

HANDBOOK

A Toolkit for Local Electeds Climate Action

Vector Borne Diseases

A part of [The Adaptation Handbook](#)



Stay tuned for the up-to-date version of this resource!

This document is undergoing fact checks and updates... you will be able to access the new version in September 2025.

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Introduction

Our warming climate facilitates the spread of vectors into new regions, and extends the transmission season, increasing the risk of human exposure to these diseases. As a result, public health officials are increasingly concerned about the growing threat vector-borne diseases pose in a changing climate. Local governments can play a crucial role in protecting citizens by implementing targeted surveillance, public education campaigns, and preventive measures. These efforts are essential for early detection and control of outbreaks, ultimately helping to safeguard communities from the escalating threat of vector-borne diseases due to climate change.

[Vector-borne diseases](#) are caused by viruses, bacteria, or parasites transmitted to humans from animals or insects. They originate in animals and must be transmitted through a “vector” (e.g., mosquito, tick) to infect a human.

Two major vector-borne illnesses in Canada are [West Nile virus](#) and [Lyme disease](#). The incidence of West Nile virus and Lyme disease are expected to increase as the geographic ranges of their respective vectors expand, a consequence of climate change.

These two vector-borne diseases, among others, pose mounting threats to Canadians. For instance, during the past decade, the number of cases of Lyme disease has seen [a rapid increase](#) from 144 identified cases in 2009 to more than 3,100 cases in 2021 across Canada. Among all provinces and territories, Ontario suffers significantly more than the rest, with [1,704 cases](#) out of 3147 across Canada in 2021, followed by Quebec, which only recorded 709 cases.

People are more prone to suffer from these vector-borne diseases in months without snow cover, such as in summer when ticks are most active, and people spend more

time in outdoor settings. However, with climate change [Canada is experiencing warmer winters](#), which means that ticks and other vectors are more active throughout the year than before.

Local government jurisdiction

- The Public Health Agency of Canada [recommended](#) that public health could address the health impacts of climate change through activities that align with its core functions, including:
 - **Health promotion:** Promoting healthy policies across sectors, such as advocating for and supporting active transportation initiatives.
 - **Health protection and disease prevention:** Helping communities reduce health impacts, for example, the recently released Wildfire Smoke Response Strategy.
 - **Population health assessment:** Understanding health risks and future impacts, as was done in [Toronto's Population Health Profile: Insight on the Health of Our City \(2023\)](#).
 - Health Surveillance: Collecting data to track and monitor changes in diseases and their related environmental conditions, for example, the West Nile surveillance and reporting program and
 - Emergency preparedness and responses: Preparing for and responding to extreme weather events, for example, serving as a partner and collaborator on the City of Toronto's Heat Relief Strategy.
- Provincial governments have adopted **legislation requiring the development of comprehensive action plans and frameworks** for managing vector-borne diseases. This means that local governments have the legal foundation and support to develop corresponding programmes in their electorates per the provincial laws.
 - Ontario, for instance, has established the [Provincial Framework and Action Plan concerning the Vector-Borne and Zoonotic Diseases Act](#), which mandates the establishment of surveillance programs, the creation of educational materials, and the promotion of research into vector-borne and zoonotic diseases.
- Municipalities suffer from vector-borne diseases to varying extents, and they, therefore, can choose their own strategies to deal with the problem accordingly.
 - From the statistics, we can see that Ontario suffers a lot from Lyme disease, but provinces like Yukon, Nunavut, and Northwest Territories are still free from such diseases at this stage. Furthermore, although Ontario has three times the population of British Columbia, it has 100

times the cases of British Columbia, which means that the severity is not proportional to population. As a result, it is unrealistic to have a federal universal plan for vector-borne diseases, and local governments and municipalities are better placed to deal with the challenge.

Best Practices

- From the [*Assessing and Mitigating Municipal Climate Risks and Vulnerabilities in York Region, Ontario*](#) report, local municipalities generally perceive **a lack of climate science and information** as a barrier to initiating risk assessment and adaptation planning information. Therefore, **third-party assistance can be beneficial**, such as help from external organisations, interdepartmental cooperation, or higher levels of government.
- With the impacts of climate change and increased temperature, vector-borne diseases, such as Lyme disease and West Nile Virus, are increasingly impacting Canadians. While adaptation measures are essential, it is also critical that emissions are reduced.
- Vector-borne disease adaptation for municipalities, on the other hand, can be exemplified through the following measures:
 - **Surveillance and Monitoring**
 - **Public Education and Outreach**
 - **Vector Control Programs**
 - **Infrastructure Management**
 - **Collaboration and Coordination**
 - **Policy Development**
 - **Emergency Response Planning**

Pushback and Responses

1. Why prioritize vector-borne diseases when there are other urgent health issues?

While there are multiple pressing health issues, vector-borne diseases are emerging as a significant threat due to climate change, affecting more people each year. Effective control measures can prevent these diseases from becoming a larger public health crisis, saving resources in the long term.

2. Are vector control measures cost-effective?

Yes, prevention and early intervention strategies are generally cost-effective. For example, mosquito control programs can prevent outbreaks of diseases

like West Nile virus, which would otherwise result in higher healthcare costs and economic disruption.

3. What impact do pesticides have on the environment?

It's important to use integrated pest management approaches that minimize environmental impact. This includes biological controls and targeted pesticide use only when necessary, alongside public education to reduce breeding sites.

4. How can we justify spending on vector control when budgets are tight?

Investing in vector control is a proactive measure that can reduce future healthcare costs and protect our community's health. Additionally, many vector control strategies, such as community clean-ups and public education, are not excessively costly but highly beneficial.

5. Is there evidence that climate change is impacting vector-borne diseases in our area?

Yes, [studies](#) have shown that warmer temperatures extend the breeding season of vectors like mosquitoes and ticks, increasing the risk of diseases such as Lyme disease and West Nile virus. Monitoring and adapting to these changes is crucial for public health.

Possible Initiatives

***Resource expertise level:**  Green = beginner  Blue = intermediate
 Black = advanced  Double black = expert

****Climate Caucus has ranked the following initiatives from beginner to expert, based on Complexity to implement, Staff time & expertise, and Political capital. Please note, these rankings are our own best judgements.*

Monitor Vector Prevalence

The basics:

- Local governments can oversee surveillance programs to monitor vector populations and disease prevalence.
- They may collaborate with public health agencies and environmental organisations to collect data on vectors and the incidence of associated diseases.

Examples:

- [Blacklegged Tick Surveillance](#), City of Toronto
 - The City of Toronto has constructed and maintained an active tick surveillance map.
 - With help from the National Microbiology Laboratory, Toronto Public Health has identified a list of locations where black-legged ticks are known to establish habitats. Toronto has now focused on tick-dragging efforts outside of known risk areas.
- [Vector-Borne Diseases Surveillance and Protection Plan](#), North Bay Parry Sound District Health Unit
 - This plan outlines the surveillance plan in North Bay Parry Sound District, which includes not just Lyme disease and West Nile Virus, but also Eastern Equine Encephalitis virus (EEEV) and vectors such as Larval Mosquito.
- [Vector-borne Disease Control Program – Surveillance](#), Regional Municipality of Durham Health Protection
 - The surveillance part of the report includes several components, such as Adult Mosquito Surveillance, Larval Mosquito Surveillance, Tick Surveillance, Human Case Surveillance, and Complaint Response. The programme's scope is very comprehensive as it constitutes surveillance on both vectors and identified cases. Furthermore, realising the limit of relying solely on the government and health unit, the programme also features complaint response where residents are encouraged to submit complaints regarding both public and privately-owned (commercial and residential) stagnant water sites, which are believed to be ideal habitats for vectors.

Educate the Public

The basics:

- Local governments can educate the public about vector-borne diseases and their prevention.
 - This includes disseminating information about symptoms, risk factors, and strategies for avoiding exposure to vectors. They may also conduct outreach campaigns to raise awareness about the connection between climate change and the spread of vector-borne diseases.
- It must also be noted that municipalities should provide such education programmes in languages other than English and French to reach as many communities as possible.
 - Municipalities should make their own decisions according to the local demographics. A good example from the [City of Ottawa](#) can be found below, where languages such as Arabic, Punjabi, Chinese, Spanish, and more are also available in addition to English and French.

Examples:

- [Lyme Disease](#), City of Toronto – Provides information on Lyme Diseases and advice on disease prevention.
- [Reducing the Risk of West Nile Virus](#), City of Toronto – Public education on West Nile Virus.
- [Lyme Disease](#), City of Ottawa
- [Lyme Disease Fact Sheet](#), City of Ottawa
- [Communication / Public Education](#), Regional Municipality of Durham
- [Indigenous Climate Health Action Program](#), First Nations Health Authority
- [Insect and Animal Diseases](#), Region of Waterloo
 - Public education regarding prevention and personal protection through websites, social media, and media briefings
- [Tick Bite Prevention](#), Lunenburg Lyme Association, District of Lunenburg, Nova Scotia
- [Fight the Bite](#), York Region
 - York region has a set of activities included in the larger “Fight the Bite” campaign. Strategies include media releases and interviews for protection measures and surveillance findings, social media and YouTube educational videos on Lyme disease, black-legged ticks and personal protection, and posting permanent “Fight the Bite!” tick signs in risk area trailheads.

◆ Establish Vector Control Programs

The basics:

- Local governments may implement vector control measures to reduce populations of disease-carrying vectors

Examples:

- [West Nile Virus Mosquito Fogging Program 2023](#), City of Winnipeg
 - The City of Winnipeg controls adult mosquitoes by fogging campaigns. Fogging is the application of an insecticide to an area to reduce adult mosquito populations
- [Monitoring and Treatment of Roadside Catch Basins](#), Regional Municipality of Durham
 - Usually, a licensed PCO will conduct three rounds of catch basin larvicide in the Durham Region, with the first treatment round beginning in early to mid-June and subsequent treatment rounds occurring in July and August.
- [Bait Stations Installation in Municipality](#), District of Lunenburg
 - The bait station program will see bait stations set up in a controlled area of the county, designed to attract and treat deer to reduce or eliminate the population of black-legged ticks.

◆ Improve and Manage Infrastructure

The basics:

- Local governments may invest in infrastructure improvements to mitigate the impact of climate change on vector-borne diseases. This could include upgrades to sewage systems, stormwater management infrastructure, and urban planning measures to reduce mosquito breeding habitats.

Examples:

- [Standing water by-laws and infrastructure](#), Region of Waterloo
 - As part of the health promotion standard for local public health units, the government has adopted policies for cleaning standing water sites in the region and promoting stormwater infrastructure.
- [Monitoring and Treatment of Standing Water Sites](#), Region of Durham
 - Durham Region Health Department routinely monitors chronic Standing Water sites, including municipal-owned SWMPs, ditches, field pools, etc.
- [Mosquito Surveillance, Control and Standing Water](#), Middlesex-London Health Unit
 - About 250 standing water sites located on public property in Middlesex-London are monitored seasonally on a weekly basis by Health Unit staff. Young mosquitos are collected from these water sites and identified in the laboratory to verify whether they carry vector-borne diseases.

- [Standing water complaints investigation](#), York Region.
 - The region proactively responds to complaints regarding standing water in the region and conducts larviciding, stormwater management ponds, and sewage lagoons in the summer months.

Collaborate with Stakeholders

The basics:

- Local governments can work closely with stakeholders to coordinate efforts to address vector-borne diseases. Collaboration ensures a unified approach and maximizes the effectiveness of interventions.

Examples:

- [Cooperation between the Municipality of Lunenburg the National Microbiology Laboratory and the Public Health Agency of Canada](#), District of Lunenburg
 - The municipality funded an innovative bait station research project in Garden Lots and Blue Rocks in partnership with Dr. Robbin Lindsay of the National Microbiology Laboratory and the Public Health Agency of Canada on this research project, which finished in 2021.
- [Communication with Health Care Providers](#), The Haliburton, Kawartha, Pine Ridge District Health Unit (HKPR District Health Unit)
 - HKPRDHU maintains constant communication regarding VBDs with health care providers in the region to help ensure timely diagnosis and treatment for patients.
 - In addition, HKPRDHU also seeks to strengthen relationships with veterinarians who test ticks on animals and get faster results, to enhance their surveillance data.
- [Collaborators with local employers with outdoor workers](#), Region of Waterloo
 - Municipalities in the Region of Waterloo collaborated with local employers and outdoor workers to support staff members with appropriate risk messaging and resources to reduce occupational exposures.
 - The Health Unit also collaborates with each municipality through official planning processes, which eventually direct enforcement for the elimination of standing water in the region.

Develop Policy Framework

The basics:

- Local governments develop policies and regulations related to vector control and public health. These policies may include guidelines for land use planning, and environmental management practices to minimize the risk of vector-borne diseases.

Examples:

- [Agreement between Health Department and Municipality on Stagnant Water](#), Regional Municipality of Durham
 - As per the agreement between DRHD and local municipal by-law enforcement officers, outlined in the Notice of Required Action (distributed annually to municipalities), municipal staff are the first to respond to investigate stagnant water complaints on private property.
- [Climate Change and Health Vulnerability Assessment](#), Region of Waterloo
 - The assessment outlines policies that the region of Waterloo recommends public health units within the region to adopt to improve adaptive capacity to Vector-borne and Zoonotic Diseases.
- [Plan for Addressing Vector-borne Diseases](#), City of Toronto
 - Toronto has a detailed plan addressing vector-borne diseases like West Nile Virus and Lyme disease. The plan involves active surveillance of mosquitoes and ticks, public education initiatives, and coordination with healthcare providers to ensure early detection and rapid response to outbreaks. This comprehensive approach helps protect residents and manage the risks associated with vector-borne diseases effectively.

Additional Resources

Did you know Climate Caucus offers an “Ask Us Anything” service for elected officials in the network?

You could ask questions like “can you help me find this resource?” “Do you know of funding for X?” “Do you have examples of X policy

- [Vector-borne diseases in Canada](#), Canada Communicable Disease Report (CCDR)[Lyme Disease](#), Public Health Ontario
- [West Nile Virus](#), Public Health Ontario
- [Ontario Blacklegged Tick Established Risk Areas 2024](#), Public Health Ontario
- [Increased risk of endemic mosquito-borne diseases with climate change](#), Canada Communicable Disease Report (CCDR)
- [West Nile Virus Information for Municipalities](#), Province of Manitoba
- [A report on Lyme Disease Epidemiology and Surveillance in Nova Scotia](#), Province of Nova Scotia
- [Provincial Framework and Action Plan concerning Emerging Vector-Borne Diseases Act, 2015](#), Legislative Assembly of Ontario
- [What to expect with climate change?](#) Canada Communicable Disease Report (CCDR)
- [West Nile Virus Preparedness and Prevention Plan](#), Ontario Ministry of Health, 2023

Climate Caucus Resources:

[Climate Caucus Municipal Grants List](#) - detailed list of relevant municipal grants

[Policies and Resources Library](#) - list of motions, bylaws, council reports and briefing notes