Vector-borne disease, cities, and climate change

Case scenario
While in the office reviewing your mail you see an invitation from the local public health department to attend a town hall meeting to discuss mosquito- and tick-borne illnesses, climate change, and your neighbourhood. It notes that although West Nile virus has been at low levels the past few years, it is episodic by nature and could return to higher levels. In contrast, ticks that carry Lyme disease have been moving north, and cases of Lyme disease have been increasing steadily. Your health department reports that there have been laboratory-confirmed cases of Lyme disease in your city for a few years now that are not linked to travel. You decide to attend the meeting and find out more.

Evidence
The World Health Organization recently identified the mosquito as one of the deadliest animals in the world. Most years, mosquitoes cause more deaths than murder, war, and wild animal attacks combined. In 2015, malaria alone caused almost half a million deaths (especially in children), and the worldwide incidence of dengue has risen 30-fold in the past 30 years. Zika, dengue, chikungunya, and yellow fever are all transmitted to humans by the Aedes aegypti mosquito. More than half the world’s population lives where this mosquito species is present. Although Canada does not currently have A aegypti mosquitoes, they are present in many favourite travel destinations. The Centers for Disease Control and Prevention estimates that the range of the A aegypti mosquito includes much of the southern United States, and the related Aedes albopictus mosquito has an estimated range that includes most of the Eastern Seaboard including much of New York State, New Hampshire, and Vermont. The main mosquito-borne illness in Canada is West Nile virus, but because of the deadlier diseases that mosquitoes carry in many countries, they can no longer be seen as insignificant pests. Lyme disease is not everywhere in Canada, but inroads have been made by ticks in southern British Columbia, Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia. And where the ticks are, Lyme disease soon follows.

One of the trends in urban planning in Canada and around the world is to increase urban density near public transit, increase green space, and have more cycling and walking paths. This is done to prevent urban sprawl, minimize pollution, encourage physical activity (to prevent obesity and diabetes), minimize the “heat island effect,” and preserve the natural environment. It is possible, however, that these efforts might not only inadvertently enhance the survival of ticks and mosquitoes but also increase our exposure to them and vector-borne diseases like West Nile virus and Lyme disease. Further, ticks and mosquitoes generally thrive with increased rainfall and rising temperatures—both of which are associated with climate change.

Dr Nicholas Ogden summed up the situation by noting, “Climate change is likely to drive the emergence and re-emergence of vector-borne diseases in Canada. However, the degree to which the Canadian public will be at risk from these diseases will be determined, at least in part, by how we design, build, and manage urban and suburban environments.” That is where the neighbourhood comes in. Local assessment is needed to minimize mosquitoes by, for example, preventing stagnant water, and to minimize ticks by landscape design and maintenance and strategic pesticide use.

Bottom line
Risk of increasing vector-borne diseases in cities from the new urban and suburban landscape and climate change is an emerging issue, so stay tuned. In the meantime, FPs can help people realize that mosquitoes and ticks are no longer mere nuisances. When out in green spaces, protective measures such as long sleeves and pants, DEET-containing insect repellents, and tick checks need to become routine practices—especially when traveling.

References