Bed Bug (*Cimex lectularius* L.) Infestations Impact Quality of Life

Anyone can accidently acquire bed bugs
What Do Bed Bugs Look Like?

Blood feeding true bugs – family Cimicidae, order Hemiptera

- Small
- Flattened
- Wingless
- Piercing-sucking mouthparts
- Undergoes incomplete metamorphosis
The Bed Bug Life Cycle

Bed bugs go through an egg stage, and five nymph stages before they become reproductive adults.

Bed bugs need to feed on blood at least once during each life stage.
Bed bugs are **not** known to transmit disease organisms.
Reactions to Bites

- Bites may occur in lines - usually on exposed skin
- Saliva can cause a person to itch and cause swelling
- Scratching can lead to secondary infections
Reactions to Bites

• Reactions vary depending on your immune system and number of bites
  ❖ No symptoms, itching, swelling, pustules, scarring, etc
  ❖ A study of 30% reaction
  ❖ Another 96% reaction

• Bites do not confirm bed bug infestations
• Bed bug cases dramatically increased in AZ in 2007
• Over-use and abuse of retail pesticides and other chemicals increasingly evident
• 2007-2011 preliminary data compiled from individuals calling by phone, sending written correspondence, or attending educational / outreach events tracked ➡ bed bug impact survey being developed
Bed Bug Survey Team
We launched (in 2014) an on-line survey (funded by USDA-NIFA) to methodically determine bed bug impacts and analyze the behavioral risk factors associated with bed bug infestations.

- Bed Bug survey in Spanish: https://es.surveymonkey.com/s/F5NZXJK
Target Audience

- The target audience are adults living in the U.S. that accessed information about bed bugs online.
- People who have *never* experienced bed bugs, people with a *history* but no current infestation, people with *current* infestations.
University of Arizona Bed Bug Survey

The bed bug epidemic is a national problem. From coast to coast, communities are doing their best to figure out how to beat back bed bugs. Figuring out the best solution, however, is dependent on understanding the problem and the people it affects. That's why Midwest Pesticide Action Center has partnered up with the University of Arizona to investigate the bed bug problem nation-wide.

Please take some time to fill out the University of Arizona Bed Bug Survey (for the Spanish version, click here). This survey will be important in establishing a baseline understanding of bed bug infestations—most notably, what factors contribute to such infestations.

As of December 2014, 289 respondents have contributed toward the fight against bed bugs by filling out this survey. Let's keep up the good work!
Bed Bugs

If you think you have bed bugs, don’t panic. There is a lot you can do; learn more and create an action plan. Bed bugs are hard to control, even for professionals. When using pesticides, always read and follow the label directions. Be mindful of the possible dangers of using pesticides. These days, many bed bugs are resistant to common pesticides. Bug bombs (foggers) don’t work for bed bugs. Learn more, one step at a time.

- Where to Start with Bed Bugs
- Bed Bug Biology and Behavior
- Bed Bug Control Methods
- Preventing Bed Bug Infestations

Use the EPA Bed Bug Information Clearinghouse to find bed bug information for First Responders, Health Care Facilities, Hotels, Housing Authorities, Landlords, Pest Management Professionals, Residential, Schools/Childcare, Shelters, Transportation Services, and Workers Entering Homes.

University of Arizona and collaborating researchers hope to determine the real impact and social cost of bed bugs, the risks to individuals and society, as well as the significant causes of infestations. Take their survey here.
HEALTHY PEOPLE & COMMUNITIES

Multi-family Housing

High occupancy multi-family housing and subsidized housing have some of the most dangerous self-treatment and concerning pesticide use (1). Low-income communities and people of color have higher asthma rates (2) and when pests and pesticides are asthma triggers, this lowers indoor air quality for a vulnerable population (3). We offer several resources for individuals and property managers to help reduce pests and pesticide use indoors, particularly bed bugs.

Along with these resources, NCAP is a member of the Healthy Homes Coalition of Multnomah County. The county runs a healthy homes program in coordination with a large group of partners, including other community-based organizations, medical providers, case managers and community health workers. Our participation in this workgroup focuses on public housing and toxics reductions, which have been demonstrated to reduce in-home environmental triggers. The County program has reduced by 2.5 times the likelihood of emergency room visits for children with poorly controlled asthma resulting in approximately $350,000 in annual healthcare cost savings. Multnomah County Health Department received an award from the EPA for their work to reduce asthma and has been honored as an exceptional asthma program with the National Environmental Leadership Award in Asthma Management.

In addition, NCAP has entered into a partnership with researchers at University of Arizona to promote, encourage and support their work to analyze the impacts of bed bug on quality of life. The work will promote bed bug health with a well-being impact survey, analyzing data after 12 and 24 months.

Take the survey if you currently live with bed bugs, have dealt with them in the past, or have never experienced bed bugs. We are dedicated to helping community members who need it most, and sharing your experience will be extremely helpful to develop strategies to reduce the bed bug problems.

English version of Bed Bug survey / Spanish version of Bed Bug survey
Are you living in a place with bed bugs?

- Yes
  - ID
  - Behaviors
  - Impacts
  - Management

- No, but I have experienced bed bugs in the past

- No, and I have never experienced bed bugs

Demographic Information
- age, gender, people # in household, annual household income, living situation, disability, and location
Results

Are you currently living in a place with bed bugs?

- Yes, currently living with bed bugs: 34.8%
- No, and have never experienced bed bugs: 48.5%
- No, but have experienced bed bugs in the past: 16.7%

N = 540
63% female
37% male
- Reached people of all ages
• People with lower annual income reported more infestations
People renting as opposed to buying homes are more likely to report infestations.

People currently living with bed bugs reported the highest number of people per household.

People reporting disabilities may have a higher incidence of bed bugs.
Survey Results

- 35% of respondents had pest control experts identify the insects
- 41% used internet/literature resources
- 16% relied on landlords, friends, family, etc.
• Approximately 50% of people with bed bugs or a history of bed bugs report swollen, itchy bumps or sores

• Additional 8% of people with bite reactions required medical treatment

• An average of 14% report that they have no reaction to the bites at all
• 30% of people with bed bugs applied 2 - 3 retail pesticides inside their home
• 19% used foggers known to be completely ineffective
• 20% had applied pesticides more than 8 times in the past year
• 25% had applied non-pesticide product chemicals such as gasoline, alcohol or cleaning chemicals
LONG ISLAND, NY

BED BUG BLAZE
MAN SETS CARS ON FIRE TRYING TO KILL PESTS
People with bed bugs:

- 37% contracted with a pest management company to apply pesticides only
- 9% contracted with a pest management company that used heat or cold treatment
- 8% used canine detection
- 9% had multiple companies involved in remediation
- 7% received pro bono (free)
How long did remediation take?

• Approximately 76% of respondents resolved their infestation within 6 months of confirming a problem, of those, 13% within a week

• 10% never resolved the problem and moved out

Many indicated they took bed bugs with them
7% of people with bed bugs have had infestations for over a year.
Who has a pest management service that applies a pesticide?

- 37% of people living with bed bugs
- 53% of people with a history of bed bugs
- 3% of people with no bed bug history has a pest management service every month (17% have a contract that includes the application of pesticides only when needed)
• 19% of people with current bed bug infestations had moved home 2-3 times in 5 years

• People with no bed bug history stay with friends/family less often, and host visitors less often, compared to those with a history of bed bug infestation.
People with infestations are more likely to have acquired second hand articles two or more times per year, compared to residents with no history of bed bugs.

Second-hand items are often assumed to be the cause of bed bug introductions.
Living with bed bugs causes economic, social and human health costs
Social Impact

• Loss of or troubled personal relations
• Feeling isolated
• Loss of friends and family connections
• Loss of self esteem
• Concerns that they may have transferred the bed bugs to another home or location
• Etc.
Economic Impact

• Cannot fulfill work duties as well as usual
• Financial loss (include how much you think you have lost in the comment box below)
• Cannot parent or care for dependents as well as usual
• Loss of job
• Loss of home
• Etc.
Health Impacts

- Loss of sleep
- Cannot eat properly
- Cannot relax
- Increased alcohol consumption
- Increased smoking
- Increased prescription drug use
- Increased illicit drug use
- Increase mental health problems
- Significant weight gain or loss
- Decline in health or increase in health problems
- Feelings of depression and / or desperation
The top five impacts are:
1. suffer sleep loss, 86.9%
2. cannot relax, 80.6%
3. depression and/or desperation, 69.4%
4. concerns that they transferred bed bugs to other locations, 65.6%
5. financial losses, 60%
The top five impacts are:

1. suffer sleep loss, 87.5%
2. cannot relax, 87.5%
3. concerns that they transferred bed bugs to other locations, 54.7%
4. financial losses, 40.6%
5. depression and / or desperation, 39.1%
<table>
<thead>
<tr>
<th>Bed bug costs</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Average cost of pest control services</td>
<td>$400-5000 varies on location, severity of infestation, area</td>
</tr>
<tr>
<td></td>
<td>affected and treatment selected</td>
</tr>
<tr>
<td>Mattress encasements</td>
<td>$100-250 per bed</td>
</tr>
<tr>
<td>Laundering all clothes</td>
<td>$50-100 per person</td>
</tr>
<tr>
<td>Interceptor traps or monitoring devise</td>
<td>$25-75 per room</td>
</tr>
<tr>
<td>Vacuum and/or dry-steam cleaner</td>
<td>Vacuum $200-450 + dry-steam cleaner $300-550</td>
</tr>
<tr>
<td>Your sanity and peace of mind</td>
<td>$priceless$</td>
</tr>
</tbody>
</table>

Fumigation, heat treatments, pesticides, $ bed bug warranty
Overwhelming need for community education
The poor are at greatest risk

Increased number of people reporting long-term (beyond a year) bed bugs
Survey Conclusions

- People living with bed bugs and with a history of bed bugs are exposed to a much higher pesticide load compared to those with no experience.

- This makes bed bug management an environmental justice issue.
How to Control Bed Bugs

• Integrated Pest Management (IPM) approach is the most likely strategy to result in successful elimination of bed bugs and safeguard the people and the environment

• Choose most appropriate treatment options based on:
  – Level of infestation
  – Level of clutter
  – Square footage
  – People needs
  – Structure types
Prevention

Prevention is a very cost-effective tool for managing bed bugs

Draft Federal Strategy on Bed Bugs
September 2013

Prepared by
The Federal Bed Bug Workgroup

1 The Draft Federal Strategy on Bed Bugs reflects a broad-based consensus of federal agencies. It is an outcome of the collaborative interagency Federal Bed Bug Workgroup. The Draft Strategy was authored by key agencies (CDC, EPA, HHS, USDA) and includes technical information and input from the Department of Defense and the National Institutes of Health. Photo courtesy of Dr. Harold Harlan and the Armed Forces Pest Management Board (www.afpm.org).
Non-Chemical Methods

Becoming the primary methods used in combination with chemical methods

- Heat (>122°F)/Cold
- Vacuuming
- Encasements
- Desiccant dusts
Chemical Methods

• Multiple applications of insecticides
• Crack and crevice applications
• Resistance to pyrethroid products is very high
• Not all populations are resistant to the same products
• Three general types of resistance occurring
Many Legitimate Products

- Novel liquid pesticide formulations
  - Temprid (β-cyfluthrin & imidacloprid)
  - Transport (bifenthrin & acetamiprid)
  - Tandam (α-cyhalothrin & thiomethoxam)
- Chlorfenapyr
  - pyrolle; “pro-insecticide”
- Alpine Dust
  - Dinotefuran and DE
- CimeXa
  - Amorphous silica gel

Products, vendors, or commercial services mentioned or pictured in this seminar are for illustrative purposes only and are not meant to be endorsements.
Survey Conclusions

• Due to increasing resistance problems non-chemical treatment options are emerging as industry standards

• 2014 field collected bed bugs samples from Arizona have tested resistant to synthetic pyrethroids (APMC unpublished)
In Summary

• Knowledge gap among the target audience of non-English speakers and low-income residents
• Extreme pesticide and chemical abuse at a higher than expected level
• A critical need for bed bug education and training for pest management professionals
• Potential pesticide resistant issues among bed bug populations
Resources

1. http://www2.epa.gov/bedbugs
3. http://njaes.rutgers.edu/bedbug/?info

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