7M+

snow-adjacent complaints analyzed

NYC Snow-Adjacent 311 Complaint Analysis

Weather-Complaint Correlation Study | 2010–2026

Data: NYC 311 Open Data • Open-Meteo ERA5 • U.S. Census ACS 2023

r = −0.78

Temp–Heating Correlation

3.89×

Heating Spike Below Freezing

87×

Snow/Ice Surge at 32°F

11×

Bronx vs SI Gap

Executive Summary

Temperature is King

Daily temperature explains ~61% of heating complaint variance (r = −0.78). Below freezing, heating complaints nearly 4× and snow/ice surges 87×.

Lag Effects Matter

Plumbing complaints peak 2 days after cold snaps. Homeless shelter needs lag 3 days. Heating and snow/ice respond same-day (lag 0).

Stark Equity Gaps

The Bronx generates 817 heating complaints per 1,000 residents vs. 73 on Staten Island — an 11× disparity tied to poverty and aging housing.

Methodology

01 **311 Data**

42.8M service requests filtered to 18 snow-adjacent complaint types across 6 categories: Heating, Plumbing, Snow/Ice, Boilers, Water Supply, Homeless Shelter.

02 **Weather Data**

ERA5 daily records (2010–2026): temperature, precipitation, wind speed. Derived: wind chill (NWS formula), snow day estimation, 3-day cold snap detection.
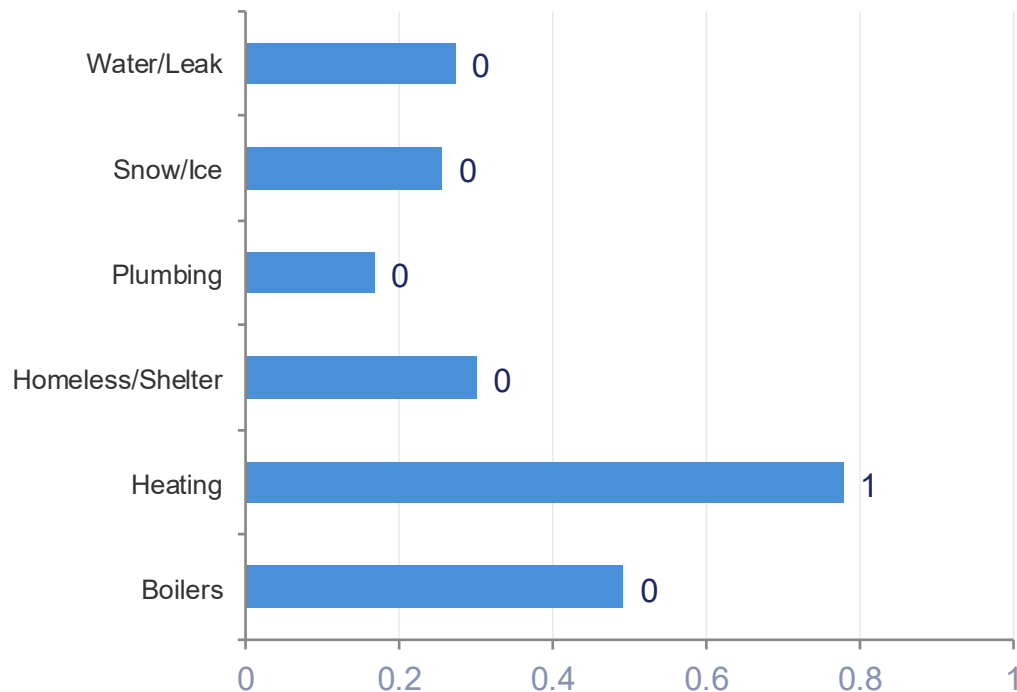
03 **Census Data**

ACS 2023 5-Year for all 5 boroughs: population, median income, renter %, poverty rate, housing age, building structure types.

04 **Analysis**

Pearson correlations, lag analysis (0–7 days), temperature thresholds, snow event multipliers, wind chill brackets, cold snap case studies.
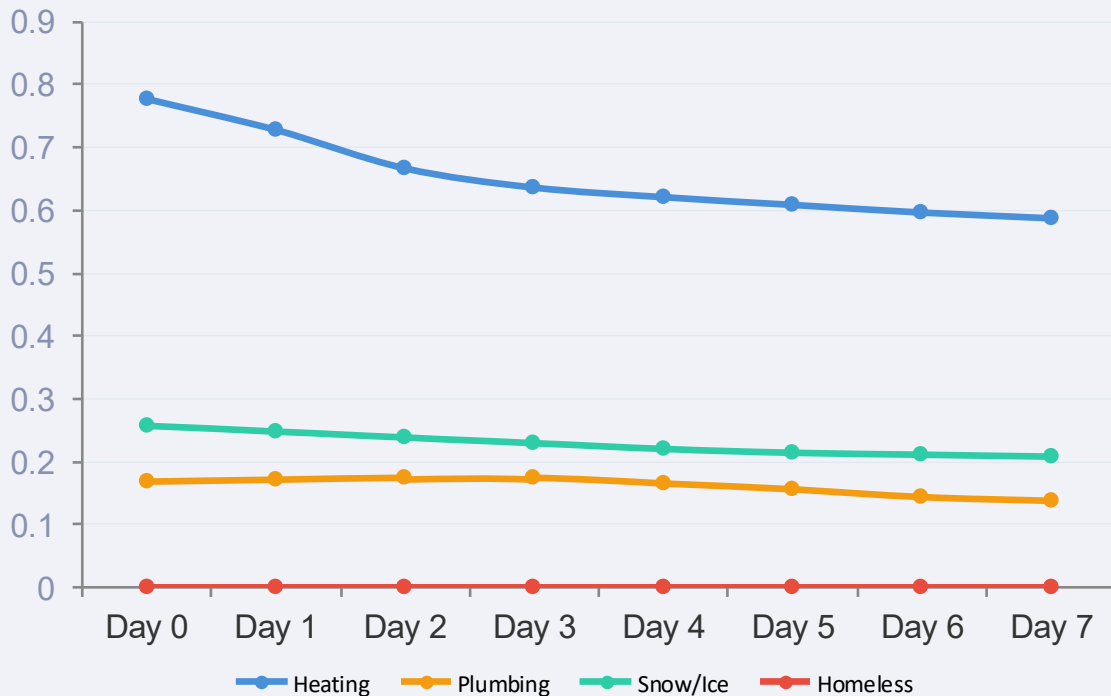
Weather-Complaint Correlations

Category	Value
Water/Leak	0
Snow/Ice	0
Plumbing	0
Homeless/Shelter	0
Heating	1
Boilers	0

Key Insight

All categories show negative correlation with temperature — complaints rise as it gets colder.

Heating/Hot Water at r = −0.78 is exceptionally strong, explaining ~61% of daily variance from temperature alone.

Snow/Ice (r = −0.26) and Homeless (r = −0.20) show moderate effects driven by specific weather events rather than continuous temperature.

Lag Analysis: When Do Complaints Peak?

Heating	Same day
Immediate response to cold	

Snow/Ice	Same day
Event-triggered	

Plumbing	2 days
Pipes freeze, then burst	

Homeless	3 days
Cumulative exposure	

Temperature Thresholds

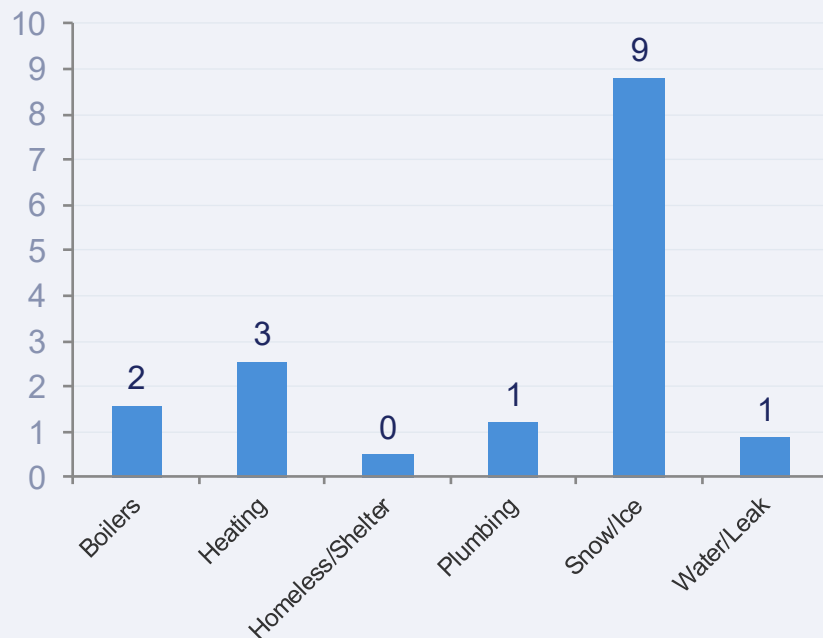| Threshold	Heating	Snow/Ice	Plumbing	Boilers
≤ 10°F	6.48×	14.7×	2.04×	2.28×
≤ 20°F	4.93×	27.19×	1.65×	2.21×
≤ 25°F	4.49×	39.28×	1.52×	2.18×
≤ 30°F	4.03×	50.81×	1.38×	2.03×
≤ 32°F	3.89×	86.64×	1.34×	1.94×
≤ 35°F	3.83×	173.98×	1.28×	1.93×
≤ 40°F	4.06×	445.38×	1.23×	1.94×

86.64×

Snow/Ice complaints surge
below freezing (32°F)

3.89×

Heating complaints
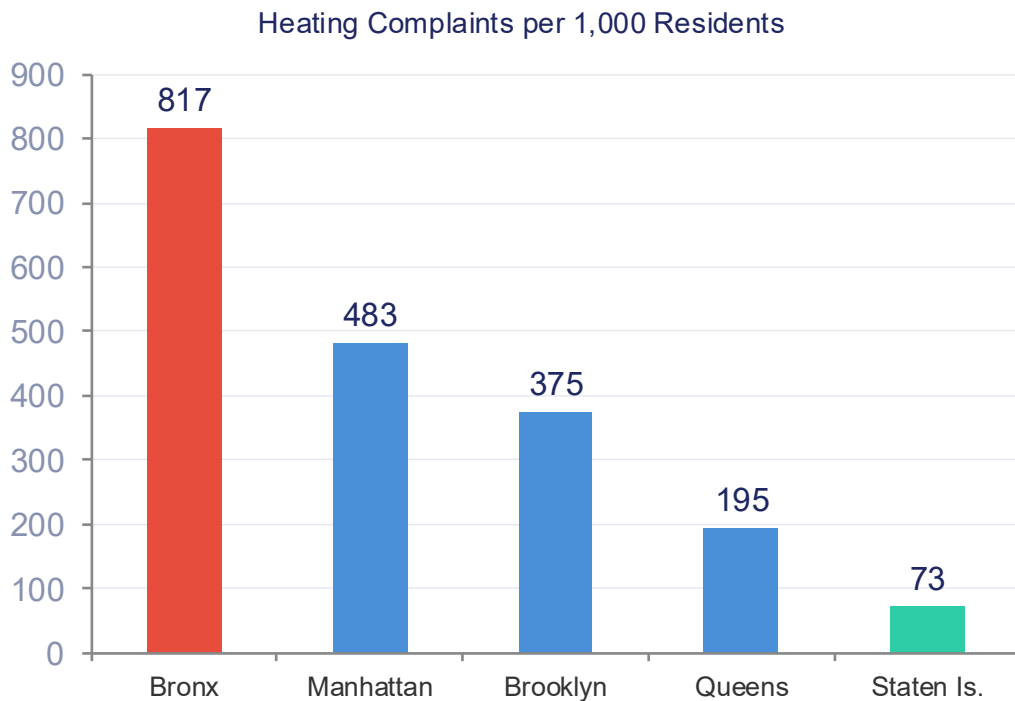below freezing

Snow Events & Wind Chill Impact

Snow Day vs Normal Day

Wind Chill	Heating	Plumbing	Snow/Ice
<-0°F	3384.3	304.6	350.1
0-10°F	2047.5	262	212.1
10-20°F	1471	227	113.8
20-32°F	1071.7	202.2	17.4

Wind chill below 0°F drives heating complaints to 3,384/day average — nearly double the 20–32°F bracket.

Borough Equity Analysis

Heating Complaints per 1,000 Residents

Borough	Complaints
Bronx	817
Manhattan	483
Brooklyn	375
Queens	195
Staten Is.	73

26.9% — **Bronx Poverty Rate**
vs 10.9% Staten Island

79.7% — **Bronx Renter Rate**
vs 32.1% Staten Island

$49K — **Bronx Median Income**
vs $98K Staten Island

70 yrs — **Bronx Building Age**
Median built 1954

Cold Snap Case Studies

Period	Days	Avg °F	Min °F	Heating/day
2017-12-29 to 2018-01-09	12	16.5	-4	3693.4
2015-01-29 to 2015-02-07	10	18.2	-3.8	1555.4
2015-02-13 to 2015-02-22	10	14.1	-3.9	2494.9
2026-01-25 to 2026-02-03	10	15.6	3.8	4297.6
2015-02-24 to 2015-03-02	7	16.9	-6.2	1340.9
2014-02-08 to 2014-02-13	6	15.9	-1.5	1504
2011-01-23 to 2011-01-26	4	16.9	-4.1	2176.2

Cold snaps are defined as periods where the 3-day rolling average temperature falls to 20°F or below for 2+ consecutive days. During these events, heating complaints surge to 2,000–4,000+ per day citywide. The longest cold snap in our dataset (Dec 29, 2017 – Jan 9, 2018) lasted 12 days with an average temperature of 16.5°F.

Recommendations

Pre-Position Resources at 35°F

Complaints begin rising well above freezing. Trigger staffing increases when forecasts drop below 35°F, not 32°F.

Target Bronx for Proactive Outreach

With 11× the per-capita heating complaint rate, the Bronx needs dedicated heating inspection teams and tenant education before winter.

Build Lag-Aware Response Models

Plumbing and homeless shelter complaints lag cold events by 2–3 days. Staff these services for delayed surge, not just the storm itself.

Wind Chill Early Warning System

When wind chill drops below 0°F, heating complaints hit 3,384/day. Implement automatic emergency protocols at this threshold.

Invest in Aging Housing Stock

Pre-war buildings in high-poverty boroughs drive complaint volume. Long-term capital investment in heating systems and plumbing is the only structural fix.