

# Bed Bugs and Public Health: New Approaches for an Old Scourge

Mona Shum, MSc,<sup>1</sup> Elizabeth Comack, PhD,<sup>2</sup> D. Taz Stuart, MSc,<sup>3</sup> Reg Ayre, CPHI(c),<sup>4</sup> Stéphane Perron, MD,<sup>5</sup> Shelley A. Beaudet, BSc,<sup>6</sup> Tom Kosatsky, MD<sup>7</sup>

## ABSTRACT

**Objective:** To share four Canadian cities' experiences with bed bug infestations and to explore public health roles in managing them.

**Methods:** We summarize presentations from a workshop at the 2010 Canadian Public Health Association Conference which examined the re-emergence of bed bugs in Canada and compared management approaches of municipal and public health authorities in four large Canadian cities. We include updates on their activities since the workshop.

**Results:** Cities across Canada have observed an increase in complaints of bed bug infestations over recent years. Toronto Public Health considers bed bugs to be a threat to health and has been heavily involved in the front-line response to bed bug complaints. In Winnipeg, Montreal and Vancouver, city inspectors are responsible for investigating complaints, and public health plays a supporting or secondary role. We identified factors that may contribute to successful management of bed bugs: sufficient funding, partnerships among many stakeholders, training and education, and surveillance and evaluation.

**Conclusion:** Various public health agencies in Canadian cities have played key roles in the fight against bed bugs through new initiatives, education, and encouragement and support for others. By working with the public, owners, tenants, the health sector and other stakeholders, public health practitioners can begin to curb the resurgence of bed bugs and the social strains associated with them.

**Key words:** Bed bug; *Cimex lectularius*; environmental health; public health

La traduction du résumé se trouve à la fin de l'article.

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Bed bugs (*Cimex lectularius*) are small, elusive insects that feed almost exclusively on human blood. Bed bug infestations have become prominent worldwide, generating increased public concern.<sup>1,2</sup> Despite the attention to bed bugs by the public, researchers, governments and pest control companies, their control has been a challenge.<sup>3,4</sup>

Because bed bugs have not been proven to transmit disease between humans,<sup>3</sup> there is resistance to framing their resurgence as a public health threat. Nevertheless, bed bugs have been associated with negative health effects, including allergic reactions, bacterial skin infections and scarring as a result of the intense scratching they provoke. Improper insecticide use can result in acute health effects<sup>3</sup> and may lead to chronic disease.<sup>5,6</sup> Perhaps of greatest concern to public health is the psychological stress on persons living with bed bugs. While bed bugs do not discriminate – anyone can be subject to a bed bug infestation – health impacts differ depending upon people's social and economic circumstances. One study conducted with Winnipeg's inner-city residents found that bed bugs negatively impacted the former's ability to lead healthy lives. Respondents reported that bed bugs disrupted their sleep and led to stress, social isolation, loss of self-worth, and social stigma.<sup>4</sup> Moreover, the financial costs (and associated stress) incurred from an infestation can be overwhelming for those with limited means.<sup>4</sup>

## METHODS

A workshop at the 2010 Canadian Public Health Association (CPHA) Conference\* examined the re-emergence of bed bugs in Canada, dis-

cussed the state of bed bug science (summarized elsewhere)<sup>7</sup> and compared the approaches to bed bug identification and control of municipal and public health authorities in four large Canadian cities. Here we report on the experiences of the four cities – Toronto, Winnipeg, Montreal and Vancouver – with regard to their efforts to respond to the public health threat posed by bed bugs.

By drawing on the experiences of the four cities (including updates since 2010), we make the case that framing the bed bug problem as a public health threat is key to the implementation of effective strategies for its management – especially for vulnerable populations.

## RESULTS

### Toronto Public Health – Public health as lead

The number of requests for services related to bed bugs in Toronto saw a seven-fold increase between 2005 and 2008.<sup>8</sup> While bed bugs were not historically considered a public health issue, a combination of political and public pressure and an increasing demand for service led to the framing of the issue as a public health matter, and Toronto Public Health (TPH) took the lead in bed bug management

### Author Affiliations

1. Manager, National Collaborating Centre for Environmental Health, Vancouver, BC
2. Professor, Department of Sociology, University of Manitoba, Winnipeg, MB
3. Entomologist, City of Winnipeg, Winnipeg, MB
4. Manager, Healthy Environments, Toronto Public Health, Toronto, ON
5. Physician-Advisor, Direction de santé publique de Montréal, Montréal, QC
6. Senior Environmental Health Officer, Vancouver Coastal Health, Vancouver, BC
7. Medical Director, National Collaborating Centre for Environmental Health, BC Centre for Disease Control, Vancouver, BC

**Correspondence:** Mona Shum, NCCEH, 555 W. 12<sup>th</sup> Avenue, Vancouver, BC V5Z 3X7, Tel: 604-707-2460, Fax: 604-707-2444, E-mail: mona.shum@bccdc.ca

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\* The workshop facilitator was Dr. John Carsley, Vancouver Coastal Health. Speakers included: Dr. Stéphane Perron, Montreal Public Health; Taz Stuart, City of Winnipeg; Dr. Elizabeth Comack, University of Manitoba; and Reg Ayre, Toronto Public Health.

**Table 1.** Comparison of Legislation, Owner and Tenant Obligations, Assistance for Vulnerable Groups, and Evaluation Related to Bed Bugs in Four Canadian Cities

City/Inspector	Legislation	Owner and Tenant Obligations	Assistance for Vulnerable Groups	Evaluation (e.g., Indicators)
Toronto/PHI (TPH)	Section 13 of the Ontario Health Promotion and Protection Act <sup>28</sup> indicates that Medical Officers of Health can order both landlords and tenants to manage bed bugs.	Under Ontario's Residential Tenancies Act, the landlord is responsible for ensuring his or her apartments are free of bed bugs by hiring a pest control company, and the tenant is responsible for preparing the unit for treatment. <sup>28</sup>	Toronto and Ontario governments provide limited amounts of funding for preparation of units for treatment and replacement of furniture for those who need assistance.	In 2010, Toronto 1) responded to more than 2,000 requests for service, 2) conducted over 3,500 apartment unit assessments, 3) assisted 110 vulnerable residents with unit preparation/extreme cleaning, 4) developed bed bug best practice fact sheets in 13 different languages, 5) distributed over \$25,000 worth of donated mattress encasements, 6) sealed over 6,000 units, 7) replaced common area carpeted floors with cleanable solid surfaces in 12 multi-residential buildings, 8) started a loaner vacuum program, and 9) with the Toronto Community Housing Corporation (TCHC), developed an illustrated brochure on preparing apartments for cleaning.
Winnipeg/City By-Law Enforcement Officers	Before 2008, bed bug infestations in rental accommodations were subject to Winnipeg's Maintenance and Occupancy By-Law, which identified owners as responsible for managing infestations.  In 2008, the Neighbourhood Liveability By-Law, <sup>29</sup> replaced this by-law and categorizes bed bugs as a "nuisance" and "unsanitary", and assigns responsibility to both owners and occupants to prevent infestations.	Manitoba's Residential Tenancies Act holds the landlord responsible for ensuring that premises are made free of bed bugs by hiring a licensed exterminator; the tenant is responsible for preparing the unit for treatment and allowing access.	Grants are provided for community-based organizations and individuals to support their education and prevention efforts and include provision of bed bug prevention materials (mattress covers, insect monitors, and laundry bags) and assistance with treatment (furniture removal, vacuuming, heat treatments).	Since the program began in 2011, it has seen an overall decrease of 60% in bed bug infestations to levels similar to 2008; however, the overall number of provincially owned housing complexes with bed bug issues has been reduced only fractionally.
Montreal/City or Borough Inspector	A Montreal municipal by-law on sanitation and maintenance of dwelling units <sup>21</sup> is designed to ensure that apartments and residential buildings are safe, sanitary and properly maintained.  Recently, the city implemented a by-law that requires pest control operators to submit a bed bug control plan. <sup>21</sup>	Most Montreal boroughs ask that tenants send a registered letter to the owner of the building and provide 10 days for the landlord to address their concerns; if the issue is not addressed in that time frame, the tenant can call the municipal inspector.  Provincially, the Régie du logement du Québec intervenes in residential lease matters, informs citizens of their rights and obligations related to leases, promotes conciliation between landlords and tenants, and provides legal assistance regarding bed bug infestations.	Montreal's housing corporation promotes Integrated Pest Management (IPM) and pays for treatment of its facilities (but usually not for their preparation).  Non-profit organizations such as RCLALQ (Regroupement des Comités de Logement et Associations des Locataires du Québec) help defend the legal rights of tenants. Several CSSS in Montreal provide funding for preparation of units for treatment on an ad hoc basis.	In 2012, DSP Montréal, in collaboration with the housing corporations and the CSSS, initiated a randomized controlled trial aimed at demonstrating the effectiveness of providing assistance in the preparation of dwellings of vulnerable households.
Vancouver/Property Use Inspector (City)	Until April 2008, Vancouver Coastal Health Authority (VCH) was responsible for pest control enforcement under the City of Vancouver's Health By-law No. 6580.  In 2008, Vancouver moved pest control under the Standard of Maintenance By-law and the City's Property Use Division took over inspection and enforcement.	If a landlord does not comply with a Standards of Maintenance order, inspectors can refer the matter for prosecution. If tenants are non-compliant (in preparing their unit), the landlord may rely on the rental agreement to resolve the issue.	None	None

for the City, becoming one of the first Canadian cities to do so. TPH encountered complex cases involving the most vulnerable (the poor, the elderly, and those with disabilities and mental health issues), which required resource-heavy, long-term management.

The Toronto Board of Health directed TPH to hold a multistakeholder bug forum, which led to the establishment of the Toronto Bed

Bug Project in 2008.<sup>9</sup> The Project includes working groups of landlords, tenants, pest control firms, social housing and shelter managers, community agencies and others. It supports education and outreach, creation of legislative tools, and development of best control practices.

TPH has relied extensively on partnerships, re-allocating funds and donations in order to continue the project. Toronto and

Ontario governments provide limited amounts of funding for preparation of units for treatment and replacement of furniture for those who need assistance. TPH has not conducted a formal evaluation of the project but has collected data on their response to infestations (Table 1).

In 2011, Ontario rolled out a \$5 million plan to educate Ontarians and fund public health agencies in the Province's fight against bed bugs.<sup>10</sup> TPH hired a dedicated bed bug program manager and six public health inspectors for a 12-month period. The program also enabled TPH to contract with private agencies to undertake unit preparation and extreme cleaning, both of which help ensure successful eradication of bed bugs.<sup>\*11-15</sup> Although Ontario's bed bug program funding ended March 31, 2012, both the City of Toronto and the Province of Ontario have recognized the importance of the work undertaken in controlling bed bugs and both are moving toward providing permanent, sustainable funding.

### Winnipeg – Public education campaigns

Like other Canadian cities, Winnipeg has experienced an increase in bed bug reports. One local extermination company reported 2,800 bed bug calls in 2010, compared with only a handful of calls in the previous six years.<sup>16</sup> City by-law enforcement officers (CBEOs), not necessarily trained in public health, have replaced public health inspectors (PHIs) as responders to bed bug complaints. If landlords do not comply within a given time period, CBEOs can issue a written order and timelines to complete extermination. Landlord non-compliance can lead to charges under the Neighbourhood Liveability By-Law. Nevertheless, when interviewed in 2009, CBEOs indicated that no charges had been issued under the new by-law and, because bed bugs are considered more a “nuisance” than a public health threat, no health hazard orders had been issued for bed bugs.<sup>4</sup>

In March 2011, the Manitoba government implemented a more comprehensive program for responding to bed bugs, setting aside \$770,000 to finance the first year of a two-year bed bug response plan, with funding expected to continue for at least two more years. A key plank of the program is a public education campaign that stresses both prevention and eradication. Educational materials include brochures, posters, fact sheets, a website, and a phone line that offers information and tracks infestations.<sup>17</sup> Grants are also provided for community-based organizations and individuals to support education and prevention efforts, and include provision of bed bug prevention materials (mattress covers, insect monitors, and laundry bags) and assistance with treatment (furniture removal, vacuuming, heat treatments).<sup>18</sup> Manitoba has also assembled a coalition of municipalities, health authorities, business groups, property managers and other key stakeholders to advance its province-wide approach.

Since the program began in 2011, bed bug complaints and treatments have decreased. While the number of overall complaints has decreased by 60% to levels similar to 2008, the number of provincially owned housing complexes with bed bug issues has decreased only fractionally. Nevertheless, in developing and maintaining

partnerships between tenants, pest management professionals, and landlords to assist residents in living pest-free, the Manitoba program has served as an example for other jurisdictions, including Minneapolis/St Paul, Seattle, Sacramento, Tampa Bay and Ottawa.<sup>19</sup>

### Montreal Public Health – Surveillance and support for city action

A 2011 survey of 1,000 Montreal Island residents by la Direction de santé publique de Montréal (DSP Montréal) found that 24,293 city households (2.8%) dealt with a bed bug infestation in 2010-2011.<sup>20</sup> In managing bed bug infestations in Montreal, multiple partners are integral; DSP Montréal partners with the Centre de santé et des services sociaux (CSSS), the City, its boroughs, non-profit organizations, owners, tenants, Montreal's housing corporation, and the health service sector in its fight against bed bugs. DSP Montréal is responsible for the education of partners and the public, second-line support for agencies dealing with bed bugs, communication strategies, and field epidemiology. DSP Montréal produces educational materials and conducts training for municipal inspectors, nurses, social workers, physicians, and non-profit organizations. Non-profit organizations and the CSSS collaborate with municipal inspectors by reporting infested housing units, and advocate for affordable, healthy housing. They support vulnerable populations, educate clients and help identify sources of funding for bed bug management.

Municipal inspectors, although not specifically trained in bed bug control, are responsible for responding to bed bug complaints. In Montreal, inspection responsibilities are decentralized to boroughs, each of which has local teams of housing inspectors. A small central team supports the boroughs.

Several limitations hinder early detection and appropriate response to bed bug infestations. Most Montreal boroughs ask that tenants send a registered letter to the owner of the building and provide 10 days for the landlord to address their concerns; if the issue is not addressed in that time frame, the tenant can call the municipal inspector. This formal process discourages many tenants through fear of retribution, while others are unaware of its existence. Municipal inspectors from most boroughs provide only the landlord (and not the tenant) with the inspection report. A notice of infraction, which is not a legally binding document, may be negotiated by the owner without penalty. The inspector may also issue a statement of offence, which does have associated penalties; however, there is little consistency among boroughs as to how and when these statements are issued. Since inspectors are not trained to deal with bed bugs, they usually cease to intervene once a pest control operator is hired by the owner. Although pest control operators in Canada are required to take courses, no quality assurance system (such as certification by a professional organization) exists to ensure that they apply pesticides safely and effectively. For example, some operators use ineffective pesticides like boric acid or do not use proper spraying techniques. However, in order to partially offset these shortcomings, the City has recently implemented a by-law that requires pest control operators to submit a bed bug control plan.<sup>21</sup>

In March 2011, the City of Montreal, in collaboration with Montreal's housing corporation and the DSP Montréal, developed an action plan to decrease bed bug infestations. The plan is based on surveillance, research, prevention, stakeholder communication and intervention. The communication platform will be based on a survey of public awareness of bed bugs to be completed by the end

\* At the time of the 2010 CPHA conference, TPH had a “Bug and Scrub” program, where homeless men were trained in preparing units before treatment. The program provided low-cost, reliable, non-judgemental assistance to the most vulnerable in dealing with an infestation. However, the program has since been scaled back due to employment standards issues.

of 2012. DSP Montréal, in collaboration with the housing corporations and the CSSS, started a randomized controlled trial aimed at demonstrating the effectiveness of providing assistance in the preparation of dwellings of vulnerable households, as inadequate preparation is often cited as a reason for ineffective bed bug eradication.<sup>12-14,22</sup> Funding is provided in part by the Quebec Health Ministry; given additional funding, DSP Montréal plans to evaluate issues in implementation and intervention.

### **Vancouver – A city-based complaint-driven process**

In 2008, the City's Property Use Division took over the inspection and enforcement of bed bug management from the Vancouver Coastal Health Authority (VCH). VCH currently plays a supportive/consultative role to City inspectors and becomes involved in bed bug management only in the presence of a health hazard as defined by the BC Public Health Act.

In Vancouver, almost all bed bug inspections are complaint-driven, but occasionally property use inspectors (PUIs), who have limited training on bed bugs, discover infestations during the course of regular building inspections. PUIs are responsible for case management, and they conduct inspections with fire, police, and/or social services representatives. PUIs are only able to inspect the unit of complaint as they have no mandate to enter adjacent units and will not inspect if a tenant objects. The landlord must make necessary arrangements with adjoining tenants if he/she believes that additional units are infested. As a result, often bed bugs are not completely eradicated after treatment (T. Hamilton, City of Vancouver, 2011, personal communication). If a landlord does not comply with a Standards of Maintenance order, inspectors can refer the matter for prosecution. Generally it takes over a year for cases to reach trial and if the landlord is found guilty, the trial judge may levy a fine of between \$250 and \$2000. Vancouver has had no instances where landlords were prosecuted for bed bugs. If a landlord is continually non-compliant, tenants tend to move. If tenants are non-compliant (in preparing their unit), the landlord may rely on the rental agreement to resolve the issue. PUIs are not involved in dispute settlement (T. Hamilton, City of Vancouver, 2011, personal communication).

Currently, there are no ongoing programs that help disadvantaged tenants prepare their units for treatment. The PUI is only responsible for inspection and does not participate in outreach or educational activities (T. Hamilton, City of Vancouver, 2011, personal communication). Vancouver Coastal Health offers information to the public, conducts occasional inspections and holds workshops for the health care sector, municipal departments, landlord groups, hotel operators and groups requesting information.<sup>23</sup> Prior to April 1, 2008, VCH was a lead agency (and is still quite involved) in bed bug control, liaising with a wide variety of stakeholders with the goal of developing educational materials, determining best practices and controlling bed bugs. BC Housing also provides education to building managers and tenants through information sheets supplemented by one-on-one consultation.<sup>24</sup> The Vancouver Area Network of Drug Users (VANDU) has partnered with VCH, Ministry of Employment and Investment, City of Vancouver and three owners of single-room-occupancy buildings to reduce bed bug infestations in pilot projects that were considered successful.<sup>25,26</sup> The BC Residential Tenancy Branch can also have a role in resolving bed bug complaints.

## **DISCUSSION**

The four case cities highlighted here provide insight into evolving and promising practices for bed bug management and for the role of public health. Once bed bugs are declared a threat to public health, they become a part of the public health mandate. Toronto is perceived as a leader in bed bug management in Canada; that leadership may relate to the fact that the City confronted bed bugs as a public health issue, offering front-line support by inspectors working in the health department who understand public health, who implement surveillance and develop partnerships based on education and advocacy, and who are backed up by legislative authority when necessary.

The experiences of the four cities provide examples of how public health agencies can play an important role in bed bug management. While legal enforcement of standards may prompt action by property managers and tenants, prosecution can be a slow and uncertain process, such that cases involving vulnerable clients are better addressed through education, outreach and support. Nowhere is that clearer than in the area of residential preparation for pest management. In that regard, public health can work with and facilitate collaboration between social services, housing, mental health, and municipal and other levels of government. Also, public health can educate property managers, health professionals, home care workers, school and nursing home staff and the public, which will help reduce the spread of bed bugs, decrease stigma and increase recognition of bed bug problems (both in terms of diagnoses and infestations). At the 2010 CPHA bed bug session, participants agreed that greater education of the public would serve to de-stigmatize bed bug issues and make it more likely that affected persons report and remediate problems early.

Moreover, public health agencies can train inspectors in: bed bug recognition and safe and effective control; supporting challenged residents (particularly with preparation of their homes); managing complex social environments; community mobilization; and surveillance activities. Public health agencies can work with cities or provinces to pass regulations that require cooperation between tenants and owners and can encourage funding of social programs aimed at assisting the most vulnerable.

Surveillance and evaluation has been lacking in Canadian cities. TPH and DSP Montréal have conducted surveys about infestations, Manitoba has been recording complaint calls, and TPH has tracked website hits (90,000 hits in 2010) about bed bugs. As surveillance is necessary to promote the allocation of resources and to inform evaluation of interventions, public health agencies can draw on their surveillance experience to develop surveillance programs themselves or help cities develop their own. Public health agencies are also well positioned to play a key role in undertaking ongoing evaluations of bed bug control programs, ensuring that effective protocols and remedies are in place.

Public health agencies can also play a significant role in advocating that the federal government recognize bed bugs as a public health matter, thereby encouraging effective provincial responses (including dedicated funding).

Other promising actions for public health agencies could involve requiring that pest management companies submit plans for control strategies (as in Montreal) and/or obtain certification governed by a professional organization to ensure that those who respond to infestations implement best practices.<sup>27</sup> Also, public health agen-

cies could encourage municipalities to adopt pest control/pesticide bylaws, which would give staff the necessary powers to deal with problem building owners.

## CONCLUSION

Although there have been no known cases of disease transmission, bed bugs can cause severe reactions, secondary infections, and severe stress that impact health – especially for vulnerable populations. Canadian city public health agencies can consider bed bugs a public health threat, support legislation around pest control and responsibilities of tenants and owners, and conduct or encourage surveillance and evaluation activities. By working with the public, owners, tenants, the health sector and other stakeholders, public health practitioners can begin to curb the resurgence of bed bugs and the accompanying personal scars and social strains.

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## RÉSUMÉ

**Objectifs :** Relater l'expérience de quatre villes canadiennes aux prises avec des infestations de punaises de lit et analyser le rôle joué par la santé publique pour maîtriser ces infestations.

**Méthode :** Nous résumons les présentations d'un atelier donné à la Conférence 2010 de l'Association canadienne de santé publique, où l'on a examiné la réémergence des punaises de lit au Canada et comparé les approches de prise en charge des autorités municipales et sanitaires dans quatre grandes villes canadiennes. Nous incluons des nouvelles de leurs activités depuis l'atelier.

**Résultats :** De nombreuses villes du Canada observent une hausse des plaintes d'infestations de punaises de lit depuis quelques années. Le Service de santé publique de Toronto, qui considère les punaises de lit comme une menace pour la santé, est très impliqué dans les interventions de première ligne en cas de plainte d'infestation. À Winnipeg, Montréal et Vancouver, ce sont les inspecteurs de la ville qui sont chargés d'enquêter sur les plaintes, la santé publique jouant un rôle secondaire ou de soutien. Nous avons recensé les facteurs pouvant contribuer à une prise en charge efficace des punaises de lit : des fonds suffisants, des partenariats entre les nombreux acteurs du milieu, la formation et la sensibilisation, ainsi que la surveillance et l'évaluation.

**Conclusion :** Divers organismes de santé publique dans les villes canadiennes jouent un rôle clé dans la lutte contre les punaises de lit en menant de nouvelles initiatives, en faisant de la sensibilisation, et en offrant soutien et encouragement à d'autres. En travaillant avec le public, les propriétaires, les locataires, le secteur de la santé et les autres acteurs, les praticiens de la santé publique peuvent espérer juguler la réapparition des punaises de lit et les tensions sociales qui en résultent.

**Mots clés :** punaise lit; *Cimex lectularius*; santé environnementale; santé publique

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