Fall 12-16-2017

Of Rats and Men

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LEDE: War on Rats

Greg Bennet's rat problem started with a noise.

His cat Lucy heard it before he did: a very feint, rhythmic tapping sound.
"Chk-chk, chk-chk-chk."
After a few seconds it would stop, then after a few more it would start up again.
"Chk-chk-chk…chk-chk-chk-chk."
Over the next few months, the noise seemed like it was getting louder—or closer—to his studio apartment. When Lucy started to spend hours crouched in front of the oven, Bennet was sure rats were nesting in the crawlspaces.

There were a few nights over the previous summer where he would come home to find a horde of rats laying siege outside his old, unkempt building. The overstuffed trash bins next to the entrance were crawling with them, the most he had ever seen.

A female rat's litter size grows relative to how much protein they can eat. Now it was winter, and with only a half inch of plaster protecting him, Bennet was in trouble.

Luckily, Bennet had found Lucy on a farm in Oregon, a free-range kitty surviving off barn mice. Surely the rats knew better than to break into an apartment guarded by a combat veteran. As it turned out, the young ones didn't.

"The first time she caught something, I was on the futon watching TV half asleep," Bennet recalls. "I could just tell by the sound that she had finally had success."

UnfortunatelyBennet kept, Lucy was well-fed , so she just smacked the rat around for about 45 minutes. these days, and she didn't care to finish the job.

"She played with it for about 45 minutes until she got bored of it because she had smacked it around enough that the rat was a little bit bloodied and gotten its sense knocked out of it 10-20-30 times."

Eventually, the 58-year-old restaurant server he wrangled the dazed rodent it into a plastic soup container, sealed it tight, and returned it to the its source: the garbage.

Bennet was an old hippie, and the thought of the young rat slowly suffocating in the trash kept him up at night. So when Lucy caught the second one, he decided to return to nature—by flushing it down the toilet.

“I figured I gave him a fair chance,” says Bennet. “If he’d made it down into the sewer without drowning, it would be down there with his friends and lots of food.”

But the rat spread its hind legs just in time to cling onto the bowl as the water was sucked down into the pipes. That’s when Bennet picked up the needle-nose pliers to “keep it from cheating.”

The third rat was too big to flush. And Lucy had clawed it half to death. So Bennet brought out the heavy artillery for a mercy kill. A hammer. He felt squeamish on the first shot so it glanced of its head. The second time he overcompensated. He killed the rat, but cracked the tile and soiled it with blood and gray matter.

“I didn’t really want to look at it when I did it, so I turned away as I did it, and the hammer just ended up bouncing off its head,” says Bennet. “I felt bad, so the second time I hammered down really hard. Not only did it crack the tile on the floor in the bathroom, but its brains splattered all over the wall of the bathtub.”

Bennet didn’t know it at the time, but a CUNY analysis of health, inspection and 311 complaints show he and Lucy were battling rodents in one of the rattiest neighborhoods in New York City. The Brooklyn burg Had 1,945 rat sightings by the Department of Health in 2017 – more than twice what it had two years before – and more than 1,100 phone complaints by residents or business owners. was determined to move to a better-maintained building. But Bedford-Stuyvesant had gentrified in the seven years he lived there, and the 58-year old restaurant server could no longer find a studio for under $1200.

Lucy and Bennet felt like they were alone in their battles against the rats. But the skirmishes are actually taking place every day throughout the cit. ’s battles against seven or eight rats from several litters lasted two winters. Theirs was just one of countless campaigns from New York City’s 200-year-old war on rats.

NUTT: The Problem

Mayor Bill de Blasio is the city’s latest commander-in-chief to inherit what history has shown to be an unwinnable war. Like Nonetheless, like his predecessors, nonetheless, de Blasio has promised to turn the tide against the rats. The Mayor’s Office claims that the city’s current rat abatement programs are successful, but resident accounts, expert opinions, and government data indicate that the rat problem has gotten worse during his administration. The CUNY analysis shows the rat problem seems to be an issue of environmental justice.

The city has failed to curb the rat population because its overall strategy has been to minimize spending. The Mayor’s Office and the Department of Health (DOH) have been able to mitigate public demand for a better rat control program by undermining two critical facts about the rat problem. The first is that the rat problem should be treated as an environmental justice issue. Our comparison of the city’s data on rats with U.S. Census demographic data shows that The poorer neighborhoods have ongoing complaints about rats and violations related to rodents,

but still have worse the worst rat problems. And as the data shows the problem getting worse, putting more New Yorkers at risk of public health dangers and destruction of property, the city exaggerates the effectiveness of its programs. The second is that rats and the diseases they carry have the potential to sicken and even kill many New Yorkers. If rats were to cause an outbreak of a Zika-like disease, New Yorkers with lower incomes would be the more likely victims, and the rat problem would instantly become a health disparity issue.
At the same time, the city exaggerates the effectiveness of its current rat budget and how it has decided to allocate this minimal investment. Although the DOH The health department has a sophisticated database for monitoring rat activity, but it has rigged the way it evaluates its own progress. So results that appear to be "positive" lead to Positive results have allowed the city to justify investing millions more in questionable technologies, namely solar-powered trash compactors called Big Bellies that run about $3,000 apiece.

Dirty Data, Dirty Diseases

There are two million rats that live in New York City, about one for every four humans. Yet through a casual walk through the city, you would see thousands of people and if you're lucky, only a few rats.
The world of the rat is mostly an invisible world, a parallel universe, "the Upside Down" version of a human city. They find shelter amongst the inexhaustible variety of voids in the urban jungle: in the dirt under concrete sidewalks, in old brick sewers long forgotten, in the dusty corners of restaurant cellars, inside the crawl spaces of apartments. Only when darkness falls, do they venture out in search of food amongst the thousand tons of refuse we throw out every night.

At dawn they disappear back into hidden nests and burrows, but traces of their world remain in ours. Rat trails can contain over 20 species of viruses and bacteria that can infect humans, causing serious illness or death. It's this invisible mark on the human world that keeps urban rodentologist Bobby Corrigan awake at night.

"If you go to any park at night and sit and watch, you'll see the rats feed in the litter baskets, then run all over the tables and benches urinating, defecating, body smears, urinal, genital secretions," says Corrigan. "Then in the morning, you'll see a family having their breakfast there. For me, it's a crime scene. There should be crime tape, because those benches are dangerous."

Because the world of the rat is not easy to see, it's easy for most to ignore. The back of Corrigan's business card has a quote from Sir Arthur Conan Doyle, the creator of Sherlock Holmes: "We must be trained to see what others overlook."

Corrigan is at the top of his unusual field. Today, he travels the world training metropolises how to win their rat wars. But his claim to fame was working for the DOH health department as its chief scientific researcher. Corrigan shaped the city's current rat control strategy by helping to

create rat indexing," the term authorities use for tracking rats, and the Rat Reservoir program, which identifies the hotspots that are given the most attention.

The project started with a $611,000 pilot study in 2014 that identified 6 rat reservoirs hotspots in Manhattan and the Bronx, which the DOH attacked using integrated pest management: a combination of clean-ups, enforcement, poison baiting, and education.
After the DOH health department reported success, the Mayor added an extra $3 million to its annual budget, supporting 50 new positions including 13 public health sanitarians, 13 senior exterminators, and two population biologists, including Corrigan.

The health department DOH now proactively inspects over 100,000 properties, door-to-door, and indexes their findings onto a database. Data analysis allows them to concentrate resources into "rat reservoirs", 45 areas within neighborhoods that have exceptional rat populations.

They have reported up to an 80-90 percent% reduction of rats in some reservoirsof the focus areas. Once the health department DOH sees a reservoir has improved and no longer needs intensive support, they will "graduate" it and move on to the next.

Yet in spite of the program, the overall rat population seems to be growing across the five boroughs.

"How much are they going up? Nobody is going be able to figure that out," said Corrigan, who ran the program until 201X. But is there an increase in rats? Yes. I firmly believe, after looking at this for so long, New York has more rats now than ever before," says Corrigan.

A 1968 scientific survey found 11 percent of New York City had rats, Corrigan said. Now it's probably almost 90 percent, he said. "In 1968, when a scientist did a survey here, 11% of New York had rats. Now if we go borough by borough, neighborhood by neighborhood, it's probably going to be in the high 80's. But the city won't say that." he added.

Corrigan thinks the health department's DOH's claims to have reduced rat populations in certain rat reservoirs by 80-90 percent may be true, at least temporarily. The health department DOH measures a reservoir's population by counting burrows the holes and tunnels rats dig in outdoor green spaces. The DOH department's exterminators will bombard a park or empty lot with poison and destroy the burrows. This will bring the rat population down for several months, at which point the DOH recounts the number of burrows, and gets its high 80-90% reduction rate. But as long as a handful of rats are left, and protein-based food readily accessible, the population will bounce right back, according to Corrigan and other experts.

Such optimistic reports stem from an instinct shared by man and rat: self-preservation. Increased budgets put greater pressure on the health department DOH and its commissioners to perform, according to Corrigan.

"Again this is no criticism," says Corrigan. "That's the city. It's just the way things work."

Whereas Corrigan thinks of inflated progress reports as a normal component in the bureaucratic machine, but he is less forgiving of the lack of communication about the the potential consequences of failed rat control. Corrigan thinks the city must better inform the public about the diseases that may be lurking in what he describes as the "jungle of microbes" living on public spaces.

"The city just does not want that said. They'd tell you that you're gonna create pandemonium with that kind of talk," says Corrigan said. "But that's what's going on. If you buy a house in the city, there's full disclosure laws. If someone sells you a house knowing they have termites, you could sue them. Cause you just bought a house that's eaten up. Or suppose it has asbestos or mold, you have to fully disclose the risks of that property. But in New York City, everything you do is at your own risk."

Matthew Combs, an evolutionary biologist at Fordham University, has also been researching NYC rats for several years. Combs' research team at the Munshi-South Lab works closely with the health departmentDepartment of Health. Like Corrigan, Combs thinks the DOH department does not want the public to be fully informed about the diseases rats carry.
One of their recent projects mapped the prevalence of different rat parasites in different neighborhoods in Manhattan.Combs' team took samples from 133 rats captured in Columbus Park, Grand Central, and in public housing developments in the Lower East Side and Chinatown. They found dangerous viruses and bacteria that can infect humans: E. Coli, Campylobacter, porcine sapovirus, Hepatitis E, rosavirus, Seoul hantavirus, and Bartonella, which can cause a variety of conditions from food poisoning, to gastroenteritis, hemorrhagic fever, kidney and liver failure. They mapped the different rat parasites found in the different Manhattan neighborhoods.

"It's pretty easy to tell where those locations are if you look at the map," says Combs, "But we don't specifically say where they are because we were asked not to."

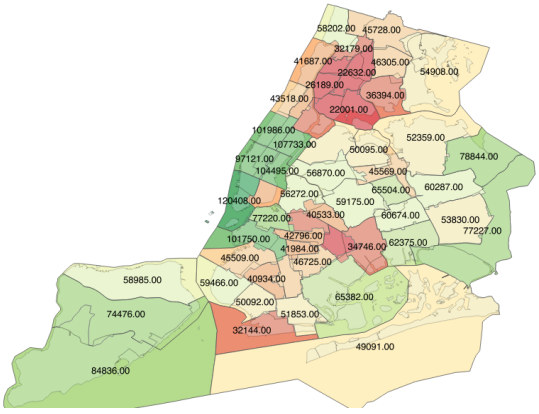
The health department Department of Health asked the researchers not to name the park, residential buildings, or the train station—the paper refers to these locations only as RP, RH, and RS. The researchers found that the parasites were very specific to certain areas. In other words, if a resident living in "residential housing site 1" or "RH1"—most likely NYCHA's Smith Houses, according to the CUNY analysis —was hospitalized with hepatitis E, it would be easy to use the study's findings to argue that the reason for the infection was a rat infestation.

MAPS and DATA:

It’s impossible to count all the rats in the city, but several other statistics beyond burrow counts can stand in for an actual rat count. The CUNY investigation measured rat activity in different neighborhoods by analyzing publicly available government data: rat sightings reported to the non-emergency 311 complaint phone line, health department property inspections, restaurant inspections and housing violations. All but the restaurant inspections . 3 of 4 of these datasets showed that the rat problem is not getting better. In fact, it looks like it’s getting worse. Restaurant Inspections was the outlier.

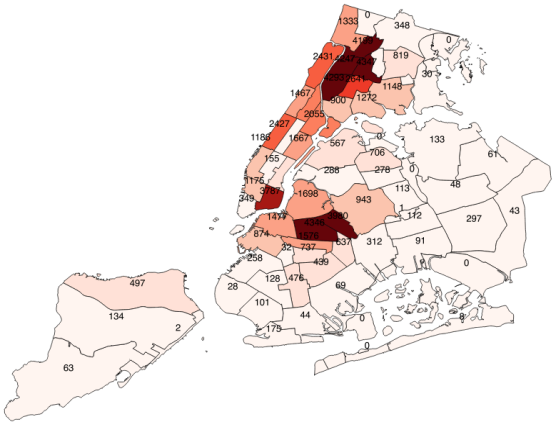
Overall, the worst areas with the worst rat problems over the past three years are the Lower East Side and Chinatown in Manhattan, Bed-Stuy, Bushwick and Crown Heights in Brooklyn, and the Southeast Bronx, including Grand Concourse and Fordham. For the most part, these are the poorest community districts of their respective boroughs. Queens and Staten Island are relatively rat-free compared to the other boroughs.

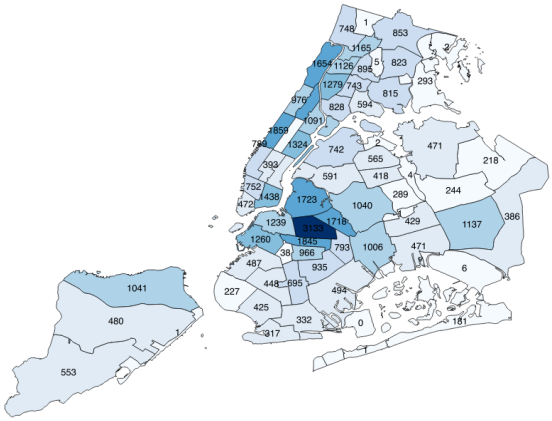
Median Household Income (Red->Green)



1. Active Rat Signs (Red)

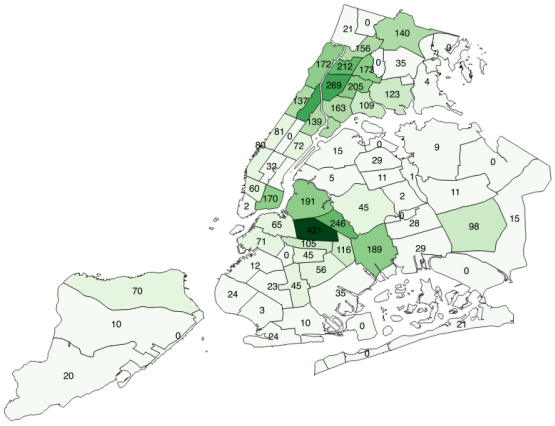
2. 311 calls (Blue)

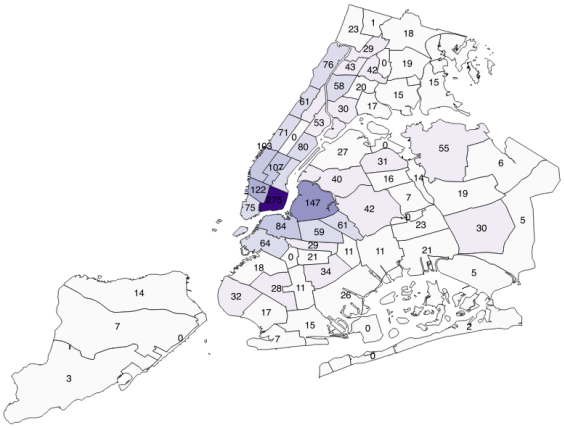




3. HPD Violations (Green)

4. Restaurants (Purple)





The community districts with the worst rat problems have other traits in common. Neighborhoods are crowded and produce much more garbage. Residents have lower household incomes and their landlords neglect the buildings they live in.

When the Health Department inspects properties for rats, they list them as one of three categories: pass, problem conditions (like exposed garbage), or active rat signs (live rats, rat feces or urine marks, burrows, holes). Using active rat signs as a measure for rat population or rat problems, and adjusting for population density (2010 Census estimates and community

district size in square miles), the CUNY analysis I ranked the 59 community districts to see which had worst rat problems and why.

Top 5 / Bottom 5 Community Districts and their Characteristics

The number one variable that distinguishes neighborhoods with rat problems is garbage, according to Rick Simeone, head of the Department of Health's division of Pest Control Services.

"If you take an area like Lower Manhattan, the Upper West Side, or Downtown Brooklyn, you have an extremely high concentration of people," says Simeone. "Not only do you have people living in those areas, but you have people commuting from all over the city and Long Island, and they work in those areas so you have high-rise buildings, and you just have a higher concentration of garbage in those areas."

The rattiest neighborhoods on the list support Simeone's argument: many have the highest population densities and produce the most garbage.

However, rat problems cannot be explained by population density and garbage concentration alone.

Community Districts 6, 7, 8 in Manhattan: Stuyvesant Town and Turtle Bay, the Upper West Side and, Upper East Side of Manhattan, respectively, have the highest population densities. They also produce about 40,000 tons more refuse per square mile than the average community district. But out of 59 community districts, they rank 25th, 22nd, and 15th for active rat signs. How can the most crowded and trashy areas manage to have an average number of rats? These three community districts also happen to be three of the wealthiest, with median household incomes over $100,000.

Three community districts with similar population densities and refuse, like Fordham in the Bronx, the Lower East Side and Chinatown, and Central Harlem have some of the worst rat problems. They are also significantly poorer, with average incomes around $35,000.

Six of the 10 worst rattiest community districts also belonged to the 10 poorest community districts. Five were among the very poorest, with median household incomes between $22,000 and $27,000. The top 10 rattiest neighborhoods had average incomes around $32,000. In contrast, the 10 community districts with the least active rat signs had average incomes that were twice as high, around $65,000.

"Rat Sightings" reported to 311

Health Department property inspections that found "Active Rat Signs"

DISPARITY AND LANDLORDS

The top 10 rat-infested districts also had the most residential buildings owned by landlords who failed to address rat problems. Landlord neglect leads to open violations for rodents, which appear on records of Housing Preservation and Development, the city agency that inspects tenants' complaints and enforces building maintenance by citing and fining landlords. Eight community districts were in both top 10 lists: most active rat signs, and most HPD Housing Development rodent violations.

By city law, landlords are required to remove pests from apartments. But extermination is expensive. Effective extermination, which uses integrative pest management, is even more expensive.

Combs, who has spent hundreds of hours trapping rats throughout Manhattan for his research at Fordham, has seen how low-income residents and bad landlords cause more rats.

"Poorer areas have less upkeep," says Combs, "and less intensive treatment. So even when someone calls an exterminator, they're calling the cheap-o guy that just puts down some bait and walks away for a pretty minimal effect. As opposed to a someone who wants to get it done right and seal up all your holes and go through all the steps."

George Reyes, a long-time resident of Bushwick, thinks that his neighborhood's rat problem is not just driven by cheap landlords neglecting low-income tenants, but opportunistic landlords trying to bring in higher-income tenants.

Bushwick ranks 6th in Active Rat Signs (3980), 5th 311 Complaints (1714), 4th in HPD Violations. Bushwick is one of the most rapidly gentrifying neighborhoods in Brooklyn. The DOH designated two rat reservoirs in each of these community districts back in 2015.

"It's the landlord's fault more than the city's. Look around you," said Reyes, pointing to the trash bins. "They don't take care of the place, they don't take out the trash when they're supposed to."

Reyes had lived in the building for 13 years. Since the current landlord took over three years ago, he had never seen an exterminator inside the building. Outside, a poison bait box was tied amongst garbage bins overflowing with trash.

According to Reyes, the block had a really bad rat problem over the summer, so the Health Department came in and cleaned it up, placing bait stations around problem buildings, and provided new trash bins to the buildings. Reyes doesn't know why his building doesn't have new bins, but he isn't surprised.

Most of its tenants, like Reyes, have lived there for over a decade in rent-stabilized apartments. In those 10 years, the surrounding neighborhood has changed rapidly. Young, white, middle-class people started moving in, and paying significantly more for rent. For many landlords, this was a gold rush, and they became anxious to turn over their apartment buildings.

“They got really aggressive trying to buy us out,” says Reyes. “They would knock on my door every three or four days, come into the living room and sit on my sofa uninvited. I had to tell them to get out.”

The visits only stopped after de Blasio signed a new law in 2015 that limited repeat buyout offers. The landlords had offered Reyes and his neighbors over $15,000. But most didn’t take the deal. Reyes himself pays around $1800 for a two-bedroom apartment, which can cost between $3,000-4,000 even on the same block.

Subsequently the landlords started to neglect the building. Reyes thinks the disrepairs—including the conditions that invite rats—are intentional, a passive-aggressive strategy to help motivate tenants to move out.

Looking at theThe housing development records that document landlord’s violations seem to support records, it’s easy to believe Reyes’ theory. Since March of 2016, the building at 252 Stockholm Street has 72 open violations from Housing Preservation and Development (35 in 2017, 26 from 2016). The 7 Class C violations, which are considered immediately hazardous and need to be addressed within 24 hours, include a broken radiator, broken wood on a kitchen floor, defective smoke and carbon monoxide detectors, and rodents.

“See this building next door?” Reyes said, pointing to a building with a neat garbage area. “They don’t have a rat problem because they’ve already flipped it. There’s no excuse for rats when someone’s paying three or four thousand in rent.”

But the residents in Reyes building and the building next door, which since 2016, has had 123 open violations including rats, cannot afford to pay rents that high. Many of his neighbors are undocumented immigrants who speak little English.

“They’re afraid to report the landlords to the city,” says Reyes. “I always tell them they have to call in and make complaints. It makes it hard to stay united.”

Reyes considers himself lucky because he hasn’t had rats in his apartment. Some of his neighbors have had rats falling through holes in the bathroom ceiling. Before she returned to her native country, one old woman he knew was bitten on the face in her sleep. Food residue on the faces of sleeping infants can attract rats, and has led to the most some of the most horrific rat stories in the cityhorrific rat stories in which .

Bad landlords have helped rats, but not singlehandedly, according to Combs. He thinks the building's age, as well as the age of the surrounding infrastructure, and even the natural history of the land pre-dating the urban environment, has shaped the rat colonies in the area. There may be historical factors, like building a neighborhood on a marsh, or over the brick sewers of yesteryear, experts said.

"There might be historical factors at play too," says Combs. "A lot of these poorer neighborhoods were founded on the least desirable places to live: on marshes, on fills."

Like Combs, Corrigan also believes brick sewers are part of the "rats' secret success formula." He also agrees that it's hard to pinpoint what exactly about poor neighborhoods is conducive to rat activity.

"You have to consider all the factors of being poor," says Corrigan. "It gets psychological, it gets sociological, it gets organizational."

At the same time, while When Corrigan worked for the city, he said he saw how seemingly negligible preferences in the ways the city managed poorer neighborhoods could have substantial effects on rat problem.

"For example, I found out that a whole bunch of poor neighborhoods are not on a premier collection schedule under DSNY," says Corrigan. "Now do they get collected as often as everyone else? Yes. But suppose there's a 3-hour time difference. In that 3-hour window, most of the rats are out and so is your trash. Versus another neighborhood, where most of the rats are out your trash happens not to be there. It's very subtle."

INTERACTIVE MAP:

https://tswalsh.carto.com/builder/39754540-39b9-4c43-bae2-734dbc5692c9/embed

This is the interactive map we used to find George Reyes and other residents with rat problems.

Use this map to see on a city scale, what areas have the most active rat signs (color), how these have changed over time (selectable timeline from 2015-2017), and get information about residential properties and restaurants that have been cited for rats. This map was created from Department of Health Pest Control inspections, Department of Health restaurant inspections, and Housing Preservation and Development open violations.

VIDEO 1:

Watch this video for an inside look at the indexing and the Rat Reservoir program, where it works and where it doesn't. It also shows how we used the Health Department's data to make the interactive map and find residents facing rat problems.

https://vimeo.com/250375180

The New Budget:

A rat infestation on a single vacant lot can show how complicated a rat solution can be. In a city as dense as New York, different types of properties under different agencies can exist on the same block, within the foraging range of rats belonging to the same reservoirhotspot that's targeted for city attention. The rats can use a web of different infrastructure to travel: steam pipes, sewers, telecommunication and utility lines, all of which are also maintained by different agencies.

The Rodent Task Force and the Health Department's Department of Health's referral system attempt to coordinate the efforts of vastly different bureaucratic institutions that typically don't work together. The Health DepartmentHealth Department may prioritize rat control, but it doesn't have the teeth to enforce enthusiasm or compliance by the other agencies. The Health DepartmentDepartment of Health cannot fine government properties or infrastructure. Schools, which are overseen by the Department of Education, sewers and catch basins, which are overseen by the Department of Environmental Conservation, subway stations, which are overseen by the MTA are notorious feeding grounds.

"That does not mean that they should not put very heavy internal pressure on the other agencies to make sure they do the most they can do with the resources they are given," says Corrigan. "And I'm not sure that is done."

Corrigan thinks the Rodent Task Force, which was created during the Bloomberg administration, has been ineffective. Officials at the various agencies are supposed to work together to address the problem, but each of them is stretched "to the max" he said. "So if someone tries to criticize any agency for not doing more on rats, there'd be a very quick turnaround, and they'd say, 'Well what are you doing on rats?' and right away, everyone is compromised. It's a conundrum in every sense of the word."

At least in part, the city has come to the rescue of poorer residents. In the summer of 2017, the city launched a $32 million multi-agency initiative called the Neighborhood Rat Reduction plan. This unprecedented level of funding acknowledges that the city's decades-worth of extermination campaigns have failed. Instead, the city is investing in new construction and garbage overhauls.

About $25 million of the new $32 rat budget was given to improve conditions in public housing. $16 million goes to renovating NYCHA's basements--many of which still had dirt floors easily tunneled through by rats—by filling them with concrete. $8 million was allocated to providing

NYCHA buildings—many of which did not even have separate recycling bins until 2015—with brand new trash compactors, in order to prevent plastic garbage bags from accumulating on property while waiting for collection trucks.

The Neighborhood Rat Reduction plan seems to benefit the city's poorest residents. The plan targets the city's worst rat neighborhoods, which are also the poorest: Bushwick and Bedstuy in Brooklyn, the Lower East Side and Chinatown in Manhattan, and Grand Concourse in the Bronx. However, de Blasio explained these neighborhoods were chosen first because, "we want to see it work in the places that are toughest in this city. If we do that we can got a lot farther."

It's almost guaranteed that the city will determine that the new plan is working and give more money to expand it across the city.There are signs the city's evaluation of the new program will be compromised by the same poor measures of its previous efforts. Like the Rat Reservoir program, the city may not be using the best measure of success. has already rigged the way it will measure its success. Instead of using indexing, active rat signs, 311 complaints, the DOH will monitor progress by counting burrows.

"It's easy to be the critic, whether it's a movie, baseball game, or rat control. How do you get it done in a city that's already stretched to the limit on everything?" says Corrigan. "On roads, bridges, sewers, schools, housing? New York's the Big Apple, and everyone wants a piece of that money. Maybe if I was ruler of the city, I'd have to make the same hard decisions."

Corrigan accepts that rats cannot be at the center of every decision made by the city. At the same time, some seemingly trivial decisions made by the city have exponentially exacerbated the rat problem.

One of the best example was the switch to the plastic trash bags by the Department of Sanitation. New York is one of the only major cities that allows garbage to be collected in plastic bags and not directly from trash bins. Every night, restaurants throw garbage bags filled with protein for rats, onto the streets for private trash trucks to collect at some point in the night. The change from trash containers to bags prioritized the safety of trash workers. But the bags They can sit out for hours, but and it only takes seconds for rats to chew threw them. Even if collectors get to them before the rats do, food fragments or grease often spill onto the sidewalks and gutters as they're thrown into the trucks.

"In terms of expediency and safety for the sanitation workers, it's the best way to go," says Corrigan, "But we've been growing these rats by the hundreds of thousands ever since we switched to those bags as approved containers," Corrigan said. . Those bags are actually acceptable containers by code."

TALKING TRASH

While Corrigan and Simeone frequently butted heads while working together at the Health Department, they agree on one thing: more garbage equals more rats. This formula isn't strictly anecdotal. The more protein a female rat eats, the larger her litter size.

The city has finally given some ammo to take out the trash problem in 2017's rat campaign. The plan mandates buildings with more than 10 units to put their garbage bags out after 4am. Other buildings and their residents are now required to collect food refuse in a separate bin.

What didn't go to public housing was distributed among other agencies like DSNY and HPD; the Health Department was left with only a modest boost from the Mayor's 2015 infusion of $3 million to expand the Rat Reservoir Program. While Corrigan was happy to see a more serious investment by the city, he was uncertain about how well that money was being spent, especially not in the hands of the Health Department.

"Sometimes assistant commissioners will say, 'You know, I'm really hurting on whatever: trucks, tables, bosses. And we will use some of those trucks for rat control.' New vehicles needed for increased surveys to decrease the rat population! Well, there it goes," explains Corrigan.

The city's new plan also includes a budget for 336 Big Bellies, solar-powered trash compactors equipped with a wireless monitoring system. Big Bellies can hold five times as much garbage as a standard 55-gallon waste basket, according to Big Belly Solar, the company that makes them. But they come at a steep price for a garbage can – about $7,000 each for the current model. They can alert collection crews when they are full. They are also rat-proof, with a small, mail-box style door that people open with a handle. The door lets garbage in, but doesn't let people take garbage out.

Corrigan was part of the initial pilot program where the Department of Health tested Big Bellies' effects on rats. Big Belly Solar approached the DOH with free compactors that they claimed would reduce rodents. And it worked.
His team replaced all the waste-baskets with Big Bellies and surveyed rat activity at night. They didn't use any poisons or dry-ice (carbon-dioxide poisoning) during the experiment. Rat activity was reduced by 96% percent in Tompkins Square Park.
"We had phenomenal results, which is not new." says Corrigan. "If you go back and look at the original studies of Baltimore rats in the 40s with the Davis group (he's the pioneer, 'Doctor Rat.'). They showed that all you have to do is clean up all the alleyways of Baltimore. And you will, without a single ounce of poison, just by removing the trash, get rid of all the rats."

"Once the Norway rat goes hungry, they go whacko. They start killing each other, eating the babies, hiding, inbreeding, the whole population implodes. And those that are strong enough, disperse. Big Bellies certainly reinforce that hypothesis."

VIDEO 2: $3K Solar Compactor Doesn't Work
https://vimeo.com/249891793

Big Bellies can be found in cities across the U.S., including Chicago and Philadelphia. But there are signs they aren't working as advertised. A 2014 Philadelphia Comptroller's audit found that the frequent breakdowns, reliance on Big Belly Solar for maintenance, and high purchasing cost made them a poor investment.

The Philadelphia Comptroller's Audit echoes that of the NYC Parks Department worker:

- "City personnel are not properly trained to perform non-warranty service, maintenance and repairs."
- "During the observations of both night and day crews, many crew members commented that the monitoring system was not reliable. Many times they noted green lights when the system was full and red and/or yellow lights when the system was nearly empty."
- "Requiring citizens to grasp a possibly germ infested unsanitary handle to dispose of trash may not encourage use of these trash receptacles."

The Big Bellies in Williamsburg and Greenpoint, two of the Sanitation Department's pilot neighborhoods, are covered in filth and frequently overflowing with trash. Either because they are full, or people don't like to touch the handle, litter ends up collecting on the surrounding sidewalk, or on the top of the units and covering the solar panels that power them.

Whether or not Big Bellies have been helping or hindering the rats, the city can argue that it's the former as long as it continues to use burrow counts to measure rat activity.

The 336 Big Bellies to be purchased by the new budget may not have the same dysfunctions. They are a newer model that includes a waste compactor and a recycling compactor. They also cost nearly twice as much at $7000.
While an exact contract cannot be found on the Office of Citywide Purchasing's list of recent contracts, a recent contract with Illinois' state university system for 500 of these units rewarded Big Belly Solar with a $5.7 million contract, according to Bloomberg. Big Belly's previous contract with NYC in 2015 went for $1.5 million.

Even though Corrigan believes in the Big Belly, was amazed at their effectiveness on rats, he's skeptical about the city's contract with the company.

"If you go and buy a Big Belly right now under your name, I think you can get it for $3200," says Corrigan. "I was on the periphery of the input on that grant. And I said, 'Somebody needs to talk to the bosses at Big Belly and ask why all the sudden they're $4000 more. Once the city has all those millions, everybody starts taking a bite. It's ridiculous."

According to the Philadelphia Comptroller's report, Big Belly Solar prevents distributors from selling to key accounts like city governments. The report states that Big Belly Solar's price to the city was 15% above the price it sells to distributors. One distributor interviewed by the Comptroller's office claimed his markup was about 5%. Philadelphia would have spent $300 less

per compactor, and saved $200,000 for 720 compactors if they had purchased from the said distributor instead of directly from Big Belly.

Corrigan most blames the company's commission based sales team for the price hike. But according the NYC.gov's lobbyist database, Big Belly Solar paid a lobbyist named Brendan Sexton $165,000--between $25,000 and $42,500 annually between in 2012 and 2016--to lobby the Department of Sanitation's procurement division.

This isn't the first time that a supplier for the Sanitation Department was able to score a multi-million-dollar contract after investing a significant amount to woo politicians. In 2015, Joseph Dussich, donated $100,000 to Campaign for One New York, a political advocacy group with ties to De Blasio, reported the New York Times. Dussich owned of a Queens company that manufactures Mint-X, the only rodent-repellant trash bag registered with the EPA. For years, he struggled to land a city contract.
But shortly after his donation, Blasio's office connected him with the Parks Department. Dussich got a $15,000 contract for a pilot program for Mint-X. The city then purchased a 5-year supply of Mint-X from a distributor, who purchased the product from Dussich for $3 million. This activity led to an FBI investigation into the Dussich, the Parks Department, and the de Blasio administration.

WHAT IT WOULD TAKE?

For Corrigan, the only way the city's leaders and residents will take the rat problem seriously enough to properly fund the war on rats is after we have been hit by a weapon of mass destruction: a deadly contagion.

"Let's say a rat here in New York City caused a plague," says Corrigan. "We would do what we have to do. We would get the money. Could we do it? Yes. Could Seattle do it? Yes. Could Portland do it? Yes. But right now, we don't have that urgency."

Corrigan isn't convinced the city will win the war on rats. *Home reactus*, Corrigan he calls our kind. And the city's overall strategy has been an extension of human nature. Like most other cities across the U.S. and the world, NYC has not had a proactive approach, caught in an endless cycle of responding to complaints with poison baiting. Corrigan, who is writing a book called "Tempting a Plague," thinks the new budget is a step in the right direction, but that it might be too little, too late.

Combs and the Munshi-South lab are also mapping rats in the city. But instead of using city data like 311 complaints or active rat signs to measure populations, they are tracing migration patterns using DNA samples. By comparing where rats have migrated—and where they haven't—with other geographic data like building age, underground infrastructure, and average household income, the researchers can see what helps or hinders rat colonies.

So far, they have shown that there's genetically-unique pockets of rats. For example, uptown rats aren't closely related to downtown rats because the two groups have been separated by midtown, which has better infrastructure, newer buildings, and less residents producing refuse.

Combs' research has the potential to help the DOH and other city agencies direct their resources in a more accurate and comprehensive way than indexing. His findings also show that if a rat carrying a deadly new disease were to arrive in the city's ports, it probably wouldn't spread through the rat population, because rats don't like newcomers, and they don't travel far, even across generations.

But all it would take is one rat to infect one human, because even if rats like to stay at home, people don't.