Life Quality Impacts of Bed Bug (*Cimex lectularius* L.) 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
• Bed bug impact survey developed
In 2014, we launched 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 English: http://www.surveymonkey.com/s/DGLQS52
- Bed Bug survey in Spanish: https://es.surveymonkey.com/s/F5NZXJK
Survey Design

Are you living in a place with bed bugs?

Yes

No, but I have experienced bed bugs in the past

No, and I have never experienced bed bugs

ID

Behaviors

Impacts

Management

Demographic Information

age, gender, # of people in household, annual household income, living situation, disability, and location
Results

Are you currently living in a place with bed bugs?

- No, and have never experienced bed bugs 46.3%
- Yes, currently living with bed bugs 37.8%
- No, but have experienced bed bugs in the past 15.9%

- Reached adults of all ages
- 64.6% female
- 35.4% male
Statistical Analyses

Stratified (blocked) contingency tables (CMH test of general association); effects based on \textit{a priori} hypotheses permitted by sample sizes

- Effects:
  - Income (poverty vs no poverty)*
  - Children (present vs absent)
  - Living arrangements (owning vs renting vs alternate)
  - Mobility (moved, traveled, hosted $\geq 4$ times, 2$^{\text{nd}}$ hand furnishings $\geq 2$ times/year vs none of these)

- Response:
  - Current or previous BB vs no history

*Based on Federal Register 2016 poverty guidelines
Poverty
Stratified over Children, Living, Mobility

General Association = 29.40, df = 1, $P < 0.01$, $n = 537$

*Poverty was associated with BB infestations across other effects*

Living
Stratified over Children, Poverty, Mobility

General Association = 35.14, df = 2, $P < 0.01$, $n = 537$

*Owning associated with lower incidence of BB compared with renting or alternative arrangement*
People with lower annual income reported more infestations.
Mobility
Stratified over Children, Living, Poverty

General Association = 4.43, df = 1, \( P < 0.035 \), \( n = 537 \)

*Increased mobility weakly associated with lower incidence of BB infestation*

*May be interacting with other effects*

Children
Stratified over Living, Poverty, Mobility

General Association = 2.95, df = 1, \( P < 0.086 \), \( n = 537 \)

*Presence of children is only weakly suggestive of association with BB infestation*
• 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

• About 50% of people with bed bugs or a history of bed bugs reported swollen, itchy bumps or sores
The top five impacts are:
1. suffer sleep loss, 87.3%
2. cannot relax, 79.9%
3. depression and / or desperation, 67.2%
4. concerns that they transferred bed bugs to other locations, 67.2%
5. financial losses, 57.8%
The top five impacts are: 1. suffer sleep loss, 87.5%
   2. cannot relax, 86.1%
   3. concerns that they transferred bed bugs to other locations, 52.8%
   4. financial losses, 43.1%
   5. depression and / or desperation, 41.7%
Survey Results on Management

• 54.8% of people with bed bugs applied at least 2 retail pesticides inside their home
• 22.0% used foggers known to be completely ineffective
• 22.7% had applied pesticides more than 8 times
• 23.3% had applied non-pesticide product chemicals such as gasoline, alcohol or cleaning chemicals
Who had a pest management service that applied a pesticide?

- 37.9% of people living with bed bugs
- 55% of people with a history of bed bugs
- 3% of people with no bed bug history had a pest management service every month (17.8% had a contract that included the application of pesticides only when needed)

76% resolved their infestation within 6 months of confirming a problem
Conclusions

Overwhelming need for community education
• 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
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