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HOW NEW YORK LIVES:

AN ANALYSIS OF THE CITY'S HOUSING MAINTENANCE CONDITIONS



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EXECUTIVE SUMMARY

Nearly 125 years after Jacob Riis published *How the Other Half Lives*, exposing conditions in New York City's crowded tenement buildings, the state of the city's housing stock has dramatically improved. City and State regulation, tax incentive programs, the construction of State-supported affordable housing, and private investment in the city's real estate have all fueled an improvement in housing quality for New Yorkers throughout the five boroughs.

Despite these tremendous gains, in some neighborhoods a substantial number of housing units have unsound conditions that may imperil the health and safety of its inhabitants. This is particularly concerning, since public health experts have long identified poor housing conditions as an important determinant of health and safety.

This report, from New York City Comptroller Scott M. Stringer, details the state of New York City's housing conditions using data drawn from the most recent triennial Housing and Vacancy Survey (HVS) published by the New York City Department of Housing Preservation and Development (HPD) and the U.S. Census Bureau.

In mapping the state of the City's housing stock, this report finds that conditions in New York City Housing Authority (NYCHA) properties have deteriorated significantly in recent years, with a number of long-term and emerging trends apparent in the data that was examined.

The report presents several key findings:

- In 2002, 60 percent of public housing apartments had at least one deficiency. By 2011, 79 percent of public housing apartments had at least one deficiency.
- Water leaks, a key element of a recent tenant-filed federal lawsuit, also rose substantially. In 2002, water leaks were observed in approximately one-fifth of NYCHA apartments. By 2011 that percentage was nearly one-third.
- The number of units with broken or missing windows increased 945 percent from 2005 to 2011.
- From 2005 to 2011, rodent observations increased 12 percentage points, with over 36 percent of NYCHA apartments experiencing this condition in 2011.
- From 2008 to 2011, heating equipment breakdowns increased by 72.8 percent and units with broken plaster and peeling paint increased by 111 percent.

The report also identified several key differences in conditions between stabilized and market-rate units:

- In 2011, 20 percent of rent-stabilized units suffered heating equipment breakdowns and broken plaster and peeling paint was observed in 24 percent of rent-stabilized units – both nearly double the percentage of market-rate units.
- Rodent observations were also higher in 2011. One-third of rent-stabilized units had mice or rats compared to just under one-fifth of market-rate units.

However, when controlling for factors like structure type and age, the differences between market-rate and rent-stabilized housing maintenance conditions are not as pronounced as they first appear.

The report also identifies meaningful differences in housing conditions based on income, race, building size, building age, and borough:

- Over 34 percent of rent-regulated black households have three or more HVS deficiencies, compared with 28 percent of Hispanic households, 18 percent of Asian/Pacific Islander households and 16 percent of white households.
- Low-income tenants often endure worse conditions than affluent tenants in rental apartments. More than a quarter of rent-regulated units occupied by households earning less than \$51,540 (60% of the area median income) report three or more deficiencies compared to one-fifth of units occupied by households earning over \$150,000.

The disparities identified between stabilized and market-rate housing conditions are concerning, especially since New York remains home to nearly one million rent-stabilized units. While HPD is engaged in a long-term effort to boost inspections, the continued existence of these disparities may require additional housing and code enforcement investment by the City, State, and Federal governments.

Taken together, these findings reinforce the daunting challenge facing the City in preserving our existing affordable housing stock and working with our State and Federal partners to ensure that NYCHA remains a bastion of affordable housing in New York for the next 80 years of its existence. Sustained attention from all levels of government is required to bring these vital affordable housing units back to a state of good repair.

The prospect of safe, high-quality housing is undermined when dwelling units have sporadic heat, broken windows, peeling paint, and rodents. This report shows how far we've come in making New York a better place to live. But it also shows how much more we have to do to ensure that every family—regardless of race, income, or neighborhood—has a safe, properly maintained place to call home.

INTRODUCTION

A structurally sound home that protects its occupants from the elements and ensures basic levels of sanitation is a vital precondition for any person's health and safety. In order to gauge how well a city's housing stock fulfills these basic human needs, one must examine the physical quality of the dwelling units.

Perhaps a seemingly trivial topic to the casual observer, public health experts have long identified housing conditions as important determinants of health, with linkages to respiratory ailments, chronic diseases, mental health afflictions and injurious situations ranging from slips and falls to house fires.¹ Substandard housing conditions can also have negative impacts on child development. One study found that for each major deficient maintenance condition present within a housing unit, the probability of a student living in that unit graduating high school drops by about one percent.²

To help track housing conditions, the New York City Department of Housing Preservation and Development (HPD), in conjunction with the U.S. Census Bureau, publishes a triennial Housing and Vacancy Survey (HVS).³ The primary function of the HVS is to measure New York City's vacancy rate for regulatory purposes. However, the HVS also amasses a wealth of supplementary housing data unrelated to vacancy rates, including information that details the physical condition of the City's housing stock.

Drawing from microdata that accompanied the release of the four most recent Housing and Vacancy Surveys, this report presents an examination and analysis of selected housing quality variables for the City's four most prominent housing types: rent-stabilized apartments, market-rate rental apartments, owner-occupied housing and public housing apartments.

The report also examines data describing structural defects as well as building maintenance conditions and equipment deficiencies.⁴

The 2011 HVS report states that overall housing conditions in New York City are "extremely good." However, in some pockets of the City, a discernable number of housing units present unsound conditions that may imperil the health and safety of its inhabitants.

Our analysis of HVS data from 2002 to 2011 finds that deteriorating housing quality is particularly evident in the City's public housing apartments, which exhibited worsening conditions in a number of structural defect and maintenance deficiency categories.

Evidence of poor quality housing conditions in New York City Housing Authority (NYCHA) apartments includes worsening external wall conditions – including heightened levels of missing bricks, siding and outside wall material – increases in the number of broken or missing windows, upticks in heating equipment breakdowns, the presence of mice or rats, cracks and holes in interior walls and ceilings, broken plaster and peeling paint and water leaks.

The data presented in this report paints a picture of a city that has by-and-large maintained a high-quality housing stock in recent years, but some areas, such as public housing, will require sustained government efforts in order to bring deteriorated units back to a state of good repair.

1. Krieger, J., Higgins, D. (2002) "Housing and Health: Time Again for Public Health Action." *American Journal of Public Health*.
2. Braconi, Frank. "Housing and Schooling." *The Urban Prospect*, March/April 2001. Citizens Planning and Housing Council.
3. Results of the housing and vacancy survey are based on a representative sample of all types of housing in the five boroughs of the City.

4. It is important to note the uniqueness of a buildings maintenance deficiencies versus a buildings structural defects. The 2011 Housing and Vacancy Survey report clearly frames the distinction between structural defects and maintenance and equipment deficiencies: "*Structural defects measure problems that are more deeply seated, less easily repaired, and more serious than maintenance deficiencies. Maintenance deficiencies are linked to the operation and maintenance of a building and the units in it and are usually less profound and more easily fixed through routine repairs and maintenance than are structural problems. Both are a function of investment decisions. Structural defects are largely connected to capital disinvestment, while maintenance deficiencies are a reflection of efforts to reduce current operating expenses.*"

A BRIEF HISTORY OF LOCAL HOUSING CONDITIONS

As New York City grew rapidly in the 19th century, substandard housing conditions were an unrelenting issue, with pervasively deficient living conditions capturing the attention of the City's Board of Health and local advocacy groups. A report published in 1853 by the Association for Improving the Condition of the Poor described living conditions in some tenement houses as *"damp, badly ventilated, generally filthy, and beds of pestilence and disease."*⁵

The report prompted the New York State Legislature to appoint a committee in 1856 to examine living conditions in the city and recommend legislation that would, *"remedy the evils and offer full protection to the lives and health of the occupants of such buildings."*⁶

No immediate legislative progress was made until 1867, when the State found itself compelled to respond to a landmark report published by the Citizens Association of New York which documented, for the first time, the sanitary condition of the City. The report, prepared by a team of 24 physicians, paid special attention to the city's *"fever-nests and insalubrious quarters"* and made recommendations for well-administered sanitary regulation of the City's housing stock, including the creation of a new Department of Social Statistics and Dwelling Improvement which was to be tasked with monitoring and enforcing upgrades to the City's residential building conditions.⁷

Following the adoption of the State's first Tenement House law in 1867 and 1879, which established basic standards for City dwellings, investigative journalist Jacob Riis published his sensational *"How the Other Half Lives"* in 1890. Riis used pictures and prose to document the squalid conditions of the City's tenement houses for an audience of affluent New Yorkers who were unexposed to the living conditions of the City's working class. His book offered recommendations

for improving old houses and building new, model tenements.⁸

Years of civic discussion and debate eventually led to the passage of a series of laws – including the Tenement House Act of 1901, and the Multiple Dwelling Law of 1929 – which required the provision of ventilation, running water and light and set new standards for sanitation, fire egress, minimum square footage, and density.

By the beginning of the 20th century, the linkage between housing conditions and public health and safety had become an accepted cornerstone of public policy and housing reform advocacy. In 1910, the National Housing Association was established with a mission to *"improve housing conditions, both urban and suburban, in every practicable way."*⁹ In introducing the mission of National Housing Association to an audience of public health professionals, tenement house reformer Lawrence Veiller noted *"the view that the improvement of home conditions and of all environment is fundamental, is not confined to the medical profession, but is spreading throughout the country."*¹⁰

Despite these crucial steps forward, widespread improvements to the city's living conditions did not come quickly. In 1934, the New York City Civil Works Administration conducted an eight-month survey of housing conditions in multifamily residential buildings. The study characterized 17 square miles of the city's oldest housing stock as *"firetraps, breeders of crime and disease."*¹¹

Recognizing that cities lacked the capacity to adequately address the public health consequences of urban slums on their own, and desperate to create new jobs to bolster the depressed economy, the federal government passed the U.S. Housing Act of 1937 which established

5. Veiller, Lawrence. "Tenement House Reform in New York, 1934-1900." Prepared for the Tenement House Commission of 1900. <https://archive.org/details/tenementhouseref00veilrich>

6. Ibid.

7. Report of the Council of Hygiene and Public Health of the Citizens Association of New York. 1865. http://books.google.com/books?id=_fFHXA7zbt4C&pg=PA142&source=gbs_toc_r&cad=4#v=onepage&q&f=false

8. Riis, Jacob. *"How the Other Half Lives."* 1890. Charles Scribner's Sons.

9. Veiller, Lawrence. "The National Housing Association." 1910. <https://archive.org/details/cu31924016066254>

10. Lawrence Veiller. *Remarks: 38th Annual Meeting of the American Public Health Association.* Milwaukee, WI. September, 1910.

11. Dagen Bloom, Nicholas. *"Public Housing That Worked."* 2008. University of Pennsylvania Press.

federally-funded, locally-operated public housing programs. The vision for public housing in the U.S. was built on the successes of President Roosevelt's Public Works Administration, through which New York City had constructed Knickerbocker Village in the Lower East Side and Harlem River Houses in Northern Manhattan in the early 1930s.¹²

In the city, there was no greater champion for replacing antiquated tenements with new public housing developments than Mayor Fiorello LaGuardia. In October 1938, the Mayor invoked substandard housing conditions to rally New Yorkers for change over the airwaves of WNYC, proclaiming: "*Tear down the old, build up the new. Down with rotten antiquated rat holes. Down with hovels. Down with disease. Down with fire traps. Let in the sky. A new day is dawning. A new life! A new America!*"¹³

Many of the city's slums were eventually cleared and the public housing that was constructed in their place was considered at the time to be among the city's premium accommodations for low- and middle-income New Yorkers.

During the decades of post-war prosperity, New York City experienced a rejuvenation of housing conditions. One initiative that helped spur housing improvements was the J-51 tax abatement program which was enacted in 1955 to encourage the installation of heat and hot water systems in the city's cold water flats.¹⁴

However, as the 1960s segued into the 1970s, demographic change and economic restructuring caused real estate values to plummet in many areas. Consequently, housing conditions began to languish, with deterioration snowballing into dilapidation and residential buildings forsaken for abandonment.

The Bronx in particular experienced historic levels of fire and arson in the 1970s, eviscerating large portions of its existing housing stock. As one historian

has noted, during the 1970s there were seven census tracts in the Bronx that lost at least 97 percent of their buildings to fire and abandonment and 44 other Bronx census tracts that lost at least half.¹⁵ The combination of fire, organized arson-for-profit schemes and rampant insurance fraud culminated in the loss of some 108,000 housing units in the Bronx alone from 1970 – 1981.¹⁶

The wave of housing divestment and abandonment experienced in the 1970s set the stage for the New York's *in rem* program which allowed the city to amass an inventory of approximately 40,000 occupied and 60,000 vacant units that were in tax delinquency.¹⁷ The accumulation of *in rem* housing was a major factor that necessitated the City's housing initiatives in the 1980s.

Citing the "*tide of deterioration, arson and abandonment which has swept the city's housing market for years*" and noting that over 20 percent of the City's rental units had serious maintenance deficiencies, Mayor Ed Koch unveiled a five-year, \$4.4 billion housing plan in his 1985 State of the City address.¹⁸ Koch's original plan, which called for the construction of 100,000 low- and moderate-income units, was later expanded to build or preserve 252,000 units at a cost of \$5.1 billion.¹⁹

Years later, in remarks delivered at a real estate conference in Portugal, former Mayor Koch drew a linkage between the *in rem* program and the success of his affordable housing plan, noting that it relied on "*the transformation of all vacant, city-owned buildings into affordable housing, and the rehabilitation of all the occupied residential buildings owned by the City.*"²⁰

Since those days, New York City's housing marketplace has strengthened substantially and physical building condition ratings are now at their highest levels since

12. Public Housing in the United States, 1933 – 1949. U.S. Department of the Interior. [http://www.nps.gov/nr/publications/guidance/Public Housing in the United States MPS.pdf](http://www.nps.gov/nr/publications/guidance/Public%20Housing%20in%20the%20United%20States%20MPS.pdf)

13. LaGuardia and Wagner Archives. LaGuardia Community College. Box #060233, Folder #9. File Name: 06.020.0053.060233.9.PDF

14. J-51 Guidebook. New York City Department of Housing Preservation and Development. April, 2004.

15. Flood, Joe. "The Fires: how a computer formula burned down New York City – and determined the future of American cities." 2010. Riverhead Books.

16. Soffer, Jonathan. "Ed Koch and the Rebuilding of New York City." 2010. Columbia University Press.

17. Braconi, Frank. "In Re In Rem: Innovation and Expediency in New York's Housing Policy." In Schill (Ed.) *Housing and Community Development in New York City: Facing the Future*. (pp 93-118).

18. Koch, Edward I. "The State of the City – Housing Initiatives." January 30, 1985. <http://chpcny.org/assets/Koch-1985-SOC-housing-plan.pdf>

19. Soffer, Jonathan. "Ed Koch and the Rebuilding of New York City." 2010. Columbia University Press.

20. Ed Koch, "Remarks: 9th Lisbon Real Estate Fair and Conference." November 22, 2006.

1965. Undoubtedly, the improvement in the quality of the city's housing stock can largely be attributed to the revival of the city's economy and the consequent strengthening of property values throughout the five boroughs, making housing abandonment a rare occurrence today. Public reinvestment in the housing stock reinforced the market-driven improvement, and in some neighborhoods, was the catalyst for it. Additionally, improved enforcement of the City's housing code has also had a significant effect on the quality of the housing stock.

Currently, HPD administers two programs that supplement basic maintenance code enforcement in private housing: the Alternate Enforcement Program which allows the agency to make repairs in residential buildings with open hazardous violations, and the Proactive Preservation Initiative which identifies and addresses deteriorating physical conditions in multifamily buildings. A recent Comptroller's Audit found that HPD was generally in compliance with the local law that enabled the Alternate Enforcement Program.²¹

Despite the City's existing efforts, significant enclaves of poor quality housing persist and nearly 30 percent of the City's housing units have multiple maintenance deficiencies.

HOUSING CONDITIONS TODAY

The Housing and Vacancy Survey provides the most detailed and comprehensive snapshot of housing maintenance conditions in New York City. The HVS itemizes both structural and dwelling maintenance deficiencies for each of the housing units contained in its survey panel. In this section our analysis of those deficiencies is presented, based on our tabulations of HVS microdata.

Structural Defects

A building's structural defects are observed by U.S. Census Bureau field representatives conducting the

HVS. Structural defect assessments are used to determine the dilapidation rate of occupied buildings.

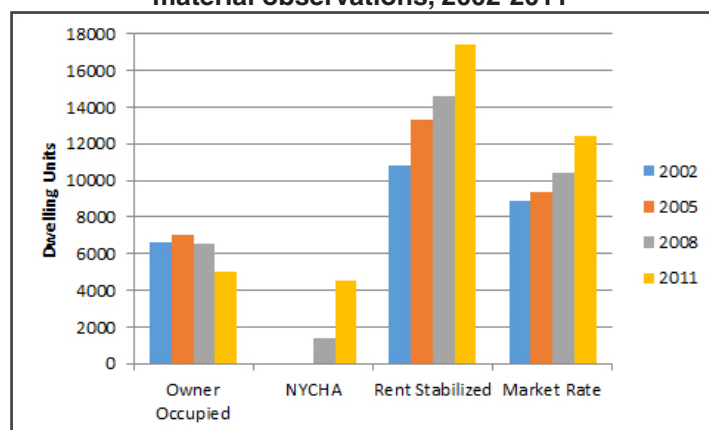
Although the City's dilapidation rate is now the lowest since comparable data became available, with 99.8 percent of all housing types in structurally sound condition as of 2011, two measures of structural defects yield some intriguing insights into the overall physical state of the City's housing stock.

Condition of External Walls

Among the external wall conditions observed by Census personnel are "missing bricks, siding or other outside wall material." The HVS describes these conditions as "defects that can only be corrected by extensive repairs to siding, shingles, boards, brick, concrete or stucco."

As Chart 1 illustrates, there was modest improvement in the condition of outside wall material in owner-occupied housing from 2002 to 2011. However, structural wall defects were observed in the NYCHA category for the first time in 2008 and those observations became more frequent in 2011. Additionally, steady increases were observed in the rent-stabilized and market rate rental categories. Missing bricks, siding or other outside wall material observations increased at a notably sharper rate for rent-stabilized apartments relative to market-rate rentals.

Chart 1 – Missing bricks, siding or other outside wall material observations, 2002-2011



Source: NYC Comptroller's Office from New York City Housing and Vacancy Survey microdata

21. Audit Report on the Department of Housing Preservation and Development's Alternative Enforcement Program. April 9, 2013. Office of the New York City Comptroller.

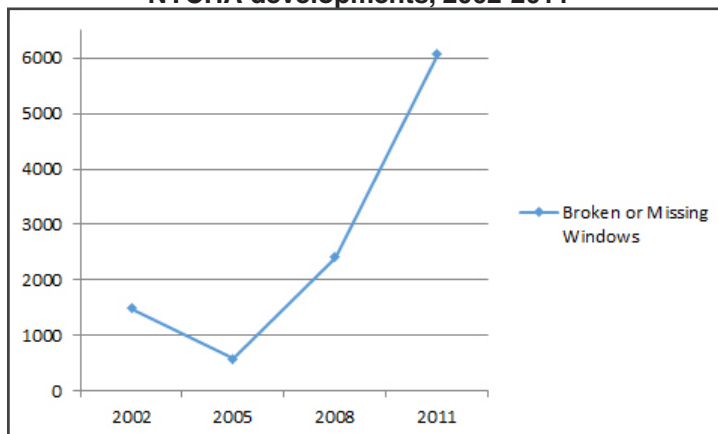
Condition of Windows

Perhaps the most startling trend in the assessment of structural defects over the last four HVS reports is the condition of windows in public housing developments.

In NYCHA buildings, a sharp increase in broken or missing windows was observed. Although the condition of windows in public housing improved from 2002 to 2005, observations of broken or missing windows surged by over 900 percent from 2005 to 2011. By 2011, HVS data indicates that broken or missing windows were present in over 6,000 NYCHA apartments. The incidence of broken or missing windows in NYCHA housing was about three times that of the overall housing stock in 2011.

Chart 2 illustrates changes in the broken or missing windows observation for NYCHA developments.

Chart 2 – Broken or missing window observations in NYCHA developments, 2002-2011



Source: NYC Comptroller's Office from New York City Housing and Vacancy Survey microdata

MAINTENANCE AND EQUIPMENT DEFICIENCY TRENDS AND CHANGES, 2002 – 2011

In addition to structural building defects, the Housing and Vacancy Survey also includes data on an array of maintenance and equipment deficiencies in individual dwelling units.

Table 1 – Maintenance and Equipment Deficiencies, 2002 – 2011

	Owner Occupied	Market Rate	Rent Stabilized	NYCHA
Heating Equipment Breakdowns				
2002	5.4%	9.3%	18.2%	18.7%
2005	7.1%	11.8%	21.5%	19.2%
2008	5.2%	10.2%	17.8%	18.5%
2011	7.1%	11.1%	20.1%	26.6%
Additional Heating Required				
2002	5.2%	11.2%	16.0%	22.0%
2005	7.2%	15.6%	20.2%	23.3%
2008	8.1%	14.3%	19.9%	24.1%
2011	9.5%	16.9%	21.3%	28.7%
Presence of Mice or Rats				
2002	9.9%	18.9%	35.5%	26.9%
2005	7.4%	16.8%	35.8%	26.4%
2008	9.5%	16.4%	35.3%	30.8%
2011	10.6%	19.3%	33.6%	36.9%
Cracks and Holes in Interior Walls and Ceilings				
2002	3.6%	8.9%	20.0%	16.6%
2005	3.5%	10.2%	20.1%	17.2%
2008	3.7%	8.6%	19.5%	20.8%
2011	4.5%	11.0%	21.0%	30.8%
Floor Holes				
2002	1.2%	4.2%	10.9%	6.3%
2005	1.4%	4.4%	11.4%	5.2%
2008	1.4%	5.0%	11.4%	7.1%
2011	1.6%	4.5%	10.8%	8.9%
Broken Plaster and Peeling Paint				
2002	5.8%	11.5%	23.1%	25.2%
2005	5.7%	11.1%	25.5%	29.5%
2008	5.3%	9.8%	19.2%	22.2%
2011	7.1%	12.2%	23.8%	39.2%
Water Leakage				
2002	9.1%	12.6%	27.3%	20.0%
2005	10.0%	13.6%	27.5%	19.6%
2008	11.0%	12.9%	24.2%	21.4%
2011	13.6%	16.1%	28.8%	32.1%

Source: NYC Comptroller's Office from New York City Housing and Vacancy Survey microdata

Table 1 illustrates changes in seven key housing deficiencies over the last four HVS reports.²² In most categories, changes in deficiency levels for owner-occupied housing, market-rate rentals and rent-stabilized apartments tend to hold steady or change only slightly. However, in public housing developments, significant adverse changes in deficiency levels were observed from 2002 to 2011.

Across each of the deficiency categories examined for this report, NYCHA apartments presented consistent signs of deterioration. In 2002, just over 40 percent of public housing units had no maintenance deficiencies. However, after steady declines in subsequent Housing and Vacancy Surveys, by 2011 only 21 percent of NYCHA apartments did not have any observed deficiencies.

A report published by the Community Service Society (CSS) in July 2014 confirmed the alarming rise in maintenance deficiencies in public housing units from 2002 to 2011.²³ CSS documented increases in the number of NYCHA apartments with three or more deficiencies and with four or more deficiencies. The CSS report concluded that NYCHA apartments with at least three deficiencies increased from 20 percent in 2002 to 34 percent in 2011, and that NYCHA dwellings with at least four deficiencies rose from 11 percent in 2002 to 19 percent in 2011.

The subsections below describe the maintenance and equipment deficiency trends that appear in Table 1 and note the public health and safety consequences of the most serious maintenance deficiencies found in New York City dwelling units.

Heating Equipment Breakdowns

The inconvenience, discomfort and potential health and safety consequences of a heating equipment breakdown are apparent to anyone who has spent a winter in New

York City.²⁴ Exposure to cold temperatures has been linked to increased rates of influenza infection²⁵ and persistent exposure to cold conditions has been found to increase mortality rates in urban areas, with higher effects seen in communities with less education and in communities with a higher percentage of population that identifies as black.²⁶

New Yorkers in all housing types reported the need to supplement functional heating systems with additional sources of heat, including kitchen stoves, fireplaces and space heaters on at least one occasion in the winter prior to participating in the housing and vacancy survey. The use of supplementary heat increased across the board from 2002 to 2011. In 2011, more than 25 percent of public housing units used an additional heating source and more than 20 percent of rent stabilized apartments used an additional heating source.

Heating equipment breakdowns in public housing units increased from 2008 to 2011, with more than one in four residents of NYCHA apartments reporting heating equipment breakdowns. HVS survey data indicate that over 25,000 NYCHA apartments were affected by heating equipment breakdowns in 2008, with that number rising to over 43,000 in 2011 – an increase of 72.8 percent. Rent-stabilized apartments also exhibited a considerable frequency of heating equipment breakdowns, with the percentage of rent-stabilized tenants reporting breakdowns rising from 17.8 to 21.5 from 2002 to 2011. The HVS also tabulates the number of heating equipment breakdowns in dwellings, with “four or more times” as the highest measure. In NYCHA developments, there was a 50 percent rise in the number of dwelling units experiencing at least four heating equipment breakdowns from 2002 to 2011. By 2011, more than 23,000 public housing units registered at least four heating breakdowns.

22. The percentages presented in the table detail only units where observations occurred. Units where “no observation” was reported were not factored into the percentages presented in the table. Some caution should be used in interpreting differences in the 2011 HVS due to sampling and weighting variations attributable to changes in the 2000 and 2010 decennial census. These differences should be viewed as general historical trends.

23. Bach, V., Waters, T. (2014). Strengthening New York City’s Public Housing. *The Community Service Society*.

24. Heating equipment breakdowns are defined in the HVS as failures of the heating system that last for at least six consecutive hours during the winter time. Heating equipment breakdowns can be caused by broken pipes, electrical or gas parts out of order, downed power lines, or running out of fuel.

25. Davey, M., Reid, D. (1972) “Relationship of Air Temperature to Outbreaks of Influenza.” *British Journal of Preventative and Social Medicine*.

26. Anderson, B., Bell, M. (2009) “Weather related mortality – How Heat, Cold and Heat Waves Affect Mortality in the United States.” *Epidemiology*.

New York City's Mayor's Management Reports document the fluctuation of heat and hot water complaints. From FY01 to FY04, heat and hot water complaints accounted for over 25 percent of all housing complaints received by the City; however, that percentage has leveled off to approximately 20 percent of all housing complaints since FY05.²⁷

Between FY01 and FY13, heat and hot water violations accounted for an average of 4.9 percent of all housing code violations issued by HPD. According to the FY13 Mayor's Management Report, HPD's housing litigation division commenced 2,819 heat and hot water enforcement proceedings and collected \$2 million in heat and hot water charges from building owners – an indication that heating equipment breakdowns remain a chronic maintenance issue across parts of the city.

Broken Plaster, Peeling Paint and Holes in Interior Walls and Ceilings

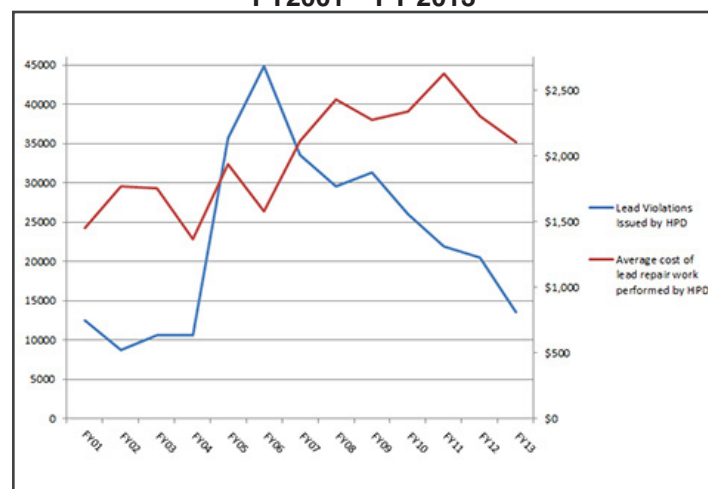
Lead paint exposure is a particularly dangerous consequence of broken plaster, peeling paint and holes in interior walls and ceilings, especially for children. The U.S. Department of Housing and Urban Development (HUD) reports that lead exposure can lead to brain and organ damage, behavioral problems and learning disorders in children, as well as seizures, stomachaches, headaches, nausea, tiredness, irritability, and in extreme cases, death.²⁸ Generally, lead paint is not considered a health threat if the paint is intact.

Cracks and holes in interior walls and ceilings have increased substantially in public housing units. From 2002 to 2011, observations of such conditions in NYCHA dwellings nearly doubled, implying that over 50,000 units had such conditions in 2011. By 2011, just under one third of NYCHA apartments reported interior cracks and holes in walls and ceilings. Rent-stabilized apartments also exhibited a high rate of deficiency in this category.

NYCHA residents reported a high frequency of broken plaster and peeling paint. The percentage of NYCHA residents reporting such conditions nearly doubled from 2008 to 2011, indicating that by the latter year almost 64,000 public housing units contained such maintenance deficiencies. By 2011, rent-stabilized tenants reported broken plaster and peeling paint nearly twice as often as occupants of market-rate rentals.”

According to recent Mayor's Management Reports, a surge of lead violations were issued by HPD from FY04 to FY09. However, since FY09, lead violations have decreased and now hover just slightly above FY01 to FY04 levels. However, the cost borne by HPD to remediate lead paint violations has steadily risen. In FY13, the average cost of lead repair work performed by HPD stood at \$2,108 per incident, a 45 percent increase since FY01.

Chart 3 – Lead violations and repair costs, FY2001 – FY 2013



Source: Mayors Management Report

The Center for Disease Control (CDC) sets environmental intervention blood lead levels (EIBLL) which serve as benchmarks to measure blood lead levels in children.²⁹ Under the New York City Health Code, when EIBLL levels are breached, an environmental inspection of the child's home must be conducted to determine if housing conditions are the source of that child's lead exposure.³⁰

27. Public housing residents must file heat and hot water complaints with the NYCHA Customer Contact Center rather than through the City's 311 system. Therefore, NYCHA heat and hot water complaints may not be included in these figures.

28. http://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/healthyhomes/lead

29. According to the New York City Department of Health and Mental Hygiene, EIBLL is currently defined as 15 mcg/DL or higher.

30. Report to the New York City Council on Progress in Preventing Childhood Lead Poisoning in New York City. New York City Department of Health & Mental Hygiene, September 30, 2013.

Consistent EIBLL data for children younger than six years of age has been published by the New York City Department of Health and Mental Hygiene (DOHMH) for the years 2005 – 2012.³¹ In 2005, 751 children younger than six years old presented blood lead levels that exceeded the EIBLL threshold. By 2012, that number had dropped by 58 percent to 313 incidents, a percentage decrease that closely aligns with the reduction in HPD lead violations from FY06 to FY12.³²

Water Leakage

Water leakage and dampness³³ are often precursors to the spread of household mold which has been linked to a series of negative health outcomes including eczema, asthma, bronchitis and other respiratory infections.³⁴ A 2007 journal article estimated that the cost of asthma attributable to dampness and mold in the home nationwide was between \$2.1 billion and \$4.8 billion annually.³⁵

NYCHA developments exhibited a sharp uptick in water leak observations from 2002 to 2011. Reported water leaks rose from approximately one-fifth of public housing units surveyed to nearly one-third. Rent-stabilized apartments also exhibited high water leakage levels, with 28.8 percent of residents reporting water leaks in 2011.

For some New Yorkers living in NYCHA developments, mold caused by water leaks have become a chronic problem. Following the filing of a federal class-action

lawsuit by tenant groups, the City agreed to a settlement in December 2013 that will require NYCHA to remove mold, fix leaks and insulate pipes and address other sources of moisture in apartments within seven to fifteen days of receiving a work order for the condition.³⁶

However, problems with mold are not limited to public housing. In June 2014, there were some 8,300 mold related open housing maintenance code violations in New York City dwellings, comprising approximately 2.7 percent of all open violations issued by HPD inspectors at that time.³⁷

Presence of Mice or Rats

Rodents spread allergens that are widely understood precursors of asthma and other ailments such as Hantavirus Pulmonary Syndrome.³⁸

Public housing apartments registered steady increases in the reported presence of mice or rats from 2005 to 2011. According to HVS responses, rodents were present in 26 percent of NYCHA apartments in 2005, and by 2011 the frequency of mouse and rat observations had jumped to 37 percent. In each of the four HVS reports studied, over one-third of rent-stabilized apartments reported the presence of mice or rats, an appreciable difference compared to owner-occupied housing and market-rate apartments.

Research published by the New York City Department of Health and Mental Hygiene (DOHMH) in 2005 found that rodent infestation is most common in low-income households. According to DOHMH, rodents were found in 29 percent of dwellings occupied by households earning less than \$25,000 and in 25 percent of households earning \$25,000 to \$49,999.³⁹

31. Data from other DOHMH reports suggest that children younger than 6 years of age account for the majority of child lead cases in New York City. According to the 2009 DOHMH annual data report for lead poisoning in New York City, in 2005 a total of 875 children younger than 18 years of age presented blood levels that triggered an environmental inspection of that child's home, meaning that over 85 percent of children that presented blood lead levels of 15 mcg/dL or higher in 2005 were six years of age or younger.

32. Report to the New York City Council on Progress in Preventing Childhood Lead Poisoning in New York City. New York City Department of Health & Mental Hygiene, September 30, 2013.

33. This category tracks incidents in which water leaks into a unit through ceilings, the roof or closed windows. Observations of water leaking through fixtures such as toilets or sinks are not included in this category.

34. Mendell, M., Mirer, A., Cheung, K., Tong, M., Douwes, J. (2011). "Respiratory and Allergic Health Effects of Dampness, Mold, and Dampness-Related Agents: A Review of the Epidemiological Evidence." *Environmental Health Perspectives*.

35. Mudarri, D., Fisk, W.J., (2007). "Public Health and Economic Impact of Dampness and Mold." *International Journal of Indoor Environment and Health*.

36. "Facing Suit, New York City Agrees to Remove Mold in Public Housing More Quickly," New York Times, December 16, 2013.

37. Housing code violation data obtained from the NYC Open Data website on June 24, 2014 listed 8,343 open violations related to mold.

38. Observations in this category include a visual confirmation of mice or rats or their signs or traces within the three months prior to participation in the Housing and Vacancy Survey. Signs or traces of mice or rats include droppings, holes in the wall or torn food containers.

39. NYC Vital Signs. Vol 4, No. 3. December 2005. <http://www.nyc.gov/html/doh/downloads/pdf/survey/survey-2005pest.pdf>

PATTERNS OF DEFICIENT MAINTENANCE IN NEW YORK CITY'S HOUSING STOCK

In the previous section we detailed the presence of particular maintenance deficiencies in the primary sectors of the City's housing stock. Those specific deficiencies often cluster in poorly managed or financially-stressed buildings, causing a cumulative impact on the health and comfort of the residents. In this section we look at how deficiencies cluster across the broad housing types.

Following common practice in housing research, we categorize dwelling units that have three or more of the seven major maintenance conditions present at the same time as "deficient."⁴⁰ An apartment that only has one of the conditions present may not be systematically under-maintained, and in most cases it can be presumed that the condition will shortly be corrected. However, multiple maintenance deficiencies are evidence of systematic maintenance problems which may reflect owner malfeasance or financial stress. Often, systematic under-maintenance is associated with the economic, regulatory, or structural characteristics of the housing. For example, units in older buildings can be expected to have more maintenance deficiencies than new dwellings, both because the building systems and components may deteriorate over time, and because tenant incomes and rents are likely to be lower.

Table 2 below details the frequency of units with three or more maintenance deficiencies in 2011 by housing type.

Table 2 – Summary of Deficient Dwelling Units by Housing Type in 2011

All Housing Types	15.0%
Owners occupied	4.8%
Market Rate Rental	10.6%
Rent Regulated	24.4%
NYCHA	34.8%

Source: NYC Comptroller's Office from New York City Housing and Vacancy Survey microdata

40. The seven major maintenance conditions that the HVS clusters into a single "maintenance deficiencies" variable include: heating equipment breakdown (one or more times), additional heating required, rodent infestation, cracks/holes in walls, ceilings or floors, broken plaster/peeling paint larger than 8.5 x 11 inches, toilet breakdowns and water leaks.

While public housing units show the greatest frequency of maintenance deficiencies and the most adverse trends in recent years, the maintenance condition of rent-regulated housing units also appear to be generally worse than that of market-rate rental units. Insofar as an alleged discouragement of housing investment has been one of the primary criticisms of rent regulation, we give particular attention to that issue. Several researchers have already examined and commented on this enduring debate.

In 1990, Gyourko and Linneman used data from the 1968 HVS and found a nine percent greater probability that the oldest and smallest rent controlled Manhattan buildings were in an unsound condition relative to non-regulated rentals, with smaller probabilities found in the other boroughs.⁴¹

A 1993 study using more recent data examined the effect of rent regulations on the quality of rental housing in New York City and concluded that rent regulations may lead to a decline in the quality of regulated dwellings or reduce the chances that those units improve in quality.⁴²

Newer research on the topic conducted by Elizabeth Roistacher, professor of economics at Queens College, used data from the 2008 HVS and concluded that rent-regulated apartments are in buildings that are less well-maintained, although she cautions that her results "cannot be called powerful evidence of differences."⁴³

Table 3 illustrates differences in the percentage of owner-occupied, rent-regulated, NYCHA and market-rate dwelling units with three or more deficiencies. All percentages in Table 3 are for 2011.

Deficiency rates vary depending on a tenant's contract rent. Predictably, as contract rents increase in the rent-regulated sector, the percentage of units with three or more maintenance and equipment deficiencies decreases. That lends credence to critics' claims that by limiting the cash flow of buildings and by reducing

41. Gyourko, J., Linneman, P. (1990). "Rent Controls and Rental Housing Quality: A Note on the Effects of New York City's Old Controls." *Journal of Urban Economics*.

42. Moon, C. and Stotsky, J. (1993). "The Effect of Rent Control on Housing Quality Change: A Longitudinal Analysis." *Journal of Political Economy*.

43. Roistacher, E. "Rent Regulation: Beyond the Rhetoric." June 2010.

the owners' returns on maintenance investment, rent regulation results in lower housing quality. However, the consistent relationship between rents and maintenance condition does not hold true in market-rate rental units, where the percentage of deficient units shows little variation in the \$501 - \$2000 contract rent range and only drops as rents reach \$2,001 or more.

Table 3 – Summary of Deficient Dwelling Units in 2011

	Owner Occupied	Market Rate	Rent Regulated	NYCHA
Contract Rent:				
\$1 - \$500	N/A	10.4%	28.4%	37.9%
\$501 - \$1,000	N/A	12.8%	27.7%	31.7%
\$1,001 - \$1,500	N/A	11.7%	24.4%	24.3%
\$1,501 - \$2,000	N/A	12.0%	16.4%	-----
> \$2,000	N/A	6.7%	7.8%	-----
Household Income:				
≤\$34,360	5.7%	15.1%	26.0%	36.3%
\$34,361 - \$51,540	7.2%	8.3%	27.8%	35.0%
\$51,541 - \$85,900	4.5%	11.0%	21.6%	25.8%
\$85,901 - \$111,670	4.3%	7.5%	21.5%	-----
\$111,671 - \$150,325	3.3%	6.0%	17.2%	-----
> \$150,325	4.2%	7.6%	20.6%	-----
Race:				
White	3.1%	7.1%	15.6%	23.9%
Black	9.9%	17.7%	34.6%	34.7%
Hispanic	5.6%	11.2%	28.4%	37.6%
Asian/Pacific Islander	4.6%	10.0%	18.2%	14.4%
Other	10.7%	11.0%	27.3%	-----
Building Size:				
1-2 Stories	4.1%	8.7%	-----	-----
3-10 Stories	7.0%	14.4%	25.8%	35.6%
11-20 Stories	2.2%	4.6%	14.3%	32.6%
Over 20 Stories	0.9%	2.0%	9.5%	40.5%
Building Age:				
2000 or later	6.3%	9.6%	14.0%	-----
1980 – 1999	3.7%	4.7%	9.2%	-----
1947 – 1979	3.7%	4.7%	15.1%	35.0%
1920 – 1946	5.4%	13.5%	27.0%	35.2%
Pre-1900 – 1919	6.2%	14.0%	28.4%	N/A
Borough:				
Bronx	7.2%	16.2%	32.6%	41.6%
Brooklyn	6.6%	14.1%	26.2%	34.0%
Manhattan	3.2%	8.3%	21.4%	34.9%
Queens	4.6%	7.9%	16.0%	25.3%
Staten Island	2.5%	2.5%	11.8%	9.1%
<i>Note: the household income ranges above correspond with current area median income levels for families of four: \$34,360 = 40% AMI; \$51,540 = 60% AMI; \$85,900 = 100% AMI; \$111,670 = 130% AMI; \$150,325 = 175% AMI</i>				
<i>Note: fields marked with dashed lines represent categories with small sample sizes that prohibit reliable measurements.</i>				

Source: NYC Comptroller's Office from New York City Housing and Vacancy Survey microdata

Appendix II at the conclusion of this report includes a detailed discussion of the effects of contract rents on maintenance deficiencies in rent-regulated and market-rate dwelling units.

It might also be expected that maintenance deficiencies are negatively correlated with renter incomes, as high-income households can afford the higher rents that may be associated with well-maintained housing. Using area median income (AMI) levels for families of four as a benchmark for categorizing income groups, we find that over one quarter of rent-regulated units occupied by households at or below 60 percent of AMI (\$51,540) are maintenance-deficient units. As household incomes increase, the rate of deficient rent-regulated apartments levels off to approximately one-fifth, with small variations between income groups. A substantially lower percentage of market-rate rental units are deficient when compared to rent-regulated apartments in each income group.

The race and ethnicity of tenants also correlates with the likelihood of deficient maintenance in rent-regulated and market rate rentals, although a large number of confounding circumstances are likely to influence these findings. Over one third of rent-regulated tenants who identify as black live in apartments with three or more HVS deficiencies, while tenants who identify as white report a deficiency rate that is less than half that. Since black households on average have lower incomes than white households, and pay lower rents, a more thorough, multi-variate statistical analysis is required to conclude that race is a factor that independently influences maintenance condition.⁴⁴

Dwelling maintenance conditions also differ with structure type for both rent-regulated and market-rate rental buildings. The city's largest-sized buildings have lower maintenance deficiency levels than small and mid-sized buildings. New York's tallest rental buildings also registered the highest percentage of units with zero deficiencies. For example, over 71 percent of market rate rental units in buildings over 20 stories were free of major maintenance deficiencies, while approximately 54 percent of rent-regulated units in similarly sized buildings reported zero deficiencies.

44. See Appendix II

The condition of the city's smallest rental buildings are notable and have important policy ramifications in light of a recent finding that over three quarters of low-income New Yorkers that do not receive any housing subsidy live in 1 to 5 unit properties.⁴⁵ Because rent stabilization generally applies only to buildings of at least six units, reliable data could only be generated for apartments in 1 to 2 story market rate rental buildings, 8.7 percent of which contained three or more deficiencies.

Units in mid-sized buildings of 3 to 10 stories presented the highest percentage of deficient units, a notable finding given that 57 percent of the City's rent-stabilized and market-rate rental buildings fall into this category. Buildings of that size are often owned by individual real estate investors with varying financial motives and management expertise.

Manhattan benefits the most from relatively low deficiency rates in rent-stabilized and market-rate rental buildings that exceed ten stories in height, with 69 percent of the city's 11 to 20 story rental buildings and 85 percent of rental buildings over 20 stories located in that borough. The boroughs with the largest proportions of 1 to 2 story rental buildings and 3 to 10 story rental buildings are Queens (43.2%) and Brooklyn (36.1%) respectively.

A building's age is also an important factor. Predictably, buildings constructed before 1947 (generally built prior to World War II) exhibit considerably higher deficiency rates. This trend holds true for both rent-regulated and market rate dwellings, although rent-regulated units in pre-war buildings exhibit more than twice the percentage of deficient units relative to pre-war market rate rentals.

The data also indicates differences in conditions by borough. Staten Island possesses the city's highest quality rent-regulated and market-rate rental housing stock, with deficiency rates of only 11.8 percent and 2.5 percent respectively. Nearly three quarters of market-rate rentals in Staten Island exhibited zero deficiencies, as did nearly two-thirds of Staten Island's

rent-regulated units. The quality of dwelling units in Queens, Manhattan, Brooklyn and the Bronx follow Staten Island in respective order.

Neighborhood differences in deficiency rates for rent-stabilized and market-rate housing units are also apparent. The map on the next page illustrates the average number of maintenance deficiencies for rental apartments by neighborhood.⁴⁶ Blue neighborhoods represent areas with the lowest average deficiencies and red neighborhoods represent areas with the highest average deficiencies. Appendix I lists the average deficiency rate in the rental housing sector for each New York City neighborhood.

One notable result presented in Table 3 that does not relate to rent-regulated or market-rate housing is a building size trend that is unique to public housing. Generally, in other housing types, as the number of stories increases, deficiency rates decrease. However, NYCHA apartments reverse this effect with the highest percentage of deficient units (40.5%) found in buildings over 20 stories. This sharply contrasts with a deficiency rate of less than one percent in owner-occupied units found in buildings over 20 stories.

It is noteworthy, although not unexpected, that owner-occupied maintenance and equipment deficiency rates, detailed in Tables 1 and 3 are generally lower than other housing types. Among the possible explanations for these findings are that home owners do not face the same constraints in executing home repairs as tenants in other settings such as public housing. They may also perceive incentives to under-report maintenance and equipment deficiencies in their dwelling units. Notwithstanding whether maintenance and equipment deficiencies appear in rent-regulated, market-rate or other housing types, the City is tasked with inspecting maintenance deficiencies and enforcing their remediation. HPD bears this responsibility, dedicating some \$28.4 million for code enforcement in FY13. The City has stepped up its efforts to monitor local housing quality, with HPD code enforcement inspections increasing by more than 46 percent over the course of the last decade.

45. Ellen, I., Been, V., Hayashi, A., and Gross, B. (2013). "Maintenance and Investment in Small Rental Properties in New York City." *The Furman Center for Real Estate and Urban Policy*.

46. The data illustrated in map and listed in the accompanying appendix are a combination of rent-regulated and market rate units.

Average 2011 HVS Deficiencies In Rent Stabilized And Market Rate Rental Units By Neighborhood

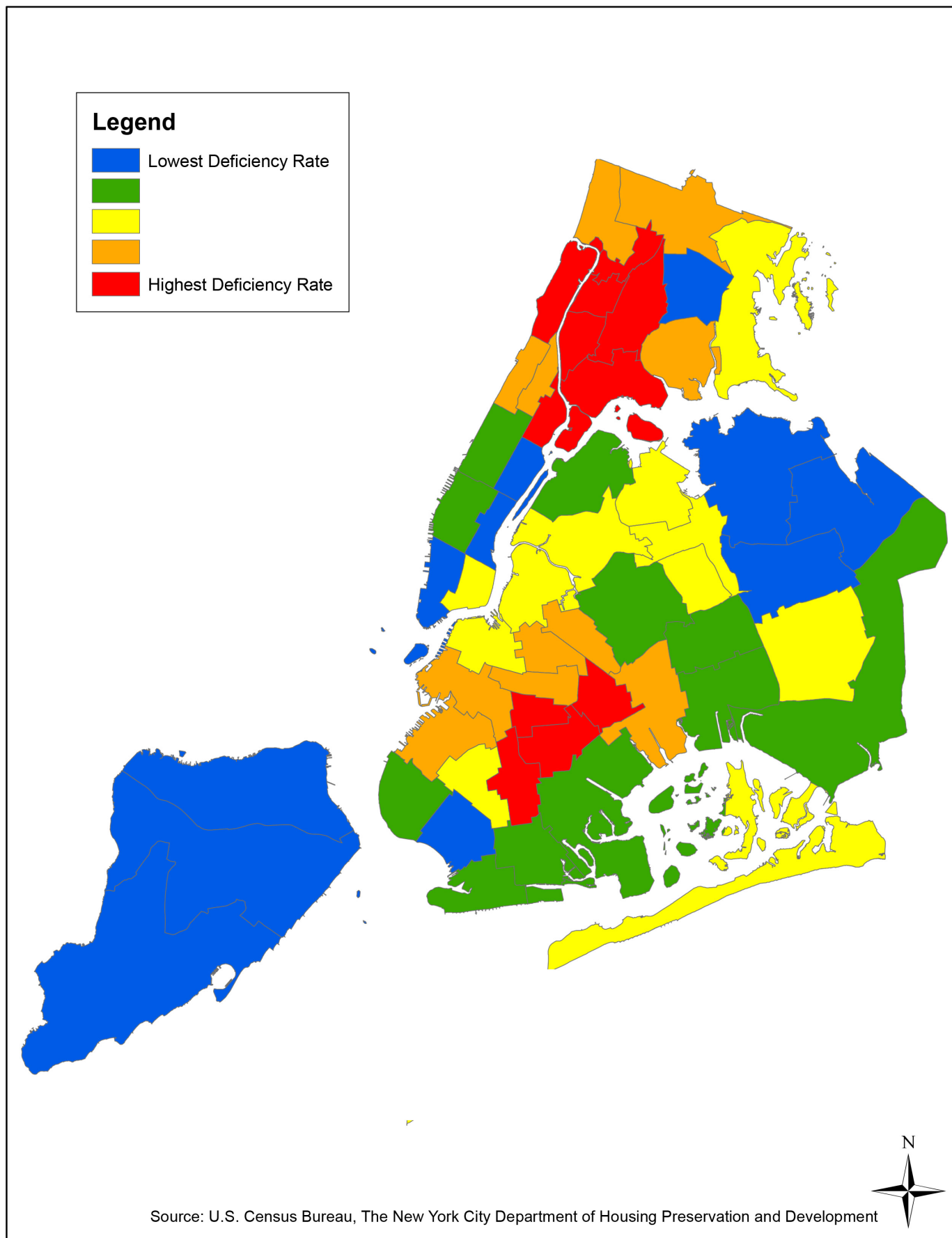
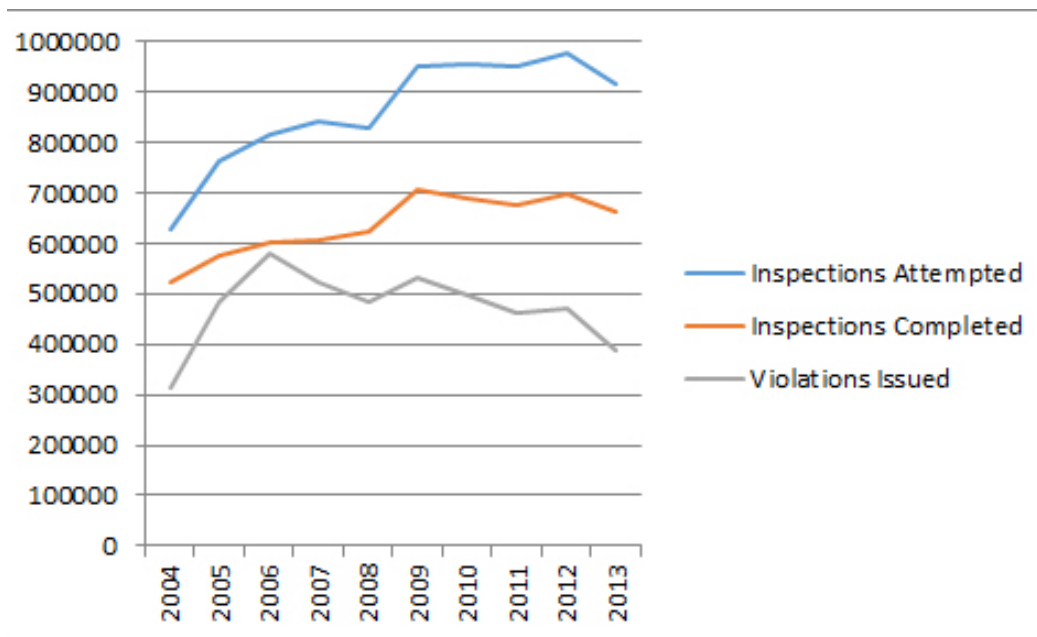


Chart 4 – HPD Housing Code Inspections and Violations, 2004-2013.



Source: Mayors Management Report

CONCLUSION

The quality of New York City’s housing stock has significantly advanced from its historical low points. The overall physical conditions of the City’s dwellings are at their highest recorded levels since the Housing and Vacancy Survey began monitoring housing conditions in 1965.

Improvements in local housing quality over the years can be traced back to the nascent housing advocacy of Lawrence Veiller, Jacob Riis and others. However, it is also clear from the experience of the 1970s and more recent decades, that the city’s overall economic prosperity plays a key role in ensuring good quality housing for its citizens.

Perhaps the most important conclusion that can be drawn from this brief examination of New York City’s housing quality is that the recent deterioration of physical conditions in the city’s public housing stock must be counterbalanced immediately. The fact that public housing lags so far behind other housing types in New York City is ironic considering the original mission of the New York City Housing Authority.

Setting irony aside, it is clear that the New York City Housing Authority will require sustained attention from

all tiers of government, especially the federal level, in order to bring its vital affordable housing units back to a state of good repair – an effort that will require at least \$18 billion according to City Council testimony delivered by NYCHA Chairwoman Shola Olatoye earlier this year. Alleviating NYCHA’s housing quality dilemma will be among the City’s greatest challenges as it seeks to preserve some 120,000 units of affordable housing over the next decade.

AVERAGE 2011 HVS DEFICIENCIES IN RENT STABILIZED AND MARKET RATE RENTAL UNITS BY NEIGHBORHOOD

	Neighborhood	Average Deficiencies
1	South Shore	0.2256587
2	Mid-Island	0.3433596
3	Bayside/Little Neck	0.5534799
4	Flushing/Whitestone	0.6221784
5	Stuyvesant Town/turtle Bay	0.6667197
6	Hillcrest/Fresh Meadows	0.6780495
7	North Shore	0.6818801
8	Greenwich Village/Financial District	0.7428022
9	Upper East Side	0.7611667
10	Bensonhurst	0.7716746
11	Pelham Parkway	0.8571401
12	Flatlands/Canarsie	0.8604961
13	Bellerose/Rosedale	0.8661388
14	Upper West Side	0.8676069
15	Howard Beach/S. Ozone Park	0.8706959
16	Astoria	0.882225
17	Sheepshead Bay/Gravesend	0.9070032
18	Kew Gardens/Woodhaven	0.931171
19	Chelsea/Clinton/Midtown	0.9403638
20	Bay Ridge	0.9418244
21	Middle Village/Ridgewood	0.9432056
22	Coney Island	0.9713972
23	Borough Park	1.003101
24	Rockaways	1.009533
25	Throgs Neck/Co-op City	1.045923
26	Elmhurst/Corona	1.05792
27	Williamsburg/Greenpoint	1.114156
28	Sunnyside/Woodside	1.122065
29	Forest Hills/Rego Park	1.126621

	Neighborhood	Average Deficiencies
30	Jackson Heights	1.1757
31	Brooklyn Heights/Fort Greene	1.184398
32	Lower East Side/Chinatown	1.215959
33	Jamaica	1.2322407
34	Sunset Park	1.303254
35	Soundview/Parkchester	1.340856
36	Park Slope/Carroll Gardens	1.369402
37	Bedford Stuyvesant	1.404875
38	Bushwick	1.510625
39	Williamsbridge/Baychester	1.540678
40	Riverdale/Kingsbridge	1.554298
41	Central Harlem	1.615611
42	North Crown Heights/Prospect Heights	1.619006
43	Morningside Heights/Hamilton Heights	1.639289
44	East New York/Starrett City	1.687021
45	Brownsville/Ocean Hill	1.697704
46	Mott Haven/Hunts Point	1.724797
47	Flatbush	1.76283
48	Washington Heights/Inwood	1.784193
49	East Flatbush	1.829455
50	Kingsbridge Heights/Moshulu	1.924824
51	East Harlem	1.958333
52	Highbridge/S. Concourse	2.017641
53	Morrisania/East Tremont	2.070716
54	University Heights/Fordham	2.135053
55	South Crown Heights	2.349051

Source: NYC Comptroller's Office from New York City Housing and Vacancy Survey microdata

AN ECONOMETRIC ANALYSIS OF HOUSING MAINTENANCE DEFICIENCIES

The analysis presented in this study finds significant variation in housing maintenance conditions according to the regulatory status, rent, age, structure type, tenure type and neighborhood of housing units, as well as according to the demographic characteristics of the housing occupants. Those characteristics vary with each dwelling unit, and the maintenance condition of the unit is the product of factors that promote good maintenance conditions or detract from them. For example, an apartment may be in an older, pre-World War I structure, leading one to expect more maintenance problems, but it may also be located in a high-income area and rent for a high price, leading one to expect excellent maintenance conditions. In order to understand the separate effects of different factors on maintenance condition, then, it is necessary to use multivariate statistical techniques to disentangle the offsetting or reinforcing factors.

In this section we present a series of multivariate regressions that analyze the specific effects of different apartment characteristics on the number of maintenance deficiencies that can be expected to be found in a dwelling unit and on the probability that a dwelling unit in New York City will be of a poor maintenance quality.

Table II-A shows the results of five linear regressions of the number of maintenance deficiencies in rental units, with explanatory factors that include apartment, neighborhood and occupant characteristics. In each case the linear regression coefficients are shown with their respective t-statistics, indicating the level of statistical significance, in smaller type below.

The first regression shows the estimated effects of apartment type, structure type, regulatory status and neighborhood on the number of maintenance deficiencies. It omits the household characteristic variables. The reference group to which particular types of apartments are compared are rentals in 1- to 3-unit structures, which our research has shown are generally better maintained than are apartments in larger rental buildings. The vast majority of those units rent at market rates, although there are some that fall under the rent regulation umbrella for one reason or another.

The regression results indicate that dwelling units in all types of large rental buildings have more maintenance deficiencies than units in 1- to 3-unit structures. Holding other factors constant, market-rate rentals in 4-unit or larger buildings have about 0.27 more deficiencies per unit than apartments in small buildings (column 1). Rent-stabilized units in large buildings have about 0.57 additional maintenance deficiencies than rental units in small structures. Controlling for the other variables, units in NYCHA developments have a statistically-significant 1.18 additional maintenance deficiencies per unit.

The age of the building is also shown to be associated with the number of maintenance deficiencies. Post-World War II buildings constructed between 1946 and 1980 are omitted for comparison. Apartments in rental buildings built prior to WWI are found to have about .40 more maintenance deficiencies than apartments in the reference group, while apartments in modern buildings (built 1980-2000) are found to have about .11 fewer deficiencies than the reference group apartments. Apartments in elevator buildings are found to have fewer maintenance deficiencies, perhaps because such buildings require greater managerial expertise and attract more professionalized investors. The number of years that have elapsed since the current tenant moved in is associated with more deficiencies, presumably because maintenance conditions in vacant apartments are often corrected prior to leasing.

The regression also shows that the borough in which the apartment is located is a powerful predictor of maintenance condition (Queens is omitted from the regression to serve as a reference). Controlling for other factors, apartments in the Bronx have .42 more maintenance deficiencies than like apartments in Queens, and apartments in Manhattan have, on average, .44 additional maintenance deficiencies. These differences are statistically significant and hold

even when average neighborhood income is controlled for.

In Regression 2 the number of maintenance deficiencies is regressed on the same set of variables as well as on household income, age of householder, and a set of dummy variables signifying the race (white is the omitted for reference) and ethnicity of the householder and their nativity. The inclusion of the household characteristics variables improves the predictive power of the regression while the estimates of the effects of the initial variables remain fairly constant.

In addition to those already discussed, two findings from Regressions 1 and 2 stand out. First, the effect of apartment rent appears to have only a very weak and marginally significant effect on the number of deficiencies, and in any case the coefficient is of the “wrong” sign—that is, the regressions find that the higher the rent, the more maintenance deficiencies the apartment is likely to have. This is a startling finding which undercuts the notion that maintenance condition is primarily a function of the rental value of the apartment, which regulatory status may influence.

It can be argued that by controlling for regulatory status the regressions are “pulling off” the effects of apartment rent, and that the positive and statistically significant coefficient on “Rent Stabilized,” in particular, is suppressing the statistical effect of individual apartment rent. To test the validity of that criticism, we present two additional regressions (Regressions 3 and 4) which were run for market-rate rentals and rent-stabilized apartments separately. In neither of those regressions is the rent variable statistically significant.

The second notable finding is that, even after controlling for apartment characteristics, neighborhood income, and household income, race is strongly and significantly associated with the number of maintenance deficiencies. Black householders, in particular, occupy apartments with, on average, .51 more maintenance deficiencies than similar white households. In fact, whether the occupant of the apartment is white or black is almost as important a predictor of maintenance condition as whether the apartment is market-rate or rent-stabilized. Hispanic householders live in apartments with .28 additional maintenance deficiencies, and Asian householders in apartments with .11 additional deficiencies, compared to statistically similar white householders.

It is tempting to conclude that these findings are evidence of “maintenance discrimination” against minority renters, especially black renters. In other words, that landlords are not as quick to correct maintenance deficiencies in the apartments of minority tenants as they are when the tenant is white. To test that hypothesis, we ran a regression of recent movers—renters who moved into their apartments no more than two years prior to the 2011 HVS. (Regression 5.)

Table II-A
Linear Regressions of Housing Maintenance Deficiencies

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
	Unit	Plus Housheold	Market Rate	Rent Stabilized	Recent
	Characteristics	Characteristics	Only	Only	Movers
Market Rate	0.26979	0.28200	X	X	0.15159
	5.10	5.34			1.94
Stabilized	0.57286	0.58326	X	X	0.18669
	11.66	11.93			2.53
Controlled	0.30590	0.34605	X	X	0.10191
	2.08	2.34			0.33
Subsidized	0.40321	0.42517	X	X	0.40805
	5.15	5.52			2.62
In rem	0.60703	0.56017	X	X	-0.70502
	2.60	2.36			-1.42
NYCHA	1.18252	1.07181	X	X	0.81374
	14.62	13.15			4.84
Pre-WWI	0.40219	0.37386	0.30880	0.39611	0.26834
	7.26	6.79	3.10	4.16	3.51
Pre-WWII	0.28179	0.27361	0.28952	0.31384	0.34145
	6.99	6.85	3.83	4.68	5.58
Built 1980-2000	-0.11347	-0.11948	-0.05642	-0.35340	-0.11292
	-1.95	-2.06	-0.68	-2.03	-1.44
Built 2000-2011	-0.10755	-0.13080	-0.10663	-0.28287	-0.00518
	-1.71	-2.10	-1.10	2.43	-0.06
Elevator Bldg	-0.17633	-0.14809	-0.33048	-0.09117	-0.11832
	-4.09	-3.44	-4.18	-1.56	-1.82
Apartment Rent	0.00004	0.00004	0.00004	0.00005	0.00004
	1.94	1.77	1.29	0.93	1.28
Years Occupied	0.01021	0.01395	0.00772	0.02259	0.26983
	6.64	7.89	1.60	8.29	7.52
Bronx	0.42075	0.34289	0.19505	0.39344	0.28375
	7.85	6.32	1.29	4.84	3.19
Brooklyn	0.25220	0.21051	0.26728	0.30335	0.21462
	5.88	4.85	2.59	4.17	3.14
Manhattan	0.43604	0.35640	0.63387	0.33639	0.33721
	7.23	5.91	4.97	3.71	3.63
Staten Island	-0.17346	-0.15550	-0.38504	-0.22824	-0.24972
	-2.34	-2.06	-2.86	-0.85	-2.63
NH Income	-0.00708	-0.00519	-0.00744	-0.00505	-0.00491
	-11.92	-8.47	-6.82	-5.36	-5.70
HH Income	X	0.00014	0.00034	0.00008	0.00006
		0.78	1.52	0.23	0.27
Black Householder	X	0.50864	0.35360	0.64286	0.46676
		11.32	3.17	9.10	5.96
Hispanic Householder	X	0.28243	0.15790	0.32637	0.22423

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
	Unit	Plus Housheold	Market Rate	Rent Stabilized	Recent
	Characteristics	Characteristics	Only	Only	Movers
		6.45	1.70	4.69	3.30
Asian Householder	X	0.11802	0.14557	0.16267	0.07267
		2.19	1.47	1.78	1.04
Foreign Born	X	0.00447	-0.05060	0.10414	-0.10960
		0.13	-0.71	1.85	-2.04
Householder's Age	X	-0.00538	-0.00137	-0.00814	-0.00445
		-4.76	-0.61	-4.28	-2.37
constant	19.23477	0.74829	1.13399	1.16215	0.49630
r-squared	0.1164	0.1323	0.1233	0.0997	0.1158
Oberservations	9,171	9,171	1,702	4,069	2,915

Table II-B
Probability Regressions of Poor Maintenance Conditions

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
	Unit	Plus Housheold	Market Rate	Rent Stabilized	Recent
	Characteristics	Characteristics	Only	Only	Movers
Market Rate	0.05966	0.06275	X	X	0.02319
	3.38	3.54			1.17
Stabilized	0.13438	0.13642	X	X	0.03940
	9.29	9.43			2.18
Controlled	0.08842	0.10155	X	X	0.01638
	2.24	2.52			0.16
Subsidized	0.11081	0.11058	X	X	0.04182
	3.89	3.90			0.88
In rem	0.15867	0.14754	X	X	-0.04528
	3.74	3.43			-0.69
NYCHA	0.32286	0.29322	X	X	0.19418
	11.93	10.89			4.01
Pre-WWI	0.10352	0.09612	0.07165	0.12208	0.04872
	5.84	5.47	2.24	4.04	2.07
Pre-WWII	0.07461	0.07351	0.08210	0.09071	0.06930
	5.89	5.84	3.08	4.22	3.75
Built 1980-2000	-0.04060	-0.04108	0.02191	-0.09196	-0.02924
	-1.69	-1.74	0.62	-1.25	-0.86
Built 2000-2011	-0.00302	-0.00964	0.00881	-0.03704	0.02924
	-0.13	-0.42	0.25	-0.87	-0.86
Elevator Bldg	-0.03260	-0.02758	-0.07552	-0.00880	-0.01880
	-3.01	-2.54	-3.76	-0.55	-1.30
Apartment Rent	0.00000	0.00001	0.00001	0.00000	0.00001
	0.04	0.72	1.35	-0.02	1.32
Years Occupied	0.00219	0.00283	0.00107	0.00479	0.05214
	5.88	6.39	1.00	6.23	5.76

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
	Unit	Plus Housheold	Market Rate	Rent Stabilized	Recent
	Characteristics	Characteristics	Only	Only	Movers
Bronx	0.10120	0.08461	0.05808	0.09612	0.06522
	6.40	5.37	1.60	3.82	2.95
Brooklyn	0.06571	0.05607	0.05957	0.06949	0.03735
	4.88	4.12	2.29	2.94	2.10
Manhattan	0.09868	0.08147	0.12134	0.07194	0.05751
	5.66	4.71	3.95	2.59	2.50
Staten Island	-0.04735	-0.04839	X	-0.01425	-0.08195
	-1.39	-1.42		-0.16	-2.00
NH Income	-0.00156	-0.00114	-0.00130	-0.00098	-0.00088
	-9.10	-6.46	-4.97	-3.36	-3.78
HH Income	X	-0.00001	0.00003	0.00003	-0.00004
		-0.15	0.45	0.23	-0.45
Black Householder	X	0.11345	0.06504	0.15693	0.08661
		8.60	2.66	7.30	4.52
Hispanic Householder	X	0.06719	0.01227	0.08960	0.03154
		5.22	0.56	4.30	1.85
Asian Householder	X	0.04200	0.03983	0.04492	0.02441
		2.32	1.57	1.48	1.14
Foreign Born	X	-0.00598	-0.01752	0.01991	-0.02643
		-0.63	-1.06	1.28	-2.14
Householder's Age	X	-0.00096	0.00054	-0.00176	-0.00046
		-3.02	0.97	-3.14	-0.95
Observations	9,171	9,171	1,677	4,069	2,915

The recent-mover regression indicates that the differential in the maintenance condition of apartments occupied by otherwise similar white, black, and Hispanic renters exists within a short-time after the apartment is initially leased—and in fact may be present even when it is leased. This finding does not rule out “maintenance discrimination” in occupied apartments, but points the analysis primarily towards differences in the quality of the housing stock where whites, blacks and Hispanics are most likely to seek apartments.

A set of probability (probit) regressions is presented in Table II-B. These regressions estimate the marginal effects of the original set of variables on the probability that a dwelling unit will be of poor maintenance quality (three or more of the seven major maintenance deficiencies). The value of the effects are evaluated at the mean of the variables, and for dummy variables, the marginal effects shown are for a discrete change from 0 to 1. Statistical significance, as measured by the z-statistic, is shown in smaller type below the estimated effect.

In general, the results of the probability regressions support the results of the linear regressions discussed above. The regressions estimate the probability of a rental unit being in poor maintenance condition at the mean of all the explanatory variables at 17.4 percent, compared to the actual overall rate of poor maintenance quality of 20.0 percent. The regressions estimate that market-rate rentals (in buildings of 4 units or more) are about 6 percentage points more likely to be in poor maintenance condition than rental units in 1- to 3-unit structures. Rent-stabilized units are about 13 percentage points more likely to be in poor maintenance condition than rental units in small buildings. NYCHA units are estimated to be 32 percentage points more likely to be in poor maintenance condition.

The probability regressions also confirm the non-significance of individual apartment rents and occupant income

in predicting poor maintenance quality. Those variables are not statistically significant in any of the regression specifications while the neighborhood variables, Borough and Neighborhood Income, are significant. However, while the borough effects are large, the neighborhood incomes effects are relatively weak. Each \$10,000 increase in average neighborhood household incomes reduces the estimated probability that an apartment will be in poor maintenance condition by only about 1 percentage point. We interpret these results as indicating that dwellings in rental buildings in favorable borough and neighborhood locations are considered to be more valuable assets and are maintained better, regardless of the income of the particular tenant or the rent they pay for their unit.

The probability regressions also confirm a large householder demographic effect. All other variables held constant, a black householder is about 11 percentage points more likely to live in an apartment in poor maintenance condition than a similar white householder, and a Hispanic householder is about 7 percent more likely. As in the linear maintenance deficiency regressions, these effects are present even when the sample is limited to recent movers.

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