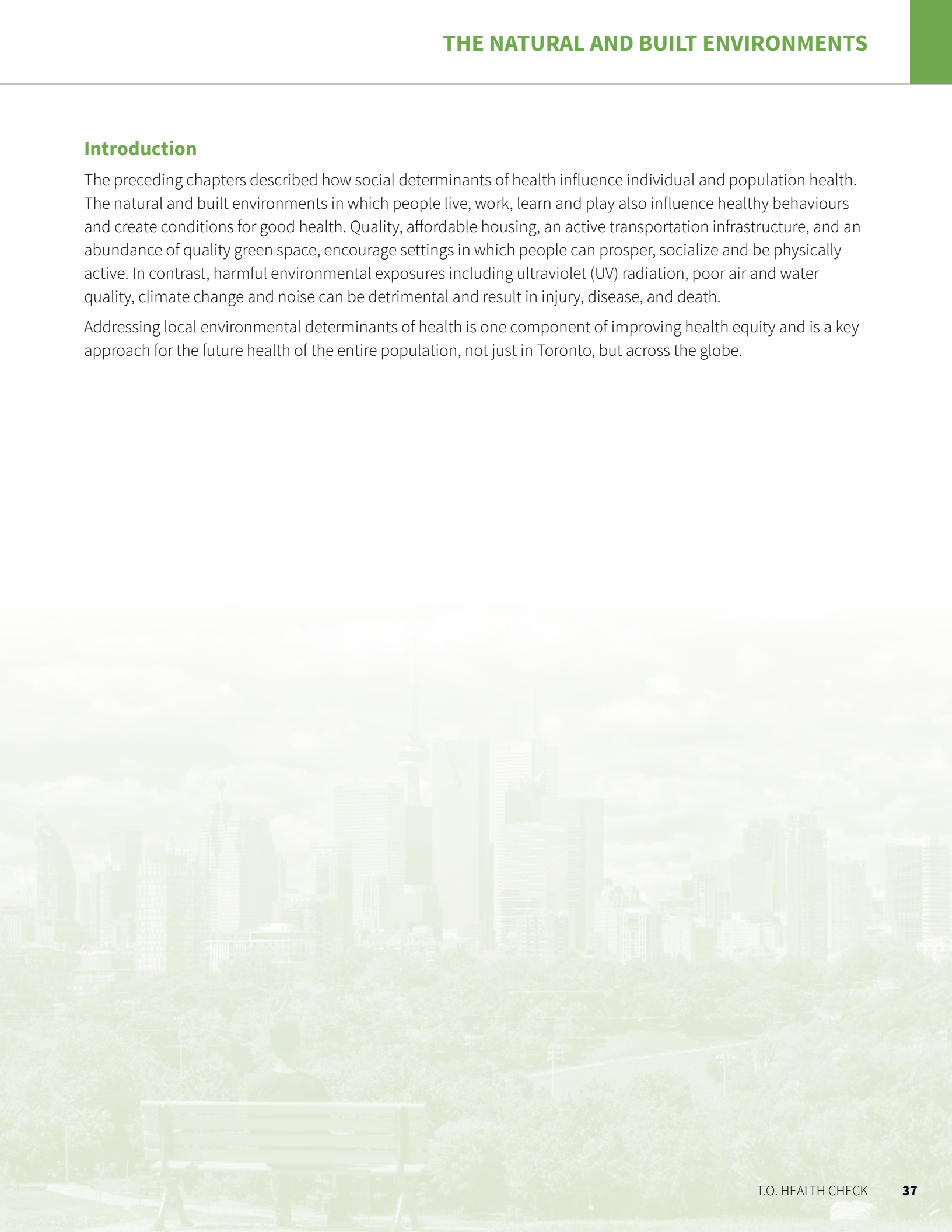
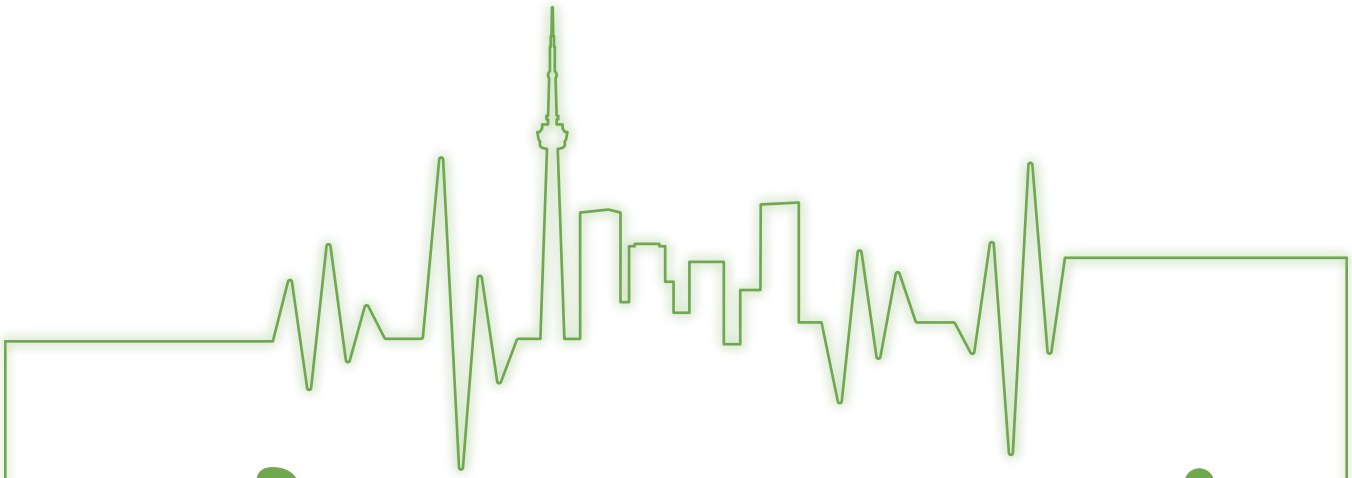
Introduction

The preceding chapters described how social determinants of health influence individual and population health. The natural and built environments in which people live, work, learn and play also influence healthy behaviours and create conditions for good health. Quality, affordable housing, an active transportation infrastructure, and an abundance of quality green space, encourage settings in which people can prosper, socialize and be physically active. In contrast, harmful environmental exposures including ultraviolet (UV) radiation, poor air and water quality, climate change and noise can be detrimental and result in injury, disease, and death.

Addressing local environmental determinants of health is one component of improving health equity and is a key approach for the future health of the entire population, not just in Toronto, but across the globe.





49% *of Torontonians* ***are using sustainable means such as walking, cycling or public transit*** *as their main mode of transportation*

p. 40

Air pollution from traffic and other sources contributes to about **1,300 premature deaths** and **3,550 hospitalizations** each year

p. 41

9 in **10** Toronto residents are **exposed to noise levels** that have the potential to harm health

p. 45

On average, **120 people die each year** due to extreme heat

p. 44

Approximately **37% of Toronto households** experienced housing affordability issues in 2016

p. 39

23% of Toronto households are not considered **adequate, affordable or suitable**

p. 39

Housing

Housing is one of the pathways through which social and economic inequities (e.g. income, employment, etc.) translate into health inequities [1]. Housing that is affordable, of good quality, and stable is imperative for promoting health and preventing illness [2] [3] [4]. Poor housing conditions (e.g. overcrowded, inadequate ventilation, mould, etc.) are associated with a wide range of health issues such as respiratory infections, chronic illnesses, injuries, stress, substance use, poorer mental health, and even premature death [3] [5]. Access to affordable and stable housing can lead to better physical and mental health outcomes by eliminating harmful exposures, reducing stress and allowing a greater sense of control and security [6]. It can also reduce the need for frequent moves, evictions, the risk of being homeless [4], and free up resources needed to acquire other basic necessities such as food and clothing [3] [6] [7]. A 2018 study indicated that Toronto food bank clients, on average, paid 68% of their income on rent and utilities, with rent being the most commonly cited reason for skipping meals [8].

Housing Affordability and Conditions

Affordable housing is a known problem in Toronto with rents increasing faster than income and the cost of buying a home out of reach for many. Affordability is the most common reason for households being in Core Housing Need as described further below.

In Toronto, in 2016:

- 37% of households were spending 30%[1] or more of their average monthly total income on shelter costs[2].
- 12% of households were considered not suitable, that is, the dwelling did not have enough bedrooms for the size and composition of the household.
- 7% of dwellings needed major repairs including repairs to defective plumbing or electrical wiring, and structural repairs to walls, floors or ceilings.

Core Housing Need

Core Housing Need is an indicator used in Canada to identify households that are not living in or able to access acceptable housing. It describes households living in dwellings that are considered inadequate in condition, not suitable in size, and unaffordable [9].

In Toronto:

- 240,780 households (23%) were categorized as being in Core Housing Need in 2016, meaning that its housing fell below at least one of the standards for adequacy, affordability or suitability, and 30% or more of its total before-tax income would be required to pay the median rent of alternative local housing that is acceptable[3]. This is largely unchanged from 2006 (24%).

In 2010, rates of Core Housing Need varied among household types including female lone-parent households (41%), female seniors (aged 65 years and over) living alone (38%), immigrants (25%), particularly recent immigrants (40%) and non-permanent residents (34%) [4]. The rate among Indigenous people was 28%.

[1] The shelter-cost-to-income ratio threshold (30%) to measure housing affordability has been used in Canada since the 1980s. Although used commonly, some claim that the 30% cut-off is arbitrary and not empirically derived [46] [47].

[2] The 2016 Census defines shelter costs as the average of the total expenses related to the dwelling, paid by households. For owner-occupied dwellings, shelter costs are referred to as owner's major payments and include where applicable, mortgage payments, property taxes and condominium fees, along with the costs of electricity, heat, water and other municipal services. For renter-occupied dwellings, shelter costs are referred to as gross rent and include where applicable, the rent and the costs of electricity, heat, water and other municipal services.

[3] According to the Canada Mortgage and Housing Corporation, a household is in Core Housing Need if its housing 1) falls below at least one of the adequacy, affordability or suitability standards, and 2) requires 30% or more of its total before-tax income to pay the median rent of alternative local housing that meets all three standards. A household is not in core housing need if its housing meets all three standards OR if its housing does not meet one or more of these standards, but has sufficient income for alternative local housing that does meet all three standards. See Appendix 3 for more details.

COMPARING TO The proportion of dwellings in Core Housing Need was higher in Toronto than in other major Canadian cities such as Vancouver (20%) and Ottawa (13%) in 2016.

Transportation

Active transportation, including walking and cycling, has a number of health benefits. People who use active transportation have a lower risk of obesity, diabetes, heart disease, stroke, and cancer. Active transportation also has positive impacts on mental health conditions including anxiety and depression. Reducing motor vehicle trips through active and other sustainable methods including public transit and carpooling, results in lower levels of air pollution, greenhouse gases, noise and traffic congestion which indirectly improves health. On the other hand, pedestrians and cyclists face higher risks of injuries and death from collisions when compared to people travelling in cars or using public transit. Overall, the health benefits of walking and cycling outweigh the safety risks [10]. Sidewalks and bike lanes help to promote these forms of active transportation.

Active and Other Transportation Methods

In Toronto:

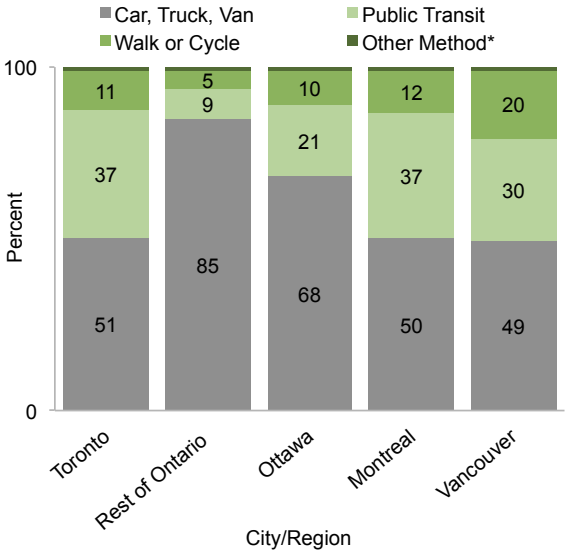
- 11% of individuals aged 15 years and over used a form of active transportation such as walking or cycling, as their main mode of commuting in 2016. 37% used public transit.
- 62% of adults (aged 18 and over) used an active means of transportation in the preceding 7 days in 2015/16.
- 44% of students in grade 7 to 12 used active transportation to and/or from school in 2014.
- Active transportation rates were lower for secondary grade students (38%), compared to grade 7/8 students (57%), and for female students (40%), compared to males (47%).

More information on premature death and hospitalization resulting from traffic-related air pollution is included in the Air Quality section of this chapter. Information on road traffic injuries and deaths is included in Chapter 10. Physical activity information is included in Chapter 11.

DATA GAP Data on the active transportation practices of children and youth in Toronto and Ontario are limited to infrequent local surveys that are not comparable between health regions or over time.

COMPARING TO Active transportation as the primary mode of commuting was higher in Toronto (11%) compared to the rest of Ontario (5%), and similar to Ottawa (10%) and Montreal (12%). Vancouver's rate however, was almost twice as high (20%) (Figure 3.1).

Figure 3.1: Percent of Respondents 15 and over by Primary Method of Commuting, Toronto, Rest of Ontario, Ottawa, Montreal, and Vancouver, 2016



* Values for each city/region equal 1%.
Data Source: Statistics Canada, Census of Population, 2016

Sidewalks and Bicycle Lanes

In Toronto:

- 24% of streets did not have sidewalks in 2014 [11].
- 587 lane kilometers of on-street cycling infrastructure existed in 2018. The type of bike lane (eg. lanes that are physically separated from traffic, designated by painted lines on the roadway, or shared with the roadway i.e. "sharrows", etc.) and their connectivity are important considerations for bike lane usage and safety [12].
- 660 lane kilometers of multi-use, off road trails existed in 2018 including rail trails, hydro corridor trails, boulevard trails, and major parks trails [13].

Ultraviolet Radiation Exposure and Sun Safety

Exposure to ultraviolet (UV) radiation is a major risk factor for most skin cancers. Sunlight is the main source of UV rays. Tanning lamps and beds are also sources of UV rays [14]. Extensive exposure to the sun during childhood is an important risk factor for developing melanoma later in life [15]. Skin protection includes seeking shade, wearing clothing and a hat that cover as much skin as possible, and using a broad spectrum and water-resistant sunscreen with a sun protection factor (SPF) of at least 30, on exposed skin. Using UV tanning equipment or deliberately trying to get a tan should be avoided [16]. In Ontario, the Skin Cancer Prevention Act (Tanning Beds), 2013, bans the use of tanning beds by youth under 18 years of age [17].

Among Toronto adults (aged 18 and over), in 2015/16:

- 25% reported experiencing a sunburn on their body in the past 12 months.
- 24% always or often used sunscreen with SPF 30 or higher on their face and body when they were in the sun for 30 minutes or more in the summer.
- 46% reported that they often or always sought shade when they were in the sun for 30 minutes or more in the summer.

In contrast to adults:

- 82% of Toronto students in grades 7 to 12 reported in 2014 that they sought shade always or most of the time, when they were outdoors from June to September.

Air Quality

Air pollution causes cardiovascular and respiratory health problems, affects birth outcomes, brain development and function, and is linked to cancer, chronic diseases, including diabetes, and other illnesses [18], with the most severe outcomes measured as premature deaths and hospitalizations. While Toronto's air quality has improved over the past decade, more efforts are needed to reduce emissions that are harmful to health[4]. Over half of Toronto's air pollution is emitted within the city's boundaries. Major contributors include industrial, commercial, and residential sources, traffic, and off-road mobile sources such as air, rail, and marine. Of these, traffic has the strongest impact on health.

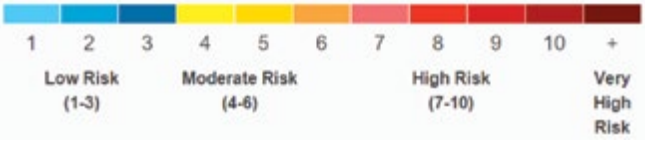
In Toronto:

- In 2014 it was estimated that 1,300 premature deaths and 3,550 hospitalizations occurred each year with air pollution from all sources as a contributing factor [19].
- In 2014 it was estimated that 280 premature deaths and 1,090 hospitalizations occurred each year with traffic-related pollution as a contributing factor [19]. These deaths account for about 20% of all premature deaths and 30% of all hospitalizations due to air pollution.

[4] TransformTO, Toronto's climate action strategy, is aimed at reducing local greenhouse gas emissions and improving the health, economy, and social equity of the city. The strategy includes the following greenhouse gas reduction targets, based on 1990 levels: 30% by 2020, 65% by 2030, and 80% by 2050.

- 35% of residential land was located within 100 metres of a major arterial road[5], within 150 metres of a highway[6] with annual average daily traffic (AADT) of more than 50,000 vehicles, or within 500 metres of a highway in 2017 [20].
- The Air Quality Health Index (AQHI) (Figure 3.2) at the downtown station[7] ranged from 1 (low risk) to 7 (high risk), with an average reading of 2.9 in 2017.
- Climate models suggest there will be more hot days in the future than are currently experienced in the city. This may create conditions for increasing amounts of secondary pollutants such as ozone [21].

Figure 3.2: Air Quality Health Index Scale



DATA GAP

Indoor air quality also affects health. There are many factors affecting indoor air quality including the use of synthetic materials in new construction, asbestos in older buildings, combustion products from cooking, and second-hand smoke, which can also pose health risks [22]. Future research should consider identifying or collecting data on indoor air quality so that its impact on the health of Toronto residents can be better evaluated.

More information on air quality, greenhouse gases and climate change is included in the climate change section of this chapter.

Water Quality

Toronto has high quality drinking water that conforms to Ontario's strictly regulated drinking water quality standards. However, residential homes built before the mid-1950s may have water service pipes containing lead. As well, some homes may have leaded faucets, valves and solder used to connect pipes prior to 1990. Over time, corrosion causes the release of lead into drinking water [23].

This is an ongoing public health concern since lead in drinking water can affect brain and nervous system development. Those at greatest risk include pregnant women, infants, and children under the age of six [24]. In 2014, the City of Toronto initiated the addition of phosphate to drinking water at all four water treatment plants. Phosphate forms a protective coating inside pipes and household plumbing fixtures, which reduces the potential for lead to leach into drinking water [25].

Drinking Water

In Toronto:

- There are approximately 437,000 residential water service pipes. The estimated number of lead service pipes decreased from approximately 65,000 (15%) in 2007 to 30,169 (7%) in 2017 [26].
- The proportion of lead levels for homes and businesses not meeting the Ontario Drinking Water Quality Standard of 10 parts per billion (ppb) has decreased over time. In 2008, 52% of the 100 homes and businesses tested had high lead levels in their water, compared to 2% of the 55 homes and businesses tested in 2017 [27].

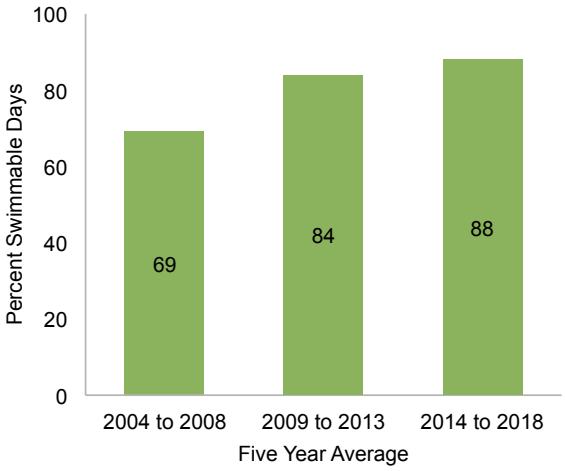
[5] A major arterial road has daily traffic typically over 20,000 vehicles in both directions and a legal speed limit of 50 to 60 km/h.
[6] A highway has daily traffic typically over 40,000 vehicles in both directions and a legal speed limit of 80 to 100 km/h.
[7] Located at Bay St. and Wellesley St. W.

Beach Water

Water also impacts health when it is enjoyed for recreational purposes such as swimming at beaches. High *E. coli* levels indicate increased risk of gastrointestinal infections for bathers, especially children, the elderly, and individuals with weakened immune systems. The City of Toronto monitors Toronto's eleven public beaches from June to Labour Day each year and notifies the public when high levels of E. coli are detected in water samples. When the *E. coli* count exceeds the provincial standard of 100 *E. coli* per 100 millilitres of water, the City posts the affected beaches as unsafe for swimming and other related recreational activities.

- Beach water quality in Toronto's eleven beaches has improved over time. During the five-year period from 2004 to 2008, 69% of potential days were deemed "swimmable beach days", on average, compared with an average of 88% swimmable beach days during 2014 to 2018 (Figure 3.3). This is largely a result of improved infrastructure including the elimination of combined sewer overflows at the Eastern and Western Beaches and beach maintenance measures [28].
- It is predicted that rainfall in Toronto will increase in the future as a result of climate change, thus potentially impacting the quality of beach water [29].

Figure 3.3: Percent Swimmable Beach Days, Toronto, 2004 to 2008, 2009 to 2013, 2014 to 2018



Data Source: Toronto Public Health

Climate Change

Climate change results from accumulating greenhouse gases in the Earth's environment and can create extreme weather patterns including heat waves and heavy rainfall that alter the natural and built environments. The impacts of climate change include contaminated water and food, mould growth, and injury and death due to extreme weather events [30]. Changes in vectorborne diseases also result from climate change, which contributes to the burden of infectious diseases [31]. These diseases are sensitive in various ways to weather and climate conditions, ongoing trends of extremes in temperature and precipitation, and more variable weather overall, and threaten to undermine recent global progress against these diseases [32].

While the effects of climate change are global in nature, they are particularly relevant to an urban area like Toronto and a key driver for change in the built environment.

Greenhouse Gases

In Toronto:

- Greenhouse gas emissions decreased from 195,040 tonnes of carbon dioxide (CO_2) in 2012 to 142,937 tonnes in 2016.
- Compared to 1990, greenhouse gas emissions were 33% lower in 2016 [33]. As such, the 2020 target of a 30% reduction in emissions from 1990 levels is projected to be met.
- The 2030 target is a 65% reduction in emissions from 1990 levels.

High Temperatures

Rising temperatures can result in heat waves, vectorborne disease, and food insecurity. These are some of the expected impacts on public health that are expected if temperatures continue to rise. "Trends in climate change impacts, exposures, and vulnerabilities show an unacceptably high level of risk for the current and future health of populations across the world" [34].

In Toronto:

- It has been estimated that extreme heat contributes to an average of 120 premature deaths per year and that this figure could continue to increase with climate change [35].
- The daily maximum temperature in the summer months (June to August) has increased from an average of less than 24 degrees Celsius in 1840, to 26.5 degrees in 2017 [36], suggesting that people are more likely to be exposed to temperatures that are hazardous to their health.
- The average annual temperature is forecast to rise by 4.4 degrees Celsius during the period from 2040 to 2049, compared to the period from 2000 to 2009 [37].

More information on the effect of climate change on air quality and recreational (beach) water quality is included in the corresponding sections of this chapter.

Vectorborne Diseases

West Nile virus (WNv) and Lyme disease are two important vectorborne diseases, both of which are endemic in Toronto.

In Toronto:

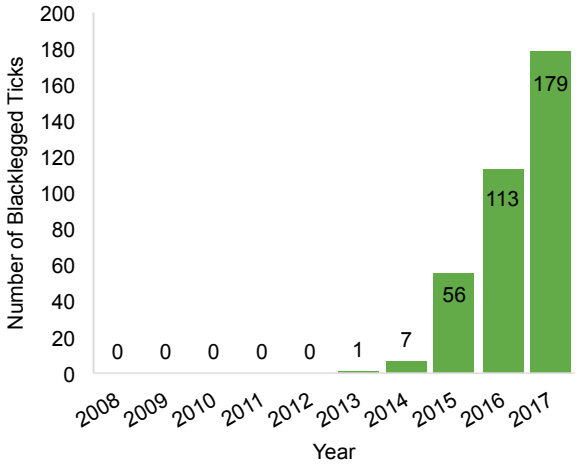
- WNv was first detected in birds in 2001.
- The first human WNv cases were reported in 2002.
- Since the early 2000's, WNv activity has varied widely from year to year; some of this variation is believed to be related to temperature and precipitation patterns [38].

The prevalence of Lyme disease is associated with the presence of its vector, the blacklegged tick. The risk of Lyme disease is predicted to increase in Ontario. This predicted increase is related to rising summer temperatures, shorter winters, ecological changes, increased human exposure, and faster maturation cycles for pathogens [39].

In Toronto, in 2017:

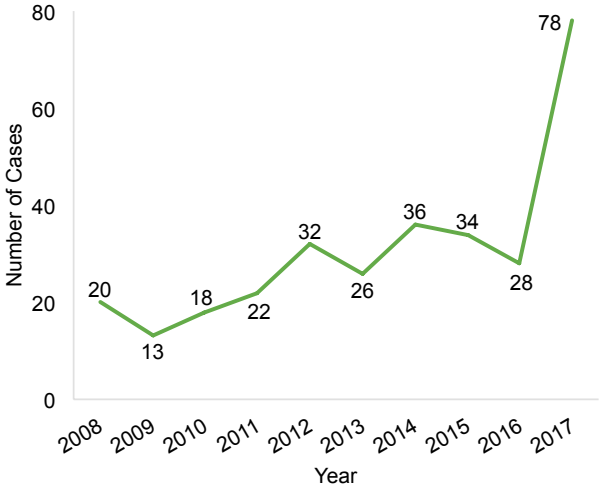
- The number of identified blacklegged ticks increased from one in 2013, to 179 in 2017 (Figure 3.4).
- The number of reported Lyme disease cases increased from 20 in 2008, to 78 in 2017 (Figure 3.5).

Figure 3.4: Number of Blacklegged Ticks, Toronto, 2008 to 2017



Data Source: Toronto Public Health
Blacklegged Tick surveillance commenced in 2013.

Figure 3.5: Number of Reported Lyme Disease Cases, Toronto, 2008 to 2017



Data Source: Integrated Public Health Information System (iPHIS)
Data extracted: June 2018

More Information on vectorborne disease is included in Chapter 9.

Green Space and Tree Cover

Green space includes natural and landscaped areas such as parks, trails, backyards, golf courses, and ravines. The presence and use of green space promotes physical activity and improves health and wellbeing. Green space is associated with reduced mortality, obesity, depression, anxiety, cardiovascular disease and improved birth outcomes. It provides places for stress reduction, mental restoration and social interactions [40]. Green space also helps to improve air and water quality, buffer noise, reduce the urban heat island effect and mitigate extreme weather events. Trees have been found to increase the health benefits of green spaces, and reduce health inequities [41].

In Toronto:

- The tree canopy was estimated in 2008[8], to be between 27 and 28%, representing 10.2 million trees [42]. The ideal proportion is 40% which represents the City's goal
- 13% of the city was considered green space in 2015 [42]. This represents approximately 30 square metres of green space per person.
- Trees and green space are not evenly distributed however, the vast majority of residents live within 500 metres of parkland [40]. The health benefits of green space increase when it is in close proximity (less than 1 km) to residential areas.

Environmental Noise

Environmental noise, such as that produced by traffic, can negatively affect health and contribute to sleep disturbances [43]. The World Health Organization has recommended that outdoor noise levels be kept at 55 A-weighted decibels (dBA) during the day (7 am to 7 pm) and evening (7 pm to 11 pm), and 40 dBA at night (11 pm to 7 am) to protect people's health. The 55 dBA target was suggested as an interim target as 40 dBA can be difficult to achieve especially in urban environments [44].

In Toronto, in 2016:

- Noise measurements estimated that 89% of the residential population was exposed to noise levels higher than 55 dBA during the day, while 43% were exposed to these levels at night [43], suggesting that a substantial proportion of people are exposed to noise levels that may negatively impact their health.
- Nearly 60% of noise was attributed to traffic.

HEALTH INEQUITIES

Areas in the lowest income group are estimated to be eleven times more likely to have 50 percent of their residents exposed to night noise levels above 55 dBA, than residents in the highest income group [43].

[8] An update including 2018 data is expected to be released in fall, 2019.

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