cmt/38thparl/session-2/health/reports/Rpt-Health-38-2-29Nov2006.pdf>.
- ⁶⁰ World Health Organization. Health Impact Assessment (HIA): Glossary of terms used. Geneva, Switzerland; [cited 2018 Dec 10]. Available from: <https://www.who.int/hia/about/glos/en/index1.html>.

2

Measuring Population Health & Well-being

An examination of population and public health in BC requires an exploration of performance measures of health and wellness promotion and disease prevention, of health outcomes, as well as of access to health services. *Promote, Protect, Prevent: Our Health Begins Here. BC's Guiding Framework for Public Health* (the Guiding Framework)¹ sets out 30 specific performance measures and six overarching measures of

population health and well-being in BC. The specific performance measures reflect critical aspects of population health and well-being. The more broad, overarching measures represent the combined effects of the seven goals of the Guiding Framework, and are critical for assessing the performance of the public health system overall.¹ This chapter will explore the six overarching measures in turn.

Guiding Framework: Overarching Measures

Performance Measures

The six overarching performance measures included in the Guiding Framework are as follows:

- Geographic disparity in life expectancy between local health areas (in years).
- The age-standardized incidence rate for diabetes (per 1,000 population).
- Health-adjusted life years of the BC population.
- Infant mortality rate (per 1,000 live births).
- The age-standardized rate of mortality due to preventable causes (per 100,000 population).
- The percentage of British Columbians (age 12+) who report that they are very satisfied with life.

Gap in Life Expectancy at Birth Between Local Health Areas

Performance Measure: Geographic disparity in life expectancy between local health areas (in years).

Baseline: 10.0 years (2007-11)

2023 Target: 6 years

Life expectancy is the expected number of years of life remaining at a given age; for this report it is expected years of life at birth.² BC has had the longest life expectancy in Canada since the mid-to-late 1990s;³ however, this long life expectancy is not shared equally across the province.

The gap in life expectancy between **local health areas** (LHAs) identified in the Guiding Framework was a 10.0-year difference from the shortest life expectancy to the longest, in

the baseline timeframe of 2007-11 (a five-year aggregate). Reducing this gap is an important principle for population and public health policy, with the objective of supporting a generalized increase in health status for British Columbians. The target identified in the Guiding Framework for this indicator is to reduce the gap to 6 years by 2023.

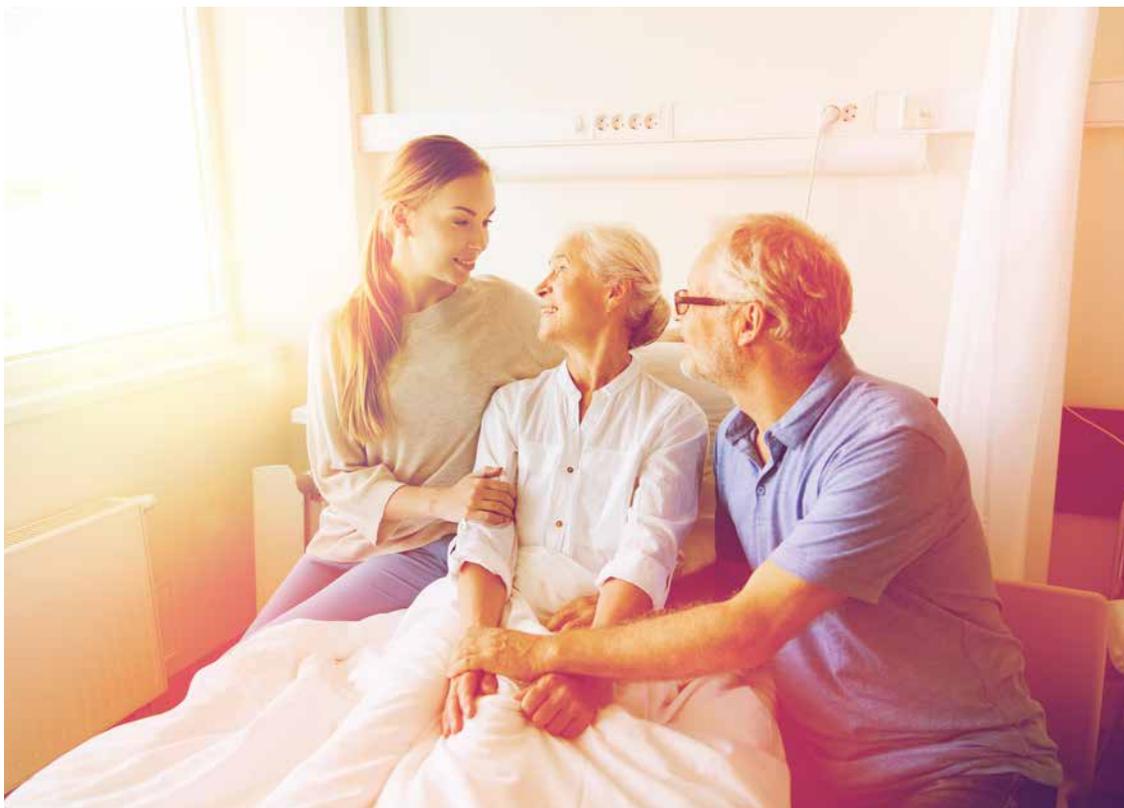
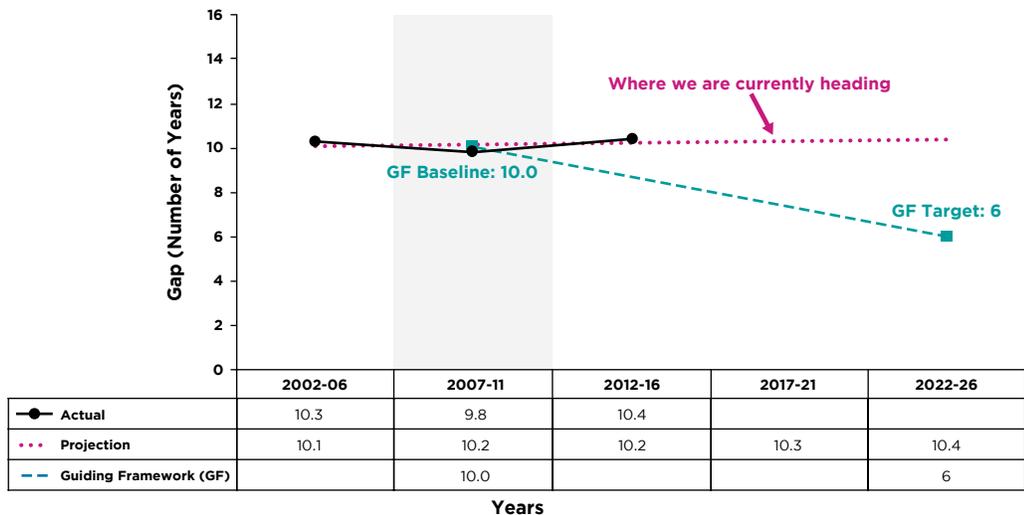


FIG 2.1 Actual and Projected Disparity in Life Expectancy at Birth Between Local Health Areas, BC, 2002-06 to 2022-26



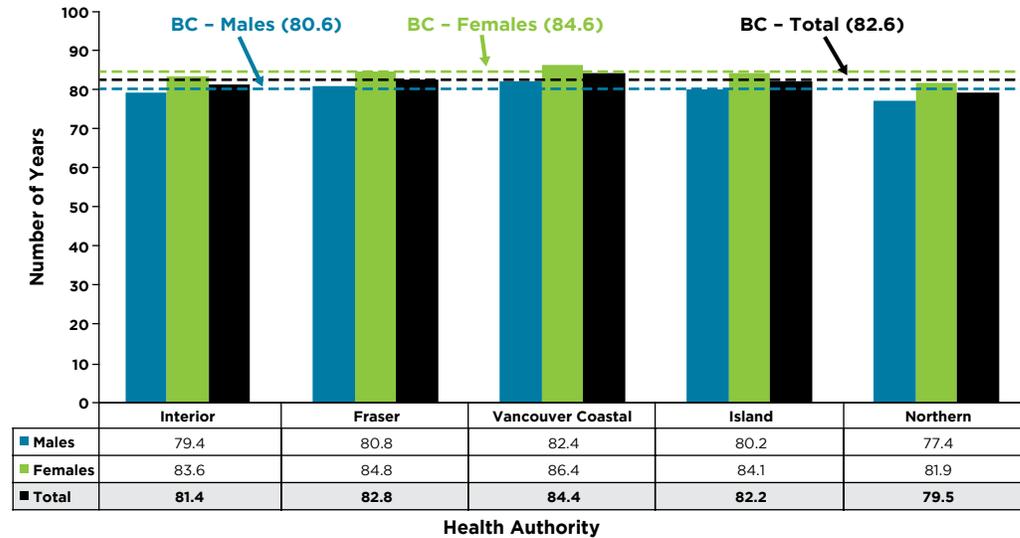
Notes: “Life expectancy” is the expected number of years of life remaining at a given age; in this case, at birth. This analysis is based on five-year aggregate data. The gap in life expectancy is calculated by subtracting the average life expectancy of the highest five local health areas (LHAs) from the average of the lowest five LHAs. The difference in the Guiding Framework baseline value and the actual value reported for the baseline year is a result of an update to the data source that took place after the March 2017 update of the Guiding Framework. See Appendix B for more information about these data sources.

Sources: BC Vital Statistics Agency (Deaths); BC Stats (Population Data). Life expectancy data prepared by BC Stats and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2017.

As shown in Figure 2.1, the gap between LHAs with the longest life expectancy and those with the shortest actually increased slightly, up to 10.4 years in 2012-16. While there are some trends in life expectancy among the LHAs, the five LHAs with the longest life expectancies and the five with the shortest are not the same in each time period shown; in addition, they are not from the same health authority areas. Thus, this indicator is not comparing the same LHAs over time. Based on the current projection shown, if this trend continues, the disparity will continue to increase and the 2023 target will not be achieved.

Understanding life expectancy at birth in BC has become increasingly difficult due to the ongoing overdose crisis. As shown in Chapter 1 (Figure 1.2), life expectancy has been declining since 2014, when the impact of the crisis began to emerge. There will be further discussion about this crisis and the related provincial response efforts in Chapters 6 and 9.

FIG 2.2 Life Expectancy at Birth, by Sex and Health Authority, BC, 2011-15



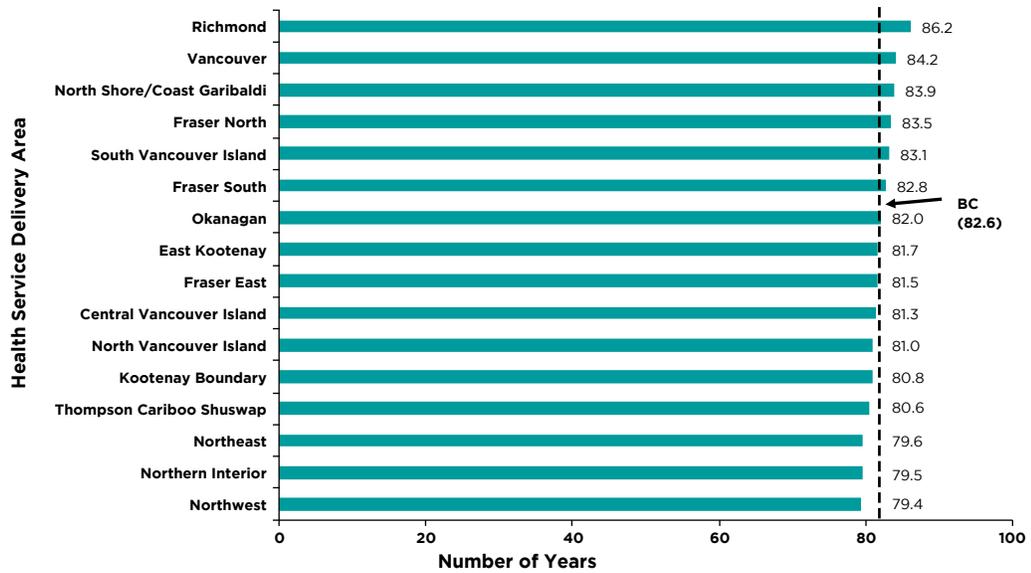
Notes: "Life expectancy" is the expected number of years of life remaining at a given age; in this case, at birth. Health authority is based on the residence of the individual. See Appendix B for more information about these data sources.

Sources: BC Vital Statistics Agency (Deaths); BC Stats (Population Data). Prepared by BC Stats, June 2015; and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

Other trends are emerging as well. While males have had shorter life expectancies than females across the decades, the gap between them has narrowed over time from about seven years in the 1970s,⁴ to the four-year gap in 2011-15³ (see Figure 2.2). The most important factor in reducing the gap has been a reduction in mortality from cardiovascular disease⁵ and lung cancer⁶, likely related to declining smoking rates among males.⁷ For years, females had lower smoking rates than males⁷ and consequently, lower mortality rates from cardiovascular disease⁵ and lung cancer⁶. Smoking rates for males peaked in the mid-1960s, while tobacco use among females did not peak until the mid-1970s.⁷

At a difference of 4.5 years, there is a slightly larger gap between males and females in Northern Health than other health authorities. However, this figure also reveals that the gap between health authorities (4.9 years) is now greater than the gap between males and females—suggesting a need to further address geographic disparities in health status and health outcomes. Geographic disparities in life expectancy are observed across Canada, with rural and remote locations often having lower life expectancies than the Canadian average.⁸

FIG 2.3 Life Expectancy at Birth, by Health Service Delivery Area, BC, 2011-15



Notes: "Life expectancy" is the expected number of years of life remaining at a given age; in this case, at birth. Health service delivery area is based on the residence of the individual. See Appendix B for more information about these data sources.
Sources: BC Vital Statistics Agency (Deaths); BC Stats (Population Data). Prepared by BC Stats, June 2015; and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

Figure 2.3 shows the average life expectancies for each of the 16 **health service delivery areas** (HSDAs) in BC for 2011-15.^f During this five-year aggregate period, life expectancy ranged from a high of 86.2 years in Richmond to less than 80 years in Northeast, Northern Interior, and Northwest. This gap between the highest and lowest life expectancies (6.8 years) indicates that health benefits are not equally shared across all geographic areas in the province. This is the result of complex socio-economic determinants of health, which will require innovative, multi-sectoral responses.

^f The current opioid overdose crisis would not impact this chart substantially. The related public health emergency was declared in April 2016. If there was an impact prior to that time it was likely just beginning in 2014 or 2015 and would have had minimal impact on this five-year average.

Diabetes Incidence

Performance Measure: The age-standardized incidence rate for diabetes (per 1,000 population).

Baseline: 6.5 per 1,000 population (2009/10) **2023 Target:** 6 per 1,000 population

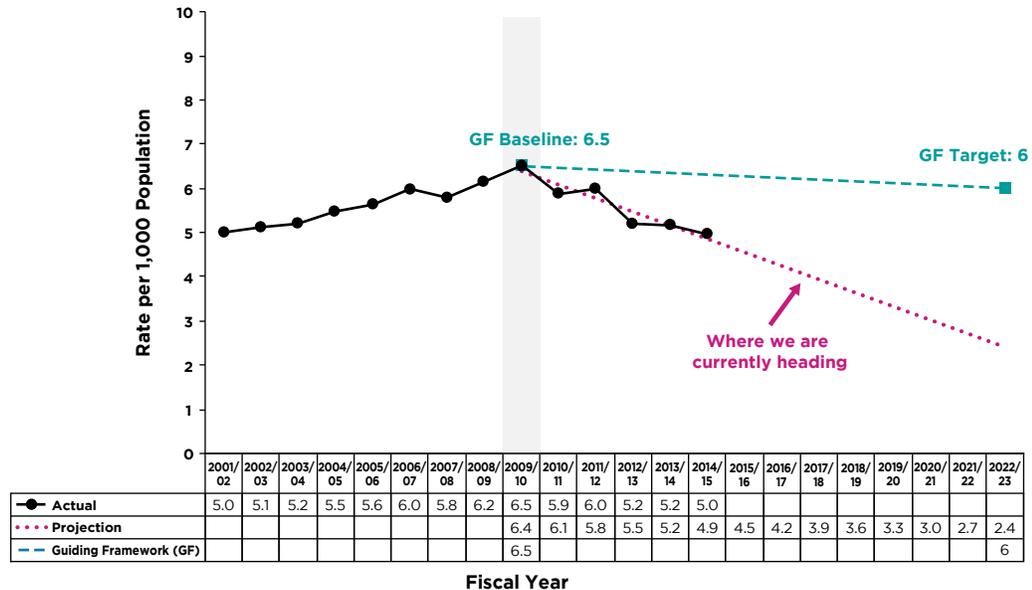
Diabetes is a chronic condition of high blood sugar that has complex causes—including lifestyle and environmental causes, genetic influences, and other factors—which results in ineffective use of insulin in the body. The diabetes incidence rate is the number of new cases of diabetes identified in a specified time period, as a rate per population (in this case, per 1,000 people).⁹ Diabetes incidence was chosen as a chronic disease indicator for the Guiding Framework because it serves as a “bellwether” or **sentinel chronic disease** and reflects the importance of chronic disease prevention. Diabetes is also associated with a

variety of risk factors that accompany other chronic diseases.¹

The target identified in the Guiding Framework for this indicator is 6 per 1,000 population, a modest improvement from the baseline value of 6.5 per 1,000. This modest target was partially informed by an increasing incidence rate and a need to slow and then stop the increase before being able to achieve substantive reductions. The increasing incidence rate was partially a product of **case finding** in BC, through testing programs and initiatives underway to identify people living with diabetes.¹



FIG 2.4 Actual and Projected Age-standardized Incidence Rate for Diabetes, BC, 2001/02 to 2022/23



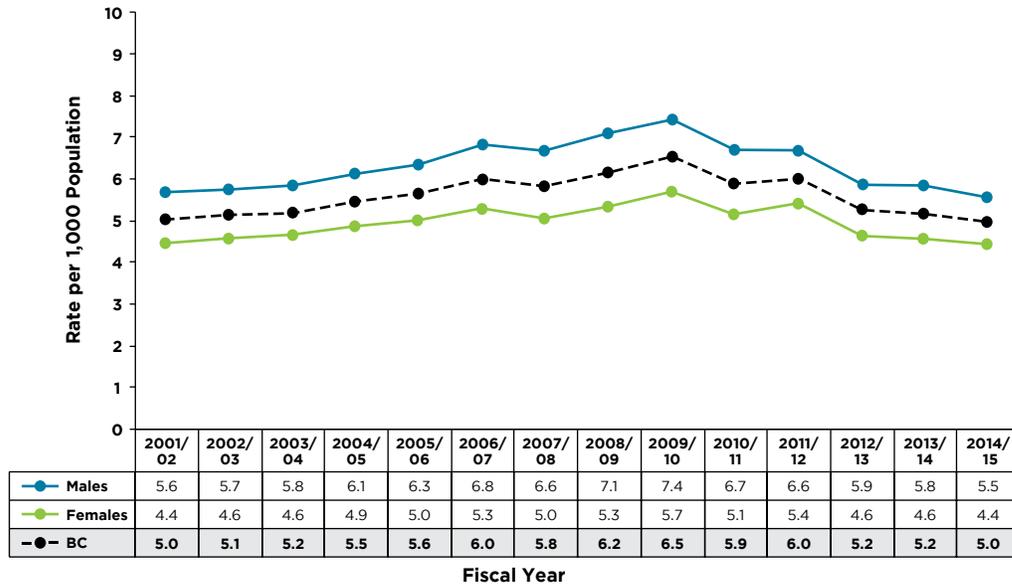
Notes: Standardized to the Canada 1991 population. See Appendix B for more information about this data source.
Source: BC Ministry of Health, Chronic Disease Registries. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

As shown in Figure 2.4, the incidence of diabetes appears to have peaked in 2009/10, which suggests that case-finding within BC has largely been achieved. The rate is now in a period of slow decline, and by 2014/15 it had dropped to 5.0 per 1,000 population. Based on the current projection, if this trend continues, the 2023 target will be achieved and surpassed.

Figure 2.5 shows diabetes incidence rate by sex. As this figure indicates, males had a higher rate of diabetes incidence for the entire time period shown. While there is some year-to-year variation in the gap between the sexes, the size of the gap (approximately 1.2 per 1,000 population) has not changed over time.

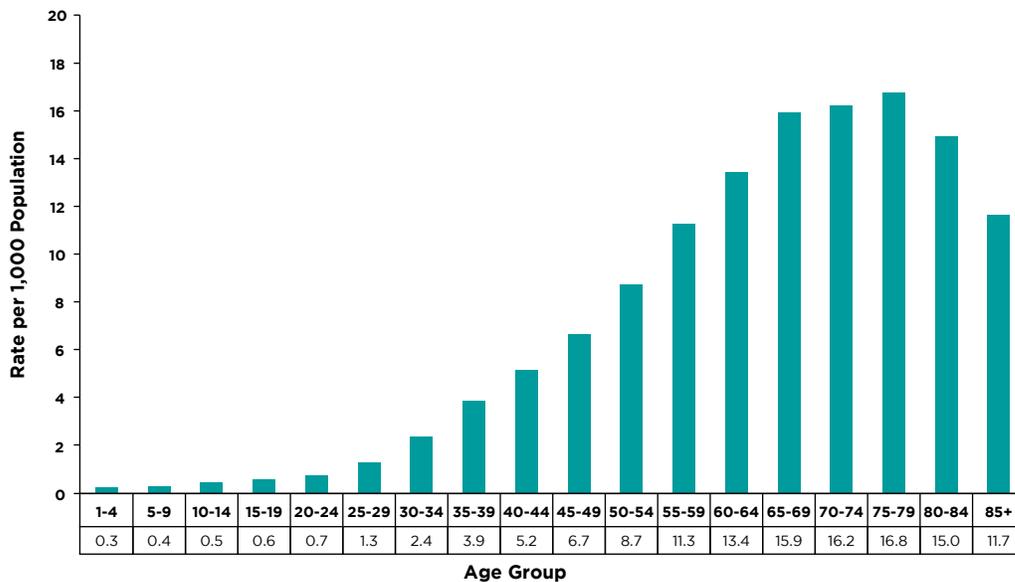
Figure 2.6 provides diabetes incidence rates according to age group. There is a clear relationship between age and new diagnoses of diabetes; the rates increase with each age group, peaking for those age 65 to 84 at 15.0 or more per 1,000 population.

FIG 2.5 Age-standardized Incidence Rate for Diabetes, by Sex, BC, 2001/02 to 2014/15



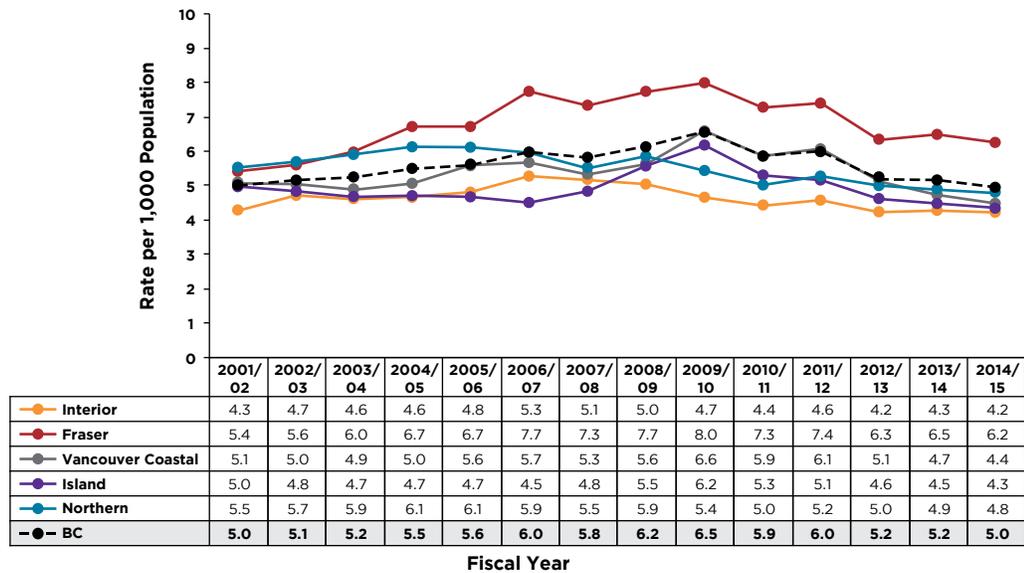
Notes: Standardized to the Canada 1991 population. See Appendix B for more information about this data source.
Source: BC Ministry of Health, Chronic Disease Registries. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 2.6 Incidence Rate for Diabetes, by Age Group, BC, 2014/15



Note: See Appendix B for more information about this data source.
Source: BC Ministry of Health, Chronic Disease Registries. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 2.7 Age-standardized Incidence Rate for Diabetes, by Health Authority, BC, 2001/02 to 2014/15



Notes: Standardized to the Canada 1991 population. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.
Source: BC Ministry of Health, Chronic Disease Registries. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

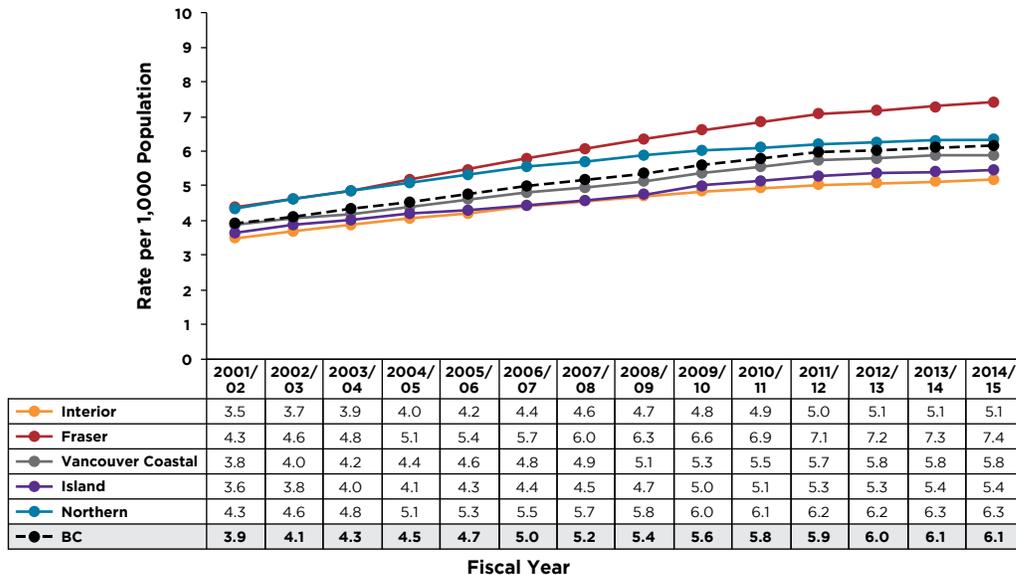
As shown in Figure 2.7, while there are some year-to-year fluctuations, the incidence rates of diabetes for all health authorities have been decreasing since the provincial peak in 2009/10. As of 2014/15, all rates are below or near the provincial target for 2023 of 6 per 1,000 population. This figure also shows considerable variation between health authorities over time, with the population in Fraser having the highest incidence rate for the last 11 years. Geographic disparity in diabetes incidence rates across BC likely reflects both modifiable behavioural effects (e.g., obesity, being physically active) as well as ethnic variation—see the end of this section for more discussion.

In addition to incidence rate, examining the diabetes prevalence rate (the rate of known/ diagnosed cases of people living with diabetes in the population) helps to understand the overall burden of diabetes in a given population. As shown in Figure 2.8, diabetes prevalence is

increasing in BC, particularly in Fraser, which is consistent with the higher incidence rate shown in Figure 2.7. However, the rate of increase has slowed considerably in recent years.

Several factors could be contributing to the higher diabetes prevalence rates shown in Fraser and Northern. For example, as will be explored in Chapter 3 of this report, people in Fraser and Northern health authorities also have the lowest rates of fruit and vegetable consumption and physical activity. Furthermore, ethnicity is one factor that can substantially impact the rate of diabetes prevalence in a population, as there are higher prevalence rates of diabetes in areas with large Asian and South Asian populations;¹⁰ within Fraser, 14.29 per cent of the population identifies as South Asian (in comparison to 7.2 per cent of the BC population).¹¹

FIG 2.8 Age-standardized Prevalence Rate for Diabetes, by Health Authority, BC, 2001/02 to 2014/15



Notes: Standardized to the Canada 1991 population. See Appendix B for more information about this data source.
Source: BC Ministry of Health, Chronic Disease Registries. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, September 2017.

Overall, a continuation of the downward trend of diabetes incidence across BC represents a very significant positive development with respect to the health of the population. Lifestyle behaviours linked to diabetes are well-known, and are mostly modifiable through evidence-based preventive initiatives. The incidence and prevalence of diabetes in BC had been rising over the years and it was emerging as a major factor in the demand for health services. If the current trend continues as projected, diabetes will be another condition, similar to cardiovascular diseases and conditions such as ischemic heart disease and heart failure, that has been reduced in the population through the combined effects of healthier lifestyles and clinical prevention.¹² In 2005, it was estimated that provincial programming aimed at behavioural lifestyle modifications would result in \$1 billion in cost avoidance if the incidence rate was reduced by 25 per cent over 10 years, and up to \$2 billion

if it was reduced by 50 per cent.¹⁰ Therefore, the reduction in the diabetes incidence rate and the related reduction in the rate of increase of diabetes prevalence represent considerable potential cost savings for the provincial health care system.

Health-Adjusted Life Expectancy

Performance Measure: Health-adjusted life years of the BC population.

Baseline: Males – 70.9 years; Females – 73.7 years (2008-10)

2023 Target: Males – 76 years; Females – 79 years

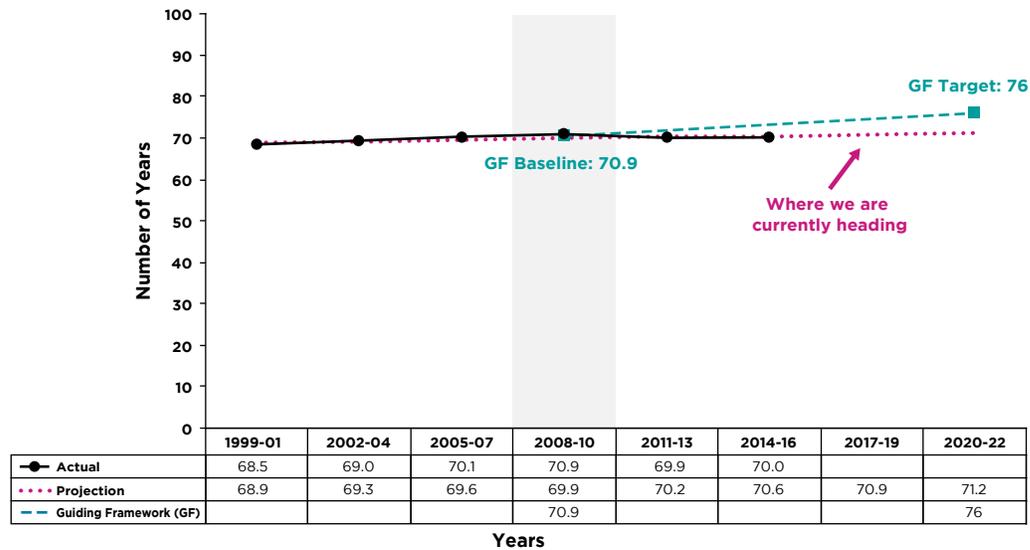
Health-adjusted life expectancy (HALE) is a core indicator of population health status. It incorporates both life expectancy (quantity of life) and healthy life years (a component of the quality of one's life) in order to determine the number of years in full health that a person can expect to live given the current morbidity and mortality conditions.¹³ According to Statistics Canada, the HALE at birth for Canadians increased between 2000-02 and 2005-07, from 67.5 to 68.9 years for males and from 69.9 to 71.2 years for females.¹³

The Guiding Framework established the HALE in BC at 70.9 years for males and 73.7 years for females, for the baseline three-year aggregate timeframe of 2008-10. It set targets of 76 years for males and 79 years for females by 2023.

As shown in Figures 2.9a and 2.9b, there has been an overall improvement over the last 17 years, but the HALE in BC for both males and females has decreased slightly since the Guiding Framework baseline timeframe. The HALE for both males and females are



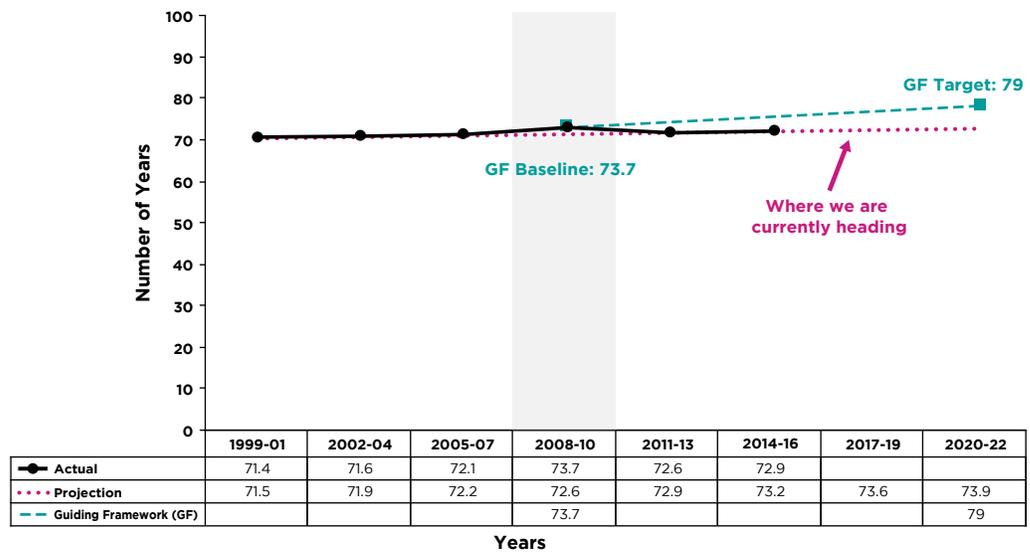
FIG 2.9a Actual and Projected Health-adjusted Life Expectancy at Birth Among Males, BC, 1999-01 to 2020-22



Notes: "Health-adjusted life expectancy" (HALE) is the number of years in full health that an individual can expect to live given the current morbidity and mortality conditions. BC Stats produced the HALE rates using their Abridged Life Tables, and combined death data from BC Vital Statistics with health utility index data from Statistics Canada. See Appendix B for more information about these data sources.

Sources: BC Vital Statistics Agency (Deaths); Statistics Canada (Health Utility Index); and BC Stats. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, April 2017.

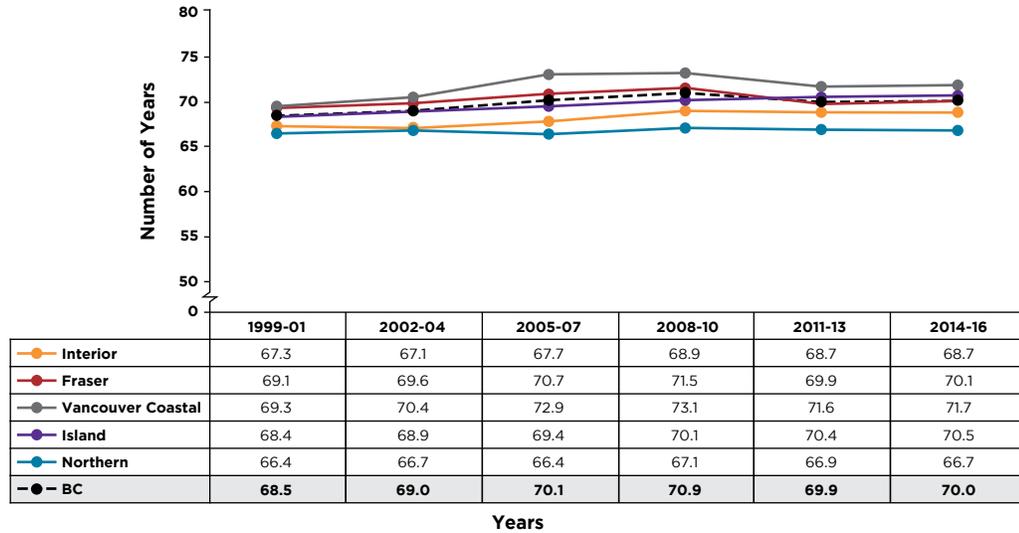
FIG 2.9b Actual and Projected Health-adjusted Life Expectancy at Birth Among Females, BC, 1999-01 to 2020-22



Notes: "Health-adjusted life expectancy" (HALE) is the number of years in full health that an individual can expect to live given the current morbidity and mortality conditions. BC Stats produced the HALE rates using their Abridged Life Tables, and combined death data from BC Vital Statistics with health utility index data from Statistics Canada. See Appendix B for more information about these data sources.

Sources: BC Vital Statistics Agency (Deaths); Statistics Canada (Health Utility Index); and BC Stats. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, April 2017.

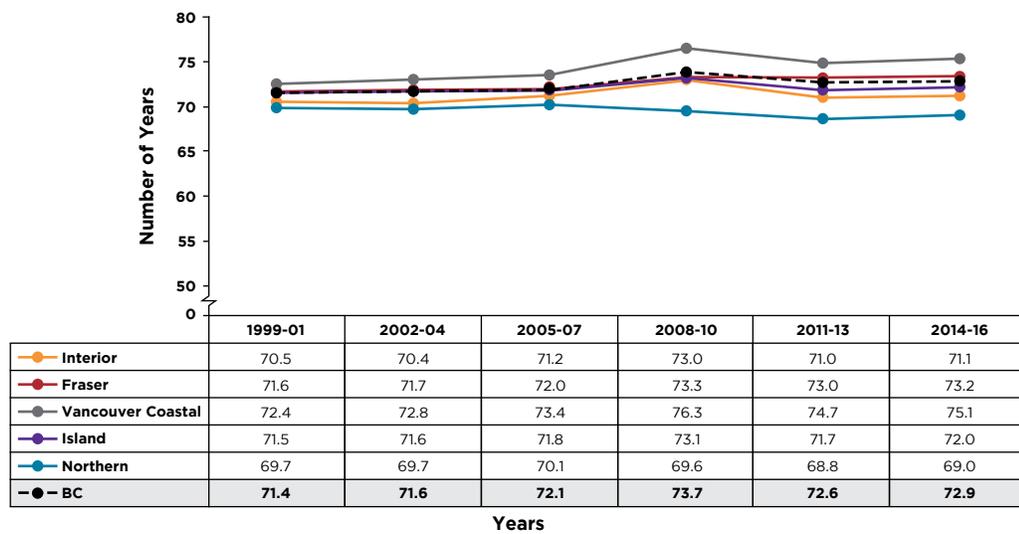
FIG 2.10a Health-adjusted Life Expectancy at Birth Among Males, by Health Authority, BC, 1999-01 to 2014-16



Notes: "Health-adjusted life expectancy" (HALE) is the number of years in full health that an individual can expect to live given the current morbidity and mortality conditions. BC Stats produced the HALE rates using their Abridged Life Tables, and combined death data from BC Vital Statistics with health utility index data from Statistics Canada. Health authority is based on the residence of the individual. See Appendix B for more information about these data sources.

Sources: BC Vital Statistics Agency (Deaths); Statistics Canada (Health Utility Index); and BC Stats. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, April 2017.

FIG 2.10b Health-adjusted Life Expectancy at Birth Among Females, by Health Authority, BC, 1999-01 to 2014-16



Notes: "Health-adjusted life expectancy" (HALE) is the number of years in full health that an individual can expect to live given the current morbidity and mortality conditions. BC Stats produced the HALE rates using their Abridged Life Tables, and combined death data from BC Vital Statistics with health utility index data from Statistics Canada. See Appendix B for more information about these data sources.

Sources: BC Vital Statistics Agency (Deaths); Statistics Canada (Health Utility Index); and BC Stats. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, April 2017.



currently projected to continue to increase by 2020-22; however, this increase will not be enough for them to meet the associated provincial targets.

As shown in Figures 2.10a and 2.10b, there are some differences between health authorities for HALE among both males and females, and these differences are fairly consistent over time: for both sexes, HALE is highest in Vancouver Coastal, and lowest in Northern.

Infant Mortality

Performance Measure: Infant mortality rate (per 1,000 live births)

Baseline: 3.7 per 1,000 live births (2009-11) **2023 Target:** 2.5 per 1,000 live births

Infant mortality rate is the number of infants who die in the first year of life, expressed as a rate per 1,000 live births.¹⁴ This indicator is a long-established measure of child health as well as the overall well-being of a society. A low rate reflects a healthy population, with good care and attention paid to the health of mothers and children.⁴

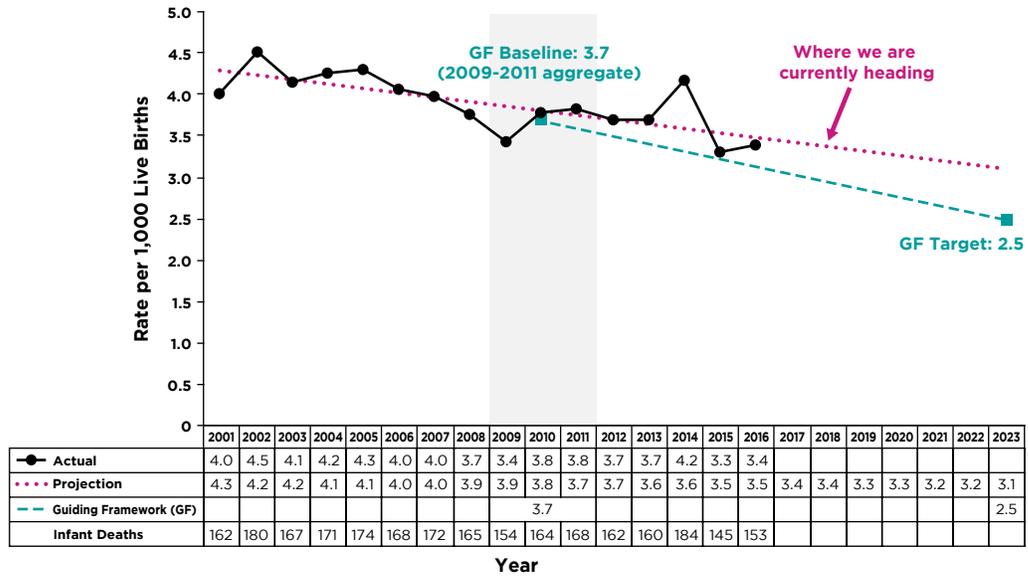
The infant mortality rate baseline in the Guiding Framework was 3.7 per 1,000 live births during the three-year aggregate period of 2009-11. The target for 2023 is a rate of 2.5 per 1,000.

Figure 2.11 presents the actual and projected infant mortality rate for BC. It shows that the number of infant deaths has not been substantially reduced since 2009; however, the rate has decreased overall. Population growth in BC partially accounts for the lack of change in the overall number of deaths. After a dramatic reduction in earlier decades, the rate of decrease has slowed during the past decade as a result of short-term increases in some years; however, the reasons for these increases are not well understood, and some volatility is expected when working with small numbers, so caution should be exercised in interpreting these data. BC is not projected to reach the target for 2023 unless the rate of decrease regains the momentum seen between 2005 and 2009.

Figure 2.12 shows the infant mortality rate per 1,000 live births by health authority as a three-year rolling aggregate. Rolling aggregates account somewhat for the volatility due to small numbers, and thus, the rate for BC appears more stable than in Figure 2.11. This figure shows variation in the infant mortality rate among the health authorities, both in the rate and in the direction of the trends. For example, Interior is trending away from the target, as were Vancouver Island and Northern until recently.

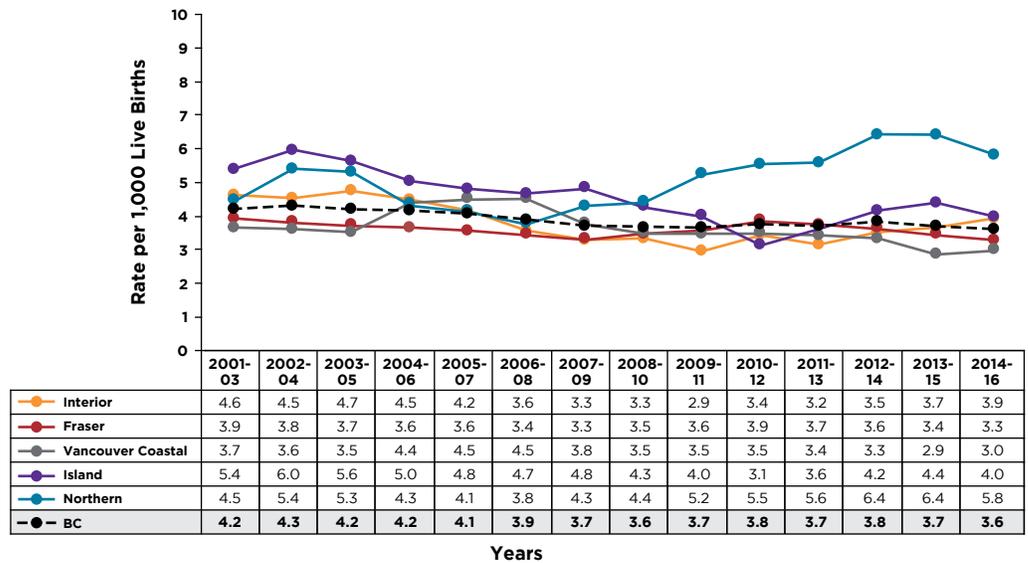
Infant mortality can result from a number of different causes, including perinatal conditions, congenital anomalies, respiratory diseases, infectious diseases, and others.¹⁵ Improved access to health care, advances in clinical medicine, and better surveillance and monitoring of disease have all contributed to reductions in the infant mortality rate.¹⁶ Preventive measures such as improved sanitation, nutrition, and education have also led to reductions in the infant mortality rate over time.¹⁶ Comprehensive prenatal and neonatal care services play a key role in ensuring that pregnant women and their infants receive appropriate care and that new parents are informed and well-supported.

FIG 2.11 Actual and Projected Infant Mortality Rate, BC, 2001 to 2023



Notes: "Infant mortality rate" is the number of infants who die in the first year of life, expressed as a rate per 1,000 live births. The infant mortality rate is assigned to the year of the child's birth. The GF baseline value is a three-year aggregate. See Appendix B for more information about this data source.
Source: BC Vital Statistics Agency. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2018.

FIG 2.12 Infant Mortality Rate, by Health Authority, BC, 2001-03 to 2014-16



Notes: "Infant mortality rate" is the number of infants who die in the first year of life, expressed as a rate per 1,000 live births. The infant mortality rate is assigned to the year of the child's birth. Health authority is based on the residence of the mother. See Appendix B for more information about this data source.
Source: BC Vital Statistics Agency. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2018.

Mortality Due to Preventable Causes

Performance Measure: The age-standardized rate of mortality due to preventable causes (per 100,000 population).

Baseline: 139.4 per 100,000 population (2007-09)

2023 Target: 120 per 100,000 population

Mortality due to preventable causes refers to **premature deaths** (deaths of individuals who are younger than age 75) that could potentially have been prevented through **primary prevention** efforts.¹⁷ In this report, this indicator will be examined as an age-standardized rate per 100,000 population. The rate of mortality due to preventable causes is a vital measure for understanding the impact of initiatives targeting healthier lifestyles and disease prevention.

The age-standardized baseline rate of preventable **premature mortality** in the Guiding Framework was 139.4 per 100,000 population for the three-year aggregate time period of 2007-09, with a target of 120 per 100,000 by 2023.

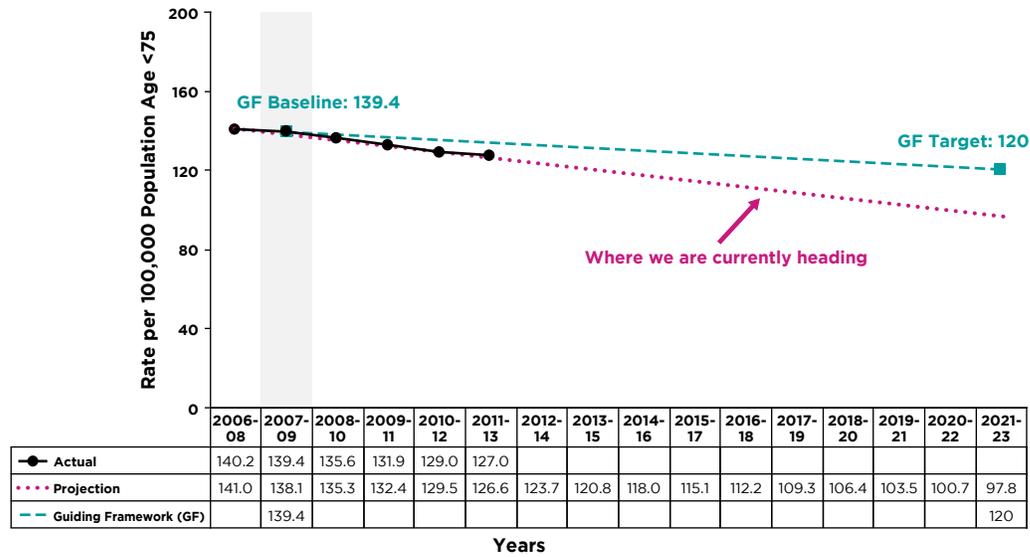
Figure 2.13 indicates that the age-standardized rate of mortality from preventable causes in BC

has declined consistently up to 2011-13. These trends were driven by a number of factors, including reduced infant mortality, reduced mortality from injuries (particularly motor vehicle crashes), and reduced mortality from a variety of smoking-related causes such as cardiovascular disease and lung cancer. If this downward trend continues, the 2023 target is expected to be attained in a few years, and surpassed by 2021-23.

Figure 2.14 shows that males have consistently had an age-standardized mortality rate due to preventable causes that is approximately double the rate of females. While the gap has narrowed from a difference of 95.8 per 100,000 in 2006-08 to a difference of 84.7 per 100,000 in 2011-13, the male rate remained at double the female rate in 2011-13.

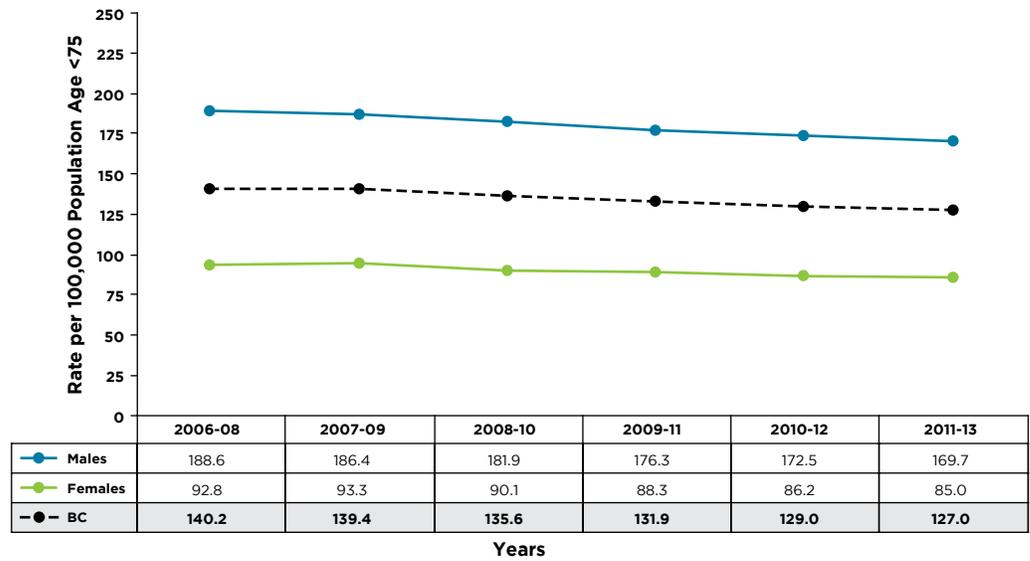


FIG 2.13 Actual and Projected Age-standardized Rate of Mortality from Preventable Causes, BC, 2006-08 to 2021-23



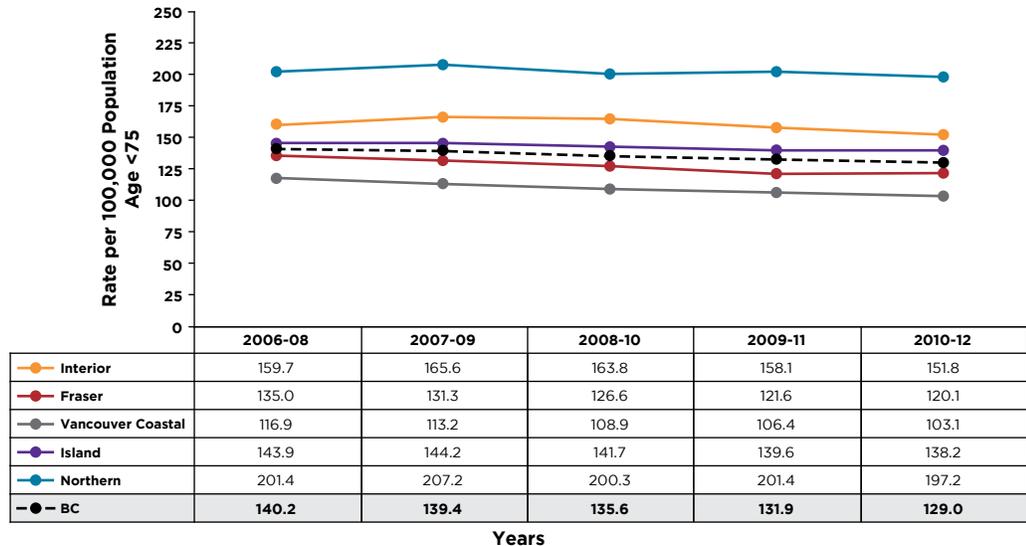
Notes: "Mortality from preventable causes" refers to premature deaths that could potentially have been prevented through primary prevention efforts. Premature deaths are those of individuals who are younger than age 75. Standardized to the Canada 2011 population. See Appendix B for more information about this data source.
Source: Statistics Canada, Table 102-4315. CANSIM (database). Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 2.14 Age-standardized Rate of Mortality from Preventable Causes, by Sex, BC, 2006-08 to 2011-13



Notes: "Mortality from preventable causes" refers to premature deaths that could potentially have been prevented through primary prevention efforts. Premature deaths are those of individuals who are younger than age 75. Standardized to the Canada 2011 population. See Appendix B for more information about this data source.
Source: Statistics Canada, Table 102-4315. CANSIM (database). Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

FIG 2.15 Age-standardized Rate of Mortality from Preventable Causes, by Health Authority, BC, 2006-08 to 2010-12



Notes: "Mortality from preventable causes" refers to premature deaths that could potentially have been prevented through primary prevention efforts. Premature deaths are those of individuals who are younger than age 75. Standardized to the Canada 2011 population. Health authority is based on the residence of the deceased. See Appendix B for more information about this data source.

Source: Statistics Canada, Table 102-4315, CANSIM (database). Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Figure 2.15 demonstrates that from 2006-08 to 2010-12, all health authorities succeeded in reducing mortality due to preventable causes. However, there is substantial variation among health authorities on this measure, both in the level of burden related to mortality from preventable causes, and in the rate at which they are achieving reductions. Higher rates per population and slower rates of decline are apparent in Northern, Interior, and Island, while lower rates per population and faster rates of decline are seen in Vancouver Coastal and Fraser.

Life Satisfaction

Performance Measure: The percentage of British Columbians (age 12+) who report that they are very satisfied with life.

Baseline: 36.9 per cent (2009-10)

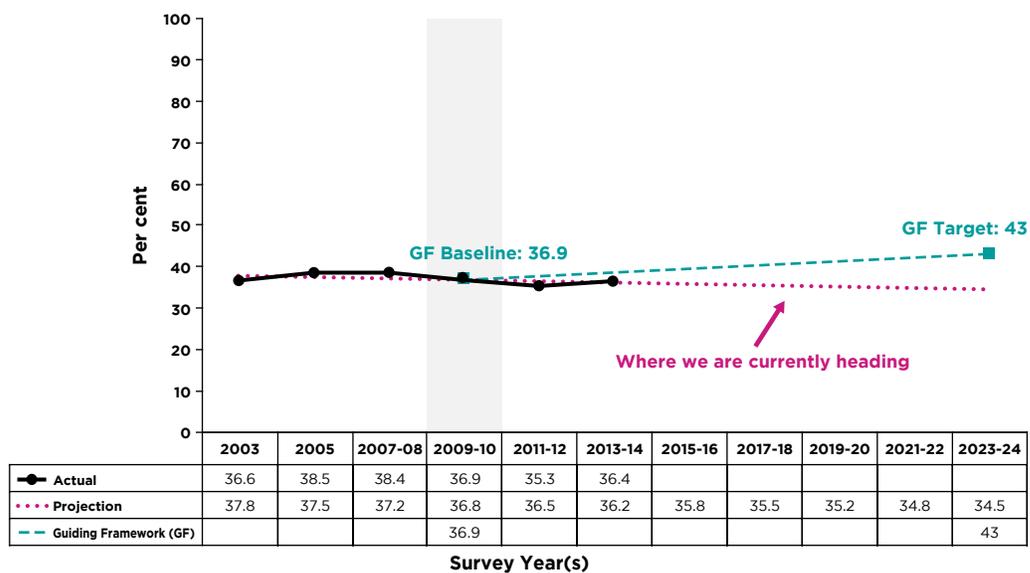
2023 Target: 43 per cent

Life satisfaction is a standard measure of well-being. The Guiding Framework included a baseline of 36.9 per cent of the population age 12 and up reporting that they were very satisfied with their lives in 2009-10. It identified a target of 43 per cent by 2023-24.

(Figure 2.16). The projection based on current data available indicates that if this trend proceeds unchanged, the target will not be met, and the level of life satisfaction will drop below the baseline value.

The percentage of British Columbians who report that they are very satisfied with their lives has declined slightly over the past decade

FIG 2.16 Actual and Projected Percentage of the Population Age 12+ Who Are Very Satisfied With Their Life, BC, 2003 to 2023-24



Note: See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Figure 2.17 indicates that for most of the years shown, a similar percentage of males and females reported being very satisfied with their lives; however, a gap emerged in the most recent year (2013-14), with males being less likely to report this.

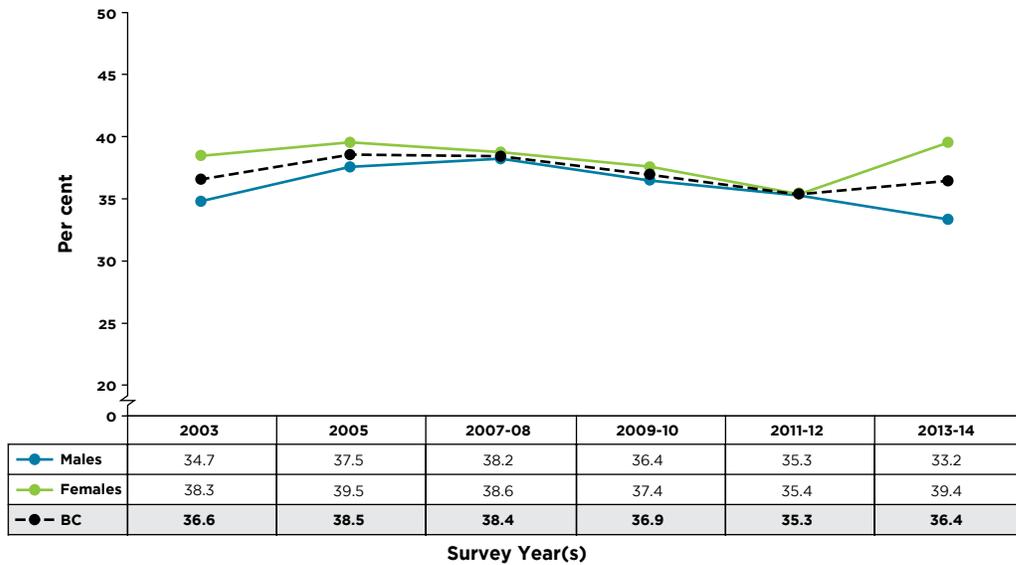
Figure 2.18 shows the percentage of the population who report being very satisfied with their lives, according to age group. This figure shows a somewhat U-shaped curve, in which the youngest and oldest surveyed were more likely to report being very satisfied with their lives, while those people age 20 to 59 were less likely to report this.

Life satisfaction is determined by numerous factors; however, some socio-economic influences may at least partly explain the trend for certain age cohorts. “Generation squeeze” is a term that is often used to describe the economic situation of those age 20–40. On

average these individuals earn less, have higher levels of student debt, and face high housing costs.¹⁸ In addition, government social spending is less focused on those under age 45 compared to those over age 65: spending is between 2.9 and 3.9 times more per person for those over 65 in comparison to those under 45.¹⁹ The term “sandwich generation” is also used to describe those approximately age 40-60 who are caring for both aging parents and dependent children.²⁰ All of these factors may contribute to higher levels of stress and decreased life satisfaction, and thus, to the U-shaped curve shown in Figure 2.18.



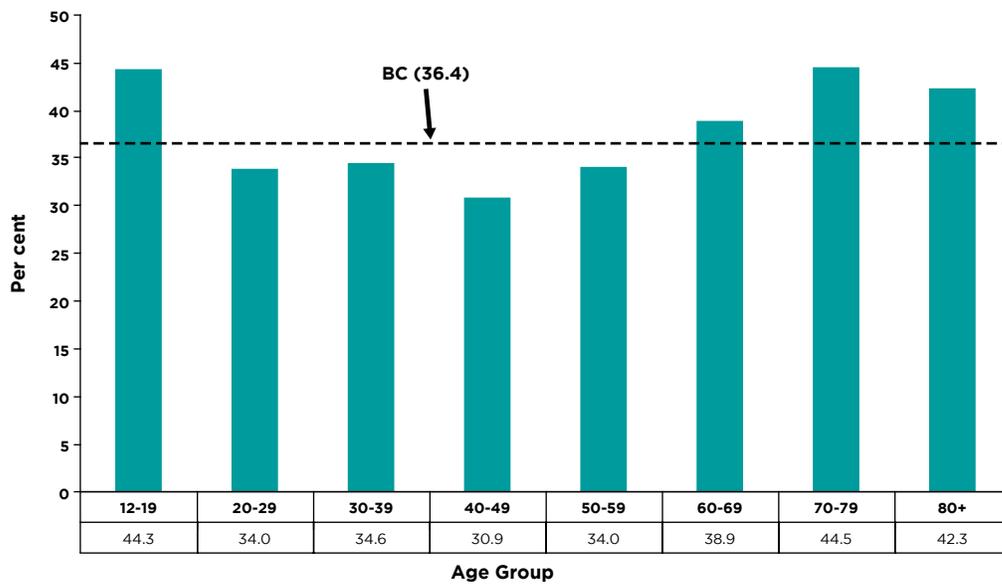
FIG 2.17 Percentage of the Population Age 12+ Who Are Very Satisfied With Their Life, by Sex, BC, 2003 to 2013-14



Note: See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

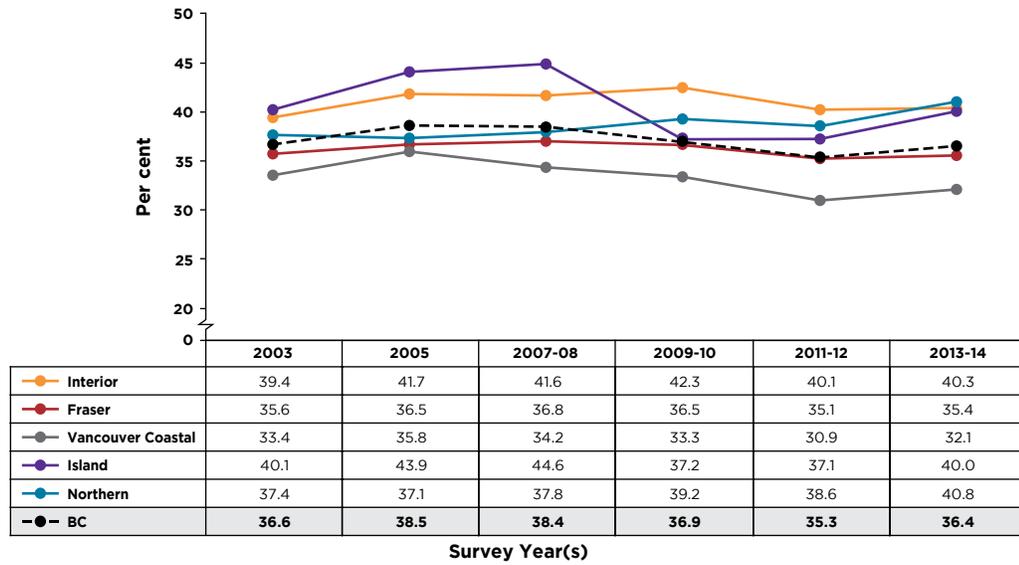
FIG 2.18 Percentage of the Population Age 12+ Who Are Very Satisfied With Their Life, by Age Group, BC, 2013-14



Note: See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2013-14 combined sample. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

FIG 2.19 Percentage of the Population Age 12+ Who Are Very Satisfied With Their Life, by Health Authority, BC, 2003 to 2013-14



Notes: Health authority is based on the residence of the respondent. See Appendix B for more information about this data source.
Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Figure 2.19 shows some variation among health authorities on this measure, as well as year-to-year fluctuation within health authorities; however, by 2013-14, Interior, Island, and Northern all had similar percentages of the population reporting being very satisfied with their lives (approximately 40 per cent). Across all points in time, Vancouver Coastal had the lowest percentage of the population reporting this, while Fraser had the second lowest.

Among the five regional health authority areas, Vancouver Coastal and Fraser have the highest number of LHAs and HSDAs classified as metro (population greater than 190,001) and urban/rural (population 40,001–190,000).²¹ Therefore, the majority of the population served by these health authorities live in urban and more densely populated locations. Differences in self-reported life satisfaction may be due in part to environmental stressors related to urban

environments. Proximity to nature and time spent in nature are correlated with positive mental health, with those who frequently spend time in nature having lower levels of depression.²² Time spent commuting is another factor correlated with lower mental health, and this is more common in urban environments.²³

Conclusion

This chapter explored six overarching measures of population health and well-being and evaluated their progress in reaching targets for 2023 set out in BC’s Guiding Framework. Findings presented show that two performance measures—disparity in life expectancy between local health areas and percentage of British Columbians who report being very satisfied with life—are both currently worsening and moving away from their targets. Life expectancy had been increasing in BC but since 2014 has been decreasing—a trend that is expected

to continue to worsen as the overdose crisis continues in BC. Progress is being made on two performance measures: age-standardized diabetes incidence rate and age-standardized mortality due to preventable causes; they are currently expected to achieve and then surpass targets by 2023. The remaining two performance measures—infant mortality rate and health-adjusted life expectancy (HALE)—are moving in the right direction, but the current rate of movement is not enough to meet the targets. There has been some progress in the infant mortality rate in the past decade, but increases in recent years have now moved the projection in the wrong direction; more work is needed to regain the downward trend seen in earlier years. Similarly, the HALE for both males and females has improved over time, but the projected increase is not sufficient to meet the associated provincial targets.

Additionally, this chapter showed that for several performance measures, males do not fare as well as females, including for HALE and for the age-standardized rates of diabetes incidence and mortality due to preventable causes. There is some geographic disparity for all of the performance measures discussed in this chapter. The most substantial geographic variation is shown in life expectancy at birth, the age-standardized incidence rate for diabetes, and mortality due to preventable causes. Analyses presented here show that the gap in life expectancy at birth now varies more based on geography than it does by sex, and that British Columbians in Northern and Interior are more likely to die from preventable causes than those in other parts of the province. These examples show that targeted interventions are needed in certain areas of the province to address these disparities. The next chapter will examine performance measures of healthy living and healthy communities.

REFERENCES

- ¹ BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ² BC Stats. Vital statistics [Internet]. Victoria, BC: BC Stats; [cited 2017 Jan 17]. Available from: <http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/VitalStatistics.aspx>.
- ³ Statistics Canada. Table 102-0512 Life expectancy, at birth and at age 65, by sex, Canada, provinces and territories, annual (years) (table). CANSIM (database). Ottawa, ON: Statistics Canada; [modified 2012 May 31; cited 2016 Dec 12]. Available from: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=1020512&pattern=&csid=>
- ⁴ BC Provincial Health Officer. The health and well-being of people in British Columbia. A report on the health of British Columbians. Provincial Health Officer's annual report 2002. Victoria, BC: BC Ministry of Health Planning; 2003.
- ⁵ Public Health Agency of Canada. Tracking heart disease and stroke in Canada 2009. Ottawa, ON: Public Health Agency of Canada; 2009 [cited 2017 Mar 13]. Available from: <http://www.phac-aspc.gc.ca/publicat/2009/cvd-avc/pdf/cvd-avs-2009-eng.pdf>.
- ⁶ Canadian Cancer Society's Advisory Committee on Cancer Statistics. Canadian cancer statistics 2016. Toronto, ON: Canadian Cancer Society; 2016 [cited 2017 Mar 13]. Available from: <http://www.cancer.ca/~media/cancer.ca/CW/cancer%20information/cancer%20101/Canadian%20cancer%20statistics/Canadian-Cancer-Statistics-2016-EN.pdf?la=en>.
- ⁷ Physicians for a Smoke-Free Canada. Smoking in Canada. Ottawa, ON: Physicians for a Smoke-Free Canada; 2012 Jul [cited 2017 Mar 13]. Available from: <http://www.smoke-free.ca/factsheets/pdf/prevalence.pdf>.
- ⁸ Greenberg L, Normandin C. Health at a glance: disparities in life expectancy at birth. Ottawa, ON: Statistics Canada; 2011 [cited 2018 Feb 22]. Available from: <http://www.statcan.gc.ca/pub/82-624-x/2011001/article/11427-eng.htm>.
- ⁹ Last JM, editor. A dictionary of public health. New York: Oxford University Press; 2007.

- ¹⁰ BC Provincial Health Officer. The impact of diabetes on the health and well-being of British Columbians. Provincial Health Officer's annual report 2004. Victoria, BC: BC Ministry of Health; 2004.
- ¹¹ Fraser Health. Community health atlas, immigration and citizenship, language and ethnicity. Surrey, BC: Fraser Health; 2011 [cited 2018 Jan 25]. Available from: <http://www.fraserhealth.ca/your-community/community-health-atlas/>.
- ¹² Cardiac Services BC. Heart disease in BC: heart disease is one of the leading causes of death in Canada. Vancouver, BC: Cardiac Services BC; [cited 2018 Apr 11]. Available from: <http://www.cardiacbc.ca/health-info/heart-disease-in-bc>.
- ¹³ Statistics Canada. Table 102-0122 Health-adjusted life expectancy, at birth and at age 65, by sex and income, Canada and provinces, occasional (years) (table). CANSIM (database). Ottawa, ON: Statistics Canada; [modified 2012 May 23]. Available from: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=1020122>.
- ¹⁴ BC Vital Statistics Agency. Selected vital statistics and health status indicators. One hundred and fortieth annual report 2011. Victoria, BC: BC Vital Statistics Agency; 2011 [cited 2017 Feb 07]. Available from: <http://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/statistics-reports/annual-reports/2011/pdf/ann2011.pdf>.
- ¹⁵ BC Provincial Health Officer. Pathways to health and healing: 2nd report on the health and well-being of Aboriginal people in British Columbia. Provincial Health Officer's annual report 2007. Victoria, BC: BC Ministry of Health; 2007.
- ¹⁶ BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ¹⁷ Canadian Institute for Health Information, Statistics Canada. Health indicators 2013. Ottawa, ON: Canadian Institute for Health Information. Cited by Statistics Canada. Table 102-4315 Premature and potentially avoidable mortality, three-year average, Canada, provinces, territories, health regions and peer groups (occasional). CANSIM (database). Ottawa, ON: Statistics Canada; [modified 2016 May 24; cited 2017 Jan 23]. Available from: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=1024315&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid=>
- ¹⁸ Generation Squeeze. Things are harder now: infographic. Vancouver, BC: Generation Squeeze; 2017 [cited 2018 Jan 29]. Available from: https://www.gensqueeze.ca/its_harder_now.
- ¹⁹ Kershaw P. Generation squeeze: measuring the age gap in Canadian social spending. Vancouver, BC: Generation Squeeze; 2015 [cited 2018 Jan 29]. Available from: https://www.gensqueeze.ca/measuring_age_gap_in_social_spending.
- ²⁰ Kingsmill S, Schlesinger B. Family squeeze: surviving the sandwich generation. Toronto: University of Toronto Press; 1998.
- ²¹ BC Ministry of Health. BC health system strategy geographic service areas. Victoria, BC: BC Ministry of Health; 2016.
- ²² Cox, DTC, Shanahan DF, Hudson HL, Fuller RA, Anderson K, Hancock S, et al. Doses of nearby nature simultaneously associated with multiple health benefits. *Int J Environ Res Public Health*. 2017;172(14):1-13. doi:10.3390/ijerph14020172.
- ²³ Hilbrecht M, Smale B, Mock SE. Highway to health? Commute time and well-being among Canadian adults. *World Leis J*. 2014;56(2):151-63 doi:10.1080/16078055.2014.903723.

3

Healthy Living & Healthy Communities

This chapter explores healthy living, including lifestyle and behavioural factors, and how healthy communities support health and well-being in BC. **Chronic diseases** are a large health burden in BC, and the impacts are felt across society. **Behavioural risk factors** for chronic disease (e.g., physical inactivity, unhealthy eating, commercial tobacco use,⁸ harmful alcohol use) are embedded in family, community, and societal conditions that shape, influence, and constrain a person's ability to make healthy choices.¹ Reducing risk factors improves health status, reduces suffering, and reduces health care costs (both direct and indirect). It is estimated that a one per cent annual reduction in risk factor prevalence (smoking, excess weight, and physical inactivity) until 2036 could result in a cumulative \$15 billion in direct and indirect health care costs avoided in BC.²

Fortunately, we know that, in many cases, the risk factors for chronic diseases are responsive to prevention and thus, can be modified. While addressing **modifiable risk factors** is challenging, a multi-faceted approach that includes increased prevention activities, education and awareness, policy and legislation,

and environmental changes can prevent a great deal of chronic illness.¹ The Ministry of Health has developed numerous programs and activities that promote behaviour change and prevent chronic illness, such as Appetite to Play,³ which provides tools and resources to promote physical activity and healthy eating for child care providers; and Choose to Move, a six-month program to promote physical activity and social connection among older adults.⁴ New technology and the Internet have also allowed health promotion programs to reach a wider number of British Columbians and represent a new strategic approach to promoting education and awareness (e.g., Carrot Rewards).

Modifiable risk factors can also be addressed through the promotion of healthy public policy, which helps to make the healthy choice the easier choice. In a **“health in all policies”** approach, health impacts are accounted for in the development of legislation, regulation, and policy across all government sectors to ensure that they are in the best interest of the health of the public. Health in all policies is one way to support the development of healthy communities. Healthy communities are part of the multi-faceted approach to

⁸ The term “commercial tobacco use” is used here to distinguish it from ceremonial or traditional tobacco use by First Nations. For the remainder of this chapter, the term “tobacco use” will be used to indicate commercial tobacco use.

improving health, in part, through addressing modifiable risk factors and dealing with the rise in chronic diseases. Healthy communities provide people of all ages with opportunities to attain and maintain good health. They are places where people can live, work, learn, and play and have opportunities to access safe and

affordable housing, transportation, affordable and nutritious foods, recreation, education and employment, medical and social services, clean air and water, and a safe, inclusive, socially cohesive environment.⁵

Guiding Framework Goal 1: Healthy Living & Healthy Communities

Goal Statement

Supportive communities that make it easier for people to make healthy choices at every stage of life.

Objectives

The objectives for this goal focus on creating supportive environments that make it easier for people to make healthy choices:

1. Improve the health of children through enhanced health-education partnerships to increase the implementation of school-based healthy living programs such as physical activity, healthy eating and living tobacco free.
2. Collaborate with local governments to create health-promoting environments and community-based programs that encourage British Columbians to make healthy choices.
3. Enhance workplace wellness by supporting employers to implement policies and programs that protect the health of their workers and encourage positive health practices.

Performance Measures

The Guiding Framework established four performance measures related to Goal 1:

- The percentage of British Columbians (age 12+) who consume fruit and vegetables at least five times per day.
- The percentage of British Columbians (age 12+) who are physically active or moderately active in their leisure time.
- The percentage of British Columbians (age 12+) who smoke.
- The percentage of BC students in grades 3, 4, 7, 10, and 12 who report that at school, they are learning how to stay healthy.

Fruit & Vegetable Consumption

Performance Measure: The percentage of British Columbians (age 12+) who consume fruit and vegetables at least five times per day.

Baseline: 43.8 per cent (2009-10)

2023 Target: 55 per cent

The food we eat affects our health, growth, and development. Healthy eating promotes and supports health and well-being for all people throughout their lifespan and contributes to the overall health of individuals, families, and communities.⁶ A healthy diet helps protect against malnutrition and chronic diseases such as diabetes and heart disease.⁷ Frequency of fruit and vegetable consumption is associated with several healthy behaviours,⁸ and is used in this report as a proxy measure for healthy eating overall.

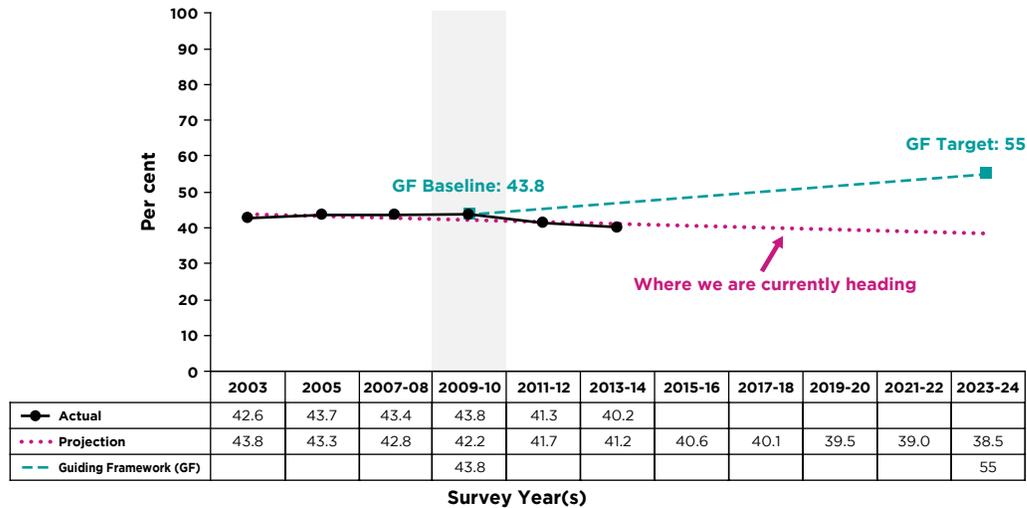
The BC Ministry of Health has initiated and supported numerous initiatives that encourage healthy eating in BC. These initiatives work across settings and use key levers to support British Columbians to make healthy choices in all environments. Key areas of focus for healthy eating include access and availability of healthy foods (e.g., Farmers' Market Nutrition Coupon Program, Community Food Action Initiative, Farm to School BC); food skills, knowledge, education, and awareness (e.g., Food Skills for Families, Informed Dining, BC School Fruit and Vegetable Nutritional Program, Action Schools! BC, Sustainable Childhood Obesity Prevention through Community Engagement [SCOPE] Live 5-2-1-0 guidelines for healthy eating, screen time and physical activity); and healthy food environment public policy (e.g., Public Health Impediments [trans fat] Regulation, Guidelines for Food and Beverage Sales in BC Schools).

In the baseline year for this indicator (2009-10), 43.8 per cent of the population age 12 and up reported consuming fruit and vegetables at least five times per day. The Guiding Framework target for 2023 is to increase this to 55 per cent.

As shown in Figure 3.1, the current provincial rate of reported fruit and vegetable consumption is 40.2 per cent (2013-14). This is below the 2009-10 baseline, and the trend is moving away from the 2023 target. More work will be required to improve this downward trend, including the continued implementation of current evidence-based healthy eating initiatives, as well as additional targeted actions to increase food security, such as improved access to fruits and vegetables—particularly for underserved sub-populations.

Figure 3.2 shows that more females than males reported consuming fruit and vegetables at least five times per day for all years from 2003 to 2013-14. Despite minor fluctuations, during this time there was an overall downward trend for both males and females, and the gap (approximately 10–12 percentage points) has not changed substantially over time. To achieve increases and move toward the provincial target for this indicator, more work is needed to increase healthy eating among males.

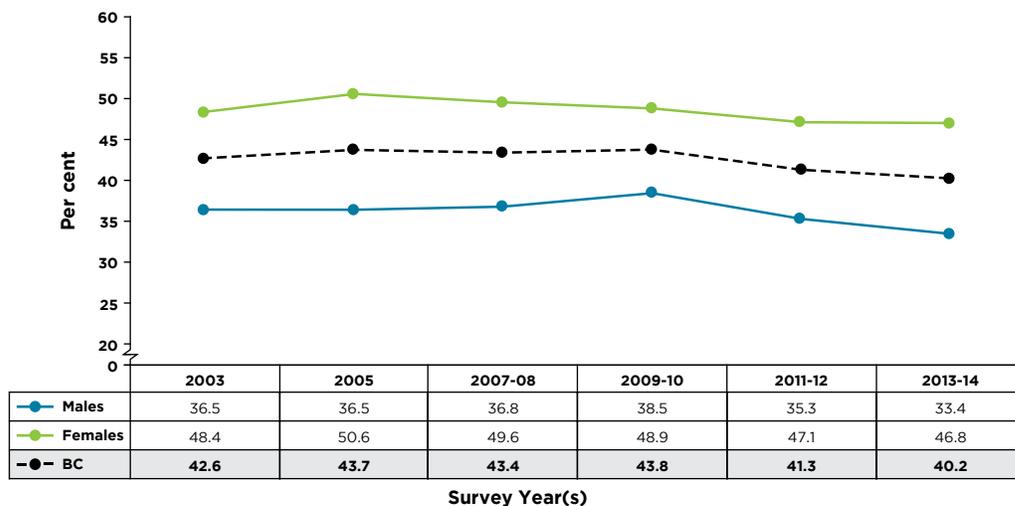
FIG 3.1 Actual and Projected Percentage of the Population Age 12+ Who Consume Fruit and Vegetables Five or More Times per Day, BC, 2003 to 2023-24



Notes: The measure indicates the usual number of times (frequency) per day a person age 12 and up reported eating fruit and vegetables but does not take into account the amount consumed. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 3.2 Percentage of the Population Age 12+ Who Consume Fruit and Vegetables Five or More Times per Day, by Sex, BC, 2003 to 2013-14



Notes: The measure indicates the usual number of times (frequency) per day a person age 12 and up reported eating fruit and vegetables but does not take into account the amount consumed. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

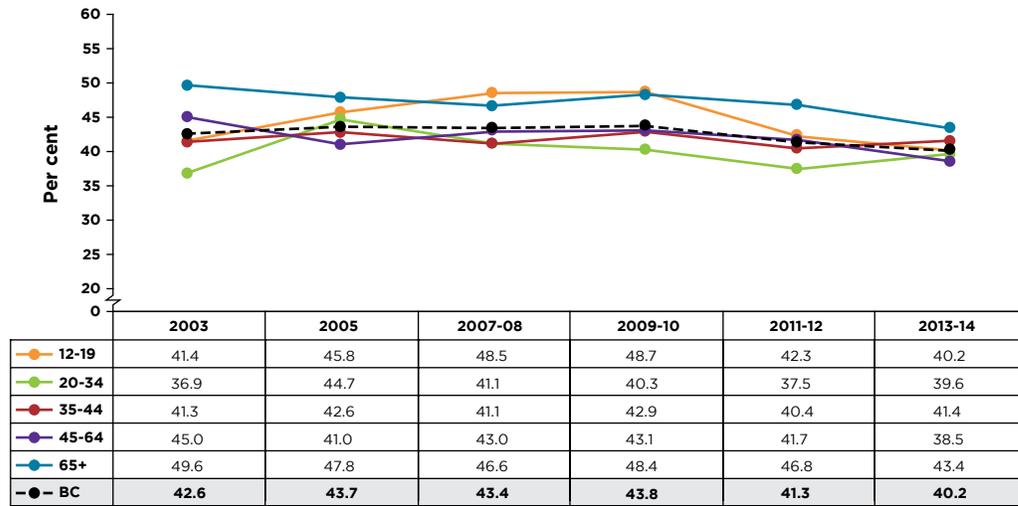


Figure 3.3 indicates that overall, the percentage of the population who consume fruit and vegetables five or more times per day is highest among the youngest and oldest age groups in BC. However, in the most recent year those groups saw a decline, while people age 20–34 and 35–44 saw a slight increase, resulting in less disparity based on age.

Programs delivered in schools throughout the province, such as BC School Fruit and Vegetable Nutritional Program and Farm to School, may be a way to further promote lifelong healthy eating practices by encouraging increased consumption of fruit and vegetables at an early age.

As shown in Figure 3.4, there is regional variation in fruit and vegetable consumption among health authorities across BC. Fraser, Vancouver Coastal, and Northern had the lowest rates, while Island had the highest rate of consumption for all years analyzed until 2013-14, when Interior surpassed it; in fact, in contrast to trends in other health authorities, Interior is showing improvement over time.

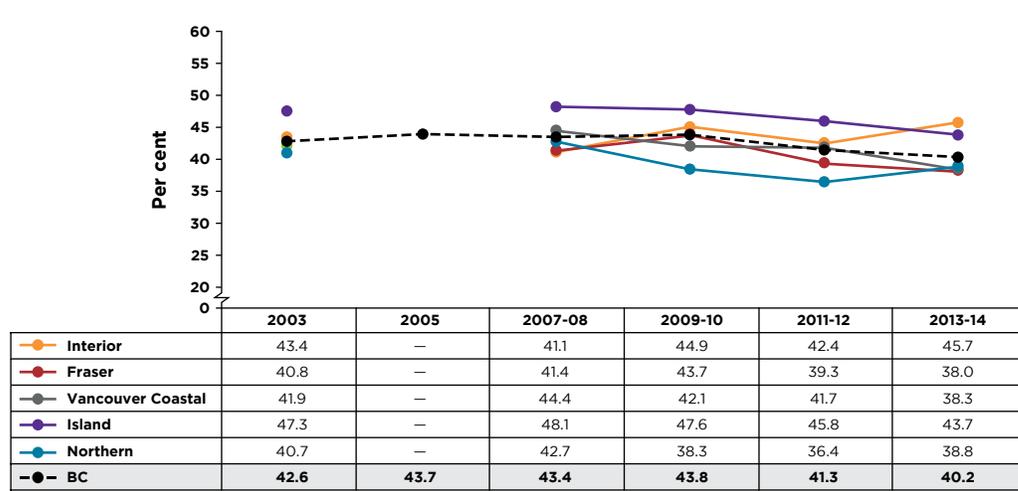
FIG 3.3 Percentage of the Population Age 12+ Who Consume Fruit and Vegetables Five or More Times per Day, by Age Group, BC, 2003 to 2013-14



Notes: The measure indicates the usual number of times (frequency) per day a person age 12 and up reported eating fruit and vegetables but does not take into account the amount consumed. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

FIG 3.4 Percentage of the Population Age 12+ Who Consume Fruit and Vegetables Five or More Times per Day, by Health Authority, BC, 2003 to 2013-14



Notes: The measure indicates the usual number of times (frequency) per day a person age 12 and up reported eating fruit and vegetables but does not take into account the amount consumed. Health authority data not available for 2005. Health authority is based on the residence of the respondent. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Physical Activity

Performance Measure: The percentage of British Columbians (age 12+) who are physically active or moderately active in their leisure time.

Baseline: 59.3 per cent (2009-10)

2023 Target: 70 per cent

The World Health Organization has identified physical inactivity as the fourth leading risk factor for global mortality, causing an estimated 3.2 million deaths.⁹ Physical activity is good for the health and well-being of individuals, families, and communities, and for the environment and the economy.¹⁰ **Physical activity** can be defined as “...any bodily movement produced by skeletal muscles that requires energy expenditure.”⁹ Regular physical activity promotes healthy weights and is critical to the healthy development of children and youth and preserving mobility and independence in older adults.⁶

The Ministry of Health released *Active People, Active Places: British Columbia Physical Activity Strategy* in November 2015. The Strategy is designed to guide and stimulate policies, practices, and programs in physical activity to improve the health and well-being of British Columbians and the communities in which they live, learn, work, and play.¹¹ Non-government organizations, health authorities, and other key stakeholders provided input and recommendations to create an evidence-based action plan to guide investments over the three years following the Strategy’s release (2015/16–2017/18). The goal is to increase physical activity levels through investment in an array of measures that support the determinants of physical health in the population, such as individual behaviour, physical environments, and social/economic environments.¹²

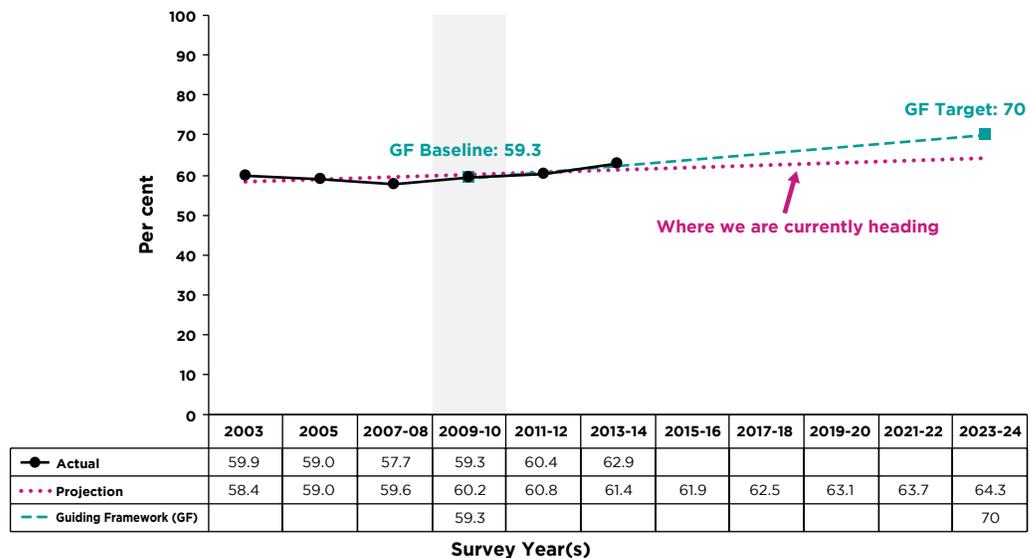
To complement the emphasis on increasing physical activity, the Strategy also seeks to reduce sedentary behaviour. For example, time spent in front of screens by children can be harmful to their healthy physical development, so the Strategy recommends implementation of the Healthy Beginnings for Preschoolers 2-5 Guidelines¹³ for physical activity and screen time in child care settings and early years learning programming. The Strategy draws on the guidelines for maximum recommended amounts of screen time created by the Canadian Society for Exercise Physiology: no screen time for children under age two; one hour or less per day for children age 3–4; and no more than two hours per day for children and youth age 5–17.^{14,15} This is also consistent with the SCOPE Live 5-2-1-0 guidelines (an initiative that started at BC Children’s Hospital).¹⁶

The Guiding Framework baseline for this indicator was 59.3 per cent of British Columbians who were physically active or moderately active in their leisure time (2009-10). The target is to increase this to 70 per cent by 2023.

As shown in Figure 3.5, based on data available, there is an overall gradual upward trend projected, but it is not enough to meet the target; however, in recent years the increase has accelerated, and if this shorter term trend continues, the 2023 target may be achieved.



FIG 3.5 Actual and Projected Percentage of the Population Age 12+ Who Are Physically Active, BC, 2003 to 2023-24



Notes: Population age 12 and up who reported a level of physical activity, based on their responses to questions about the nature, frequency, and duration of their participation in leisure-time physical activity. Physically active means active or moderately active. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Programs such as BC Healthy Communities and BikeBC provide funding for communities across the province to develop programs that promote healthy living and to invest in creating a built environment that promotes **active transportation** (i.e., human-powered transportation, such as walking or cycling).¹⁷

Numerous communities have implemented projects as a result of these programs, and if this continues it may continue to increase physical activity and move this indicator closer to the target.



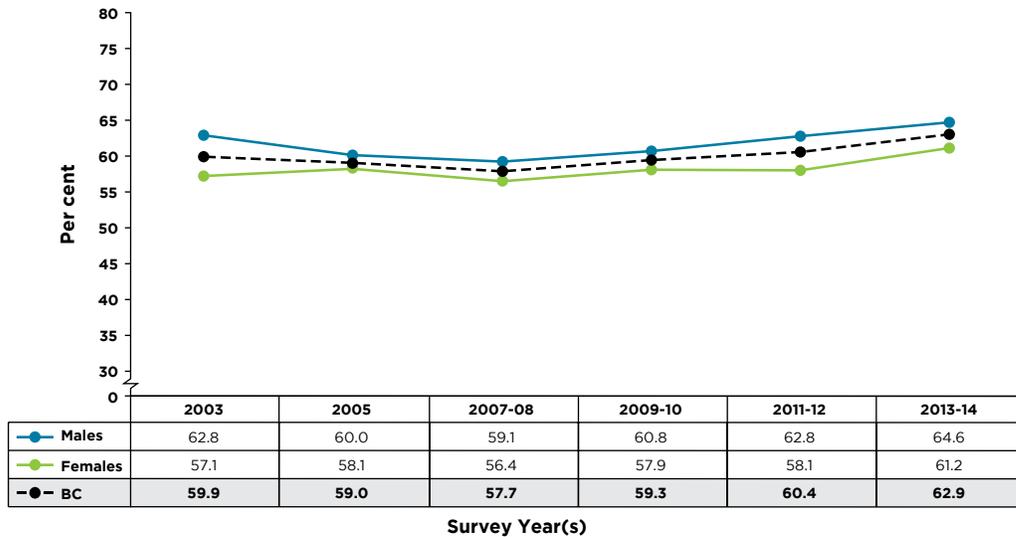
Figure 3.6 presents, by sex, the percentage of the population age 12 and up who are physically active or moderately active in their leisure time. It shows that males are consistently more likely to report physical activity than females, but that the size of the gap between males and females varies over time.

Figure 3.7 shows, by age group, the percentage of the population age 12 and up who report being physically active or moderately active during their leisure time. This figure illustrates that all age groups are reporting increased physical activity over the 10 years shown. There is a clear inverse relationship between age and physical activity level: the youngest age group (12–19) is the most physically active, and the level of activity decreases with age, with the lowest activity level among those age 65 and up. The exception to this pattern can be seen in the 35–44 and 45–64 age groups, as these two groups are very similar at all points in time.

It is recommended that children and youth age 12–19 complete at least 60 minutes per day of moderate to vigorous physical activity.¹² The BC Ministry of Education has established daily physical activity requirements for all students: 30 minutes daily for kindergarten to grade 7 students; 30 minutes daily or 150 minutes weekly for grades 8 and 9 students; and 150 minutes weekly for grades 10–12 students.¹⁸ The higher level of physical activity and physical literacy among youth age 12–19 may be partly due to curriculum requirements in schools; students up to and including grade 10 are required to take physical and health education classes in school, and students in grades 11 and 12 must document at least 150 minutes of weekly exercise as part of their Graduation Transitions program.^{h,19}

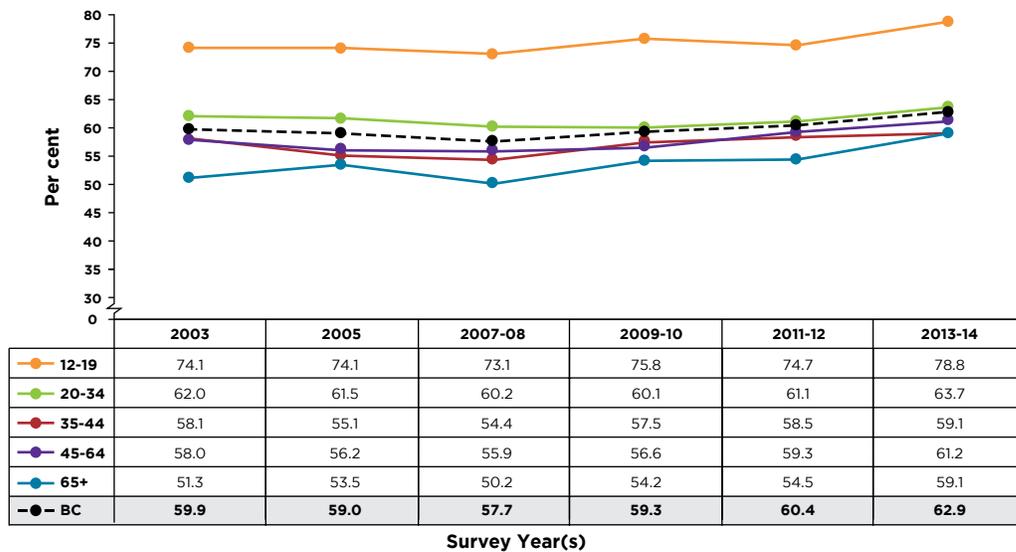
^h Students in grades 11 and 12 are not required to take physical and health education classes in school.

FIG 3.6 Percentage of the Population Age 12+ Who Are Physically Active, by Sex, BC, 2003 to 2013-14



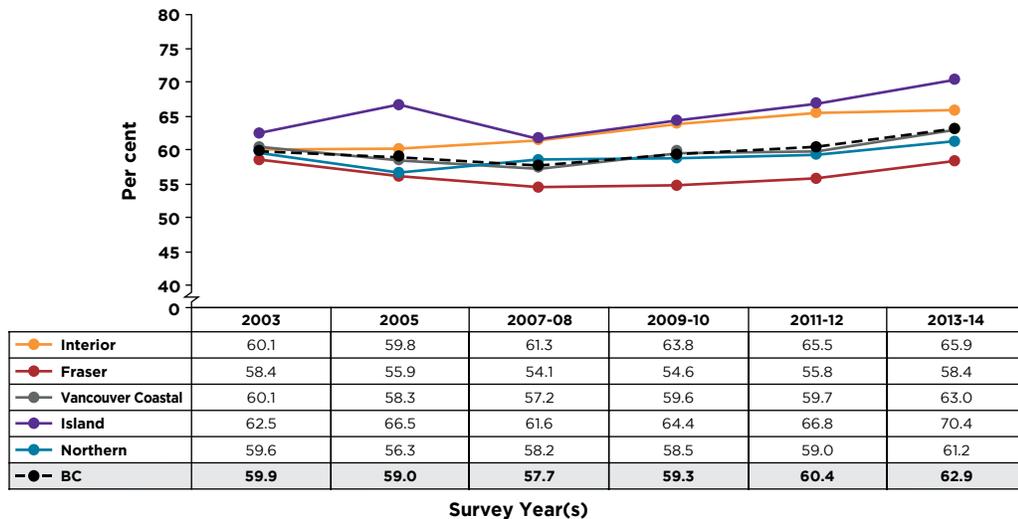
Notes: Population age 12 and up who reported a level of physical activity, based on their responses to questions about the nature, frequency, and duration of their participation in leisure-time physical activity. Physically active means active or moderately active. See Appendix B for more information about this data source.
Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

FIG 3.7 Percentage of the Population Age 12+ Who Are Physically Active, by Age Group, BC, 2003 to 2013-14



Notes: Population age 12 and up who reported a level of physical activity, based on their responses to questions about the nature, frequency, and duration of their participation in leisure-time physical activity. Physically active means active or moderately active. See Appendix B for more information about this data source.
Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 3.8 Percentage of the Population Age 12+ Who Are Physically Active, by Health Authority, BC, 2003 to 2013-14



Notes: Population age 12 and up who reported a level of physical activity, based on their responses to questions about the nature, frequency, and duration of their participation in leisure-time physical activity. Physically active means active or moderately active. Health authority is based on the residence of the respondent. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

As shown in Figure 3.8, there is moderate variation among health authorities on this measure, but all are moving toward the target. Island and Interior have the highest rates of physical activity, while Fraser has the lowest.

Some of the variation in physical activity between health authorities likely reflects different challenges in predominately urban areas compared to rural ones. For example, in Northern Interior Health Service Delivery Area, 20.7 per cent of students in grades 7–12 reported getting at least 60 minutes per day of physical activity compared to 11.0 per cent in Richmond Health Service Delivery Area.¹⁰ This disparity may be due to challenges within specific communities, such as distance to school and recreation facilities²⁰ and parental perceptions of neighbourhood safety.²¹



Smoking

Performance Measure: The percentage of British Columbians (age 12+) who smoke.

Baseline: 16.7 per cent (2009-10)

2023 Target: 10 per cent

Tobacco is the leading cause of preventable death in British Columbia. Over 6,000 deaths in BC each year are attributed to tobacco smoking, killing more people than all other drugs, motor vehicle crashes, murder, suicide, and HIV/AIDS combined.²² The main causes of smoking-related deaths are cancers, cardiovascular disease, and respiratory diseases.²³ In 2013, the annual economic burden of tobacco use was \$2.0 billion, which includes \$724 million in direct health care costs in BC.²

BC's comprehensive tobacco control strategy has likely contributed to BC having the lowest smoking rates in the country.²⁴ In response to the growing use of **e-cigarettes** by youth in BC, on September 1, 2016, the *Tobacco and Vapour Products Control Act* came into effect. This Act is designed to protect youth by preventing them from purchasing tobacco and vapour products, and restricting their exposure to emissions (second-hand smoke) from both tobacco and e-cigarettes. The legislation treats e-cigarette use exactly the same as tobacco, with the same bans and restrictions.^{25,26}

While the smoking rate has been declining over the years, in the baseline year for the Guiding Framework (2009-10), there were still 16.7 per cent of the population age 12 and up reporting that they smoked. The target is to reduce the rate to 10 per cent by 2023.

Figure 3.9 shows that there has been an overall decline in the past decade in the percentage of people who report that they smoke cigarettes (daily or occasionally) in BC, from 18.8 per cent in 2003 to 15.3 per cent in 2013-14. While the trend is moving in the right direction, it is not projected to meet the 2023 target.

Figure 3.10 shows that males are more likely to report that they smoke cigarettes (daily or occasionally) than females. In addition, the level of smoking reported by males tends to vary more from year-to-year than females. In the most recent year shown, there was a divergence in smoking levels by sex, with an increase in the percentage of males who smoked, and a decrease in the percentage of females who smoked.

6,000+

deaths in BC each year are due to tobacco smoking

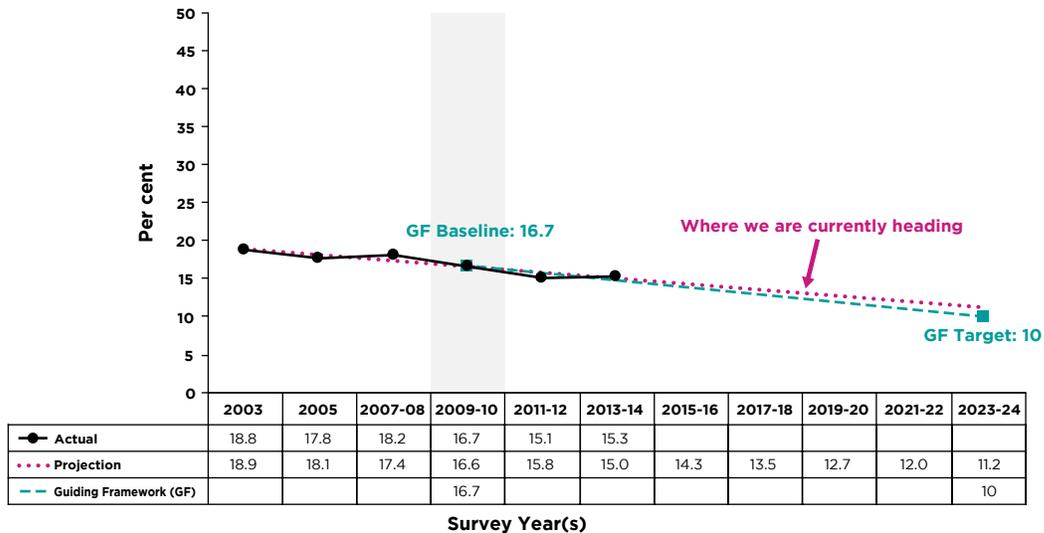
\$724 M

was the direct cost to health care in BC due to tobacco use

\$2 B

was the economic burden of tobacco use in 2013

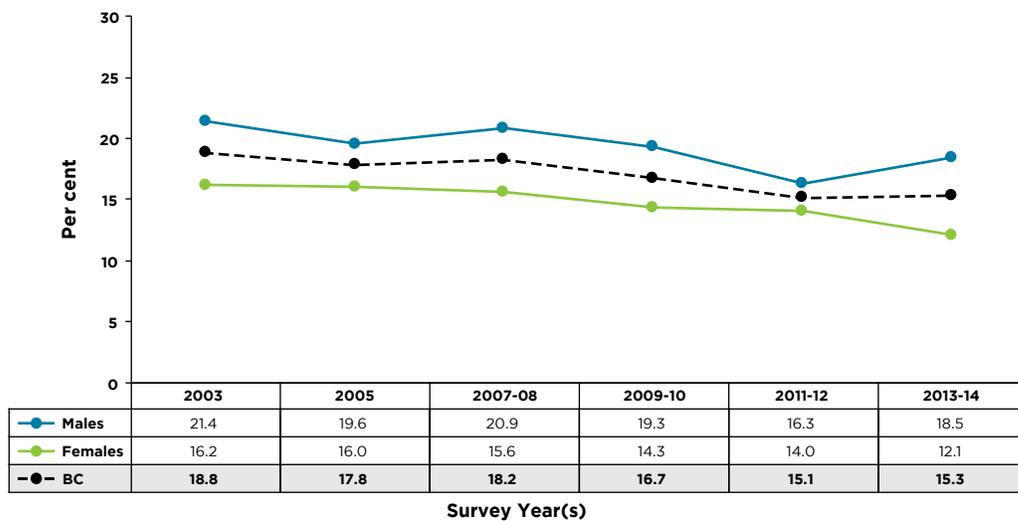
FIG 3.9 Actual and Projected Percentage of the Population Age 12+ Who Smoke, BC, 2003 to 2023-24



Notes: Population age 12 and up who reported being a smoker, including those who currently smoke daily or occasionally. Daily smoking refers to those who reported smoking cigarettes every day, but does not take into account the number of cigarettes smoked. Electronic cigarettes (e-cigarettes) are not included. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 3.10 Percentage of the Population Age 12+ Who Smoke, by Sex, BC, 2003 to 2013-14



Notes: Population age 12 and up who reported being a smoker, including those who currently smoke daily or occasionally. Daily smoking refers to those who reported smoking cigarettes every day, but does not take into account the number of cigarettes smoked. Electronic cigarettes (e-cigarettes) are not included. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

Figure 3.11 shows, by age group, the percentage of the population age 12 and up who report that they smoke cigarettes (daily or occasionally). The youngest and oldest groups (age 12–19 and 65 and up) have the lowest reported levels of smoking, while those age 20–34 have the highest. All age groups are showing a gradual downward trend over the 10 years shown, but in the most recent year (2013-14) there was an increase in smoking levels among people age 20–34 and 65 and up.

Figure 3.12 shows that there is substantial variation among health authorities on this measure, ranging from a low of 12.1 per cent in Fraser to a high of 23.6 per cent in Northern, for 2013-14. The highest smoking rates are generally found in Northern and Interior, while the lowest are in Fraser and Vancouver Coastal.

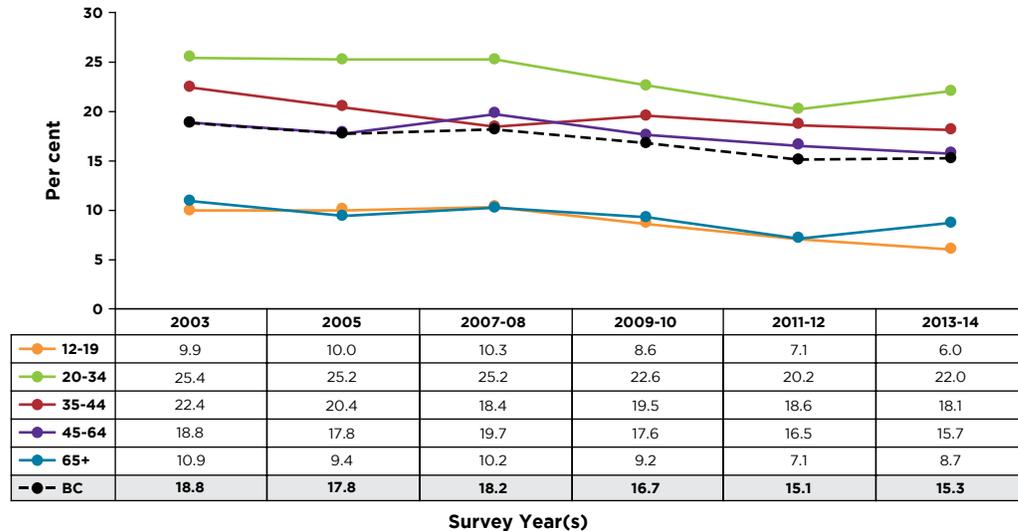
The geographic distribution of the population plays a role in understanding the impact of tobacco use. For example, while Northern had the highest rate of smoking in 2013-14, they had the fewest number of smokers; in the same timeframe, Fraser had the lowest smoking rate and the highest number of smokers.²⁵ As a result, the Fraser rate has more of an impact on the provincial average than the Northern rate. In order to reach the provincial target, it would be strategic to focus interventions in these two health authorities, to reduce both the number and percentage of smokers in BC.

In addition to reducing commercial tobacco use, initiatives underway in BC seek to reduce exposure to second-hand smoke.

Second-hand smoke is smoke from a lit cigarette, pipe, or cigar, and smoke blown into the air by a smoker.²⁷ It contains over 4,000 chemicals, including 50 that can cause cancer. Second-hand smoke causes over 100 deaths a year in BC.²⁸ The BC government, including the Ministry of Health, supports local government, health authorities, and agencies to create or modify bylaws and policies that reduce the impact of second-hand smoke on the population, such as smoke-free ski hills,^{1,28,29} and smoke-free bylaws for parks³⁰ and public beaches.³¹

¹ For example, Grouse Mountain became the first smoke-free ski hill in 2009. Other resorts followed, such as Whistler Blackcomb in 2015.

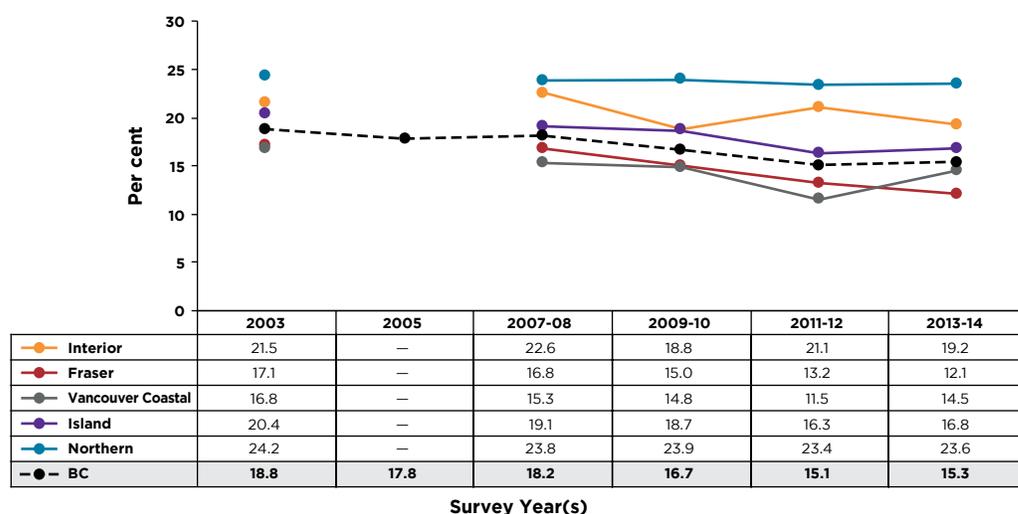
FIG 3.11 Percentage of the Population Age 12+ Who Smoke, by Age Group, BC, 2003 to 2013-14



Notes: Population age 12 and up who reported being a smoker, including those who currently smoke daily or occasionally. Daily smoking refers to those who reported smoking cigarettes every day, but does not take into account the number of cigarettes smoked. Electronic cigarettes (e-cigarettes) are not included. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 3.12 Percentage of the Population Age 12+ Who Smoke, by Health Authority, BC, 2003 to 2013-14



Notes: Population age 12 and up who reported being a smoker, including those who currently smoke daily or occasionally. Daily smoking refers to those who reported smoking cigarettes every day, but does not take into account the number of cigarettes smoked. Electronic cigarettes (e-cigarettes) are not included. Health authority data for 2005 were too unreliable to publish. Health authority is based on the residence of the respondent. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Learning To Stay Healthy

Performance Measure: The percentage of BC students in grades 3, 4, 7, 10, and 12 who report that at school, they are learning how to stay healthy.

Baseline: 51.0 per cent (2010/11)

2023 Target: 90 per cent

An effective health promotion approach operates in many settings, and considers the social, physical, and economic environments where people live, work, learn, and play.³² Schools are a priority setting for healthy living promotion as they can be used to reach almost every child, and thus, almost every family, regardless of a child's age, ability, gender, culture, or socio-economic background.⁶ The knowledge, attitudes, and behaviours established in childhood and adolescence can influence behaviours and circumstances in adult life.³³

Under the Healthy Schools BC initiative, the Ministries of Health and Education, the Directorate of Agencies for School Health (DASH) BC, health authorities, school districts, and other partners support improvements in students' health and learning. The aim of Healthy Schools BC is to strengthen relationships across the health and education sectors, and to support coordinated action in four key areas to improve the educational and health outcomes of BC students: strengthening cross-sector partnerships; coordinating provincial school-based healthy living programs; building the capacity of schools and their health partners to implement a **Comprehensive School Health**^{1,34} approach; and engaging students to participate in and lead healthy schools initiatives.³⁵ The Ministry of Health supported the Ministry

of Education in the development of the new Physical and Health Education Curriculum, by providing input and working with partners to develop resources and supports to assist teachers.

The Guiding Framework baseline for this indicator was 51.0 per cent of students in grades 3, 4, 7, 10, and 12 reporting that at school, they are learning how to stay healthy (2010/11). The target is to increase this to 90 per cent by 2023.

Figure 3.13 shows that the current provincial rate is decreasing, having dropped to 44.3 per cent in 2014/15. Therefore the current trend is moving away from the target, and work will be required to regain and improve upon the levels seen in previous years.

¹ A Comprehensive School Health approach supports "...improvements in students' educational outcomes while addressing school health in a planned, integrated, and holistic way." It recognizes that health and education are interdependent: healthy students are better learners, and better learners are healthier. This approach involves actions in four areas: social and physical environment, teaching and learning, healthy school policy, and partnerships and services.



FIG 3.13 Actual and Projected Percentage of Students in Grades 3, 4, 7, 10, and 12 Who Are Learning How to Stay Healthy, BC, 2008/09 to 2022/23



	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
● Actual	50.2	52.1	51.0	48.7	48.8	46.3	44.3								
●●● Projection	52.1	51.0	49.9	48.7	47.6	46.5	45.4	44.2	43.1	42.0	40.9	39.7	38.6	37.5	36.3
— Guiding Framework (GF)			51.0												90

School Year

Notes: The percentage of students in grades 3, 4, 7, 10, and 12 who report that, at school, they are learning how to stay healthy. Francophone schools are included. See Appendix B for more information about this data source.

Source: BC Ministry of Education, Student Satisfaction Survey. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.



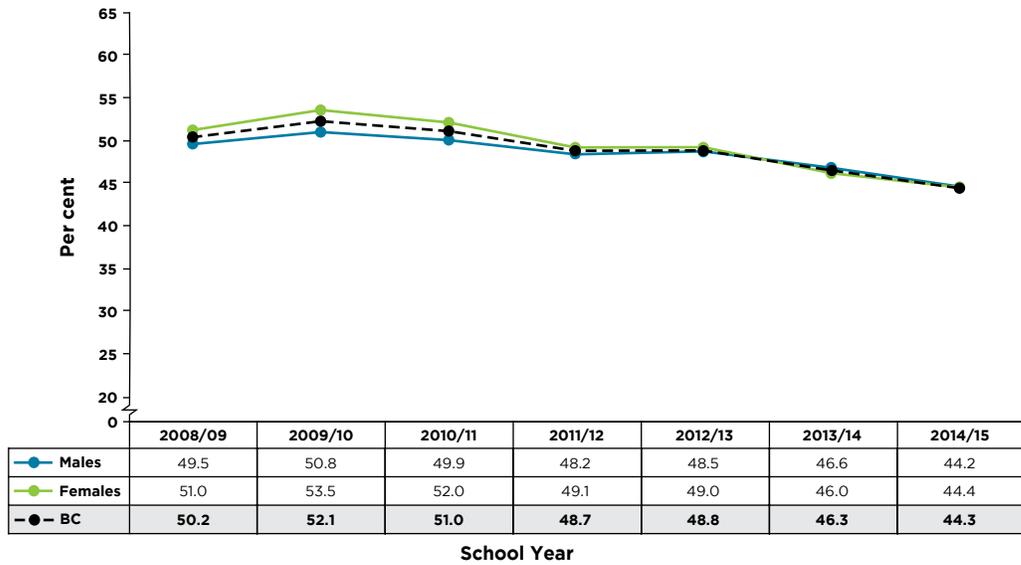
Figure 3.14 presents, by sex, the percentage of students in grades 3, 4, 7, 10, and 12 who report that at school, they are learning how to stay healthy. As this figure illustrates, the gap between the sexes has narrowed over time and was nearly eliminated by 2014/15—females are more likely to report that they are learning to stay healthy. Unfortunately, the trend for both males and females is worsening over time, with decreases down to approximately 44 per cent in 2014/15.

Figure 3.15 explores, by grade, the percentage of students who report that at school, they are learning how to stay healthy. This figure indicates that there is a strong gradient across grades: the highest rates occur in the lowest grades among the younger students, and the percentage decreases sharply for each grade level advancement. This creates a gap of approximately 30 percentage points between grade 3/4 students and grade 12 students

for all years analyzed. In addition, the rates have been falling across all four grade groups from 2008/09 to 2014/15. Only 27 per cent of grade 12 students now report that at school they are learning how to stay healthy.

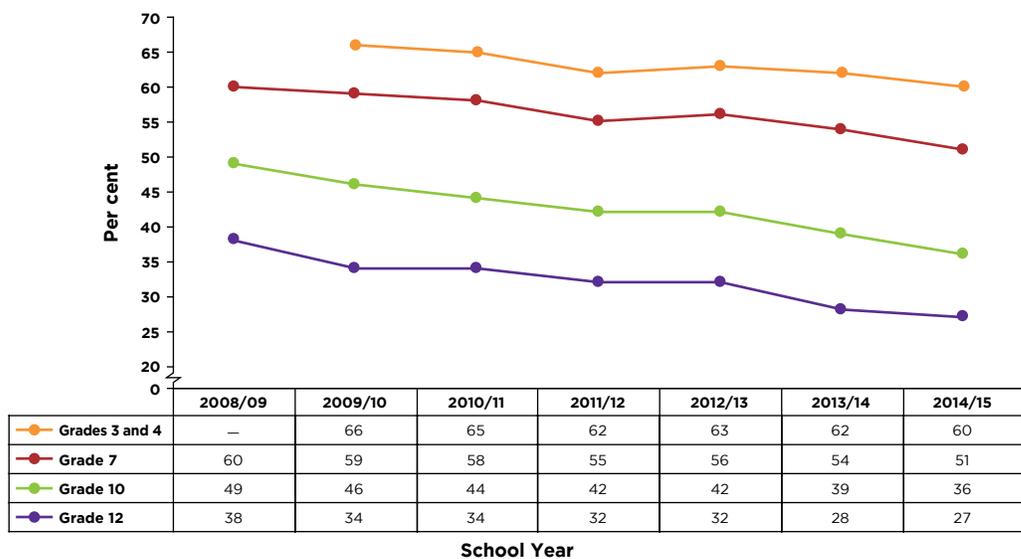
The lower rate observed with each increase in age may reflect curriculum priorities. For example, health and physical education classes are not required after grade 10, as greater emphasis is placed on academic subjects in preparation for provincial examinations and graduation.¹⁹ The Student Satisfaction Survey administered by the BC Ministry of Education asks this question in a uniform way to students across all the grades; however, when interpreting results for this indicator it is important to keep in mind that what is meant by the term “learning to stay healthy” may change and become more complex for students as they grow older.

FIG 3.14 Percentage of Students in Grades 3, 4, 7, 10, and 12 Who Are Learning How to Stay Healthy, by Sex, BC, 2008/09 to 2014/15



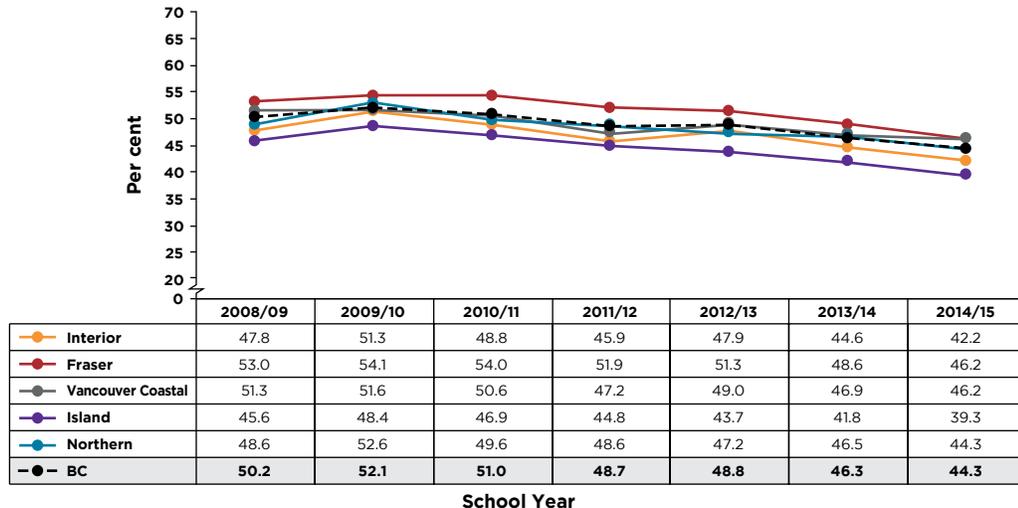
Notes: The percentage of students in grades 3, 4, 7, 10, and 12 who report that, at school, they are learning how to stay healthy. The BC total includes some respondents who did not state their sex. Francophone schools are included. See Appendix B for more information about this data source.
Source: BC Ministry of Education, Student Satisfaction Survey. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 3.15 Percentage of Students Who Are Learning How to Stay Healthy, by Grade(s), BC, 2008/09 to 2014/15



Notes: The percentage of students in grades 3, 4, 7, 10, and 12 who report that, at school, they are learning how to stay healthy. 2008/09 data not available for grades 3 and 4. Francophone schools are included. See Appendix B for more information about this data source.
Source: BC Ministry of Education, Student Satisfaction Survey. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

FIG 3.16 Percentage of Students in Grades 3, 4, 7, 10, and 12 Who Are Learning How to Stay Healthy, by Health Authority, BC, 2008/09 to 2014/15



Notes: The percentage of students in grades 3, 4, 7, 10, and 12 who report that, at school, they are learning how to stay healthy. Health authority is based on the location of the school. Francophone schools are included at both the BC and health authority levels. Inclusion of a francophone school within a health authority is based on the location of its school district. See Appendix B for more information about this data source.
Source: BC Ministry of Education, Student Satisfaction Survey. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Figure 3.16 shows that all health authorities are trending away from the 2023 target for the percentage of students in grades 3, 4, 7, 10, and 12 reporting that at school, they are learning how to stay healthy. While there is some variation in the rate of decline among the health authorities, Island consistently had a lower rate than other areas, while Fraser had a higher one.

A school curriculum is only one way to teach students how to be healthy at school, and there are opportunities to teach this through healthy school policies and the related built environment. In fact, student health is best supported when well-being is incorporated across the school: in teaching and learning; school policies; the social and physical environment of the school; and with supportive partnerships and services. For example, the *Guidelines for Food and Beverage Sales in B.C. Schools* is a policy that provides nutritionally

based requirements for what should and should not be sold in school vending machines and cafeterias.³⁶ The Guidelines also provide suggestions for restricting the marketing of unhealthy food and beverages to children and youth in BC schools.³⁷ Additionally, provincial programs such as Action Schools! BC provide ideas for kindergarten to grade 7 teachers on ways to integrate activities that promote physical activity and healthy eating into their teaching practices.³⁷ These interventions together support improvements in student health and educational outcomes.

Conclusion

This chapter has briefly reviewed the performance measures related to Goal 1 of the Guiding Framework (healthy living and healthy communities). Two measures—the consumption of fruit and vegetables, and the percentage of students learning to stay healthy—are not showing improvement and are, in fact, moving away from their provincial targets. The other two measures—the percentage of those age 12 and up who are physically active or moderately active in their leisure time, and those age 12 and up who are currently smokers—are improving, but will need further support in order to reach their provincial targets by 2023. Analyses by sex showed that females were more likely than males to report consuming fruit and vegetables at least five times per day, and less likely to be smokers, but males were more likely to report physical activity. The youngest and oldest age

groups explored (age 12–19 and 65 and up) were the most likely to report consuming fruit and vegetables five or more times per day and the least likely to report smoking. Two other performance measures—physical activity during leisure time, and students who report that at school they are learning how to stay healthy—are showing a decreasing relationship based on age, with the youngest groups reporting the highest levels, and the oldest groups reporting the lowest. There is substantial geographic variation in smoking rates, with Northern having the highest and Fraser having the lowest. Geographic disparity is also found in consumption of fruit and vegetables, with Island consistently having the highest rate and Interior showing improvement over time. The next chapter will review Goal 2 of the Guiding Framework and its associated performance measures.

REFERENCES

- ¹ BC Provincial Health Officer. Investing in prevention: improving health and creating sustainability. Victoria, BC: BC Ministry of Healthy Living and Sport; 2010 Sep.
- ² Krueger H, Rasali D, Pennock M, Gustin S. The economic benefits of risk factor reduction in British Columbia: excess weight, physical inactivity and tobacco smoking. Vancouver, BC: Provincial Health Services Authority; 2015 Jul [cited 2018 Mar 13]. Available from: http://krueger.ca/wp-content/uploads/edd/2015/12/Economic_Benefits_of_Risk_Factor_Reduction_in_BC.pdf.
- ³ Appetite to Play. Appetite to Play: healthy eating and physical activity in the early years. Vancouver, BC: Child Health BC; [cited 2018 Apr 11]. Available from: <https://www.appetitetoplay.com/>.
- ⁴ BC Recreation Parks Association. ActivAge/Choose to Move. Vancouver, BC: BC Recreation Parks Association; 2018 [cited Apr 12]. Available from: <https://www.bcrpa.bc.ca/everything-else/activage-choose-to-move/>.
- ⁵ BC Healthy Communities. Learning centre. Frequently asked questions [Internet]. Victoria, BC: BC Healthy Communities; 2016 [cited 2016 Dec 15]. Available from: <http://bchealthycommunities.ca/faq>.
- ⁶ BC Ministry of Health. Healthy families BC policy framework: a focused approach to chronic disease and injury prevention. Victoria, BC: BC Ministry of Health; 2014 Mar.
- ⁷ World Health Organization. Healthy diet [fact sheet no. 394] [Internet]. Geneva: World Health Organization; 2015 Sep [cited 2017 Mar 16]. Available from: <http://www.who.int/mediacentre/factsheets/fs394/en/>.
- ⁸ Pérez CE. Fruit and vegetable consumption. Health reports. 2002 Mar;13(3): 23-31. Available from: <http://www.statcan.gc.ca/pub/82-003-x/2001003/article/6103-eng.pdf>.

- ⁹ World Health Organization. Physical activity [Internet]. Geneva: World Health Organization; [cited 2017 Mar 17]. Available from: http://www.who.int/topics/physical_activity/en/.
- ¹⁰ BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ¹¹ Government of British Columbia. Physical activity [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Mar 17]. Available from: <http://www2.gov.bc.ca/gov/content/health/managing-your-health/physical-activity>.
- ¹² BC Ministry of Health. Active people, active places: British Columbia Physical Activity Strategy. Victoria, BC: BC Ministry of Health; 2015 Nov [cited 2017 Mar 17]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2015/active-people-active-places-web-2015.pdf>.
- ¹³ Healthy Beginnings for Preschoolers 2-5. BC Guidelines. [cited 2018 Dec 7]. Available from: <http://www.healthybeginningspreschoolers.ca/jurisdictions/british-columbia/>.
- ¹⁴ ParticipACTION. Canadian 24-hour movement guidelines for the early years (0-4): An integration of physical activity, sedentary behaviour, and sleep. Toronto, ON: ParticipACTION; 2017 [cited 2018 Jan 31]. Available from: <https://www.participaction.com/en-ca/thought-leadership/benefits-and-guidelines/0-4>.
- ¹⁵ ParticipACTION. Canadian 24-hour movement guidelines for the early years (5-17): An integration of physical activity, sedentary behaviour, and sleep. Toronto, ON: ParticipACTION; 2017 [cited 2018 Jan 31]. Available from: <https://www.participaction.com/en-ca/thought-leadership/benefits-and-guidelines/5-17>.
- ¹⁶ SCOPE. Live 5-2-1-0. Vancouver, BC: SCOPE; [cited 2018 Apr 11]. Available from: <https://www.live5210.ca/>.
- ¹⁷ Public Health Agency of Canada. What is Active Transportation? Ottawa, ON: Public Health Agency of Canada. [cited 2018 May 17]. Available from: <https://www.canada.ca/en/public-health/services/health-promotion/healthy-living/physical-activity/what-active-transportation.html>.
- ¹⁸ BC Ministry of Education. Daily physical activity: kindergarten to grade 12 program guide. Victoria, BC: BC Ministry of Health; 2011 [cited 2018 Feb 5]. Available from: https://www2.gov.bc.ca/assets/gov/education/kindergarten-to-grade-12/teach/pdfs/curriculum/dailyphysicalactivity/program_guide.pdf.
- ¹⁹ BC Ministry of Education. Physical and health education: what’s new? Victoria, BC: BC Ministry of Health; 2016 [cited 2018 Jan 31]. Available from: <https://curriculum.gov.bc.ca/curriculum/physical-and-health-education/whats-new>.
- ²⁰ Van Loon J, Frank LD, Nettlefold L, Naylor PJ. Youth physical activity and the neighbourhood environment: examining correlates and the role of neighbourhood definition. *Soc Sci Med.* 2014;104:107-15. doi.org/10.1016/j.socscimed.2013.12.013.
- ²¹ Mirta R, Falkner GEJ, Buliung RN, Stone MR. Do parental perceptions of the neighbourhood environment influence children’s independent mobility? Evidence from Toronto Canada. *Urban Stud.* 2014;51(16):3401-19. doi: 10.1177/0042098013519140.
- ²² BC Vital Statistics Agency. Selected vital statistics and health status indicators. One hundred and fortieth annual report 2011. Victoria, BC: BC Vital Statistics Agency. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ²³ Rehm J, Baliunas D, Brochu S, Fischer B, Gnam W, Patra J, et al. The costs of substance abuse in Canada 2002. Highlights. Ottawa, ON: Canadian Centre on Substance Abuse; 2006 Mar [cited 2017 Mar 24]. Available from: <http://www.ccsa.ca/Resource%20Library/ccsa-011332-2006.pdf>.
- ²⁴ Statistics Canada. Table 105-0502 Health indicator profile, two year period estimates, by age group and sex, Canada, provinces, territories, health regions (2013 boundaries) ad peer groups, occasional (table). CANSIM (database). Ottawa, ON: Statistics Canada; [cited 2017 Mar 20]. Available from: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=1050502&tabMode=dataTable&srchLan=-1&p1=-1&p2=9>.
- ²⁵ BC Ministry of Health. Legislation in effect to regulate e-cigarettes [news release]. Victoria, BC: BC Ministry of Health; 2016 Sep 1 [cited 2017 Mar 20]. Available from: <https://news.gov.bc.ca/releases/2016HLTH0064-001569>.
- ²⁶ Government of British Columbia. Tobacco and vapour products [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Mar 14]. Available from: <https://www2.gov.bc.ca/gov/content/health/keeping-bc-healthy-safe/tobacco-vapour>.

- ²⁷ HealthLink BC. The harmful effects of second-hand smoke [health file 30a]. Victoria, BC: HealthLink BC; 2015 Dec [cited 2017 Sep 6]. Available from: <https://www.healthlinkbc.ca/hlbc/files/documents/healthfiles/hfile30a.pdf>.
- ²⁸ Grouse Mountain. Healthy action taken to help kick the habit. Grouse Mountain becomes the first smoke-free resort in BC. Vancouver, BC: Grouse Mountain; 2009 Jun 5 [cited 2017 Sep 6]. Available from: <https://www.whistlerblackcomb.com/about-us/smoke-free>.
- ²⁹ Judd A. Whistler Blackcomb resort bans smoking on all properties. Global News; 2015 May 15 [cited 2017 Sep 6]. Available from: <http://globalnews.ca/news/2001077/whistler-blackcomb-resort-bans-smoking-on-all-properties/>.
- ³⁰ Plan H. Tobacco reduction. Vancouver, BC: BC Healthy Communities; 2013 Sep [cited 2017 Sep 6]. Available from: http://planh.ca/sites/default/files/planh_tobacco_reduction_guide-web09_05.25.16.pdf.
- ³¹ Capital Regional District. A bylaw to promote clean air by regulating environmental tobacco smoke [bylaw no. 3962]. Victoria, BC: Capital Regional District; 2015 Apr 1 [cited 2017 Sep 6]. Available from: <https://www.crd.bc.ca/docs/default-source/crd-document-library/bylaws/publichealthcleanairidlingtanningtattoo/3962---capital-regional-district-clean-air-bylaw-no-1-2014-%28at-second-reading%29.pdf?sfvrsn=12>.
- ³² Ottawa Charter for Health Promotion. An international conference on health promotion: the move towards a new public health. Ottawa, ON: 1986 Nov 17-21. Cited by BC Ministry of Health. Healthy families BC policy framework: a focused approach to chronic disease and injury prevention. Victoria, BC: BC Ministry of Health; 2014 Mar.
- ³³ BC Provincial Health Officer. An ounce of prevention: a public health rationale for the school as a setting for health promotion. Victoria, BC: BC Ministry of Health Planning; 2003 Oct [cited 2017 Mar 20]. Available from: http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/special-reports/o_prevention.pdf.
- ³⁴ Joint Consortium for School Health. What is comprehensive school health? Summerside, PE: Joint Consortium for School Health; [cited 2017 Oct 19]. Available from: http://www.jcsh-cces.ca/images/What_is_Comprehensive_School_Health_-_2-pager_-_July_2016.pdf.
- ³⁵ Provincial Health Services Authority. Progress report 2015: Healthy Schools BC evaluation. Vancouver, BC: Provincial Health Services Authority; 2015. Available from: http://healthyschoolsbc.ca/media/22301/healthy-schools-bc-eval_2015-progress-report-final-june-24-2015.pdf.
- ³⁶ BC Ministry of Health. Guidelines for food and beverage sales in B.C. schools. Victoria, BC: BC Ministry of Health; 2013. Available from: https://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/healthyschools/2015_food_guidelines.pdf.
- ³⁷ Action Schools BC. The Action Schools BC model. Victoria, BC: Action Schools BC; 2016 [cited 2018 Jan 31]. Available from: <https://www.actionschoolsbc.ca/action-schools-bc-program/the-action-schools-bc-model/>.

4

Maternal, Child, & Family Health

This chapter examines maternal health and healthy child development. The health of women and girls and their capacity to participate fully and fairly in society are fundamental rights and provide the foundation for healthy families, communities, and societies. Women and girls contribute to British Columbia's prosperity through their roles as leaders, students, workers, caregivers, educators, and mothers. Their health is central to improving individual and population health outcomes, and they thrive when the health system and society support their health and well-being. Healthier women and girls lead to improved health for all.

Maternal health is defined as a woman's health while she is pregnant, through childbirth, and the postpartum period,¹ including her mental, emotional, and physical health.^k However, maternal and infant health begins before conception and includes the time before a woman is aware she is pregnant. The provision of appropriate preconception and prenatal care and having an environment that supports physical, mental, and emotional needs during pregnancy and a child's early years, have a positive influence on women's health and on fetal and infants' healthy growth and development.² A healthy family, including maternal

support that includes good preconception, prenatal, and postpartum care, contributes to a healthy start in life for infants and children.³ It also reduces the risk of chronic disease later in life, and can even have impacts on the next generation.⁴

As a result of better access to contraceptive options, men and women now have greater control over the number, timing, and spacing of their children. However, there are still financial, cultural, educational, geographic, and practical barriers to accessing or utilizing contraception. In Canada, it is estimated that up to 40 per cent of pregnancies are unintended.⁵ It is critical to support people of reproductive age to access supports, make healthy choices, and reduce risks, in order to contribute to optimal outcomes in pregnancy. Additionally, preconception care has health benefits for girls and women—as well as men—regardless of their plans to become parents.⁶

The years between conception and age six are a critical period of growth.⁷ The interactions that children have with their environment during this time profoundly affect their physical, cognitive, social, and emotional development and influence the development of their brains,

^k While sex-based analyses in this report use binary constructs of male/female, it is important to understand that sex- and gender-based distinctions are far more diverse for many British Columbians. For example, not all biological females are women, not all women are mothers, and not all mothers are women. Overall for this report, it will be necessary to refine how data are interpreted and how recommendations are implemented to meet the needs and realities of various sub-populations, such as people who are transgender.

their behaviours, their capacity to learn, as well as their health outcomes later in life.^{8,9,10,11} Investments in preconception and prenatal health and healthy infant and child development promote positive early life experiences, as well as reduce the negative impacts of adverse events in childhood.⁸ Adverse childhood events (ACE) may include a child's experience of neglect or abuse, or witnessing domestic violence. Having multiple ACEs is a risk factor for many health conditions, as well as being a risk factor for future generations, because these events can create a cycle of trauma and adversity within a family.¹² The intergenerational impact of these stressful or

traumatic events in the early years also highlights the need to support families experiencing vulnerabilities.

Family relationships have a great deal of influence over our health, and interactions within families can support or impede the health and well-being of individuals within the family.¹² As previously noted in the joint BC Provincial Health Officer and Child Health BC report entitled *Is "Good", Good Enough? The Health and Well-being of Children & Youth in BC*, "...generally, healthy children emerge most often from healthy families, and healthy families lead to healthy communities."¹³

Guiding Framework Goal 2: Maternal, Child, & Family Health

Goal Statement

Families have the capacity to achieve and maintain good health at all stages of child development.

Objectives

The objectives for Goal 2 are to maximize the healthy physical, emotional, and social development of women, children, infants, and youth:

1. Enhance the health of all women during their childbearing years and the health of women during pregnancy and the postpartum period through universal and targeted screening, perinatal health programs and maternity care planning.
2. Improve the health of infants, children and youth through health promotion strategies that address risk factors that impact healthy physical, social and emotional development.
3. Enhance the health of women in rural or remote areas, including First Nations and Aboriginal communities, by improving access to perinatal and public health services and resources.

Performance Measures

The Guiding Framework established four performance measures related to Goal 2:

- The rate of low weight singleton births (per 1,000 live births).
- The percentage of new mothers who report smoking during pregnancy.
- The rate of hazardous drinking among women of reproductive age.
- The percentage of children who are not vulnerable on any Early Development Instrument Dimensions.

Low Birth Weight

Performance Measure: The rate of low weight singleton births (per 1,000 live births).

Baseline: 40.5 per 1,000 live births (2008-10 [3-year average])

2023 Target: 36 per 1,000 live births

An infant's weight at birth provides information about the health of the child as well as the mother. Birth weight is used around the world as an indicator of the health of newborns and as a predictor of health and developmental outcomes later in life.¹⁴ **Low birth weight**—weighing below 2,500 grams when born—is associated with a higher chance of death within the first year of life.¹³ Low birth weight births occur more frequently among underserved populations;¹⁵ as a result, this indicator is an important sign of population health disparities.⁷ Some modifiable predictors of low birth weight include low socio-economic status, poor nutrition, poor maternal weight gain, smoking during pregnancy, consumption of alcohol and other substances during pregnancy, overall maternal health, and maternal experiences of abuse during pregnancy.¹⁶

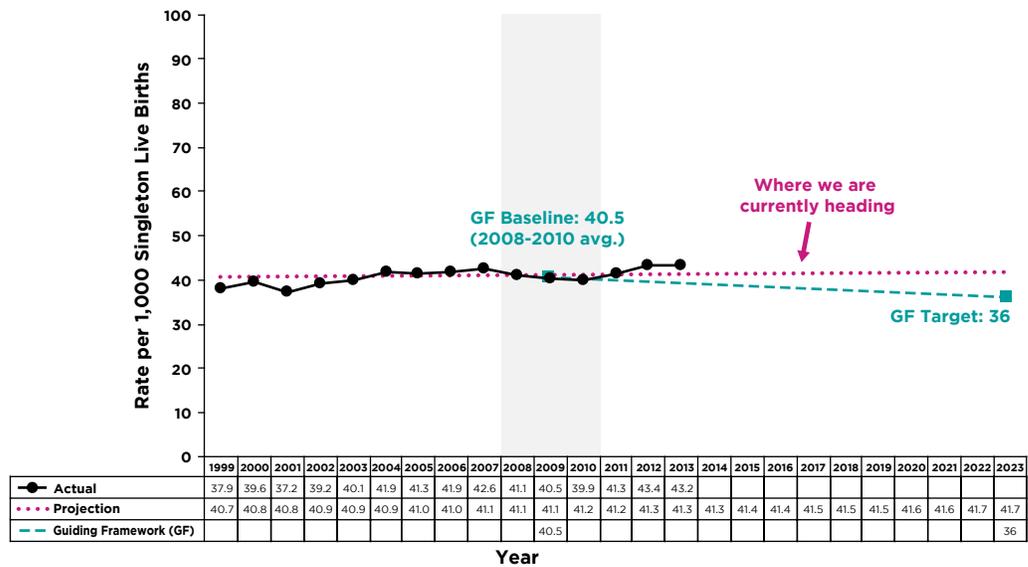
Globally, success in reducing the prevalence of low birth weight babies has been achieved in China, where 2.4 per cent (or 24 per 1,000 live births) were recorded as being below 2,500 grams in 2015.¹⁷ Many other countries have rates of low birth weight below 5 per cent, including Iceland, Estonia, Finland, Sweden, Latvia, and Norway.¹⁷ In Canada, by comparison, 6.3 per cent of newborns were reported as low birth weight. The average among countries belonging to the Organisation for Economic Co-operation and Development was 6.5 per cent.¹⁷

The indicator for low birth weight includes **full-term** and **preterm births** (infants born before 37 weeks of pregnancy),¹⁸ and includes only singleton births (one child carried and born in the pregnancy).¹⁹ Since a baby's birth weight relates to its gestational age, the inclusion of preterm births may result in an inflated number of low birth weight babies shown here. The Guiding Framework baseline for this indicator was 40.5 per 1,000 singleton live births (a three-year average, 2008-10). The target for 2023 is to reduce this to 36 per 1,000 singleton live births.

As shown in Figure 4.1, the rate of low birth weight singleton births decreased during the latter half of the 1990s before increasing again between 2001 and 2007. For the next three years it appeared that rates were falling again; however, this was interrupted by increased rates through 2011 and 2012. Overall, there has not been a consistent, sustained decrease over the 25 years shown, and if the current projection holds, this indicator will not meet its 2023 target.



FIG 4.1 Actual and Projected Rate of Low Birth Weight Singleton Births, BC, 1999 to 2023



Notes: "Low birth weight" means live births of babies weighing less than 2,500 grams and includes preterm births (babies born before 37 weeks gestation). "Singleton" means one child carried and born. See Appendix B for more information about this data source.
Source: BC Vital Statistics Agency. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

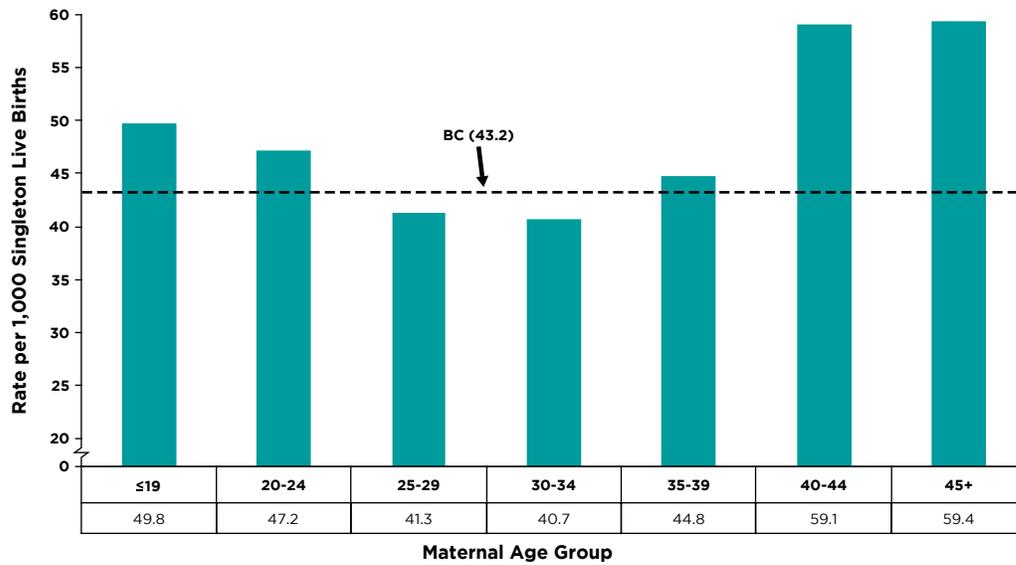
As Figure 4.2 shows, mothers in the lowest and highest age groups have the highest rate of low birth weight among singleton live births, while those in the middle (age 30–34) have the lowest. Mothers age 40 and up had a rate of low birth weight infants that was nearly 60 per 1,000 live singleton births in 2013.

These findings are consistent with evidence that maternal age is a key factor associated with low birth weight.^{20,21,22} The increase in low birth weight babies may also be correlated with the increase in women delaying their first pregnancy.² Access to appropriate contraceptives has given future parents more control over when they would like to start a family, and more people are choosing to delay having children for a variety of reasons.²⁰

Figure 4.3 demonstrates that there is year-to-year variation in the rate of low birth weight singleton births across all health authorities. While Fraser and Vancouver Coastal have the highest rates of low birth weight infants for most of the years shown, the most recent years show an increase in the rate in several health authority areas.

In 2013, through the Healthy Start Initiative, the BC Ministry of Health and Perinatal Services BC—in collaboration with the regional health authorities—developed Provincial Perinatal, Child and Family Public Health Services Standards²³ and the Population and Public Health Prenatal Care Pathway.²⁴ These initiatives promote consistency in universal public health services available to women during the prenatal period and those with children up to two years of age, and support the early identification and provision of enhanced services to women experiencing related vulnerabilities. An example of enhanced services is the Nurse-Family Partnership, a program provided in BC for young, first-time mothers and their children from underserved populations.²⁵ Women in the program are visited by a public health nurse during their pregnancy and receive enhanced support until the child is two years old.²⁶ Goals of the program include improved pregnancy outcomes, child health and development, and economic self-sufficiency of the parents.²⁷

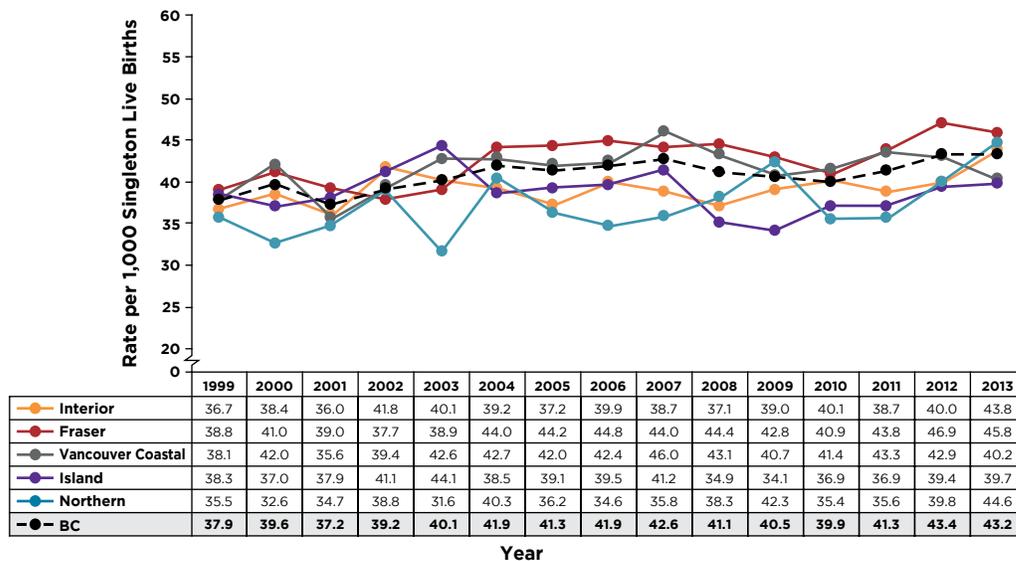
FIG 4.2 Rate of Low Birth Weight Singleton Births, by Maternal Age, BC, 2013



Notes: "Low birth weight" means live births of babies weighing less than 2,500 grams and includes preterm births (babies born before 37 weeks gestation). "Singleton" means one child carried and born. See Appendix B for more information about this data source.

Source: BC Vital Statistics Agency. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 4.3 Rate of Low Birth Weight Singleton Births, by Health Authority, BC, 1999 to 2013



Notes: "Low birth weight" means live births of babies weighing less than 2,500 grams and includes preterm births (babies born before 37 weeks gestation). "Singleton" means one child carried and born. Health authority is based on the residence of the mother. See Appendix B for more information about this data source.

Source: BC Vital Statistics Agency. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Smoking During Pregnancy

Performance Measure: The percentage of new mothers who report smoking during pregnancy.

Baseline: 8.5 per cent (2010/11)

2023 Target: 4 per cent

Smoking commercial tobacco¹ is the most important modifiable factor related to adverse pregnancy outcomes.²⁸ Smoking during pregnancy has negative effects on the health of both the mother and fetus, including a higher frequency of obstetric complications,²⁹ reduced fetal growth, an overall increased risk of infant mortality, a higher incidence of **Sudden Infant Death Syndrome**, and an increased risk of **asthma** in the child.^{30,31} Smoking during pregnancy is associated with socio-economic disadvantage, such as mothers with lower socio-economic status,³² lower levels of education,²⁹ and those experiencing intimate partner violence.³³

There are several initiatives underway in BC to assist people to reduce and stop smoking, including pregnant women.³⁴ For example, the Smoking Cessation Program helps eligible BC residents with the cost of smoking cessation prescription drugs or nicotine replacement therapy products. The Ministry of Health also supports smoking cessation for BC residents through QuitNow (www.quitnow.ca), which provides free professional coaching by phone and text, along with other online resources. In addition to these initiatives, protocols have been developed to identify women in the prenatal period who smoke, in order to support them in quitting. For example, the Population and Public Health Prenatal Care Pathway, released in 2014, is an evidence-informed prenatal practice support tool that can promote the health of

pregnant women and their families, including women who smoke or are exposed to second-hand smoke during pregnancy.²⁵

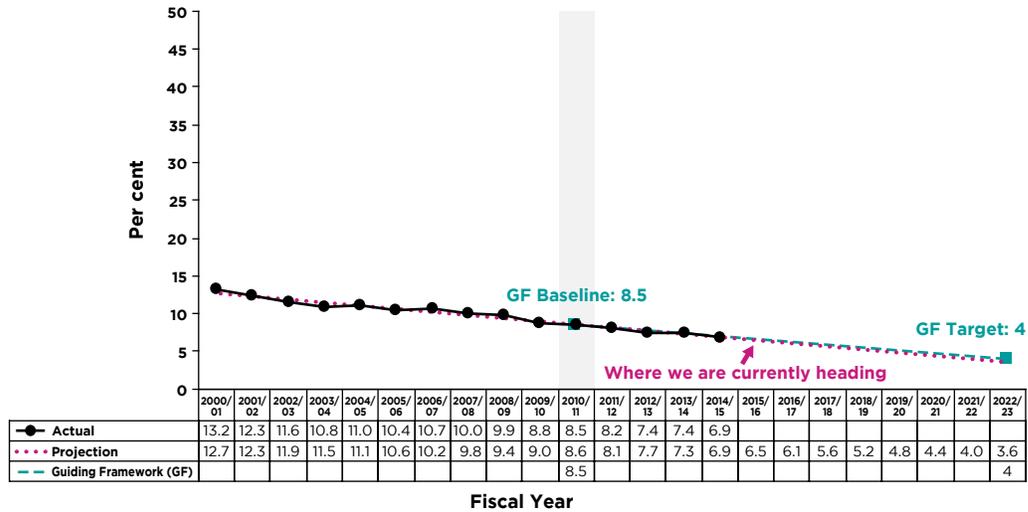
The baseline identified in the Guiding Framework for new mothers who reported smoking during pregnancy was 8.5 per cent in 2010/11, and the target is to reduce this to 4 per cent by 2023.

Figure 4.4 shows that the percentage of mothers who report smoking during pregnancy has fallen consistently over the past decade. If the current rate of decline can be sustained, the target can be achieved or surpassed by 2023. However, these data must be interpreted with caution as the percentage of women who report smoking during pregnancy is likely underreported due to societal stigma related to smoking during pregnancy.

Figure 4.5 shows the relationship between the percentage of new mothers who report smoking during pregnancy and maternal age. The youngest age group of mothers (under age 20) has the highest percentage of smoking during pregnancy (27.0 per cent in 2014/15), followed by mothers aged 20–24 (18.4 per cent in 2014/15). The level of smoking decreases with age, with the lowest percentage among mothers age 40 and up. All age groups show improvement over time, with the percentages decreasing across the five years shown, consistent with the overall provincial trend.

¹ The term “commercial tobacco” is used here to distinguish it from tobacco that is used by Indigenous peoples for ceremonial or traditional purposes. For the remainder of this chapter, the term “tobacco” will be used to indicate commercial tobacco.

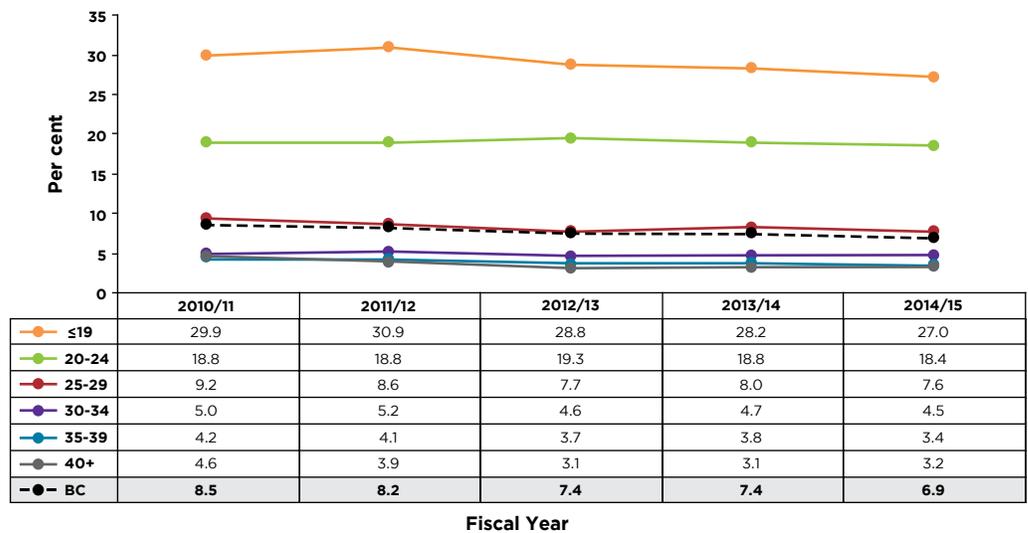
FIG 4.4 Actual and Projected Percentage of Mothers Who Smoke During Pregnancy, BC, 2000/01 to 2022/23



Notes: "Mothers" means women who gave birth in the fiscal year. Data include all births (live births and stillbirths) that occurred in BC in hospital or at home with a registered midwife. They exclude late pregnancy terminations. "Smoke during pregnancy" means mothers who reported smoking at any time during the current pregnancy, even if they quit during the pregnancy. Never smokers, former smokers, and patients with unknown smoking status are considered non-smokers for the purposes of this analysis. Data do not account for second-hand smoke exposure or e-cigarette use. See Appendix B for more information about this data source.

Source: Perinatal Services BC, Provincial Health Services Authority, British Columbia Perinatal Data Registry. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

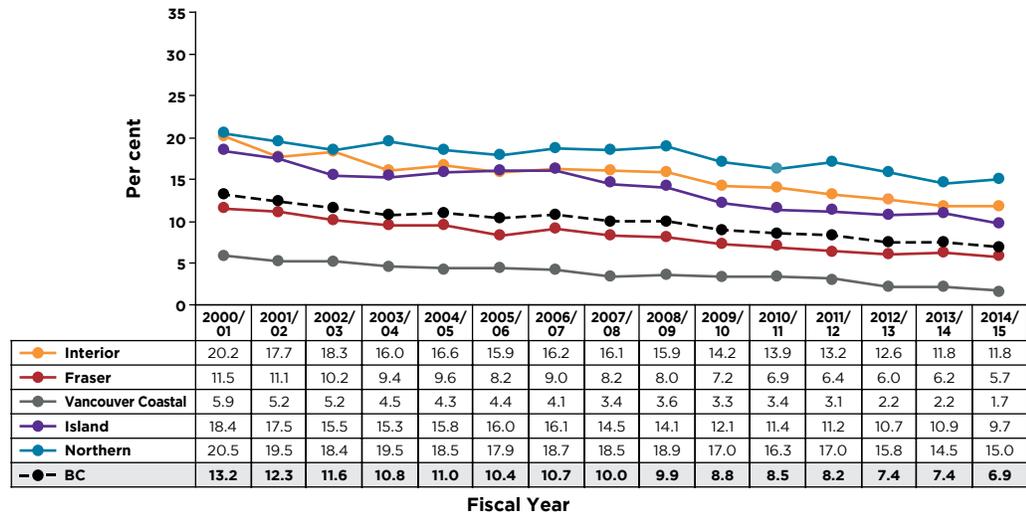
FIG 4.5 Percentage of Mothers Who Smoke During Pregnancy, by Maternal Age, BC, 2010/11 to 2014/15



Notes: "Mothers" means women who gave birth in the fiscal year. Data include all births (live births and stillbirths) that occurred in BC in hospital or at home with a registered midwife. They exclude late pregnancy terminations. "Smoke during pregnancy" means mothers who reported smoking at any time during the current pregnancy, even if they quit during the pregnancy. Never smokers, former smokers, and patients with unknown smoking status are considered non-smokers for the purposes of this analysis. Data do not account for second-hand smoke exposure or e-cigarette use. See Appendix B for more information about this data source.

Source: Perinatal Services BC, Provincial Health Services Authority, British Columbia Perinatal Data Registry. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 4.6 Percentage of Mothers Who Smoke During Pregnancy, by Health Authority, BC, 2000/01 to 2014/15



Notes: "Mothers" means women who gave birth in the fiscal year. Data include all births (live births and stillbirths) that occurred in BC in hospital or at home with a registered midwife. They exclude late pregnancy terminations. "Smoke during pregnancy" means mothers who reported smoking at any time during the current pregnancy, even if they quit during the pregnancy. Never smokers, former smokers, and patients with unknown smoking status are considered non-smokers for the purposes of this analysis. Data do not account for second-hand smoke exposure or e-cigarette use. Health authority is based on the residence of the mother. See Appendix B for more information about this data source.

Source: Perinatal Services BC, Provincial Health Services Authority, British Columbia Perinatal Data Registry. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Figure 4.6 shows that the decrease in reported smoking observed in Figure 4.4 has occurred across all health authority areas. It also shows considerable variation between health authority areas: Island, Interior, and Northern have much higher percentages of mothers who report smoking during pregnancy, compared to Fraser and Vancouver Coastal. In fact, in 2014/15, the percentage in Northern was almost nine times that of Vancouver Coastal.



Hazardous Drinking Among Women of Reproductive Age

Performance Measure: The rate of hazardous drinking among women of reproductive age.

Baseline: 15.5 per cent (2009-10)

2023 Target: 14 per cent

Alcohol use in pregnancy can have a negative effect on a fetus, including **Fetal Alcohol Spectrum Disorder** (FASD). FASD is a term that describes a range of lifelong effects that can occur in an individual who was prenatally exposed to alcohol, including physical, mental, and behavioural difficulties and learning disabilities.³⁵ In fact, prenatal alcohol exposure is the leading preventable cause of developmental disabilities in Canada.³⁶

For women, **“hazardous drinking”** (sometimes called heavy drinking or binge drinking) means consuming four or more drinks on one occasion, at least once a month during the past year.^{m,37} Alcohol use in pregnancy is widely considered to be underreported, making it a challenge to establish accurate data. However, looking at the rate of hazardous

drinking among women of reproductive age (age 15–44) can help us to understand the level of alcohol consumption among women who may be in the early stages of pregnancy, when many women are unaware that they are pregnant.⁷ Canada’s Low-Risk Alcohol Drinking Guidelines advise women not to drink if they are pregnant or are planning a pregnancy.³⁸ There is no safe alcohol consumption during pregnancy, including no safe time during the pregnancy, no safe type of alcohol, and no safe level of drinking; the safest option is to refrain from drinking alcohol when pregnant or planning a pregnancy.^{39,40} In the baseline year of 2009-10 for this indicator, 15.5 per cent of women of reproductive age reported hazardous drinking. The Guiding Framework target for 2023 is to reduce this to 14 per cent.

^m Prior to 2013, hazardous drinking for women was defined as consuming five or more drinks on one occasion, at least once a month in the past year.

Canada’s Low-Risk Alcohol Drinking Guidelines for Women of Reproductive Age

Why Does Sex Matter?

Canada’s Low-Risk Alcohol Drinking Guidelines are different for males and females, because females experience more risks and potential harms than males for the same level of consumption.³⁸ Males and females are affected differently by alcohol because females on average weigh less, and have physiological differences (i.e., less fat tissue, less water in the body, and fewer enzymes to break down alcohol).⁵¹

What’s Your Limit?

To reduce long-term health risks, drink no more than:

- 10 drinks a week with no more than 2 drinks in a day
- No more than 3 drinks on any single occasion³⁸

Alcohol and Pregnancy

A Canadian survey found that 40 per cent of pregnancies are unintended.⁵² If you consume alcohol and have sex, use effective contraception and stop drinking alcohol when you become aware that you are or may be pregnant to avoid harmful effects on the fetus.⁵³

When Zero is the Limit

Do not drink when you are:

- Pregnant or planning to be pregnant
- Driving a vehicle or using machinery and tools
- Taking medicine or other drugs that interact with alcohol
- Doing any kind of dangerous physical activity
- Living with mental or physical health problems
- Living with alcohol dependence
- Responsible for the safety of others
- Making important decisions³⁸

For these guidelines, “a drink” means:

			
Beer 341 ml (12 oz.) 5% alcohol content	Cider/ Cooler 341 ml (12 oz.) 5% alcohol content	Wine 142 ml (5 oz.) 12% alcohol content	Distilled Alcohol (rye, gin, rum, etc.) 43 ml (1.5 oz.) 40% alcohol content

Note: Reproduced with permission from the Canadian Centre on Substance Use and Addiction.
Source: Canadian Centre on Substance Use and Addiction, 2018. *Canada’s low-risk alcohol drinking guidelines*.³⁸

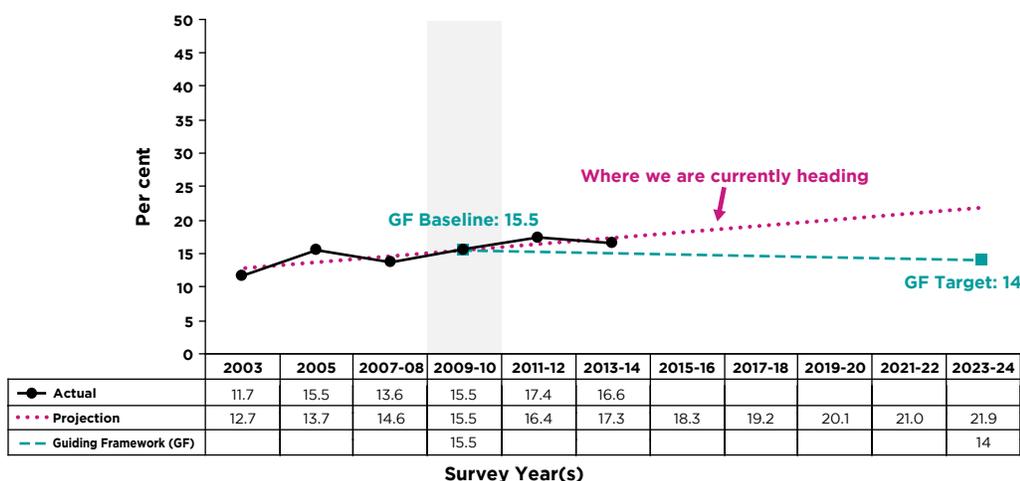
As shown in Figure 4.7, the rate of hazardous drinking among women of reproductive age has increased during the past decade; thus, the provincial trend is moving away from the 2023 target. This increase in hazardous drinking among women in BC mirrors national trends.⁴¹ Causes for the increase may include increased marketing to women by the alcohol industry, as well as women being more comfortable reporting heavy drinking due to changing social norms.^{42,43,44}

Figure 4.8 shows that among women age 15–44, there is a complex relationship between age and hazardous drinking. Women age 20–24 have the highest percentage for the 10 years shown. The older age groups (women age 30–34, 35–39, 40–44) have the lowest percentages for most years shown, but these percentages have all been increasing over time—particularly among those age 30–34, who saw an increase from 8.9 per cent in 2003

to 21.5 per cent in 2013-14. In fact, the only decrease was seen in the youngest age group (women age 15–19), from 13.7 per cent in 2003 to 11.1 per cent in 2013-14.

Figure 4.9 shows some regional variation between health authority areas, with an overall pattern in which Fraser has the lowest percentage of hazardous drinking among women of reproductive age and Interior has the highest. Northern experienced a steep decline between 2011-12 and 2013-14, from 19.8 per cent to 11.7 per cent.

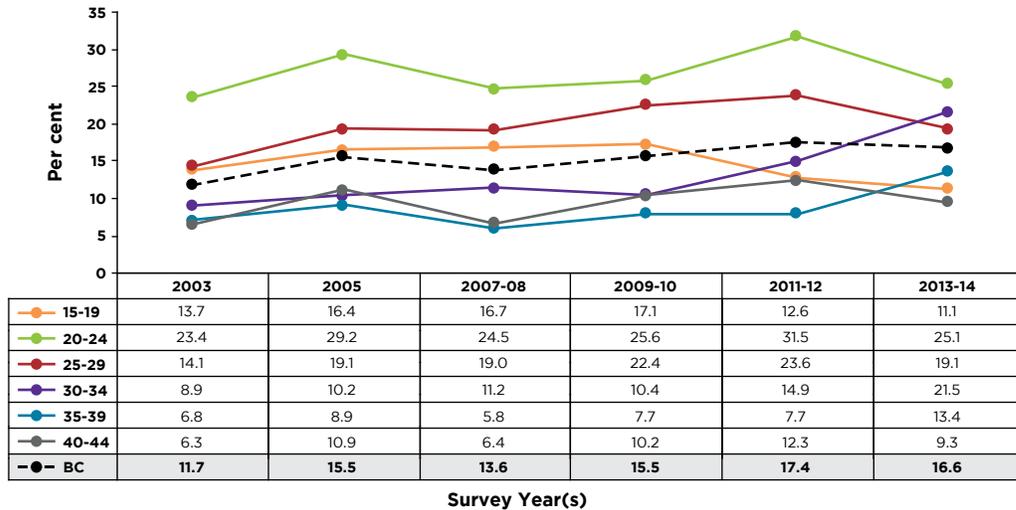
FIG 4.7 Actual and Projected Percentage of Women Age 15-44 Who Engage in Hazardous Drinking, BC, 2003 to 2023-24



Notes: For this indicator, reproductive age is defined as age 15-44. The percentage is based on all women 15-44 years of age, regardless of whether they consumed any alcohol during the last 12 months. Non-responses have been excluded. "Hazardous drinking" (also known as heavy drinking) means consuming five or more drinks on one occasion, at least once a month during the past year (except starting in 2013-14, when the definition for women was changed to four or more drinks on one occasion). Due to the change in definition, the data from 2013-14 onwards are not directly comparable to previous years. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

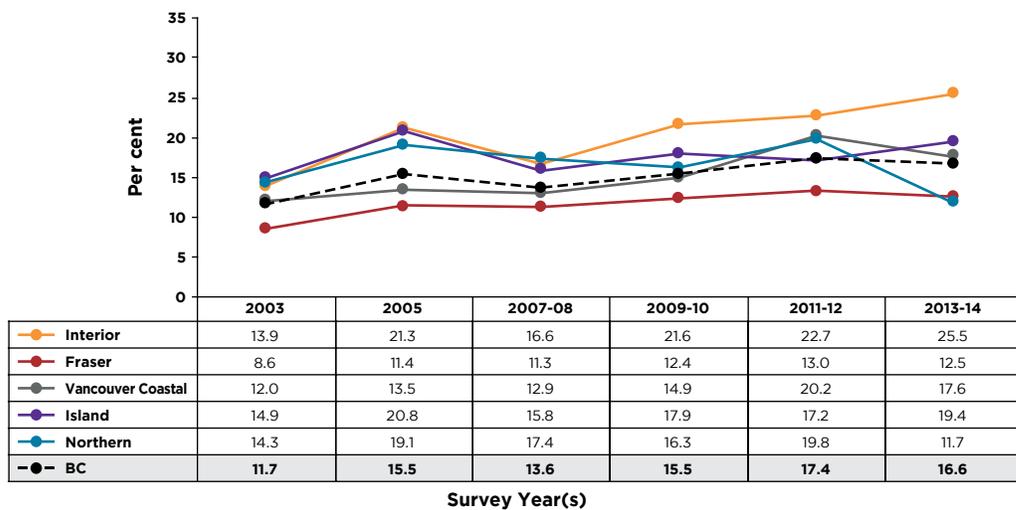
FIG 4.8 Percentage of Women Age 15-44 Who Engage in Hazardous Drinking, by Age Group, BC, 2003 to 2013-14



Notes: For this indicator, reproductive age is defined as age 15-44. The percentage is based on all women 15-44 years of age, regardless of whether they consumed any alcohol during the last 12 months. Non-responses have been excluded. "Hazardous drinking" (also known as heavy drinking) means consuming five or more drinks on one occasion, at least once a month during the past year (except starting in 2013-14, when the definition for women was changed to four or more drinks on one occasion). Due to the change in definition, the data from 2013-14 onwards are not directly comparable to previous years. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 4.9 Percentage of Women of Reproductive Age Who Engage in Hazardous Drinking, by Health Authority, BC, 2003 to 2013-14



Notes: For this indicator, reproductive age is defined as age 15-44. The percentage is based on all women 15-44 years of age, regardless of whether they consumed any alcohol during the last 12 months. Non-responses have been excluded. "Hazardous drinking" (also known as heavy drinking) means consuming five or more drinks on one occasion, at least once a month during the past year (except starting in 2013-14, when the definition for women was changed to four or more drinks on one occasion). Due to the change in definition, the data from 2013-14 onwards are not directly comparable to previous years. Health authority is based on the residence of the respondent. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

Vulnerability on Early Development Instrument Dimensions

Performance Measure: The percentage of children who are not vulnerable on any Early Development Instrument Dimensions.

Baseline: 69.1 per cent (2009/10–2010/11) **2023 Target:** 79 per cent

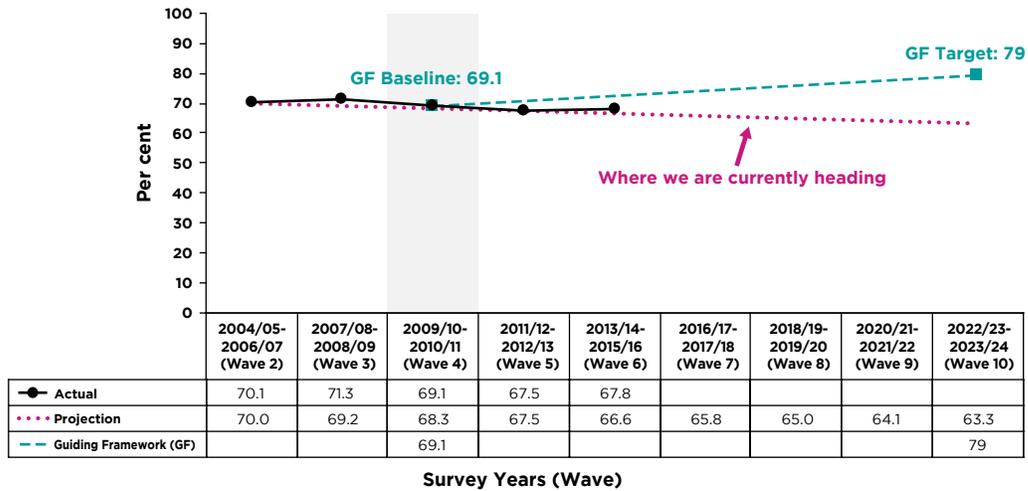
The Early Development Instrument (EDI), administered by the Human Early Learning Partnership (HELP), is a survey that measures five dimensions of early child development known to be predictors of adult health, education, and social outcomes:⁴⁵ physical health and well-being; language and cognitive development; social competence; emotional maturity; and communication skills and general knowledge.⁴⁶ The EDI is used to explore the percentage of kindergarten children in BC assessed as “vulnerable.” The Human Early Learning Partnership defines **child vulnerability** as “...the portion of the population that, without additional support and care, may experience future challenges in school and society.”⁴⁶

The Guiding Framework baseline for this performance measure was 69.1 per cent (2009/10–2010/11). The target is to increase this to 79 per cent by 2023.

As shown in Figure 4.10, the percentage of kindergarten children who were not vulnerable on any EDI dimension has decreased over the last decade. Unfortunately, this means that the trend is moving away from the target, and that an increasing number of kindergarten children are vulnerable in their development.

Figure 4.11 shows limited variation among the health authorities for children who are not vulnerable on any EDI dimensions; however, as shown, Interior has the highest percentage of non-vulnerable kindergarteners, while Vancouver Coastal and Northern have the lowest for all points in time. Over the last decade, the percentage of kindergarten children who are not vulnerable on any EDI dimensions has decreased across all health authorities, which means that the trend is moving away from the provincial target, and the vulnerability of children is increasing in BC. More supports will be needed across all health authorities to be able to reach provincial targets.

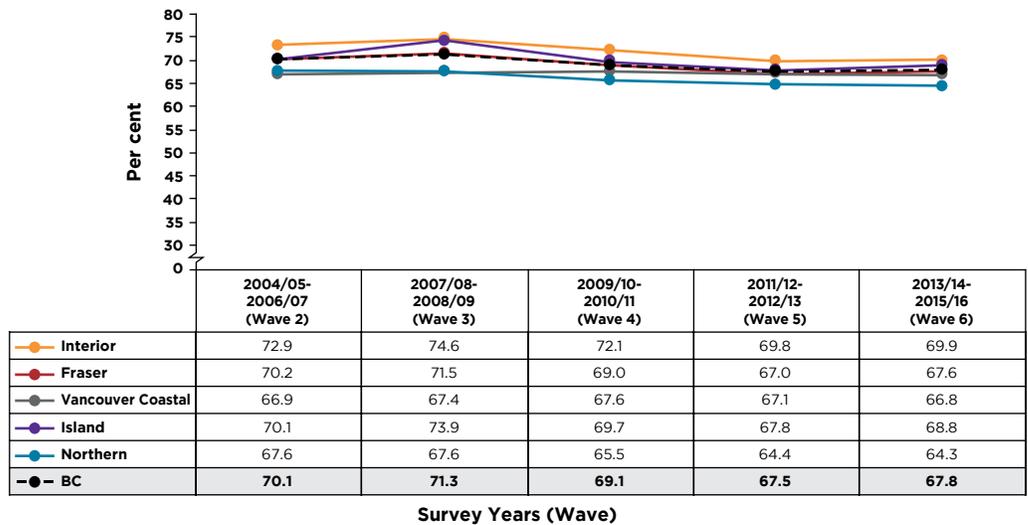
FIG 4.10 Actual and Projected Percentage of Kindergarten Children Who Are Not Vulnerable on Any Early Development Instrument Dimensions, BC, 2004/05-2006/07 to 2022/23-2023/24



Notes: A wave includes data collected from consecutive school years. Wave 1 is excluded from this analysis. Wave 2 (2004/05-2006/07) and Wave 6 (2013/14-2015/16) cover three-year periods, while the other waves are based on two-year periods. Projections for Waves 7 through 10 are based on the assumption that future waves will cover two-year periods. See Appendix B for more information about this data source.

Source: Human Early Learning Partnership, Early Development Instrument. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

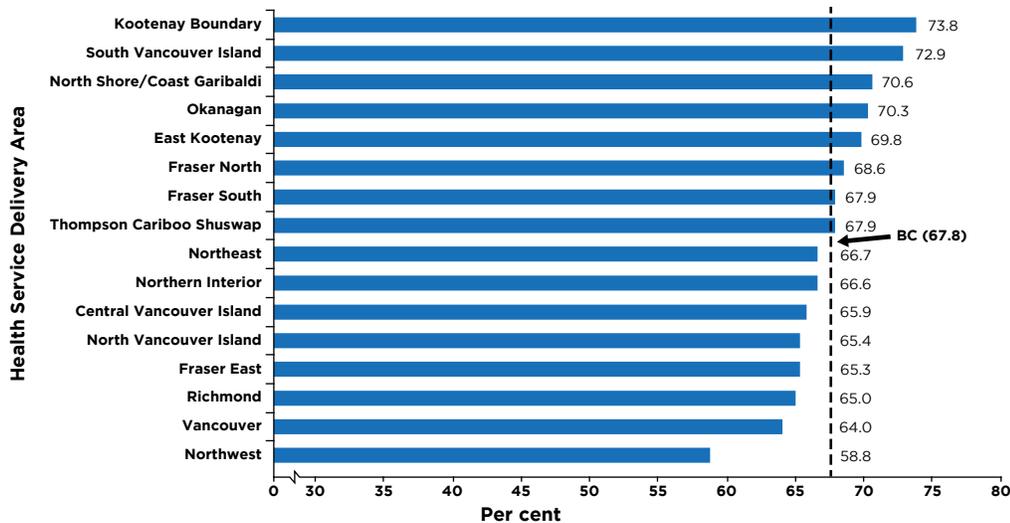
FIG 4.11 Percentage of Kindergarten Children Who Are Not Vulnerable on Any Early Development Instrument Dimensions, by Health Authority, BC, 2004/05-2006/07 to 2013/14-2015/16



Notes: A wave includes data collected from consecutive school years. Wave 1 is excluded from this analysis. Wave 2 (2004/05-2006/07) and Wave 6 (2013/14-2015/16) cover three-year periods, while the other waves are based on two-year periods. Health authority is based on the residence of the child. See Appendix B for more information about this data source.

Source: Human Early Learning Partnership, Early Development Instrument. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 4.12 Percentage of Kindergarten Children Who Are Not Vulnerable on Any Early Development Instrument Dimensions, by Health Service Delivery Area, BC, 2013/14-2015/16



Notes: A wave includes data collected from consecutive school years. Wave 6 (2013/14-2015/16) covers a three-year period. Health service delivery area is based on the residence of the child. See Appendix B for more information about this data source.

Source: Human Early Learning Partnership, Early Development Instrument. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

Exploring this performance measure by health service delivery area (HSDA) shows larger geographic variations than analyses by health authority. As shown in Figure 4.12, there is a 15 percentage point difference between the HSDAs with the highest and the lowest percentages of kindergarten children who are not vulnerable on any EDI dimensions. However, analyses at the neighbourhood level reported by HELP reveal even greater disparities: the percentage of children who are not vulnerable ranges from a low of 40 per cent in some communities to a high of 91 per cent in others.⁴⁷ Further analyses, conducted by the Provincial Health Services Authority (PHSA), show a relationship between household income and vulnerability; 45.3 per cent of children vulnerable on more than one EDI indicator were in the lowest income groups, compared to 27.1 per cent in the highest income groups.⁴⁸

Additional analyses by HSDA, conducted by the Office of the Provincial Health Officer in

2016, reveal that Northwest, Richmond, and Fraser East share above-average percentages of children vulnerable in the emotional maturity domain of the EDI, which may manifest as difficulty with emotional regulation or challenges in their capacity to help others.⁷ These same three HSDAs had the highest percentages of kindergarten children vulnerable in the communication skills and general knowledge domain.⁷ These children may have difficulty telling a story, understanding the language of instruction, or articulating their needs.⁴⁸ BC's Lower Mainland has a high number of people whose primary language is Chinese or Punjabi; in Richmond, just over 43 per cent of the population reported speaking a language other than English or French at home, followed by over 30 per cent in Vancouver.⁴⁹ Research findings suggest that having English as a second language, along with a lower level of maternal education, contribute to a child's higher vulnerability score as measured by the EDI.⁵⁰

Overall, the EDI results indicate that more children than before are being assessed as vulnerable on the emotional maturity and social competence scales in BC, and more children are being identified as vulnerable on two or more

scales than previously reported.⁴⁸ Now, almost one-third of BC's children will start grade one with at least one vulnerability, which will have an impact on their developmental growth.⁴⁸



Conclusion

This chapter has explored healthy maternal, infant, and children's health and well-being in BC, through a review of Goal 2 of the Guiding Framework and related performance measures. One measure—rate of low birth weight singleton births—does not appear to be worsening, but is also not moving toward the target identified by the Guiding Framework. Two measures—the rate of hazardous drinking among women of reproductive age and the percentage of kindergarten children who are not vulnerable on any Early Development Instrument dimensions—are worsening and moving away from provincial targets. The final

measure—the percentage of new mothers who report smoking during pregnancy—is moving in the right direction and is currently projected to reach the 2023 target. The more in-depth analyses revealed some additional findings, including substantial geographic and age-related disparities for new mothers who reported smoking during pregnancy and for women in their reproductive years who engaged in hazardous drinking. The next chapter will review Goal 3 of the Guiding Framework and its associated performance measures for mental health and well-being.

REFERENCES

- ¹ World Health Organization. Maternal health [Internet]. Geneva: World Health Organization; 2017 [cited 2017 Feb 07]. Available from: http://www.who.int/topics/maternal_health/en/.
- ² BC Provincial Health Officer. The health and well-being of women in British Columbia. Provincial Health Officer's 2008 annual report. Victoria, BC: BC Office of the Provincial Health Officer; 2011 [cited 2017 Feb 07]. Available from: <http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/annual-reports/phoannual2008.pdf>.
- ³ BC Ministry of Healthy Living and Sport and BC's health authorities. Model core program paper: healthy infant and child development. Victoria, BC: BC Ministry of Healthy Living and Sport; 2010 [cited 2018 May 16]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2010/healthy-child-youth-development-core-program-paper.pdf>.
- ⁴ Hughes KP, Bellis MA, Hardcastle KA, Sethi D, Butchart A, Mikton C, et al. The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis. *Lancet Public Health*. 2017;2(8):e356-66.
- ⁵ University of Ottawa. Society, the individual, and medicine. Facts and figures on abortions in Canada. Ottawa, ON: University of Ottawa; 2015; Cited by Black AY, Guilbert E, Hassan F, Chatziheofilou I, Lowin J, Jeddi M, et al. The cost of unintended pregnancies in Canada. Estimating direct cost, role of imperfect adherence, and the potential impact of increased use of long-acting reversible contraceptives. *J Obstet Gynaecol Can*. 2015 Dec;37(12):1086-97.
- ⁶ World Health Organization. Preconception care: maximizing the gains for maternal and child health [policy brief]. Geneva: World Health Organization; 2013 [cited 2018 Jan 08]. Available from: http://www.who.int/maternal_child_adolescent/documents/preconception_care_policy_brief.pdf.
- ⁷ BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ⁸ Royal College of Physicians and Surgeons of Canada. Early childhood development. Royal College position statement. Ottawa, ON: Royal College of Physicians and Surgeons of Canada; [released 2014 Jun 26; cited 2018 Apr 11]. Available from: <http://www.royalcollege.ca/rcsite/documents/health-policy/early-childhood-development-statement-e.pdf>.
- ⁹ Hertzman C. Framework for the social determinants of early child development. Encyclopedia on early childhood development [Internet]. Montreal, QC: Centre of Excellence for Early Childhood Development; 2010 Nov. Available from <http://www.childencyclopedia.com/sites/default/files/textes-experts/en/669/framework-for-the-social-determinants-of-early-child-development.pdf>. Cited by BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ¹⁰ McCain M, Mustard J, McCuaig K. Early years study 3: making decisions, taking action. Toronto, ON: Margaret & Wallace McCain Family Foundation; 2011. Cited by BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ¹¹ World Health Organization. Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2008 [cited 2016 Feb 26]. Available from: http://www.who.int/social_determinants/thecommission/finalreport/en/index.html. Cited by BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ¹² BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ¹³ BC Provincial Health Officer. The health and well-being of people in British Columbia. A report on the health of British Columbians. Provincial Health Officer's annual report 2002. Victoria, BC: BC Ministry of Health Planning; 2003.

- ¹⁴ Ashdown-Lambert JR. A review of low birth weight: predictors, precursors and morbidity outcomes. *J R Soc Promot Health*. 2005 Mar; 125(2):76-83. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ¹⁵ Kidder K, Stein J, Fraser J. The health of Canada’s children: a CICH profile. 3rd ed. Ottawa, ON: Canadian Institute of Child Health; 2000 [cited 2018 May 23]. Available from: <https://files.eric.ed.gov/fulltext/ED447900.pdf>.
- ¹⁶ Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. *Bull World Health Organ*. 1987;65(5):663-737. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ¹⁷ Organisation for Economic Co-operation and Development. Health at a glance 2017: OECD indicators. Paris: OECD Publishing; 2017 [cited 2018 Apr 16]. Available from: https://www.oecd-ilibrary.org/docserver/health_glance-2017-en.pdf?expires=1523910441&id=id&accname=guest&checksum=59BC4B6F9D807DDD2853C2A824754D9D.
- ¹⁸ Definition of *preterm* in English [Internet]. Oxford dictionaries. Oxford: Oxford University Press; 2017; [cited 2017 Feb 07]. Available from: <https://en.oxforddictionaries.com/definition/preterm>.
- ¹⁹ Definition of *singleton* in English [Internet]. Oxford dictionaries. Oxford: Oxford University Press; 2017; [cited 2017 Feb 07]. Available from: <https://en.oxforddictionaries.com/definition/singleton>.
- ²⁰ Johnson J, Tough S. Delayed child-bearing. *J Obstet Gynaecol Can*. 2012 Jan;34(1):80-93.
- ²¹ Chen XKI, Wen SW, Fleming N, Demissie K, Rhoads GG, Walker M. Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study. *Int J Epidemiol*. 2007 Apr;36(2):368-73.
- ²² Restrepo-Méndez MC, Lawlor DA, Horta BL, Matijasevich A, Santos IS, Menezes AM, et al. The association of maternal age with birthweight and gestational age: a cross-cohort comparison. *Paediatr Perinat Epidemiol*. 2015 Jan;29(1):31-40.
- ²³ Government of British Columbia, Perinatal Services BC, Fraser Health, Interior Health, Northern Health, Vancouver Coastal Health, Vancouver Island Health. Healthy Start Initiative: provincial perinatal, child and family public health services. Victoria, BC: Government of British Columbia; 2013 Apr [cited 2017 Mar 27]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2013/healthy-start-initiative-phs.pdf>.
- ²⁴ Perinatal Services BC. Provincial perinatal guidelines. Population and public health prenatal care pathway. Vancouver, BC: Perinatal Services BC; 2014 Mar [cited 2017 Mar 27]. Available from: <http://www.perinatalservicesbc.ca/Documents/Guidelines-Standards/HealthPromotion/PrenatalCarePathway.pdf>.
- ²⁵ BC Ministry of Children and Family Development. British Columbia’s early years. Annual report 2013/2015. Victoria, BC: BC Ministry of Children and Family Development; [cited 2017 Mar 27]. Available from: http://www2.gov.bc.ca/assets/gov/family-and-social-supports/child-care/bc_early_years_annual_report.pdf.
- ²⁶ Healthy Families BC. Nurse-Family partnership [Internet]. Victoria, BC: Healthy Families BC; 2016 Dec 23 [cited 2017 Mar 24]. Available from: <https://www.healthyfamiliesbc.ca/nurse-family-partnership>.
- ²⁷ Healthy Families BC. BC Healthy Connections Project [Internet]. Victoria, BC: Healthy Families BC; [cited 2017 Mar 24]. Available from: <https://www.healthyfamiliesbc.ca/home/bc-healthy-connections-project>.
- ²⁸ Cnattingius S. The epidemiology of smoking during pregnancy: smoking prevalence, maternal characteristics, and pregnancy outcomes. *Nicotine Tob Res*. 2004;6 Suppl 2:S125-40. Cited by Public Health Agency of Canada. What mothers say: the Canadian Maternity Experiences Survey. Ottawa, ON: Public Health Agency of Canada; 2009 [modified 2014 Jan 15; cited 2017 Feb 09]. Available from: <http://www.phac-aspc.gc.ca/rhs-ssg/survey-eng.php>.
- ²⁹ Hofhuis W, de Jongste JC, Merkus PJFM. Adverse health effects of prenatal and postnatal tobacco smoke exposure on children. *Arch Dis Child*. 2003;88:1086-90.
- ³⁰ Rogers JM. Tobacco and pregnancy. *Reprod Toxicol*. 2009 Sep; 28(2):152-60. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ³¹ Public Health Agency of Canada. What mothers say: the Canadian Maternity Experiences Survey. Ottawa, ON: Public Health Agency of Canada; 2009 [modified 2014 Jan 15; cited 2017 Feb 09]. Available from: <http://www.phac-aspc.gc.ca/rhs-ssg/survey-eng.php>.

- ³² Schneider S, Schutz J. Who smokes during pregnancy? A systematic literature review of population-based surveys conducted in developed countries between 1997 and 2006. *Eur J Contracept Reprod Health Care*. 2008 Jun;13(2):138-47.
- ³³ Cheng D, Salimi S, Terplan M, Chisolm MS. Intimate partner violence and maternal cigarette smoking before and during pregnancy. *Obstet Gynecol*. 2015 Feb;125(2):356-62.
- ³⁴ Government of British Columbia. BC smoking cessation program [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Mar 30]. Available from: <http://www2.gov.bc.ca/gov/content/health/health-drug-coverage/pharmacare-for-bc-residents/what-we-cover/drug-coverage/bc-smoking-cessation-program>.
- ³⁵ Canada FASD Research Network. FASD fact sheet [Internet]. Vancouver, BC: Canada FASD Research Network; [cited 2017 Feb 09]. Available from: <https://canfasd.ca/media/fasd-fact-sheet/>.
- ³⁶ Public Health Agency of Canada. Fetal Alcohol Spectrum Disorder (FASD) [Internet]. Ottawa, ON: Public Health Agency of Canada; [modified 2017 May 25; cited 2017 Sep 5]. Available from: <http://www.phac-aspc.gc.ca/hp-ps/dca-dea/prog-ini/fasd-etcaf/index-eng.php>.
- ³⁷ Statistics Canada. Heavy drinking, by age group and sex (table). Ottawa, ON: Statistics Canada; [modified 2016 Mar 07; cited 2017 Feb 09]. Available from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health79a-eng.htm>.
- ³⁸ Canadian Centre on Substance Use and Addiction. Canada's low-risk alcohol drinking guidelines. Ottawa, ON: Canadian Centre on Substance Use and Addiction; [cited 2018 Mar 22]. Available from: <http://www.ccsa.ca/Resource%20Library/2012-Canada-Low-Risk-Alcohol-Drinking-Guidelines-Brochure-en.pdf>.
- ³⁹ Rowe T, editor. Alcohol use and pregnancy consensus clinical guidelines. *J Obstet Gynaecol Can*. 2010;32(8 Suppl 3):s1-31.
- ⁴⁰ Canadian Institute for Substance Use Research, BC Centre for Excellence for Women's Health. Drinking guidelines: supporting health and life; 2012 [cited 2018 May 23]. Available from: <http://www.heretohelp.bc.ca/factsheet/drinking-guidelines-supporting-health-and-life>.
- ⁴¹ Chief Public Health Officer. Chief Public Health Officer's report on the state of public health in Canada 2015. Alcohol consumption in Canada. Ottawa, ON: Public Health Agency of Canada; 2016 Jan [cited 2017 Mar 24]. Available from: <https://www.canada.ca/content/dam/canada/health-canada/migration/healthy-canadians/publications/department-ministere/state-public-health-alcohol-2015-etat-sante-publique-alcool/alt/state-phac-alcohol-2015-etat-aspc-alcool-eng.pdf>.
- ⁴² Dowsett Johnston A. To your health? Women & alcohol. Canadian Women's Health Network; 2012 Jun 7 [cited 2017 Mar 30]. Available from: http://www.cwhn.ca/sites/default/files/ToYourHealth_06_2012_EN.pdf.
- ⁴³ Thomas G, Poole N, Nathoo T, Greaves L. Risky alcohol use in women of childbearing age in Canada, 2003-2012 [prepared by Okanagan Research Consulting for the Public Health Agency of Canada]. Nanaimo, BC: Okanagan Research Consulting; 2014 Apr [cited 2017 Mar 30]. Available from: http://www.okanaganresearch.com/PHAC%20Brief%20Research%20Report_21%20Apr%202014.pdf.
- ⁴⁴ Organisation for Economic Co-operation and Development. Tackling harmful alcohol use: economics and public health policy. Paris: Organisation for Economic Co-operation and Development; 2015 [cited 2017 Mar 30]. Available from: <http://www.oecd.org/health/tackling-harmful-alcohol-use-9789264181069-en.htm>.
- ⁴⁵ Human Early Learning Partnership. Early development instrument [Internet]. Vancouver, BC: University of British Columbia; [cited 2016 Jun 03]. Available from: <http://earlylearning.ubc.ca/edi/>.
- ⁴⁶ Human Early Learning Partnership. Vulnerability on the EDI [fact sheet]. Vancouver, BC: University of British Columbia; [cited 2017 Mar 24]. Available from: http://earlylearning.ubc.ca/media/fact_sheet_vulnerability_on_the_edi_2016.pdf.
- ⁴⁷ Human Early Learning Partnership. EDI BC: 2016 provincial report. Vancouver, BC: University of British Columbia, School of Population and Public Health; 2016 Oct [cited 2017 Feb 15]. Available from: <http://earlylearning.ubc.ca/media/edibc2016provincialreport.pdf>.
- ⁴⁸ Provincial Health Services Authority. Priority health equity indicators for British Columbia: Selected indicators report. Vancouver, BC: Provincial Health Services Authority, Population and Public Health Program; 2016 Jan [cited 2018 Feb 23]. Available from: http://www.phsa.ca/population-public-health-site/Documents/Priority%20health%20equity%20indicators%20for%20BC_selected%20indicators%20report_2016.pdf.

- ⁴⁹ Foster LT, Keller CP, McKee B, Ostry A. *British Columbia atlas of wellness*. 2nd ed. Victoria, BC: Western Geographical Press, Department of Geography, University of Victoria; 2011.
- ⁵⁰ Curtin M, Madden J, Staines A, Perry IJ. Determinants of vulnerability in early childhood development in Ireland: a cross-sectional study. *BMJ Open*. 2013;3(5): e002387. doi:10.1136/bmjopen-2012-002387.
- ⁵¹ Canadian Centre on Substance Use and Addiction. *Women and Alcohol*. Ottawa, ON: Canadian Centre on Substance Use and Addiction, 2014. [cited 2018 Sept 20]. Available from: <http://www.ccsa.ca/Resource%20Library/CCSA-Women-and-Alcohol-Summary-2014-en.pdf>.
- ⁵² Norman, WV. *The Case for Contraception Subsidy in BC: A cost-effective policy to improve health outcomes. Evidence from the CART- Contraception-effectiveness Modeling study*. Presentation given to Ministry of Health, Victoria, BC: 2018. Accessed online at: http://med-fom-cart-grac.sites.olt.ubc.ca/files/2017/08/2017-08-03_PHAC-CSHS_Norman.pdf.
- ⁵³ Centre for Excellence in Women's Health. *Women and Alcohol*. Vancouver, BC: Centre for Excellence in Women's Health, 2017. [cited 2018 Sept 20]. Available from: <http://bcewh.bc.ca/wp-content/uploads/2018/03/InfoSheet-Women-Alcohol0308.pdf>.

5

Mental Health & Substance Use

The promotion of positive mental health is identified in *Healthy Minds, Healthy People: A Ten-Year Plan to Address Mental Health and Substance Use in B.C.*, as a key strategy for improving the overall health and well-being of BC's citizens, as well as for reducing the burden of mental illnesses and substance use problems on the health care system now and in the future.¹ Optimal mental health and wellness is much more than the absence of mental illness. The World Health Organization describes **positive mental health** as a state of well-being, in which a person realizes their abilities, copes with the normal stresses of life, works productively, and contributes to their community.² The 2010 pan-Canadian Declaration on Prevention and Promotion affirms that "...positive mental health and mental fitness are a foundation for optimal overall health and well-being, throughout the lifespan."³

Healthy infant and child development is an important aspect of positive mental health, because a strong foundation of optimal social/emotional development and positive mental health in infancy and childhood promotes skills that can support healthy behaviours and choices across the lifespan.⁴ Maternal

mental health can have an important effect on healthy child development; for example, maternal depression can be a risk factor for socio-emotional and cognitive development in children,⁵ and it can adversely affect breastfeeding and mother-child bonding.⁶ As discussed in Chapter 4, the years between conception and age six are a critical time for physical, cognitive, social, and emotional development.⁷ Additionally, adolescence and young adulthood are critical developmental periods. Positive mental health foundations and strategies established during this time are associated with better physical health status, positive mental health and **resilience** in times of stress, and reduced risk of developing chronic disease in adulthood.⁸

Guiding Framework Goal 3: Positive Mental Health & Prevention of Substance Harms

Goal Statement

Optimal mental health and reduced harms associated with substances.

Objectives

The objectives for this goal focus on promoting positive mental health, preventing mental health problems, and reducing harms associated with psychoactive substances:

1. Promote positive mental health and well-being in settings such as homes, schools, workplaces and care facilities through cross-sectoral partnerships and evidence-based action.
2. Reduce the harms associated with substances and related health issues through policies and targeted programs that address specific social, environmental and individual risk and protective factors.
3. Reduce the harms associated with hazardous drinking by promoting a culture of moderation related to alcohol use.

Performance Measures

The Guiding Framework established five performance measures related to Goal 3:

- The percentage of British Columbians (age 12+) who experience positive mental health.
- The percentage of young BC children who are not vulnerable in terms of social development.
- The percentage of young BC children who are not vulnerable in terms of emotional development.
- Among BC students who use alcohol or cannabis, the percentage who first use before the age of 15.
- The percentage of British Columbians (age 12+) who engage in hazardous drinking.

BC's Response to the Opioid Overdose Emergency

In response to a significant rise in illegal drug overdose deaths across BC, in April 2016, the Provincial Health Officer declared a public health emergency under the *Public Health Act*—the first in BC. This declaration allows for real-time reporting and sharing of information on overdose events to help inform and protect people and save lives. Despite efforts to prevent and respond to overdoses quickly and effectively, including expansion of publicly funded naloxone and establishment of overdose prevention services, BC continues to see an alarming number of people experiencing illegal drug overdoses.

In July 2017, the government established the Ministry of Mental Health and Addictions with a mandate to escalate the province's response; \$322 million over three years has been allocated to fund innovative initiatives alongside existing evidence-based strategies. On December 1, 2017, the Minister of Mental Health and Addictions announced the activation of the Overdose Emergency Response Centre.¹¹ This structure, based on emergency management best practices, is designed to build on successes to date, and will rapidly identify and address gaps in the province's response at the local level. For more information on how the province is responding to the public health emergency, see the public progress reports, available on the "Current Health Topics" webpage of the Provincial Health Officer website at www.health.gov.bc.ca/pho.

People use **psychoactive substances** in ways that can range from beneficial to highly problematic. In moderation, many psychoactive substances can be consumed and enjoyed without harm.⁹ Problematic use includes episodic use that can have negative health consequences (such as overdose or injury) and chronic use that can lead to substance use disorders or other serious illness.¹⁰ When substance use is problematic, there are harms to individuals, families, and communities. In the context of BC's current illegal drug overdose epidemic, any use of illegal drugs comes with a risk of overdose or overdose death,ⁿ even if it is the first time that substance has been used. To help people who use drugs make informed decisions, free drug-checking services are now available at all overdose prevention and supervised consumption services locations in

the province. For more information on the province's public health emergency, see the text boxes *BC's Response to the Opioid Overdose Emergency*, and *BC's Anti-stigma Campaign*.

The cost of mental health and substance use affects all British Columbians. Government spends about \$1.5 billion annually on services to address mental health and substance use, plus another \$500 million on physician visits and medication.¹² Research suggests that the economic burden of mental illness in Canada—including health care costs, lost productivity, and reductions in health-related quality of life—is an estimated \$51 billion per year.^{13,14} Harms associated with substance use also have a large burden: indirect costs of lost productivity related to alcohol use alone are estimated at \$1.1 billion.¹

ⁿ The exception to this is cannabis, which at the time of writing has not been reported as containing contaminants.

BC's Anti-stigma Campaign

In January 2018, as part of the response to the overdose crisis, BC's Ministry of Mental Health and Addictions launched a campaign to address stigma experienced by people who use drugs. This campaign uses a variety of communication methods including television, radio, online, social media (e.g., Facebook, Instagram), and public billboards. It challenges stereotypes and emphasizes that addiction can—and does—affect people from a variety of backgrounds. Drug use is a health issue that requires support and compassion, and stigma can prevent individuals from seeking help or accessing services where and when they need it.

The anti-stigma campaign targets people who may influence those who use drugs, including friends, family, caregivers, health care providers, teachers, parents, and co-workers.⁴⁵ The StopOverdoseBC.ca website provides information on the anti-stigma campaign, how to talk to loved ones about addiction and drug use, as well as information on treatment, recovery, harm reduction, and culturally appropriate services.⁴⁶

“There are multiple studies showing how stigma associated with drug use drives people to use alone or in settings where people may be unwilling to call 911 for emergency assistance... in order to encourage people to reach out for help – stigma, guilt, and shame must be removed from the equation.”

– Dr. Bonnie Henry

BC Government press release, Jan 29, 2018

Results So Far

Market research conducted to monitor the reach of the campaign indicates that it has had some notable successes. For example, close to one million people have been reached through media placement, and 75 per cent of BC adults surveyed recall having seen or heard at least one element of the campaign.⁴⁵ The overdose website (StopOverdoseBC.ca), with the anti-stigma messaging, has also been an effective way to reach people, with over 20,000 page views during the first month of the campaign alone. As of August 2018 there have been over 60,000 page views, and visitors have spent on average one minute 36 seconds on the site—well above the industry standard.⁴⁵



Note: Reproduced with permission from the BC Ministry of Mental Health and Addictions.

To find out more about preventing overdose and the anti-stigma campaign, visit: StopOverdoseBC.ca

Positive Mental Health

Performance Measure: The percentage of British Columbians (age 12+) who experience positive mental health.

Baseline: 71.0 per cent (2009-10)

2023 Target: 80 per cent

As stated earlier in this chapter, positive mental health is important to overall health and well-being. Optimal mental health supports, and in turn is supported by, healthy child development, and allows an individual to better cope with life stressors,¹⁵ develop healthy relationships, and contribute positively to society.¹⁶

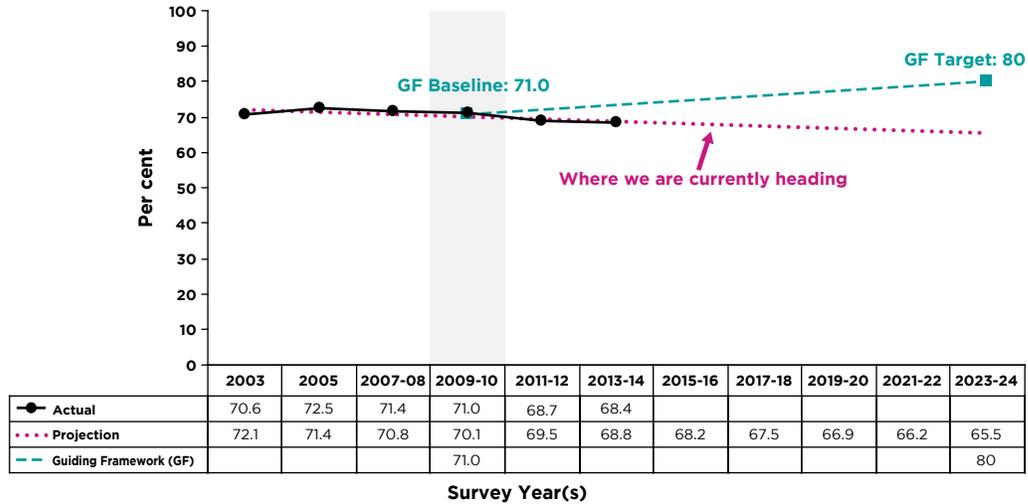
Promotion of positive mental health can focus on both determinants that are within the control of the individual (e.g., exercise, eating habits, and sleep), as well as determinants outside of the direct control of the individual (e.g., economic resources, education, rapid social change).¹⁷ Vulnerability for poor mental health or mental illness is associated with family history, genetic predisposition, exposure to violence and trauma, and lack of social support.¹ Interventions can range from mental health promotion aimed at the general population, to targeted prevention and **harm reduction** for at-risk groups, and therapeutic intervention for individuals with mental illness.¹

The Guiding Framework baseline for this indicator was 71.0 per cent of British Columbians age 12 and up who reported experiencing positive mental health (2009-10). The target is to improve this to 80 per cent by 2023.

As shown in Figure 5.1, the percentage of people age 12 and up who report that they perceive their own mental health as very good or excellent has been decreasing slightly. If this trend continues, the target will not be achieved, and in fact, will be almost five per cent lower than the baseline year by 2023-24.

Figure 5.2 shows that males and females alternated having a higher rate of those reporting very good or excellent mental health from 2003 to 2009-10, and the difference between them was not substantial. The rates for both males and females have been decreasing in recent years and are nearly equivalent in 2013-14.

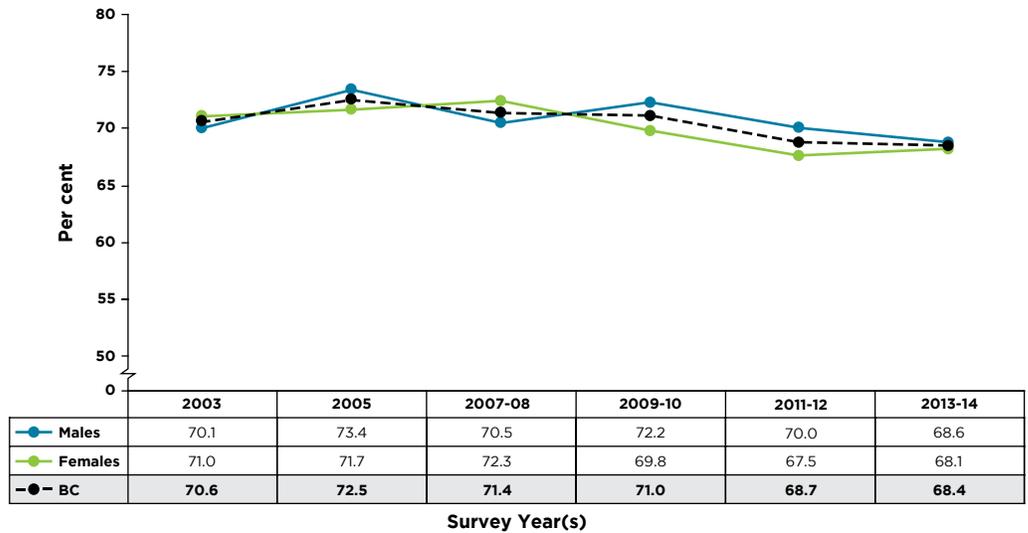
FIG 5.1 Actual and Projected Percentage of the Population Age 12+ Who Report Positive Mental Health, BC, 2003 to 2023-24



Notes: Population age 12 and up who reported perceiving their own mental health status as being excellent or very good. Perceived mental health provides a general indication of the population suffering from some form of mental disorder, mental or emotional problems, or distress, not necessarily reflected in perceived health. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 5.2 Percentage of the Population Age 12+ Who Report Positive Mental Health, by Sex, BC, 2003 to 2013-14



Notes: Population age 12 and up who reported perceiving their own mental health status as being excellent or very good. Perceived mental health provides a general indication of the population suffering from some form of mental disorder, mental or emotional problems, or distress, not necessarily reflected in perceived health. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

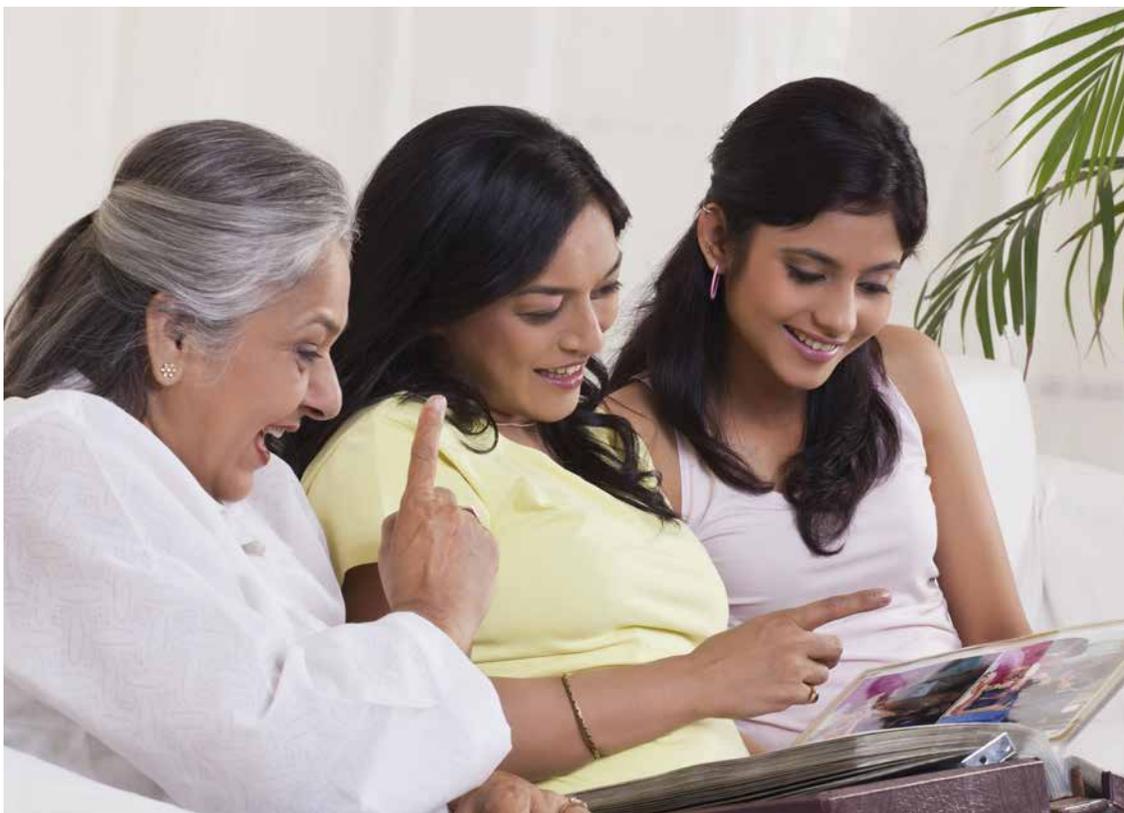


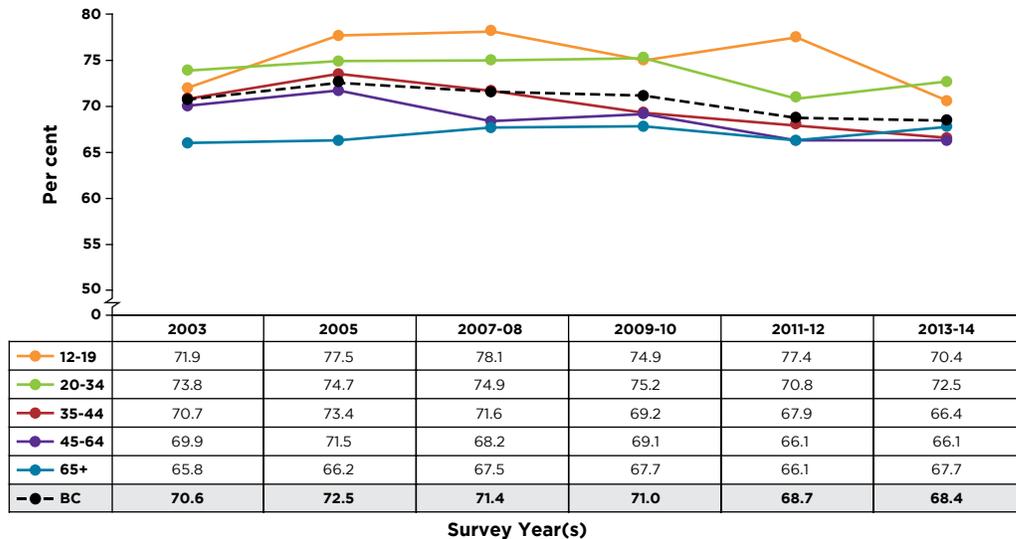
Figure 5.3 provides, by age group, the percentage of people age 12 and up who rate their mental health as very good or excellent. The disparity between age groups varies year to year, with some years (2005, 2007-08, 2011-12) having a larger spread than others. For most years shown, younger people (age 12–19 and 20–34) were more likely to rate their mental health positively than older people (age 45–64 and 65 and up). All age groups except age 65 and up have seen slight decreases over the time period shown here.

There are similarities between these trends and those shown in Chapter 2 regarding the performance measure of life satisfaction. As noted, individuals age 20–40 (“generation squeeze”) on average earn less, have higher levels of debt, and face high housing costs;¹⁸ the “sandwich generation” (individuals age 40–60) are often taking care of both aging parents and dependent children.¹⁹ All of these factors may

contribute to lower levels of positive mental health. However, Figure 5.3 suggests that older age groups, especially those age 65 and up, are also less likely to report positive mental health.

Figure 5.4 shows limited variation between the health authorities with regard to British Columbians who self-reported very good or excellent mental health. Percentages have decreased over the years shown, although some health authority populations have had more variation than others. More work will be needed across all of the regions if the target is to be achieved.

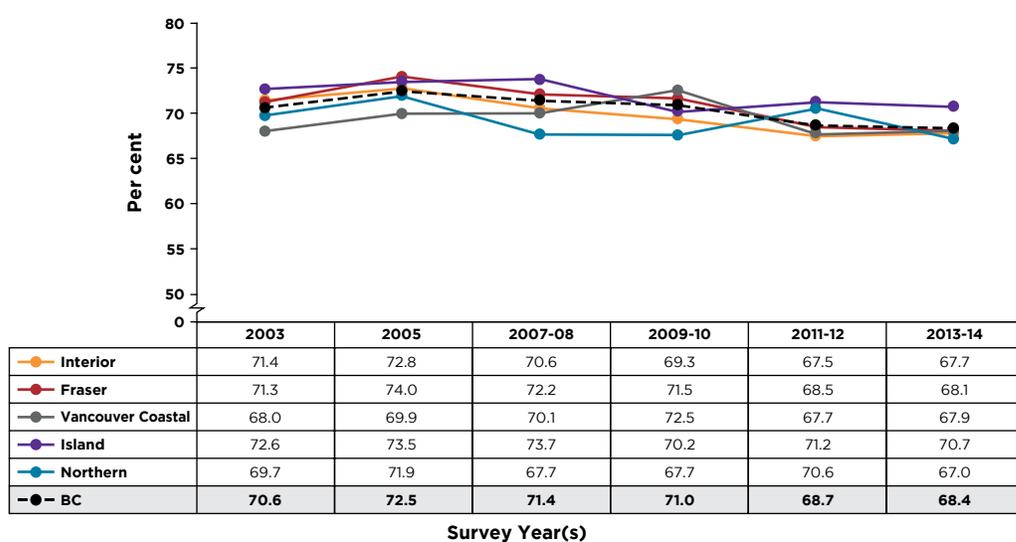
FIG 5.3 Percentage of the Population Age 12+ Who Report Positive Mental Health, by Age Group, BC, 2003 to 2013-14



Notes: Population age 12 and up who reported perceiving their own mental health status as being excellent or very good. Perceived mental health provides a general indication of the population suffering from some form of mental disorder, mental or emotional problems, or distress, not necessarily reflected in perceived health. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, April 2017.

FIG 5.4 Percentage of the Population Age 12+ Who Report Positive Mental Health, by Health Authority, BC, 2003 to 2013-14



Notes: Population age 12 and up who reported perceiving their own mental health status as being excellent or very good. Perceived mental health provides a general indication of the population suffering from some form of mental disorder, mental or emotional problems, or distress, not necessarily reflected in perceived health. Health authority is based on the residence of the respondent. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from CANSIM Tables 105-0501 and 105-0502. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Social Development

Performance Measure: The percentage of young BC children who are not vulnerable in terms of social development.

Baseline: 85.5 per cent (2009/10–2010/11)

2023 Target: 88 per cent

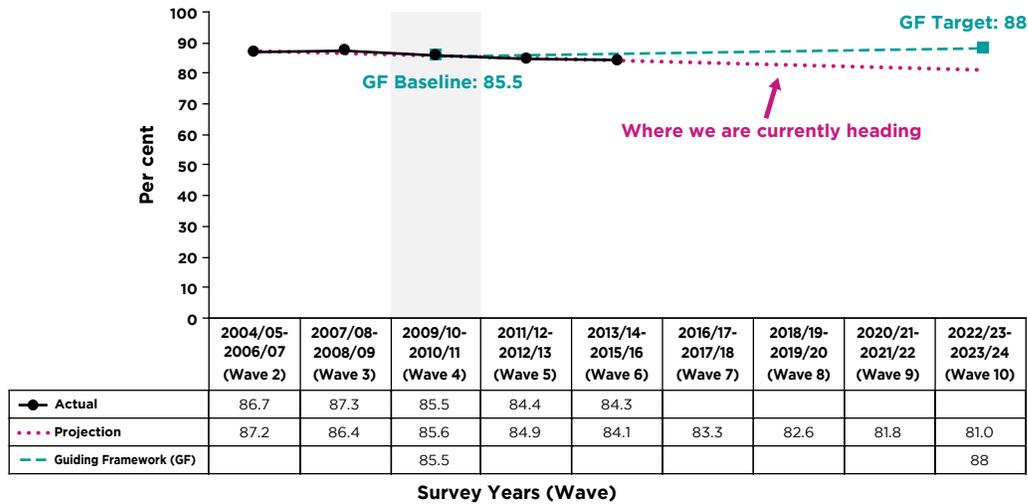
This indicator uses the Social Competence Domain of the Early Development Instrument (EDI) to look at children’s overall social competencies, capacity for respect and responsibility, approaches to learning, and readiness to explore new things.²⁰ The social and emotional skills developed in the early years are foundational to lifelong positive mental health and effective functioning.²¹ The ability to use certain skills appropriately in social situations is the basis for “**social competence**”.²² The Ministries of Health, Children and Family Development, and Education use EDI data to inform planning and policy development and to monitor trends. Health authorities provide support to families with identified needs, thereby reducing early childhood vulnerability and supporting all children to reach their full potential.

The baseline identified in the Guiding Framework for this measure was 85.5 per cent of kindergarten children being assessed as not vulnerable in terms of social development for the 2009/10–2010/11 school years. The target is to improve this to 88 per cent by 2022/23–2023/24.

As shown in Figure 5.5, the percentage of kindergarten children who were not vulnerable for social development declined from 85.5 per cent in 2009/10–2010/11 to 84.3 per cent in 2013/14–2015/16. While this is not a substantial decrease, it indicates that the trend is moving away from the target, and that children are becoming increasingly vulnerable in terms of their social development.

Figure 5.6 demonstrates that all health authorities share the phenomenon of a decreasing percentage in 2013/14–2015/16 compared to ten years ago (2004/05–2006/07) for children who are not vulnerable on this dimension; thus, all health authority areas are moving away from the target. The 2016 provincial report on the EDI, prepared by the Human Early Learning Partnership, discusses emerging trends in mental health that may, in part, contribute to the increasing level of vulnerability shown in this figure. These trends include an increase in diagnosed mental health disorders in young children,²³ along with historically less focus and investment in social and emotional well-being compared to other areas of early childhood development, such as language development, **literacy**, and **numeracy**.²⁰

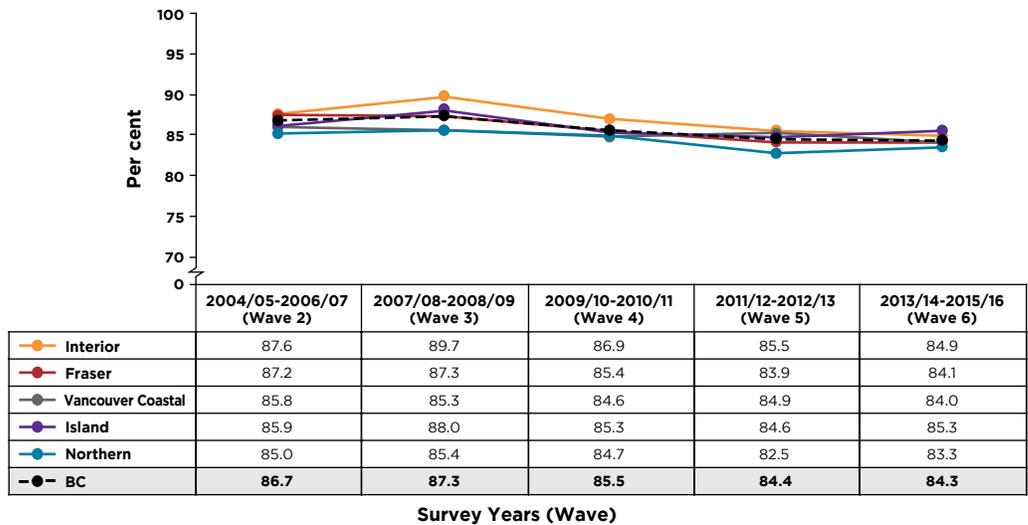
FIG 5.5 Actual and Projected Percentage of Kindergarten Children Who Are Not Vulnerable on the Early Development Instrument Social Dimension, BC, 2004/05-2006/07 to 2022/23-2023/24



Notes: A wave includes data collected from consecutive school years. Wave 1 is excluded from this analysis. Wave 2 (2004/05-2006/07) and Wave 6 (2013/14-2015/16) cover three-year periods, while the other waves are based on two-year periods. Projections for Waves 7 through 10 are based on the assumption that future waves will cover two-year periods. See Appendix B for more information about this data source.

Source: Human Early Learning Partnership, Early Development Instrument. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 5.6 Percentage of Kindergarten Children Who Are Not Vulnerable on the Early Development Instrument Social Dimension, by Health Authority, BC, 2004/05-2006/07 to 2013/14-2015/16



Notes: A wave includes data collected from consecutive school years. Wave 1 is excluded from this analysis. Wave 2 (2004/05-2006/07) and Wave 6 (2013/14-2015/16) cover three-year periods, while the other waves are based on two-year periods. Health authority is based on the residence of the child. See Appendix B for more information about this data source.

Source: Human Early Learning Partnership, Early Development Instrument. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Emotional Development

Performance Measure: The percentage of young BC children who are not vulnerable in terms of emotional development.

Baseline: 86.2 per cent (2009/10–2010/11) **2023 Target:** 88 per cent



This indicator uses the Emotional Maturity Domain of the Early Development Instrument (EDI) to look at children's **prosocial** and helping behaviours, as well as hyperactivity and inattention, and aggressive, anxious, and fearful behaviours.²⁰ The social and emotional skills developed in the early years are foundational to lifelong positive mental health and functioning.²¹

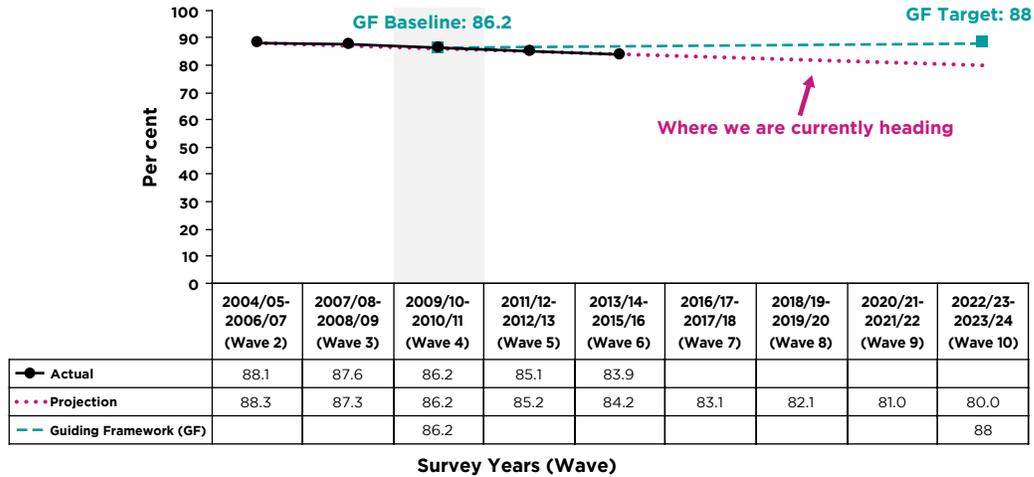
The baseline identified in the Guiding Framework for this measure was 86.2 per cent of kindergarten children being assessed as not vulnerable in terms of emotional development for the 2009/10–2010/11 school years. The target is to improve this to 88 per cent by 2022/23–2023/24.

Figure 5.7 shows a similar trend as seen in the data for vulnerability for the EDI social dimension: the percentage of kindergarten

children who were not vulnerable in terms of emotional development has also decreased over the past decade, including since the baseline. Levels decreased from 88.1 per cent in Wave 2 (2004/05–2006/07) to 83.9 per cent by Wave 6 (2013/14–2015/16). With this continued trend away from the target, work will be needed to even return to the baseline level by 2022/23–2023/24.

Figure 5.8 demonstrates that the overall decline in BC shown in Figure 5.7 is fairly consistent across the health authorities—there is limited variation between them for this dimension, and all are moving away from the target. As discussed for the previous indicator, trends in the diagnosis of mental health disorders in young children and the lack of focus on social and emotional well-being in young children may, in part, contribute to the decrease seen in this figure.

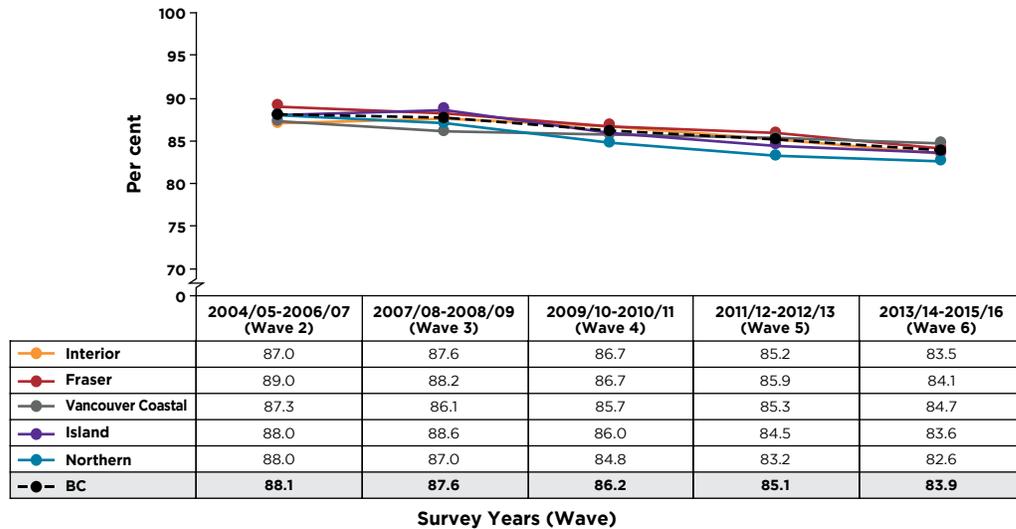
FIG 5.7 Actual and Projected Percentage of Kindergarten Children Who Are Not Vulnerable on the Early Development Instrument Emotional Dimension, BC, 2004/05-2006/07 to 2022/23-2023/24



Notes: A wave includes data collected from consecutive school years. Wave 1 is excluded from this analysis. Wave 2 (2004/05-2006/07) and Wave 6 (2013/14-2015/16) cover three-year periods, while the other waves are based on two-year periods. Projections for Waves 7 through 10 are based on the assumption that future waves will cover two-year periods. See Appendix B for more information about this data source.

Source: Human Early Learning Partnership, Early Development Instrument. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 5.8 Percentage of Kindergarten Children Who Are Not Vulnerable on the Early Development Instrument Emotional Dimension, by Health Authority, BC, 2004/05-2006/07 to 2013/14-2015/16



Notes: A wave includes data collected from consecutive school years. Wave 1 is excluded from this analysis. Wave 2 (2004/05-2006/07) and Wave 6 (2013/14-2015/16) cover three-year periods, while the other waves are based on two-year periods. Health authority is based on the residence of the child. See Appendix B for more information about this data source.

Source: Human Early Learning Partnership, Early Development Instrument. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Student Alcohol & Cannabis Use

Performance Measure: Among BC students who use alcohol or cannabis, the percentage who first use before the age of 15.

Baseline: Alcohol – 74.9 per cent (2008); Cannabis – 66.8 per cent (2008)

2023 Target: Alcohol – 60 per cent; Cannabis – 55 per cent

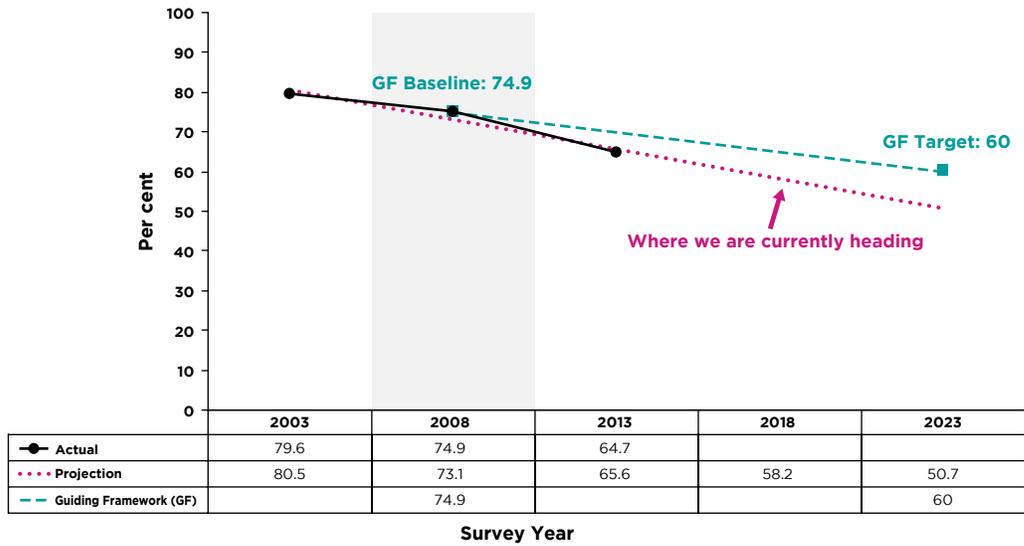
Adolescence and young adulthood is the peak period for risky experimentation with alcohol and other psychoactive substances. There is a known relationship between the age of initiation of substance use and the level of risk to an individual—the younger a person is when he/she begins experimenting, the greater the likelihood that he/she will have problematic substance use issues and/or substance-related illnesses and problems in the future.¹ Alcohol and cannabis are the most commonly used drugs among BC adolescents.²⁴ As such, delaying the onset of alcohol and cannabis use can reduce the risk of substance dependence and other associated illnesses and problems in the future. There are a number of factors that influence alcohol and cannabis use, including availability, social norms around substance use, socio-economic status, and prevailing culture.^{25,26,27}

There have been recent legislative and policy changes in BC and Canada regarding alcohol and cannabis, respectively. The BC government conducted a comprehensive liquor policy review in 2013, which resulted in 73 recommendations to modernize liquor policy in BC. The intent is to have a balanced approach to protecting public health and safety while streamlining regulations and improving customer convenience.²⁸ However, while the moratorium on the number of liquor sales outlets in BC will be maintained, implementing some of the other recommendations (e.g., allowing alcohol sales in additional venues; easing restrictions on licensing) is predicted to lead to increased

availability and increased consumption of alcohol.²⁹ To date, 66 out of the report's 73 recommendations have been implemented.³⁰ Some of the recommendations that have not yet been implemented include warning labels on liquor products; a review of Liquor Control and Licensing Branch's enforcement penalties; and standardization of non-liquor products that can be sold in liquor retail outlets.³¹ In February 2016, some minimum prices were introduced for alcohol sold at BC Liquor Stores and Licensee Retail Stores; this creates a social reference price for different sources of alcohol.³³ Other recommendations, such as index pricing (i.e., scaling the price of alcohol to the rate of inflation) and minimum unit pricing (i.e., pricing based on a standard alcohol unit content) have not been adopted.³³ The BC government will be monitoring the impact of policy changes on health and safety in BC,³¹ and an upcoming Provincial Health Officer's report will also explore the health impacts of recent changes.

In April 2017, the federal government introduced the *Cannabis Act*, to legalize, regulate, and restrict access to cannabis. The act came into force in October 2018, and creates a legal framework for the production, distribution, sale, and possession of cannabis in Canada. The act includes provisions to restrict youth access to cannabis, allow adults to possess a limited amount of cannabis, ensure strict safety and quality requirements, and allow for legal production of cannabis.³⁴

FIG 5.9 Actual and Projected Percentage of Students in Grades 7-12 Who Used Alcohol Before Age 15, Among Those Who Have Ever Used, BC, 2003 to 2023



Note: See Appendix B for more information about this data source.
Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Alcohol Use

Alcohol use can have negative impacts on the development, health, and well-being of adolescents. Studies of adolescent brain development over the last decade indicate that alcohol exposure can result in behavioural and cognitive deficits.^{35,36} Research also shows that starting to consume alcohol at a younger age is highly associated with a risk of problematic alcohol consumption later in life.^{35,37}

The baseline identified in the Guiding Framework for this measure was that among youth who consumed alcohol, 74.9 per cent reported that they had begun using alcohol before age 15 (2008). The target is to reduce this to 60 per cent by 2023.

According to McCreary Centre Society data, 44.5 per cent of students in grades 7–12 reported ever having a drink of alcohol in 2013.²² Figure 5.9 shows that among students in grades 7–12 who use alcohol, the proportion who reported using it before the age of 15 has declined steadily in BC across the last 10 years, down to a low of 64.7 per cent in 2013. The current trend is on track to meet and then surpass the target by 2023.

Figure 5.10 shows that progress toward the 2023 target for this indicator is occurring among both males and females. The percentage for females reached a low of 63.9 per cent in 2013.

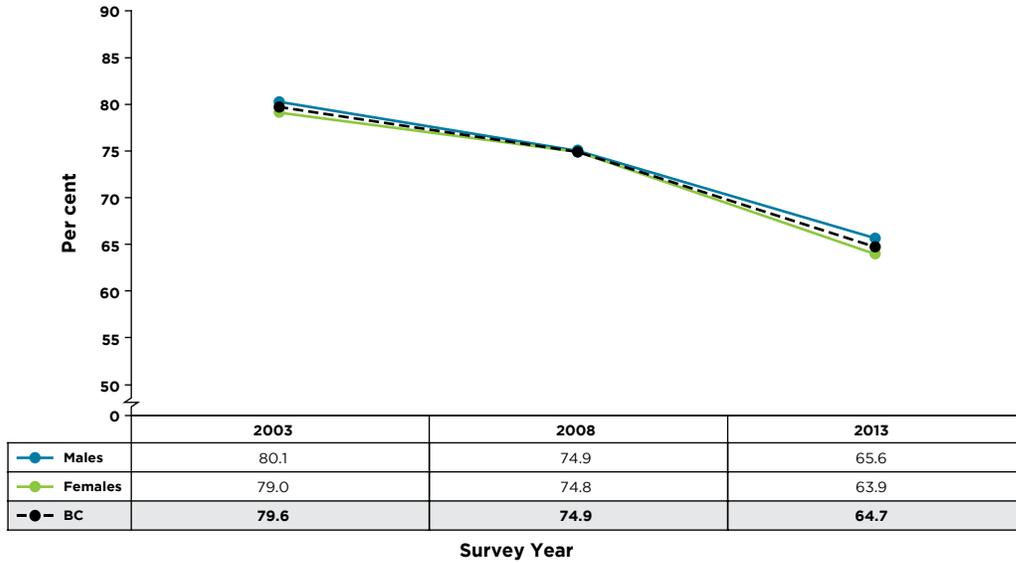
Figure 5.11 shows a similar declining trend in alcohol consumption beginning before age 15, as seen in Figures 5.9 and 5.10. Among students who use alcohol, the percentage of those who used it before age 15 declined in all health authorities; however, there is variation in the percentages across health authorities. Higher rates of early initiation were seen in Interior, Northern, and Island. In addition, the gap between the highest and lowest health authorities has widened to approximately 10 percentage points in the most recent year.

There is currently no definitive causal explanation for this trend. The liquor law modernization process did not begin until 2013; therefore, it cannot explain the declining alcohol use among students in grades 7–12. This declining trend has occurred in many

countries in the developed world, including the United Kingdom, the United States, Norway, and Sweden.³⁸ The Institute for Alcohol Studies in the United Kingdom notes a number of hypotheses for why teen alcohol use is declining, including better legal enforcement, changing social norms, demographic shifts, and lower affordability.³⁸ However, their report makes it clear that more research must be done to establish any sort of causal relationship between these factors and the decline in teen alcohol consumption.³⁸



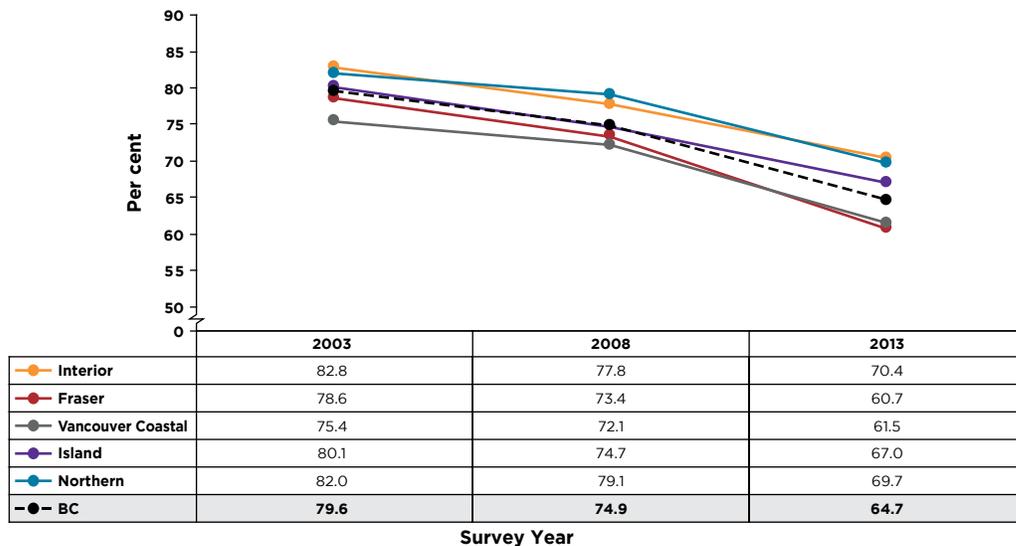
FIG 5.10 Percentage of Students in Grades 7-12 Who Used Alcohol Before Age 15, Among Those Who Have Ever Used, by Sex, BC, 2003 to 2013



Note: See Appendix B for more information about this data source.

Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 5.11 Percentage of Students in Grades 7-12 Who Used Alcohol Before Age 15, Among Those Who Have Ever Used, by Health Authority, BC, 2003 to 2013



Notes: Changes in participating school districts and in consent procedures adopted by school districts may have affected trend results across the survey years. Health authority is based on the location of the school. See Appendix B for more information about this data source.

Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Cannabis Use

Cannabis is the most common illicit drug used by Canadians age 15 and up,³⁹ and Canadian youth have the highest rate of cannabis use among youth in developed countries.⁴⁰ Research has suggested that cannabis use, particularly chronic use starting in adolescence, can result in a number of short- and long-term physical, mental, and psychosocial effects.⁴¹ Frequent use of cannabis during adolescence can result in reduced cognitive functioning and limited educational attainment.⁴¹

The baseline identified in the Guiding Framework for this measure was that among youth who use cannabis, 66.8 per cent reported that they had begun using it before age 15 (in 2008). The target is to reduce this to 55 per cent by 2023.

According to the McCreary Centre Society, 25.5 per cent of students in grades 7–12 reported ever using cannabis in 2013.²² Figure 5.12 shows that of that subset, 58.9 per cent used cannabis before age 15.

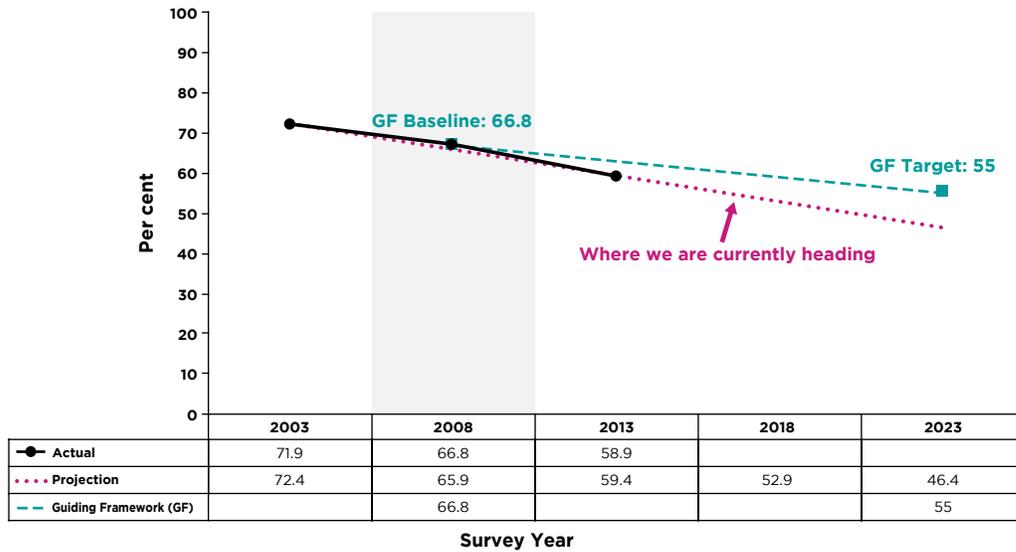
This figure shows a similar trend to that reported for alcohol use: among students who use cannabis, the proportion who reported using it before age 15 has declined steadily in BC across the last 10 years. This trend is currently on track to meet and then surpass the 2023 target.

Other countries, including the United Kingdom, Spain,⁴² and the United States,⁴³ have also seen a declining trend in cannabis use among youth. This is likely due to a number of different sociological factors; however, there is no definitive causal explanation for this trend.

As shown in Figure 5.13, for the first two points in time (2003 and 2008), there is not a substantial difference between the percentage of male and female cannabis users who report that they first used it before age 15; however, from 2008 to 2013, the percentage for females decreased more than the percentage for males, resulting in a gap of approximately four percentage points by 2013.



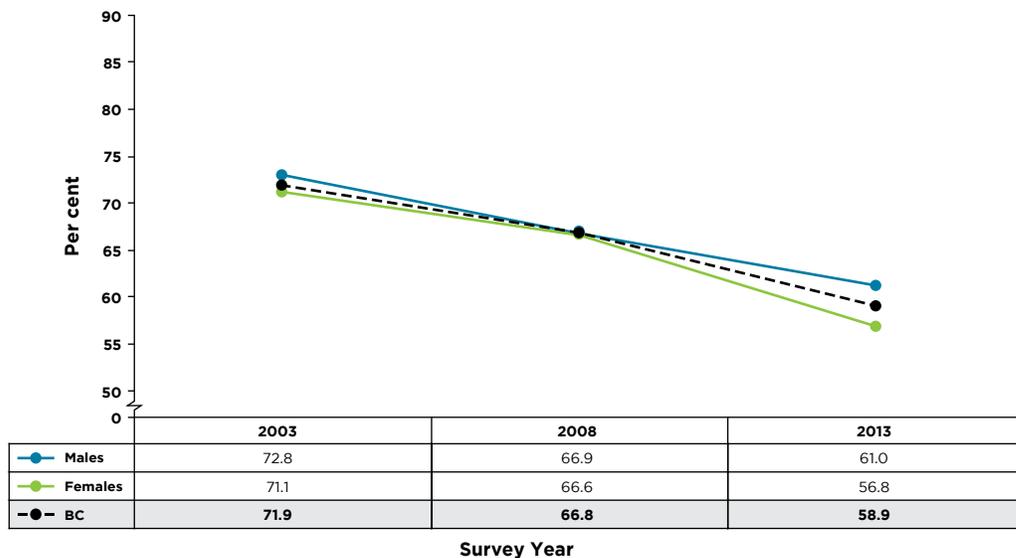
FIG 5.12 Actual and Projected Percentage of Students in Grades 7-12 Who Used Cannabis Before Age 15, Among Those Who Have Ever Used, BC, 2003 to 2023



Note: See Appendix B for more information about this data source.

Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

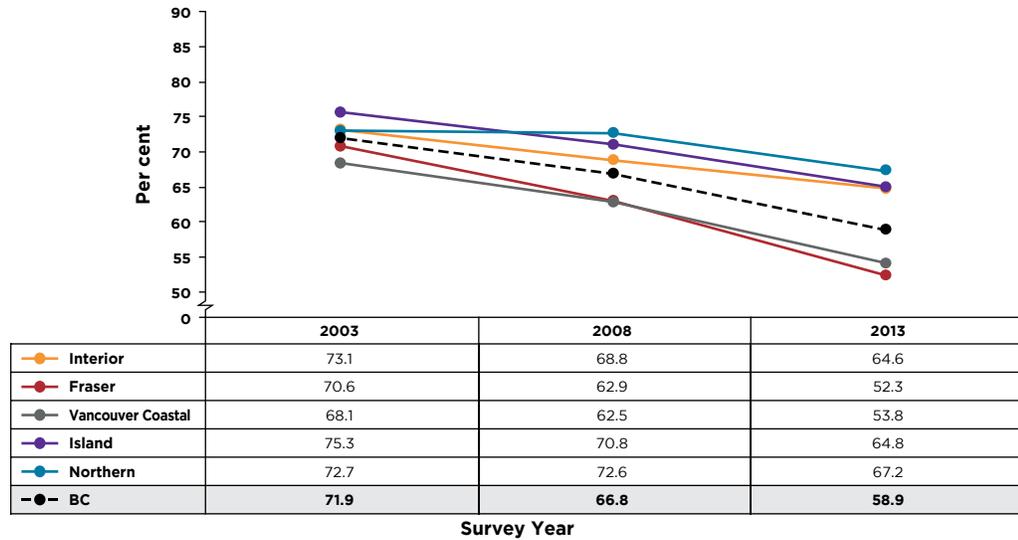
FIG 5.13 Percentage of Students in Grades 7-12 Who Used Cannabis Before Age 15, Among Those Who Have Ever Used, by Sex, BC, 2003 to 2013



Note: See Appendix B for more information about this data source.

Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 5.14 Percentage of Students in Grades 7-12 Who Used Cannabis Before Age 15, Among Those Who Have Ever Used, by Health Authority, BC, 2003 to 2013



Notes: Changes in participating school districts and in consent procedures adopted by school districts may have affected trend results across the survey years. Health authority is based on the location of the school. See Appendix B for more information about this data source.
Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

As shown in Figure 5.14, for this performance measure, all health authorities are experiencing a declining trend, but some are seeing faster rates of decline than others. Regional variations in cannabis use are similar to those of alcohol: Interior, Island, and Northern had the highest rates of early initiation in the most recent survey year, while Vancouver Coastal and Fraser had the lowest rates. In fact, in 2013, the rates in Vancouver Coastal and Fraser were already below the 2023 target of 55 per cent.

Hazardous Drinking

Performance Measure: The percentage of British Columbians (age 12+) who engage in hazardous drinking.

Baseline: 15.8 per cent (2009-10)

2023 Target: 14 per cent

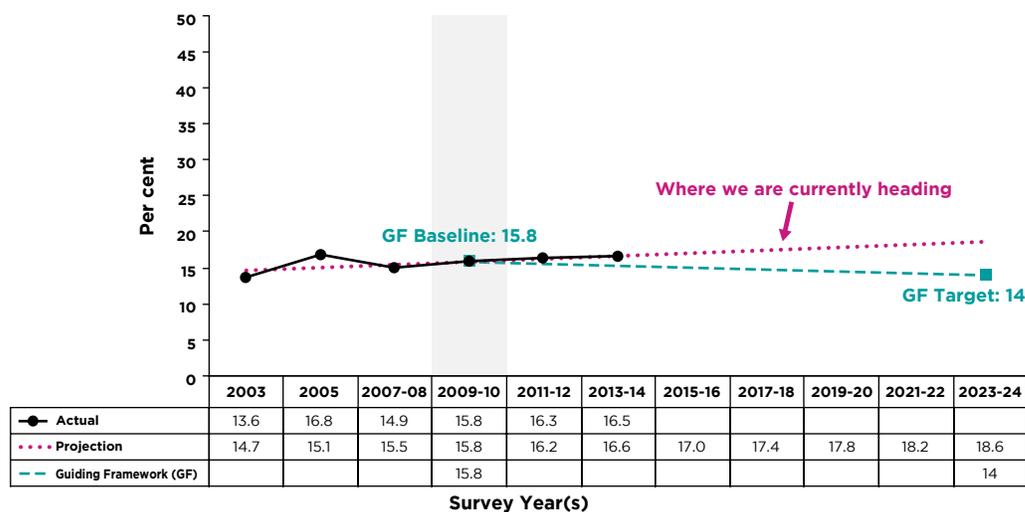
Hazardous drinking (also known as **heavy drinking or binge drinking**) can be defined as consuming five or more drinks on one occasion (or four or more drinks for women), at least once a month during the past year.^{o,44} The majority of people who consume alcohol do not experience problems; however, a sizeable minority have consumption patterns that increase the risk of health and social harms to themselves and others. For example, a 2006 Ministry of Health report on preventing harm from substance use found that excessive alcohol consumption was a leading contributing cause of death among British Columbians 25 years of age

and under, playing a role in fatal road crashes, suicides, homicides, and poisoning deaths.²⁵

The baseline identified in the Guiding Framework for this measure was 15.8 per cent of respondents age 12 and up reporting that they engaged in hazardous drinking (2009-10). The target is to reduce this to 14 per cent by 2023.

Figure 5.15 shows that the percentage of British Columbians age 12 and up who engage in hazardous drinking has actually been increasing. If this trend continues, the 2023 target will not be attained, and more work will be needed just to return to the baseline value.

FIG 5.15 Actual and Projected Percentage of the Population Age 12+ Who Engage in Hazardous Drinking, BC, 2003 to 2023-24



Notes: "Hazardous drinking" (also known as heavy drinking) means consuming five or more drinks on one occasion, at least once a month during the past year (except starting in 2013-14, when the definition for females was changed to consuming four or more drinks on one occasion). Due to the change in definition, the data for females from 2013-14 onwards are not directly comparable to previous years. This indicator is population-based, meaning that it includes the entire population age 12 and up, regardless of whether they consumed any alcohol during the last 12 months. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, January 2017.

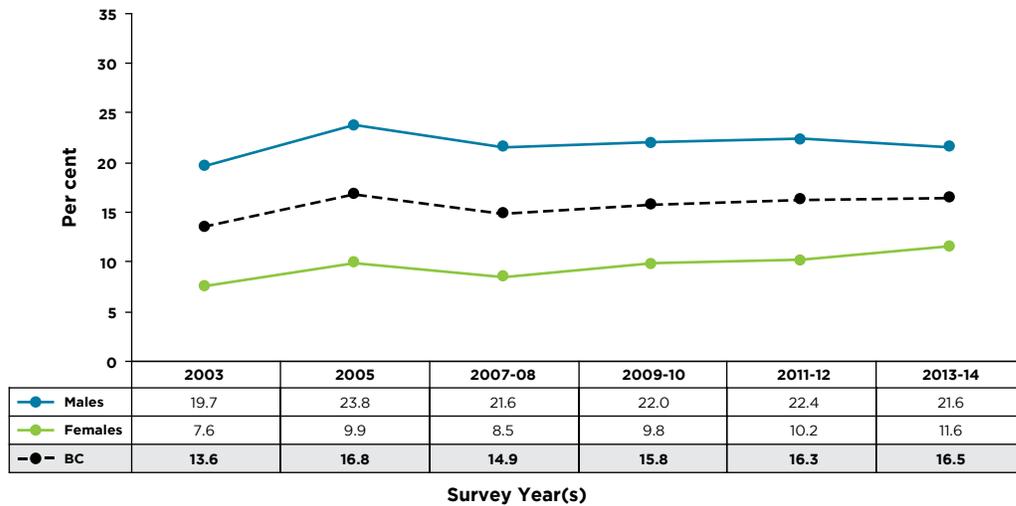
^o Prior to 2013, hazardous drinking for women was defined as consuming five or more drinks on one occasion, at least once a month in the past year.



For every year shown in Figure 5.16, a higher proportion of males than females reported engaging in hazardous drinking, and neither sex is achieving reductions in hazardous drinking. The rate for females has increased slightly more over time, but the last year of increase (from 2011-12 to 2013-14) should be interpreted with caution due to the 2013 change in the definition of “hazardous drinking” for women.

Figure 5.17 shows that the BC population age 20–34 has the highest percentage of hazardous drinking in BC, while those age 65 and up have the lowest percentage. The percentage of hazardous drinking has increased over the time period for all age groups, with the exception of the 12–19 age group. The rate for this age group decreased in both 2011-12 and 2013-14.

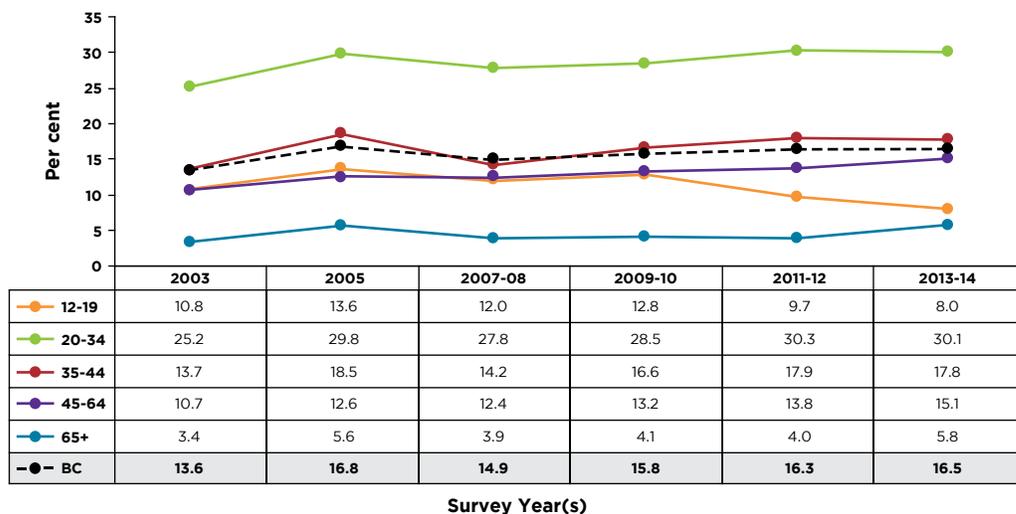
FIG 5.16 Percentage of the Population Age 12+ Who Engage in Hazardous Drinking, by Sex, BC, 2003 to 2013-14



Notes: "Hazardous drinking" (also known as heavy drinking) means consuming five or more drinks on one occasion, at least once a month during the past year (except starting in 2013-14, when the definition for females was changed to consuming four or more drinks on one occasion). Due to the change in definition, the data for females from 2013-14 onwards are not directly comparable to previous years. This indicator is population-based, meaning that it includes the entire population age 12 and up, regardless of whether they consumed any alcohol during the last 12 months. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, January 2017.

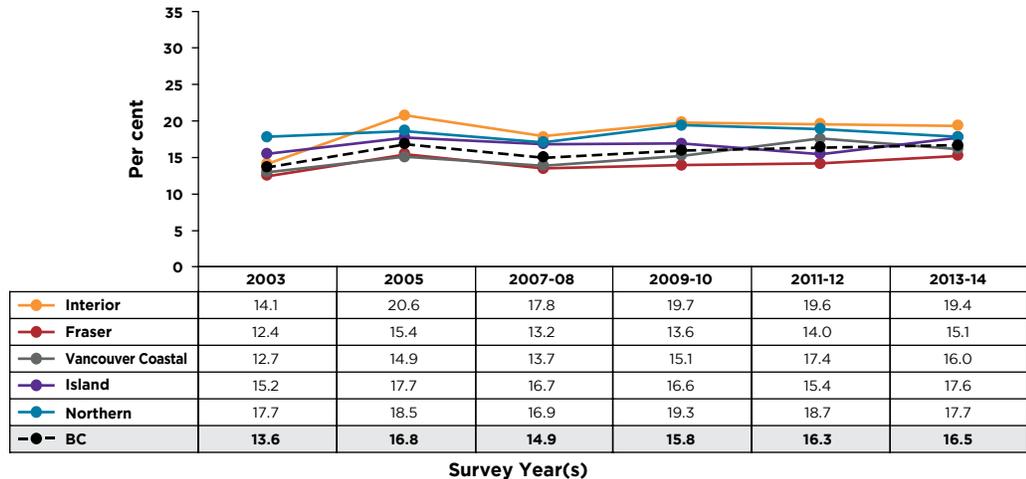
FIG 5.17 Percentage of the Population Age 12+ Who Engage in Hazardous Drinking, by Age Group, BC, 2003 to 2013-14



Notes: "Hazardous drinking" (also known as heavy drinking) means consuming five or more drinks on one occasion, at least once a month during the past year (except starting in 2013-14, when the definition for females was changed to consuming four or more drinks on one occasion). Due to the change in definition, the data for females from 2013-14 onwards are not directly comparable to previous years. This indicator is population-based, meaning that it includes the entire population age 12 and up, regardless of whether they consumed any alcohol during the last 12 months. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, January 2017.

FIG 5.18 Percentage of the Population Age 12+ Who Engage in Hazardous Drinking, by Health Authority, BC, 2003 to 2013-14



Notes: “Hazardous drinking” (also known as heavy drinking) means consuming five or more drinks on one occasion, at least once a month during the past year (except starting in 2013-14, when the definition for females was changed to consuming four or more drinks on one occasion). Due to the change in definition, the data for females from 2013-14 onwards are not directly comparable to previous years. This indicator is population-based, meaning that it includes the entire population age 12 and up, regardless of whether they consumed any alcohol during the last 12 months. Health authority is based on the residence of the respondent. See Appendix B for more information about this data source.

Source: Statistics Canada, Canadian Community Health Survey, 2003 and 2005 annual samples and 2007-08 to 2013-14 combined samples. Extracted from the Public Use Microdata Files. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, January 2017.

Figure 5.18 shows a slight increasing trend overall for all health authorities in the percentage of the population age 12 and up who engage in hazardous drinking. Interior and Northern have had the highest percentage in most years, while Fraser and Vancouver Coastal have usually had the lowest.

Conclusion

This chapter has explored positive mental health and preventing harms associated with substance use, through a review of Goal 3 of the Guiding Framework and its related performance measures. Four of the five measures are moving away from provincial targets: British Columbians reporting positive mental health; hazardous drinking; and kindergarten children being identified as “not vulnerable” in terms of social development and emotional development. However, the measures for student alcohol and cannabis use before age 15 are improving enough to be projected to surpass the provincial

targets by 2023, if the current rates of decline persist. Furthermore, for substance use measures (alcohol use, cannabis use, hazardous drinking), Interior, Northern, and Island are facing particular difficulties. Gaps are emerging in substance use patterns between males and females, whereby males have higher levels of reported cannabis and alcohol use before age 15, and of hazardous drinking. British Columbians age 20–34 report the highest levels of hazardous drinking. The next chapter will review Goal 4 of the Guiding Framework and its associated performance measures for communicable disease prevention.

REFERENCES

- ¹ BC Ministry of Health Services, BC Ministry of Children and Family Development. Healthy minds, healthy people: a 10-year plan to address mental health and substance use in British Columbia. Victoria, BC: BC Ministry of Health Services and BC Ministry of Children and Family Development; 2010 Nov 1 [cited 2017 Feb 15]. Available from: http://www.health.gov.bc.ca/library/publications/year/2010/healthy_minds_healthy_people.pdf.
- ² World Health Organization. Mental health: a state of well-being [Internet]. Geneva: World Health Organization; [cited 2017 Feb 15]. Available from: http://www.who.int/features/factfiles/mental_health/en/.
- ³ Creating a healthier Canada: making prevention a priority – a declaration on prevention and promotion from Canada’s Ministers of Health and Health Promotion/Healthy Living; 2010 [cited 2017 Feb 15]. Available from: <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/declaration/pdf/dpp-eng.pdf>.
- ⁴ BC Ministry of Health. Promote, protect, prevent: our health begins here. BC’s guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ⁵ Bernard-Bonnin AC, Canadian Paediatric Society. Maternal depression and child development. Ottawa, ON: Canadian Paediatric Society; 2004 Oct 1 [reaffirmed 2015 Jan 30; updated 2015 May 15]. Available from: <http://www.cps.ca/en/documents/position/maternal-depression-child-development>.
- ⁶ World Health Organization. Maternal mental health [Internet]. Geneva: World Health Organization; 2017 [cited 2017 Sep 21]. Available from: <http://www.who.int/topics/early-child-development/mentalhealth/en/>.
- ⁷ Royal College of Physicians and Surgeons of Canada. Early childhood development. Royal College position statement. Ottawa, ON: Royal College of Physicians and Surgeons of Canada; [released 2014 Jun 26; cited 2017 Sep 22]. Available from: <http://www.royalcollege.ca/rcsite/documents/health-policy/early-childhood-development-statement-e.pdf>.
- ⁸ Lawrence RS, Gootman JA, Sim LJ, editors. Adolescent health services: missing opportunities. Washington, DC: National Academies Press; 2009. Cited by BC Ministry of Health. Promote, protect, prevent: our health begins here. BC’s guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ⁹ Health Officers Council of British Columbia. 2005. A public health approach to drug control in Canada. British Columbia: Health Officers Council of British Columbia; 2005. Cited by BC Ministry of Health. Evidence review: prevention of harms associated with substances. Victoria, BC: BC Ministry of Health; 2006 [cited 2017 Feb 15]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2006/harms-prevention-evidence-review.pdf>.
- ¹⁰ BC Ministry of Healthy Living and Sport. Model core program paper: prevention of harms associated with substances. Victoria, BC: BC Ministry of Healthy Living and Sport; 2009 Feb [cited 2017 Feb 15]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2009/harms-prevention-core-program-paper.pdf>.
- ¹¹ BC Ministry of Mental Health and Addictions. Province escalates overdose emergency response to save lives, support people with addictions [news release]. Vancouver, BC: BC Ministry of Mental Health and Addictions; 2017 Dec 01 [cited 2018 Jan 09]. Available from: <https://news.gov.bc.ca/releases/2017mh0008-002003>.
- ¹² Government of British Columbia. B.C.’s mental health and substance use strategy: 2017-2020. Victoria, BC: Government of British Columbia; 2017 [cited 2017 Jul 6]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2017/mental-health-substance-use-strategy.pdf>.
- ¹³ Smetanin P, Stiff D, Briante C, Adair CE, Ahmad S, Khan M. The life and economic impact of major mental illnesses in Canada: 2011 to 2041 [prepared by RiskAnalytica, on behalf of the Mental Health Commission of Canada]. Ottawa, ON: Mental Health Commission of Canada; 2011. Cited by Centre for Addiction and Mental Health. Mental illness and addictions: facts and statistics [Internet]. Toronto, ON: Centre for Addiction and Mental Health; 2012 [cited 2017 Feb 15]. Available from: http://www.camh.ca/en/hospital/about_camh/newsroom/for_reporters/Pages/addictionmentalhealthstatistics.aspx.
- ¹⁴ Lim KL, Jacobs P, Ohinmaa A, Schopflocher D, Dewa CS. A new population-based measure of the burden of mental illness in Canada. *Chronic Dis Can.* 2008;28(3):92-8. Cited by Centre for Addiction and Mental Health. Mental illness and addictions: facts and statistics [Internet]. Toronto, ON: Centre for Addiction and Mental Health; 2012 [cited 2017 Feb 15]. Available from: http://www.camh.ca/en/hospital/about_camh/newsroom/for_reporters/Pages/addictionmentalhealthstatistics.aspx.

- ¹⁵Canadian Mental Health Association. Benefits of good mental health [Internet]. Toronto, ON: Canadian Mental Health Association; [cited 2017 Sep 20]. Available from: http://toronto.cmha.ca/mental_health/benefits-of-good-mental-health/.
- ¹⁶Klein S, Harden BJ. Building the evidence-base regarding infants/toddlers in the child welfare system: introduction. *Child Youth Serv Rev.* 2011;33:1333-36. Cited by Children's Health Policy Centre. Overview: laying the foundation for lifelong mental health. *Children's Mental Health Research Quarterly.* 2011;5(4):3-4.
- ¹⁷Government of British Columbia. mental health [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Feb 27]. Available from: <https://www2.gov.bc.ca/gov/content/careers-myhr/all-employees/safety-health-well-being/health/mental#resilience>.
- ¹⁸Generation Squeeze. Things are harder, now [Internet]. Vancouver, BC: Generation Squeeze; 2017 Dec 15 [cited 2018 Jan 29]. Available from: https://www.gensqueeze.ca/its_harder_now.
- ¹⁹Burke RJ, Calvano LM. *The sandwich generation: caring for oneself and others at home and at work.* Northampton, MA: Edward Elgar Publishing; 2017.
- ²⁰Human Early Learning Partnership. EDI BC: 2016 provincial report. Vancouver, BC: University of British Columbia; 2016 Oct [cited 2017 Feb 15]. Available from: <http://earlylearning.ubc.ca/media/edibc2016provincialreport.pdf>.
- ²¹Hawkins JD, Kosterman R, Catalano RF, Hill KG, Abbott RD. Promoting positive adult functioning through social development intervention in childhood: longterm effects from the Seattle Social Development Project. *Arch Pediatr Adolesc Med.* 2005 Jan;159(1):25-31. Cited by BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ²²BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ²³Public Health Agency of Canada. Report from the Canadian Chronic Disease Surveillance System: mental illness in Canada, 2015. Ottawa, ON: Public Health Agency of Canada. Cited by Human Early Learning Partnership. EDI BC: 2016 provincial report. Vancouver, BC: University of British Columbia; 2016 Oct [cited 2017 Feb 15]. Available from: <http://earlylearning.ubc.ca/media/edibc2016provincialreport.pdf>.
- ²⁴Saewyc EM. Alcohol and other drug use among BC students. Myths and realities. *Visions Journal.* 2009;5(2):8-9.
- ²⁵BC Ministry of Health. Following the evidence: preventing harms from substance use in BC. Victoria, BC: BC Ministry of Health; 2006 Mar [cited 2017 Apr 07]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2006/followingtheevidence.pdf>.
- ²⁶Chief Public Health Officer. The Chief Public Health Officer's report on the state of public health in Canada 2015. alcohol consumption in Canada. Ottawa, ON: Public Health Agency of Canada; 2016 Jan [cited 2017 Apr 07]. Available from: <https://www.canada.ca/content/dam/canada/health-canada/migration/healthy-canadians/publications/department-ministere/state-public-health-alcohol-2015-etat-sante-publique-alcool/alt/state-phac-alcohol-2015-etat-aspc-alcool-eng.pdf>.
- ²⁷Broman CL. The availability of substances in adolescence: influences in emerging adulthood. *J Child Adolesc Subst Abuse.* 2016;25(5):487-95.
- ²⁸BC Ministry of Justice. B.C. liquor policy review final report. Victoria, BC: BC Ministry of Justice; 2014 [cited 2017 Sep 21]. Available from: http://www2.gov.bc.ca/assets/gov/employment-business-and-economic-development/business-management/liquor-regulation-licensing/documents/liquor_policy_review_report.pdf.
- ²⁹Stockwell T, Zhao J, Macdonald S, Pakula B, Gruenewald P, Holder H. Changes in per capita alcohol sales during the partial privatization of British Columbia's retail alcohol monopoly 2003-2008: a multi-level local area analysis. *Addiction* 2009;104:1827-36. doi:10.1111/j.1360-0443.2009.02658.x
- ³⁰Government of British Columbia. Liquor policy review implementation table. Victoria, BC: Government of British Columbia; 2018 [cited 2018 Apr 12]. Available from: <https://engage.gov.bc.ca/app/uploads/sites/121/2018/03/Liquor-Policy-Review-Implementation-Table.pdf>.
- ³¹Government of British Columbia. GovTogetherBC BC liquor policy review - results. Victoria, BC: Government of British Columbia; [cited 2018 Feb 1]. Available from: <https://engage.gov.bc.ca/govtogetherbc/impact/bc-liquor-policy-review-results/>.

- ³²BC Liquor Control and Licensing Branch. Policy directive No: 16 – 04. Victoria, BC: BC British Columbia Liquor Control and Licensing Branch; 2016 Feb 23 [cited 2018 Feb 01]. Available from: https://www2.gov.bc.ca/assets/gov/employment-business-and-economic-development/business-management/liquor-regulation-licensing/policy-directives/16-04_minimum_price.pdf.
- ³³BC Provincial Health Officer. Public health approach to alcohol policy: an updated report from the Provincial Health Officer. Victoria, BC: BC Provincial Health Officer; 2008.
- ³⁴Government of Canada. Legalizing and strictly regulating cannabis: the facts. Ottawa, ON: Government of Canada; 2017 [cited 2017 Sep 21]. Available from: <https://www.canada.ca/content/dam/hc-sc/documents/services/campaigns/27-16-1808-Factsheet-The-Facts-eng-03.pdf>.
- ³⁵Guerri C, Pascual M. Mechanisms involved in the neurotoxic, cognitive, and neurobehavioral effects of alcohol consumption during adolescence. *Alcohol*. 2010;44(1):15-26. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ³⁶Maldonado-Devincci AM, Badanich KA, Kirstein CL. Alcohol during adolescence selectively alters immediate and long-term behavior and neurochemistry. *Alcohol*. 2010;44(1):57-66. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ³⁷Grant BF, Dawson DA. Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: results from the National Longitudinal Alcohol Epidemiologic Survey. *J Subst Abuse*. 1998;10(2):163-73. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ³⁸Institute for Alcohol Studies. Youthful abandon: why are young people drinking less. London, UK: Institute for Alcohol Studies; 2016 [cited 2018 Feb 14]. Available from: <http://www.ias.org.uk/uploads/pdf/IAS%20reports/rp22072016.pdf>.
- ³⁹Health Canada. Canadian Alcohol and Drug Use Monitoring Survey 2011. Ottawa, ON: Health Canada; 2012. Cited by Pirie T, Simmons M. Cannabis use and risky behaviours and harms: a comparison of urban and rural populations in Canada. Ottawa, ON: Canadian Centre on Substance Abuse; 2014 Feb [cited 2016 Mar 21]. Available from: <http://www.ccsa.ca/Resource%20Library/CCSA-Cannabis-use-Risky-behaviours-and-Harms-2014-en.pdf>.
- ⁴⁰UNICEF Office of Research. Child well-being in rich countries: a comparative overview. Innocenti report card 11. Florence: UNICEF Office of Research; 2013 [cited 2017 Feb 15]. Available from: https://www.unicef-irc.org/publications/pdf/rc11_eng.pdf.
- ⁴¹George T, Vaccarino F, editors. Substance abuse in Canada: the effects of cannabis use during adolescence. Ottawa, ON: Canadian Centre on Substance Abuse; 2015 [cited 2017 Feb 15]. Available from: <http://www.ccsa.ca/Resource%20Library/CCSA-Effects-of-Cannabis-Use-during-Adolescence-Report-2015-en.pdf>.
- ⁴²European Monitoring Centre for Drugs and Drug Addiction. European drug report: trends and developments 2017. Luxembourg: Publications Office of the European Union; 2017 [cited 2018 Feb 15]. Available from: <http://www.emcdda.europa.eu/publications/edr/trends-developments/2017>.
- ⁴³Johnston LD, Miech RA, O’Malley PM, Bachman JG, Schulenberg JE, Patrick ME. Monitoring the future: national survey results on drug use 1975-2017. 2017 overview: key findings on adolescent drug use. Ann Arbor Michigan: University of Michigan Institute for Social Research; 2018 [cited 2018 Feb 15]. Available from: <http://www.monitoringthefuture.org/pubs/monographs/mtf-overview2017.pdf>.
- ⁴⁴Statistics Canada. Heavy drinking, by age group and sex (table). Ottawa, ON: Statistics Canada; [modified 2016 Mar 07; cited 2017 Feb 09]. Available from: <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health79a-eng.htm>
- ⁴⁵Preliminary findings of data collected by Insights West on behalf of the Ministry of Mental Health and Addictions; 2018.
- ⁴⁶Government of British Columbia. New campaign aims to save lives by eliminating stigma [news release]. Victoria, BC: Government of British Columbia; 2018 [cited 2018 Sep 24]. Available from: <https://news.gov.bc.ca/releases/2018MMHA0001-000113>.

6

Communicable Disease Prevention

Communicable diseases are caused by harmful bacteria, viruses, parasites, or fungi. They can be spread, directly or indirectly, from one person to another.¹ They can also be spread indirectly from contaminated food, water, domestic utensils, clothing, etc., or from an insect or animal; or directly from the inanimate environment.² There are many

different communicable diseases, such as influenza, chickenpox, measles, or the common cold. This chapter focuses on communicable diseases that are preventable through vaccines, and those that are transmitted through air, through person-to-person contact, through ingestion, or through blood, body, and/or sexual fluids.



One hundred years ago, infectious diseases were the leading cause of death in Canada; now they cause less than 5 per cent of deaths.³ This improvement is due to societal and scientific advancements, such as immunizations, improvements in sewage and drinking water treatment, legislation and policies to stop the spread of some infections, and the development of antimicrobials (substances that kill or stop the growth of microorganisms, including antibiotics, antivirals, antifungals,

and antiparasitics).^{4,5} Under the *Public Health Act*, public health officials have an important role in monitoring, surveillance, and control of communicable diseases.

Guiding Framework Goal 4: Communicable Disease Prevention

Goal Statement

People living longer, higher quality lives free of preventable disease.

Objectives

The objectives for Goal 4 focus on preventing and reducing communicable disease transmission and reducing associated morbidity and mortality:

1. Prevent and reduce communicable disease transmission through public health measures and initiatives such as immunization, community health promotion and prevention, harm reduction and treatment as prevention programs.
2. Reduce morbidity and mortality associated with communicable disease through screening and early detection, rapid response to communicable disease cases and outbreaks and effective use of therapies.

Performance Measures

Within Goal 4 of the Guiding Framework, there are five performance measures:

- Immunization coverage rates up-to-date by second birthday in accordance with the routine childhood immunization schedule.
- The incidence of hepatitis C among repeat testers per year (per 1,000 population).
- The percentage of newly diagnosed HIV cases with CD4 at diagnosis greater than 500.
- Condom use among sexually active adolescents.
- The percentage of young women (ages 18–24) who have had a test for chlamydia in the previous year.

Immunization Rates

Performance Measure: Immunization coverage rates up-to-date by second birthday in accordance with the routine childhood immunization schedule.

Baseline: 71 per cent (2012)

2023 Target: 90 per cent

Immunization is one of the most successful public health interventions—in fact, vaccines have saved more lives in Canada than any other medical intervention in the past 50 years.⁶ Vaccinations protect individuals and populations from specific diseases that can cause illness or even death. Because of the success of immunization, many of the diseases prevented by vaccines are rare in Canada. However, the viruses and bacteria that cause these diseases still exist, and immunizations keep these diseases under control. In addition, immunizations protect not only the people being immunized, but everyone around them. When most people in a community have been vaccinated for a disease, the chance of that disease spreading within the community is reduced. This indirectly protects those people who cannot be vaccinated, such as infants who are too young to be immunized and immunocompromised people—this is known as **herd immunity** or **community immunity**.^{6,7}

There are many challenges in understanding and assessing immunization rates in BC, and one issue identified in the Guiding Framework was the need to develop a consistent methodology for the measurement of two-year-old immunization rates.⁸ This would enable a more accurate picture of coverage rates in BC. For example, while the data presented in this section are the best available at the time of publication, the rates likely underreport immunizations administered in BC because they only include children for whom every

dose of the immunization schedule has been captured in the provincial immunization registry (Panorama).⁹ This excludes children with even one dose unrecorded in Panorama.

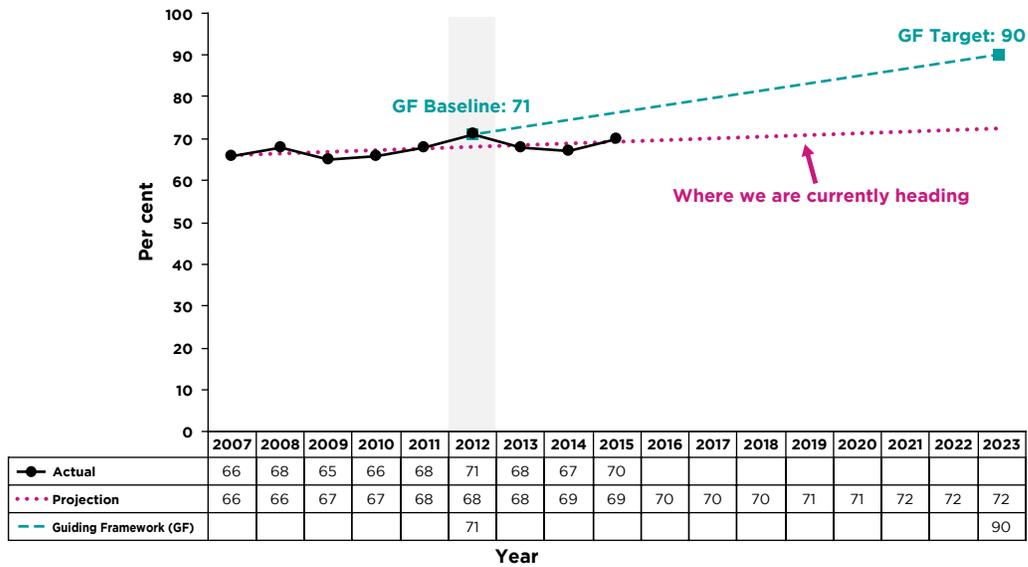
The rates also exclude immunizations provided by physicians in BC, as these are not yet captured in Panorama; this accounts for approximately 20 per cent of immunizations among children up to age two across the province (the other 80 per cent are administered by public health practitioners). This varies greatly between regions. For example, in 2017 in BC, 44 per cent of immunizations for children up to age two were administered by physicians in Vancouver Coastal, compared to less than 1 per cent in Interior. In Northern, 100 per cent of immunizations were delivered by public health.⁹

Since Vancouver Coastal has such a high proportion of physician-administered immunizations and monitors their immunization rates through surveys, their childhood immunization data are not directly comparable to other health authorities. As a result, Vancouver Coastal immunization data are provided in the narrative of this section, but are not included in data charts.

The baseline coverage rate for immunizations being up-to-date by a child's second birthday in accordance with the routine childhood immunization schedule was 71 per cent in 2012. The Guiding Framework target was set to increase this to 90 per cent by 2023.

⁹ Panorama is a public health information system used by health professionals in BC.

FIG 6.1 Actual and Projected Percentage of Children with Up-to-Date Immunizations by Age Two, BC, 2007 to 2023

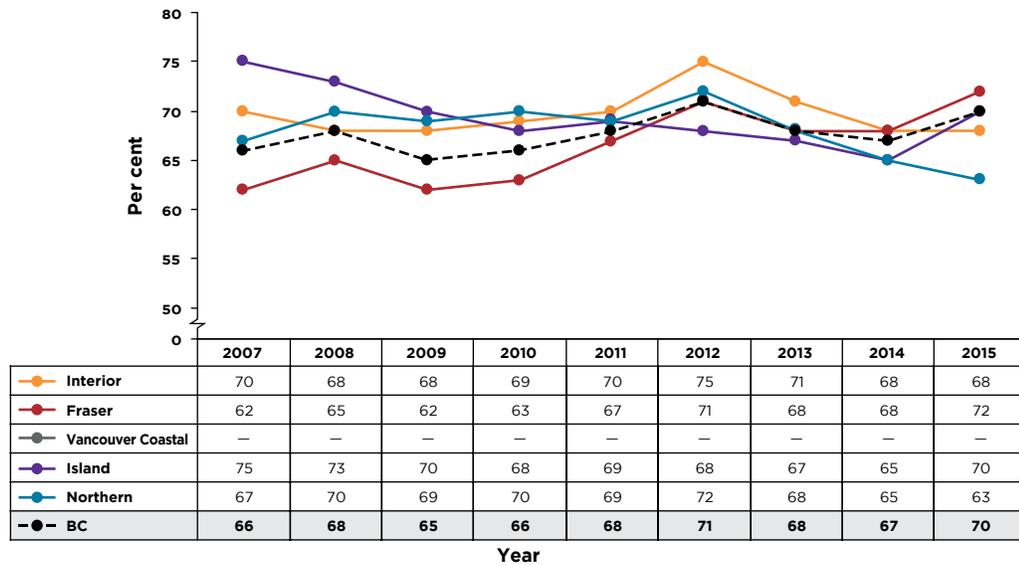


Notes: Children with up-to-date immunizations, according to the *BC Routine Immunization Schedule, Infants & Children*. Data for all regional health authorities included, except for Vancouver Coastal Health Authority (VCH); comparable data for VCH are unavailable. See Appendix B for more information about this data source.
Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

As shown in Figure 6.1, the overall provincial rate (excluding Vancouver Coastal) had been increasing for a few years until it decreased in 2013 and 2014. While rates appear to be slowly increasing once again, they are not on track to reach the target by 2023.



FIG 6.2 Percentage of Children with Up-to-Date Immunizations by Age Two, by Health Authority, BC, 2007 to 2015



Notes: Children with up-to-date immunizations, according to the *BC Routine Immunization Schedule, Infants & Children*. Comparable data are unavailable for Vancouver Coastal Health Authority. Health authority is based on the residence of the child. See Appendix B for more information about this data source.
Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Figure 6.2 provides the percentages of children with up-to-date immunizations by age two, according to health authority areas. With the exception of a few isolated years (e.g., 2012), three of the four health authorities with data available show overall decreases during this time period. The exception to this is Fraser, which has shown a marked increase in its rate, moving from the lowest rate to the highest among these four regions. In fact, the improvement in that region accounts for the appearance of a broader increase at the provincial level.

As described earlier, childhood immunization data from Vancouver Coastal are not comparable to other health authority data; however, in 2016, Vancouver Coastal reported that according to a survey of the 2012 birth cohort, 69 per cent of two-year-olds in their health authority population were up-to-date for their age.¹⁰



Hepatitis C Rates

Performance Measure: The incidence of hepatitis C among repeat testers per year (per 1,000 population).

Baseline: 6.0 per 1,000 population (2009)

2023 Target: 3 per 1,000 population

Hepatitis C is a treatable and curable liver disease caused by the hepatitis C virus (HCV). Transmission of HCV can occur through exposure to blood containing the virus, such as through sharing of equipment for drug use (e.g., needles, syringes, pipes), accidental needle pokes, receiving blood or a blood product in a country that does not screen for the hepatitis C virus, tattoos and piercings with contaminated equipment, childbirth, and sexual intercourse (including anal sex), especially if blood or open sores are present.^{11,12}

Hepatitis C is one of the communicable diseases that are reportable under the *Public Health Act*, Health Act Communicable Disease Regulation.¹³ Chronic hepatitis C carries a high risk of progression to severe liver disease (e.g., **cirrhosis** and liver cancer) if not treated.¹⁴ New treatments for hepatitis C that prevent progression of the disease and cure it are available under BC's PharmaCare program.¹⁵ However, it is estimated that approximately 25 per cent of people in BC living with HCV are undiagnosed, and so may not benefit from this treatment.¹⁶

The Guiding Framework established a baseline rate of 6.0 new cases (incidence) of hepatitis C per 1,000 population in 2009, and set the goal of reducing that to 3 per 1,000 by 2023.

Figure 6.3 shows that the rate of newly diagnosed cases of hepatitis C among repeat testers (a good measure of the number of new infections in BC) fell dramatically from 2000 to 2012 and then increased during the subsequent

three years. The sharp decrease cannot be expected to reach zero as shown by the projection line, but it does indicate a trend that reflects successes in programs and initiatives. It is likely that the minor increase in recent years is related to case finding, as rates of testing for hepatitis C in BC have increased; the numbers of individuals tested in BC more than doubled between 2009 and 2016.¹⁹

The decrease in the incidence of new hepatitis C infections is likely due to a number of factors, including engagement of those who use injection drugs into harm reduction services. It is estimated that 80 per cent of new hepatitis C infections in developed countries are transmitted through injection drug use.¹⁷ In BC between 1990 and 2013, 3,628 individuals were diagnosed with hepatitis C after testing negative up to two years prior. Of those, 2,498 (73.3 per cent) reported illicit drug use.¹⁸

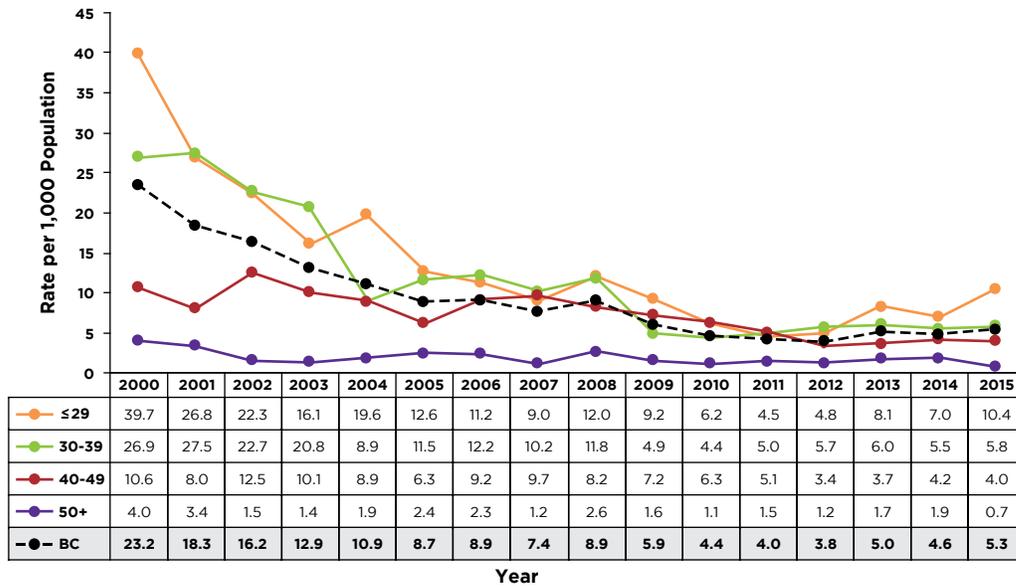
Figure 6.4 shows that over the time period, the male and female incidence rates for this indicator have converged. Overall, these data show improvement since 2000, and while the plateau and subsequent slight rise seen in recent years should be monitored, as noted earlier, this is likely a result of case finding, due to the substantial increase in people being tested in BC.

Similarly to the trend by sex shown in Figure 6.4, analyses by age group (Figure 6.5) show that gaps in incidence rates present in earlier years have been reduced, and that there have been overall improvements for all age groups. Repeat testers under age 29 and 30–39 have the highest incidence rates, while those age 50 and up have the lowest.

While Figure 6.6 shows that there is some regional variation between health authority areas on this measure, all areas have considerable year-to-year fluctuations with converging rates of new diagnoses from 2008 onward. Consistent with the provincial trend, most health authorities share an overall decreasing trend, with a slight increase in recent years as the number of individuals being tested has increased.



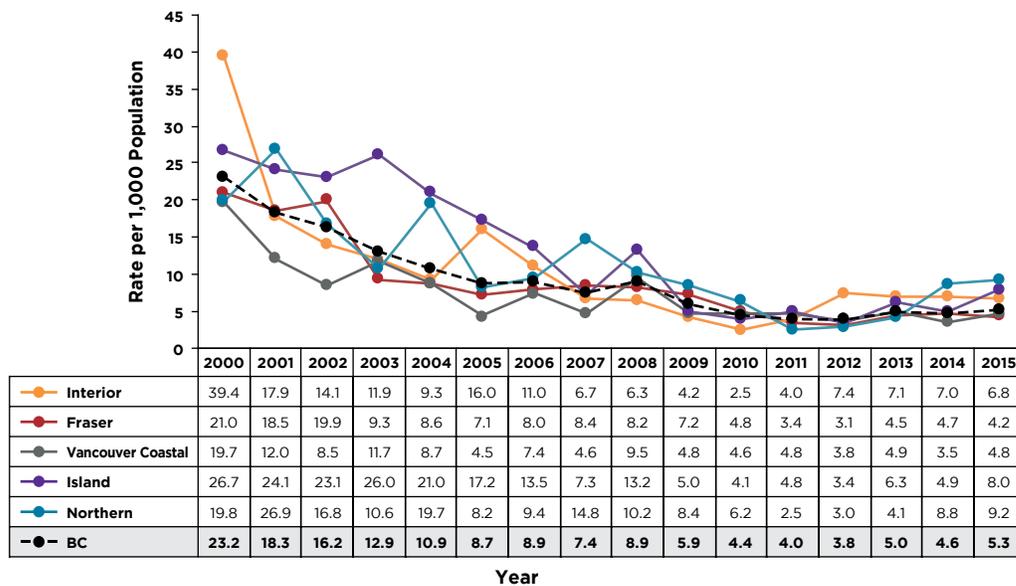
FIG 6.5 Rate of Newly Diagnosed Cases of Hepatitis C Among Repeat Testers, by Age Group, BC, 2000 to 2015



Notes: BC total includes unknown age. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 6.6 Rate of Newly Diagnosed Cases of Hepatitis C Among Repeat Testers, by Health Authority, BC, 2000 to 2015



Notes: Health authority is based on the residence of the individual. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

HIV

Performance Measure: The percentage of newly diagnosed HIV cases with CD4 at diagnosis greater than 500.

Baseline: 44.7 per cent (2011)

2023 Target: 75 per cent

Human Immunodeficiency Virus (HIV) is a virus that attacks the immune system, the system that defends the body from infections and cancer, leading to lifelong infection.²⁰ HIV works by destroying white blood cells called CD4 cells, and weakening the immune system. If too many CD4 cells are destroyed, the body can no longer defend itself against infections or cancers.²¹ Without treatment, HIV infection progresses, and in the later stage can advance to Acquired Immunodeficiency Syndrome (AIDS). HIV is another communicable disease that is reportable under the *Public Health Act*, Health Act Communicable Disease Regulation.¹³

Because HIV attacks CD4 cells over time, the number of CD4 cells in the blood can indicate how long a person has been living with HIV infection. A higher CD4 count at diagnosis indicates a more recent infection in an earlier stage of progression. In contrast, a lower CD4 count indicates a later stage of infection and that the person has been living with HIV for a longer period of time.²² Early diagnosis of people living with HIV can mean better health outcomes through earlier engagement in treatment, reduced chance of disease progression, as well as the prevention of disease transmission to other individuals.²²



In 2013, British Columbia launched the Seek and Treat for Optimal Prevention (STOP) of HIV/AIDS program. One of the goals of this program is to enhance the reach of HIV testing across BC in an effort to diagnose people living with HIV earlier in their infection. (See side bar “STOP HIV/AIDS” for more information).

The Guiding Framework established a baseline in 2011 of 44.7 per cent of newly diagnosed HIV cases identified with a CD4 count greater than 500. The 2023 target is to increase this to 75 per cent.

STOP HIV/AIDS

Seek and Treat for Optimal Prevention of HIV/AIDS (STOP HIV/AIDS) originated as a pilot project (2009–2013) in the cities of Vancouver and Prince George, and is a real-world implementation of the Treatment as Prevention approach that aims to reach and engage people, including the most underserved populations, through HIV testing, treatment, and care and support. Implementation of routine offers of HIV testing in acute care settings and through primary care in Vancouver during the pilot identified a number of individuals who were unaware of their advanced HIV infection. Provincial expansion of this approach took place in 2013.

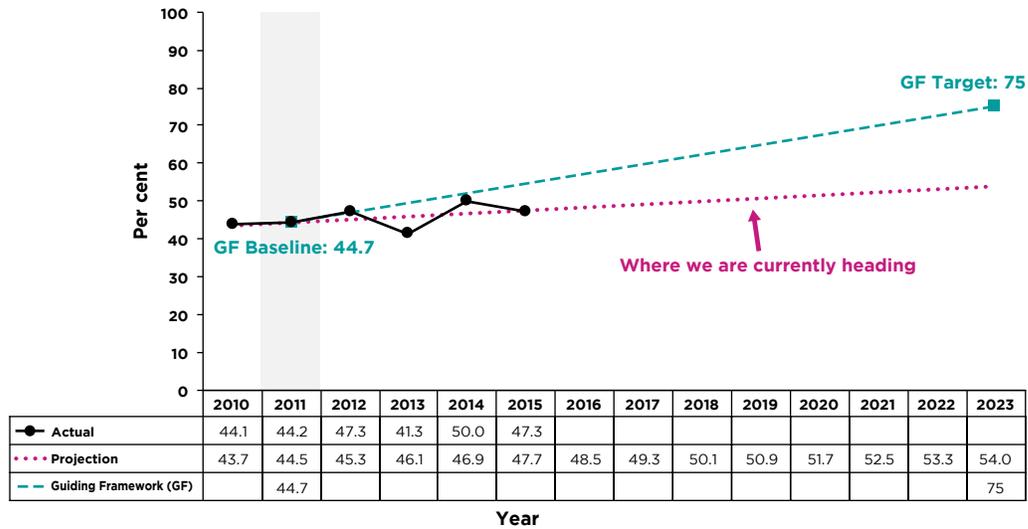
The STOP HIV/AIDS provincial program is implemented collaboratively by health authority partners, government, community organizations, and other health care partners. For example, this includes the BC Centre for Excellence in HIV/AIDS, the BC Centre for Disease Control, regional health authority partners, and the First Nations Health Authority. Implementation is guided by the Ministry of Health’s strategic framework, *From Hope to Health: Towards an AIDS-free Generation*, which includes goals, milestones, and targets for enhancing the reach of harm reduction services and testing for HIV, and for reaching and retaining people into HIV treatment, support, and care.²⁰



As shown in Figure 6.7, overall there has been a positive trend in BC toward earlier diagnosis of HIV (with CD4 counts over 500), with the exception of a decrease in 2013. While the trend is positive, the rate of change overall is currently insufficient to achieve the target by 2023. However, it is reasonable to anticipate that as the expanded testing progresses and previously undiagnosed cases are identified, the rate of increase in newly diagnosed cases with CD4 counts over 500 should accelerate.

Figure 6.8 compares the percentage of newly diagnosed HIV cases with CD4 counts over 500 between males and females. In general, the proportion of new HIV cases with CD4 counts over 500 has been increasing among females, while it has remained relatively unchanged among males. Some difference between sexes may be due to the disproportionate burden of HIV among males. About 85 per cent of all new HIV diagnoses are among males, and about half are among gay, bisexual, and other men who have sex with men (gbMSM).²³

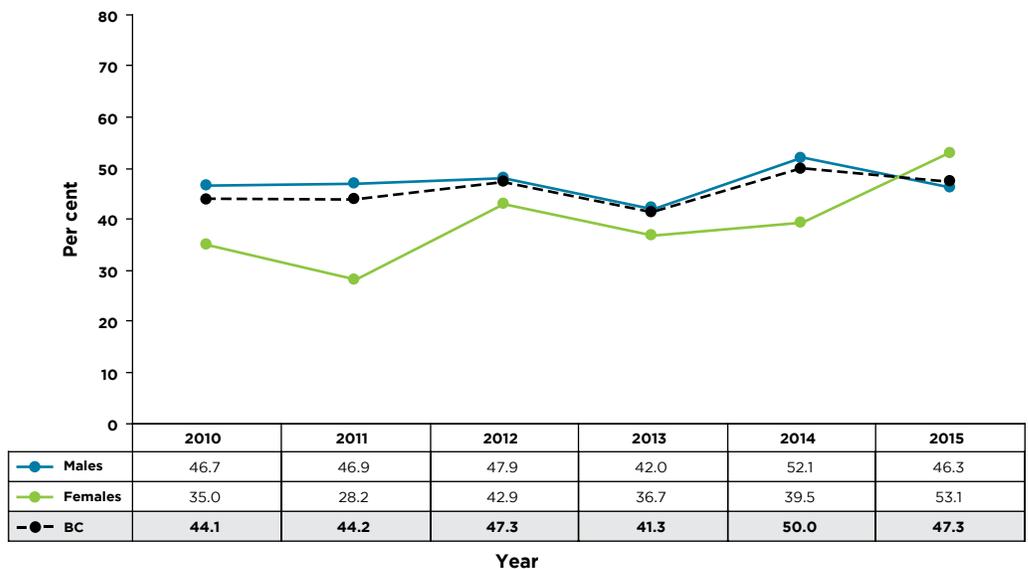
FIG 6.7 Actual and Projected Percentage of Newly Diagnosed HIV Cases with CD4 Greater Than 500, BC, 2010 to 2023



Notes: After the release of the Guiding Framework, counts of newly diagnosed HIV cases were updated by the BC Centre for Disease Control; therefore, the actual percentage in 2011 varies slightly from the Guiding Framework baseline value. Analyses include anyone seroconverting within 180 days as well as anyone diagnosed through lab tests associated with detection of HIV in acute stages. Calculated rates exclude cases with unknown CD4 counts. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 6.8 Percentage of Newly Diagnosed HIV Cases with CD4 Greater Than 500, by Sex, BC, 2010 to 2015



Notes: Analyses include anyone seroconverting within 180 days as well as anyone diagnosed through lab tests associated with detection of HIV in acute stages. Calculated rates exclude cases with unknown CD4 counts. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.



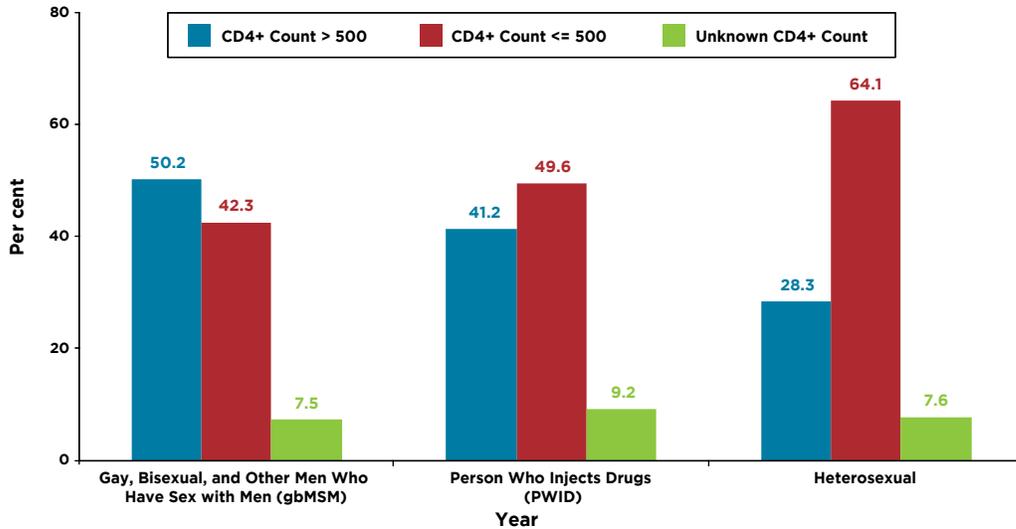
Figure 6.9 compares the percentages of newly diagnosed HIV cases with CD4 counts greater than 500 and cases with CD4 counts equal to or less than 500, by exposure group. The exposure group of gbMSM has the highest percentage of newly diagnosed HIV cases with CD4 counts greater than 500 (indicating earlier diagnosis). The highest percentage of newly diagnosed HIV cases with CD4 count equal to or less than 500 was among cases linked to heterosexual transmission.

These results may be due to the frequency of testing among gbMSM. Because of the higher burden of HIV among gbMSM, the *HIV Testing Guidelines for the Province of BC* recommends that gbMSM be tested for HIV on an annual basis.²⁴ Additionally, BC has developed clinical services and outreach programs that cater to gbMSM communities in order to improve access to HIV testing, including point-of-care

tests.²⁵ Compared to other exposure groups, individuals who acquire HIV through heterosexual contact have the highest inter-test interval (the time between the most recent negative HIV test and the first positive HIV test) at 2.9 years.²³

Figure 6.10 shows a clear relationship between age and early diagnoses of HIV, with the highest percentage of early diagnoses among those age 29 years or younger, and the lowest percentage among those age 50 and up. This may be due to differences in testing patterns between different age groups. A higher proportion of older adults may not be as engaged with routine HIV testing and thus, are diagnosed after living with HIV for longer. In contrast, younger adults are testing for HIV more frequently, and as a result, are more likely to be diagnosed in an earlier stage of infection.²³

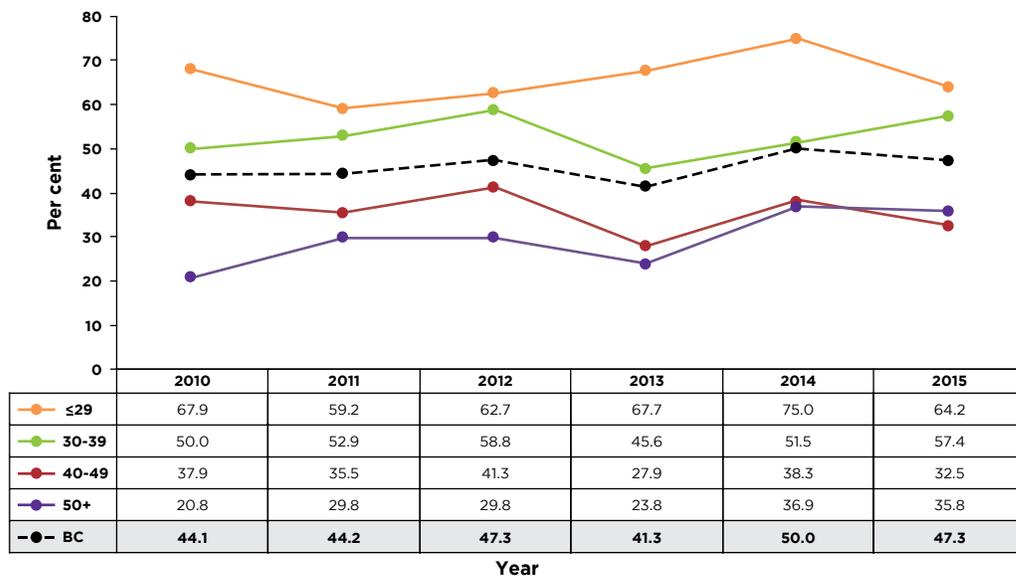
FIG 6.9 Percentage of Newly Diagnosed HIV Cases, by CD4+ Level and Exposure Group, BC, 2011-15



Notes: CD4+ over 500 include people diagnosed in the acute stage of HIV infection, which is defined as anyone seroconverting within 180 days or with laboratory findings suggestive of acute HIV infection. Analyses exclude cases with no identified exposure type, and types of exposure where numbers are extremely small. Individuals belonging to more than one exposure category are assigned based on the following hierarchy: gbMSM > PWID > heterosexual contact. See Appendix B for more information on this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2018.

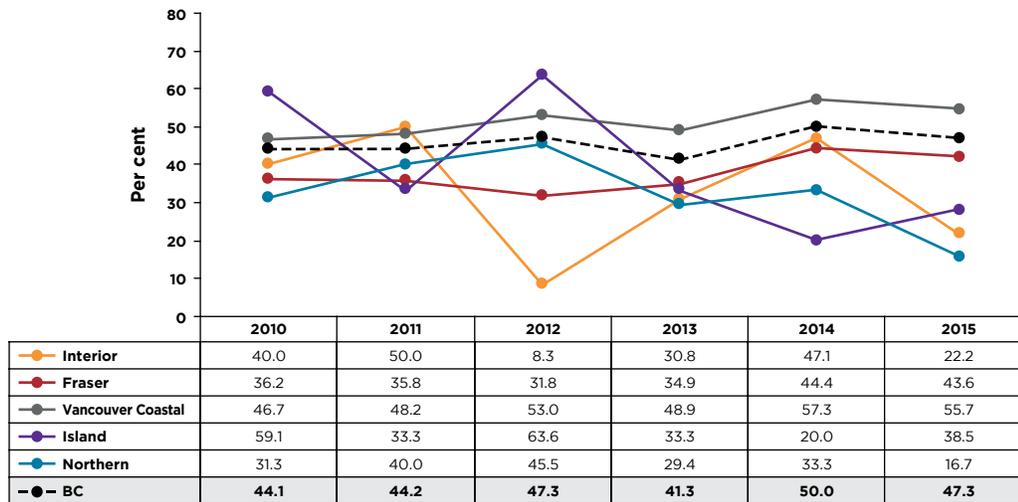
FIG 6.10 Percentage of Newly Diagnosed HIV Cases with CD4 Greater Than 500, by Age Group, BC, 2010 to 2015



Notes: Analyses include anyone seroconverting within 180 days as well as anyone diagnosed through lab tests associated with detection of HIV in acute stages. Calculated rates exclude cases with unknown CD4 counts. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 6.11 Percentage of Newly Diagnosed HIV Cases with CD4 Greater Than 500, by Health Authority, BC, 2010 to 2015



Notes: Analyses include anyone seroconverting within 180 days as well as anyone diagnosed through lab tests associated with detection of HIV in acute stages. Calculated rates exclude cases with unknown CD4 counts. Data for Island Health should be interpreted with caution, as the stage of infection for a large number of new diagnoses in this health authority is unknown. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

There is substantial variation among health authorities on this measure (Figure 6.11), with trends moving in different directions and at different rates of change. Vancouver Coastal and Fraser are currently trending towards the target, while Interior and Island^a have demonstrated considerable instability. The fluctuations seen here may relate to volatility created by small numbers, particularly outside of Vancouver Coastal and Fraser, as well as by different timing in implementation of the STOP HIV/AIDS program, including expanded testing.

^a Data for Island should be interpreted with caution, as the stage of infection for a significant number of new diagnoses in Island is unknown. This is the result of Island's laboratory data not being linked to the BC Centre for Disease Control's Public Health Laboratory data, which can match CD4 to diagnosis.



Condom Use

Performance Measure: Condom use among sexually active adolescents.

Baseline: 66.2 per cent (2008)

2023 Target: 76 per cent

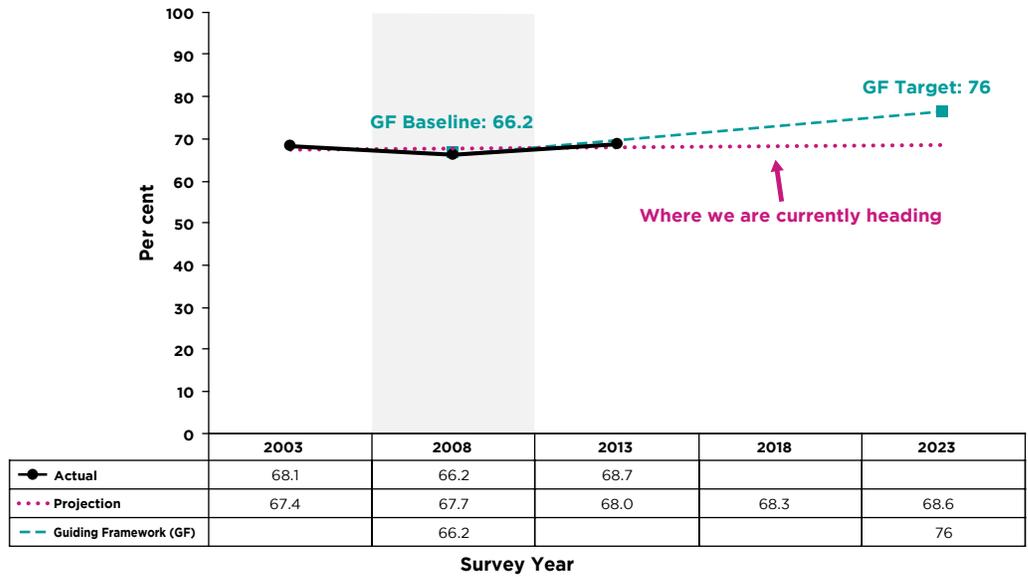
Condom use is an effective intervention to prevent unplanned pregnancy and to prevent acquisition of many sexually transmitted infections (STIs). Early sexual intercourse, unprotected sex, and having multiple sexual partners all increase the chances of acquiring an STI²⁶ and of having an unplanned pregnancy.^{27,28} According to the McCreary Centre Society's Adolescent Health Survey for 2013, 19 per cent of youth reported that they had ever had intercourse. Among those who had ever had intercourse, the most common age for first having intercourse was 15. However, their survey also showed that youth have been waiting longer to first have intercourse than in previous years. For example, among students who had ever had intercourse, 39 per cent had first done so before age 15 in both 2003 and 2008, but this decreased to 34 per cent in 2013.²⁹

The Guiding Framework established a baseline of 66.2 per cent of sexually active adolescents reporting that they used condoms in 2008, and the goal is to increase this to 76 per cent. This indicator focuses on condom use among adolescents who have been sexually active or who are currently sexually active.

Figure 6.12 shows that the percentage of sexually active students in grades 7–12 who report using condoms has remained relatively unchanged provincially from 2003 to 2013. As a result, this indicator is not currently projected to reach the target, and more work will be needed to continue to increase the regular use of condoms among sexually active youth, in order to reach the target of 76 per cent by 2023.

Figure 6.13 shows that among sexually active adolescents, a greater proportion of males report using condoms than females. This figure also shows that while the provincial level trend is relatively stable, the percentage among females increased.

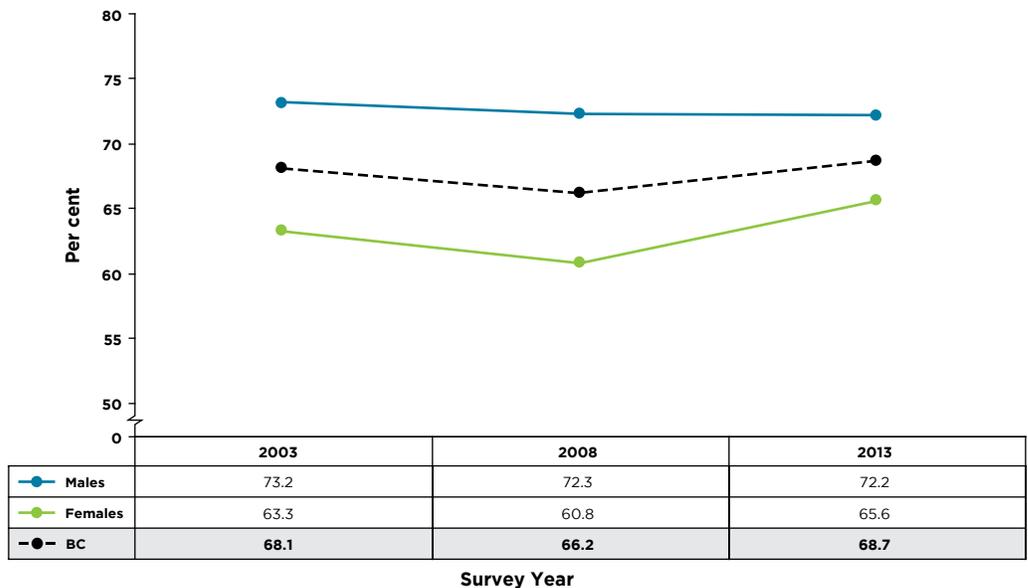
FIG 6.12 Actual and Projected Percentage of Sexually Active Adolescents in Grades 7-12 Who Use Condoms, BC, 2003 to 2023



Note: See Appendix B for more information about this data source.

Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 6.13 Percentage of Sexually Active Adolescents in Grades 7-12 Who Use Condoms, by Sex, BC, 2003 to 2013



Note: See Appendix B for more information about this data source.

Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.



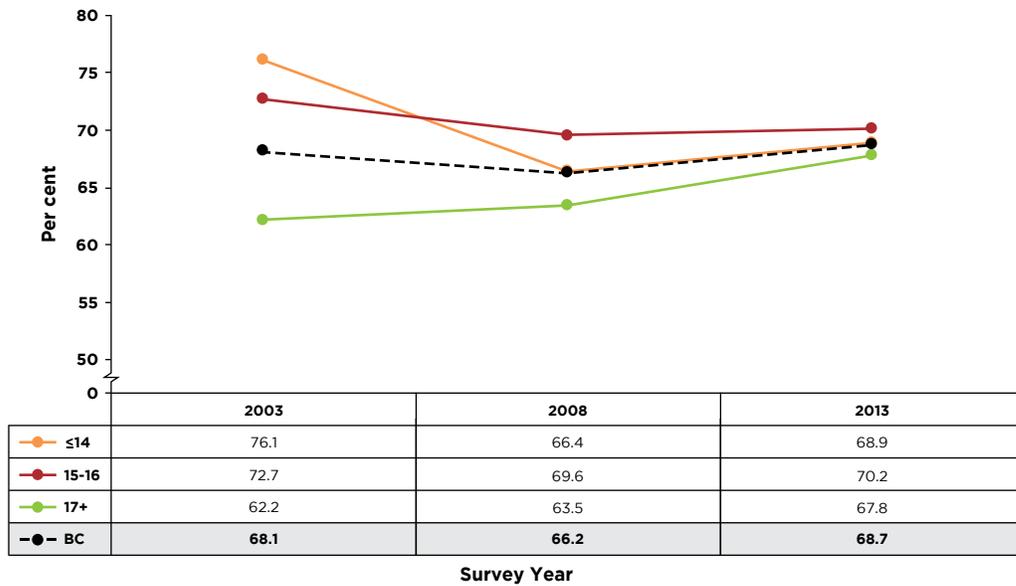
Figure 6.14 shows that there was a relationship between age and condom use among sexually active students in grades 7–12 in 2003 (with younger students having a higher proportion of condom use), but that by 2013 this difference had been substantially reduced. Looking closer at this reduction, one can see that while condom use among those age 17 and up has increased, condom use among those age 16 and under has decreased.

The percentage of sexually active adolescents who report using condoms has not varied substantially across health authorities between 2003 and 2013 (Figure 6.15). Interestingly, all health authorities saw a slight drop in this percentage in 2008, with the exception of Interior, which saw an increase.

Ensuring better reach of low-barrier harm reduction supplies (including condoms) to adolescents, as well as building protective

factors to support healthy relationships and decision-making, will be important factors in meeting this target. Since 2013, regions have received targeted annual funding to meet goals in BC's strategic policy for HIV, *From Hope to Health: Towards an AIDS Free Generation*. One of the targets in this policy was more equitable reach of harm reduction supplies, including condoms, by 2016.²² However, in 2014/15, fewer condoms per 100,000 people were distributed through the BC Centre for Disease Control's Harm Reduction Supplies program than in 2012/13.²² Condom distribution should also be supported by sexual health education; the 2008 Adolescent Health Survey found that students want sexual health education to focus more on STI prevention, contraception, and sexual assault.²⁹

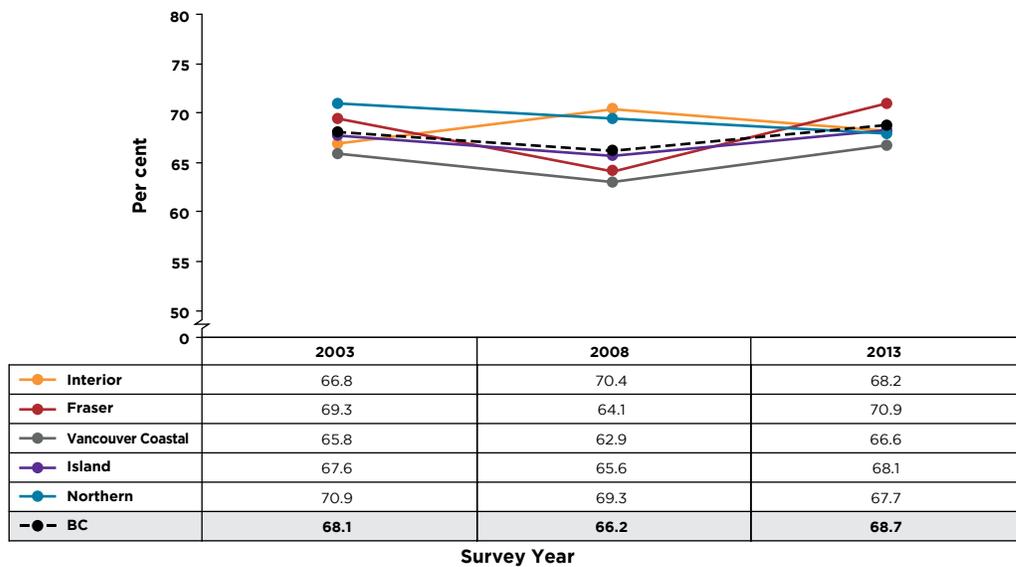
FIG 6.14 Percentage of Sexually Active Adolescents in Grades 7-12 Who Use Condoms, by Age Group, BC, 2003 to 2013



Note: See Appendix B for more information about this data source.

Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 6.15 Percentage of Sexually Active Adolescents in Grades 7-12 Who Use Condoms, by Health Authority, BC, 2003 to 2013



Notes: Changes in participating school districts and in consent procedures adopted by school districts may have affected trend results across the survey years. Health authority is based on the location of the school. See Appendix B for more information about this data source.

Source: McCreary Centre Society, Adolescent Health Survey, 2003, 2008, and 2013. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Chlamydia

Performance Measure: The percentage of young women (ages 18–24) who have had a test for chlamydia in the previous year.

Baseline: 34.7 per cent (2011)

2023 Target: 40 per cent

Chlamydia is the most commonly reported STI in BC.^{30,31} Although the health consequences of chlamydia are typically limited, a history of chlamydia infection is a risk factor for **pelvic inflammatory disease**, infertility, **ectopic pregnancy**, and chronic pelvic pain.

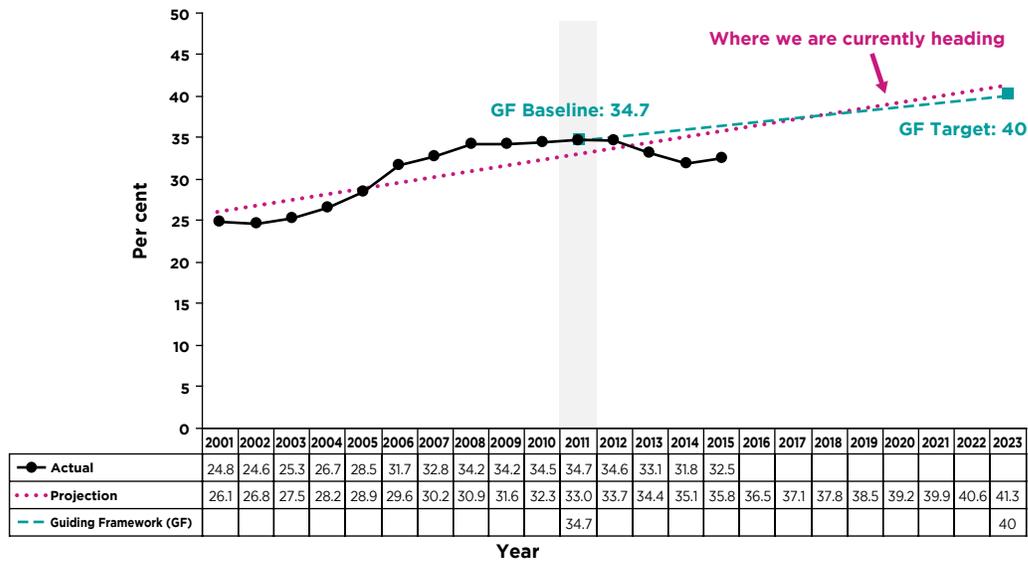
Having chlamydia (or another STI) can make both males and females more vulnerable to contracting additional STIs, including HIV. Many people who are infected with chlamydia do not experience any symptoms; therefore, routinely offered testing is important for finding and treating people who are unaware they are infected. The focus on young women for this Guiding Framework indicator is an effective way to monitor chlamydia in the population because females have a much higher rate of chlamydia diagnoses than men (353.0 per 100,000 population in 2014, compared to the male rate of 222.4 per 100,000). Furthermore, focusing on the age group of 18–24 is warranted in light of the highest rates being among females at a young age—between 15–24 years of age.³⁰ This higher rate among younger females is related to more frequent testing in females as part of a routine pelvic examination and **Pap test**,³⁰ and because males may be treated without diagnostic testing.³² However, the cervical cancer screening policy in BC has recently changed, with screening initiated at age 25 and Pap testing occurring every three years, rather than annually or biannually.³³ This change in the frequency of testing may impact chlamydia screening for women.

The Guiding Framework established a baseline percentage in 2011 of 34.7 per cent of young women (age 18–24) being tested for chlamydia in the previous year. It set a goal of increasing that to 40 per cent by 2023.

As shown in Figure 6.16, the percentage of young females (age 18–24) tested for chlamydia has increased in BC. While there have been some recent years that show a decrease, the overall longer term trend is projected to meet or exceed the target by 2023.

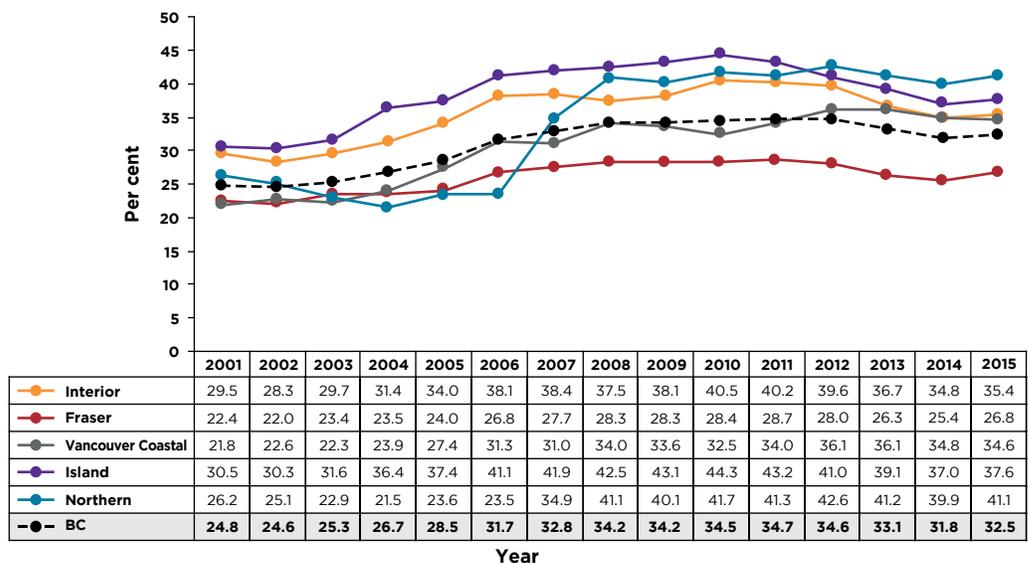
Figure 6.17 shows that there is substantial regional variation in chlamydia testing within BC; most of the health authorities share a general trend, but there was a disparity of 14 percentage points from the lowest (Fraser) to the highest (Northern) in 2015. In fact, due in part to the steep rate of increase in 2007 and 2008, Northern has already reached the provincial target, while Fraser is below the baseline at all points in time.

FIG 6.16 Actual and Projected Percentage of Females Age 18-24 Tested for Chlamydia in the Previous Year, BC, 2001 to 2023



Notes: Data are based on Medical Services Plan fee codes for chlamydia tests, and BC Centre for Disease Control Public Health Laboratory test volumes. See Appendix B for more information about this data source.
Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 6.17 Percentage of Females Age 18-24 Tested for Chlamydia in the Previous Year, by Health Authority, BC, 2001 to 2015



Notes: Data are based on Medical Services Plan fee codes for chlamydia tests, and BC Centre for Disease Control Public Health Laboratory test volumes. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.
Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Conclusion

This chapter has explored communicable disease prevention, through a review of Goal 4 of the Guiding Framework and its related performance measures. Two of the measures—incidence of hepatitis C among repeat testers, and the percentage of young women who have been tested for chlamydia in the previous year—have improved and are currently projected to meet their provincial targets; however, these performance measures also show substantial regional variation, in which some health authorities are not benefitting from the improvements seen in other areas. The percentages of children with up-to-date immunizations by their second birthday, and of newly diagnosed HIV cases with CD4 count

over 500 at diagnosis, have both shown some improvement over the years examined, but are not currently projected to meet their targets by 2023. The percentage of sexually active adolescents who reported using condoms has not changed over time in BC, which means that this indicator is also not projected to meet its target. There have been some improvements in earlier HIV diagnoses among females and more condom use reported by female youth over time. Younger age groups have the highest rate of hepatitis C, but have higher levels of early diagnoses of HIV than older age groups. The next chapter will review Goal 5 of the Guiding Framework and its associated performance measures for injury prevention.



REFERENCES

- ¹ World Health Organization. Health topics: infectious diseases [Internet]. Geneva: World Health Organization; [cited 2017 Apr 12]. Available from: http://www.who.int/topics/infectious_diseases/en/.
- ² Last JM. A dictionary of public health. New York: Oxford University Press; 2007.
- ³ Canadian Public Health Association. Twelve great achievements of public health. Ottawa, ON: Canadian Public Health Association; [cited 2017 Feb 16]. Available from: <http://www.cpha.ca/en/programs/history/achievements.aspx>.
- ⁴ BC Ministry of Health. Public health 101: the fundamentals. What is public health? Victoria, BC: BC Ministry of Health; 2014 Apr.
- ⁵ Health Canada. Tackling antimicrobial resistance and antimicrobial use: a pan-Canadian framework for action. Ottawa, ON: Health Canada; 2017 [cited 2018 Apr 17]. Available from: <https://www.canada.ca/content/dam/hc-sc/documents/services/publications/drugs-health-products/tackling-antimicrobial-resistance-use-pan-canadian-framework-action/tackling-antimicrobial-resistance-use-pan-canadian-framework-action.pdf>.
- ⁶ ImmunizeBC. Five important reasons to immunize. Vancouver, BC: BC Centre for Disease Control; 2012 [cited 2017 Feb 16]. Available from: <http://www.immunizebc.ca/facts-on-immunity/why-immunize>.
- ⁷ Public Health Agency of Canada. Not just for kids. An adult guide to vaccination. Ottawa, ON: Public Health Agency of Canada; 2017 [cited 2018 Apr 17]. Available from: <https://www.canada.ca/content/dam/hc-sc/healthy-canadians/migration/publications/healthy-living-vie-saine/pamphlet-adult-guide-vaccination-adultes-brochure/alt/pub-eng.pdf>.
- ⁸ BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ⁹ Information compiled by BC Centre for Disease Control. Rates reported by health authorities in response to a survey; 2017 Jul 19.
- ¹⁰ Vancouver Coastal Health Authority. 2012 cohort two-year-old immunization coverage survey. Vancouver, BC: Vancouver Coastal Health Authority; 2016 [cited 2017 Jun 30]. Available from: <http://www.vch.ca/Documents/VCH-Two-Year-Old-Immunization-Coverage-Rates.pdf>.
- ¹¹ HealthLink BC. Hepatitis C virus infection [Health File #40a]. Victoria, BC: HealthLink BC; 2016 Oct [cited 2018 Mar 15]. Available from: <https://www.healthlinkbc.ca/healthlinkbc-files/hepatitis-c-virus>.
- ¹² BC Centre for Disease Control. Hepatitis C [Internet]. Vancouver, BC: BC Centre for Disease Control; 2018 [cited 2018 Jan 16]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/hepatitis-c>.
- ¹³ Health Act Communicable Disease Regulation [B.C. Reg. 4/83] [statute on the Internet]; [cited 2017 Feb 16]. Available from: http://www.bclaws.ca/civix/document/id/complete/statreg/4_83#ScheduleA.
- ¹⁴ BC Ministry of Health. Healthy pathways forward: a strategic integrated approach to viral hepatitis in BC. Victoria, BC: BC Ministry of Health; 2007 May [cited 2017 Feb 16]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2007/healthypathwaysforward.pdf>.
- ¹⁵ Government of British Columbia. B.C. covers two curative hepatitis C drugs [news release]. Victoria, BC: Government of British Columbia; 2015 Mar 23 [cited 2018 Apr 17]. Available from: <https://news.gov.bc.ca/stories/bc-covers-two-curative-hepatitis-c-drugs>.
- ¹⁶ Janjua NZ, Kuo M, Yu A, Alvarez M, Wong S, Cook D. The population level cascade of care for hepatitis C in British Columbia, Canada: The BC Hepatitis Testers Cohort (BC-HTC). *EBioMedicine*. 2016;12:189-95.
- ¹⁷ Van de Laar T, Pybus O, Bruisten S, Brown D, Nelson M, Bhagani S, et al. Evidence of a large, international network of HCV transmission in HIV-positive men who have sex with men. *Gastroenterology*. 2009; 136:1609-17.
- ¹⁸ Janjua NZ, Yu A, Kuo M, Alvarez M, Cook D, Wong J, et al. Twin epidemics of new and prevalent hepatitis C infections in Canada: BC Hepatitis Testers Cohort. *BMC Infect Dis*. 2016;16:334. doi:10.1186/s12879-016-1683-z.
- ¹⁹ BC Centre for Disease Control. Hepatitis C positivity and seroconversion rate [presentation]. Vancouver, BC: BC Centre for Disease Control; 2017 May 31.
- ²⁰ BC Provincial Health Officer. HIV, stigma and society: tackling a complex epidemic and renewing HIV prevention for gay and bisexual men in British Columbia. Provincial Health Officer's annual report. Victoria, BC: BC Ministry of Health; 2014.

- ²¹ BC Centre for Disease Control. HIV/AIDS [Internet]. Vancouver, BC: Provincial Health Services Authority; [cited 2017 Apr 13]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/hiv-aids>
- ²² BC Ministry of Health. From hope to health – towards an AIDS-free generation. Victoria, BC: BC Ministry of Health; 2012 Dec [cited 2017 Apr 13]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2012/from-hope-to-health-aids-free.pdf>.
- ²³ BC Centre for Disease Control. HIV in British Columbia: annual surveillance report 2015. Vancouver, BC: BC Centre for Disease Control; 2015 [cited 2018 Jun 22]. Available from: http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/STI/HIV_Annual_Report_2015-FINAL.pdf.
- ²⁴ Office of the Provincial Health Officer. HIV testing guidelines for the Province of British Columbia. Victoria, BC: Office of the Provincial Health Officer; 2014 [cited 2018 Jun 21]. Available from: <https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/hiv-testing-guidelines-bc.pdf>.
- ²⁵ BC Centre for Disease Control. BC Point of Care HIV Testing Program. Vancouver, BC: BC Centre for Disease Control; [cited 2018 Jun 21]. Available from: <http://www.bccdc.ca/our-services/programs/point-of-care-rapid-hiv-testing>.
- ²⁶ Rotermann M. Sex, condoms and STDs among young people. *Health Rep.* 2005 May;16(3):39-45.
- ²⁷ Wellings K, Nanchahal K, Macdowall W, McManus S, Erens B, Mercer CH, et al. Sexual behaviour in Britain: early heterosexual experience. *Lancet.* 2001 Dec 1;358:1843-50. Cited by Statistics Canada. Sexual behaviour and condom use of 15- to 24-year-olds in 2003 and 2009/2010. Ottawa, ON: Statistics Canada; [modified 2015 Jul 17; cited 2017 Feb 17]. Available from: <http://www.statcan.gc.ca/pub/82-003-x/2012001/article/11632-eng.htm>.
- ²⁸ Abma JC, Martinez GM, Copen CE. Teenagers in the United States: sexual activity, contraceptive use, and childbearing, National Survey of Family Growth 2006-2008. *Vital Health Stat* 23. 2010 Jun;(30):1-57. Cited by Statistics Canada. Sexual behaviour and condom use of 15- to 24-year-olds in 2003 and 2009/2010. Ottawa, ON: Statistics Canada; [modified 2015 Jul 17; cited 2017 Feb 17]. Available from: <http://www.statcan.gc.ca/pub/82-003-x/2012001/article/11632-eng.htm>.
- ²⁹ McCreary Centre Society. Sexual health of youth in BC. Vancouver, BC: McCreary Centre Society; 2015 [cited 2018 Jan 16]. Available from: https://www.mcs.bc.ca/pdf/AHSV_sexual_health.pdf.
- ³⁰ BC Centre for Disease Control. STI in British Columbia: annual surveillance report 2014. Vancouver, BC: BC Centre for Disease Control; 2015 [cited 2016 Apr 7]. Available from: http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/STI/STI_Annual_Report_2014-FINAL.pdf.
- ³¹ Public Health Agency of Canada. Canadian guidelines on sexually transmitted infections. Ottawa, ON: Public Health Agency of Canada; 2016 [cited 2016 Apr 07]. Available from: <http://www.phac-aspc.gc.ca/std-mts/sti-its/guidelinesdir-eng.php>.
- ³² Braverman PK. Sexually transmitted diseases in adolescents. *Med Clin North Am.* 2000;84(4):869-89. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ³³ BC Cancer. BC cancer screening: cervix [Internet]. Vancouver, BC: Provincial Health Services Authority; [cited 2018 Apr 17]. Available from: <http://www.bccancer.bc.ca/screening/health-professionals/cervix>.

7

Injury Prevention

In 2011, injuries were the leading cause of death for British Columbians age 1–44.¹ In 2010, over 2,000 people died, and more than 450,000 were treated in emergency departments, due to injury.² In addition to the costs and harms to individuals and their families, injuries are a significant economic burden on the health system in BC. In 2010, injuries cost British Columbians \$3.7 billion, which includes \$2.3 billion in direct costs and \$1.4 billion in indirect costs.²

The vast majority of injuries are preventable, and injury prevention is an important priority in BC. Injuries can be classified as either **unintentional**^{†2} (e.g., motor vehicle crashes, falls, most poisonings, sport-related injuries) or intentional (e.g., interpersonal violence, self-harm). Unintentional injuries account for the majority of injuries in BC; for example, in 2010, unintentional injuries accounted for 70 per cent of injury-related deaths, and 86 per cent of injury-related hospitalizations.² In 2010, falls and transport incidents were the top causes of hospitalization due to injury, and were the leading causes of death due to injury.²

Due to the overdose crisis described earlier in this report, there has been a substantial increase in the number of deaths caused by illegal drug use in BC. According to a recent report by the BC Coroners Service, illicit drug use as a cause of unnatural death in BC increased at a substantial rate from

2015 to 2017. It became the leading cause of unnatural death in BC in 2016, and by 2018 was responsible for more deaths than all other top causes combined (motor vehicle incidents, suicides, homicides).³ In fact, as shown in Chapter 1, the overdose crisis is now contributing to a decrease in life expectancy at birth in BC.

Injury prevention—whether intentional or unintentional injuries—means eliminating hazards and managing risks at all levels of society, while also maintaining healthy, active, and safe communities and lifestyles.⁴ Injury prevention integrates the following four domains:

- Education – educating individuals about changing behaviours, in order to reduce injuries.
- Enforcement – involves safety legislation and policies, including passing, strengthening, and enforcing voluntary standards, regulations, and laws.
- Engineering and Environmental Design – making the design, development, and manufacture of products and the built environment safer.
- Engagement – stakeholders working together on systemic change to prevent injuries.^{5,6}

[†] Unintentional injury can be defined as an injury that is not purposely inflicted, either by the person or anyone else. In the past, unintentional injuries were referred to as accidental injuries.



Guiding Framework Goal 5: Injury Prevention

Goal Statement

A safer province that reduces the risk of preventable injuries.

Objectives

The objectives for Goal 5 of the Guiding Framework focus on reducing the incidence of injuries, including those among seniors, children, and youth, and building a culture of safety:

1. Build a culture of safety at work, home and play by increasing awareness of injury risks, implementing prevention education and taking priority actions, such as designing and developing safe environments, systems and products.
2. Reduce the incidence of falls, fall-related injuries and fall-related risk factors among seniors in BC through surveillance, enhanced community capacity, public information and evidence-based prevention measures.
3. Reduce the incidence of injuries among children and youth in BC through physical and social environmental modifications and increased awareness of safety-promoting behaviours.

Performance Measures

Within Goal 5 of the Guiding Framework, there are three performance measures:

- The age-standardized hospitalization rate for unintentional injuries (per 1,000 population).
- The age-standardized mortality rate for unintentional injuries (per 100,000 population).
- The age-standardized rate of fall-related hospitalizations for British Columbians age 75+ (per 1,000 population).

Hospitalization Rate for Unintentional Injuries

Performance Measure: The age-standardized hospitalization rate for unintentional injuries (per 1,000 population).

Baseline: 7.7 per 1,000 population (2010/11) **2023 Target:** 6.2 per 1,000 population

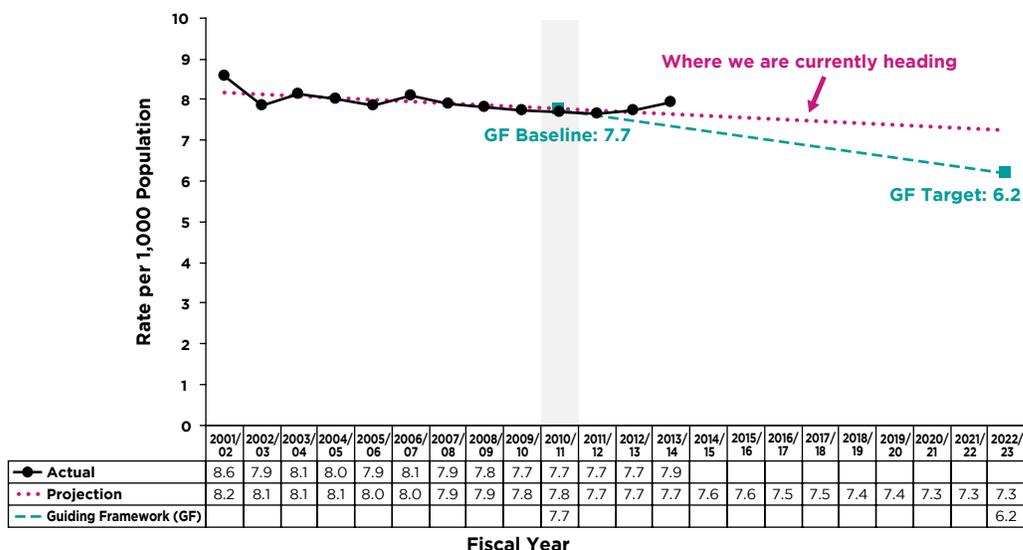
The baseline established in the Guiding Framework for this indicator was 7.7 per 1,000 population in 2010/11. The related target is to reduce this to 6.2 per 1,000 by 2022/23.

Figure 7.1 shows that, over the last decade, the hospitalization rate for unintentional injuries has been decreasing, although not enough to reach the target by 2023. However, the most recent data now show an increase in the rate, which, if it continues, will actually move the trend further away from the target. It is likely that the current overdose crisis began to have a small impact on these trends in the last year of data shown (2013/14), but the impact of the crisis is still developing, and will likely be more pronounced in subsequent years.

As shown in Figure 7.2, there has been a disparity based on sex, whereby males have a higher rate of hospitalizations due to unintentional injury than females. However, while the female rate has been relatively stable over time, the rate among males has slightly decreased, and accounts for the reduction observed at the population level (shown in Figure 7.1). This decrease among males has also resulted in a narrowing of the disparity with the female rate.



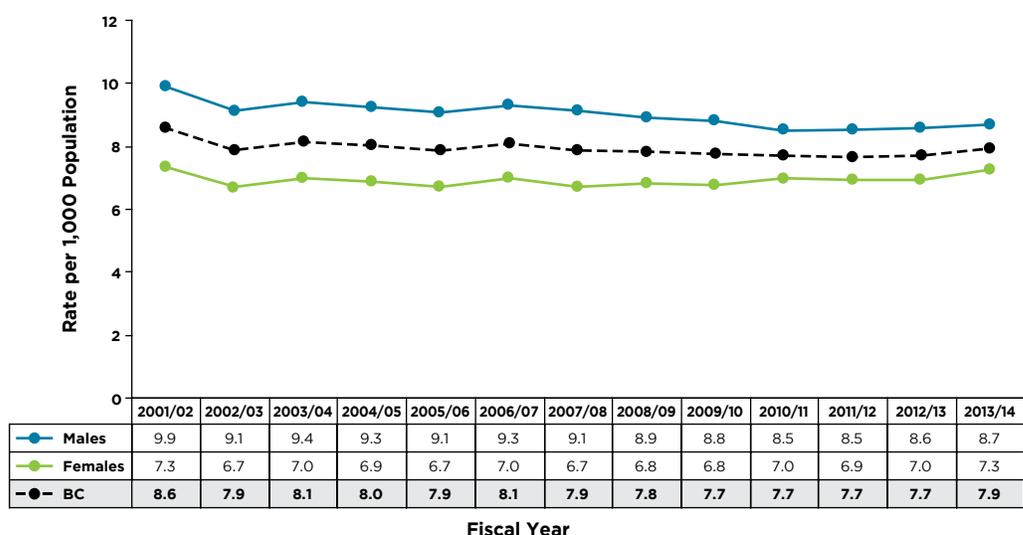
FIG 7.1 Actual and Projected Age-standardized Rate of Hospitalizations for Unintentional Injuries, BC, 2001/02 to 2022/23



Notes: "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. "Hospitalizations" include acute care, rehabilitation, surgical and day care procedures, and exclude emergency room and outpatient visits. Standardized to the Canada 1991 population. See Appendix B for more information about this data source.

Source: BC Ministry of Health, Discharge Abstract Database. Data extracted from the BC Injury Research and Prevention Unit Injury Data Online Tool. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

FIG 7.2 Age-standardized Rate of Hospitalizations for Unintentional Injuries, by Sex, BC, 2001/02 to 2013/14



Notes: "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. "Hospitalizations" include acute care, rehabilitation, surgical and day care procedures, and exclude emergency room and outpatient visits. Standardized to the Canada 1991 population. See Appendix B for more information about this data source.

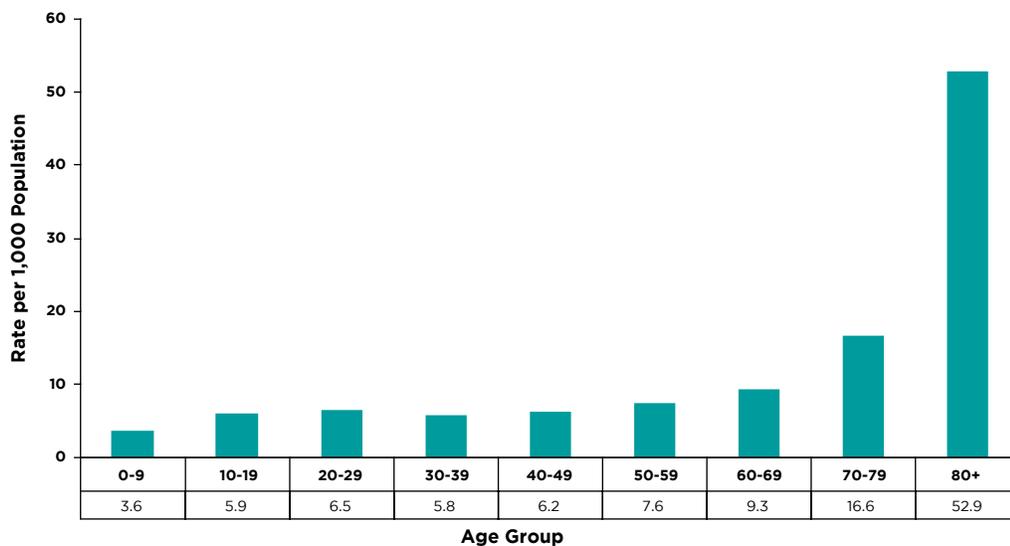
Source: BC Ministry of Health, Discharge Abstract Database. Data provided by the BC Injury Research and Prevention Unit, University of British Columbia. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

Figure 7.3 demonstrates that the majority of hospitalizations due to unintentional injuries for 2009/10–2013/14 were among the more elderly population in BC, including those age 70–79 and particularly those over age 80. This is primarily related to hospitalizations due to falls (see Figure 7.4).

Figure 7.4 shows that at a rate of 3.83 per 1,000 population, falls are the cause of the vast majority of hospitalizations due to unintentional injuries. This is the reason for the higher burden of hospitalizations among British Columbians over age 70 (see Figure 7.3). Transport-related injuries are the second highest, at 1.28 per 1,000 population. Hospitalizations related to the overdose crisis are included in “poisoning” in this figure; however, as discussed earlier, the impact of the crisis is still developing and will likely have a more pronounced effect on data trends in subsequent years.

Figure 7.5 shows that there is substantial regional variation across the province in the rates of hospitalization due to unintentional injuries: Northern and Interior have the highest rates, and Vancouver Coastal and Fraser have the lowest. The recent slight increase in the rate is a trend seen across all health authorities.

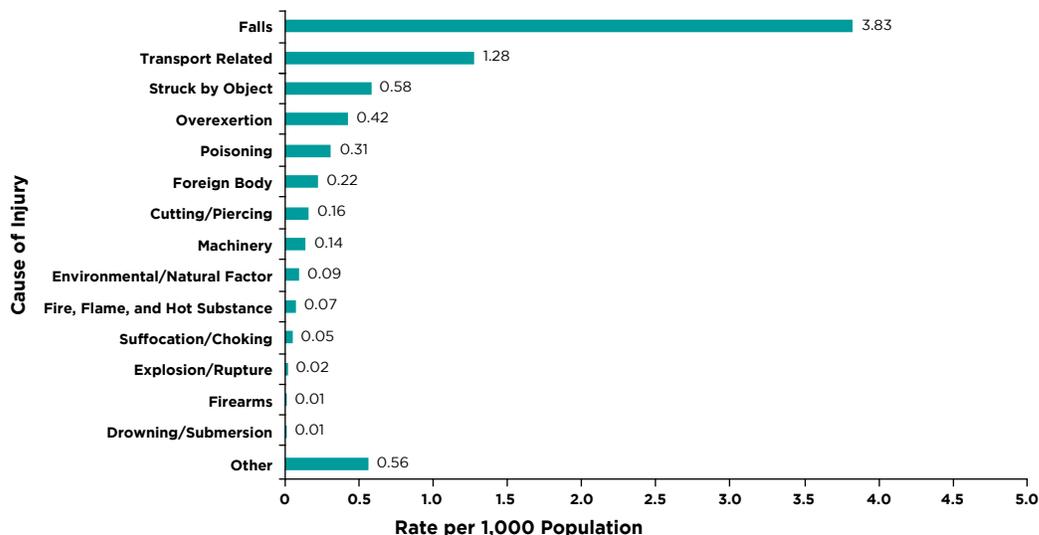
FIG 7.3 Rate of Hospitalizations for Unintentional Injuries, by Age Group, BC, 2009/10-2013/14



Notes: "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. "Hospitalizations" include acute care, rehabilitation, surgical and day care procedures, and exclude emergency room and outpatient visits. Standardized to the Canada 1991 population. See Appendix B for more information about this data source.

Source: BC Ministry of Health, Discharge Abstract Database. Data provided by the BC Injury Research and Prevention Unit, University of British Columbia. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

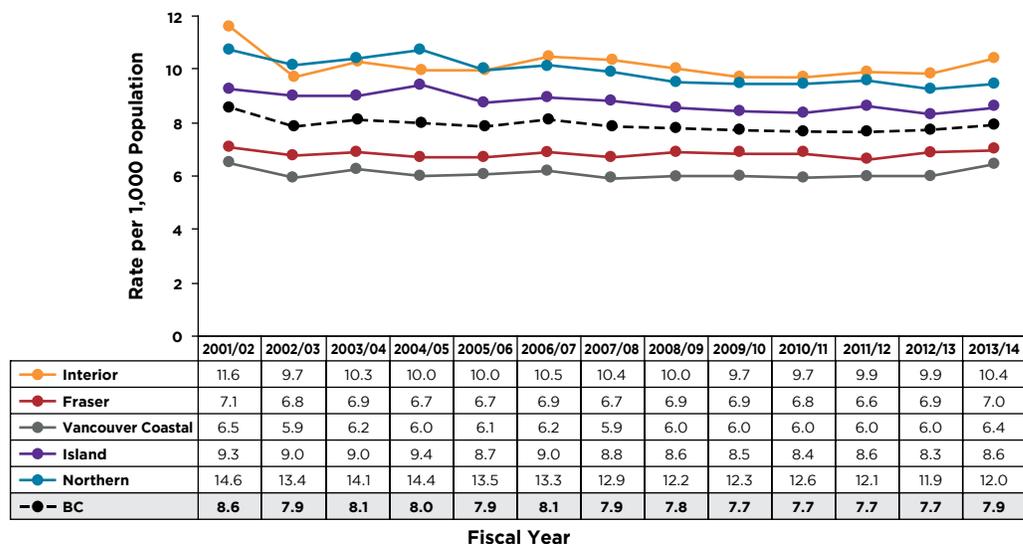
FIG 7.4 Age-standardized Hospitalization Rate for Unintentional Injuries, by Injury Cause, BC, 2009/11-2013/14



Notes: "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. "Hospitalizations" include acute care, rehabilitation, surgical and day care procedures, and exclude emergency room and outpatient visits. "Other" includes exposure to electricity/radiation, high pressure jet or noise/vibration, prolonged stay in weightless environment, and exposure to other or unspecified factors, forces, and accidents. Standardized to the Canada 1991 population. See Appendix B for more information about this data source.

Source: BC Ministry of Health, Discharge Abstract Database. Data provided by the BC Injury Research and Prevention Unit, University of British Columbia. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, May 2017.

FIG 7.5 Age-standardized Rate of Hospitalizations for Unintentional Injuries, by Health Authority, BC, 2001/02 to 2013/14



Notes: "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. "Hospitalizations" include acute care, rehabilitation, surgical and day care procedures, and exclude emergency room and outpatient visits. Standardized to the Canada 1991 population. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.

Source: BC Ministry of Health, Discharge Abstract Database. Data extracted from the BC Injury Research and Prevention Unit Injury Data Online Tool. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, December 2016.

Mortality Rate for Unintentional Injuries

Performance Measure: The age-standardized mortality rate for unintentional injuries (per 100,000 population).

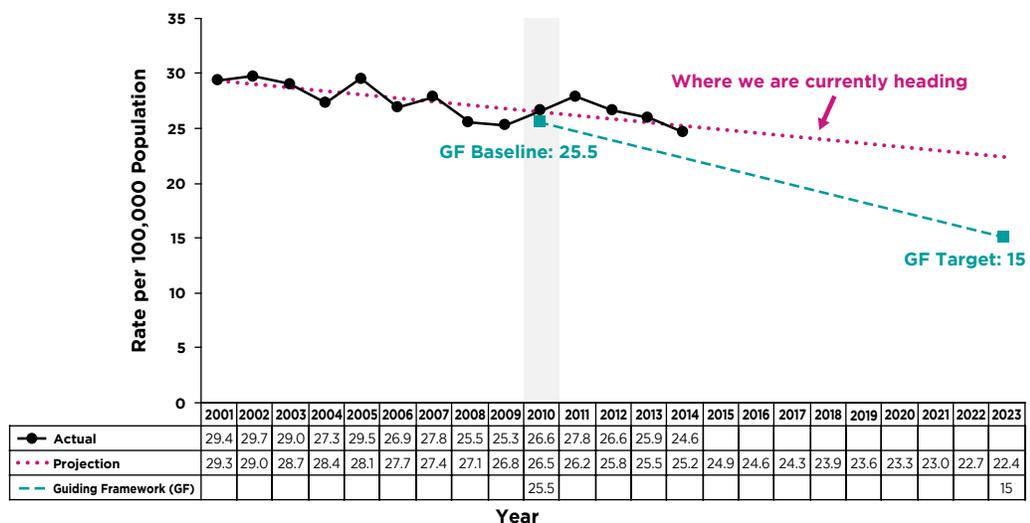
Baseline: 25.5 per 100,000 population (2010) **2023 Target:** 15 per 100,000 population

Over 2,000 people died from injuries in BC in 2010, which is equivalent to one death from injury every 4.4 hours.² The leading causes of unintentional injury mortality, in order, were falls, motor vehicle crashes, and unintentional poisoning.²

The Guiding Framework established a baseline in 2010 for this indicator of 25.5 per 100,000 population. The target is to reduce this to 15 per 100,000 by 2023.

Figure 7.6 shows the rate of deaths due to unintentional injuries in BC from 2001 to 2014. It indicates noticeable year-to-year fluctuations but an overall downward trend. While this measure is moving in a positive direction, it is not currently projected to reach the target by 2023. As discussed earlier in this report, the overdose crisis began affecting mortality rates by 2014, which impacts the last year of data shown here; however, the full effect of the crisis will be seen in subsequent years.

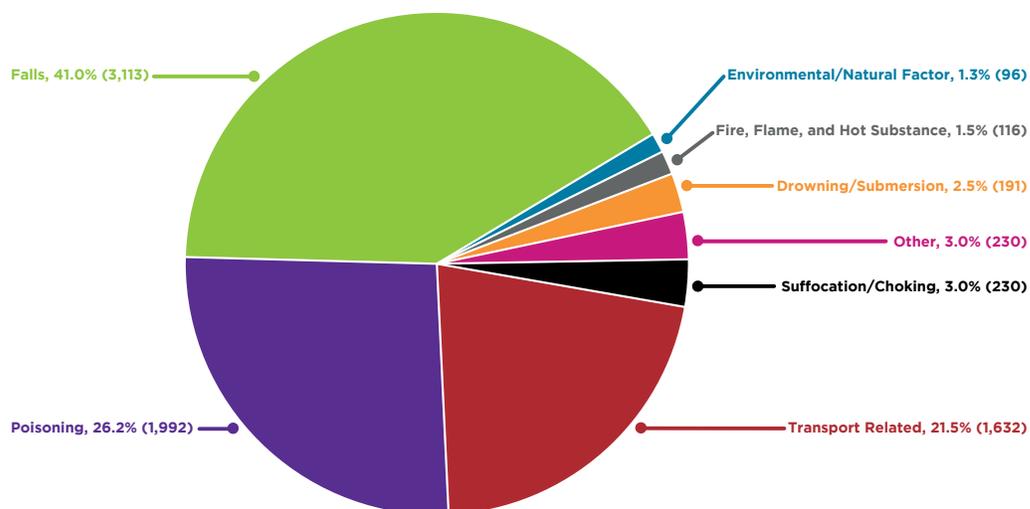
FIG 7.6 Actual and Projected Age-standardized Mortality Rate for Unintentional Injuries in BC, 2001 to 2023



Notes: After the release of the Guiding Framework, death data were updated; therefore, the actual percentage in 2010 varies slightly from the Guiding Framework baseline value. Data include all deaths occurring in BC as a result of unintentional injury, excluding non-BC residents. The denominator uses BC Stats population estimates (from P.E.O.P.L.E. 41) that include only BC residents. "Unintentional Injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. Standardized to the Canada 1991 population. See Appendix B for more information about this data source.

Source: BC Vital Statistics Agency. Data extracted and prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, January 2018.

FIG 7.7 Proportion of Mortalities for Unintentional Injuries, by Underlying Cause of Death, BC, 2010-2014



Notes: "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. "Poisoning" includes accidental poisoning and exposure to noxious substances, such as poisoning from alcohol and other drugs. "Other" includes cutting/piercing, firearms, explosion/rupture, machinery, and struck by object. Standardized to the Canada 1991 population. See Appendix B for more information about this data source.

Source: BC Vital Statistics Agency, June 2017. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

Figure 7.7 shows the proportionate distribution of deaths due to unintentional injuries, in which falls are responsible for the largest proportion (41.0 per cent), followed by poisoning (26.2 per cent), and transport-related injuries (21.5 per cent). The current overdose crisis began impacting these rates in 2014; as a result, data analysis in subsequent years will likely show a further increase in the rate of death due to unintentional injuries caused by "poisoning".

As shown in Figure 7.8, males in BC have a substantially higher rate of mortality due to unintentional injuries; in fact, while the rates are decreasing and the gap appears to be narrowing, in 2014, the rate among males (34.2 per 100,000 population) was still more than double the rate of females (15.2 per 100,000 population). The overdose crisis is differentially affecting males⁷ and this will likely result in a widening of this sex disparity in future years.

As shown in Figure 7.9, British Columbians age 70 and up carry the vast majority of the burden of mortality due to unintentional injuries in the province. The mortality rate of 274.2 per 100,000 population among those age 80 and up far surpasses every other age group. This is very similar to the finding presented in Figure 7.3, which shows that the age-specific rate for hospitalization due to unintentional injuries was also highest for British Columbians age 80 and up.

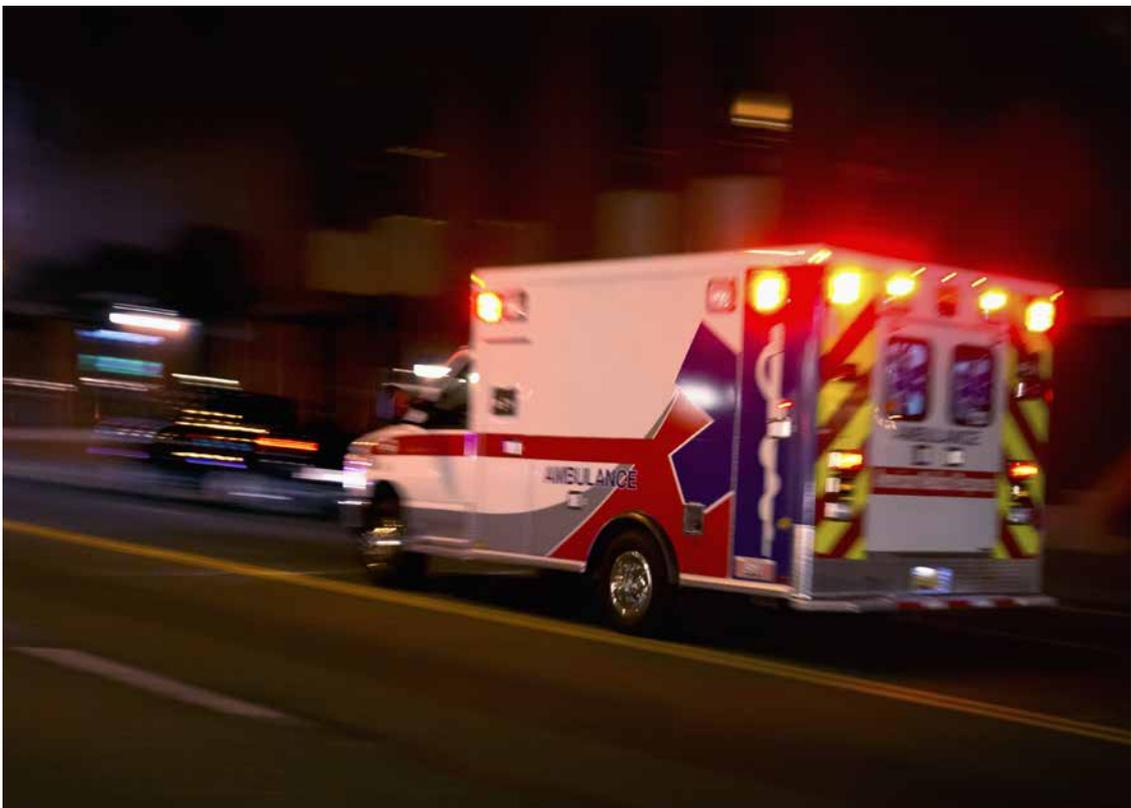
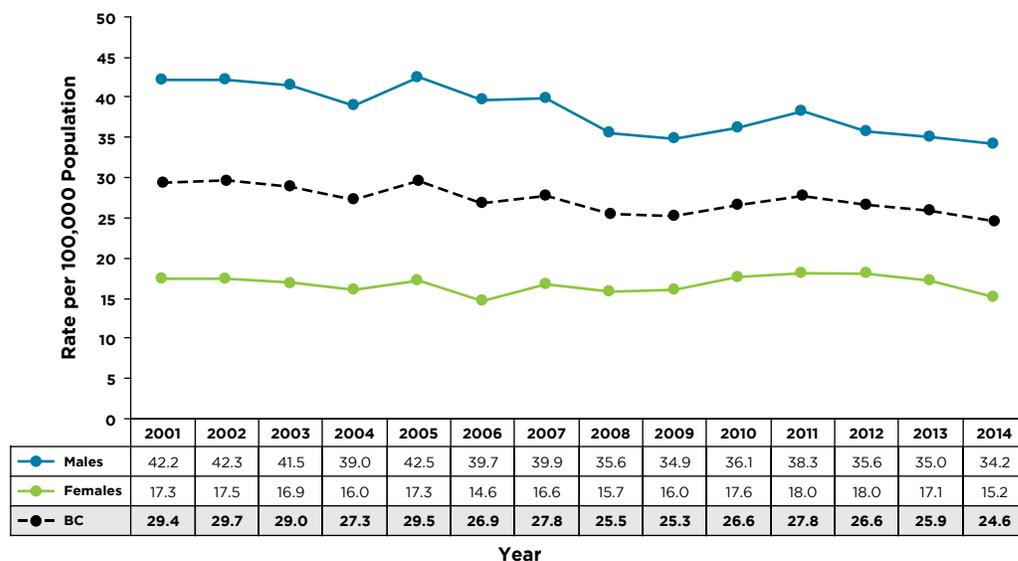
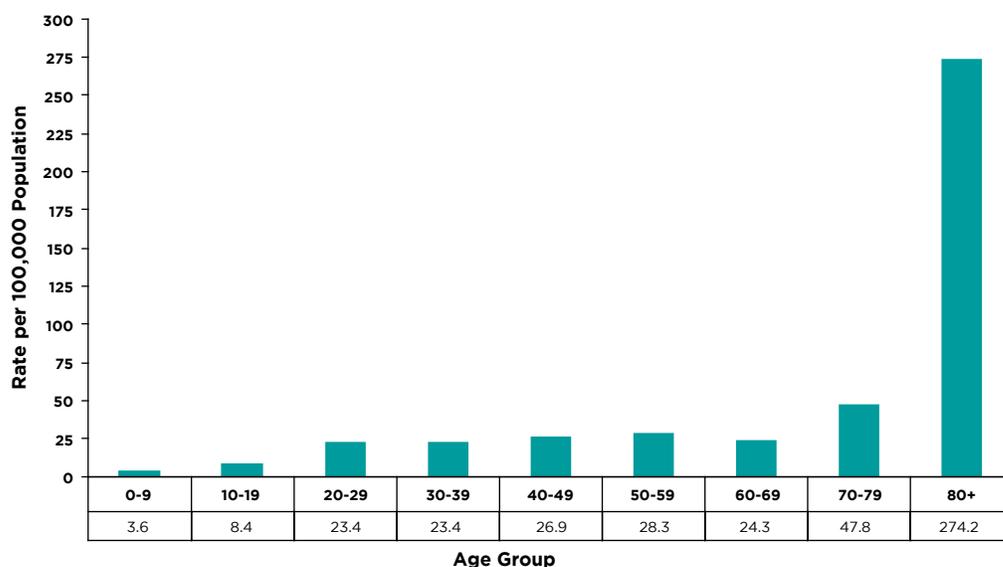


FIG 7.8 Age-standardized Mortality Rate for Unintentional Injuries, by Sex, BC, 2001 to 2014



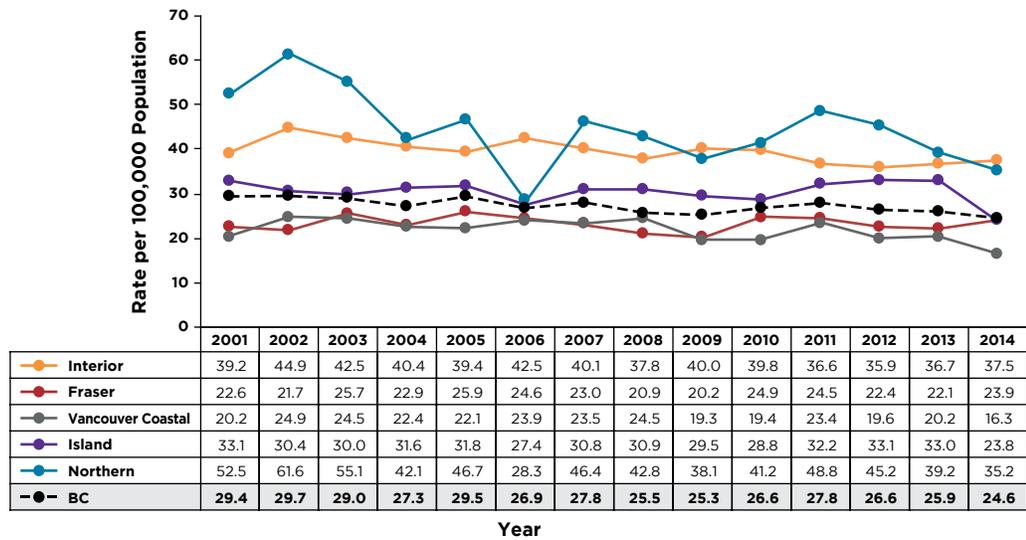
Notes: Data include only deaths occurring in BC as a result of unintentional injury among BC residents. "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. Standardized to the Canada 1991 population. See Appendix B for more information about this data source.
Source: BC Vital Statistics Agency, data as of June 2017. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 7.9 Mortality Rate for Unintentional Injuries, by Age Group, BC, 2001-2014



Notes: Data include only deaths occurring in BC as a result of unintentional injury among BC residents. "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. See Appendix B for more information about this data source.
Source: BC Vital Statistics Agency, data as of June 2017. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 7.10 Age-standardized Mortality Rate for Unintentional Injuries, by Health Authority, BC, 2001 to 2014



Notes: Data include only deaths occurring in BC as a result of unintentional injury among BC residents. "Unintentional injuries" are injuries that are not purposely inflicted, either by the injured person or anyone else. Standardized to the Canada 1991 population. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.
Source: BC Vital Statistics Agency, data as of June 2017. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

Figure 7.10 shows that there is substantial regional variation in age-standardized mortality due to unintentional injuries, with notably high rates in Northern and Interior. There is also a high level of year-to-year variation, particularly for Northern. Despite this variability, the overall provincial trend decreased across the years shown.

Fall-related Hospitalizations

Performance Measure: The age-standardized rate of fall-related hospitalizations for British Columbians age 75+ (per 1,000 population).

Baseline: 28.2 per 1,000 population (2009/10) **2023 Target:** 25 per 1,000 population

Falls were the leading cause of direct health care costs due to injury in BC in 2010, accounting for 42 per cent of all direct costs.² In that year, fall-related injuries resulted in hospital costs of \$415 million, and a total cost of \$1.2 billion.² Falls are the leading cause of injury-related deaths and hospitalizations for BC seniors, and fall-related hospitalizations have been increasing since 2000 for those aged 65 and over.⁸ Seniors with fall-related injuries tend to stay in hospital nearly twice as long as seniors hospitalized for other injuries.⁹ A 2010 Canadian study found that falls can result in a shift toward seniors moving into long-term care; this study found that

35 per cent of seniors who were hospitalized for a fall were discharged to long-term care, which was almost double the proportion of seniors who were already living in long-term care when they fell.¹⁰ Falls among seniors can have other negative outcomes as well, including loss of autonomy, and greater isolation, confusion, and depression.¹¹

The Guiding Framework established a baseline for this indicator of 28.2 per 1,000 population age 75 and up in 2009/10. The target for this measure is to reduce this to 25 per 1,000 population by 2022/23.

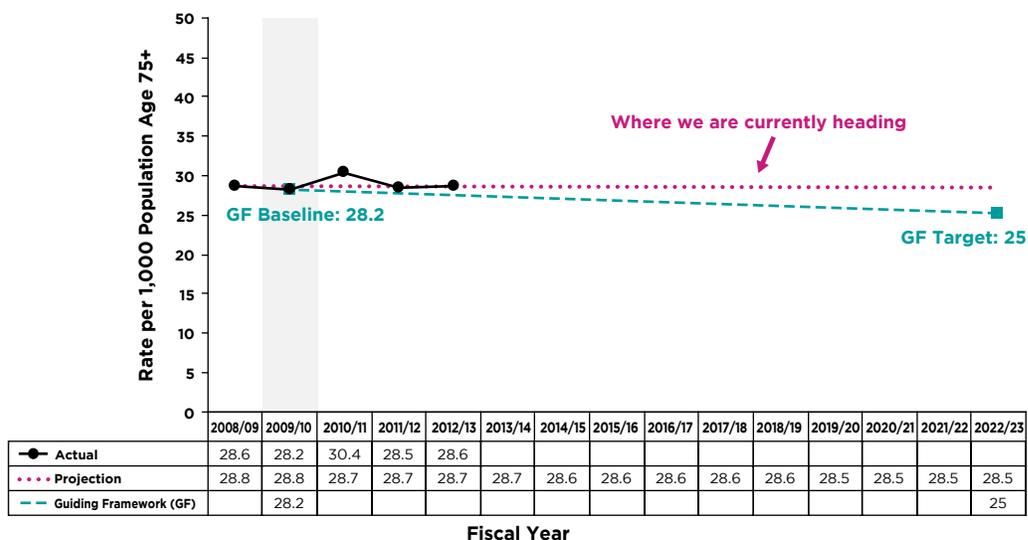


As shown in Figure 7.11, there was an increase in the rate in the year after the baseline, and overall there have not been any substantial or sustained improvements over the past five years. However, the projection line presented is based on a small number of data points, and as additional data become available the projection may alter.

Figure 7.12 shows a substantial disparity in hospitalizations due to falls according to sex, with females having a much greater burden of injury for all years 2008/09 to 2012/13.

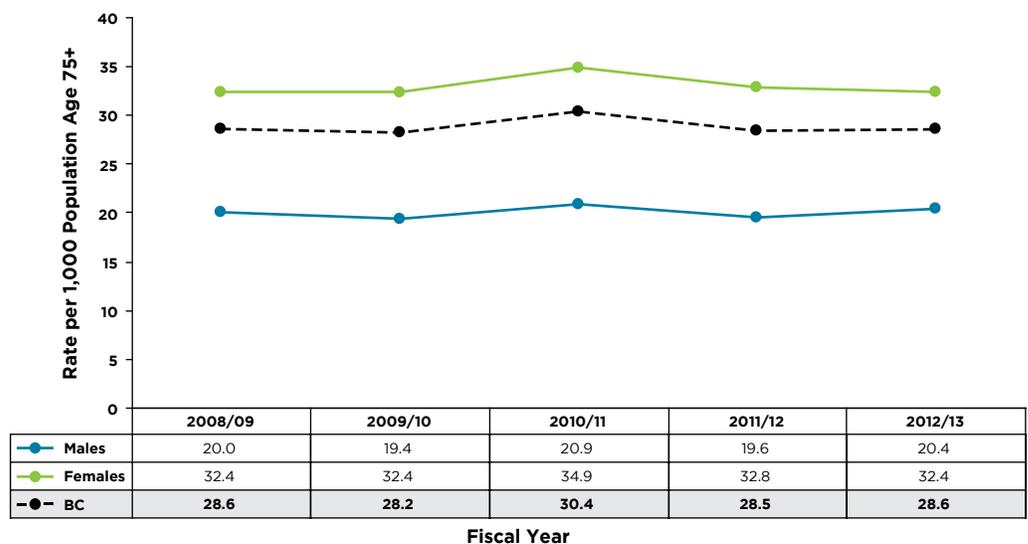


FIG 7.11 Actual and Projected Age-standardized Rate of Hospitalizations for Falls, Age 75+, BC, 2008/09 to 2022/23



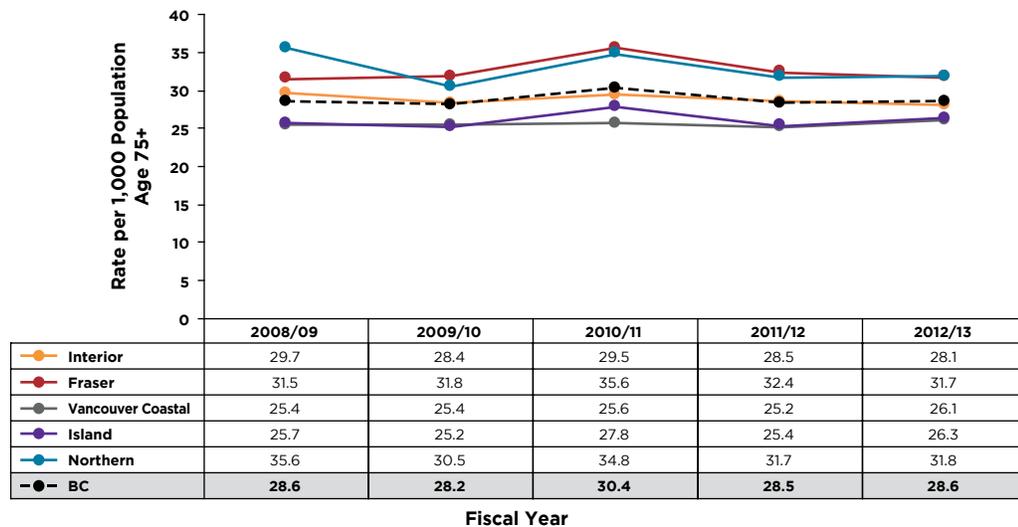
Notes: "Hospitalizations" include inpatient hospital stays, and exclude ambulatory care, emergency room visits, and outpatient visits. These data include in-hospital falls and falls that are incidental on admission. Standardized to the BC 1991 population. See Appendix B for more information about this data source.
Source: BC Ministry of Health, Discharge Abstract Database. Prepared by Hospital, Diagnostics and Workforce Branch, Health Sector Information, Analysis and Reporting Division, BC Ministry of Health; and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

FIG 7.12 Age-standardized Rate of Hospitalizations for Falls, Age 75+, by Sex, BC, 2008/09 to 2012/13



Notes: "Hospitalizations" include inpatient hospital stays, and exclude ambulatory care, emergency room visits, and outpatient visits. These data include in-hospital falls and falls that are incidental on admission. Standardized to the BC 1991 population. See Appendix B for more information about this data source.
Source: BC Ministry of Health, Discharge Abstract Database. Prepared by Hospital, Diagnostics and Workforce Branch, Health Sector Information, Analysis and Reporting Division, BC Ministry of Health; and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, April 2017.

FIG 7.13 Age-standardized Rate of Hospitalizations for Falls, Age 75+, by Health Authority, BC, 2008/09 to 2012/13



Notes: "Hospitalizations" include inpatient hospital stays, and exclude ambulatory care, emergency room visits, and outpatient visits. These data include in-hospital falls and falls that are incidental on admission. Standardized to the BC 1991 population. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.

Source: BC Ministry of Health, Discharge Abstract Database. Prepared by Hospital, Diagnostics and Workforce Branch, Health Sector Information, Analysis and Reporting Division, BC Ministry of Health; and Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, March 2017.

There is some variation among health authorities on this measure (Figure 7.13). Fraser and Northern had the highest rates over the years shown, while Vancouver Coastal and Island had the lowest.

Conclusion

This chapter has explored unintentional injuries in BC, and related rates of hospitalizations and death, through a review of Goal 5 of the Guiding Framework and the related performance measures. For two out of the three measures explored—hospitalizations and mortality due to unintentional injuries—the trends are moving in a positive direction, but are doing so at a much slower pace than is needed to reach the established provincial targets. The third, hospitalizations for falls (age 75 and up), has not shown meaningful change in either direction over time. Geographic analyses show that populations in

Northern and Interior have the highest rates of both hospitalizations and mortality due to unintentional injuries, while populations in Fraser and Northern have the highest rates of hospitalizations due to falls among those age 75 and up. Analyses by age show that British Columbians over age 70 account for the vast majority of hospitalizations and deaths that were due to unintentional injuries. In addition, the mortality rate due to unintentional injuries among males is more than double that of females in BC. The majority of deaths due to unintentional injury in BC were caused by falls, poisoning, and transport-related incidents.

The current overdose crisis only became evident in 2014—the end of the time period examined in this chapter. It is expected that in subsequent years, we will see increased rates of hospitalizations and deaths due to unintentional injuries classified as “poisoning”. The next chapter will look at environmental health, through a review of the performance measures in Goal 6 of the Guiding Framework.

REFERENCES

- ¹ British Columbia Vital Statistics Agency. Selected vital statistics and health status indicators: one hundred and fortieth annual report 2011. Victoria, BC: Ministry of Health; 2011 [cited 2017 Apr 11]. Available from: <http://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/statistics-reports/annual-reports/2011/pdf/ann2011.pdf>.
- ² BC Injury Research and Prevention Unit. Economic burden of injury in British Columbia. Vancouver, BC: BC Injury Research and Prevention Unit; 2015 Aug [cited 2017 Feb 21]. Available from: <http://www.injuryresearch.bc.ca/wp-content/uploads/2015/08/BCIRPU-EB-2015.pdf>.
- ³ BC Coroners Service. Illicit drug overdose deaths in BC. January 1, 2008 – March 31, 2018. Vancouver, BC: BC Coroners Service; [cited 2018 May 16]. Available from: <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/death-investigation/statistical/illicit-drug.pdf>.
- ⁴ BC Injury Prevention and Research Unit. The British Columbia casebook for injury prevention. Vancouver, BC: BC Injury Prevention and Research Unit; 2015 Aug [cited 2017 Feb 21]. Available from: <http://www.injuryresearch.bc.ca/reports/casebook/>.
- ⁵ BC Ministry of Health. Promote, protect, prevent: our health begins here. BC’s guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ⁶ BC Provincial Health Officer. Where the rubber meets the road: reducing the impact of motor vehicle crashes on health and well-being in BC. Victoria, BC: BC Office of the Provincial Health Officer; 2016.
- ⁷ BC Ministry of Mental Health and Addictions. Responding to BC’s illegal drug overdose epidemic progress update – January 2018. Victoria, BC: BC Ministry of Mental Health and Addictions; 2018 Jan [cited 2018 Apr 17]. Available from: https://www2.gov.bc.ca/assets/gov/overdose-awareness/final_responding_to_bcs_opioid_overdose_epidemic_-_progress_updatejan_2018.pdf.
- ⁸ BC Injury Research and Prevention Unit. Seniors’ fall prevention [Internet]. Vancouver, BC: BC Injury Research and Prevention Unit; 2016 [cited 2017 Feb 21]. Available from: <http://www.injuryresearch.bc.ca/quick-facts/seniors-falls-prevention/>.
- ⁹ Data prepared by Population Health Surveillance and Epidemiology, Ministry of Health, January 2014. Source: Acute/rehab. Separations from 2008/2009 to 2012/2013 Canadian Institute of Health Information Discharge Abstract Dataset.
- ¹⁰ Scott V, Wagar L, Elliott S. Falls & related injuries among older Canadians: fall-related hospitalizations & intervention initiatives. Victoria, BC: Victoria Scott Consulting; 2010 [cited 2017 Oct 6]. Available from: http://www.hiphealth.ca/media/research_cemfia_phac_epi_and_inventor_20100610.pdf.
- ¹¹ Public Health Agency of Canada. Seniors’ falls in Canada. Second report. Ottawa, ON: Public Health Agency of Canada; 2014 [cited 2017 Oct 6]. Available from: https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/seniors-aines/publications/public/injury-blessure/seniors_falls-chutes_aines/assets/pdf/seniors_falls-chutes_aines-eng.pdf.

8

Environmental Health

The environment in which we live can have a direct bearing on our health; it can help to build health and well-being, or it can contribute to outbreaks of disease and acute and chronic illness, and undermine quality of life and well-being. **Environmental health** is the branch of public health concerned with protecting the health of the public by assessing, correcting, controlling, and preventing factors in the environment that can negatively affect human health.¹ Compared to other parts of the world, BC has good drinking water quality and air quality, and a generally safe food supply. However, outbreaks of foodborne or waterborne disease can have serious impacts on the health of the population. Clean water, food, and air, and safe living environments have a profound impact on a community's health, especially for underserved sub-populations, such as people in care.²

Some responsibilities for environmental health, and for safeguarding related health outcomes for the population, lie with the Ministry of Health, while many others lie with the Ministry of Environment and Climate Change Strategy and the Ministry of Forests, Lands, Natural Resource Operations and Rural Development, as well as other government

ministries and organizations. Within the Ministry of Health and regional health authorities, most components of environmental health fall within the program area of health protection. Health protection refers to actions that protect a population against potential environmental health risk. It works at a population level through the development, monitoring, and enforcement of legislation and accompanying regulations as well as through policy development.³ It covers areas such as inspection and monitoring of **food premises**, drinking water facilities, and others. In addition to legislation and policies related to the physical environment, BC also has legislation in place to ensure the health, safety, and well-being of children, youth, and adults in licensed **community care facilities**.⁴ These facilities need to be monitored to make sure they are safe, nurturing living environments for the people who attend them or live there.

⁴ The *Community Care and Assisted Living Act* defines a community care facility as "...a premises or part of a premises (a) in which a person provides care to 3 or more persons who are not related by blood or marriage to the person and includes any other premises or part of a premises that, in the opinion of the medical health officer, is used in conjunction with the community care facility for the purpose of providing care, or (b) designated by the Lieutenant Governor in Council to be a community care facility."



The effect of the environment on the health of the BC population is the focus of Goal 6 of *Promote, Protect, Prevent: Our Health Begins Here*. BC's *Guiding Framework for Public Health* (the Guiding Framework). The goal statement is as follows: *Environments that optimize and support good health*. This includes monitoring the **built environment** in which people live, and potential routes of environmental exposures, such as soil, air, food, and water supplies; and the living environment of people who attend or reside in licensed community care facilities. Unfortunately, monitoring environmental health is currently restricted by

the limitations of available data. More work is needed both to develop a more comprehensive suite of performance measures that provide a meaningful overview of environmental health in BC, including climate change, and to develop the data collection and storage mechanisms to monitor them. A discussion about potential indicators for monitoring environmental health in the future is provided near the end of this chapter. In the interim, performance measures for this goal of the Guiding Framework and the analyses presented in this report use the best data currently available.

Guiding Framework Goal 6: Environmental Health

Goal Statement

Environments that optimize and support good health.

Objectives

The objectives for Goal 6 of BC's Guiding Framework focus on ensuring the availability of clean water, food, and air, and providing safe living environments, particularly for vulnerable (underserved) populations such as people in care:

1. Improve the safety of drinking water for British Columbians by implementing actions under the Action Plan for Safe Drinking Water.
2. Reduce the incidence of foodborne illness by improving current food safety policies and practices, and improving outcomes in food facilities.
3. Reduce risks to human health through partnerships that improve the stewardship of food, water, land and air.
4. Protect the health, safety and well-being of individuals being cared for in licensed community care facilities through ongoing inspection, risk assessment, monitoring and enforcement of legislation, policy and guidelines.

Performance Measures

There is a lack of consistent and reliable data available to support the monitoring of environmental health in BC. Therefore, with this acknowledged limitation, until data are available to inform more meaningful measures, there are five metrics in the Guiding Framework that provide some information about the safety of food and water supplies and licensed care facility environments in BC. The five current performance measures are as follows:

- Shigatoxigenic *E. coli* crude rate (per 100,000 population).
- Listeriosis crude rate (per 100,000 population).
- Salmonellosis crude rate (per 100,000 population).
- The percentage of households with municipal water supplies reporting that they boiled their drinking water during the previous 12 months in order to make it safe to drink.
- The percentage of persons residing in licensed community care facilities rated as low risk, based on inspections by health authority licensing officers.

The first three performance measures relate to **enteric disease**. Enteric disease is a group of diseases or illnesses associated with ingestion of food and/or water contaminated by microorganisms and microbial toxins that attack the gastrointestinal tract.⁵

E. Coli Infection Rate

Performance Measure: Shigatoxigenic *E. coli* crude rate (per 100,000 population).

Baseline: 2.85 per 100,000 population (2009-11 [3-year average])

2023 Target: 2.0 per 100,000 population

Escherichia coli (*E. coli*) is a bacterium commonly found in the intestines of warm-blooded animals. Most *E. coli* strains are harmless, but some can cause serious illness.⁶ *E. coli* O157:H7 is the most well-known⁷ and the most common strain in BC.⁸ This performance measure focuses on **shigatoxigenic *E. coli*** (strains of *E. coli* that produce shiga toxin), which can cause severe waterborne or foodborne illness.⁶ Infection in humans is usually caused by eating undercooked meat or other foods (e.g., nuts, produce) that have been contaminated by unsafe water or raw or undercooked meat juices.⁷ Other sources of infection can include unpasteurized (raw) dairy products and apple cider, or contaminated drinking water.⁷ Animals, specifically cows, goats, sheep, and deer, can also spread the germs to humans through their fecal matter, or through their contaminated fur.⁹ In BC, food and animals are routinely tested for shigatoxigenic *E. coli* through the nationally run FoodNet Canada and Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS) programs.

Shigatoxigenic *E. coli* is an infectious disease that is reportable under the *Public Health Act*, which means there is a mandatory reporting requirement by laboratories and physicians in BC.^{10,11,12} Therefore, the rate provided here is based on these reported cases. This surveillance system is stable and reliable; however, like many surveillance systems, it only captures a fraction of actual infections, because many people who are ill do not seek medical attention or do not submit a specimen for testing. Researchers have found that in Canada, every case of *E. coli* O157:H7 reported to the public health system represents about 20 cases that actually occur in the community.¹³

The baseline for this performance measure in the Guiding Framework was a three-year average of the crude shigatoxigenic *E. coli* infection rate of 2.85 cases per 100,000 population for 2009-11. The target is to reduce this to 2.0 cases per 100,000 population by 2023.



As shown in Figure 8.1, shigatoxigenic *E. coli* infection rates have varied substantially from 2002 to 2015, which represents both **endemic**[†]¹⁴ and outbreak activity. Overall, there was a decreasing trend up to 2010 that would have been sufficient to achieve this target; however, rates have been higher than expected since that time, including a large increase in 2013, and the rate is no longer projected to meet the target.

In 2016, the majority of individuals infected with shigatoxigenic *E. coli* in BC were exposed in BC or Canada, with approximately 19 per cent of infections acquired internationally.¹⁵ Physicians and laboratories are required to report gastroenteritis outbreaks, and in 2008, BC implemented routine surveillance of such outbreaks. A source is found for approximately half (46–66 per cent) of the enteric outbreaks in BC.^{16,17}

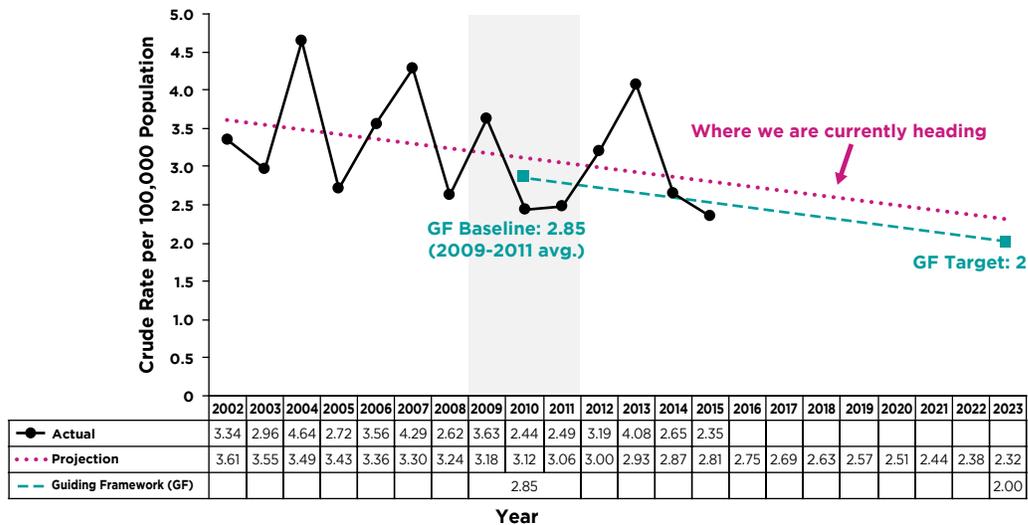
Most of the peaks in incidence shown in Figure 8.1 can be explained by outbreaks that occurred in those years. For example, in 2009, two shigatoxigenic *E. coli* outbreaks were reported in BC; one in Fraser was associated with undercooked haggis, and one in Vancouver Coastal and Fraser was associated with a petting zoo. In 2013, four outbreaks were reported: a national outbreak associated with the consumption of unpasteurised cheese produced on a farm within Interior,¹⁸ two national unsolved outbreaks, and one provincial outbreak affecting Fraser and Vancouver Coastal that remains unsolved. The increase shown in 2012 and 2013 is also due to an increase that occurred in Island in those years (see Figure 8.2 discussion). The decline over the last few years has been attributed to improved food safety initiatives, particularly in meat processing plants.¹⁹

As shown in Figure 8.2, there has been variation between health authorities on this measure, but rates have converged in the most recent year for which data are available. Overall, until recent years, rates have been decreasing and moving towards the provincial target. Regional variation may be due to the outbreaks identified earlier in this chapter but may also be due to other factors. For example, access to health care and laboratory testing may be more difficult in rural and remote regions of BC, making it more challenging to identify cases. In 2012, Island implemented a new laboratory test for shigatoxigenic *E. coli*; part of the increased incidence observed in this health authority may be a result of the evaluation of this new test. At the present time, data regarding the number of tests completed are not available; therefore, it is unknown if low rates reflect a lower volume of testing, or a lower rate of infection.

In 2013 the Food Premises Regulation (under the *Public Health Act*) was updated to enhance food safety in the food processing industry. The updated regulation requires food processors to have written food safety and sanitation plans in place. This requirement is intended to reduce the risk and cost of foodborne illness and increase consumer confidence in the safety of the food supply.²⁰

[†] Endemic refers to the constant presence—or usual prevalence—of a disease or infectious agent in a population within a geographic area.

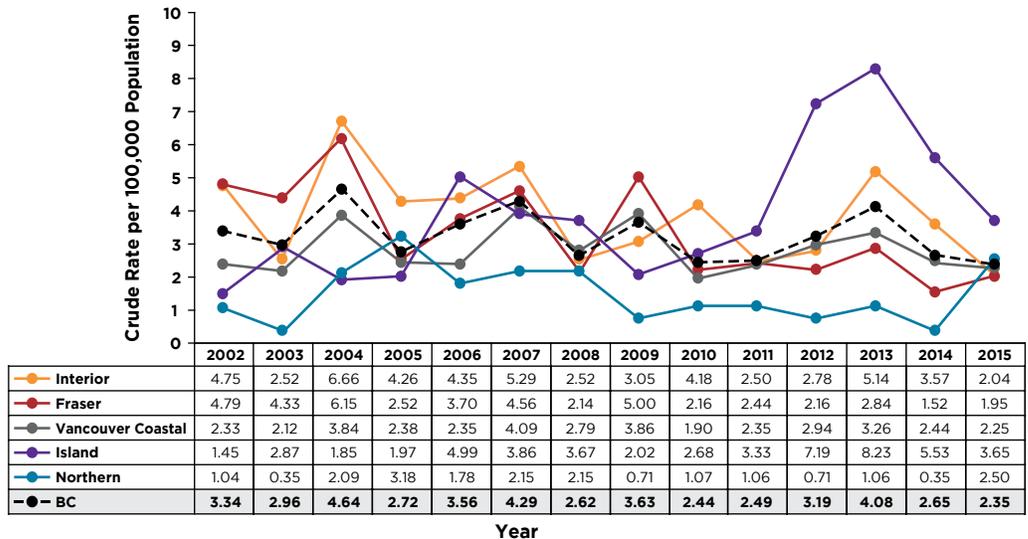
FIG 8.1 Actual and Projected Crude Rate of Shigatoxigenic *E. coli* Infections, BC, 2002 to 2023



Notes: Guiding Framework baseline and target are calculated based on a three-year average, while the rates are annual. Rates are based on counts that showed distinct investigations for this disease. An investigation with multiple disease events for the same disease is only counted once. Human shigatoxigenic *E. coli* cases are reportable in BC. Rates shown here only reflect cases reported to, or identified by, the BC Centre for Disease Control. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 8.2 Crude Rate of Shigatoxigenic *E. coli* Infections, by Health Authority, BC, 2002 to 2015



Notes: In 2012, Island Health implemented a new laboratory test that may partially account for the increased rate shown in 2012-2014. Rates are based on counts that showed distinct investigations for this disease. An investigation with multiple disease events for the same disease is only counted once. Human shigatoxigenic *E. coli* cases are reportable in BC. Rates shown here only reflect cases reported to, or identified by, the BC Centre for Disease Control. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

Listeriosis Rate

Performance Measure: Listeriosis crude rate (per 100,000 population).

Baseline: 0.35 per 100,000 population (2009-11 [3-year average])

2023 Target: 0.2 per 100,000 population

Listeriosis is a rare but potentially serious foodborne infection caused by the bacterium *Listeria monocytogenes*.²¹ Listeriosis is most often caused by eating contaminated foods, such as deli meats, soft cheeses (e.g., brie), and refrigerated seafood such as smoked salmon.²² Listeriosis can be a mild illness for healthy individuals, but can be very serious for seniors, and people with weakened immune systems who may develop sepsis (blood infection) or meningitis.²² Listeriosis among pregnant women can cause miscarriage, stillbirth, premature delivery, and neonatal infection.²²

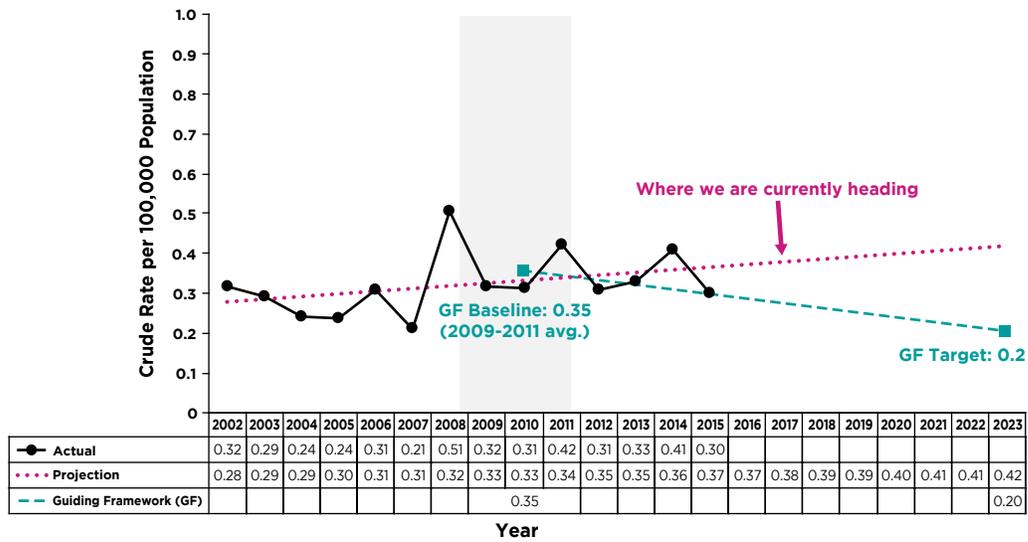
The baseline for this performance measure in the Guiding Framework was a three-year average of listeriosis at a crude rate of 0.35 cases per 100,000 population for 2009-11. The target is to reduce this to 0.2 cases per 100,000 population by 2023.

As shown in Figure 8.3, the provincial listeriosis crude rate increased to 0.51 cases per 100,000 population in 2008, and has fluctuated between about 0.3 and 0.4 cases per 100,000 since that time. Some degree of fluctuation represents the volatility inherent in working with small numbers; however, this performance measure is not currently projected to meet the provincial target. The peak shown in 2008 is due to the large national outbreak of listeriosis in 2008 linked to Maple Leaf deli meats, which included five cases in BC.

It is believed that the advent of whole **genome sequencing** of all *Listeria* isolates in Canada since 2017 may identify more outbreaks, improve control measures, and potentially contribute to a decline in rates. A genome is all of the genetic material in the deoxyribonucleic acid (DNA) of a living organism, which acts as a “blueprint” for the organism’s structure and function.²³ “Sequencing” is a technique used to determine the sequence of units or bases in a DNA molecule.²⁴ Knowledge of the whole genome sequencing of *Listeria* can be used to trace back and identify the source of outbreaks and help researchers study the factors that may influence the severity of listeriosis symptoms.²⁵ Genome sequencing is also being applied to other bacteria that cause enteric disease such as *Salmonella*.

Similar to the patterns shown in Figure 8.2, Figure 8.4 shows a great deal of regional and year-to-year variation, which may reflect actual rates, as well as access to laboratory testing and other unknown factors. In the most recent years shown, rates of listeriosis were highest in Island. Northern had the lowest rate for most years analyzed, but Interior was lowest in more recent years.

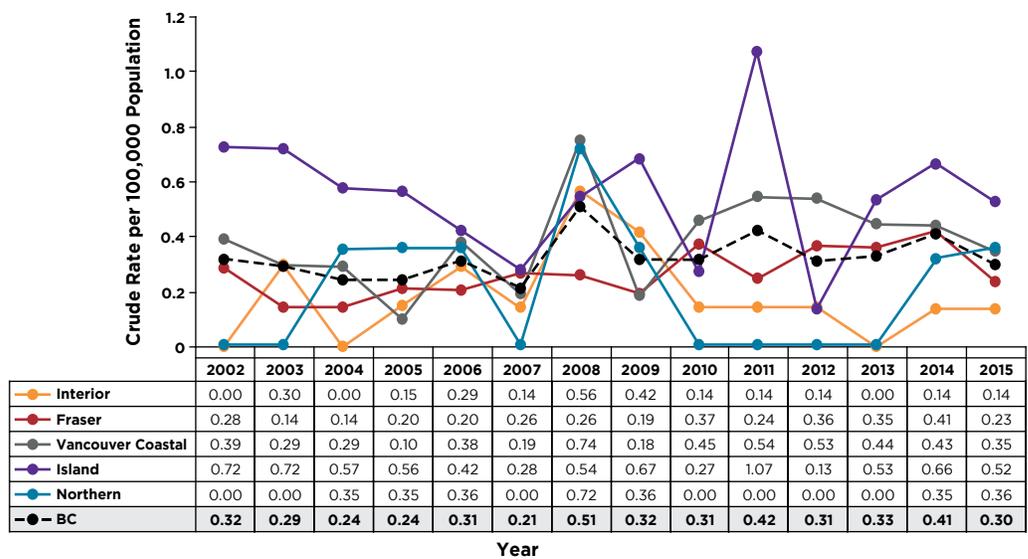
FIG 8.3 Actual and Projected Crude Rate of Listeriosis, BC, 2002 to 2023



Notes: Guiding Framework baseline and target are calculated based on a three-year average, while the rates are annual. Rates are based on counts that showed distinct investigations for this disease. An investigation with multiple disease events for the same disease is only counted once. Listeriosis cases are reportable in BC. Rates shown here only reflect cases reported to, or identified by, the BC Centre for Disease Control. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

FIG 8.4 Crude Rate of Listeriosis, by Health Authority, BC, 2002 to 2015



Notes: Rates are based on counts that showed distinct investigations for this disease. An investigation with multiple disease events for the same disease is only counted once. Listeriosis cases are reportable in BC. Rates shown here only reflect cases reported to, or identified by, the BC Centre for Disease Control. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

Salmonellosis Rate

Performance Measure: Salmonellosis crude rate (per 100,000 population).

Baseline: 23.4 per 100,000 population (2009-11 [3-year average])

2023 Target: 19 per 100,000 population

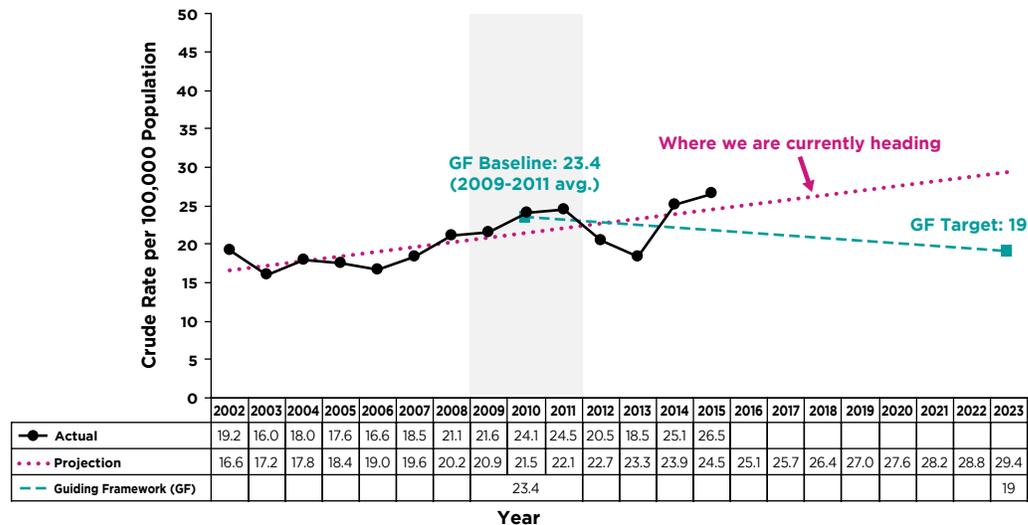
Salmonellosis is a foodborne illness caused by the *Salmonella* bacterium, which results from eating or drinking contaminated foods or beverages, such as raw or undercooked meat or poultry, unpasteurized dairy products, contaminated produce, and raw or undercooked eggs. Symptoms include stomach pain, diarrhea, fever, nausea, and vomiting. Dehydration may be severe, especially among the elderly, infants, and people with weakened immune systems.²⁶ Salmonellosis

is the second most frequently reported bacterial gastrointestinal infection in BC, after campylobacteriosis.²⁷

The baseline for this performance measure in the Guiding Framework was a three-year average of salmonellosis at a crude rate of 23.4 cases per 100,000 population for 2009-11. The target is to reduce this to 19 cases per 100,000 population by 2023.



FIG 8.5 Actual and Projected Crude Rate of Salmonellosis, BC, 2002 to 2023



Notes: Guiding Framework baseline and target are calculated based on a three-year average, while the rates are annual. Rates are based on counts that showed distinct investigations for this disease. An investigation with multiple disease events for the same disease is only counted once. Salmonellosis cases are reportable in BC. Rates shown here only reflect cases reported to, or identified by, the BC Centre for Disease Control. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

Figure 8.5 depicts some year-to-year variation that reflects both endemic disease and outbreaks. However, overall the crude rate of salmonellosis is increasing and is not projected to reach its provincial target by 2023.

There is currently a known Canada-wide outbreak of salmonellosis, caused by *Salmonella Enteritidis*, that has not yet been successfully contained.²⁸ This is reflected in the trend shown in Figure 8.5. In BC, the *Salmonella Enteritidis* outbreak started in 2007 and included two waves. The first wave, which mainly affected Fraser and Vancouver Coastal, was largely attributed to fertilized hatching eggs for poultry production that were illegally distributed.²⁹ This wave was somewhat controlled by 2011-12, through on-farm measures.³⁰ The second wave began in 2014, with an increase in rates across all health authority areas. This wave has been attributed to consumption and handling of contaminated chicken meat and eggs

and contact with live poultry.²⁸ In addition to this outbreak, another 20 *Salmonella* outbreaks affected BC residents from 2008 to 2015 (one to five outbreaks per year).³¹ Among these 20 outbreaks, 55 per cent were solved and linked to fresh produce, deli meat, pork, live animals, seeds, poultry, and an ill food handler.³¹

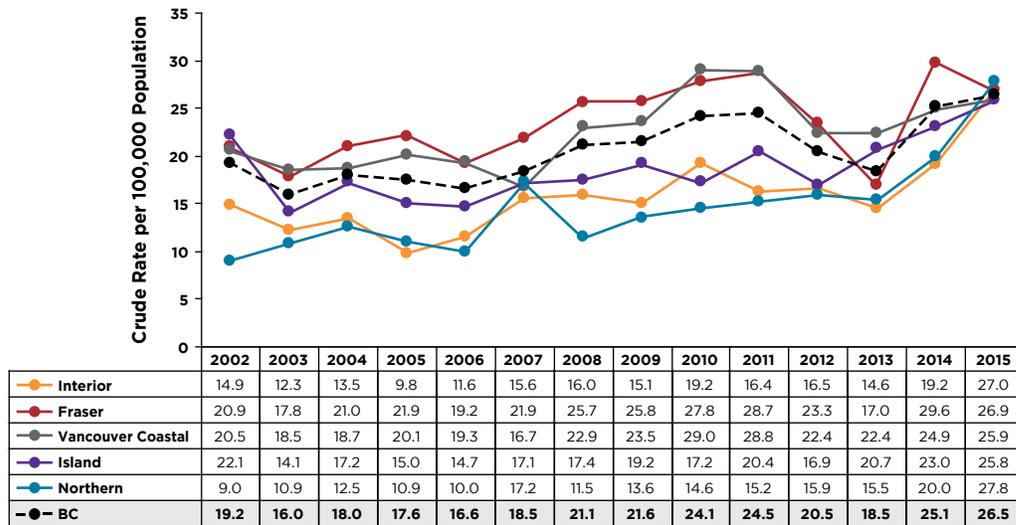
As with *E.coli*, *Salmonella* infection is underreported. It is anticipated that for every one case of *Salmonella* infection identified, there are 26 cases in the community that are not identified or reported.¹³ Whole genome sequencing of *Salmonella* (as described earlier in this chapter) will likely increase the number of outbreaks identified and increase our ability to solve and control *Salmonella* outbreaks in BC.



The BC Integrated Surveillance of Foodborne Pathogens program, which includes data from the BC Centre for Disease Control, the Ministry of Agriculture, and the Public Health Agency of Canada, conducts surveillance along the food chain and identifies foodborne **pathogens**. In addition, two national programs test for *Salmonella* along the food chain in BC: FoodNet Canada and the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS). The data collected from BC farms, food, and humans through this work has helped identify the sources for the BC component of the ongoing *Salmonella* epidemic described earlier.³² In 2016, the BC Centre for Disease

Control, the Ministry of Health, and the five regional health authorities developed the Food Premises Guideline for Pooling Eggs Safely, to reduce the rate of salmonellosis in BC.³³ Effectively addressing this outbreak and reducing the rate of salmonellosis in BC requires cooperation between the Ministry of Health and the Ministry of Agriculture, as well as food producers and food premises, such as food processors, food retailers, food services operators, and others.

FIG 8.6 Crude Rate of Salmonellosis, by Health Authority, BC, 2002 to 2015



Notes: Rates are based on counts that showed distinct investigations for this disease. An investigation with multiple disease events for the same disease is only counted once. Salmonellosis cases are reportable in BC. Rates shown here only reflect cases reported to, or identified by, the BC Centre for Disease Control. Health authority is based on the residence of the individual. See Appendix B for more information about this data source.

Source: BC Centre for Disease Control. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, June 2017.

As shown in Figure 8.6, there has been some degree of variation between the health authorities on this measure over the last decade, but in recent years their trends are converging, showing a reduction of geographic disparity. However, the trends are moving away from the provincial target, and reductions achieved within health authority areas (such as Fraser in 2012 and 2013) have not been sustained.

Drinking Water Quality & Advisories

Performance Measure: The percentage of households with municipal water supplies reporting that they boiled their drinking water during the previous 12 months in order to make it safe to drink.

Baseline: 18 per cent (2009)

2023 Target: 14 per cent

BC has a large supply of fresh water, and compared to many other places in the world, we are fortunate to have good quality drinking water. Regular treatment and monitoring of drinking water quality are crucial because outbreaks of waterborne illnesses can negatively impact the health of the population. Under the *Drinking Water Protection Act*, regional health authorities in BC provide surveillance and monitoring of drinking **water supply systems**, and the Provincial Health Officer (PHO) is mandated to report on activities conducted under the Act. However, drinking water quality is difficult to quantify as there are many different mechanisms and methods for identifying water quality concerns, each with its own data challenges, and with potential for misinterpretation. PHO drinking water reports are moving toward assessment based on the **multi-barrier approach** to protecting drinking water, in order to report more meaningfully on drinking water quality than current data allows (e.g., **boil water notices**), but this approach is not yet available. The indicator identified in the Guiding Framework is “the percentage of households with municipal water supplies reporting that they boiled their drinking water during the previous 12 months in order to make it safe to drink.”

At the end of March 2016, there were 4,791 known water supply systems in BC.^{u,34} Most of them (4,386) serve fewer than 500 people;

the majority of the population receives drinking water from a small number of much larger systems.³⁵ Health authorities work with water suppliers to issue notifications about drinking water quality to people using the systems. In BC there are three levels of notifications: **water quality advisories** (least severe), boil water notices, and “**do not use**” **water notices** (most serious).^{v,36} The Drinking Water Officers’ Guide provides suggested best practices for drinking water officers in determining the appropriate form of notice to issue.³⁷ Water supply systems can remain on a boil water notice for an extended period of time, due to concerns about the system’s treatment equipment or distribution infrastructure.

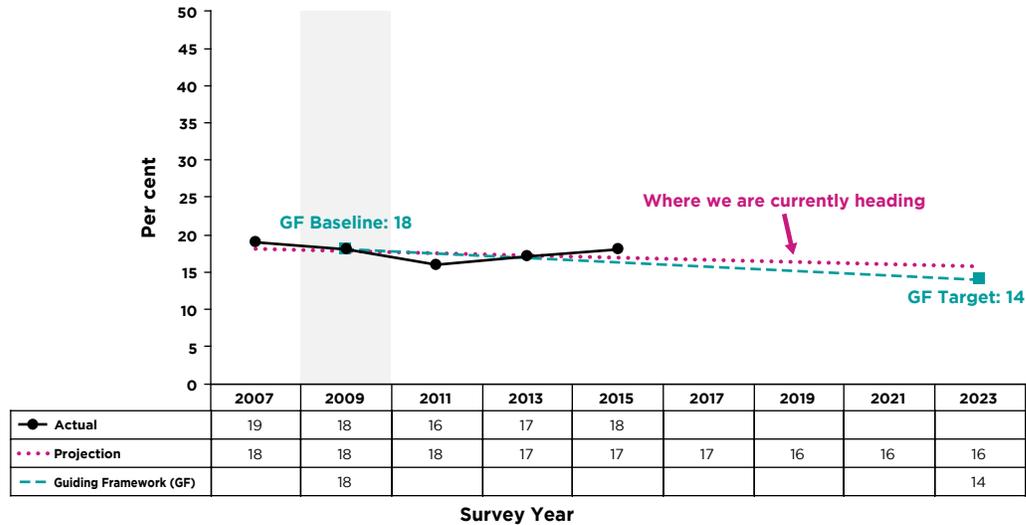
Water notifications must be interpreted with caution. While they can indicate that a concern with water quality has been identified, they are also a signal that the system of oversight for monitoring water quality is working. As such, increases in water quality notifications over time in BC are not necessarily indicative of decreased water quality—they may reflect many other changes (e.g., increased assessment and capacity for identification of small systems, more detailed reporting practices).³⁵

Additionally, water advisories and notifications are only a partial picture of drinking water quality; data from the Households and Environment Survey (Figure 8.7) include only a

^u This number only reflects systems that fit the definition of “water supply system” as defined by the *Drinking Water Protection Act*. This excludes some types of **domestic water systems**.

^v Triggers for public advisories can include the presence of bacteria, treatment failure, water main breaks, and reports of reservoir contamination. A boil water notice is used when a public health threat from **microbiological pathogens** is significant and the threat can be effectively addressed by boiling the water.

FIG 8.7 Actual and Projected Percentage of Households on Municipal Water Supplies That Boiled Water in Order to Make it Safe to Drink, BC, 2007 to 2023



Notes: Survey data reflect households on municipal water supplies that boiled water in the last 12 months in order to make it safe to drink. Excludes respondents who did not indicate whether they treated their water prior to consumption. See Appendix B for more information about this data source.

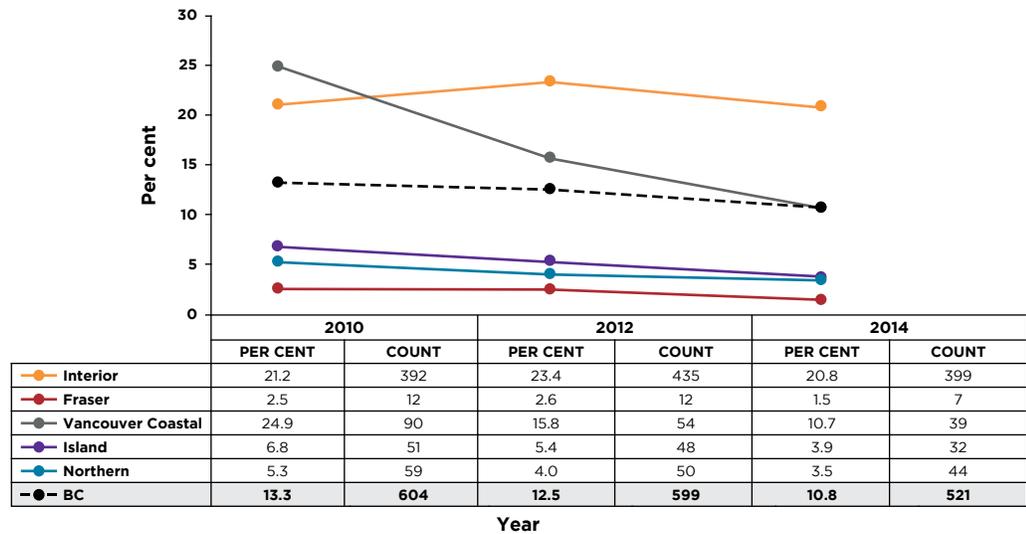
Source: Statistics Canada, Households and the Environment Survey, 2015. Extracted from CANSIM Table 153-0123. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, January 2017.

sample of households in BC and do not include households that are not on municipal water supply systems (approximately 10 per cent of households in BC were not connected to a municipal water supply in 2009).³⁸ These data also do not reflect severity of the potential water quality issue, or take into account whether it was a short-term or longer term issue.

The baseline established in the Guiding Framework was 18 per cent of households on municipal water supplies reporting in 2009 that they boiled their drinking water during the last year in order to make it safe to drink. The target is to reduce this to 14 per cent by 2023. These data should be interpreted with caution because they reflect voluntary and self-reported boil water behaviour, which may reflect media/advertising influences, perception of water safety, or personal preference, rather than water system notifications or compromised water quality.

As shown in Figure 8.7, there was no progress toward the target from the 2009 baseline to the most recent year of data available. In 2015, among households on municipal water supply systems, 18 per cent reported that in the last 12 months they boiled their water to make it safe to drink. Data shown here include survey responses from households on municipal water supplies who reported boiling their water in order to make it safe to drink.³⁹ The longer term trend suggests that there may be a slight decrease and movement toward the target, but it is currently insufficient to reach the target by 2023 unless the rate of decrease is accelerated.

FIG 8.8 Number and Percentage of Water Supply Systems with Boil Water Notices and Water Quality Advisories on March 31st, by Health Authority, BC, 2010 to 2014



Notes: Number and percentage of water systems with notices to boil water or water quality advisories currently active on March 31st of each year. Health authority is based on the location of the water system. See Appendix B for more information about this data source.
Source: Regional health authorities. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, February 2017.

Figure 8.8 presents a different way of examining drinking water quality in BC. This figure provides a snapshot in time on March 31st each year, and shows the proportion of water systems that had a boil water advisory in place on that date, by health authority. It also lists the number of boil water advisories for each health authority (not graphed). This figure suggests that a disproportionate percentage of water systems in Interior and Vancouver Coastal had advisories in place on March 31st in these three years, although the percentage within Vancouver Coastal has decreased substantially in recent years while Interior remains much higher—in both proportion and count.



As noted earlier, these trends should be interpreted with caution, since the number of people on a given water supply system varies substantially, from a single household to the majority of a health authority population, and because water quality notifications do not necessarily represent compromised drinking water quality—sometimes it shows the effectiveness of the monitoring system. For example, Vancouver Coastal has one large

water system with many users. Other areas of the province often have many small systems consisting of a handful of households. It may be more difficult to make improvements in areas with small systems given the difficulty in attracting operators with technical expertise; reduced access to laboratory services; and cost barriers to upgrading the water system infrastructure given the smaller number of system users available to finance upgrades.³⁵

Licensed Community Care Facilities

Performance Measure: The percentage of persons residing in licensed community care facilities rated as low risk, based on inspections by health authority licensing officers.

Baseline: TBD

2023 Target: TBD

Licensed community care facilities are regulated under the *Community Care and Assisted Living Act* and its associated regulations (Child Care Licensing Regulation and Residential Care Regulation). The facilities included in this Act are **residential care facilities**^{w,40} for children, youth, and adults, as well as child day care facilities; however, metrics for this indicator only include residential care facilities for children, youth, and adults. Residential care facilities include facilities for seniors—sometimes referred to as long-term care facilities, continuing care facilities, or nursing homes. Also included are facilities known informally as group homes; these may include smaller residential facilities for persons with developmental disabilities, facilities providing withdrawal management and treatment for persons with substance use disorders, facilities for persons with mental health disorders or brain injuries, and residential facilities for children and youth. Facilities that provide highly specialized care, such as **hospices**, are also included.⁴¹ Licensed facilities include both publicly subsidized and private pay models.

In order to monitor licensed care facilities, a director of licensing is appointed by the Minister of Health as the steward for health authority community care licensing programs. The director has powers under the *Community Care and Assisted Living Act* to ensure the safe care of persons in licensed facilities.⁴⁰ Health authorities are responsible for monitoring licensed residential care facilities. Medical health officers in health authorities have duties

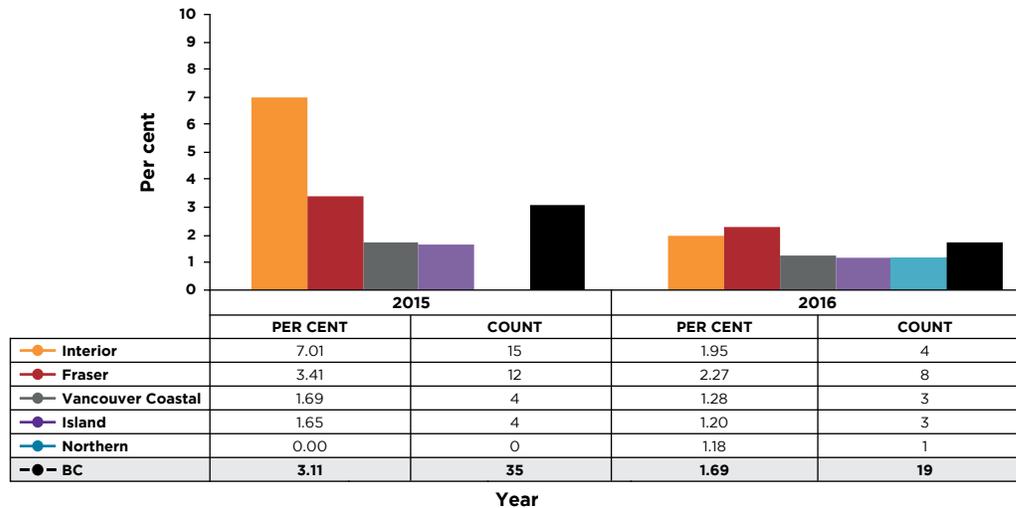
assigned to them under the Act, (e.g., issuing licences, inspecting facilities, investigating complaints).⁴⁰ Health authority licensing officers regularly inspect and monitor all licensed care facilities to ensure legislative compliance using a standardized risk assessment tool. They categorize facilities as low, medium, or high risk, based on compliance with the *Community Care and Assisted Living Act* and the Residential Care Regulation.

Frequency of monitoring is based on the risk rating given to the facility: in general, low-risk facilities will receive their next comprehensive routine compliance inspection within 12–18 months, while for high-risk facilities that timeframe is shortened to 3–6 months.⁴² Licensing officers may also visit a facility at any time for a follow-up inspection, to determine if an identified area of non-compliance has been corrected, or in the event of a complaint or incident report.

The current performance measure established in the Guiding Framework is the percentage of persons residing in low-risk facilities. This indicator is currently challenging to monitor for multiple reasons. First, health authority resources are focused on monitoring and tracking of high-risk—rather than low-risk—facilities in accordance with the varied timeframes for comprehensive inspections. This type of focus is reasonable since residents of high-risk facilities could be at higher risk of harm. Second, the assessment and monitoring process currently undertaken by the health authorities only captures data on an institution,

^w Residential care facilities provide accommodation, meals, care, and supervision based on the needs of the person residing in the facility.

FIG 8.9 Number and Percentage of Licensed Residential Community Care Facilities Rated as High Risk, by Health Authority, BC, 2015 and 2016



Notes: "Licensed residential community care facilities" refer to facilities licensed under the *Community Care and Assisted Living Act*, and include facilities for acquired injury, child and youth residential care, community living, hospice care, long-term care, mental health and substance use, and extended care units and private hospitals under the *Hospital Act*. A rating of "high risk" is based on inspections by health authority licensing officers using a standardized risk assessment tool. Health authority is based on the location of the facility. See Appendix B for more information about this data source.

Source: Health Authority Community Care Licensing Programs. Prepared by Population Health Surveillance and Epidemiology, BC Office of the Provincial Health Officer, BC Ministry of Health, February 2017.

not beds or people. Since facilities can vary considerably in size and capacity, this means that it is currently impossible (without a manual count of occupied beds) to report on the percentage of people in low- or high-risk facilities.

While identification of and reporting on the percentage of persons residing in low-risk facilities is not possible at this time, it is possible to report on the percentage of facilities rated as high risk.

As shown in Figure 8.9, there was a reduction in the percentage of residential care facilities rated as high risk from 2015 to 2016 for all health authorities except Northern. This trend should be interpreted with caution due to the short time frame and the volatility in working with small numbers; for example the increase shown in Northern is only the result of a change from zero to one facility rated as high-risk.^x The rate in Interior decreased sharply from approximately 7 to 2 per cent (from 15 to 4 high-risk facilities).



^x Longer term trend data are not currently available.

Discussion

As discussed throughout this chapter, the current performance measures for environmental health have limitations. There is a need to further develop environmental health indicators and related data, in order to meaningfully monitor the quality of the air, water, and food in BC. Existing performance measures, such as the crude rates of shigatoxigenic *E. coli* and salmonellosis, are effective ways of monitoring these enteric diseases and the efforts to control their spread in the province; however, the crude rate of listeriosis is based on a small number of cases, which produces a rate that is inherently unstable. As discussed earlier in this chapter, expanding data collection and monitoring to enable a shift to a multi-barrier approach to evaluating and monitoring drinking water quality in BC may provide more meaningful data than is currently available.

An enhanced suite of environmental health indicators will provide valuable data on how changes in the natural environment, built environment, and wildlife populations affect human health outcomes. Such indicators will become increasingly important to measure as the effects of climate change become more severe and impact health outcomes of British Columbians. For example, ***Vibrio parahaemolyticus*** is a bacterium that occurs naturally in the ocean; however, when ocean temperatures rise, it grows in shellfish consumed in BC, such as clams, oysters, and mussels,⁴³ and can cause foodborne illness.^{43,44} Climate change can also cause instances of extremely hot or cold weather, which affects the whole population but will have disproportionate effects on vulnerable and underserved populations (e.g., young children, the elderly, low-income individuals, and those with existing cardiopulmonary and respiratory illnesses).⁴⁵ Overall, a more comprehensive set

of environmental health indicators could be based on the understanding that human health is influenced by a number of environmental factors, including severe weather events, climate change, the air we breathe, water we drink, and food we eat.

Conclusion

This chapter has explored a selection of performance measures for environmental health established in Goal 6 of BC's Guiding Framework for Public Health. There has been improvement in the crude rate of shigatoxigenic *E. coli* infections, but the rate of decline is currently insufficient to reach the provincial target by 2023. The crude rates of listeriosis and salmonellosis are both currently worsening, and thus, moving away from their respective provincial targets. Current systems of reporting outbreaks related to BC's food supply are in place, with physicians and laboratories required to report all suspected or confirmed outbreaks of enteric disease; however, many cases go unreported as individuals do not seek medical attention and/or do not submit a specimen for testing. Integrated surveillance, which looks at data from animal, environment, food, and human sources, is a promising way to understand more about foodborne pathogens, as shown by the BC Integrated Surveillance of Foodborne Pathogens program for *Salmonella*. There has not been a meaningful or sustained reduction in the percentage of households on municipal water supplies who report boiling their water to make it safe to drink, and this measure is currently not projected to meet its target by 2023. While we currently do not have the ability to report on the proportion of persons in licensed community care facilities rated as low risk, the proportion of facilities that are rated as high risk in BC decreased from 2015 to 2016. The next chapter will explore public health emergency management within BC, through a review of the performance measures in Goal 7 of the Guiding Framework.

REFERENCES

- ¹ Government of Newfoundland and Labrador, Health and Community Services. Environmental health [Internet]. St. John's, NL: Government of Newfoundland and Labrador; 2017 May 9 [cited 2017 Jun 7]. Available from: <http://www.health.gov.nl.ca/health/publichealth/envhealth/environmental.html>.
- ² BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ³ BC Ministry of Health. Public health 101: the fundamentals. Module 3: how does public health work? Victoria, BC: BC Ministry of Health; 2014 Apr [cited 2017 Feb 21]. Available from: <http://urls.bccampus.ca/4qb>
- ⁴ Community Care and Assisted Living Act [SBC 2002, Chapter 75] [statute on the Internet]; [cited 2017 Jun 6]. Available from: http://www.bclaws.ca/civix/document/id/complete/statreg/02075_01#section1.
- ⁵ Sudbury & District Health Unit. Enteric disease fact sheet. Sudbury, ON: Sudbury & District Health Unit; 2014 [cited 2017 Feb 21]. Available from: <https://www.sdhu.com/wp-content/uploads/2016/04/EntericDiseaseFactSheetFINAL.pdf>.
- ⁶ World Health Organization. E. coli [fact sheet]. Geneva: World Health Organization; 2016 Oct [cited 2017 Feb 21]. Available from: <http://www.who.int/mediacentre/factsheets/fs125/en/>.
- ⁷ BC Centre for Disease Control. E. Coli infection [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2017 Feb 23]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/e-coli-infection>.
- ⁸ BC Centre for Disease Control. British Columbia annual summary of reportable diseases 2014. Vancouver, BC: BC Centre for Disease Control; 2015 Sep 03 [cited 2017 Feb 21]. Available from: <http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Epid/Annual%20Reports/AR2014FinalSmall.pdf>.
- ⁹ Centers for Disease Control and Prevention. E. coli infection [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; [reviewed 2015 Sep 30; updated 2018 Apr 02; cited 2018 Apr 19]. Available from: <https://www.cdc.gov/healthypets/diseases/ecoli.html>.
- ¹⁰ BC Centre for Disease Control. British Columbia annual summary of reportable diseases 2013. Vancouver, BC: BC Centre for Disease Control; 2014 Sep 03 [cited 2018 Apr 20]. Available from: <http://www.bccdc.ca/About-Site/Documents/Annual-Reports/2013CDAnnualReportFinal.pdf>.
- ¹¹ Government of Canada. For health professionals: E. coli (Escherichia coli) infection. Ottawa, ON: Government of Canada; [modified 2017 Mar 27; cited 2018 Apr 20]. Available from: <https://www.canada.ca/en/public-health/services/diseases/e-coli/health-professionals-e-coli.html>.
- ¹² Public Health Act [SBC 2008, Chapter 28] [statute on the Internet]; [cited 2018 Apr 19]. Available from: http://www.bclaws.ca/civix/document/id/complete/statreg/08028_01.
- ¹³ Thomas MK, Murray R, Flockhart L, Pintar K, Pollari F, Fazil A, et al. Estimates of the burden of foodborne illness in Canada for 30 specified pathogens and unspecified agents, circa 2006. *Foodborne Pathog Dis.* 2013 Jul;10(7): 639-48.
- ¹⁴ Centers for Disease Control and Prevention. Principles of epidemiology in public health practice. 3rd ed. An introduction to applied epidemiology and biostatistics. Lesson I: introduction to epidemiology. Section II: epidemic disease occurrence [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; [updated 2012 May 18; cited 2017 Jun 7]. Available from: <https://www.cdc.gov/ophss/csels/dsepd/ss1978/lesson1/section11.html>.
- ¹⁵ BC Centre for Disease Control. British Columbia annual summary of reportable diseases 2016. Vancouver, BC: BC Centre for Disease Control; 2017 Nov [cited 2018 Feb 15]. Available from: <http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Epid/Annual%20Reports/2016CDAnnualReportFinal.pdf>.
- ¹⁶ Fong D, Otterstatter M, Taylor M, Galanis E. Analysis of enteric disease outbreak metrics, BCCDC, 2005-14. *Can Comm Dis Rep.* 2017;43(1):1-6.
- ¹⁷ Taylor M and Galanis E. Establishing criteria to initiate enteric outbreak investigations in British Columbia. *Can Comm Dis Rep.* 2014;40(S1):10-16.

- ¹⁸ Currie A, Galanis E, Chacon PA, Murray R, Wilcott L, Kirkby P, et al. Outbreak of E. coli O157:H7 infections linked to aged raw milk gouda cheese, Canada, 2013. *J Food Prot.* 2018;81(2):325-31.
- ¹⁹ Pollari F, Christidis T, Pintar KDM, Nesbitt A, Farber J, Lavoie MC, et al. Evidence for the benefits of food chain interventions on E. coli O157:H7/NM prevalence in retail ground beef and human disease incidence: a success story. *Can J Public Health.* 2017 Apr 20;108(1): 71-8.
- ²⁰ Government of British Columbia. Food safety & sanitation plans [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Jun 07]. Available from: <http://www2.gov.bc.ca/gov/content/health/keeping-bc-healthy-safe/food-safety/food-safety-sanitation-plans>.
- ²¹ HealthLink BC. Listeriosis [HealthLink BC File #75]. Victoria, BC: HealthLink BC; 2013 Nov [cited 2017 Feb 21]. Available from: <https://www.healthlinkbc.ca/healthlinkbc-files/listeriosis>.
- ²² BC Centre for Disease Control. Listeria/Listeriosis [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2017 Feb 23]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/listeria-listeriosis>.
- ²³ Genome Canada. Understanding the code of life. Ottawa, ON: Genome Canada; [cited 2018 Mar 02]. Available from: <https://www.genomecanada.ca/en/why-genomics/understanding-code-life>.
- ²⁴ Genome British Columbia. Glossary. Vancouver, BC: Genome British Columbia; [cited 2018 Mar 02]. Available from: <https://www.genomebc.ca/education/glossary/#S>.
- ²⁵ Pightling AW, Rand H, Strain E, Pagotto F. Genome sequence of the Listeria monocytogenes Food Isolate HPB913, collected in Canada in 1993. *Genome Announc.* 2016 Sep-Oct;4(5):911-16.
- ²⁶ HealthLink BC. Salmonellosis [HealthLink BC File #17]. Victoria, BC: HealthLink BC; 2016 Jan [cited 2017 Feb 21]. Available from: <https://www.healthlinkbc.ca/healthlinkbc-files/salmonellosis>.
- ²⁷ BC Centre for Disease Control. Salmonella infection [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2017 Feb 23]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/salmonella-infection>.
- ²⁸ BC Centre for Disease Control. BC integrated surveillance of foodborne pathogens annual summary. Salmonella findings 2016. Vancouver, BC: BC Centre for Disease Control; 2017 Oct.
- ²⁹ Taylor M, Leslie M, Ritson M, Stone J, Cox W, Hoang L, et al. Investigation of the concurrent emergence of Salmonella enteritidis in humans and poultry in British Columbia, Canada, 2008-2010. *Zoonoses Public Health.* 2012 Dec;59(8):584-92.
- ³⁰ Taylor M, Cox W, Otterstatter M, deWith N, Galanis E. Evaluation of agricultural interventions on human and poultry-related Salmonella enteritidis in British Columbia. *Food Path Dis.* 2018;15(1):39-43.
- ³¹ Canadian Network for Public Health Intelligence. Data on Salmonella Outbreaks. Extracted February 2018.
- ³² BC Centre for Disease Control. BC integrated surveillance of foodborne pathogens annual summary. Salmonella findings 2015. Vancouver, BC: BC Centre for Disease Control; 2016 Aug [cited 2018 Feb 13]. Available from: <http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Epid/Enterics/2015%20BCISFP%20Annual%20Report.pdf>.
- ³³ BC Centre for Disease Control. Food premises: guideline for pooling eggs safely. Vancouver, BC: BC Centre for Disease Control; 2016 [cited 2018 Mar 15]. Available from: http://www.bccdc.ca/resource-gallery/Documents/Educational%20Materials/EH/FPS/Food/Pooled%20Egg%20Guideline_FINAL.pdf.
- ³⁴ Edwards J. Personal communication. BC Ministry of Health; 2017 Jun 07.
- ³⁵ BC Office of the Provincial Health Officer. Progress on the action plan for safe drinking water in British Columbia 2015. Victoria, BC: BC Office of the Provincial Health Officer; 2015 Jul [cited 2017 Feb 23]. Available from: <http://www2.gov.bc.ca/assets/gov/environment/air-land-water/pho-drinkingwater2015-web.pdf>.
- ³⁶ Government of British Columbia. Water quality notifications [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Feb 23]. Available from: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/notices-boil-water-advisories>.
- ³⁷ BC Ministry of Health. Drinking water officers' guide introduction. Victoria, BC: BC Ministry of Health; 2017 [cited 2018 May 28]. Available from: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/how-drinking-water-is-protected-in-bc/dwog_all_documents_2017.pdf.
- ³⁸ Statistics Canada. Household water supply [Internet]; 2016 Oct 07 [accessed 2017 Jun 30]. <http://www.statcan.gc.ca/pub/11-402-x/2011000/chap/env/env02-eng.htm>

- ³⁹ Statistics Canada. Households and the Environment Survey (HES) -2017 – CATI- Questionnaire: HES2017. Ottawa, ON: Statistics Canada; 2017 [cited 2018 Mar 12]. Available from: http://www23.statcan.gc.ca/imdb/p3Instr.pl?Function=getInstrumentList&Item_Id=297742&UL=IV&.
- ⁴⁰ Government of British Columbia. Residential care facilities [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Jun 08]. Available from: <http://www2.gov.bc.ca/gov/content/health/accessing-health-care/finding-assisted-living-or-residential-care/residential-care-facilities>.
- ⁴¹ BC Ministry of Health. A guide to community care facility licensing in British Columbia. Victoria, BC: BC Ministry of Health; 2016 Spring [cited 2017 Feb 23]. Available from: http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/child-day-care/a_guide_to_community_care_facility_licensing_in_british_columbia_spring_2016_update.pdf.
- ⁴² BC Ministry of Health. High risk residential care facilities [fact sheet]. Victoria, BC: BC Ministry of Health; 2016.
- ⁴³ BC Centre for Disease Control. Vibrio parahaemolyticus. Vancouver, BC: BC Centre for Disease Control; [cited 2018 Apr 3]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/vibrio-parahaemolyticus>.
- ⁴⁴ Goertz CEC, Walton R, Rouse N, Belovarac J, et al. Vibrio parahaemolyticus, a climate change indicator in Alaska marine mammals. In: Mueter FJ, Dickson DMS, Huntington HP, Irvine JR, Logerwell SA, MacLean LT, et al., editors. Responses of arctic marine ecosystems to climate change. Fairbanks, AK: Alaska Sea Grant, University of Alaska Fairbanks; 2013 [cited 2018 Apr 3]. Available from: https://www.fws.gov/alaska/fisheries/mmm/seaotters/pdf/Goertz_2013_vibrio_parahaemolyticus.pdf.
- ⁴⁵ Government of British Columbia. Addressing climate and health risks in BC: climate change health risks. Victoria, BC: BC Ministry of Environment and Climate Change Strategy; [cited 2018 Apr 18]. Available from: https://www2.gov.bc.ca/assets/gov/environment/climate-change/adaptation/health/final_climate_change_and_health_backgrounder_overview.pdf.

9

Public Health Emergency Management

Public health emergency management is emergency management undertaken by the public health system, along the continuum from prevention/mitigation to recovery. It enables effective and efficient responses to emergencies and **hazards** that have implications for public health.¹ The goal for public health emergency management is to foster a population and a system that is resilient to emergencies.² The ultimate purpose of this work is to save lives, preserve the environment, and protect property and the economy.³ This chapter examines the readiness of BC to effectively handle emergencies, including both direct public health emergencies, and other emergency situations that have implications for population and public health (e.g., earthquakes, fires, oil spills). It also will discuss both established indicators of public health emergency management and recent examples of related response actions in BC.

Nearly every emergency has health implications. Some emergencies are directly health related, such as influenza pandemics and emergent infectious diseases. Others are natural disasters or other emergencies with health consequences, such as floods, earthquakes, forest fires, and toxic or chemical spills. With its focus on improving the health and well-being of populations, preventing disease, illness and

injury, and reducing inequities, public health has a key role in preventing and/or reducing the impact of emergencies on population health. This requires working with other government ministries and other organizations and agencies, as needed, to reduce the health impact of disasters that cross jurisdictions and government areas of responsibility.

The BC health system's response to an emergency or disaster is guided by the following legislation:

- *Public Health Act* – provides a range of powers for health officers and the Provincial Health Officer (PHO) to deal with public health threats.
- *Emergency Health Services Act* – governs the provision of emergency health services in BC.
- *Emergency Program Act* – governs emergency management in BC. It requires that ministers develop plans and procedures to be followed in the event of an emergency or disaster, and sets out the way in which government will respond and recover.
- *Emergency Program Management Regulation* – requires each minister to develop emergency plans and procedures to be followed in the event of an emergency or disaster.⁴

Guiding Framework Goal 7: Public Health Emergency Management

Goal Statement

Communities resilient to health emergencies.

Objectives

The objectives for Goal 7 focus on increasing preparedness and responsiveness of the public health system and reducing the impact of a **pandemic** and health risks from natural disasters.

1. Increase the preparedness and responsiveness of the public health system by running regular exercises and training and ensuring all health authorities have public health emergency management plans in place.
2. Protect British Columbians by reducing the impact of a pandemic on society through surveillance efforts that can identify and track health risks and through planning, preparedness and response efforts that minimize exposure and transmission of pandemic viruses.
3. Protect British Columbians through public health response to health risks from natural disasters such as floods, forest fires or earthquakes.

Performance Measures

Within Goal 7 of the Guiding Framework, there are two performance measures:

- The number of health authorities (including the First Nations Health Authority) with a pandemic influenza response plan that aligns with the Ministry plan.
- The number of health authorities (including the First Nations Health Authority) that have participated in an emergency exercise with a public health component in the last two years.



Pandemic Influenza Response Plan

Performance Measure: The number of health authorities (including the First Nations Health Authority) with a pandemic influenza response plan that aligns with the Ministry plan.

Baseline: 1 (2010)

2023 Target: 7

Influenza pandemics can cause serious illness and death.⁵ **Pandemic influenza** is an influenza virus that is carried and spread around the world quickly and efficiently, because humans have little or no immunity against it.⁶ Influenza pandemics occur about every 10 to 40 years. There were three in the last century: the Spanish flu (1918–1919); the Asian flu (1957–1958); and the Hong Kong flu (1968–1969). The most recent pandemic of influenza (H1N1) happened in 2009.⁵

Since it is impossible to predict when or how a pandemic will unfold, it is necessary to have planning and response measures in place to mitigate its impact. In BC there is a plan describing the health sector’s approach to and preparations for an influenza pandemic (*Pandemic Influenza Response Plan*), as well as one for provincial government activities outside of the health system (*The BC Pandemic Influenza Provincial Coordination Plan*). The pandemic plan

sets out roles, responsibilities, and tasks for the Ministry of Health, regional health authorities, and other provincial health organizations prior to, during, and immediately following a pandemic event.⁵ The broader provincial coordination plan outlines the government’s strategy for cross-ministry coordination, internal and external communications, and provincial government **business continuity**.⁷

When originally released in 2012, the *Pandemic Influenza Response Plan* recommended that health authorities develop and implement regional plans that follow provincial guidelines as closely as possible.⁵ This indicator was designed to monitor the development and completion of those regional plans. As shown in Table 9.1, as of June 2017, all regional health authorities and the Provincial Health Services Authority (PHSA) have pandemic plans in place with the exception of the First Nations Health Authority (FNHA).



TABLE 9.1 Health Authority Completion of Pandemic Influenza Plans (as of June 2017)

Health Authority	Exercise Completion	Plan Information
Fraser	Completed	The pandemic plan in place in Fraser Health is organized as a consolidation of individual facility and program component plans. Dates of the individual plans range from 2014 to 2016. ⁸
Interior	Completed	Interior Health has a pandemic plan in place, and released an update in 2016.
Island	Completed	Island Health has a pandemic plan in place that was released in 2014, and in June 2017 an update was in progress.
Northern	Completed	Northern Health has a pandemic plan in place that was released in 2009, and in June 2017 an update was in progress.
Vancouver Coastal	Completed	Vancouver Coastal Health has a pandemic plan in place that was updated and released in 2015.
First Nations Health Authority	In development	FNHA is in the process of developing a pandemic plan. FNHA also supports BC First Nations communities to prepare for and manage pandemic and other communicable disease emergencies across BC. ⁹
Provincial Health Services Authority	Completed	PHSA has a pandemic plan in place that was released in 2013.

While health authorities all work to ensure an up-to-date pandemic plan is in place, BC and regional health authorities are moving toward an **all-hazards approach** to emergency management. This approach builds upon the work undertaken by the Provincial Ebola Preparedness Task Force (discussed later in this chapter) and includes emergency response readiness to common consequences of all types of hazards.¹⁰ It aligns with approaches used across Canada. The strategy includes a provincial standard for health care worker (HCW) all-hazard protection training, so that HCWs across the province can respond safely and confidently, and implement appropriate precautions, to all types of risks. The health authorities' actions and implementation plans

for an all-hazards emergency response are to be shared with the Ministry of Health to facilitate the province's ongoing all-hazards preparedness.^{3,11}

Participation in an Emergency Exercise with a Public Health Component

Performance Measure: The number of health authorities (including the First Nations Health Authority) that have participated in an emergency exercise with a public health component in the last two years.

Baseline: 5 (2012)

2023 Target: 7

Training and exercise activities are critical components of emergency management, and are vital to a successful response to an emergency situation. Emergency exercises are used to validate response plans, test procedures, facilities, equipment, and resources, and provide realistic training to staff. They also foster and maintain relationships between key partners.¹²

The Government of British Columbia's Core Policies and Procedures Manual requires that all ministries, including the Ministry of Health, develop, implement, and test their emergency and **business continuity plans**.¹³ These plans include an all-hazards approach to prepare for, respond to, and recover from a wide range of emergencies and disasters.¹⁴ An all-hazards approach focuses on preparing to respond to common consequences of hazards rather than the individual hazards themselves—it recognizes and integrates common emergency management elements across all hazard types, then fills any remaining gaps with hazard-specific components.³

Health Emergency Management BC (HEMBC) is a program of the Provincial Health Services Authority and the Ministry of Health that provides emergency management leadership and support to the BC health authorities and to the PHO at the Ministry of Health. HEMBC supports the health authorities to plan for, respond to, and recover from the impacts of emergency events.¹⁵ This work includes the development and implementation of strategic and operational emergency plans and programs across the health system. There

is a HEMBC team in each BC regional health authority¹⁶ and at the Ministry of Health. Part of the support HEMBC provides to BC health authorities and the Ministry of Health includes delivering emergency training and exercises. In the 2016/17 fiscal year, HEMBC delivered 121 exercises to over 3,500 health staff; over 20,000 staff received in-person training, and over 36,000 took online training.¹⁷

Emergency exercises can be focused on health-specific events (e.g., a table-top exercise for a pandemic influenza event), or they can be focused on an emergency event, with a component that looks at how that event could affect the health of the population. For example, for an exercise that focuses on an earthquake scenario, the public health component could focus on how the earthquake could affect public health (e.g., compromised drinking water quality, issues with the food supply, infectious disease outbreaks).

This Guiding Framework indicator focuses on whether the seven BC health authorities have conducted or been involved in either health event-related emergency exercises or emergency exercises with a public health component. As shown in Table 9.2, this target has currently been reached. As of June 2017, all health authorities have participated in an emergency exercise with a public health component in the last two years. While this performance measure requires ongoing exercises, health authorities are all regularly conducting exercises at a frequency that is conducive to meeting the target in 2023.

TABLE 9.2 Health Authority Participation in Emergency Exercises with a Public Health Component in the Last Two Years (as of June 2017)

Health Authority	Exercise Completion	Plan Information
Fraser	Completed	In 2017, Fraser Health participated in two health protection-related table-top exercises delivered by HEMBC, alongside Vancouver Coastal Health. The first one focused on two scenarios: a train derailment and a fire at Port Metro Vancouver. The second focused on the scenarios of a crude oil spill and a municipal-wide power outage. ¹⁸
Interior	Completed	Since 2015, Interior Health has participated in a number of exercises. For example, a table-top exercise in 2016 focused on response to an environmental spill, and one in 2017 had an emergency operations centre review and a simulated response to an emerging pathogen. Additionally, Interior Health completed community response training and exercises that targeted Community Leadership Teams, and looked at the impacts of flood and fire events, including the impact on health service delivery, public health, and health protection services. ¹⁹
Island	Completed	In 2016, Island Health participated, alongside FNHA, in Exercise Coastal Response, which was a multi-day, full-scale, functional exercise to respond to the scenario of a large earthquake and tsunami event in Port Alberni. ²⁰ This event incorporated responses to public health issues such as water quality. Island Health also completed Exercise Laurel Point, which was an exercise scenario of a large marine diesel spill. This scenario included significant water and air quality aspects that tested public health risk assessment, monitoring, and messaging capabilities. ²¹
Northern	Completed	In 2016, Northern Health participated in a joint table-top pandemic response exercise with Interior Health. This exercise reviewed existing surveillance and response activation procedures that would be used in the event of an emerging pathogen or pandemic outbreak. ²²
Vancouver Coastal	Completed	In 2017, Vancouver Coastal Health participated in two health protection-related table-top exercises in conjunction with those completed by Fraser Health and delivered by HEMBC. These exercises focused on a train derailment and a fire, as well as crude oil spill and municipal-wide power outage scenarios. ¹⁸
First Nations Health Authority	Completed	In 2016, the FNHA participated, with Island Health, in Exercise Coastal Response, which was a multi-day, full-scale, functional exercise that involved the scenario of a large earthquake and tsunami event in Port Alberni. ^{20,23}
Provincial Health Services Authority	Completed	In 2017, the BC Centre for Disease Control, at the PHSA, had health emergency operations centre training and worked through both a public health and earthquake scenario. ²⁴

Emergency Response in Action in BC

Over the last 10 years, BC has activated emergency responses to several different types of scenarios. This includes H1N1 (2009), Ebola (2013–16), wildfires (2017) and BC’s overdose emergency (2016–present). While these are beyond the scope of the Guiding Framework and the related performance measures being assessed in this report, it is important to review these responses as examples of emergency response planning in action in BC.

H1N1

The 2009 H1N1 (“swine flu”) pandemic officially began in June 2009, when the World Health Organization (WHO) raised its alert level to Phase 6 (the pandemic phase). This new strain of influenza, which caused severe respiratory illness, appeared in Mexico in March 2009, and quickly spread to the United States and Canada.²⁵ Canada experienced two waves of increased H1N1 activity. The first wave began in April 2009, and peaked during the first three weeks of June. The second wave peaked a few months later, in early November 2009.²⁶

Canada’s response to the pandemic was led by the Public Health Agency of Canada (PHAC). They worked closely with health officials across Canada to ensure a consistent national response to H1N1 and timely information sharing across all provinces and territories.²⁷ PHAC coordinated national surveillance efforts, ensured there were sufficient vaccines available for Canada’s population,²⁷ developed guidelines with the input of its jurisdictional partners, and distributed a Health Alert Notice to Canada border service officers to provide travellers with information and advice on the virus.²⁸

The first cases of H1N1 in BC were reported in late April 2009, shortly after those in Mexico.²⁵ Health officials were actively preparing for more cases to be identified by increasing surveillance activities, updating guidelines and practices,

and reviewing and updating pandemic influenza plans. For example, BC developed guidelines and communications processes for schools, day cares,²⁸ summer camps,²⁹ and workplaces,³⁰ as these settings can act as amplification points of seasonal influenza. In addition, guidelines and communication processes were developed for athletes and visitors attending the Olympic and Paralympic Winter Games in BC in 2010.²⁸

In BC, the peak of the second wave of influenza activity arrived earlier than in other parts of the country.³¹ By the end of October 2009, BC hospitals were experiencing the greatest demand on their resources due to the pandemic.²⁵ A vaccine for H1N1 became available at the end of October, with immunization first targeting those most at risk of severe disease or complications (e.g., persons with chronic conditions under age 65; pregnant women; persons residing in remote and isolated communities, etc.) before being expanded to the general population by mid-November.²⁵ By the end of November, hospital demand had dropped significantly. BC also ensured its stockpile of antivirals was in place to treat the H1N1 virus.²⁸ People who took antivirals after getting sick experienced a less severe and shorter illness and were more likely to avoid hospitalization.²⁵

As of February 2010, there were 1,059 confirmed severe H1N1 cases in BC, with 56 deaths; of those deaths, 49 had underlying medical conditions.³² By the end of March 2010, an estimated 1.8 million individuals, or 40 per cent of BC’s population, had been immunized with H1N1 vaccine, and 2 million doses of antiviral medication had been distributed for the prevention and treatment of H1N1 influenza.²⁸ The WHO decreased the alert level in August 2010.³³

Communication was a key component of BC’s pandemic response. The Office of the PHO held regular conference calls with health authorities and other key stakeholders both in BC and nationally to share information and coordinate contingency planning to accommodate large

volumes of H1N1 patients and increased calls to HealthLink BC, the province's telehealth service.³⁴ The PHO also engaged in daily media briefings to ensure that appropriate messaging reached the public as soon as possible.²⁵ The information and communications campaign to the public included a dedicated H1N1 website (with a centralized web resource for health professionals), social media, news releases, and advertising that provided accurate, up-to-date information.²⁵ BC updated its comprehensive pandemic response plan based on lessons learned from this H1N1 pandemic, in order to be prepared in the event of another pandemic.

Ebola Virus

Ebola is a severe viral disease, which causes hemorrhagic fever that can lead to internal bleeding and organ failure,³⁵ with an average 50 per cent case fatality rate.³⁶ An Ebola Virus Disease (EVD) outbreak began in early 2014 in Guinea, West Africa, and quickly spread to Sierra Leone and Liberia. By August 2014, the WHO alerted the international community to the likelihood of further spread and declared the Ebola outbreak a public health emergency of international concern.³⁷ The PHAC directed Canada's response to Ebola and worked with the provinces and territories to facilitate preparedness in detecting, managing, and reporting EVD.³⁸ Canada introduced travel restrictions, donated over \$5 million in technical and human resources to support emergency efforts in West Africa,³⁹ and provided the WHO with personal protective equipment.^{39,40} Travellers arriving to Canada from countries affected by the Ebola outbreak were screened and required to engage in regular monitoring.⁴¹ They were to report to public health officials if symptoms occurred, and a quarantine of 21 days was implemented for individuals who had unprotected exposure to the Ebola virus, or direct contact with victims of Ebola or with infected fluids.⁴²

In the fall of 2014, the BC Ministry of Health set up the Provincial Ebola Preparedness

Task Force, co-chaired by the PHO and the Associate Deputy Minister, Health Services. The Task Force met regularly to review BC's response protocols in the event of a case of Ebola arriving in BC. They also were in regular contact with organizations and individuals across BC, including municipalities, post-secondary institutions, regulatory colleges, bargaining associations, and health professional organizations, to provide information and answer questions regarding Ebola preparedness and response.⁴²

Policies and guidelines were developed by experts across BC's health system to address the entire continuum of care for someone who may develop EVD, and guidance documents were made publicly available on the PHO's website. Each health authority had designated central care point sites for those people who had a potential exposure to Ebola and had developed symptoms.⁴³ In BC, a total of 173 people were considered EVD contacts because they may have been exposed to the virus through a probable or confirmed EVD case.⁴³ As per the contact guidelines, 39 people were considered "medium risk", "at risk", and above,⁴⁴ and had movement restrictions imposed on them. Three BC residents were tested for EVD; no one tested positive and no one required quarantine.⁴⁴

In March 2016, the WHO declared the Ebola public health emergency crisis over. Overall, during the course of the outbreak, the WHO recorded more than 28,600 suspected or confirmed Ebola cases, and over 11,300 deaths.^{45,46} No confirmed cases of EVD were identified in BC or Canada.⁴³ BC's Task Force was deactivated, and lessons learned from Ebola preparedness are being embedded into the health care system. Surrey Memorial Hospital is equipped with a biocontainment treatment unit for high acuity infectious diseases, but around the province, there is still a need to fully implement sustained, rigorous training in infection control, decontamination,

and the recommended donning and doffing of personal protective equipment. A Health Care Worker All Hazard Personal Protective Training Framework has been developed by the Ministry of Health⁴⁷ and is included in the all-hazards approach to ensure ongoing preparedness for novel or unexpected pathogens, or potential pandemics.⁴³

BC Wildfires

In the summer of 2017, BC had the worst wildfire season in its history. A Provincial State of Emergency was declared on July 7, 2017, when, on that day alone, 56 new wildfires started.⁴⁸ It was extended four times as aggressive fires, fuelled by hot, dry weather, displaced approximately 65,000 BC residents.^{49,50}

The Ministry of Health played a key role during this crisis, by activating the provincial Health Emergency Coordination Centre (HECC) and leading daily health system coordination calls to support a seamless response across the health system. The Health Wildfire Smoke Response Coordination Group and the BC Centre for Disease Control's Environmental Health Services both supported HEMBC's response by providing smoke forecasts, health impact predictions, public information, and research.⁵¹

Over 1,300 fires burning 1.2 million hectares resulted in a number of air quality advisories.⁵² BC's Air Quality Health Index estimates the short-term health risk caused by degraded air quality and measures how safe it is to breathe on a scale from 1 to 10 (with 1 being low or no risk).⁵² In Kamloops, the smoky conditions resulted in a peak reading of 49, indicating exceptionally low air quality and an extremely high health risk.⁵³

In BC's interior, over 80 evacuation alerts were issued in communities. Interior Health evacuated a total of 880 patients and clients from 19 health care facilities, 220 of which were received by Northern Health.⁵⁴ To meet the needs of the general population evacuees, Northern Health

set up a primary care clinic and nursing triage unit in Prince George, resulting in approximately 1,000 patient visits during its operation.⁵² Interior Health also established primary health care sites in two Kamloops locations and many communities opened reception centres for the over 48,000 registered wildfire evacuees.^{52,54}

By the end of the fire season, British Columbia had mobilized over 4,700 personnel, including fire fighters from across Canada, Australia, Mexico, New Zealand, and the United States, and had spent over \$568 million.⁵⁰ The 70-day State of Emergency ended on September 15, 2017,⁵¹ making it the longest in BC's history.⁵⁰ HEMBC conducted a wildfire debrief with all health system partners and has identified areas for improvement for future events.⁵⁴

Illegal Drug Overdose Emergency

As discussed throughout this report, there is currently an emergency response underway in BC to address the illegal drug overdose crisis. In April 2016, the PHO responded to the significant increase in illegal drug overdose deaths in BC by declaring the province's first ever Public Health Emergency.⁵⁵ By the end of 2016, 993 people had died in BC from apparent illegal drug overdoses. In 2017 this figure increased to 1,449 reported deaths.⁵⁶ These numbers may increase as investigations are concluded. In January and February of 2018, there were 228 suspected overdose deaths.⁵⁷

Following the declaration of the Public Health Emergency, a Joint Task Force on Overdose Response was created in July 2016, to lead an integrated response across the public health and public safety sectors. The Joint Task Force publicly reported on the progress of the province's response to the crisis every two months.⁵⁸ A Health System Steering Committee was also created to guide the health system response, with representation from the Ministry of Health, all regional health authorities, the Provincial Health Services



Authority, and the First Nations Health Authority.⁵⁷ Under the direction of the Joint Task Force, task groups worked on a coordinated response to the emergency. Their activities included

- Expanding access to naloxone.
- Increasing access to overdose prevention and supervised consumption services.
- Increasing access to **opioid agonist treatment**.
- Establishing enhanced surveillance and early-warning and monitoring systems.
- Reaching and engaging those who are using drugs alone.
- Launching and maintaining a comprehensive social marketing campaign to raise awareness of issues related to the emergency.⁵⁹

Despite efforts to prevent and respond to overdoses, including expansion of publicly funded naloxone and establishment of overdose prevention services, BC continues to see an alarming number of people experiencing illegal drug overdoses. In July 2017, the BC Government established the Ministry of Mental Health and Addictions with a mandate to escalate the province's response. On December 1, 2017, the Minister of Mental Health and Addictions announced the activation of the Overdose Emergency Response Centre,

and all task groups were brought under that centre. The Overdose Emergency Response Centre enabled expansion of BC's response from a focus on public health and safety to one that incorporated more engagement across multiple sectors in both government and community organizations.⁶⁰ Its structure is based on emergency management best practices, is designed to build on successes to date, and is working to rapidly identify and address gaps in the province's response at the local level.

Throughout this crisis, significantly more males than females have died, and most overdose deaths have occurred among those age 19-59.⁵⁷ The illegal drug overdose crisis continues to impact individuals, communities, families, frontline workers, and first responders, and puts pressure on the health and public safety systems. However, the coordinated response described above has mobilized human and financial resources across sectors, and has saved the lives of many British Columbians. At the time of publication of this report there were no deaths at supervised consumption or drug overdose prevention sites.⁵⁷ The continued increases in overdoses and overdose deaths, and related coordinated responses to this public health emergency, underscore the importance of working together in the event of an emergency.

⁵⁷ The Health System Steering Committee also includes representatives from the Ministry of Children and Family Development, Providence Health Care, BC Emergency Health Services, and the Public Health Agency of Canada.

Conclusion

This chapter has summarized actions taken by BC health authorities that align with the performance measures of Goal 7 of the Guiding Framework, including having a pandemic influenza response plan in place, and participating in public health emergency exercises. Public health emergency management is critical for a complex system to respond effectively and efficiently to health and other emergencies, and to ensure resilience of the population and the health system. Six health authorities currently have pandemic influenza response plans in place that align with the

ministry plan; the FNHA is developing its plan to align with the BC plan and in collaboration with First Nations communities. All health authorities have participated in an emergency exercise with a public health component in the last two years. In the last 10 years, BC has demonstrated the ability to activate plans and to develop new initiatives and strategic actions as needed in response to several emergencies with public health implications, including H1N1, Ebola Virus Disease, wildfires, and the current illegal drug overdose crisis. The next chapter will examine health surveillance in BC.

REFERENCES

- ¹ BC Ministry of Health, Population and Public Health. Evidence review: public health emergency management. Victoria, BC: BC Ministry of Health; 2013 Apr [cited 2017 Feb 27]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2013/public-health-emergency-management-evidence-review.pdf>.
- ² BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ³ Ministers Responsible for Emergency Management. An emergency management framework for Canada. 2nd ed. Ottawa, ON: Public Safety Canada; 2011 Jan [cited 2017 Feb 27]. Available from: <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/mrgnc-mngmnt-frmwrk/mrgnc-mngmnt-frmwrk-eng.pdf>.
- ⁴ Province of British Columbia. Comprehensive emergency management plan: Public health and medical services annex. Victoria, BC: Province of British Columbia; 2012 [cited 2017 Feb 27]. Available from: <http://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/provincial-emergency-planning/public-health-and-medical-services-annex.pdf>.
- ⁵ Government of British Columbia. British Columbia's pandemic influenza response plan (2012). Introduction and background. Victoria, BC: Government of British Columbia; 2012 Sep [cited 2017 Feb 27]. Available from: <http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/bc-pandemic-influenza-plan-2012.pdf>.
- ⁶ Government of British Columbia. British Columbia's pandemic influenza response plan (2012). Introduction and background. Victoria, BC: Government of British Columbia; 2012 Sep [cited 2017 Feb 27]. Available from: <http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/bc-pandemic-influenza-plan-2012.pdf>.
- ⁷ Government of British Columbia. British Columbia pandemic influenza provincial coordination plan. Victoria, BC: Government of British Columbia; [revised 2014 Nov 17; cited 2018 Apr 19]. Available from: <http://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/provincial-emergency-planning/pandemic-influenza-provincial-coordination-plan.pdf>.
- ⁸ Lee V. Personal communication. Fraser Health; 2017 Jul 12.
- ⁹ First Nations Health Authority. Communicable disease emergencies (pandemic influenza) [Internet]. West Vancouver, BC: First Nations Health Authority; 2017 [cited 2017 Jun 23]. Available from: <http://www.fnha.ca/what-we-do/communicable-disease-control/communicable-disease-emergencies-pandemic-influenza>.
- ¹⁰ Sagar, B. Personal communication. BC Ministry of Health; 2018 Mar 06.

- ¹¹ Sagar, B. Personal communication. BC Ministry of Health; 2018 Feb 16; 2018 Mar 06; 2018 Mar 08.
- ¹² Government of British Columbia. Exercise program [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Feb 28]. Available from: <http://www2.gov.bc.ca/gov/content/safety/emergency-preparedness-response-recovery/emergency-management-bc/emergency-management-training-and-exercises/exercise-program>.
- ¹³ Government of British Columbia. Core policies and procedures manual chapter 16: business continuity management. Victoria, BC: Government of British Columbia; [cited 2018 Jun 21]. Available from: <https://www2.gov.bc.ca/gov/content/governments/policies-for-government/core-policy/policies/business-continuity-management>.
- ¹⁴ Government of British Columbia. Health emergency response and personal preparedness [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Feb 28]. Available from: <http://www2.gov.bc.ca/gov/content/health/keeping-bc-healthy-safe/emergency-preparedness>.
- ¹⁵ Provincial Health Services Authority. Health emergency management BC [Internet]. Vancouver, BC: Provincial Health Services Authority; [cited 2017 Feb 28]. Available from: <http://www.phsa.ca/our-services/programs-services/health-emergency-management-bc>.
- ¹⁶ Northern Health. Emergency response roles & responsibilities. Prince George, BC: Northern Health; 2015 Jul 05 [revised 2015 Oct 05; cited 2017 Feb 28]. Available from: https://northernhealth.ca/Portals/0/Your_Health/Programs/Public%20Health/OfficeHealthResourceDevelopment/HEMBC-Roles-Responsibilities-and-Contacts.pdf.
- ¹⁷ Health Emergency Management BC. Quarterly report. Q4 (January 1 – March 31, 2017). Vancouver, BC: Provincial Health Services Authority; 2017 Mar.
- ¹⁸ McLachlan D. Personal communication. Health Emergency Management BC; 2017 Jun 15.
- ¹⁹ Erland R. Personal communication. Interior Health; 2017 Jun 14.
- ²⁰ Government of British Columbia. Exercise Coastal Response 2016. After action review report. Victoria, BC: Government of British Columbia; 2017 Jan.
- ²¹ Delorme G. Personal communication. Island Health; 2017 Jun 13.
- ²² Fitzpatrick J. Personal communication. Northern Health; 2017 Jun 16.
- ²³ Reid D. Personal communication. First Nations Health Authority; 2017 Jun 16.
- ²⁴ Beattie J. Personal communication. Health Emergency Management BC; 2017 Jun 14.
- ²⁵ BC Provincial Health Officer. B.C.'s response to the H1N1 pandemic. A summary report. Victoria, BC: BC Office of the Provincial Health Officer; 2010 Jun [cited 2018 Feb 13]. Available from: https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/special-reports/pho_report_bc_response_to_the_h1n1_pandemic_june2010.pdf.
- ²⁶ Standing Senate Committee on Social Affairs, Science and Technology. Canada's response to the 2009 H1N1 influenza pandemic. Ottawa, ON: Senate; 2010 Dec [cited 2018 Feb 13]. Available from: <https://sencanada.ca/content/sen/Committee/403/soci/rep/rep15dec10-e.pdf>.
- ²⁷ Government of Canada. Lessons learned review: Public Health Agency of Canada and Health Canada response to the 2009 H1N1 pandemic. Ottawa, ON: Public Health Agency of Canada and Health Canada; 2010 Dec [cited 2018 Mar 05]. Available from: <https://www.canada.ca/en/public-health/corporate/mandate/about-agency/office-evaluation/evaluation-reports/lessons-learned-review-public-health-agency-canada-health-canada-response-2009-h1n1-pandemic/background-context.html>.
- ²⁸ BC Ministry of Health. H1N1 flu virus (human swine flu) [fact sheet]. Victoria, BC: BC Ministry of Health; 2010 Apr.
- ²⁹ Ontario Agency for Health Protection and Promotion. H1N1 “the literature” – this week at a glance. Toronto, ON: Ontario Agency for Health Protection and Promotion; 2009 Jun 05 [cited 2018 Feb 14]. Available from: https://www.publichealthontario.ca/en/eRepository/H1N1_Weekly_Literature_Synthesis_2009-10.pdf.
- ³⁰ Government of British Columbia. British Columbia's H1N1 pandemic influenza response plan (2009). Health human resources guidelines for the H1N1 pandemic response – summary. Victoria, BC: Government of British Columbia; 2009 Nov 29 [cited 2018 Feb 16]. Available from: <http://www.health.gov.bc.ca/pandemic/response/pdf/Health%20Human%20Resources%20Guidelines%20-%20Summary%20V3.pdf>.
- ³¹ Moghadas SM, Pizzi NJ, Wu J, Tamblin SE, Fisman DN. Canada in the face of the 2009 H1N1 pandemic. *Influenza Other Respir Viruses*. 2011 Mar;5(2):83-8.
- ³² BC Ministry of Health Services, BC Ministry of Healthy Living and Sport. H1N1 flu virus (human swine flu) under surveillance [news release]. Victoria, BC: BC Ministry of Health Services and BC Ministry of Healthy Living and Sport; 2010 Feb 02 [cited 2018 Jan 12]. Available from: https://archive.news.gov.bc.ca/releases/news_releases_2009-2013/2009HSERV0001-000004.pdf.

- ³³ World Health Organization. Report of the WHO pandemic influenza A (H1N1) vaccine deployment initiative. Geneva: World Health Organization; 2012 [cited 2018 Mar 06]. Available from: http://www.who.int/influenza_vaccines_plan/resources/h1n1_deployment_report.pdf.
- ³⁴ BC Ministry of Health. Government response to H1N1 [fact sheet]. Victoria, BC: BC Ministry of Health; 2009 Nov 09.
- ³⁵ Henry B, Kendall P. Important information on EVD for BC physicians [letter]. Victoria, BC: BC Office of the Provincial Health Officer; 2014 Oct 10 [cited 2018 Feb 09]. Available from: <https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/letter-to-bc-physicians-ebola.pdf>.
- ³⁶ World Health Organization. Ebola virus disease [fact sheet 103]. Geneva: World Health Organization; [cited 2016 Jan 18]. Available from: <http://www.who.int/mediacentre/factsheets/fs103/en/>.
- ³⁷ World Health Organization. Key events in the WHO response to the Ebola outbreak. One year into the Ebola epidemic. Geneva: World Health Organization; 2015 Jan [cited 2018 Feb 09]. Available from: <http://www.who.int/csr/disease/ebola/one-year-report/who-response/en/>.
- ³⁸ Semalulu T, Wong G, Kobinger G, Huston P. Why has this Ebola outbreak in West Africa been so challenging to control? *CCDR*. 2014 Aug;40(14):290-8.
- ³⁹ Public Health Agency of Canada. Canada offers essential protective equipment to help stop the spread of Ebola in West Africa [news release]. Ottawa, ON: Public Health Agency of Canada; 2014 Sep [cited 2018 Feb 09]. Available from: <https://www.canada.ca/en/news/archive/2014/09/canada-offers-essential-protective-equipment-help-stop-spread-ebola-west-africa.html>.
- ⁴⁰ Government of Canada. Canada's response to the Ebola outbreak in the West Africa region [backgrounder]. Ottawa, ON: Government of Canada; [modified 2014 Sep 15; cited 2018 Feb 09]. Available from: <https://www.canada.ca/en/news/archive/2014/09/canada-response-ebola-outbreak-west-africa-region.html>.
- ⁴¹ Government of Canada. Guidance document - minimizing the risk of exposure to Ebola Virus Disease in Canada through strengthened quarantine measures. Ottawa, ON: Government of Canada; 2014 Nov 10 [modified 2014 Nov 21; cited 2018 Feb 09]. Available from: <https://www.canada.ca/en/public-health/services/infectious-diseases/viral-haemorrhagic-fevers/guidance-document-minimizing-risk-exposure-ebola-virus-disease-canada-through-strengthened-quarantine-measures.html>.
- ⁴² BC Ministry of Health. Ebola preparedness in BC [fact sheet]. Victoria, BC: BC Ministry of Health; 2016 Mar 11.
- ⁴³ BC Provincial Health Officer. British Columbia Ebola Virus Disease (EVD) contact investigation and management guideline. Victoria, BC: BC Office of the Provincial Health Officer; [updated 2015 Apr 22; cited 2018 Mar 07]. Available from: <https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/british-columbia-ebola-virus-disease-evd-contact-investigation-and-management-guideline.pdf>.
- ⁴⁴ Hart M. Personal communication. BC Ministry of Health; 2018 Feb 16.
- ⁴⁵ Centres for Disease Control and Prevention. 2014-2016 Ebola outbreak in West Africa [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; [reviewed 2016 Oct 21; updated 2016 Jun 22; cited 2018 Feb 09]. Available from: <https://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/index.html>.
- ⁴⁶ World Health Organization. Ebola situation report [Internet]. Geneva: World Health Organization; 2016 Mar [cited 2018 Mar 13]. Available from: <http://apps.who.int/ebola/ebola-situation-reports>.
- ⁴⁷ Sagar B. Personal communication. BC Ministry of Health; 2018 Mar 05.
- ⁴⁸ Government of British Columbia. Provincial state of emergency declared [news release]. Victoria, BC: Government of British Columbia; 2017 Jul 07 [cited 2018 Mar 07]. Available from: <https://news.gov.bc.ca/releases/2017TRAN0196-001286>.
- ⁴⁹ Government of British Columbia. Wildfire season summary [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Feb 15]. Available from: <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary>.
- ⁵⁰ Government of British Columbia. Provincial state of emergency will expire today [news release]. Victoria, BC: Government of British Columbia; 2017 Sep 15 [cited 2018 Mar 07]. Available from: <https://news.gov.bc.ca/releases/2017PSSG0050-001585>.
- ⁵¹ McGuire C. Personal communication. Health Emergency Management BC; 2018 Feb 14.
- ⁵² BC Wildfire Service. Current statistics [Internet]. Victoria, BC: BC Wildfire Service; [cited 2018 Feb 15]. Available from: <http://bcfireinfo.for.gov.bc.ca/hprScripts/WildfireNews/Statistics.asp>.
- ⁵³ Interior Health Authority. @InteriorHealth. Special issue: wildfire response; 2017 Sep [cited 2018 Feb 15]. Available from: <https://www.interiorhealth.ca/AboutUs/MediaCentre/PublicationsNewsletters/Documents/Edition%2017%20-%20September%202017.pdf>.

- ⁵⁴ Abbott G, Chapman M. Addressing the new normal: 21st century disaster management in British Columbia. Victoria, BC: BC Flood and Wildfire Review; 2018 Apr 30 [cited 2018 Jun 19]. Available from: <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/bc-flood-and-wildfire-review-addressing-the-new-normal-21st-century-disaster-management-in-bc-web.pdf>.
- ⁵⁵ Government of British Columbia. Provincial health officer declares public health emergency [news release]. Victoria, BC: Government of British Columbia; 2016 Apr 14 [cited 2017 Jun 26]. Available from: <https://news.gov.bc.ca/releases/2016HLTH0026-000568>.
- ⁵⁶ BC Coroners Service. Illicit drug overdose deaths in BC: January 1, 2008 to February 28, 2018. Burnaby, BC: Office of the Chief Coroner, BC Ministry of Public Safety & Solicitor General; 2018 Apr 05 [cited 2018 April 18]. Available from: <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/death-investigation/statistical/illicit-drug.pdf>.
- ⁵⁷ BC Ministry of Public Safety and Solicitor General, BC Coroners Service. Illicit drug overdose death review panel releases recommendations [news release]. Victoria, BC: Ministry of Public Safety and Solicitor General, BC Coroners Service; 2018 Apr 05; [cited 2018 Apr 18]. Available from: <https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/news/2018/2018pssg0019-000572.pdf>.
- ⁵⁸ BC Office of the Provincial Health Officer. Current health topics. Opioid overdose [Internet]. Victoria, BC: BC Office of the Provincial Health Officer; [cited 2017 Jun 26]. Available from: <http://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/current-health-topics>.
- ⁵⁹ Miller H. Personal communication. BC Ministry of Health; 2017 Jun 19.
- ⁶⁰ BC Ministry of Mental Health and Addictions. Province escalates overdose emergency response to save lives, support people with addictions [news release]. Vancouver, BC: BC Ministry of Mental Health and Addictions; 2017 Dec 01 [cited 2018 Jan 09]. Available from: <https://news.gov.bc.ca/releases/2017mh0008-002003>

10

Health Surveillance

This chapter explores the topic of health surveillance as it relates to public health planning in BC. **Public health surveillance** is the ongoing systematic collection, analysis, interpretation, and dissemination of health-related data needed for planning, implementation, and evaluation of public health practices¹—or, information for action. One focus is identifying and monitoring trends in health events (e.g., non-communicable chronic and communicable diseases, injuries), in order to inform interventions to reduce adverse impacts of these diseases or injuries on the population. A second focus is monitoring determinants of disease, illness, and injuries, and making related efforts to mitigate these determinants to improve the health of the population. Therefore, public health surveillance is a key contributor to population health, as it provides the public health system and others with the information needed to support planning, decision-making, action, and evaluation.²

BC has built a solid foundation for population and public health surveillance, but it has developed in a fragmented and uncoordinated manner.² Some aspects of public health surveillance (e.g., communicable diseases)

are more established than others. There are deficiencies in the access and availability of data as well as limitations in analytical infrastructure. These are important limiting factors in monitoring the progress of performance measures, and also create a challenge for the Provincial Health Officer (PHO), who is required, under the *Public Health Act*, to report on the health status of British Columbians.²

In 2013, the Ministry of Health, in collaboration with provincial public health partners and health authorities, initiated the *Population and Public Health Surveillance Plan for British Columbia*. The project looked at the current state of surveillance in BC, identified gaps and challenges, and developed recommendations to address those gaps.

Guiding Framework: Health Surveillance

Objectives

1. Support the planning, implementation and improvement of public health programs by improving health surveillance with respect to monitoring and reporting on environmental health, communicable and chronic diseases, injuries, risk factors, and the determinants of health.

Performance Measures

Two performance measures related to health surveillance were identified in the Guiding Framework:

- Develop a plan to improve public health surveillance in BC.
- Implement the public health surveillance plan for BC.

Development of the Population & Public Health Surveillance Plan

Development of the *Population and Public Health Surveillance Plan for British Columbia* was completed in 2015. It included the creation of two documents: Part 1 (Current State) and Part 2 (Implementation Strategy). Part 1 was created through a collaborative process involving the Ministry of Health, the five regional health authorities, the Provincial Health Services Authority, and the First Nations Health Authority, and was released in 2014. It outlined the current state of public health surveillance in BC and reviewed population and public health surveillance programs around BC. It found the following:²

- A variety of surveillance resources, supported by a policy and legislative framework, exist at the regional, provincial, and national level.
- The mandate for population and public health surveillance is shared between a number of specialized provincial organizations, and more generalized resources within the regional health authorities.
- Human and data resources reside primarily within provincial-level organizations, and are focused on communicable disease and harm reduction surveillance. Surveillance of chronic disease and maternal/child health are less of a focus. Some other areas, such as injury prevention, environmental health, and emergency management, have even fewer resources.
- Communicable disease and harm reduction surveillance have developed in a coordinated fashion, led by the BC Centre for Disease Control. Development of non-communicable disease and population health surveillance initiatives has been more recent and has been relatively uncoordinated, leading to substantial variation in resources across program areas and between regional health authorities.
- The Ministry of Health and the First Nations Health Authority are collaborating with respect to how to work together on public health surveillance for the First Nations population.

Following this assessment of the current state, Part 2 of the surveillance plan was developed and then released in 2015. Part 2 was an implementation strategy that focused on addressing surveillance gaps identified in Part 1. This included capacity building at the regional and provincial levels and the development of an observatory focused on population and public health. The purpose of this observatory is to enable more coordinated surveillance efforts, and greater accessibility of data and analytics to meet local, regional, and provincial surveillance needs.³ As discussed in the next section, implementation of this plan is underway.

Implementation of the Population & Public Health Surveillance Plan

The second performance measure related to health surveillance in the Guiding Framework is to implement the public health surveillance plan for BC by 2023. Implementation of the *Population and Public Health Surveillance Plan for British Columbia* is currently underway. A main focus of implementation is the establishment of a BC Observatory for Population and Public Health (the Observatory), which was a recommendation from Part 2 of the surveillance plan. The Observatory was established in fiscal 2015/16.⁴

The Observatory, based out of the BC Centre for Disease Control, is a partnership initiative between the BC Centre for Disease Control, the BC Ministry of Health, the BC Office of the PHO, five regional health authorities, the Provincial Health Services Authority, and the First Nations Health Authority. It was established to provide collaborative leadership in advancing provincial and regional surveillance capacity in the areas of non-communicable diseases, injuries, risk and protective factors, and environmental health. The Observatory helps to address the fragmented nature of chronic disease and injury surveillance in the province, as well as deficiencies in access

to data analytic infrastructure for surveillance.⁵ It supports the PHO and medical health officers in the health authorities to report on the health status of their populations, as required under the *Public Health Act*.⁶ Surveillance data within the Observatory will be used to support the public health system in policy development, program planning and evaluation, and decision-making to support health and well-being in communities in British Columbia.⁶

The goals of the Observatory, as outlined in their 2016/17–2020/21 strategic plan, are as follows:

- Establish a secure data platform equally accessible to all partners.
- Develop a robust methodology hub.
- Ensure that surveillance products are relevant and actionable.
- Build capacity to work in a flexible and nimble way.
- Enable needs-based applied public health research.
- Build a strong partnership with local, regional, and provincial stakeholders.⁶

The Public Health Executive Committee, which includes senior public health leadership from around the province, sets strategic direction for the Observatory. The Operations Committee, which includes senior epidemiologists from all partner organizations, develops the annual work plan and guides its implementation.⁶

The Observatory is structured as a “hub and spoke” model: the Observatory director and administrative assistant are located at the BC Centre for Disease Control (the hub), and regional epidemiologists are situated in their respective health authorities (the spokes).⁶ The core team is expected to eventually include a project manager, a knowledge translation specialist, and additional data management and analytic support, including computer scientists, epidemiologists, and biostatisticians.⁶



Since its establishment, the Observatory has begun engaging in a number of key functions to enhance population health monitoring and surveillance in BC, including playing an active role in responding to the illegal drug overdose public health emergency in BC. The Observatory's team includes regional epidemiologists who engage in overdose surveillance and analysis and assist in regular reporting.⁵ The Observatory is also developing a library of indicators that are reported provincially and regionally (including indicators of health and well-being as well as factors that impact health outcomes); this library will define the indicator, describe its strength and limitations, and explain the data sources and calculations, to promote understanding of and facilitate standardization of indicator use across the province.⁷ In December 2017, the Observatory launched the BC Chronic Disease Dashboard, a public-facing, interactive tool available on the BC Centre for Disease Control's website. This dashboard

provides summary statistics for 32 chronic conditions and their subtypes, displayed either as a map, a graph, or a data table.⁸ Additionally, the Observatory is involved in planning how to address the current lack of granular local-level data available in the province—specifically for risk and protective factors—which is needed by the health authorities for program planning and service delivery.⁵

Overall, there has been considerable advancement in the development of the Observatory, although there is still work to be done and challenges to be overcome. For example, information-sharing agreements need to be finalized before data can be accessed.⁹ Additionally, financial and staffing resources are being examined to ensure sufficient support and optimal efficiencies are in place. The Observatory is currently working with the Ministry of Health to examine if Population Data BC can expand its mandate to support surveillance.^{2,5}

² Population Data BC (PopData) is a multi-university data and education resource that facilitates interdisciplinary research on the determinants of human health, well-being, and development. For more information, visit www.popdata.bc.ca.

Conclusion

This chapter has reviewed the two performance measures identified in the Guiding Framework related to health surveillance: developing and then implementing a plan for improved public health surveillance in BC. The development of the *Population and Public Health Surveillance Plan for British Columbia* was completed in 2015 and included two parts: an assessment of the current state, and an implementation strategy focused on addressing identified surveillance gaps. This led to the development of the BC Observatory for Population and Public Health in fiscal 2015/16.⁴ The Observatory focuses on monitoring

population and public health, and has the capacity to enable more coordinated surveillance efforts across BC and greater accessibility of data. Enhancing health surveillance and data availability will allow for better monitoring of trends in health events as well as determinants of disease, illness, and injuries, and thus, will provide the information needed to support health-related planning, decision-making, action, and evaluation. The next chapter will review and discuss analyses and observations presented in this report, and provide recommendations for enhancing population and public health in BC.

REFERENCES

- ¹ World Health Organization. Public health surveillance [Internet]. Geneva: World Health Organization; [cited 2017 Feb 28]. Available from: http://www.who.int/topics/public_health_surveillance/en/.
- ² BC Ministry of Health. Population and public health surveillance plan for British Columbia. Part 1: current state. Victoria, BC: BC Ministry of Health; 2014 Sep.
- ³ BC Ministry of Health. Population and public health surveillance plan for British Columbia. Part 2: implementation strategy. Victoria, BC: BC Ministry of Health; 2015 May.
- ⁴ Smolina K. Personal communication. BC Observatory for Population and Public Health; 2018 Mar 27.
- ⁵ Smolina K. BC Observatory for Population and Public Health. BCCDC Grand Rounds [online presentation]. Vancouver, BC: BC Centre for Disease Control; 2017 Jan 31 [cited 2018 Feb 08]. Available from: <http://mediasite.phsa.ca/Mediasite/Play/8d003cc8a3244fc88b302850b1149c481d?catalog=8b83c4e8dc9540b08787fc2a880b79b321>.
- ⁶ BC Centre for Disease Control. Strategic plan 2016/17 – 2020/21: BC Observatory for Population and Public Health. Vancouver, BC: BC Centre for Disease Control; [cited 2017 Jun 15]. Available from: <http://www.bccdc.ca/Our-Services-Site/Documents/FINAL-Obs-Strat-Plan-2016-2022.pdf>.
- ⁷ Ye X. Personal communication. BC Ministry of Health; 2018 Feb 07.
- ⁸ BC Centre for Disease Control. Chronic disease dashboard [Internet]. Vancouver, BC: BC Centre for Disease Control; c.2018 [cited 2018 Mar 15]. Available from: <http://www.bccdc.ca/health-info/disease-system-statistics/chronic-disease-dashboard>.
- ⁹ Smolina K. Personal communication. BC Observatory for Population and Public Health; 2018 Mar 16.

11

Discussion & Recommendations

This report explores the population health status of British Columbians, through the 36 performance measures laid out in *Promote, Protect, Prevent: Our Health Begins Here. BC's Guiding Framework for Public Health* (the Guiding Framework). The Guiding Framework established long-term direction for the public health system, reinforced the strategic partnerships required for successful improvement of the health of the population, and solidified a strategic process by which priority actions would be developed and implemented for the future. The 36 performance measures were intended to help assess the impact of new interventions, monitor and report on progress over time, and ensure continuous quality improvement. The performance measures were mainly selected from existing strategies in order to align efforts and ensure that data were available.¹ These performance measures are indicative of the broader health status of the population, and of the ability of the public health system to support optimal population health.

This report has examined progress on these performance measures from baselines toward targets, and has shown that there is measurable success in many areas, while other areas will require significant action in order to achieve the provincial targets. This chapter discusses key findings of the report, and offers seven

recommendations to improve health and well-being in BC and move further toward provincial targets.

Setting Strategic Health Priorities in BC

In the early 2000s, public health events, such as a waterborne illness outbreak in Walkerton Ontario (2000), and an outbreak of Severe Acute Respiratory Syndrome (SARS) (2003), emphasized the importance of having a strong public health system (see Chapter 1). This led to an investment in public health renewal in BC, starting in 2003. Public health renewal included the development of the *Core Public Health Functions* in 2005 to establish the essential roles and functions of the public health system, and the development of consistent, modern legislation, including the replacement of the *Health Act* by the *Public Health Act* in 2009.²

Around this time, several strategic initiatives—including *ActNow BC*; *Healthy Minds, Healthy People*; *Tobacco Control Strategy*; and *From Hope to Health: Towards an AIDS-free Generation*—were being developed and implemented to address a wide range of public health issues in the province. With all of these strategies underway,

it was recognized that overarching direction was needed to provide the long-term strategic vision for the whole public health system. The Guiding Framework was developed in 2013 (and updated in March 2017) to fulfill this function. It established seven goals and corresponding performance measures that support the overall vision for public health in BC: “vibrant communities in which all people achieve their best health and well-being where they live, work, learn and play”. Together these performance measures help to provide a comprehensive picture of the health of British Columbians.

Summary & Observations of Progress to Date

Making Progress

Some of the performance measures are projected to meet 10-year targets, and together, suggest that the overall health of the population of BC continues to improve. For example, the performance measures of diabetes incidence, age-standardized mortality due to preventable causes, smoking during pregnancy, and hepatitis C incidence among repeat testers, are all showing provincial successes. Risk factor trends were particularly positive among adolescents, with decreasing rates of alcohol and cannabis use prior to age 15 and increasing rates of chlamydia testing among young women. The peaking and subsequent decline in the incidence rate for diabetes during the past decade is particularly important. This shift in the incidence of diabetes—a sentinel chronic disease—represents an important landmark in our progress, through behavioural and environmental change, to reduce the incidence rates of chronic disease in the province. While these performance measures show progress for BC overall, there are some underserved sub-populations that have not experienced the same successes; therefore, it is important to continue to explore and address disparities based on variables presented in this report (sex, age, and region), as well as other

variables that are beyond the scope of analyses in this report (e.g., income, education, community).

Areas of Challenge

While there are numerous areas with clear successes demonstrated, there are also performance measures that illustrate persistent challenges in moving toward 10-year targets established in the Guiding Framework, and thus, in advancing overall health and health equity in our population. One such performance measure is disparity in life expectancy at birth between local health areas, which is widening; however, this is occurring in what has been—up until the last two years—an overall improving trend. There are also challenges in reaching targets for the three early child development performance measures presented (kindergarten children who are not vulnerable for social development or emotional development, or on any Early Development Instrument dimensions). In fact, these three performance measures are moving away from targets. Additionally, trends in fruit and vegetable consumption among British Columbians age 12 and up have proven difficult to shift in a more positive direction, and the reduction in the percentage of children who are learning how to stay healthy at school requires attention if the positive trends in adolescent health are to be maintained. There are also declining rates of positive mental health and life satisfaction in the province, which is consistent with findings that BC rated lower among Canadian provinces for both of these measures.

Two areas of challenge in BC identified during the development of this report are the impacts of increased alcohol consumption and of the opioid overdose crisis. These challenges are reflected in performance measures analyzed in this report. The trends in hazardous drinking, both generally among British Columbians age 12 and up and specifically among women of reproductive age, have worsened. This highlights a need to review recent changes in alcohol policy in BC, and this will be the subject of an upcoming Provincial Health Officer’s (PHO) report. The

impact of the overdose crisis within BC is seen across several performance measures, as it increases rates of illness/injury and death, and is even negatively impacting life expectancy at birth for the broader population. This issue will also be examined further in a future PHO report.

Variable Trends

The remaining performance measures show more mixed results. Some are moving in a positive direction, but not at a level that would result in meeting the 10-year Guiding Framework targets: infant mortality rate, health-adjusted life expectancy, physical activity rate, smoking rate, immunization rate by second birthday, newly diagnosed HIV cases with CD4 count greater than 500 at diagnosis, hospitalizations and mortality due to unintentional injuries, crude rate of shigatoxigenic *E. coli* infection, and drinking water quality. The long-term trend for injury mortality rates is moving in the desired direction, but a recent increase in rates is troubling and warrants further monitoring. While hospitalizations for injuries have declined consistently, the hospitalization rate for falls among persons age 75 and up has remained relatively unchanged overall, with some variation by regional health authority. Additionally, there has not been any consistent change for two performance measures: low birth weight singleton births and condom use among sexually active adolescents.

Many performance measures reflect challenges specific to certain sub-populations. For example, males are less likely to consume fruits and vegetables and be non-smokers, while females are less likely to be physically active. Likewise, health authorities have varied challenges. While evidence suggests that people in more densely populated urban centres in BC may experience lower levels of social/community connectedness³—a strong determinant of positive mental health—it is clear that the burden of challenges in health and wellness in BC falls disproportionately on rural and remote areas of the province.

Complex Linkages

Many of the performance measures examined in this report are interconnected, and changes for better or worse in one will have implications for others. Additionally, broader social and structural factors will have a ripple effect on many of these performance measures. For example, an economic downturn can create challenges for income, education, housing, food security, and access/affordability of health care, which in turn, can negatively influence mental health, fruit and vegetable consumption, early childhood development, alcohol consumption, smoking rates, and many more. As described earlier, the current overdose crisis is impacting several performance measures, including unintentional injury rates, mortality rates due to injuries, and life expectancy.

There are also complex interconnections of many of these measures that make some relationships difficult to assess. For example, while it would be expected that the decrease in the rate of mothers who report smoking during pregnancy would result in a reduced rate of low birth weight infants, the rate of low birth weight infants has actually increased. This may be due to increased hazardous drinking among women of reproductive age, or to other factors not examined here, such as increased average maternal age or increased maternal poverty.⁴ Similarly, while the decrease in fruit and vegetable consumption could be expected to negatively impact the diabetes incidence rate, the incidence rate in BC has in fact decreased. This may be related to increased physical activity levels shown in this report, or to broader structural changes such as increased testing for diabetes and improved access to health services. Therefore, improving the health of the population requires a focus on overall population and sub-population health needs, rather than on a specific performance measure.

While the linkages among performance measures can make it more difficult to understand trends, it also creates opportunities to package supports

to fit multiple needs within population groups. An example of this is seen in the complex picture for young families depicted across disparate performance measures. Increasing levels of vulnerability among kindergarten children have developed in concert with a decreasing level of self-rated positive mental health and relatively low levels of life satisfaction among young adults and parents' age groups. Taken together, these results indicate that families of young children are a sub-population group that needs additional supports. This may include mental health and parenting supports across early years and young adulthood for families, and public health programming for pregnant and postpartum women, young families, children, and youth. Another example is the “sandwich generation”, who are attempting to live healthy lives while caring for dependent children at the same time as they are caring for their aging parents. This group is likely to continue to grow, given the aging population of Canada and a trend toward delaying marriage and/or starting a family,⁵ and they may need somewhat different supports than young families in order to meet their needs.

Pursuing Health Equity & Equality in BC

As described in Chapter 1, health inequalities are the outcomes rooted in unequal health determinants between different population groups that come about for a variety of reasons (e.g., biology, individual choices, chance).⁶ Health inequities are inequalities in health between groups of people within a population that can be avoided and which are often linked to the disparities in social and economic conditions within a population.⁷ The “causes of the causes” (see Chapter 1) are broader features of society, environmental factors, and socio-economic influences that provide the context and constraints of health determinants, health behaviours, and ultimately, health outcomes.⁸ While analyses of many socio-economic variables (e.g., income, education, Indigenous ancestry), are beyond the scope of this report, analyses

presented in this report include examination of disparities by sex, age, and geography. Analyses by Indigenous ancestry are currently underway in a series of joint reports by the PHO and First Nations Health Authority, entitled *The Population Health and Wellness Agenda*.

It is important to note that the disparities identified in this report are specific to the performance measures presented, and are not generalizable beyond these measures. For example, while females fared better than males for many of the performance measures examined here, other analyses show that females often fare worse than their male counterparts, including adults (see PHO report *The Health and Well-being of Women in BC*)⁹ and children or youth (see PHO report *Is Good, Good Enough?: The Health and Well-being of Children and Youth in BC*).¹⁰

Sex-related Disparities

There is disparity between the sexes for many of the performance measures reviewed in this report. Many of the large disparities negatively impact males: males are twice as likely as females to die due to unintentional injuries or due to preventable causes, are substantially more likely to engage in hazardous drinking, and are less likely to consume fruit and vegetables. Some of the more moderate disparities affect males both positively and negatively: males continue to be more likely to smoke, but are also more likely to be physically active. In addition, while males are still more likely to be hospitalized due to unintentional injury, the rate in males is improving to a faster degree than in females, and as a result the gap is narrowing.

For females, there are challenges in some areas. This report has shown that females are less likely to be physically active than males, and have higher rates of fall-related hospitalizations among those age 75 and up. Analyses also show an increasing rate of hazardous drinking among reproductive-age females.

Other performance measures show little or no gap between males and females: the percentage

of students who are learning to stay healthy in school; the rate of British Columbians who experience positive mental health; and the hepatitis C rate.

Overall, most of the performance measures in this report that were analyzed by sex showed a sex-related disparity. Since males and females are facing challenges in different areas, sex-specific, targeted programming is warranted in many instances. For example, a focus for males could be reducing risk behaviours, promoting a healthy lifestyle, and preventing injuries. Additionally, disparities based on sex are known to exist for performance measures that are not covered in this report. For example, a previous PHO report (*The Health and Well-being of Women in BC*)⁹ identified many aspects of women's health in BC that warrant additional supports and programming, but these aspects have not been included as performance measures within the Guiding Framework. Overall, ongoing focused work to improve disparities by sex across the province is needed.

Geographic-related Disparities

There is substantial regional variation apparent for many of the performance measures, and work to reduce this variation continues to be challenging. Each health authority has a distinct population with different demographics, access to services, cultural norms, and geographic factors. As such, while there may be provincial programs that aim to influence key risk and protective factors for health, each health authority tailors their public health programs and services to address the specific health needs of their populations.

Rural areas face specific health challenges, as reflected in some of the performance measures in this report; however, rural life also affords many benefits. Many rural and remote communities have characteristics that may contribute to their resiliency, such as a strong sense of community.¹¹ This positive outlook could be part of the reason why the more rural health

authorities—Northern, Interior, and Island—had the highest rates of life satisfaction. However, Northern, in particular, faces some challenges in the areas of unintentional injury and smoking rates. Injury prevention programs targeted towards more rural areas could reduce the burden of injuries on the health system overall. Smoking rates are highest in Northern and lowest in Fraser. However, Fraser has the highest number of smokers in the province (Northern has the lowest), which means that reductions in the rate in Fraser will have a large influence on lowering the provincial rate. Programming targeted to both health authorities could have a positive effect on both the rate and number of smokers in BC.

While the diabetes incidence rate is on track and expected to meet the 2023 Guiding Framework target, the rates in Fraser are still above the provincial average. As stated in Chapter 2, ethnicity is a factor that can significantly affect the prevalence rate of diabetes, and higher prevalence rates have been found in areas with large Asian and South Asian populations.¹² Culturally appropriate programming targeted to the large South Asian community in Fraser could have a positive effect on the incidence rate in this health authority.¹³

Age-related Disparities

There are age-related disparities for several performance measures, suggesting that some aspects of healthy living and health outcome measures become more of a challenge as people age, or at particular life stages.

Several performance measures examined in this report showed decreases in health behaviour with age. One example is among the percentage of students who report they are learning to stay healthy at school. The highest percentage is in grades 3 and 4, and the rate decreases for each subsequent grade surveyed. Additionally, while overall, the percentage of the population reporting that they are physically active increased slightly between 2003 and 2013-14, there is an

inverse relationship between age and physical activity in BC, in which as age increases, physical activity decreases. In fact, the drop in physical activity level during leisure time is most pronounced after age 12–19, suggesting that more work is needed to promote physical activity among adults.

Some challenges that emerged in the analyses showed that particular age groups experienced more challenges in certain health behaviours and outcomes. For example, as discussed earlier in this chapter, younger adults are facing pressures and challenges associated with being parents of young families, while slightly older age groups are facing the socio-economic pressures (e.g., “generation squeeze”) and socio-emotional burdens of having dual care provider roles (e.g., the “sandwich generation”). This is shown within performance measures of life satisfaction and self-rated positive mental health, which are low among these age cohorts. Another example can be seen in people age 80 and up, who were found to have more physical health challenges than other age groups, with substantially higher rates of serious injuries and deaths due to injuries—rates were approximately ten times other age groups for these performance measures.

Collaborating to Improve Health

Addressing the broad underlying factors that influence health across the whole population—the determinants of health, as well as the more upstream “causes of the causes” (see Chapter 1)—will require collaboration across sectors and the consideration of health in all public policies. This includes working with partners in other areas of the health system and across government, such as the Ministries of Mental Health and Addictions, Education, Children and Family Development, Social Development and Poverty Reduction, Indigenous Relations and Reconciliation, Agriculture, and Environment and Climate Change Strategy, as well as with other levels of government (e.g., local governments,

federal government), and non-government partners such as community organizations. Continued and additional commitment to partnerships and collaborations within and beyond the health system are critical to successfully influence trends and achieve targets.

There has been an increased emphasis in BC toward policies to improve those determinants of health that are outside the control of the health system. For example, commitments to invest in child care and early childhood education¹⁴ will have a positive effect on the well-being of families with young children, if child care workers and early childhood educators are equipped with knowledge, skills, and resources to support healthy infant and child development. A commitment to a province-wide poverty reduction strategy¹⁴ looks to address homelessness and support mental health and addictions. Improved housing affordability¹⁴ should decrease housing vulnerability across the province, supporting many environmental and social health determinants.

For challenges identified in this report, the best opportunity to affect change is with initiatives that consider multiple tools of influence. These include legislation and regulation, taxation and pricing, education and information, programs and services, and more. Collaborative partnerships across all sectors (discussed earlier)—communities, schools, and workplaces, as well as academia, all working alongside community-based and non-government organizations—are vital in order to shape programs, improve access to services, inform policy, reduce inequities, and ultimately improve individual and community well-being. In many ways, the public health system is being challenged to be more focused and to work more collaboratively in order to deliver the most effective upstream programs, at the most effective level, to the people in the province who will benefit the most. Policy directives that help operationalize the Guiding Framework can put more emphasis on action at the local level and leverage programs and

initiatives with demonstrated successes in order to improve health outcomes across the province.

Moving forward, partners across the province have the Guiding Framework, with its set of ambitious targets, as long-term direction for the public health system. This report has highlighted broad demographic groups (based on age and sex) and health regions with challenges, and the next step in moving these analyses and continued understanding forward is for each regional health authority to examine these performance measures and conduct more in-depth analyses in order to establish clear target populations for programs and initiatives. Partnerships with local government and the provincial government, as well as partnerships and collaboration across health authority regions can help health authorities identify successful initiatives that could be leveraged and adapted for implementation in other areas. This should be supported by community-level analyses by the BC Observatory for Population and Public Health, which can provide local-level data to health authorities to support identification of needs and targeted programming for their populations.

Recommendations

The Guiding Framework provides a common vision for the public health system in BC and a basis for developing programs to address regional and population-related disparities. To ensure continued progress on improving health and well-being in BC, the following seven recommendations are offered.

Health in All Policies

The framework identified in Chapter 1 illustrates an approach to understanding and influencing health by addressing more upstream factors—the “causes of the causes” (e.g., culture, policies, resources, systems, affluence, social cohesion, media)—through to more direct or downstream influences (e.g., blood pressure, body weight).

An estimated 25 per cent of the health of the population can be attributed to the health care system (see Chapter 1), meaning most health outcomes in BC are driven by the policies and programming decisions made in other sectors. For example, a recent study found that increased social spending resulted in decreased avoidable mortality and a slight increase in life expectancy.¹⁵ Also, as discussed in Chapter 1, for every one dollar spent on early childhood development and care there is up to \$9 saved in future spending on health, social, and justice services.^{16,17} Therefore, in order to best support British Columbians as well as to enhance the efficacy of broader provincial systems, it is critical to shift towards a more preventive approach, and to identify and understand the impact of policies of other ministries on the work of the Ministry of Health and on the health of the individual, communities, and the population as a whole. This requires increased inter-governmental collaboration to ensure initiatives in one ministry do not inadvertently compromise those in another, and requires a broader systemic shift to re-focus on health promotion and illness and injury prevention.

A “**health in all policies**” approach would best enable a preventive lens for health in BC that prioritizes the overall health and well-being of British Columbians, and embeds cross-government collaboration into systems and processes. There are many ways to define and to apply this approach. In general, a health in all policies approach is one whereby public policies across sectors systematically consider implications of decisions for health systems and health outcomes, and in doing so, seek synergies that both avoid harmful impacts and improve population health and health equity.¹⁸

A **health impact assessment (HIA)** is a common tool used to apply a health in all policies approach. An HIA evaluates both the positive and negative health impacts of a policy, program, or project using a broad social determinants of health lens, and produces recommendations that

help to ensure government initiatives improve health outcomes and reduce health inequities. As such, HIAs are much broader in scope than human health risk assessments conducted as part of an environmental impact assessment.¹⁹ BC had been a leader in Canada in applying a health in all policies approach, with all submissions to cabinet between 1993 and 2000 being evaluated for their effects on the health of the population; however, this practice was voluntary and fell out of use after 2000.²⁰

There are many examples of success from jurisdictions that have implemented a health in all policies approach. For example, in Portland Oregon, a health impact assessment was completed in 2008 regarding replacement options for the Columbia River Crossing (I-5 Bridge). This assessment considered both health protection concerns, such as changes in air quality and noise pollution, and health promotion.²¹ The health impact assessment recommended improving pedestrian and bike access to the bridge to promote active transportation options, widening separated bike and pedestrian paths on the bridge to increase safety, and increasing opportunities for public transportation.²¹ The assessment suggested adding tolls to discourage vehicle use, and maintaining current capacity of the bridge to prevent increases in pollution.²¹ Another example, in Montérégie, a health and social service region in Southern Quebec, involved completion of a health impact assessment for a proposed composting plant.²² The assessment included consideration of workers' exposure to dust, bioaerosols, and noise, and increased traffic and economic burden on the general population.²² The health impact assessment process provided a structured approach for citizen engagement, identified ways to maximize benefits and minimize or mitigate potential harms of the plant that were identified,²² and enabled a more informed process with healthier outcomes, since it helped to expose issues that were not initially considered at the outset of the project.²²

In Quebec, Section 54 of the *Public Health Act*, passed in 2001, requires that health impact assessments are conducted to ensure that new legislation does not harm the health of citizens.²³ This requires inter-ministry cooperation, with the ministry responsible for developing the legislation or policy carrying out the initial stages of the assessment with the support of the General Secretariat of the Ministry of Health and Social Services.²³ Other jurisdictions in Canada have also implemented this approach in various forms, such as People Assessing Their Health (PATH), which has been used in Nova Scotia since the mid-1990s and focuses on community empowerment,²⁴ as well as the voluntary Health Lens for Public Policy applied in Alberta since 2010.²³ Integrating the requirement for health impact assessments into provincial legislation, as Quebec has done, serves to hardwire inter-ministerial collaboration and a health in all policies approach into provincial systems and processes, and best positions the province for success in long-term collaboration and achieving health outcomes.

Recommendation 1: Establish a legislated health in all policies approach in BC, utilizing a health impact assessment model that includes a requirement for assessing health and equity impacts for all proposed, new, or revised policy, legislation, or programming across the BC Government.

Review of health impacts should include both upstream and downstream implications for health. Consideration of equity impacts includes assessment of implications for vulnerable groups, including women, children, Indigenous peoples, and others. For optimal results, a health impact assessment office, responsible for reviewing health impacts, could be embedded within the Ministry of Health with formalized linkages that support a systematic and formalized cross-government mandate.

Underserved Populations

There is substantial variation in BC according to both sex and geography for many of the performance measures examined in this report, and work to reduce this variation continues to be challenging. This is not a new trend, but for some performance measures the disparity remains persistent and/or is worsening. As such, while there may be provincial programs that aim to influence key risk and protective factors for health, these public health programs and services need to be tailored to enhance the specific health needs of certain sub-populations. For example, children and youth have been identified in this report, as well as in the joint BC PHO and Child Health BC report entitled *Is “Good”, Good Enough? The Health and Well-being of Children & Youth in BC*, as a sub-population in need of more targeted interventions and prevention work. When the increasing levels of vulnerability among kindergarten children are viewed in light of a decreasing level of self-rated positive mental health among young adults and parents’ age groups, the issues faced by young families in BC emerge as a particular priority.

Recommendation 2: Develop and implement a comprehensive health promotion strategy in BC that recognizes sex- and gender-specific health needs, and supports all gender identities and sexual orientations through appropriately targeted interventions. For optimal success, this strategy should include a plan for establishing targeted interventions that meet the sex- and gender-specific health needs of the population, and for addressing gaps in health equity.

Recommendation 3: Increase support for programs and policies across government that focus on health among women (including pregnant and postpartum women), children, youth, and families in BC. Targeting population and public health system programming to these

life stages and considering the needs of this population in all public policy are particularly critical because experiences during the preconception, prenatal, infant, and childhood periods have the strongest effect on health later in life. This includes supporting the needs of parents of young children as well as those parents who are caring for both children and aging parents.

Recommendation 4: Increase the focus on illness and injury prevention and health promotion for British Columbians living in rural and remote areas of BC. A disproportionate and inequitable burden of disease, illness, injury, and mortality is experienced in rural areas of BC. Rural citizens face different challenges in accessing health-supporting determinants and health services, and require different solutions than their urban counterparts; for example, a previous PHO report illustrated the different challenges faced by rural/remote and urban populations for road safety, and showed that prevention of motor vehicle crash injuries and fatalities requires rural/remote- or urban-specific solutions. While proportionately fewer people live in rural and remote areas, health performance measure rates in rural and remote populations are falling behind enough that they notably impact overall provincial rates—enough so that provincial targets cannot be met if challenges for those populations persist.

Enhanced Commitment to Public Health Programming & Surveillance

As stated in Chapter 10, BC has built a solid foundation for population and public health surveillance; however, there are deficiencies in the availability of and access to data, as well as limitations in the analytical infrastructure. This makes it more difficult to monitor and report on the health of the population, particularly within the regional health authorities. In order to drive positive change in the health of their populations,

health authorities need to have timely access to local-level data as well as the capacity to analyze those data. This can help in both planning targeted interventions as well as working to inform and support a more community-centred approach to public health system programming. More environmental data are also needed, to capture issues that are not currently reported, that are underreported, or that do not have data that are consistently available across the province. The BC Observatory for Population and Public Health (see Chapter 10) was established to improve both provincial and regional surveillance capacity.

Recommendation 5: Develop a more robust and meaningful population and public health surveillance system for BC. This includes reviewing the Guiding Framework performance measures, identifying new or revised measures, and establishing regular and ongoing public health reporting. In order to accurately and effectively monitor and report on progress or growing health concerns, epidemiologists in the Office of the PHO, in health authorities, and at the BC Observatory for Population and Public Health need greater ability to access data in a consistent, reliable way, with compatible infrastructure and adequate expertise and resourcing for community-level analyses. Ongoing monitoring and reporting is needed to assess progress, identify priority areas, and inform any necessary course corrections over time. This will, in turn, enhance opportunities to focus on programs and initiatives that support movement toward the targets for 2023. This also aligns with one of the key components of the new Health System Strategy—the commitment to establish a clear performance management framework built on public reporting—and will also support the service development needs and impact of primary care networks. Public health surveillance supports a collaborative understanding of population health needs, which means it is uniquely placed to provide support to primary care networks.

Recommendation 6: Establish more relevant and applicable performance measures to monitor environmental health in BC. This includes establishing more appropriate and meaningful performance measures, as well as building a health information system that can readily capture the data and has the capacity to analyze data consistently across all health authorities. This also includes establishing and/or further developing mechanisms to monitor air, water, soil, food supplies, and impacts of climate change.

Recommendation 7: Commit to increasing the proportion of health authority budgets allocated to population and public health to 6 per cent. If something is worth doing—and population health is worth doing—it is worth doing well. As Benjamin Franklin said, “...an ounce of prevention is worth a pound of cure.” This axiom is frequently cited by experts in the field of public health and is as true today as it was in the 1700s.²⁵ This translates into approximately doubling the current public health spending among most regional health authorities to 6 per cent (6 per cent being approximately one-sixteenth, or one ounce of a pound). This can be achieved most effectively through allocating new funds from federal health transfers or budget surplus, rather than redirecting money from elsewhere in the health system.²⁶ Such an investment has the potential to generate benefits for the life expectancy and quality of life of British Columbians.^{15,25} This type of increase would have economic benefits through increased productivity for British Columbians. It also has substantial benefits from public health and primary care perspectives, particularly when funding is allocated strategically into health promotion and illness and injury prevention initiatives that focus “upstream” from health outcomes.

Conclusion

The overall pattern among health outcomes for BC reflected by the performance measures presented in this report is mixed. There are some significant improvements, but notable challenges remain among many of the performance measures. There is also unequal progress within the population for many performance measures, as geographic-, sex-, and age-related disparities persist or grow. As long-term direction for the public health system, the Guiding Framework is intended to be a living document that evolves along with the health needs of the province. The Ministry of Health, health authorities, and partners

that are invested in the success of the Guiding Framework are committed to ensuring there is a measurable impact on health and quality of life for generations to come. To this end, this report has provided an update on Guiding Framework targets, identified areas of focus in the coming years, and offered recommendations to assist in the successful attainment of BC's goals for the public health system. The ultimate goal we strive for as a province is achieving a collective vision of vibrant communities in which all people achieve their best health and well-being where they live, work, learn, and play.

REFERENCES

- ¹ BC Ministry of Health. Promote, protect, prevent: our health begins here. BC's guiding framework for public health. Victoria, BC: BC Ministry of Health; 2013 Mar.
- ² Government of British Columbia. Public Health Act [Internet]. Victoria, BC: BC Ministry of Health [cited 2018 May 08]. Available from: <https://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-system/legislation/public-health-act>.
- ³ Shields M. Community belonging and self-perceived health. Ottawa, ON: Statistics Canada; 2008 Jun [cited 2018 Sep 25]. Available from: <https://www150.statcan.gc.ca/n1/en/pub/82-003-x/2008002/article/10552-eng.pdf?st=AttcsWR0>.
- ⁴ Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. *Bull World Health Organ.* 1987;65(5):663-737. Cited by BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ⁵ Williams C. The sandwich generation. *Canadian Social Trends [Catalogue 11-008]*. Ottawa, ON: Statistics Canada; 2005. Cited by BC Provincial Health Officer. The health and well-being of women in British Columbia. Victoria, BC: BC Ministry of Health; 2011 [cited 2018 Jan 26]. Available from: <https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/annual-reports/phoannual2008.pdf>.
- ⁶ Public Health Agency of Canada. Key health inequalities in Canada: a national portrait. Ottawa, ON: Public Health Agency of Canada; 2018.
- ⁷ World Health Organization. *Social Determinants of Health: Key Concepts*. Geneva, Switzerland: World Health Organization. [cited 2018 Oct 26]. Available from: https://www.who.int/social_determinants/thecommission/finalreport/key_concepts/en/.
- ⁸ ABC News. Boyer Lectures: Sir Michael Marmot highlights health inequalities and 'causes of the causes' [Internet]; [updated 2016 Sep 11; cited 2017 Mar 23]. Available from: <http://www.abc.net.au/news/2016-09-03/boyer-lecture-sir-michael-marmot-highlights-health-inequalities/7810382>.
- ⁹ BC Provincial Health Officer. The health and well-being of women in British Columbia. Victoria, BC: BC Ministry of Health; 2011 [cited 2018 May 08]. Available from: <https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/annual-reports/phoannual2008.pdf>.
- ¹⁰ BC Provincial Health Officer. Is "good", good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC's Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ¹¹ Canadian Institute for Health Information. How healthy are rural Canadians? An assessment of their health status and health determinants. Ottawa, ON: Canadian Institute for Health Information; 2006 Sep [cited 2018 Jan 26]. Available from: https://secure.cihi.ca/free_products/rural_canadians_2006_report_e.pdf.

- ¹²BC Provincial Health Officer. The impact of diabetes on the health and well-being of people in British Columbia. Provincial Health Officer's annual report 2004. Victoria, BC: BC Ministry of Health; 2004.
- ¹³Fraser Health Authority. South Asian health [Internet]. British Columbia: Fraser Health Authority; [cited 2018 Apr 30]. Available from: <https://www.fraserhealth.ca/health-topics-a-to-z/south-asian-health>.
- ¹⁴2017 Confidence and Supply Agreement between the BC Green Caucus and the BC New Democrat Caucus; [cited 2018 Jan 26]. Available from: https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/organizational-structure/central-government-agencies/government-communications-public-engagement/confidence-and-supply-agreement-secretariat/casa_-_may_30_2017.pdf.
- ¹⁵Dutton DJ, Forest PG, Kneebone RD, Zwicker JD. Effect of provincial spending on social services and health care on health outcomes in Canada: an observational longitudinal study. *CMAJ*. 2018;190(3):E66-71. doi:10.1503/cmaj.170132.
- ¹⁶Chief Public Health Officer. The Chief Public Health Officer's report on the state of public health in Canada 2009. Growing up well – priorities for a healthy future. Ottawa, ON: Public Health Agency of Canada; 2009 [cited 2018 Mar 14]. Available from: <http://www.phac-aspc.gc.ca/cphorsphc-respcacsp/2009/fr-rc/pdf/cphorsphc-respcacsp-eng.pdf>.
- ¹⁷Rolnick A, Grunewald R. A proposal for achieving high returns on early childhood development. Minneapolis, MN: Federal Reserve Bank of Minneapolis; 2006 Mar [cited 2018 Mar 14]. Available from: <https://www.minneapolisfed.org/~media/files/publications/studies/earlychild/highreturn.pdf>.
- ¹⁸World Health Organization. Health in all policies: framework for country action. Geneva: World Health Organization; 2013 May 09 [cited 2018 Mar 14]. Available from: http://www.who.int/healthpromotion/conferences/8gchp/130509_hiap_framework_for_country_action_draft.pdf.
- ¹⁹National Collaborating Centre for Healthy Public Policy. Four types of impact assessment used in Canada. Montreal, QC: National Collaborating Centre for Healthy Public Policy; 2010 [cited 2018 Feb 21]. Available from: http://www.ncchpp.ca/133/Publications.ccnpps?id_article=581.
- ²⁰National Collaborating Centre for Healthy Public Policy. Health impact assessment (HIA): a promising action path for promoting healthy public policies. Background paper for Roundtable on Health Impact Assessment; Montreal QC; 2008 Feb 22 [cited 2018 Feb 21]. Available from: <http://www.ncchpp.ca/docs/BackgroundPaperHIA.pdf>.
- ²¹Portland Health Impact Assessment Workgroup. Columbia River crossing health impact assessment. Portland OR: Portland Health Impact Assessment Workgroup, 2008 Jun [cited 2018 Sep 24]. Available from: <https://www.pewtrusts.org/~media/assets/2008/06/hiareport15columbiarivercrossing.pdf>.
- ²²National Collaborating Centre for Healthy Public Policy. The implementation of health impact assessment (HIA) in Canada: HIA pilot project in Montérégie, Quebec. Montreal, QC: National Collaborating Centre for Healthy Public Policy; 2011 Jun [cited 2018 Mar 15]. Available from: http://www.ncchpp.ca/docs/MonteregieHIA_EN.pdf.
- ²³National Collaborating Centre for Healthy Public Policy. Canadian experiences in institutionalizing health impact assessment (HIA). 2013 interprovincial-territorial meeting. Montreal, QC: National Collaborating Centre for Healthy Public Policy; 2013 [cited 2018 Feb 21]. Available from: http://www.ncchpp.ca/docs/2013_EIS_HIA_RepProvTerMeeting_EN.pdf.
- ²⁴National Collaborating Centre for Healthy Public Policy. A brief history of people assessing their health (PATH). Montreal, QC: National Collaborating Centre for Healthy Public Policy; 2009 Oct [cited 2018 Feb 21]. Available from: http://www.ncchpp.ca/docs/PATH_BriefHistory_EN.pdf.
- ²⁵Masters R, Anwar E, Collins B, Cookson R, Capewell S. Return on investment of public health interventions: a systematic review. *J Epidemiol Community Health*. 2017 Aug 7;71:827-834. doi:10.1136/jech-2016-208141.
- ²⁶Select Standing Committee on Health. The path to health and wellness: making British Columbians healthier by 2010. Victoria, BC: Legislative Assembly of British Columbia; 2004 [cited 2018 Feb 26]. Available from: <https://www.leg.bc.ca/content/legacy/web/cmt/37thparl/session-5/health/reports/PDF/Rpt-HEALTH-37-5-1stRpt-PathToHealthWellness-2004-NOV-25.pdf>.

Appendix A:

Glossary

Active transportation – a form of transportation from one location to another powered by human effort, including walking, running, using a wheelchair, cycling, rollerblading, skating, skiing, and/or skateboarding.¹

All-hazards approach – a comprehensive strategy for public health emergency preparedness that integrates emergency management elements (mitigation/prevention, preparedness, response, and recovery) to address typical impacts across all types of hazards (natural and man-made), with targeted interventions to fill gaps as they are identified.²

Asthma – a chronic inflammatory disease that affects the airway and causes symptoms such as shortness of breath, tightness in the chest, coughing, and wheezing.³

Behavioural risk factors – modifiable behaviours, such as physical activity, substance use, and nutrition, that have implications for future health outcomes.⁴

Binge drinking – see *hazardous drinking*.

Boil water notice – a communication issued by a water supplier to water consumers or the public in situations when the quality of water, if consumed, causes a significant public “...health threat that can be effectively addressed by boiling the water”.⁵ See also “do not use water” notice and *water quality advisory*.

Built environment – all human-made infrastructure in the environment, including residential, industrial, and public buildings, pathways, bike lanes, roads, and services.⁶

Business continuity – the ability of an organization to maintain core functions and services during, or following, a business disruption caused by an unexpected event.⁷ See also *business continuity plans*.

Business continuity plans – plans that contain procedures and strategies that are necessary to ensure the continuation of critical business services following a disruptive event, such as a serious power outage or an earthquake. They are activated when standard operational procedures and responses are overwhelmed by the event.⁷ See also *business continuity*.

Case finding – identifying cases of conditions that already exist in a population but were undiagnosed or unidentified. Case finding is often used for conditions such as hypertension, diabetes, cancer, dementia, or tuberculosis.⁶

Child vulnerability – a sub-population of children who experience more difficulty in having needs fully met, and who may experience future challenges in school and society if they do not receive additional support and care.⁸

Chlamydia – a sexually transmitted infection caused by the bacteria *chlamydia trachomatis*. In females, it infects the cervix and may spread to the fallopian tubes. In both males and females the infection may also occur in the urethra, the rectum, or the throat.⁹

- Chronic disease** – any condition that is long-lasting or permanent. While chronic diseases cannot be cured, they can be managed with medication and behavioural modification.⁶
- Cirrhosis** – a condition of the liver in which it is permanently damaged or scarred, which can be caused by viral infections (e.g., hepatitis types B, C, and D) or prolonged exposure to environmental toxins and/or alcohol.¹⁰
- Communicable disease** – illnesses caused by harmful bacteria, viruses, parasites, or fungi that are spread, directly or indirectly, from one person to another. They can be directly spread from one person to another through contact with an infected individual, or their bodily fluids, or indirectly through contaminated food, air, water, domestic utensils, clothing, etc.¹¹
- Community care facility** – facilities that provide care for children, youth, and adults through different levels of residential care, including highly specialized care (e.g., hospices). These facilities can be licensed under the *Community Care and Assisted Living Act*; however, unlicensed facilities (permitted only to provide care for up to 2 individuals at a time) operate within BC as well.¹²
- Community immunity** – see *herd immunity*.
- Comprehensive school health** – an approach that supports health promotion and improved health and educational outcomes for students in the school environment by integrating four pillars related to school health (e.g., teaching and learning; social and physical environment; health school policy; and partnerships and services).¹³
- Determinants of health** – a mix of social, environmental, economic, personal, and biological/genetic factors that can work together or independently to influence a person’s health status.⁴
- Domestic water system** – the infrastructure that collects, treats, stores, and transports potable water for domestic purposes (i.e., for food preparation, sanitation, human consumption, and household purposes).¹⁴ See also *water supply system*.
- “Do not use water” notice** – the highest level of notification issued by a water supplier to notify consumers when there is an imminent and significant risk to public health if the water is consumed, “...and the threat cannot be adequately addressed through a water quality advisory and boil water notice.”⁵ See also *boil water notice* and *water quality advisory*.
- E-cigarette** – an electronic or battery-powered device or product that contains a heating element able to vaporize an “e-substance” (solid, liquid, or gas) that is inhaled or released into the air. The device may resemble a cigarette and the e-substance may or may not contain nicotine.¹⁵
- Ebola** – “severe illness caused by a virus. The early stages of Ebola virus disease involve flu-like symptoms, which can progress to bleeding, organ dysfunction, and death.”¹⁶
- Ectopic pregnancy** – a pregnancy where the fertilized egg attaches itself outside of the uterus (usually in the fallopian tube), instead of inside the uterus. Also known as an *extrauterine* or *tubal pregnancy*. An ectopic pregnancy cannot turn into a “normal” pregnancy and must be ended before it poses a risk to the woman (e.g., by damaging her fallopian tube, or rupturing into the abdomen).¹⁷
- Endemic** – “the constant presence, or usual prevalence, of a disease or infectious agent in a population within a geographic area.”¹⁸
- Enteric disease** – “a group of diseases that are associated with the ingestion of food and/or water contaminated with microorganisms and microbial toxins.” The microorganisms and toxins attack a person’s gastrointestinal tract after consuming the food/water.¹⁹

Environmental health – the area of expertise within public health that is concerned with protecting human health from environmental threats such as exposure to radiation, heavy metals, air pollution, or chemicals, and enhancing quality of life through assessing, correcting, controlling, and preventing factors in the environment from negatively affecting human health.²⁰

Epidemiology – the study of patterns and burden of disease (e.g., HIV) or other health-related events (e.g., illegal drug overdose) among different populations, and using this information to guide efforts to control these cases.²¹

Fetal Alcohol Spectrum Disorder (FASD) – “a term used to describe the range of problems caused by drinking alcohol during pregnancy, including physical, mental, behavioural, and learning disabilities.”²²

Food premise – a facility where food destined for public consumption is prepared, processed, handled, packaged, transported, displayed, served, sold, or stored.²³

Full-term – refers to a baby delivered anytime between 37 and 42 weeks of pregnancy.²⁴

Genome sequencing – a laboratory technique used to determine or decode the sequence in which the units or bases in a DNA molecule are structured. “A genome is an organism’s complete set of DNA.”²⁵ The genome contains all the genetic material of a living organism and acts as a “blueprint” for its structure and function.²⁶

Harm reduction – “policies, programs, and practices that aim to keep people safe and minimize death, disease, and injury from high risk behaviour, especially psychoactive substance use. Harm reduction recognizes that the high risk behavior may continue despite the risk.”²⁷

Hazard – a source of potential harm, or a situation with potential to cause harm with regards to human injury, damage to health, property and/or the environment, or a combination of these things.²⁸

Hazardous drinking – a manner of consuming alcohol that poses risks to a person’s health and safety in the short- and long-term. These risks differ for women and men (e.g., women are more likely to develop osteoporosis, breast cancer, and reproductive problems).²⁹ Also referred to as *heavy drinking* or *binge drinking*.

Health – “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.”³⁰ Good health depends on more than health services and treatment of disease. It includes supportive living and working conditions; opportunities to make healthy choices; strong family and community connections; healthy and safe environments; injury prevention; and improved health for vulnerable and/or underserved sub-populations such as Indigenous people.

Health-adjusted life expectancy – a core indicator of population health status. It incorporates both life expectancy (quantity of life) and healthy life years (a component of the quality of one’s life), in order to determine the number of years that a person can expect to live in full health given the current morbidity and mortality conditions of the population.³¹

Health authority – There are five geographically defined regional health authorities in BC that deliver health services within their jurisdiction, and two that serve the whole province. The regional health authorities—Northern Health, Interior Health, Vancouver Coastal Health, Fraser Health, and Island Health—are responsible for governing, planning, and delivering health care services. The Provincial Health Services Authority serves all of BC, and coordinates delivery of provincial programs and specialized health services. The First Nations Health Authority is responsible for planning, managing, funding, and delivering health services and health programs for First Nations and Indigenous people in BC in partnership with regional health authorities and the Provincial Health Services Authority.³²

Health impact assessment – a method of determining potential impacts from a given project, policy, or program on the health of a population.³³ This kind of assessment is a common tool when applying a “health in all policies” approach.

Health in all policies approach – an approach to public policy-making across sectors that considers health-related implications when developing policy directions and making decisions. This approach seeks to avoid or minimize the introduction of harmful health impacts, as well as potentially improve population health and health equity.³⁴

Health inequalities – differences in the distribution of health determinants or health status across the population and between specific population groups. Health inequalities are the result of social, economic, or political disadvantages or of biological factors, individual choices, or chance.³⁵

Health inequities – unfair, avoidable, and systematic differences in the health of different population groups.³⁶

Health promotion – the practice of promoting healthy behaviours and creating supportive environments, policies, and programs that enable people to improve their health. Health promotion comprises a wide range of social, educational, environmental, and legislative interventions that can foster healthy lifestyle choices.³⁷

Health protection – actions that protect a population against potential environmental health risk and infectious disease. Health protection includes a range of activities, such as inspection of food premises, care facilities, and drinking water facilities, and monitoring disease prevalence.³⁸

Health service delivery area (HSDA) – a geographic sub-region within a regional health authority area. There are 16 HSDAs in BC.³⁹

Heavy drinking – see *hazardous drinking*.

Hepatitis C – a treatable and curable liver disease caused by the hepatitis C virus, which is spread through sharing of drug use equipment, or accidental exposure by needle pokes, blood/blood products that are not screened for the virus, contaminated tattoo or piercing equipment, childbirth, or sexual intercourse.⁴⁰

Herd immunity – a form of protection from a vaccine-preventable disease that occurs when a proportion of people in a community have been immunized against the disease, thus reducing spread of the disease and the chance of an outbreak. This protects people vulnerable to the disease, such as babies too young to be immunized, people with poor immune systems, and people who cannot be immunized for medical reasons.⁴¹ Also known as *community immunity*.

Hospice – a facility that provides end-of-life care.⁴²

Human Immunodeficiency Virus (HIV) – a virus that attacks the body’s immune system and is spread through contact with infected blood and other body fluids (e.g., semen, vaginal fluids, breast milk, and rectal fluids). HIV cannot be cured, but antiretroviral medication can reduce the amount of virus in the body so that the chance of transmission is almost zero. Without treatment, HIV infection can progress to Acquired Immunodeficiency Syndrome (AIDS).⁴³

Immunization – the process of introducing a vaccine into the body to trigger an immune response against a given vaccine-preventable disease.⁴⁴ Also called *vaccination*.

Incidence rate – the number of new cases or events in a population in a given time period.⁶

Infant mortality rate – the number of infant deaths assessed against a given number of live births within the same time period.⁴⁵

Life expectancy – “the expected number of years of life remaining at a given age.”⁴⁶

Listeriosis – a rare but potentially serious foodborne infection caused by the bacteria *Listeria monocytogenes*. Listeriosis is most often caused by eating contaminated foods, such as unpasteurized dairy products, deli meats, soft cheeses, or candied or smoked seafood products. Listeriosis can be a mild illness for healthy individuals but can be more serious for individuals at higher risk, such as pregnant women, infants, seniors, and immunocompromised people.⁴⁷

Literacy – “beyond its conventional concept as a set of reading, writing, and counting skills, literacy is now understood as a means of identification, understanding, interpretation, creation, and communication in an increasingly digital, text-mediated, information-rich, and fast-changing world.”⁴⁸

Local health area – a geographic sub-region in one of the province’s health service delivery areas (HDSAs). There are currently 89 local health areas.³⁹ See also *health service delivery area*.

Low birth weight – the measurement of an infant at birth weighing less than 2,500 grams.⁴⁹

Maternal health – a woman’s health while she is pregnant, through childbirth, and the postpartum period, including her mental, emotional, and physical health.⁵⁰

Modifiable risk factors – risk factors that can be changed, and which increase a person’s risk of developing a chronic disease, such as tobacco use, an unhealthy diet, and physical inactivity. Conversely, non-modifiable risk factors cannot easily be changed (e.g., age, sex, genetic make-up).⁵¹

Mortality due to preventable causes – deaths that are considered premature because they could potentially have been prevented through all levels of prevention efforts (e.g., vaccination, substance use disorder treatment).⁵²

Multi-barrier approach – an approach to safeguarding drinking water that “...involves an integrated system of procedures, processes, and tools that work collectively to prevent or reduce contamination from its source to when it is consumed in order to reduce risks to public health.”⁵³

Numeracy – the ability to understand numbers and mathematical concepts, including solving problems involving numbers (e.g., recognizing numbers, adding and subtracting, measuring, sorting, counting).⁵⁴

- Opioid agonist treatment** – medications, such as buprenorphine/naloxone, methadone, hydromorphone, and slow-release oral morphine, prescribed as part of comprehensive treatment for individuals living with an opioid use disorder. Also known as *opioid substitution treatment*.⁵⁵
- Outbreak** – “the occurrence of cases of disease in excess of what would normally be expected in a defined community, geographic area, or season.” Outbreaks can happen in a restricted geographic area, or throughout several countries.⁵⁶
- Pandemic** – the global spread of a disease.⁵⁷ A pandemic is an epidemic that transcends national boundaries and extends over much of the world, infecting large portions of the population who lack immunity to the disease.⁵⁸
- Pandemic influenza** – an influenza virus that is spread around the world quickly and by humans who have little or no immunity against it. Influenza pandemics occur about every 10 to 40 years. The most recent pandemic was in 2009, and was caused by a new strain of H1N1 influenza.⁵⁹
- Pap test** – a Papanicolaou test, or Pap smear, is a method of cervical screening used to determine if there are abnormal cells in the cervix, which could lead to cervical cancer.⁶⁰
- Pathogen** – an organism (including a virus, bacterium, or other microorganism) that can cause disease.⁵³
- Pelvic inflammatory disease (PID)** – an infection of the female upper reproductive organs that is caused by sexually transmitted infections, vaginal infections, or medical procedures that involve opening the cervix. Left untreated, PID can cause scar tissue, infertility, and complications such as ectopic pregnancy.⁶¹
- Physical activity** – “any bodily movement or activity that involves skeletal muscles and requires energy expenditure” to complete.⁶²
- Population health** – a focus on improving the health of a population by addressing and reducing health inequities due to differences in the determinants of health between and among populations.⁶³
- Positive mental health** – “a state of mental well-being in which individuals can realize their potential, cope with the normal stresses of life, work productively, and contribute to their community.”⁶⁴
- Premature death** – death of an individual who is younger than 75 years of age.⁶⁵
- Premature mortality** – an age-standardized rate of premature deaths in a population, in which premature deaths are those of individuals who are younger than age 75.⁶⁶
- Preterm births** – infants born before 37 weeks of pregnancy.⁶⁷
- Primary prevention** – the first of three disease prevention levels. Primary prevention involves supporting individuals to avoid a disease or condition by engaging in healthy behaviours, such as physical activity, regular checkups with a physician, and good nutrition—and avoiding harmful behaviours.⁶⁸
- Prosocial behaviour** – “behaviour or acts that are intended to benefit others (e.g., sharing, assisting others, cooperation)”.⁶⁹ “The development of prosocial behaviours in early childhood is associated with social and emotional competence throughout childhood, and is also associated with academic performance, problem-solving, and moral reasoning.”⁷⁰

Psychoactive substances – substances that can modify people’s moods and/or their emotional states, and sometimes alter their states of consciousness.⁶ Examples include, but are not limited to, tobacco, alcoholic beverages, cannabis, LSD, cocaine, amphetamines, opioids, and some pharmaceutical medications.⁷¹

Public health – “the combination of science, practical skills, and beliefs directed into the maintenance and improvement of the health of all the people. It is one of the efforts organized by society to protect, promote, and restore people’s health, through collective or social actions.”⁷²

Public health emergency management – the organization and planning within the public health system that enables effective and efficient responses to emergencies that have implications for public health. Effective emergency management involves actions in prevention and mitigation, preparedness, response, and recovery.⁷³

Public health surveillance – the ongoing systematic collection, analysis, interpretation, and dissemination of health-related data in a population. The objectives are to assess the health status of populations; to detect changes in trends or changes in how a disease or condition is distributed; to define public health priorities; to assist in the prevention and control of disease; and to monitor and evaluate related treatment and prevention programs.⁷⁴ Therefore, public health surveillance is a key component of planning, implementing, and evaluating public health practice.⁷⁵ See also *surveillance*.

Resilience – the ability for people to adapt to and overcome challenges, such as bad experiences or negative feelings, and move forward. Building resilience in childhood prepares children to handle challenges that they may experience in the future.⁷⁶

Residential care facility – a facility that provides accommodation, meals, care, and supervision to meet the needs of clients who live there.⁷⁷ Residential care facilities include premises for people with physical or developmental disabilities, brain injury, or mental health issues, or facilities for seniors; the latter are sometimes known as *long-term care facilities*, *continuing care facilities*, or *nursing homes*.¹²

Salmonellosis – a foodborne illness caused by *Salmonella* bacteria. It results from eating or drinking contaminated foods or beverages, such as raw or undercooked meat or poultry, unpasteurized dairy products, and raw or undercooked eggs. Symptoms include stomach pain, diarrhea, fever, nausea, and vomiting. Dehydration may be severe, especially among at-risk groups such as the elderly, infants, and immunocompromised people.⁷⁸

Second-hand smoke – smoke from a lit cigarette, pipe, or cigar, and smoke blown into the air by a smoker. It can contain over 4,000 chemicals, including 50 that can cause cancer.⁷⁹

Sentinel chronic disease – a condition that can be used in public health surveillance to gauge the stability or change in levels of chronic disease in a population.⁸⁰

Shigatoxigenic *E. coli* – a strain of *E. coli* that produces shiga toxin. This type of *E. coli* infection can cause mild to severe diarrhea, and can result in serious side effects or death.⁸¹

Social competence – the ability to use skills appropriately in social situations (e.g., interpersonal skills, communication). The concept can be broad and inclusive of the emotional foundations of positive and negative social interaction, or it can be narrow and specifically refer to problem behaviours in social context, including aggression, shyness/withdrawal, and attention deficits.⁸²

Sudden Infant Death Syndrome (SIDS) – the death of an infant while sleeping that is not fully understood, because the death remains unexplained even after a full autopsy. Babies most at risk of SIDS are between two and four months of age.⁸³

Underserved populations – a sub-population that experiences more difficulties in having needs fully met due to societal and/or systemic issues. This includes challenges in obtaining care that is appropriate, such as receiving less care or a lower standard of care, receiving treatment that does not adequately recognize their needs, or being less satisfied with health care services.⁸⁴ This term is preferred to the term “vulnerable populations”, which can imply that the problem is generated by and/or the responsibility of the individual.⁸⁵

Unintentional injury – an injury that is not purposely inflicted, either by the injured person or anyone else.⁸⁶

Vibrio Parahaemolyticus – a naturally occurring bacterium commonly found in seawater that can cause infection. Most infections occur during the summer when the water temperature rises and vibrio counts are at their highest. The bacteria may grow in shellfish, and gastroenteritis can follow ingestion of raw or undercooked seafood, especially shellfish.⁸⁷

Water quality advisory – this is the lowest level of notification issued by a water supplier in situations where the public health threat posed by the water supplied is modest. The advisory will describe the nature of the risk and actions to be taken to reduce the risk; however, the elderly, infants, and people with compromised immune systems may be advised to boil the water or drink from an alternate water source. See also *boil water notice* and “*do not use water*” notice.^{5,88}

Water supply system – Any domestic water supply system, other than one that serves only a single-family residence. A water supply system must meet the requirements of the *Drinking Water Protection Act*, and the water supplier must hold an operating permit issued by a drinking water officer.¹⁴ See also *domestic water supply system*.

REFERENCES

- ¹ Government of Canada. Active transportation [Internet]. Ottawa, ON: Government of Canada; [modified 2014 May 02; cited 2018 Oct 31]. Available from: <https://www.canada.ca/en/public-health/services/being-active/active-transportation.html>.
- ² Ministers Responsible for Emergency Management. An emergency management framework for Canada. 2nd ed. Ottawa, ON: Public Safety Canada; 2011 Jan [cited 2017 Dec 18]. Available from: <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/mrgnc-mngmnt-frmwrk/mrgnc-mngmnt-frmwrk-eng.pdf>.
- ³ Asthma Society of Canada. What is asthma? [Internet]. Toronto, ON; Asthma Society of Canada; [updated 2016 Apr; cited 2018 Nov 06]. Available from: <https://www.asthma.ca/what-is-asthma/>.
- ⁴ BC Provincial Health Officer. Investing in prevention: improving health and creating sustainability. Victoria, BC: BC Ministry of Healthy Living and Sport; 2010 Sep [cited 2017 Dec 15]. Available from: http://www.health.gov.bc.ca/library/publications/year/2010/Investing_in_prevention_improving_health_and_creating_sustainability.pdf.
- ⁵ Government of British Columbia. Water quality notifications [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Feb 23]. Available from: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/notices-boil-water-advisories>.
- ⁶ Last JM, editor. A dictionary of public health. New York: Oxford University Press; 2007.
- ⁷ Government of British Columbia. CPPM policy chapter 16: business continuity management. Core policy and procedures manual. Victoria, BC: Government of British Columbia; [cited 2017 Dec 18]. Available from: <https://www2.gov.bc.ca/gov/content/governments/policies-for-government/core-policy/policies/business-continuity-management>.
- ⁸ Human Early Learning Partnership. Vulnerability on the EDI [fact sheet]. Vancouver, BC: University of British Columbia; [cited 2017 Mar 24]. Available from: http://earlylearning.ubc.ca/media/fact_sheet_vulnerability_on_the_edi_2016.pdf.
- ⁹ HealthLink BC. Chlamydia [HealthLink BC File #081]. Victoria, BC: HealthLink BC; 2016 Dec [cited 2018 Nov 26]. Available from: <http://www.healthlinkbc.ca/healthfiles/pdf/hfile081.pdf>.
- ¹⁰ Canadian Liver Foundation. Cirrhosis [Internet]. Markham, ON: Canadian Liver Foundation; [cited 2017 Dec 15]. Available from: <https://www.liver.ca/patients-caregivers/liver-diseases/cirrhosis>.
- ¹¹ BC Centre for Disease Control. Communicable diseases [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2018 Nov 21]. Available from: <http://www.bccdc.ca/health-info/outbreaks-emergencies/communicable-diseases>.
- ¹² BC Ministry of Health. A guide to community care facility licensing in British Columbia. Victoria, BC: BC Ministry of Health; 2016 Spring [cited 2017 Feb 23]. Available from: https://www2.gov.bc.ca/assets/gov/health/accessing-health-care/finding-assisted-living-residential-care-facilities/residential-care-facilities/a_guide_to_community_care_facility_licensing_in_british_columbia_spring_2016_update.pdf.
- ¹³ Government of British Columbia. Comprehensive school health [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Nov 21]. Available from: <https://www2.gov.bc.ca/gov/content/education-training/k-12/teach/bc-performance-standards/healthy-living/background/comprehensive-school-health>.
- ¹⁴ Drinking Water Protection Act [SBC 2001, c.9] [statute on the Internet]; [cited 2018 Nov 06]. Available from: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_01009_01.
- ¹⁵ Tobacco and Vapour Products Control Act [RSBC 1996, c.451] [statute on the Internet]; [cited 2018 Nov 06]. Available from: http://www.bclaws.ca/civix/document/id/complete/statreg/96451_01.
- ¹⁶ BC Centre for Disease Control. Ebola [Internet]. Vancouver, BC: BC Centre for Disease Control; 2018 [cited 2018 Jan 12]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/ebola>.
- ¹⁷ HealthLink BC. Ectopic pregnancy [Internet]. Victoria, BC: HealthLink BC; [cited 2017 Dec 15]. Available from: <https://www.healthlinkbc.ca/health-topics/hw144921>.
- ¹⁸ Centers for Disease Control and Prevention. Principles of epidemiology in public health practice. 3rd ed. An introduction to applied epidemiology and biostatistics. Lesson I: introduction to epidemiology. Section II: epidemic disease occurrence [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; [updated 2012 May 18; cited 2017 Jun 07]. Available from: <https://www.cdc.gov/opphss/csels/dsepd/ss1978/lesson1/section11.html>.
- ¹⁹ Sudbury & District Health Unit. Enteric disease fact sheet. Sudbury, ON: Sudbury & District Health Unit; 2014 [cited 2017 Feb 21]. Available from: <https://www.sdhu.com/wp-content/uploads/2016/04/EntericDiseaseFactSheetFINAL.pdf>.

- ²⁰Government of Newfoundland and Labrador, Health and Community Services. Environmental health [Internet]. St. John's, NL: Government of Newfoundland and Labrador; 2017 May 09 [cited 2017 Jun 07]. Available from: <http://www.health.gov.nl.ca/health/publichealth/envhealth/environmental.html>.
- ²¹World Health Organization. Epidemiology [Internet]. Geneva: World Health Organization; [cited 2018 Nov 21]. Available from: <http://www.who.int/topics/epidemiology/en/>.
- ²²Government of British Columbia. Fetal Alcohol Spectrum Disorder (FASD) [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Nov 21]. Available from: <https://www2.gov.bc.ca/gov/content/health/managing-your-health/healthy-women-children/child-behaviour-development/special-needs/fetal-alcohol-spectrum-disorder-fasd>.
- ²³Food Premises Regulation [B.C. Reg. 210/99] [statute on the Internet]; [cited 2017 Dec 18]. Available from: http://www.bclaws.ca/civix/document/id/loo82/loo82/11_210_99.
- ²⁴HealthLink BC. Pregnancy [Internet]. Victoria, BC: HealthLink BC; [cited 2018 Nov 21]. Available from: <https://www.healthlinkbc.ca/health-topics/hw197814>.
- ²⁵Genome Canada. Understanding the code of life [Internet]. Ottawa, ON: Genome Canada; [cited 2018 Mar 21]. Available from: <https://www.genomecanada.ca/en/why-genomics/understanding-code-life>.
- ²⁶Genome British Columbia. Glossary [Internet]. Vancouver, BC: Genome British Columbia; [cited 2018 Mar 21]. Available from: <https://www.genomebc.ca/education/glossary>.
- ²⁷Government of British Columbia. Understanding harm reduction: substance use [Internet]. Victoria, BC: Government of British Columbia; 2016 Apr [cited 2018 Nov 21]. Available from: <https://www.healthlinkbc.ca/healthlinkbc-files/substance-use-harm-reduction>.
- ²⁸World Health Organization. Risk reduction and emergency preparedness. Geneva: World Health Organization; 2007 [cited 2018 Nov 21]. Available from: https://www.who.int/hac/techguidance/preparedness/emergency_preparedness_eng.pdf.
- ²⁹Here to Help. Drinking guidelines: supporting health and life [Internet]; c2012 [cited 2018 Nov 22]. Available from: <http://www.heretohelp.bc.ca/factsheet/drinking-guidelines-supporting-health-and-life>.
- ³⁰World Health Organization. Constitution of the World Health Organization. New York: World Health Organization; 1946 [cited 2018 Jan 23]. Available from: http://www.who.int/governance/eb/who_constitution_en.pdf.
- ³¹Statistics Canada. Table 102-0122 Health-adjusted life expectancy, at birth and at age 65, by sex and income, Canada and provinces, occasional (years) (table). CANSIM (database). Ottawa, ON: Statistics Canada; [modified 2012 May 23; cited 2017 Dec 15]. Available from: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=1020122>.
- ³²Government of British Columbia. About BC's health care system: health authorities [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Feb 26]. Available from: <https://www2.gov.bc.ca/gov/content/health/about-bc-s-health-care-system/partners/health-authorities>.
- ³³European Centre for Health Policy, WHO Regional Office for Europe. Health impact assessment: main concepts and suggested approach. Gothenburg consensus paper. Brussels: European Centre for Health Policy; 1999. Cited by World Health Organization. Health impact assessment (HIA). Definitions of HIA. Geneva: World Health Organization; [cited 2018 Nov 22]. Available from: <https://www.who.int/hia/about/defin/en/>.
- ³⁴World Health Organization. Health in all policies: framework for country action [draft document]. Geneva: World Health Organization; 2013 May 09 [cited 2018 Mar 14]. Available from: http://www.who.int/healthpromotion/conferences/8gchp/130509_hiap_framework_for_country_action_draft.pdf.
- ³⁵Public Health Agency of Canada. Key health inequalities in Canada: a national portrait – executive summary. Ottawa, ON: Public Health Agency of Canada; 2018 [cited 2018 Nov 06]. Available from: <https://www.canada.ca/en/public-health/services/publications/science-research-data/key-health-inequalities-canada-national-portrait-executive-summary.html>.
- ³⁶BC Centre for Disease Control. Health equity [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2018 Nov 22]. Available from: <http://www.bccdc.ca/health-info/prevention-public-health/health-equity>.
- ³⁷World Health Organization. What is health promotion? [Internet]. Geneva: World Health Organization; 2018 [cited 2018 Jan 23]. Available from: <http://www.who.int/features/qa/health-promotion/en/>.
- ³⁸BC Ministry of Health. Public health 101: the fundamentals. Module 3: how does public health work? Victoria, BC: BC Ministry of Health; 2014 Apr [cited 2017 Feb 21]. Available from: <http://urls.bccampus.ca/4qb>.
- ³⁹Government of British Columbia. Health boundaries [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Nov 22]. Available from: <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/land-use/administrative-boundaries/health-boundaries>.

- ⁴⁰HealthLink BC. Hepatitis C [Internet]. Victoria, BC: HealthLink BC; 2018 Jun 18 [cited 2018 Nov 08]. Available from: <https://www.healthlinkbc.ca/health-topics/hwl144584>.
- ⁴¹ImmunizeBC. Why vaccinate? [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2018 Nov 22]. Available from: <https://immunizebc.ca/why-vaccinate>.
- ⁴²Government of British Columbia. Short-term residential care [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Nov 22]. Available from: <https://www2.gov.bc.ca/gov/content/health/accessing-health-care/home-community-care/care-options-and-cost/short-term-residential-care>.
- ⁴³BC Centre for Disease Control. HIV/AIDS [Internet]. Vancouver, BC: BC Centre for Disease Control; 2017 [cited 2017 Dec 15]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/hiv-aids>.
- ⁴⁴Immunize Canada. What is immunization? [Internet]. Ottawa, ON: Canadian Public Health Association; 2017 Mar 27 [cited 2018 Nov 22]. Available from: <https://www.immunize.ca/what-immunization>.
- ⁴⁵BC Provincial Health Officer. A review of infant mortality in British Columbia: opportunities for prevention. Victoria, BC: BC Ministry of Health Planning; 2003 Oct [cited 2018 Nov 22]. Available from: <https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/special-reports/infantmortality.pdf>.
- ⁴⁶BC Stats. Vital statistics [Internet]. Victoria, BC: BC Stats; [cited 2017 Jan 17]. Available from: <http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/VitalStatistics.aspx>.
- ⁴⁷HealthLink BC. Listeriosis [HealthLink BC File #75]. Victoria, BC: HealthLink BC; 2017 Apr [cited 2018 Nov 26]. Available from: <https://www.healthlinkbc.ca/healthlinkbc-files/listeriosis>.
- ⁴⁸UNESCO. Literacy [Internet]. Paris: UNESCO; [cited 2018 Nov 22]. Available from: <https://en.unesco.org/themes/literacy>.
- ⁴⁹World Health Organization. International statistical classification of diseases and related health problems. 10th revision. 2008 ed. Vol 2. Geneva: World Health Organization; 2009 [cited 2018 Nov 22]. Available from: https://www.who.int/classifications/icd/ICD10Volume2_en_2008.pdf.
- ⁵⁰World Health Organization. Maternal health [Internet]. Geneva: World Health Organization; 2018 [cited 2018 Nov 07]. Available from: <http://www.who.int/maternal-health/en/>.
- ⁵¹Public Health Agency of Canada. Chronic disease risk factors [Internet]. Ottawa, ON: Public Health Agency of Canada; [modified 2015 Apr 09; cited 2018 May 17]. Available from: <https://www.canada.ca/en/public-health/services/chronic-diseases/chronic-disease-risk-factors.html>.
- ⁵²Canadian Institute for Health Information. Avoidable deaths [Internet]. Ottawa, ON: Canadian Institute for Health Information; [cited 2018 Nov 22]. Available from: <http://indicatorlibrary.cihi.ca/display/HSPIL/Avoidable+Deaths>.
- ⁵³Federal Provincial Territorial Committee on Drinking Water. From source to tap. The multi-barrier approach to safe drinking water. Ottawa, ON: Federal Provincial Territorial Committee on Drinking Water; 2002 May 16 [cited 2018 Jan 11]. Available from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/hecs-sesc/pdf/water-eau/tap-source-robinet/tap-source-robinet-eng.pdf.
- ⁵⁴Government of British Columbia. Teaching and assessment tools: numeracy [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Nov 22]. Available from: <https://www2.gov.bc.ca/gov/content/education-training/early-learning/teach/teaching-and-assessment-tools>.
- ⁵⁵BC Centre on Substance Use, BC Ministry of Health. A guideline for the clinical management of opioid use disorder. Vancouver, BC: BC Centre on Substance Use; 2017 Jun 05 [cited 2018 Nov 22]. Available from: http://www.bccsu.ca/wp-content/uploads/2017/06/BC-OUD-Guidelines_June2017.pdf.
- ⁵⁶World Health Organization. Disease outbreaks [Internet]. Geneva: World Health Organization; [cited 2018 Nov 22]. Available from: http://www.searo.who.int/topics/disease_outbreaks/en/.
- ⁵⁷World Health Organization. What is a pandemic? [Internet]. Geneva: World Health Organization; 2010 Feb 24 [cited 2018 Oct 19]. Available from: http://www.who.int/csr/disease/swineflu/frequently_asked_questions/pandemic/en/.
- ⁵⁸University of Ottawa. Society, the individual and medicine. Outbreaks, epidemics and pandemics [Internet]. Ottawa, ON: University of Ottawa; 2015 [cited 2018 Nov 08]. Available from: https://www.med.uottawa.ca/sim/data/Pandemic_e.htm.
- ⁵⁹Government of British Columbia. British Columbia's pandemic influenza response plan (2012). Introduction and background. Victoria, BC: Government of British Columbia; 2012 Sep [cited 2017 Feb 27]. Available from: <http://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-the-provincial-health-officer/reports-publications/bc-pandemic-influenza-plan-2012.pdf>.
- ⁶⁰HealthLink BC. Pap test [Internet]. Victoria, BC: HealthLink BC; [cited 2017 Dec 15]. Available from: <https://www.healthlinkbc.ca/medical-tests/hw5266>.

- ⁶¹ BC Centre for Disease Control. Pelvic inflammatory disease [Internet]. Vancouver, BC: BC Centre for Disease Control; 2017 [cited 2017 Dec 15]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/pelvic-inflammatory-disease>.
- ⁶² World Health Organization. Physical activity [fact sheet]. Geneva: World Health Organization; 2018 Feb 23 [cited 2018 Oct 31]. Available from: <http://www.who.int/news-room/fact-sheets/detail/physical-activity>.
- ⁶³ Government of Canada. What is the population health approach? Ottawa, ON: Government of Canada; [modified 2012 Feb 07; cited 2018 Nov 22]. Available from: <https://www.canada.ca/en/public-health/services/health-promotion/population-health/population-health-approach.html>.
- ⁶⁴ World Health Organization. Mental health: a state of well-being [Internet]. Geneva: World Health Organization; [updated 2014 Aug; cited 2017 Feb 15]. Available from: http://www.who.int/features/factfiles/mental_health/en/.
- ⁶⁵ Statistics Canada. Table 13-10-0744-01 Premature and potentially avoidable mortality, Canada, provinces and territories. Ottawa, ON: Statistics Canada; [cited 2018 Nov 22]. Available from: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310074401>.
- ⁶⁶ Statistics Canada. Health system performance [Internet]. Ottawa, ON: Statistics Canada; [modified 2018 Aug 22; cited 2018 Nov 06]. Available from: <https://www150.statcan.gc.ca/n1/pub/82-221-x/2017003/hsp-rss-eng.htm>.
- ⁶⁷ World Health Organization. Preterm birth [fact sheet]. Geneva: World Health Organization; 2018 Feb 19 [cited 2018 Nov 22]. Available from: <http://www.who.int/news-room/fact-sheets/detail/preterm-birth>.
- ⁶⁸ HealthLink BC. Primary prevention [Internet]. Victoria, BC: HealthLink BC; [cited 2018 Nov 22]. Available from: <https://www.healthlinkbc.ca/physical-activity/primary-prevention>.
- ⁶⁹ Eisenberg N, Fabes RA, Spinrad TL. Prosocial development (chapter 11). In Eisenberg N, volume editor, Damon W, Lerner RM, series editors. Handbook of child psychology and developmental science. 6th ed. Vol. 3. Social, Emotional, and Personality Development. New Jersey: John Wiley & Sons; 2006: 646-718. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ⁷⁰ Knafo-Noam A, editor. Prosocial behaviour. Encyclopedia on early childhood development. Montreal, PQ: Centre of Excellence for Early Childhood Development and Strategic Knowledge Cluster on Early Child Development; [updated 2016 Feb; cited 2016 May 26]. Available from: <http://www.child-encyclopedia.com/sites/default/files/dossiers-complets/en/prosocial-behaviour.pdf>. Cited by BC Provincial Health Officer. Is “good”, good enough? The health and well-being of children & youth in BC. A joint report by Child Health BC and BC’s Provincial Health Officer. Victoria, BC: BC Ministry of Health; 2016 Nov.
- ⁷¹ Canadian Public Health Association. A new approach to managing illegal psychoactive substances in Canada. Ottawa, ON: Canadian Public Health Association; 2014 [cited 2018 Oct 19]. Available from https://www.cpha.ca/sites/default/files/assets/policy/ips_2014-05-15_e.pdf.
- ⁷² Sheps CG (chairman). Higher education for public health: a report of the Millbank Memorial Fund Commission. New York: Prodist; 1976. Cited by Last JM. Public health and human ecology. East Norwalk, CT: Appleton & Lange; 1987.
- ⁷³ BC Ministry of Health, Population and Public Health. Evidence review: public health emergency management. Victoria, BC: BC Ministry of Health; 2013 Apr [cited 2017 Feb 27]. Available from: <http://www.health.gov.bc.ca/library/publications/year/2013/public-health-emergency-management-evidence-review.pdf>.
- ⁷⁴ Public Health Agency of Canada. HIV/AIDS epi updates: July 2010. Ottawa, ON: Public Health Agency of Canada; 2010. Cited by BC Provincial Health Officer. HIV, stigma and society: tackling a complex epidemic and renewing HIV prevention for gay and bisexual men in British Columbia. Provincial Health Officer’s annual report. Victoria, BC: BC Ministry of Health; 2014.
- ⁷⁵ World Health Organization. Public health surveillance [Internet]. Geneva: World Health Organization; [cited 2017 Feb 28]. Available from: http://www.who.int/topics/public_health_surveillance/en/.
- ⁷⁶ HealthyFamilies BC. Building kids’ resilience [Internet]. Victoria, BC: HealthyFamilies BC; [cited 2018 Nov 27]. Available from: <https://www.healthyfamiliesbc.ca/home/articles/building-kids-resilience>.
- ⁷⁷ Government of British Columbia. Residential care facilities [Internet]. Victoria, BC: Government of British Columbia; [cited 2017 Jun 08]. Available from: <http://www2.gov.bc.ca/gov/content/health/accessing-health-care/finding-assisted-living-or-residential-care/residential-care-facilities>.
- ⁷⁸ HealthLink BC. Salmonellosis [HealthLink BC File #17]. Victoria, BC: HealthLink BC; 2018 Jun [cited 2018 Nov 26]. Available from: <https://www.healthlinkbc.ca/healthlinkbc-files/salmonellosis>.
- ⁷⁹ HealthLink BC. The harmful effects of second-hand smoke [HealthLink BC File #30a]. Victoria, BC: HealthLink BC; 2015 Dec [cited 2017 Sep 06]. Available from: <https://www.healthlinkbc.ca/hlbc/files/documents/healthfiles/hfile30a.pdf>.

- ⁸⁰Porta M, Greenland S, Last JM, editors. *A dictionary of epidemiology*. Oxford: Oxford University Press, 2008.
- ⁸¹World Health Organization. *E. coli* [fact sheet]. Geneva: World Health Organization; 2018 Feb 07 [cited 2018 Nov 26]. Available from: <http://www.who.int/mediacentre/factsheets/fs125/en/>.
- ⁸²H. Krueger & Associates. *Child and youth health and well-being indicators project: appendix J – cognitive development evidence review* [prepared for the Office of the Provincial Health Officer and the Canadian Institute for Health Information]. Ottawa, ON: Canadian Institute for Health Information; 2011.
- ⁸³HealthLink BC. *Sudden infant death syndrome* [HealthLink BC File #46]. Victoria, BC: HealthLink BC; 2018 May [cited 2018 Nov 26]. Available from: <https://www.healthlinkbc.ca/hlbc/files/documents/healthfiles/hfile46.pdf>.
- ⁸⁴Bowen S. Access to health services for underserved populations in Canada. In Health Canada. "Certain circumstances": issues in equity and responsiveness in access to health care in Canada. Ottawa, ON: Health Canada; 2001 [cited 2018 Nov 26]. Available from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hcs-sss/alt_formats/hpb-dgps/pdf/pubs/2001-certain-equit-acces/2001-certain-equit-acces-eng.pdf.
- ⁸⁵Clark BC, Preto N. Exploring the concept of vulnerability in health care. *CMAJ*. 2018;190(11): E308-9.
- ⁸⁶BC Injury Research and Prevention Unit. *Economic burden of injury in British Columbia*. Vancouver, BC: BC Injury Research and Prevention Unit; 2015 Aug [cited 2017 Feb 21]. Available from: <http://www.injuryresearch.bc.ca/wp-content/uploads/2015/08/BCIRPU-EB-2015.pdf>.
- ⁸⁷BC Centre for Disease Control. *Vibrio parahaemolyticus* [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2018 Mar 21]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/vibrio-parahaemolyticus>.
- ⁸⁸Northern Health. *Advisories and notifications. Boil water notices and water quality advisories* [Internet]. Prince George, BC: Northern Health; [cited 2018 Oct 25]. Available from: <https://www.northernhealth.ca/services/environmental-health/drinking-water/advisories-and-notifications>.

Appendix B: Data Sources & Methodology

Data Sources

Adolescent Health Survey

The BC Adolescent Health Survey (AHS) is administered by the McCreary Centre Society (the Society). The AHS is administered in regular public schools,¹ and schools on reserves are not included.² The Society uses this survey to collect information from BC students in grades 7 to 12 on a wide range of topics. It was most recently conducted in 2018, and previous cycles were conducted in 1992, 1998, 2003, 2008, and 2013. Many of the questions are repeated in each survey cycle in order to track health trends over time.

This report presents survey data from 2003, 2008, and 2013 to examine two performance measures: alcohol or cannabis use before the age of 15 (Chapter 5), and condom use among sexually active adolescents (Chapter 6). Analyses by health authority are based on the location of the school. Changes in consent procedures in participating school districts may have affected trend results across the survey years.¹

BC Centre for Disease Control Databases

The BC Centre for Disease Control (BCCDC), part of the Provincial Health Services Authority, provides provincial and national leadership in disease surveillance, detection, treatment, prevention, and consultation.³ BCCDC provided data for this report for most of the performance measures in Chapter 6 (Communicable Disease Prevention), and in Chapter 8 (Environmental Health). Analyses of data by health authority are based on the residence of the individual.

Immunization data for two-year-olds were obtained from the Panorama Public Health Information System (2013 onward) and the Integrated Public Health Information System (iPHIS) (2007–2012), for four of the five regional health authorities: Fraser, Interior, Island, and Northern. The fifth, Vancouver Coastal Health (VCH), monitors data on coverage rates for two-year-olds through periodic surveys of a sample of the population; therefore, VCH coverage estimates are not comparable to the coverage data derived from the populations contained in Panorama or iPHIS and are not included in related provincial charts.⁴

Incidence of hepatitis C among repeat testers is based on data from the BCCDC Public Health Laboratory. BCCDC Public Health Laboratory performs the vast majority (over 95 per cent) of hepatitis C tests in BC.⁵ Data for HIV cases is collected in the HIV/AIDS Information System (HAISYS), housed at BCCDC.⁶ Chlamydia testing is based on the sum of chlamydia tests performed by BCCDC Public Health Laboratory and laboratory billings for performing a chlamydia test.⁷ The population size of young women is based on estimates from BC Stats.⁸

Enteric disease outbreak data for E. coli and listeriosis are derived from the national, secure, web-enabled outbreak reporting tool, Canadian Network for Public Health Intelligence.⁹ Data on salmonella are obtained from the BC Integrated Surveillance of Foodborne Pathogens database housed at the BCCDC.¹⁰

BC Ministry of Health Administrative Databases

BC Vital Statistics

One of the responsibilities of the BC Vital Statistics Agency (VSA) is administration of Vital Statistics data, such as births, deaths, and marriages in BC. The VSA uses the World Health Organization's International Classification of Diseases codes, Version 10 (ICD-10) to classify related health data. In this report, the VSA data were used to examine low weight singleton births, infant mortality, life expectancy, and mortality rate for unintentional injuries.

Geographic analyses of data by health authority regarding low weight singleton births and infant mortality are based on the residence of the mother. The infant mortality rate is assigned to the year of the child's birth for those who died

within 364 days of their birth, which may be different than the year in which they died. For example, a data point on a chart in 2013 refers to deaths of infants born in 2013 who died within one year; their death could have occurred either in 2013 or 2014.

In using VSA data to examine life expectancy at birth in BC (Chapters 1 and 2), analyses were conducted using the Chiang method¹¹; therefore, the variance of the life expectancy is the weighted sum of the variance of the probability of survival across all age intervals. Calculations of life expectancy at birth for BC use population data from the BC Client Roster on July 1 of each year.

Geographic analyses for the mortality rate for unintentional injuries are based on the residence of the deceased individual. The ICD-10 codes used to classify unintentional injuries are as follows:

Underlying Cause	ICD-10 Codes
Transport^{aa}	V01-V99
Cutting	W25-W27, W46
Falls^{bb}	W00-W19
Foreign Body	W44, W45
Firearms	W32-W34
Environment/Natural Factors	W53-W59, W64, W92-W94, W99, X20-X39, X51-X51, X53-X54, X57-X57, W60
Explosion/Rupture	W35-W40
Drowning and Submersion	W65-W70, W73, W74
Fire, Flames, and Hot Substances	X00-X06, X08-X19
Overexertion	X50
Unintentional Poisoning	X40-X49
Struck by Object	W20-W23, W50-W52
Suffocation and Choking	W75-W84
Machinery	W24, W28-W29, W30-W31
Other Unintentional	W49 Exposure to other and unspecified inanimate mechanical forces W41 Exposure to high-pressure jet W42 Exposure to noise W43 Exposure to vibration W85 Exposure to electric transmission lines W86 Exposure to other specified electric current W87 Exposure to unspecified electric current W88 Exposure to ionizing radiation W89 Exposure to man-made visible and ultraviolet light W90 Exposure to other nonionizing radiation W91 Exposure to unspecified type of radiation X58-X59 Accidental exposure to other and unspecified factors X52 Prolonged stay in weightless environment

^{aa} Includes motor vehicle occupant, motorcyclist, pedal cyclist, pedestrian, off-road vehicle, other land transport, water, air, and space transport.

^{bb} Additional breakdown conducted for falls (e.g., on stairs).

Chronic Disease Registry

The Office of the Provincial Health Officer in the Ministry of Health uses other datasets (e.g., Discharge Abstract Database, Medical Services Plan data) to compile information related to people living with chronic diseases, to form the Chronic Disease Registry. Data include the person's sex, age, residence, date of birth and/or death, as well as disease diagnosis date(s), and source of diagnosis.¹² In this report, Chronic Disease Registry data are used to examine the incidence and prevalence rate for diabetes. Geographic analyses of data by health authority are based on the residence of the individual.

Community Care Licensing Program

The Ministry of Health's Community Care Licensing Program provides provincial stewardship for the operation of the health authority community care licensing programs, and is responsible for developing and implementing legislation, policy, and guidelines to protect the health and safety of people being cared for in licensed community care facilities.¹³ These licensed facilities may be operated by for-profit or not-for-profit organizations, government bodies, or health authorities. The purpose of these facilities is to provide care to three or more individuals, including babies, toddlers, preschoolers, and school-aged children (child/day care); children or youth requiring specialized residential programs; people with physical or mental disabilities; people with substance use or mental health issues; or older adults requiring ongoing or end of life care.^{14,15}

Health authority licensing officers regularly inspect and monitor all licensed care facilities to ensure compliance with legislative requirements. They use a standardized Risk Assessment Tool to categorize facilities as low, medium, or high risk, based on compliance with the *Community Care and Assisted Living Act*, the facility's compliance history, and compliance with either the Residential Care Regulation, or the Child Care Licensing Regulation. Frequency

of monitoring is based on the risk rating given to the facility: low-risk facilities will receive their next comprehensive routine compliance inspection within 12–18 months, while for high-risk facilities that timeframe is shortened to 3–6 months.¹⁶

Health authorities provide data to the Ministry of Health on the number of high-risk facilities under each service type described in the *Community Care and Assisted Living Act* and its Regulations. Geographic analyses of data by health authority are based on the location of the facility.

Discharge Abstract Database (DAD)

The Discharge Abstract Database (DAD) records detailed patient information from hospitals, including ICD-10 diagnoses codes that describe the causes and types of injury. The DAD reflects data for those individuals who were admitted to hospital, and includes discharges, transfers, and deaths. The record ends when the patient is discharged from hospital. If the patient is transferred to a new facility, a new record is created at that facility. Hospitalization is used as a proxy measure for a serious injury.

Data from the DAD are used in this report for the hospitalization rate for unintentional injuries and for fall-related hospitalizations. Geographic analyses of data by health authority for both of these performance measures are based on the residence of the individual. To avoid multiple counts of the same injury, when a patient was hospitalized more than once during a fiscal year (e.g., re-admitted, transferred to another hospital), only the first admission was counted.

BC Perinatal Data Registry

The BC Perinatal Data Registry is owned and administered by Perinatal Services BC, an agency of the BC Provincial Health Services Authority. This database includes health data for mothers and babies from obstetrical and neonatal medical records in BC, including hospital births and registered midwife-attended home births.¹⁷

BC Perinatal Data Registry data are used in this report to examine smoking during pregnancy. Geographic analyses of data by health authority are based on the residence of the mother.

BC Stats

BC Stats is the central statistical agency of the Province of British Columbia. This organization produces population and demographic estimates for BC, including monitoring and reporting on demographic trends in the province. In this report, BC Stats provided data on gaps in life expectancy and data that were combined with health utility index scoring to determine health-adjusted life expectancy (HALE). Geographic analyses of data by health authority are based on the residence of the individual.

Health Utility Index

The Health Utility Index is used in the calculation of HALE. The index, developed at McMaster University's Centre for Health Economics and Policy Analysis, measures a person's functional health based on eight dimensions of functioning (vision, hearing, speech, mobility, dexterity, feelings, cognition, and pain).¹⁸ Mean Health Utility Index scores by sex and age groups are used in HALE calculation.

Early Development Instrument

The Early Development Instrument (EDI) is a 104-question survey measuring five domains, or core areas, of early child development that are known to be predictors of adult health outcomes, educational achievement, and social outcomes.^{19,20} The five EDI domains are physical health and well-being; social competence; emotional maturity; language and cognitive development; and communication skills and general knowledge. The EDI is administered by the Human Early Learning Partnership, an interdisciplinary research network based out of the University of British Columbia's School of Population and Public Health.²¹ The EDI is completed by kindergarten teachers for the children in their classes. All schools in BC

are invited to participate in the EDI, including public, independent, and on-reserve schools.²² Geographic analyses of data by health authority and health service delivery area are based on the residence of the child.

EDI data presented in this report are used to examine the percentage of kindergarten children who are "vulnerable" or "not vulnerable" on a selection of the five EDI domains. Children deemed "vulnerable" on the EDI are those whose score in one or more of the five domains of the EDI is below the 10th percentile cut-off score.²³ This cut-off score was established using the first full population of kindergarten children in BC from 2004 to 2007.²³ One potential confounder of vulnerability on the EDI domains is the percentage of children with English as a second language (ESL), as populations with higher proportions of ESL students may have a greater percentage of children identified as vulnerable on the language and cognitive development and communication skills and general knowledge domains.

BC Ministry of Education – School Satisfaction Survey

The School Satisfaction Survey is an annual online survey conducted by the Ministry of Education. Students in grades 4, 7, 10, and 12, their parents, and staff in BC public schools are invited to participate to discuss their school experiences. The survey is open from January to the end of April each year.²⁴

The survey covers a number of topics, and it provides a comprehensive picture of educational experiences in BC public schools. Partner groups, teachers, and experts in educational measurement and special education provided input into the survey questions. Final results are reported at the end of each school year.²⁴ Survey data are used by schools, school districts, government ministries, and external organizations for planning, research, and advocacy work for youth.

The School Satisfaction Survey data are used in this report to examine the percentage of students in various grades who report that at school, they are learning how to stay healthy. Geographic analyses of data by health authority are based on the location of the school. Francophone schools are included at both the BC and health authority levels. Inclusion of a francophone school within a health authority is based on the location of its school district. During the 2011/12 school year, survey participation was optional due to labour disputes. Response rates for that year fell below typical levels, and so those responses may not be representative of the school populations.²⁵ Collection of the School Satisfaction Survey ended in 2015/16, and it was replaced by the new Student Learning Survey in 2016/17.

Statistics Canada

The Canadian Census is conducted every five years and it gathers demographic, social, and economic information from the entire Canadian population, including Canadian citizens (by birth and by naturalization), landed immigrants and non-permanent residents as well as their families living with them in Canada, and those Canadian citizens and landed immigrants who are temporarily outside the country on Census Day. It does not include foreign residents temporarily visiting or representing a foreign government.²⁶

Statistics Canada collects and houses a wide variety of information about Canadians in CANSIM, its key socio-economic database. Statistics Canada data used in this report are derived from two surveys within CANSIM—Canadian Community Health Survey (CCHS) and the Households and the Environment Survey—as well as from CANSIM tables available on the Statistics Canada website.

Canadian Community Health Survey

Through the CCHS, Statistics Canada collects health data by region (in BC these are health authorities and health service delivery areas). Data collected include information about health status, health care utilization, and socio-economic status and other determinants of health. Prior to 2007, the survey was conducted every two years. Since 2007, the survey has been conducted annually, but is reported in combined two-year aggregate periods. This survey does not include people living on reserve or other Aboriginal settlements, full-time members of the Canadian forces, institutionalized people, children age 12 to 17 living in foster homes, and persons living in the Quebec health regions of Région du Nunavik and Région des Terres-Cries-de-la-Baie-James.²⁷

CCHS data are presented in this report to examine several performance measures: fruit and vegetable consumption; physical activity; smoking; hazardous drinking among women of reproductive age and among the general BC population age 12 and up; positive mental health; and life satisfaction. Geographic data analyses by health authority are based on the residence of the individual.

The fruit and vegetable consumption performance measure monitors the usual number of times (frequency) per day a person reported eating fruits and vegetables, but does not take into account the amount consumed. The questions asked in the CCHS that are applicable to monitoring the fruit and vegetable consumption frequency of British Columbians age 12 and up focus on the consumption of fruit juice, fruit in general, green salad, potatoes (not including French fries, fried potatoes, or potato chips), carrots, and other vegetables in general.²⁸

The physical activity performance measure includes respondents who reported being physically active or moderately active during their leisure time. The classification is based on an index of average daily physical activity

over the preceding three months. For each leisure-time physical activity the respondent was engaged in, an average daily energy expenditure was calculated by multiplying the number of times the activity was performed by the average duration of the activity and by the energy cost (kilocalories per kilogram of body weight per hour) of the activity. The index was calculated as the sum of the average daily energy expenditures of all activities. The classification is as follows: physically active = 3.0 kcal/kg/day or more; moderately active = 1.5 to 2.9 kcal/kg/day; inactive = less than 1.5 kcal/kg/day.

The smoking performance measure includes respondents who reported being a current smoker (daily or occasional). Daily smoker refers to those who reported smoking cigarettes every day. Occasional smoker includes those who reported smoking cigarettes occasionally, and former daily smokers who now smoke occasionally. The performance measure does not take into account the number of cigarettes smoked.²⁹

Hazardous drinking is defined as consuming five or more drinks on one occasion, at least once a month during the past year.²⁹ The definition of hazardous drinking for women was changed in 2013-14, from consuming five or more drinks on one occasion, to four or more drinks. Due to the change in definition, the data for females from 2013-14 onwards are not directly comparable to previous years. For the data and years presented in this report, the CCHS defined “one alcoholic drink” as one bottle or can of beer or a glass of draft; one glass of wine or a wine cooler; or one drink or cocktail with one and a half ounces of liquor.²⁸ This is not as precise a definition as given in the Canadian Centre on Substance Use and Addiction’s Low-risk Alcohol Drinking Guidelines, which accounts for the percentage of the alcohol content in the beverage and specifies the number of ounces in a “standard drink”.³⁰

Households and the Environment Survey

This survey, conducted as a voluntary telephone survey every two years,³¹ measures household actions that have, or are perceived to have, positive or negative impacts on the environment. It examines subjects such as consumption and conservation of energy and water, indoor environment, use of pesticides and fertilizers, outdoor air quality, and consumer decisions.³² The Households and the Environment Survey is administered to a subsample of the households who complete the Canadian Community Health Survey.³¹

In this report, data from this survey are presented to examine the performance measure of the percentage of households with municipal water supplies reporting that they boiled their drinking water in order to make it safe to drink.^{cc,32}

^{cc} Survey respondents are asked the following questions: during the past 12 months, did you do any of the following to the main water source? Did you? (1) use a filter or purifier on the main water supply pipe, (2) use a filter or purifier on the taps, including built in water dispensers in your refrigerator, (3) use a jug filter (for example a Brita system), (4) boil water (in order to make it safe for drinking), (5) do nothing.

REFERENCES

- ¹ McCreary Centre Society. Methodology: 2013 BC Adolescent Health Survey. Vancouver, BC: McCreary Centre Society; 2014 Jan [cited 2016 May 31; 2016 Oct 31]. Available from: http://www.mcs.bc.ca/pdf/AHSV_methodology.pdf.
- ² Ho K. Personal communication. BC Ministry of Education; 2016 Aug 11.
- ³ BC Centre for Disease Control. [Home page]. Vancouver, BC: BC Centre for Disease Control; 2016 [cited 2016 Dec 12]. Available from: <http://www.bccdc.ca/>.
- ⁴ BC Centre for Disease Control. Immunization coverage [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2018 Nov 5]. Available from: <http://www.bccdc.ca/health-info/immunization-vaccines/immunization-coverage#Coverage--Reports>.
- ⁵ BC Centre for Disease Control. Communicable disease control: hepatitis C. Vancouver, BC: BC Centre for Disease Control; 2016 [cited 2018 Nov 07]. Available from: http://www.bccdc.ca/resource-gallery/Documents/Guidelines%20and%20Forms/Guidelines%20and%20Manuals/Epid/CD%20Manual/Chapter%201%20-%20CDC/HepC_Guidelines.pdf.
- ⁶ Rank C, Lloyd-Smith E, Gilbert M. Special report: advanced HIV disease at the time of HIV diagnosis in British Columbia 1995 to 2008. Vancouver, BC: BC Centre for Disease Control; 2011 Mar [cited 2018 Nov 07]. Available from: http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/STI/STI_HIVSpecialReport_20110401.pdf.
- ⁷ BC Centre for Disease Control. Chlamydia [Internet]. Vancouver, BC: BC Centre for Disease Control; [cited 2018 Nov 07]. Available from: <http://www.bccdc.ca/health-info/diseases-conditions/chlamydia>.
- ⁸ Government of British Columbia. BC Stats: population estimates. Victoria, BC: Government of British Columbia [cited 2018 Nov 05]. Available from: <https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/population-estimates>.
- ⁹ BC Centre for Disease Control. British Columbia annual summary of reportable diseases 2015. Vancouver, BC: BC Centre for Disease Control; 2016 Sep 03 [cited 2017 Aug 22]. Available from: <http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Epid/Annual%20Reports/2015CDAnnualReportFinal.pdf>.
- ¹⁰ BC Centre for Disease Control. BC integrated surveillance of foodborne pathogens (BCISFP) methods. Vancouver, BC: BC Centre for Disease Control; 2018 Sep [cited 2018 Oct 24]. Available from: <http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Epid/Enterics/BCISFP%20Methods.pdf>.
- ¹¹ Chiang CL. On constructing current life tables. *J Am Stat Assoc.* 1972;67(339):538-41.
- ¹² BC Ministry of Health. Chronic disease registry – data dictionary. Victoria, BC: BC Ministry of Health; 2015 Mar 27 [cited 2016 May 20]. Available from: www.gov.bc.ca/health/forms/5452datadictionary.pdf.
- ¹³ BC Ministry of Health. Licensed community care facilities [fact sheet]. Victoria, BC: BC Ministry of Health; 2016 Nov 10.
- ¹⁴ BC Ministry of Health. Residential care facilities [Internet]. Victoria, BC: BC Ministry of Health; [cited 2018 Oct 22]. Available from: <https://www2.gov.bc.ca/gov/content/health/accessing-health-care/finding-assisted-living-or-residential-care/residential-care-facilities?keyword=community&keyword=care&keyword=licensing>.
- ¹⁵ BC Ministry of Health and Regional Health Authorities. A guide to community care facility licensing in British Columbia. Victoria, BC: BC Ministry of Health; 2016 Jun [cited 2018 Oct 22]. Available from: https://www2.gov.bc.ca/assets/gov/health/accessing-health-care/finding-assisted-living-residential-care-facilities/residential-care-facilities/a_guide_to_community_care_facility_licensing_in_british_columbia_spring_2016_update.pdf.
- ¹⁶ BC Ministry of Health. High risk residential care facilities [fact sheet]. Victoria, BC: BC Ministry of Health; 2016.
- ¹⁷ Perinatal Services BC. Perinatal data registry [Internet]. Vancouver, BC: Perinatal Services BC; [cited 2016 May 20]. Available from: <http://www.perinatalservicesbc.ca/health-professionals/data-surveillance/perinatal-data-registry>.
- ¹⁸ Statistics Canada. Health indicators. Functional health [publication 82-221-X] [Internet]. Ottawa, ON: Statistics Canada; [modified 2017 Nov 30; cited 2017 Dec 19]. Available from: http://www.statcan.gc.ca/pub/82-221-x/2017003/hs-es-eng.htm#hs3_1.
- ¹⁹ Human Early Learning Partnership. Early Development Instrument. What is the Early Development Instrument? Vancouver, BC: University of British Columbia; [cited 2017 Feb 15]. Available from: <http://earlylearning.ubc.ca/edi/>.
- ²⁰ Early Development Instrument. History of the Early Development Instrument. Hamilton, ON: Offord Centre for Child Studies; 2018 [cited 2018 Oct 22]. Available from: <https://edi.offordcentre.com/about/history-of-the-edi/>.

- ²¹Human Early Learning Partnership. The Human Early Learning Partnership. Vancouver, BC: University of British Columbia; [cited 2017 Aug 22]. Available from: <http://earlylearning.ubc.ca/about/>.
- ²²Human Early Learning Partnership. The Early Development Instrument [fact sheet]. Vancouver, BC: University of British Columbia; 2017 [cited 2018 Oct 22]. Available from: http://earlylearning.ubc.ca/media/factsheet_edi_20170125.pdf.
- ²³Human Early Learning Partnership. Fact sheet: vulnerability on the EDI. Vancouver, BC: Human Early Learning Partnership. [cited 2018 Nov 07]. Available from: http://earlylearning.ubc.ca/media/fact_sheet_vulnerability_on_the_edi_2016.pdf.
- ²⁴Government of British Columbia. Student learning survey information for administrators [Internet]. Victoria, BC: Government of British Columbia; [cited 2018 Nov 06]. Available from: <https://www2.gov.bc.ca/gov/content/education-training/administration/kindergarten-to-grade-12/surveys/student-learning-survey>.
- ²⁵BC Ministry of Education. Satisfaction Survey – 2015/16. Province – standard public schools only. Victoria, BC: BC Ministry of Education; [cited 2017 Oct 17]. Available from: http://www.bced.gov.bc.ca/reports/pdfs/sat_survey/public.pdf.
- ²⁶Statistics Canada. Census of population [Internet]. Ottawa, ON: Statistics Canada; [modified 2016 Apr 28; cited 2016 Aug 03]. Available from: <http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3901>.
- ²⁷Statistics Canada. Canadian Community Health Survey – annual component (CCHS). Detailed information for 2016 [Internet]. Ottawa, ON: Statistics Canada; [modified 2016 Jan 11; cited 2017 Aug 22]. Available from: <http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&Id=259374>.
- ²⁸Statistics Canada. Canadian Community Health Survey (CCHS). Annual component – 2014 questionnaire. Ottawa, ON: Statistics Canada; 2014 [cited 2017 Dec 19]. Available from: http://www23.statcan.gc.ca/imdb-bmdi/instrument/3226_QI_VII-eng.pdf.
- ²⁹Statistics Canada. Table 105-0502 Health indicator profile, two year period estimates, by age group and sex, Canada, provinces, territories, health regions (2013 boundaries) ad peer groups, occasional (table). CANSIM (database). Ottawa, ON: Statistics Canada; [cited 2017 Mar 20]. Available from: <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=1050502&tabMode=dataTable&srchLan=-1&p1=-1&p2=9>.
- ³⁰Canadian Centre on Substance Use and Addiction. Canada's low-risk alcohol drinking guidelines. Ottawa, ON: Canadian Centre on Substance Use and Addiction; 2017 [cited 2017 Dec 19]. Available from: <http://www.ccsa.ca/Resource%20Library/2012-Canada-Low-Risk-Alcohol-Drinking-Guidelines-Brochure-en.pdf>.
- ³¹Statistics Canada. Households and the Environment Survey (HES). Ottawa, ON: Statistics Canada; 2017 [cited 2018 Mar 12]. Available from: <http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=3881>.
- ³²Statistics Canada. Households and the environment (11-526-X) [Internet]. Ottawa, ON: Statistics Canada; [modified 2013 Mar 18; cited 2017 Aug 22]. Available from: <http://www5.statcan.gc.ca/olc-cel/olc.action?objId=11-526-X&objType=2&lang=en&limit=0>.

Appendix C: Dashboard

2018 PROGRESS UPDATE ON PERFORMANCE MEASURES ESTABLISHED IN BC'S GUIDING FRAMEWORK

This dashboard is based on performance measures established in *Promote, Protect, Prevent: Our Health Begins Here. BC's Guiding Framework for Public Health*

OVERALL PROGRESS: **TREND IS IMPROVING**
TREND IS RELATIVELY STABLE
TREND IS WORSENING

DISPARITIES: **NO/MINIMAL DISPARITY**
MODERATE DISPARITY
SUBSTANTIAL DISPARITY

— **DATA NOT INCLUDED IN REPORT AND/OR NOT CURRENTLY AVAILABLE**
 N/A **NOT APPLICABLE**

	BASELINE*	2023 TARGET	CURRENT STATUS	OVERALL PROGRESS	ON TRACK TO TARGET?	PROGRESS: MALES	PROGRESS: FEMALES	SEX DISPARITY	REGIONAL DISPARITY**
OVERARCHING MEASURES									
Geographic disparity in life expectancy between local health areas (in years)	10.0	6	10.4			N/A	N/A	N/A	
The age-standardized incidence rate for diabetes (per 1,000)	6.5	6	5.0						
Health-adjusted life years of the BC population	Male	70.9	76	70.0			N/A		
	Female	73.7	79	72.9			N/A		
Infant mortality rate (per 1,000 live births)	3.7	2.5	3.4			—	—	—	
The age-standardized rate of mortality due to preventable causes (per 100,000)	139.4	120	127.0						
The percentage of British Columbians (age 12+) who report that they are very satisfied with life	36.9%	43%	36.4%						
GOAL 1 – HEALTHY LIVING & HEALTHY COMMUNITIES									
The percentage of British Columbians (age 12+) who consume fruit and vegetables at least 5 times per day)	43.8%	55%	40.2%						
The percentage of British Columbians (age 12+) who are physically active or moderately active in their leisure time	59.3%	70%	62.9%						
The percentage of British Columbians (age 12+) who smoke	16.7%	10%	15.3%						
The percentage of BC students in grades 3, 4, 7, 10 and 12 who report that at school, they are learning how to stay healthy	51.0%	90%	44.3%						

	BASELINE*	2023 TARGET	CURRENT STATUS	OVERALL PROGRESS	ON TRACK TO TARGET?	PROGRESS: MALES	PROGRESS: FEMALES	SEX DISPARITY	REGIONAL DISPARITY**	
GOAL 2 – MATERNAL, CHILD & FAMILY HEALTH										
The rate of low weight singleton births (per 1,000)	40.5†	36†	43.2†	≈	✗	—	—	—		
The percentage of new mothers who report smoking during pregnancy	8.5%	4%	6.9%	✓	✓	N/A	✓	N/A		
The rate of hazardous drinking among women of reproductive age	15.5%	14%	16.6%	✗	✗	N/A	✗	N/A		
The percentage of children who are not vulnerable on any Early Development Instrument Dimensions	69.1%	79%	67.8%	✗	✗	—	—	—		
GOAL 3 – POSITIVE MENTAL HEALTH & PREVENTION OF SUBSTANCE HARMS										
The percentage of British Columbians (age 12+) who experience positive mental health	71.0%	80%	68.4%	✗	✗	≈	≈	♀♂		
The percentage of young BC children who are not vulnerable in terms of social development	85.5%	88%	84.3%	✗	✗	—	—	—		
The percentage of young BC children who are not vulnerable in terms of emotional development	86.2%	88%	83.9%	✗	✗	—	—	—		
Among BC students who use alcohol or cannabis, the percentage who first use before the age of 15	Alcohol	74.9%	60%	64.7%	✓	✓	✓	✓	♀♂	
	Cannabis	66.8%	55%	58.9%	✓	✓	✓	✓	♀♂	
The percentage of British Columbians (age 12+) who engage in hazardous drinking	15.8%	14%	16.5%	✗	✗	✗	✗	♀♂		
GOAL 4 – COMMUNICABLE DISEASE PREVENTION										
Immunization coverage rates up-to-date by second birthday in accordance with the routine childhood immunization schedule	71%	90%	70%	≈	✗	—	—	—		
The incidence of hepatitis C among repeat testers per year (per 1,000)	6.0	3	5.3	✓	✓	✓	✓	♀♂		
The percentage of newly diagnosed HIV cases with CD4 at diagnosis >500	44.7%	75%	47.3%	≈	✗	≈	✓	♀♂		
Condom use among sexually active adolescents	66.2%	76%	68.7%	≈	✗	≈	≈	♀♂		
The percentage of young women (ages 18-24) who have had a test for chlamydia in the previous year	34.7%	40%	32.5%	✓	✓	N/A	✓	N/A		
GOAL 5 – INJURY PREVENTION										
The age-standardized hospitalization rate for unintentional injuries (per 1,000)	7.7	6.2	7.9	≈	✗	≈	≈	♀♂		
The age-standardized mortality rate for unintentional injuries (per 100,000)	25.5	15	24.6	≈	✗	≈	≈	♀♂		
The age-standardized rate of fall-related hospitalizations for British Columbians age 75+ (per 1,000)	28.2	25	28.6	≈	✗	≈	≈	♀♂		

	BASELINE*	2023 TARGET	CURRENT STATUS	OVERALL PROGRESS	ON TRACK TO TARGET?	PROGRESS: MALES	PROGRESS: FEMALES	SEX DISPARITY	REGIONAL DISPARITY**
GOAL 6 – ENVIRONMENTAL HEALTH									
Shigatoxigenic <i>E. Coli</i> infection crude rate (per 100,000)	2.85 [†]	2.0 [†]	2.35 [†]	≈	✘	—	—	—	
Listeriosis crude rate (per 100,000)	0.35 [†]	0.2 [†]	0.30 [†]	✘	✘	—	—	—	
Salmonellosis crude rate (per 100,000)	23.4 [†]	19 [†]	26.5 [†]	✘	✘	—	—	—	
The percentage of households with municipal water supplies reporting that they boiled their drinking water during the previous 12 months in order to make it safe to drink	18%	14%	18%	≈	✘	N/A	N/A	N/A	—
The percentage of persons residing in licensed community care facilities rated as low risk, based on inspections by health authority licensing officers	TBD	TBD	N/A	—	—	—	—	—	—
GOAL 7 – PUBLIC HEALTH EMERGENCY MANAGEMENT									
The number of health authorities (including the First Nations Health Authority) with a pandemic influenza response plan that aligns with the Ministry plan	1	7	6	≈	✘	N/A	N/A	N/A	N/A
The number of health authorities (including the First Nations Health Authority) that have participated in an emergency exercise with a public health component in the last two years	5	7	7	✓	✓	N/A	N/A	N/A	N/A
HEALTH SURVEILLANCE									
Develop a plan to improve public health surveillance in BC	N/A	2014	N/A	✓	✓	N/A	N/A	N/A	N/A
Implement the public health surveillance plan for BC	N/A	2023	N/A	✓	✓	N/A	N/A	N/A	N/A

*The majority of baselines are set at approximately 2009-10, but range between 2007 and 2012.

**Regional disparity is based on disparities identified between the regional health authority areas in BC.

†Value is based on a three-year average.



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