NACCHO
National Association of County & City Health Officials
The National Connection for Local Public Health

[RESEARCH BRIEF]
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Rodent Control and Public Health: An Assessment of U.S. Local Rodent Control Programs

Introduction

From the 1900 San Francisco bubonic plague epidemic to the 2012 Yosemite National Park hantavirus infection outbreak, rodents have always been a prominent feature of the environment and can compromise the public's health. In addition to potentially carrying parasites and pathogens, rodents have been destroying infrastructure, infesting houses and businesses, and damaging property for centuries.

The three main rodent pests in the United States are the house mouse, Norway rat, and roof rat. Rodents transmit a large number of diseases, and in many places rodents live in close contact with humans. Rodents can directly transmit disease through feces, urine, or saliva or indirectly transmit diseases through ticks, mites, or fleas.[1] The United States has had cases of rodent-borne diseases such as plague, hantavirus, leptospirosis, rat bite fever, and murine typhus fever. A recent study found rats infected with bacterial pathogens known to cause gastroenteritis and infectious agents associated with febrile illnesses such as leptospirosis.[2] The study also identified known and novel viruses important to humans; two new species appeared to be similar to the hepatitis C virus. Rodents have also been linked to health problems associated with asthma and indoor allergic reactions.[3]

Rodent control programs in the United States have conducted rodent control activities for over 100 years. Throughout history, such activities have significantly changed; for example, pest control efforts have moved away from traditional poisoning and trapping toward an Integrated Pest Management (IPM) approach. IPM manages pests and disease vectors through pest prevention, pest reduction, and elimination of conditions that lead to infestations through safe and effective interventions.[4]

In 2015, the National Association of County and City Health Officials (NACCHO) and the Centers for Disease Control and Prevention (CDC) conducted a study to understand the current capacity of local rodent control programs across the United States. They assessed nine local rodent control programs to identify best practices, challenges, and technical assistance needs. This document presents an overview of the findings. In addition, case studies summarizing each agency's rodent control program are available at http://naccho.org/topics/environmental/vector-borne-disease-control/.

Photo courtesy of Multnomah County Department of Health

Methods

NACCHO and CDC invited nine organizations from diverse cities to participate in an assessment of their rodent control programs:

- Austin/Travis County (TX) Health and Human Services Department;
- District of Columbia Department of Health;
- Los Angeles County Department of Public Health;
- Multnomah County (OR) Department of Public Health;
- New Orleans Mosquito, Termite, & Rodent Control Board;
- New York City Department of Health and Mental Hygiene;
- Philadelphia Department of Public Health;
- San Francisco Department of Public Health; and
- Shelby County (TN) Health Department.

NACCHO conducted in-depth telephone interviews with each participating program. Key questions and priority areas for the program assessment questionnaire were developed through research and consultation with subject matter experts in rodent control. The questionnaire contained sections that corresponded to the 10 Essential Public Health Services.[5]

Photo courtesy of Multnomah County Department of Health

Results

A majority of the surveyed programs are located in a comprehensive vector program in the environmental health division of the LHD. However, in New Orleans, the Mosquito, Termite, and Rodent Control Board within the City Department of Homeland Security assumed the operations of the program from the health department because the duties aligned with those of the board. A majority of the programs are funded by local funds. Only two programs, Los Angeles County and Shelby County, are funded by service fees. In Shelby County, the program is fully funded through a state-legislated vector control fee. Overall, funding for a majority of the programs has either decreased or remained the same within the past five years. The five programs that noted a decrease in funds significantly reduced or adjusted staffing and activities. For example, Los Angeles County's program, which had previously addressed rodent complaints from owner-occupied properties for free, now has a pay-for-service fee.

All programs use IPM in rodent control efforts and are mainly complaint-based; five programs conduct a variety of proactive activities. Generally, the number of complaints reported within the past year ranged from 10 to 2,000 per month, depending on the jurisdiction. All programs use a hotline for the public to report rodent problems and record and track public complaints. Some programs are more proactive than others with activities ranging from selective baiting of manholes to conducting hundreds of thousands of inspections. In New York City, the Rodent Reservoir Analysis project identified and studied "rat reservoirs" in local neighborhoods. Inspectors set bait for the rats, closed up burrows, and worked with the community on best practices. Philadelphia's program staff includes mechanics who perform rat-proofing services each year, such as repairing plumbing and filling holes.

None of the programs tracks rodent-borne illnesses or rodent-related injuries/bites, but the programs do rely on notifications from their agencies' epidemiology divisions. No human cases of rodent-borne diseases were confirmed in the past year, although some programs reported rodent-related injuries/bites. Not all programs have the capacity to capture rodents, test for pathogens, or comb for ectoparasites. Previous activities in Los Angeles County resulted in finding rodents that carried human infectious agents, specifically two strains of human hepatitis E virus and Bartonella species bacteria.

Public education is a priority for every program surveyed. All programs inform the public about the importance of rodent control; for example, New Orleans offers a Pest Control Academy, and San Francisco holds educational meetings with the San Francisco Professional Gardeners Association. Programs disseminate rodent-related information through pamphlets and online resources. In Washington, DC, the program aims to educate the public and change behavior to mitigate the determinants of rodent activity. The program works closely with the DC Department of Public Works to provide live Web chats with the public or "Rat Summits" to discuss rodent control practices. Austin's rodent control program successfully educates and reaches out to many different populations in the area, such as the Spanish-speaking community, through translated fact sheets and other resources.

Additionally, most programs collaborate extensively with other city departments or other organizations. In some cities, several departments may share the various responsibilities for rodent control, including sanitation, housing, and parks and recreation. Sharing responsibility presents a unique challenge in Washington, DC, where nearly 42% of the land is federal land. The program has worked with the Department of the Interior to coordinate a federal-state approach to rodent control. In New York City, the program leads the Mayor's Rodent Task Force, which convenes weekly and consists of more than 20 city departments. Local rodent control programs have also partnered with organizations such as universities. For example, in Multnomah County, the program partnered with local universities to conduct research. A recent survey found that local rodents tested positive for human diseases such as hepatitis E, leptospirosis, and toxoplasmosis.

Code enforcement is also an important component to rodent control; however, not all programs assessed have enforcement power. For example, in Washington, DC, the program has strict commercial enforcement but limited residential enforcement. Most programs review policies and regulations regarding rodent-control on an as needed or regular basis. Every program makes an effort to educate the public and stakeholders about policy changes relating to rodent control. A legal framework is necessary to support effective rodent control measures and safeguard the health and safety of rodent control practitioners.

To ensure a competent workforce, all programs have processes to ensure that employees are properly certified and attend ongoing education and training courses. However, all programs expressed a desire for more staff training opportunities that include lectures, field work, and laboratory work. New York City has developed its own Rodent Academy, which provides training and courses on IPM; biology, behavior, and habitat of rodents; contributing factors to infestation; effective ways of evaluating site-specific responses and strategies; and effective communication strategies. Since 2005, the three-day academy has trained over 2,000 individuals from all over the United States.

Photo courtesy of District of Columbia Department of Health

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Conclusion

Local rodent control programs face many challenges, including a lack of funding and resources. Various aspects of the behavior and biology of rodents, such as the reproductive potential, trap avoidance, and feeding behavior complicate rodent control; therefore, rodent control is especially difficult when a program is solely complaint-based. While many rodent control programs have seen positive outcomes as a result of their work, fluctuations in funding have made it difficult to sustain these positive outcomes in the long term. Additionally, property and business owners may lack understanding of rodent control. Proactive public education by local rodent control programs can prevent a misinformed public. The lack of training opportunities is a continual challenge for many of the local rodent control programs assessed. Program staff must have up-to-date knowledge of rodent control, including rodent biology and behavior, IPM practices, and response strategies. The subject also lacks scientific literature and research; for example, respondents noted more research could be conducted on the profiling of different rodent ecosystems (e.g., descriptions of environments, behaviors exhibited, and genomic analysis) and on the surveillance of rodents arriving via ships or trains. National-level groups could host a rodent control research symposium to encourage and promote collaborations and research among rodent control practitioners and to raise awareness of the importance of rodent control. With enough staff, funding, public education, resources, and technology, rodent control programs could be even more successful. Framing rodent control as a public health issue, and collaboration among public health professionals and their communities, will help create long-term and more successful solutions to control rodent populations and keep rodent-borne diseases at bay.

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