



What Causes Bed Bug Control Failure? The Resident Factor

A review of major obstacles created by residents and an analysis of effective methods for overcoming these challenges.

By **Changlu Wang, Narinderpal Singh and Richard Cooper**

Bed bugs are one of the most difficult urban pests to manage. Due to the biology of bed bugs and the limitations of available control methods and materials, human factors play important roles in the success of bed bug management efforts. More than any other urban pest, the safe and efficient elimination of bed bug infestations requires close collaboration among residents, property management staff, and the pest control provider. In practice, there often are disputes about the causes of control failures. Lack of resident collaboration is the most commonly cited cause of failure among

pest management professionals (PMPs) and property managers.

Residents, conversely, often argue the inferior quality of the pest control service is to blame. These different opinions have, at least in part, arisen from the lack of understanding (or misunderstanding) of bed bug behavior and the role non-chemical bed bug control techniques play in successful bed bug elimination. In the following article, we'll analyze the major types of obstacles created by residents and discuss effective methods for overcoming these challenges.

OBSTACLES PRESENTED BY RESIDENTS

1. Infrequent Laundering. Studies have shown that 93-99% of bed bugs found

by visual inspection are located on furniture (Potter et al. 2006, Wang et al. 2007). Frequent laundering of bed linens is one of the most cost-effective methods to reduce/eliminate bed bugs (Naylor and Boase 2010). When the mattress and box spring are wrapped in the original plastic or are encased with vinyl zippered covers, frequent laundering of bed linens becomes especially important. Under these conditions, bed bugs tend to hide on bed linens avoiding the smooth plastic.

2. Clutter and Housekeeping Practices. Presence of clutter in homes hinders effective and efficient treatments. Clutter may harbor bed bugs that are difficult to find and treat. The location of clutter often is more important than the amount of clutter. Even a small amount of clutter on, under or next to a host-sleeping or resting area (e.g., bed or upholstered furniture) is likely to serve as a safe haven for bed bugs and can lead to elimination failure if not addressed. In contrast, a large amount of clutter located away from sleeping or resting areas has a much lower risk of harboring bed bugs and, unless the residence is heavily infested, is less likely to hinder the control effort even if it is not removed. Moving around infested items (such as bags, pillows, clothing, stuffed animals, etc.) will disturb and spread bed bugs.

3. Presence of Difficult-to-Treat Furniture. Certain types of furniture are difficult to treat. Examples include wooden furniture that is in disrepair or has many cracks and crevices, overstuffed upholstered furniture, sleeper sofas and wicker furniture; all of these provide numerous harborage for bed bugs and make pesticide or steam application very difficult. Other examples of furniture that pose treatment challenges include platform beds, wood panels placed on bed to support the mattresses and reclining chairs.

4. Resident Behavior. Where the resident sleeps and spends the most time during the day dictates where bed bugs are likely to hide. Bed bugs hide close to host sleeping or resting places. For example, we found two disabled



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residents who spent many hours on wheelchairs had dozens of bed bugs hiding on their wheelchairs. In another case, there was a handicapped resident who spent large amounts of time sitting in the bathroom, and bed bugs were found on the toilet seat and the wooden chair beside the toilet seat in this apartment. For this reason PMPs should always ask where the resident sleeps, sits and rests during the course of the day. This information can be critical in locating pockets of bed bug activity that otherwise may go undetected. Changing sleeping locations as a result of a bed bug infestation will spread bed bugs to new sleeping areas, making treatment more difficult and time consuming. It is very important that the resident not change sleeping or resting locations during the course of treatment.

5. **Improper Preparation by Resident.** PMPs commonly ask clients to prepare for treatments without realizing that most residents do not know how to properly prepare. Residents may simply not read or not interpret the instructions correctly. Improper preparation can be counterproductive, leading to the spread of bed bugs, complicating the inspection and treatment process, and reducing the efficiency of the eradication process. We observed one resident who moved an infested suitcase along with many other items to the backyard as part of the preparation. On another occasion, we noticed a resident had moved all bed linens to the corner of the bedroom. After a PMP's treatment, the resident placed the bed linens back on the bed without washing them. In both cases the infested items were not properly addressed and left unexposed to treatments. It would've been better had the resident not moved these items.
6. **Refused Access.** For various reasons, some residents prefer not to be bothered by visitors, including PMPs, even if it is a free service provided by the property management office. They may change their locks, not open the door, or ask the PMP to come back another time. Without prompt treatment, an infestation is likely to spread to neighboring units within the building and will lead to higher control costs and more difficulties in elimination. Wang et al. (2010) reported that

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101 of the 223 units in an apartment building became infested within 41 months of the first confirmed bed bug introduction. Therefore, gaining access to *all* apartments is critical for success of the treatment program.

SOLUTIONS TO THESE OBSTACLES.

A bed bug infestation in a multi-unit dwelling is a social issue and requires the cooperation of residents, property management and the PMP. Overcoming these obstacles starts with education. Educate residents and property management staff regarding bed bug biology, prevention and non-chemical control methods. An educated resident is more likely to identify infestations and follow a PMP's recommendation. Likewise, a knowledgeable housing staff is more effective in setting up a good bed bug management program and assisting PMPs in identifying and removing the obstacles created by the residents.

In some instances, residents possess a handicap and are thus unable to fully



Even a small amount of clutter on, under or next to a bed is likely to serve as a safe haven for bed bugs.

cooperate, while others are not bothered by bed bugs and are simply uncooperative. In such cases property management must take initiatives to help the PMP solve the problems. There are many cost-effective methods to remove the previously men-

tioned obstacles. These may include:

1. **Encourage residents to hot launder bed linens at least once per week.** For residents that are on a tighter budget it should be explained that they can still kill bed bugs by skipping the wash

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cycle and placing linens in the dryer on high heat. Other items such as pillows, stuffed animals and hard-to-wash items like comforters and Afghan blankets can also be heated in a dryer.

2. **Discourage residents from moving infested items to new locations and**

encourage them to eliminate clutter on, under, and next to sleeping and resting areas. To prevent the spread of bed bugs, these items should be hot laundered, placed in a sealed plastic container or discarded if no longer needed. Assisting physically chal-

lenged residents in removing clutter is more cost effective than hiring outside service providers. Enlist the help from social workers, relatives, home aids, etc. Ask them to help residents do weekly laundering and keep the house uncluttered and clean.

3. **Residents should consider disposing of complex furniture that is heavily infested and in disrepair.** Furniture that is still in good condition should only be discarded if the resident agrees with disposing of it. Wooden bed frames can be replaced with inexpensive metal frames. A metal bed frame only costs about \$35 and is an affordable solution for most residents or property management. It is cost effective for property management to provide metal bed frames to residents whose beds are resting on the floor compared to costs associated with overcoming the challenges associated with not having any bed frame. Mattress encasements can also be provided by property management to people who cannot afford or are unwilling to install encasements. Zippered encasements made of plastic are very affordable and effective for assisting with a bed bug inspection and treatment. Although they are not as comfortable and sturdy as the fabric encasements, they greatly reduce the probability of bed bugs hiding on the mattresses and box springs (more so than the fabric encasements based on our field observations). In a low-income community, we found that among encased mattresses and box springs, 88% were in plastic encasements and 12% were in fabric encasements, demonstrating that residents are willing to install plastic encasements as a cost-effective method to control bed bug infestations.
4. **Identify where the resident sleeps, sits and rests during the course of the day.** These areas must be treated and inspected for activity until the infestation is eliminated. Discourage residents from changing sleeping locations to reduce the spread of bed bugs. The fewer the sleeping and resting places used by the resident, the more localized the bed bug distribution will be and the easier it will be to eliminate.



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5. Stop asking residents to prepare for treatments except to provide access.

Ask residents not to place items on infested furniture or take items from infested furniture to a different location unless it is properly inspected and treated. Inspections of undisturbed apartments provide the most accurate assessment of the infestation and enable appropriate recommendations for the specific type of cooperation needed from the resident.

6. When a PMP's access of an infested unit is denied by a resident, management should find solutions to gain access instead of skipping a treatment.

SUCCESS IS STILL POSSIBLE. From our field experiences, we were still able to eliminate many difficult bed bug infestations even when the previously mentioned obstacles were present, but months of biweekly inspections/treatments were required. In a community-wide bed bug integrated pest management demonstration study in a low-income community, 95% of the 66 treated infestations were eliminated over 12 months when many apartments had the previously mentioned obstacles (R. Cooper, unpublished data). In that study, the housing staff took the double role of pest control technician and maintenance. He assisted residents with challenges, provided tokens for weekly laundering and followed through with each infestation until no bed bugs were detected. It took a median number of 7 biweekly visits to eliminate an infestation.

These successful cases demonstrate that lack of resident cooperation should not be used routinely as an excuse for control failure. Inaction will only worsen the bed bug problems and incur more difficulties and higher costs over time. Rather, PMPs and housing staff should take proactive roles in correcting/minimizing the obstacles and designing treatment strategies based upon the characteristics of the communities. With the available tools and materials, PMPs can still deliver effective bed bug elimination in challenging situations. **PCT**

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References:

Naylor, R. A., and C. J. Boase. 2010. Practical solu-

tions for treating laundry infested with *Cimex lectularius* (Hemiptera: Cimicidae). *Journal of Economic Entomology* 103: 136-139.

Potter, M. F., A. Romero, K. Haynes, and W. Wickemeyer. 2006. Battling bed bugs in apartments. *Pest Control Technology* 34(8): 45-52.

Wang, C., M. Abou El-Nour, and G. W. Bennett.

Controlling bed bugs in apartments — a case study. *Pest Control Technology* (11): 64-70.

Wang, C. L., K. Saltzman, E. Chin, G. W. Bennett, and T. Gibb. 2010. Characteristics of *Cimex lectularius* (Hemiptera: Cimicidae), infestation and dispersal in a high-rise apartment building. *Journal of Economic Entomology* 103: 172-177.



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