Strategies for Housing and Other Housing Providers

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BED BUGS WERE common global pests until the 1940s, when synthetic pesticides essentially eradicated them from the United States. In the last ten years, the number of bed bug infestations in the U.S. has increased exponentially, due to decreased indoor pesticide use, increased pesticide resistance, introductions from multiple global foci, and increased trade in second-hand furniture.

The U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control and Prevention (CDC) consider bed bugs to be a significant public health risk. Bed bug bites result in itching, redness, and inflammation, but their mental health impact is greatly underestimated. Lawsuits between landlords and tenants are becoming more commonplace. Individual tenants are receiving payments of $40,000 to $150,000, and a group of plaintiffs in Iowa is seeking a settlement of $1.4 million in damages. Plaintiffs are also suing summer camps, universities, and furniture stores because of alleged bed bug bites and infestations. Most recently, 200 residents brought a class action lawsuit against a senior citizens’ center on Coney Island because of an alleged bed bug infestation.

Chronic bed bug infestations disproportionately affect economically disadvantaged and minority populations in urban, lower-income, multi-unit housing or when tenants are elderly, obese, visually impaired, or mentally or physically disabled. Bed bugs thrive in sites that support transient populations with a constant turnover, such as homeless shelters, nursing homes, and government-assisted affordable housing. From January 1 to June 30, 2012, redevelopment and housing authorities in Virginia spent $404,364 in operating/general funds to control 1,047 infestations, representing 6.3 percent of all housing units. Most of the agencies had fewer than 5 percent of their units infested, but three agencies reported infestation rates between 8–19 percent. The average expenditure per infestation was $372 and ranged from $120 to $4,000. In Harrisonburg, Virginia, most of the infestations have been in housing units dedicated to the elderly and persons with disabilities, who are more likely to lack the resources to detect and control chronic infestations.

Because bed bugs are not vectors of pathogens, federal and industry funding to control these pests is almost nonexistent. In 2011 the EPA awarded $550,000 for bed bug education, outreach, and environmental justice projects. In 2012 the Pest Management Foundation solicited grant proposals of up to $35,000 to control pests in urban and suburban environments; award values were cut by 90 percent in 2013. The Federal Bed Bug Workgroup includes the EPA, Department of Housing and Urban Development (HUD), Department of Agriculture (USDA)-Agricultural Research Services (ARS), USDA-National Institute of Food and Agriculture (NIFA), Department of Defense (DOD)-Armed Forces Pest Management Board (AFPMB), Department of Commerce (DOC), and National Institutes of Health (NIH). HUD and EPA are the most likely to support the efforts of housing authorities to detect and control bed bugs. In the wake of highly visible bed bug infestations, insurance companies like Willis North America in New York are beginning to offer riders to policies covering hotels and residential property managers. Local
Authors
Lower-Income to Control Bed Bugs

government in the New York State Assembly is also moving toward mandatory requirements for insurers to offer bed bug coverage.

Current funding sources for housing authorities consist of operating funds from federal subsidies and rental income. These sources are inadequate to address the current frequency of infestations or respond to increases. We propose sustainable, cost-effective strategies that housing authorities can institute to prevent and control bed bug infestations. These include enhancing early detection, working with Extension Entomologists, anticipating and responding to tenants’ special needs, improving tenant compliance, proactively treating new furniture, investigating new funding opportunities, and reducing hidden costs.

Financial Impact and Demographics

The increase in bed bug infestations and the decrease in federal funding have hurt government-assisted affordable housing programs, defined as subsidized housing at 30 percent of a family's income. These programs serve individuals at or below 60 percent of the area median income with many housing programs targeting individuals earning 30 percent or less. This diverse population includes the elderly, persons with disabilities, individuals who are homeless, and the working poor, defined as those who earn 60–80 percent of the median income in a district. Recent guidance provided by HUD for its public housing (Notice: PIH-2012-17) and multifamily housing (Notice H 2012-5) has additional financial consequences to government-funded housing programs.

These notices outline how to prevent and control bed bugs along with the responsibilities of HUD, Public Housing Agencies, owners of HUD-Insured and -Assisted Multifamily housing, and residents. The notices explain that the owner must provide housing that is safe, sanitary, and in good repair. Guidance is provided on timeframes for inspection and recommended treatment of the unit. The notices state that the tenant must comply with the treatment and that the tenant cannot be charged for any of the costs associated with the treatment and inspection of the unit. The notice does not address tenant's non-compliance with prevention and treatment responsibilities and provides no financial support for the costs associated with inspection, prevention, and treatment in a public housing program. Financial support for multi-family properties is limited to only those properties that have a reserved fund. These funds can be accessed to address the costs associated with inspections, preventions, and treatments. The notices emphasize the need to use trained, in-house staff or a reputable third party to inspect.

Government-assisted housing programs must comply with state housing laws and regulations concerning pest and treatment responsibilities. These laws vary according to each state's housing code. In the Commonwealth of Virginia, the Virginia Landlord Tenant Act requires housing providers to certify that the unit is pest-free before the tenant moves in. When an infestation is confirmed by a certified, independent third party during the tenancy, Virginia law allows for the tenant to be charged for the treatment costs.

The Harrisonburg Redevelopment and Housing Authority (HRHA) is a middle-
sized housing agency in the City of Harrisonburg, Virginia, 130 miles southwest of Washington, D.C. The HRHA operates a Housing Choice Voucher program (843 vouchers), owns and manages one affordable high-rise complex with 120 one-bedroom units for the elderly and persons with disabilities and 129 project-based, multi-family units. In 2010 the HRHA began using heat treatment instead of pesticides as its primary strategy to control bed bug infestations. Heat treatment entailed heating a unit until the ambient temperature was 140°F (60°C) and the interiors of furniture were 120°F (49°C). A unit was typically held at 140°F for four hours. Heat treatment was deemed to be more cost-effective because only the infested unit required treatment, whereas pesticide treatment required treating the infested unit and all adjacent units, potentially a total of nine units. In addition, heat treatment was felt to be less intrusive to the tenants, did not elicit concerns about toxicity, and preparation of the unit was less expensive. (Pesticide treatment required cleaning the unit, bagging, and washing all clothing and personal belongings, whereas heat treatment required removal of candles and food.)

The cost to control infestations has increased ten-fold in the past two and half years in both of its properties. In the HRHA high-rise complex in 2010, three infestations incurred an expense of $1,800. Twenty-three infestations in 2011 incurred a cost of $10,000, and as of July 1, 2012, 31 infestations had incurred costs of $17,900. In its multi-family housing units, no bed bugs were detected, and no cost was incurred in 2010. Four infestations in 2011 incurred a cost of $4,800, and as of July 1, 2012 a total of six infestations incurred a cost of $5,350 (Figure 1). These costs did not include staff time or other expenses incurred in inspecting the unit, education efforts with tenants, or treatment coordination. Approximately two hours of staff time were required per infestation to coordinate inspection and treatment of the unit, meet with the tenant to review educational materials and pre-treatment activities, and follow up with quality control inspections. Total estimated costs, including staff time, from January 1, 2012 to June 30, 2012 were $29,710. Moreover, specialty housing programs must consider the unique and diverse tenant populations. Most of the infestations detected by the HRHA have been in housing units dedicated to the elderly and persons with disabilities (31 infestations vs. six in the multi-family units during the same period). Of the 31 reported infestations, five units required retreat-
ment for re-infestation, and one unit required two retreatments. Education and treatment materials must be tailored to individuals to ensure understanding and reduce the additional cost of re-infestations.

State and federal regulations have complicated the ability of government housing providers to reduce costs for inspection and treatment. The federal requirement for certified applicator and/or third-party inspection eliminates or limits the ability of an agency to use in-house staff or resources. In addition, obtaining a state certification requires one year of supervision under a certified applicator before eligibility to take the pesticide applicator examination.

In August 2012 the HRHA surveyed 26 housing and redevelopment authorities in the Commonwealth of Virginia concerning bed bug infestations. The surveys were completed over the phone or self-completed by the responding agencies. Survey respondents were located throughout Virginia with the exception of northern Virginia, which is considered part of the Washington, D.C., authority. These agencies detailed their current bed bug treatment methodologies, the number of infestations from January 1 to June 30, 2012, and costs for treatment. Twenty-six agencies representing 16,949 housing units reported 1,047 infestations in this six-month period. Out of these 26 agencies, nine (37.5 percent) had no bed bug infestations; most of the rest (14 out of 17, 82 percent) had fewer than 5 percent of their units infested, but Hampton (8.2 percent), Harrisonburg (15.3 percent), and Richmond (19.4 percent) reported higher infestation rates (Figure 2). The agency in Richmond reported 769 infestations (73 percent of 1,047) in this six-month period. Total costs for the 26 survey respondents to treat 1,047 infestations for the six-month period was $404,364, and the average expenditure per infestation was $372, with a median of $333 and a range of $120 to $4,000 (Figure 3). The agency in Richmond spent $160,000 (39.6 percent of $404,364) to treat units during the six-month period.

Twenty-one agencies used operating funds to pay for inspection and treatment, and one used capital funds. Treatment methods varied with respondents. Among those who treated, nine out of 17 (53 percent) used pesticides only; two used heat treatment; and four used pesticides plus heat treatment, or supplemented these treatments with diatomaceous earth. The average cost per pesticide treatment was $342, and the opinions regarding the results varied from “borderline” to “extremely successful.” The average cost per heat
treatment was $1,570, and respondents felt that results were "very good." Among the four respondents who combined pesticides and heat treatment, which cost an average of $369, three felt it was "very" successful or helpful, and one felt it was "inconsistent."

Fourteen agencies were satisfied with the treatments they used, and two reported they were "somewhat" satisfied. Inspection costs varied; $15 per unit was the lowest, and $8,250 was the highest. Most (17 out of 26, 65 percent) inspected units visually, and six out of 26 (23 percent) inspected on a monthly basis. Unfortunately, 11 out of 26 (42 percent) "never" inspected or inspected "once a year," and nine out of 26 (35 percent) inspected only if a tenant complained. When asked how they planned to budget for future costs, nine out of 24 (37.5 percent) planned to increase their operating budget by increasing the pest control budget, asking for internal assistance, subtracting the cost from rental income, or creating a line item for each extermination. Of greatest concern, most (15 out of 24, 62.5 percent) were "unsure," or had no plan to increase their budget, or they simply "hoped not to have any incidences."

Survey respondents also reported bed bug infestations in the Housing Choice Voucher program, a federal rental assistance program that pays rent directly to private landlords for eligible program participants. One-fourth reported infestations in private landlord properties (Figure 4). Out of 21,229 vouchers, 6,745 private landlords participated in the program and reported 28 infestations from January 1 to June 30, 2012. It is unlikely that four times the percentage of units operated by private landlords in Harrisonburg are infested vs. those in a larger city, such as Richmond. It is far more likely that these data reflect the value of proactive inspection. Affordable housing providers hurt themselves by underreporting the number of bed bug infestations. The HRHA has been working closely with a university and a nonprofit research institute to evaluate bed bug control measures.

At no cost to the HRHA, affordable housing in Harrisonburg is routinely inspected by professional entomologists, and infestations are quickly detected.

The results of this survey highlight the challenge government housing agencies and affordable housing providers face in addressing bed bug infestations. Agencies addressing infestations are faced with current funding sources that consist of operating funds from federal subsidies and rental income. These sources are inadequate to address the current frequency of infestations or respond to an increase in infestations. Federal bed bug infestation guidelines and state pesticide applicator certification requirements further complicate the ability of agencies to manage costs and use in-house resources.

**Recommendations**

A national strategy for improved bed bug detection and control will require collaboration among the hotel and hospitality industries, pesticide companies, the federal government, and housing associations. Universities and institutes must focus on standardizing tests for insecticide efficacy, evaluating Integrated Pest Management (IPM) for bed bug control, and under-
standing basic aspects of bed bug biology, including their feeding habits, insecticide resistance, and population genetics. Sequencing the genome of the common bed bug will be essential to identify novel insecticidal targets and molecules that could be used for detection.

Below, we present some cost-effective strategies for individuals and housing authorities to improve their detection and control of bed bugs:

1. Early detection is difficult but crucial, because cryptic populations can increase to an unbearable density before treatments begin. Therefore, early detection must be affordable and practical, enabling tenants and building owners to avoid the high costs of extensive treatment or litigation.

Four out of 10 housing authorities in Virginia inspect their units once a year or never. These sites will not discover infestations—and therefore, not treat—until they are severe. Housing authorities may address this need without adding expense by incorporating bed bug detection into other, routine inspections, such as for cockroaches or fire safety. Passive monitors placed under the legs of furniture may be an inexpensive yet effective option for agencies that rarely inspect.

2. Surveillance must be routine to be effective. Housing authorities could accomplish this by partnering with State Extension Entomologists or university researchers. Extension entomologists are professionals associated with a university or agricultural research station, who apply integrated pest management (IPM) to control pests of agriculture, turf and landscape, and housing. Presently, the EPA has approved several existing pesticides for use against bed bugs, including chlorfenapyr, pyrethrin, deltamethrin, synergized etofenprox, lambda-cyhalothrin, and permethrin, and several combinations, such as beta-cyfluthrin/imidacloprid, acetamiprid/bifenthrin, and imidacloprid/sumithrin/piperonyl

3. Control strategies must be registered and over-the-counter, similar to those for cockroaches and other domestic pests. Presently, the EPA has approved several existing pesticides for use against bed bugs, including chlorfenapyr, pyrethrin, deltamethrin, synergized etofenprox, lambda-cyhalothrin, and permethrin, and several combinations, such as beta-cyfluthrin/imidacloprid, acetamiprid/bifenthrin, and imidacloprid/sumithrin/piperonyl

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Housing authorities and PCOs need to understand better how the elderly, individuals with disabilities, or compulsive hoarders might be more vulnerable to infestations and re-infestation. These individuals might be unable to understand educational materials, and they are less likely to prepare their units adequately before treatment. Tenants’ preparation of their units before treatment can reduce the efficacy of insecticide or heat treatment, especially if bed bugs find harborage in piles of clothing, cushions, or bed linens. Improper—or no—preparation can also incur additional costs if the PCO charges to prepare the unit before treatment.

5 Housing authorities need to educate tenants on the benefits of systematic surveillance and control. Involving tenants in scheduling and meeting with PCOs or Extension Entomologists may improve compliance and follow-through.

6 Tenants must be aware of apartment policies before they move in. Beds and other upholstered furniture need to be inspected—and possibly treated—before they enter the building. Tenants in lower-income housing sometimes provide a temporary home for homeless friends or relatives. Tenants need to be aware that this behavior increases their risk for bed bugs.

7 Educational materials need to be practical, understandable, and meet the specific needs of tenants of governmental and affordable housing. Transparency in access to information and research results—for example, by the use of social media or mobile applications to reduce communication gaps—can also improve tenant compliance to prevent re-infestations.

8 Minority or immigrant populations might be suspicious or uncomfortable allowing inspectors into their homes. Muslims may object to canine inspections. Persons with mental or emotional disabilities might not realize they are being bitten or be paranoid by the prospect of strangers entering their homes. It will be crucial to engage with social workers trained in minority or mental health to gain the trust of these populations.

9 School nurses and teachers, guidance or camp counselors, and hospice workers can play an important role in educating children about early detection and safe control.

10 Reductions in operational funding and limited funding options require agencies to reexamine their IPM programs and turn to internal staff resources to offset the costs. Governmental and affordable housing providers are unable to “pass along” any of the costs associated with infestations. If costs are not managed, then the financial viability of a control program is questionable. Therefore, HUD funding mechanisms must address long-term financial implications to governmental and affordable housing programs.

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2 Swweeney, EPA, personal communication.


Housing authorities could offer to treat a new tenant’s furniture with insecticide or heat before bringing items into the unit. This measure would entail an initial investment of $100–500 for a portable heat chamber to $20,000–30,000 for a heat chamber in a trailer, but proactive treatment would decrease the cost of retreatment for re-infestations.

Dusting apartments with diatomaceous earth after steam treatment has been found to eliminate bed bugs for up to ten weeks in about half of the units treated. Housing authorities need to educate tenants about the safe and effective use of diatomaceous earth, either providing the dust to tenants or dusting routinely as part of a preemptive control strategy.

Bed bugs are rarely eliminated from a unit after only one treatment. Housing authorities need to anticipate and cost for re-infestations.

eral best practices for tenants and property managers, such as preserving suspected evidence (e.g., exuviae—i.e., exoskeletons and other remains from insect moulting—and fabric with fecal staining) for positive identification, rapid reporting to property managers, avoiding dangerous products such as kerosene or gasoline, reducing clutter and thoroughly cleaning spaces, frequently laundering, and the use of mattress encasements.6

Community-wide surveillance is essential to detect new or recurrent infestations and rapidly treat. Units that are at-risk should be monitored carefully. These include units infested within the last six months to one year or units occupied by tenants who are unwilling to report infestations. Units next to, above, below, or across from infested units should also be monitored.

Survey results revealed that agencies incurred a significant direct cost in treating infestations. These costs do not include staff time educating the tenant about treatment, coordination of treatment, or any staff time in treating the unit. Other hidden costs may be additional dumpster costs for removal of infected items, add-on dump fees, special paint to cover bed bug fecal stains, mattress encasements or wrappers for carpets, and costs charged by the PCO if the unit has not been prepared for treatment. Some smaller agencies might not have the internal resources to manage indirect costs. We recommend a more thorough analysis of the total costs (direct plus indirect) associated with infestations. These data and their significance need to be discussed with policy makers and funders of affordable housing providers.

Local community service boards (CSB) are responsible for temporarily lodging persons with mental or emotional disabilities if their unit is being treated. Hotel lodging and the CSB employee’s salary are hidden costs associated with bed bug control. Working with the CSB to identify family or friends with whom the tenant can stay would eliminate the cost of a hotel stay.

A federal agency such as HUD or the EPA should develop a certification training program for government and nonprofit, low-income housing providers. Employees could be certified to inspect and treat with nontoxic options, such as diatomaceous earth.

Faced with an increasing number of infestations and stagnant or decreasing funds, housing authorities need to investigate alternate funding opportunities through the EPA, NPMA, or the USDA-NIFA-PMAP.

Industry has been surprisingly recalcitrant to invest in IPM and other control measures. Housing authorities should consider direct dialogue with the NPMA and major insecticide manufacturers. In addition, manufacturers of mattresses and mattress covers and the American Hospitality and Lodging Association should have a vested financial interest in rapid detection and control of bed bugs. Housing authorities need to engage directly with their Senators and Representatives on a state and federal level regarding legislation to fund bed bug control. On Election Day, constituents should remember who allocated—and who refused—funding for bed bug control.

Summary

Many factors have contributed to the global resurgence in bed bugs, and none of them show signs of abating. Insecticide resistance will continue to be a problem. The global economic crisis and natural disasters will continue to displace people around the globe, and bed bugs will travel with them. If the frequency and intensity of infestations increase, so too will the expenditure for detection and control.

On the other hand, government and industry funding is decreasing or nonexistent. Because bed bug infestations have public health, financial, and social justice implications, housing authorities must adopt sustainable strategies for early detection and control. These strategies include incorporating bed bug detection into other inspections, working with Extension Entomologists, using treatments that are effective and specific to their environments, anticipating the needs of and facilitating communication to different demographic groups, proactive treatment of furniture, reexamining and prioritizing IPM programs, investigating new funding opportunities, and sharing information and resources with other authorities.

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