



Epi Data Brief

New York City Department of Health and Mental Hygiene

July 2016, No. 73

Neighborhood-based Rat Surveillance in the Bronx and Manhattan, New York City, 2010-2014

The Norway rat (*Rattus norvegicus*) is a pervasive urban rodent that brings stress to residents of infested neighborhoods, damages property, causes financial loss, and can carry a variety of pathogens transmissible to humans. In 2007 the New York City Health Department expanded its complaint-driven inspection program to incorporate a proactive "rat indexing" program. Beginning in Bronx neighborhoods with high rat activity, all properties (including residences, commercial properties, and government owned properties such as parks and schools) were inspected for active rat signs (ARS); properties with any ARS were classified as inspection failures. In 2010, rat indexing was expanded to Manhattan.

This report describes the results of the neighborhood rat indexing program by year, borough, and poverty level in four Bronx Community Districts (CDs) and six Manhattan CDs.

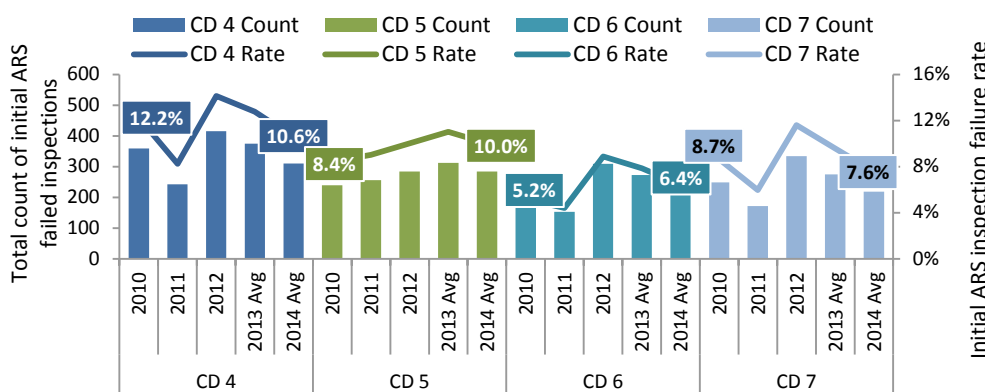
The indexing program led to reductions in active rat signs

- From 2010 to 2014, a cohort of 12,121 properties in the Bronx and a cohort of 19,033 properties in Manhattan were inspected at least once a year.
- Due to increased inspection failures, two rounds of indexing were scheduled in 2013 and 2014 for Bronx CDs, and in 2014 for Manhattan CD 12; other CDs had one round of inspection per year.

The Bronx cohort

- Among the Bronx CDs, the peak failure rate was 11% in 2012.
- Failure rates declined again in most areas in subsequent years.
- All Bronx CDs had lower failure rates in 2014 compared with rates in 2012.
- The lowest failure rate for the Bronx was 4% in CD 6, Belmont and East Tremont, in 2011.
- Bronx CD 4, Highbridge and Concourse, consistently had the highest failure rate with an average failure rate of 12%.

Count and rate of failed initial inspections for active rat signs (ARS) in the Bronx, by Community District, 2010-2014



Note: In years in which two rounds of indexing were conducted, an average rate is reported.

Source: NYC DOHMH Veterinary, Rodent and Vector Surveillance System, 2010-2014

Definition:

Active rat signs (ARS)

include any of six different signs: 1) fresh tracks, 2) fresh droppings, 3) active burrows, 4) active runways and rub marks, 5) fresh gnawing marks, and 6) live rats.

Data Sources

NYC DOHMH Veterinary, Rodent and Vector Surveillance System 2010-2014:

This report includes data on properties that were inspected for ARS one or more times per year from 2010 to 2014.

Method: During each indexing round, inspectors walked every block of each neighborhood, using handheld computers loaded with maps of the properties to record inspection findings. Inspectors inspected as much of the exterior of the property as could be accessed, including front, side, and rear yards or garbage areas, looking for ARS. A finding of any ARS resulted in a failure on initial inspection.

311 complaints, 2014

Complaints made to New York City's non-emergency services line with descriptors of 'conditions attracting rodents,' 'rat sighting,' and 'signs of rodents,' made in Community Districts that were part of the rat indexing program, are included.

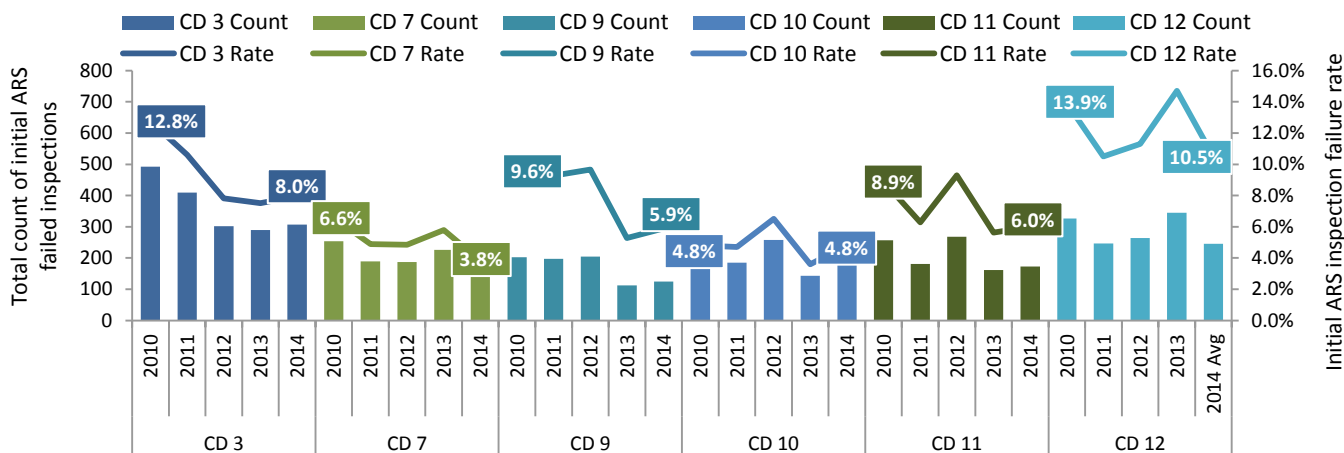
American Community Survey (ACS)

ACS 2009-2013 population estimates were used to calculate population adjusted rate of 311 complaints. ACS 2008-2012 estimates were used for neighborhood poverty analysis.

Manhattan cohort

- Among Manhattan CDs the peak failure rate occurred in the first round of indexing in 2010 (9%); it fell by nearly 30% in 2014 to a historic low of 7%.
- The highest failure rate (15%) in Manhattan was in CD 12, Washington Heights and Inwood, in 2013.
- The lowest failure rate (4%) ever observed in Manhattan was in CD 10, Central Harlem, in 2013.

Count and rate of failed initial inspections for active rat signs (ARS) in Manhattan, by Community District, 2010-2014

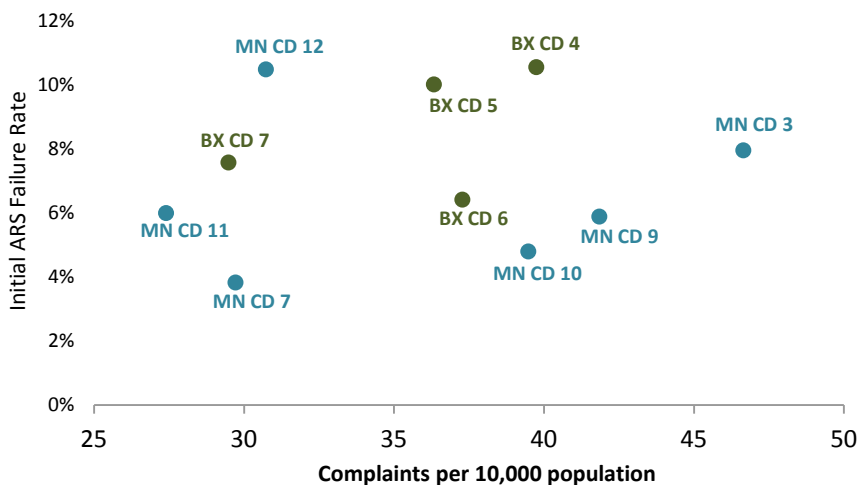


Note: In 2014 two rounds of testing were conducted in CD 12, an average is reported.
 Source: NYC DOHMH Veterinary, Rodent and Vector Surveillance System, 2010-2014

Rat-related complaints to 311 do not always predict failure rates for active rat signs

- Rates of rat-related complaints to 311 were not always aligned with rates of ARS inspection failure.
- In 2014, rat-related complaints were at the highest in the study period. There were 7,182 rat-related complaints to the NYC 311 system made in the communities included in the rat indexing program. Meanwhile failure rates on initial inspection were falling throughout 2014. The increase in complaints was likely a result of the launch of a new 311 app in February of 2014 that made it easier for rat sightings to be reported.
- The average number of complaints in the 2014 study period was 35.9 per 10,000 population. The average failure rate on initial inspection was 7.4% for the same period.
- Central Harlem (Manhattan CD 10) had a higher than average rate of complaints, while the failure rate for rat activity was often among the lowest of the indexed areas. Alternatively, Washington Heights and Inwood (Manhattan CD 12) had a below average rate of complaints, and one of the highest failure rates among the indexed areas.

Percentage of failed initial inspections for active rat signs (ARS) by rate of 311 rat-related complaints in Community Districts of New York City, 2014

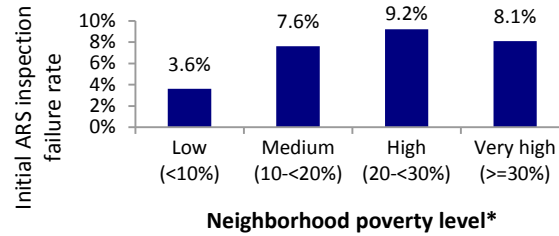


Data points are labeled with Community District, MN=Manhattan, BX=Bronx
 Sources: NYC DOHMH Veterinary, Rodent and Vector Surveillance System, 2014; NYC 311 rat-related complaints, 2014; American Community Survey 2009-2013

Active rat signs were more commonly observed in higher poverty areas than lower poverty areas

- Indexing areas were selected based on history of rat activity, and are skewed towards areas of high poverty. To better understand the relationship between poverty and rat activity, we examined mean rates of ARS failure by poverty level in the Bronx and Manhattan study areas.
- In 2014, among Census tracts that had a least 10 inspections, higher poverty areas had higher ARS.

Mean active rat signs (ARS) inspection failure rate by neighborhood poverty,* New York City, 2014



*Neighborhood poverty defined as the percent of families with incomes below 100% of the Federal Poverty Level, per ACS. Sources: NYC DOHMH Veterinary, Rodent and Vector Surveillance System, 2014; American Community Survey (ACS) 2008-2012

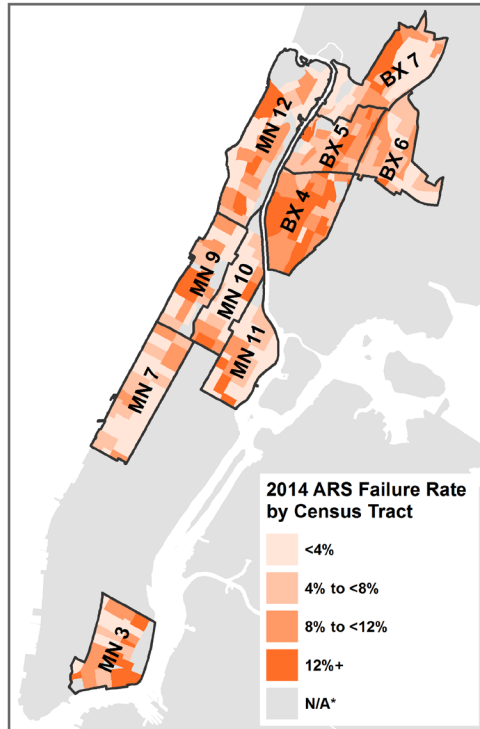
Definition: Neighborhood poverty (based on Census tract) is defined as the percent of families with incomes below 100% of the Federal Poverty Level (FPL), per American Community Survey 2008-2012, in four categories: low poverty (<10% of families below FPL), medium (10 to <20% below FPL), high (20 to <30% below FPL), and very high poverty (>=30% below FPL).

References

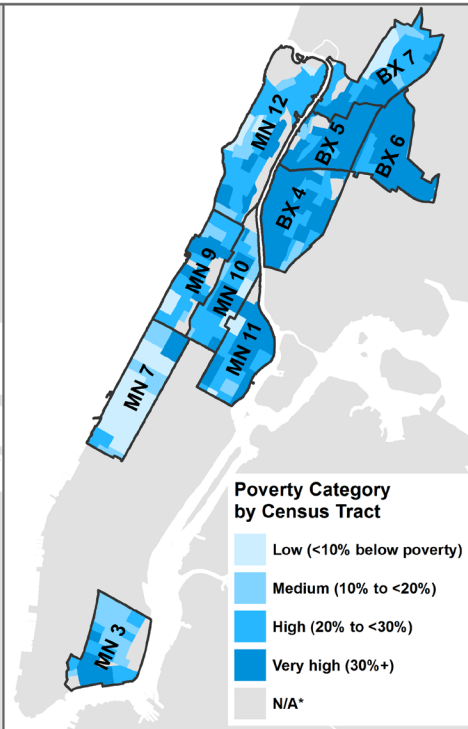
- Corrigan R. A profile of the Norway rat, *Rattus norvegicus*. In: New York City: its impact on city operations and the need for collaborative interagency rat management programs. Timm RM, O'Brien JM, eds. Proceedings of the 22nd Vertebrate Pest Conference. Davis, California: University of California, Davis; 2006:131-41.
- Evaluation of a Neighborhood Rat-Management Program — New York City, December 2007–August 2009 (MMWR): http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6137a1.htm?s_cid=mm6137a1_w.

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Active rat signs (ARS) inspection failure rate by Census tract, New York City, 2014



Neighborhood poverty^ by Census tract, New York City, 2014



^Neighborhood poverty defined as percent of families with incomes below 100% of the Federal Poverty Level, per ACS. Sources: NYC DOHMH Veterinary, Rodent and Vector Surveillance System, 2014; American Community Survey (ACS) 2008-2012

Health Department programs to prevent and control rats

The **Rat Reservoir Program** includes expanded staffing to focus efforts on areas of intense rat activity (reservoirs) in NYC. Along with other programs such as the **NYC Rodent Academy** and the **Rat Indexing program**, the Health Department continues to address both rats and the conditions that cause them. More information can be found [here](#).

Suggested Citation: Bragdon C, Guan S, Merlino M. Neighborhood-based Rat Surveillance in the Bronx and Manhattan, New York City, 2010-2014. Department of Health and Mental Hygiene: Epi Data Brief (73); July 2016.

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Epi Data Tables

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Data Tables

- Table 1.** Number of properties inspected for active rat signs, by Community District, New York City, 2010-2014
- Table 2.** Count and rate of failed initial inspections for active rat signs in the Bronx, by Community District, 2010-2014
- Table 3.** Count and rate of failed initial inspections for active rat signs in Manhattan, by Community District, 2010-2014
- Table 4.** Mean active rat signs inspection failure rate by neighborhood poverty, New York City, 2014
- Table 5.** Count and rate of 311 rat-related complaints in Community Districts of New York City, 2010-2014

Data Sources

NYC DOHMH Veterinary, Rodent and Vector Surveillance System 2010-2014:

This report includes data on properties that were inspected for active rat signs (ARS) one or more times per year from 2010 to 2014. ARS include any of six different signs 1) fresh tracks, 2) fresh droppings, 3) active burrows, 4) active runways and rub marks, 5) fresh gnawing marks, and 6) live rats.

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311 complaints, 2014

Complaints made to New York City's non-emergency services line with descriptors of 'conditions attracting rodents,' 'rat sighting,' and 'signs of rodents,' made in Community Districts that were part of the rat indexing program, are included.

American Community Survey (ACS)

ACS population estimates were used to calculate population adjusted rate of 311 complaints. The following ACS files were used as denominators: ACS 2006-2010 for data from year 2010, ACS 2007-2011 for year 2011, ACS 2008-2012 for year 2012, ACS 2009-2013 for years 2013 and 2014.

ACS 2008-2012 estimates were used for neighborhood poverty analysis, where neighborhood poverty (based on Census tract) is defined as the percent of families with incomes below 100% of the Federal Poverty Level (FPL), per ACS, in four categories: low poverty (<10% of residents below FPL), medium (10 to <20% below FPL), high (20 to <30% below FPL), and very high poverty (≥30% below FPL).

Table 1. Number of properties inspected for active rat signs, by Community District, New York City, 2010-2014

Source: Veterinary, Rodent and Vector Surveillance System 2010-2014, New York City Department of Health and Mental Hygiene, Bureau of Veterinary and Pest Control Services

Community District	Properties in cohort N	Percent of total community district
Manhattan		
3	3,855	90%
7	3,864	87%
8	2,122	85%
10	3,965	90%
11	2,883	90%
12	2,344	85%
Total	19,033	88%
Bronx		
4	2,935	87%
5	2,835	85%
6	3,475	82%
7	2,876	79%
Total	12,121	83%

Table 2: Count and rate of failed initial inspections for active rat signs (ARS) in the Bronx, by Community District, 2010-2014

Source: Veterinary, Rodent and Vector Surveillance System 2010-2014, New York City Department of Health and Mental Hygiene, Bureau of Veterinary and Pest Control Services

Failed initial inspections for ARS		
	N	Percent
Bronx Community District and Year of inspection		
CD 4		
2010	359	12.2%
2011	242	8.3%
2012	415	14.1%
2013 Average^	375	12.8%
2014 Average^	310	10.6%
CD 5		
2010	239	8.4%
2011	256	9.0%
2012	284	10.0%
2013 Average^	312	11.0%
2014 Average^	284	10.0%
CD 6		
2010	180	5.2%
2011	153	4.4%
2012	309	8.9%
2013 Average^	273	7.8%
2014 Average^	223	6.4%
CD 7		
2010	249	8.7%
2011	171	6.0%
2012	334	11.6%
2013 Average^	275	9.6%
2014 Average^	218	7.6%

^ In years in which two rounds of indexing were conducted, an average rate is reported.

Table 3: Count and rate of failed initial inspections for active rat signs (ARS) in Manhattan, by Community District, 2010-2014

Source: Veterinary, Rodent and Vector Surveillance System 2010-2014, New York City Department of Health and Mental Hygiene, Bureau of Veterinary and Pest Control Services

Failed initial inspections for ARS			
Manhattan Community District and Year of inspection	N	Percent	
CD 3			
2010	492	12.8%	
2011	409	10.6%	
2012	302	7.8%	
2013	290	7.5%	
2014	307	8.0%	
CD 7			
2010	254	6.6%	
2011	189	4.9%	
2012	187	4.8%	
2013	226	5.8%	
2014	148	3.8%	
CD 9			
2010	203	9.6%	
2011	197	9.3%	
2012	205	9.7%	
2013	112	5.3%	
2014	125	5.9%	
CD 10			
2010	190	4.8%	
2011	185	4.7%	
2012	258	6.5%	
2013	143	3.6%	
2014	191	4.8%	
CD 11			
2010	257	8.9%	
2011	181	6.3%	
2012	268	9.3%	
2013	162	5.6%	
2014	173	6.0%	
CD 12			
2010	326	13.9%	
2011	247	10.5%	
2012	264	11.3%	
2013	345	14.7%	
2014 Average [^]	246	10.5%	

[^] In years in which two rounds of indexing were conducted, an average rate is reported.

Table 4: Mean active rat signs (ARS) inspection failure rate by neighborhood poverty, New York City, 2014

Sources: *Veterinary, Rodent and Vector Surveillance System 2010-2014, New York City Department of Health and Mental Hygiene, Bureau of Veterinary and Pest Control Services; American Community Survey 2008-2012*

Neighborhood poverty category*	Mean ARS inspection failure	Census tracts
	Percent	N
Low (<10% below FPL)	3.6%	25
Medium (10% - <20% below FPL)	7.6%	36
High (20% - <30% below FPL)	9.2%	76
Very high (\geq 30% below FPL)	8.1%	112

*Neighborhood poverty (based on Census tract) is defined as the percent of families with incomes below 100% of the Federal Poverty Level (FPL), per American Community Survey 2008-2012, in four categories: low poverty (<10% of residents below FPL), medium (10 to <20% below FPL), high (20 to <30% below FPL), and very high poverty (\geq 30% below FPL).

Table 5: Count and rate of 311 rat-related complaints in Community Districts of New York City, 2010-2014

Sources: Veterinary, Rodent and Vector Surveillance System 2010-2014, New York City Department of Health and Mental Hygiene, Bureau of Veterinary and Pest Control Services; American Community Survey 2006-2010, 2007-2011, 2008-2012, and 2009-2013.

Rate per 10,000 population

Community District	2010		2011		2012		2013		2014	
	N	Rate	N	Rate	N	Rate	N	Rate	N	Rate
Manhattan										
3	430	26.0	366	22.3	369	22.4	400	24.1	773	46.7
7	619	28.9	487	22.9	565	26.6	623	29.2	635	29.7
9	386	36.0	291	26.1	323	28.6	326	28.8	474	41.9
10	462	39.2	458	38.3	457	37.4	479	38.4	493	39.5
11	215	17.4	213	17.3	205	16.7	279	23.2	330	27.4
12	454	22.4	453	22.3	468	23.2	521	25.8	621	30.7
Bronx										
4	424	29.3	394	26.7	473	31.8	404	27.2	590	39.8
5	311	23.2	335	25.6	251	19.2	342	25.9	480	36.3
6	285	32.4	246	27.7	263	29.6	285	31.6	336	37.3
7	393	26.8	377	25.7	317	21.2	306	20.7	436	29.5
Total	5,989		5,631		5,703		5,978		7,182	

Note: the increase in complaints in 2014 was mainly due to the launch of a new 311 app in February of 2014 that made it easier for rat sightings to be reported.