MAP EVALUATION UPDATE

Reported Crime in MAP Communities Compared with Other NYC Areas

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INTRODUCTION

The New York City **Mayor's Action Plan for Neighborhood Safety (MAP)** is designed to improve the safety and well-being of residents in 17 public housing developments operated by the New York City Housing Authority (NYCHA).[1] With funding provided by the New York City government through the **Mayor's Office of Criminal Justice (MOCJ)**, John Jay College's Research and Evaluation Center (JohnJayREC) began an evaluation of MAP in 2017. The quasi-experimental evaluation tracks seven crime outcomes, estimating the extent to which they changed after the introduction of MAP in July 2014.

Data used in this report are publicly available from the city's Open Data portal (see **MAP Evaluation Update 3** for more information). The NYPD historical complaint data set contains more than six million reports of felony offenses, misdemeanors, and violations from 2006 through the most recent calendar quarter. Nearly all records (97%) include geographic coordinates denoting the closest mid-block location where an incident occurred. Researchers at JohnJayREC introduced a 52-foot geodesic distance buffer (to account for the curvature of the earth) to assign all reported crime incidents to the nearest NYCHA development without overlap. This rich source of point-level data allowed researchers to examine crime-related outcomes across space and time.

MEASURING CHANGE

Researchers first compared reported crime trends in the 17 NYCHA housing developments involved in MAP with trends in all 275 NYCHA developments not participating in MAP as well as citywide trends outside of NYCHA. Reported crime rates (crime "complaints" per 10,000 residents) were calculated for 4.5 years before the launch of MAP (January 2010–June 2014) and 5.5 years after MAP (July 2014–December 2019).

Offense categories included three indices tracked by NYPD's CompStat system: 1) serious crimes known as "7 Major" felonies; 2) other felonies not included in the seven majors; and 3) misdemeanors. To test other categories, researchers organized many of the same offenses crimes into alternate groups: 4) felonies against persons; 5) felonies involving property; 6) misdemeanors against persons; and 7) misdemeanors involving property (see Table 1).

SUMMARY

This is the fifth of six Evaluation Updates reporting interim results from John Jay College's evaluation of the New York City Mayor's Action Plan for Neighborhood Safety (MAP). The study analyzes public safety outcomes in 17 public housing developments participating in the MAP initiative and finds meaningful and sometimes statistically significant improvements.

MAP:
The Mayor's Action Plan for Neighborhood Safety

The Mayor's Action Plan for Neighborhood Safety is a complex, place-based effort to improve public safety and enhance the well-being of residents living in housing developments operated by the New York City Housing Authority (NYCHA).

MOCJ:
The NYC Mayor's Office of Criminal Justice

The NYC Mayor's Office of Criminal Justice oversees the design and implementation of MAP. In 2017, MOCJ asked the City University of New York's John Jay College of Criminal Justice to evaluate the effects of the MAP initiative.

JohnJayREC:
John Jay's Research and Evaluation Center

Investigators from John Jay's Research and Evaluation Center designed an evaluation in partnership with researchers from NORC at the University of Chicago. The study monitors a range of outcomes in each NYCHA development participating in MAP as well as a matched set of non-participating developments.

1. The MAP initiative is often described as an intervention focused on 15 housing developments, but NYCHA considers three of those developments (Red Hook, Queensbridge, and Van Dyke) as comprising two distinct communities each. Thus, MAP could be defined as an effort involving 18 sites. One of those sites, however, is exclusively for older residents (Van Dyke II) and it was excluded from the study. Thus, the evaluation conceptualizes MAP as an initiative affecting 17 NYCHA communities.

TABLE 1: KEY CRIME OUTCOMES CONSTRUCTED FROM NYPD DATA

Compstat Categories*	
Seven Major Felonies	Grand larceny, robbery, felony assault, burglary, grand larceny of motor vehicle, homicide
Other Felonies, Not Seven Major	Criminal mischief, dangerous weapons, theft-fraud, possession of stolen property, arson
Misdemeanors	Assault 3, intoxicated & impaired, dangerous weapon, vehicle & traffic, offense against person, petit larceny, criminal mischief, public order, public admin, criminal trespass, fraud, possession of stolen property, offenses involving fraud, unauthorized use of motor vehicle, admin code 6
Alternate Categories**	
Person-Related Felonies	Robbery, felony assault, homicide, kidnapping
Property-Related Felonies	Grand larceny, burglary, grand larceny of motor vehicle, arson, criminal mischief, theft-fraud, possession of stolen property
Person-Related Misdemeanors	Assault 3, offenses against the person
Property-Related Misdemeanors	Petit larceny, criminal mischief, public order, public admin, possession of stolen property, criminal trespass, fraud, offenses involving fraud, unauthorized use of motor vehicle

* Sex offenses are excluded because NYPD's publicly available data for sex offenses do not include geocoordinates.

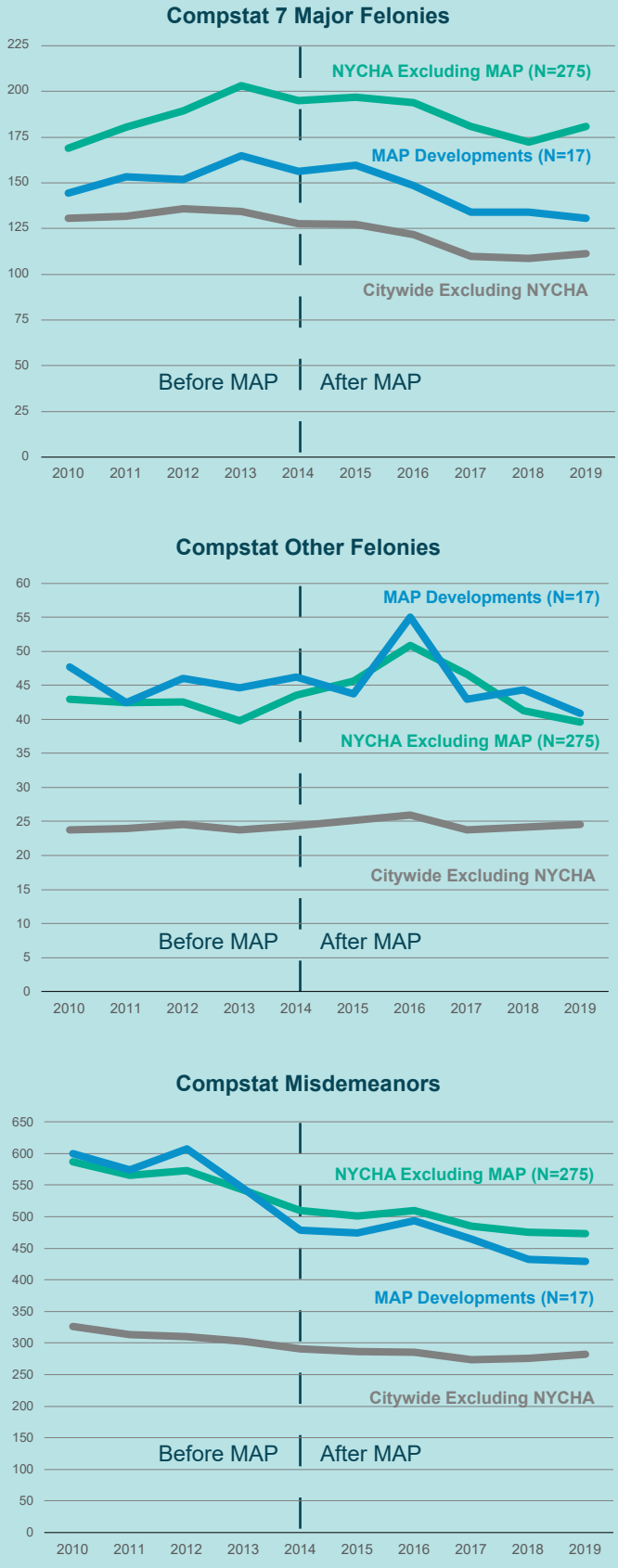
** Researchers explored different methods of categorizing offenses to detect any differences not observable with traditional Compstat categories.

Results of this initial analysis suggest that MAP may be a promising approach to improving the safety of public housing communities. When crime rates in MAP developments are compared with all non-MAP developments, trends for some crimes (i.e. misdemeanors) appear to decline more in communities participating in MAP (Figure 1).

Of course, graphing crime rates over time may not tell the complete story about public safety before and after MAP. Crime rates fluctuate, which may obscure general trends. To measure changes more accurately and to discern underlying patterns, researchers must rely on other statistical methods. The study next calculated the overall percentage change in reported crimes before and after the introduction of MAP. Researchers compared the average of all *monthly rates* of reported crimes before and after MAP in the 17 MAP developments and all other NYCHA developments not involved in MAP (Figure 2).

FIGURE 1: CRIME RATE TRENDS: 2010-2019

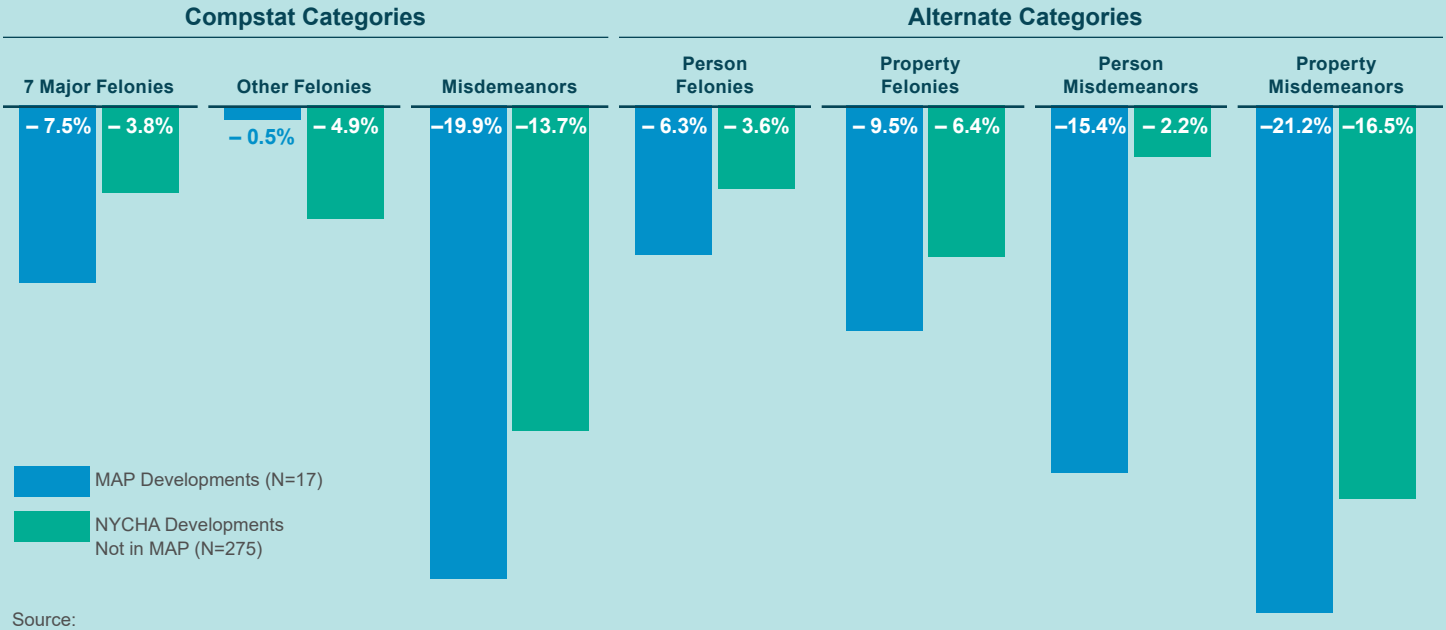
Crimes per 10,000 Population



Source: Reported crimes ("complaints") recorded by the New York City Police Department and analyzed by John Jay College of Criminal Justice.

FIGURE 2: PERCENT CHANGE IN AVERAGE MONTHLY CRIME RATES BEFORE MAP (JANUARY 2010 TO JUNE 2014) AND AFTER MAP (JULY 2014 TO DECEMBER 2019)

Reported Crimes per 10,000 Population



Source:
Reported crimes ("complaints") recorded by the New York City Police Department and analyzed by John Jay College of Criminal Justice.

The results remained encouraging. In six of the seven offense categories, average crime rates fell more in MAP developments than in non-MAP developments. The average rate of felony offenses included in NYPD's 7 majors category, for example, declined 7.5 percent in MAP developments but only 3.8 percent in non-MAP developments.

Changes in other crime rates also favored MAP. Reports of person felonies dropped 6.3 percent in MAP areas but just 3.6 percent in NYCHA developments not involved in MAP. Reports of misdemeanors against persons declined far more in MAP areas than in non-MAP areas (–15.4% versus –2.2%).

This method of detecting change, however, is not definitive. The research team conducted two additional analyses: 1) an interrupted time series analysis of crimes reported in MAP developments; and 2) a difference-in-difference analysis with matched comparison sites.

Interrupted Time Series

To assess whether MAP shifted crime trends in participating developments, researchers conducted single-group interrupted time series analyses, or ITS (Figure 3). The ITS analysis uses a regression model to estimate and fit pre-intervention and post-intervention crime trends.

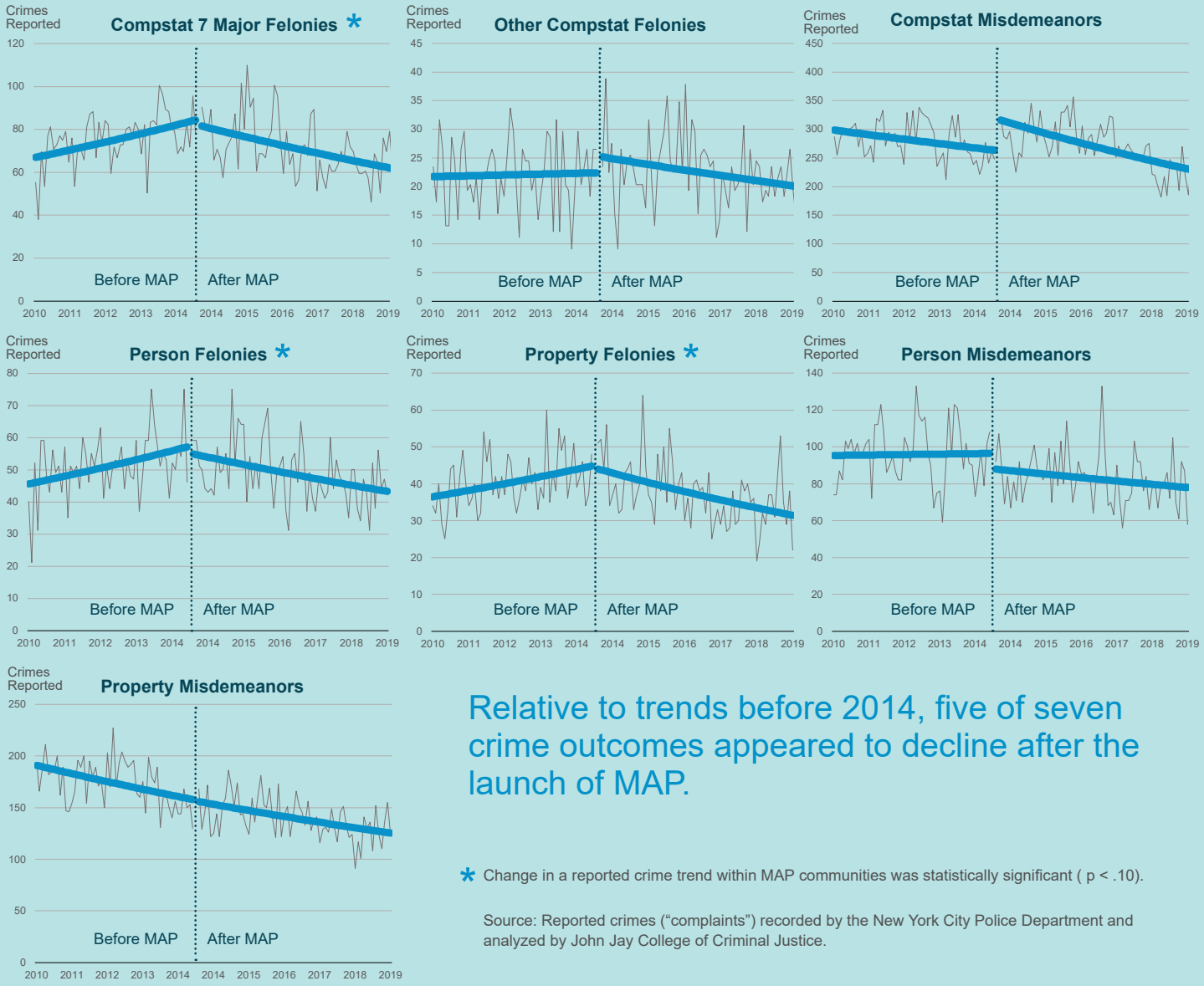
The results were still encouraging. Three reported crime outcomes (NYPD seven majors, person felonies, and property felonies) showed significant declines ($p < .10$) in MAP developments relative to pre-MAP trends. Other outcomes, however, showed only small declines or no declines. Crime may have dropped after the launch of MAP, but the rate of decline was not significantly different than the pre-MAP period.

More importantly, the single-group ITS analysis characterizes before and after trends in one place, but it does not answer a key question: were similar changes observed in other places? Other than the passage of time before and after 2014 in MAP sites, a single-group ITS analysis does not account for the possibility that crime rates were changing in similar ways in other communities.

Difference-in-Difference

The next step in the investigation was to determine how many of these apparent trends would withstand a more rigorous, comparative analysis. Researchers tracked the same outcomes in otherwise similar places not receiving the intervention. Collecting data from areas unaffected by an intervention is what researchers call measuring the "counterfactual" (**MAP Evaluation Update 3**).

FIGURE 3: INTERRUPTED TIME SERIES ANALYSIS OF CRIME TRENDS IN NYCHA DEVELOPMENTS INVOLVED IN THE MAP INITIATIVE: 2010-2019



Relative to trends before 2014, five of seven crime outcomes appeared to decline after the launch of MAP.

* Change in a reported crime trend within MAP communities was statistically significant (p < .10).

Source: Reported crimes ("complaints") recorded by the New York City Police Department and analyzed by John Jay College of Criminal Justice.

Researchers identified a matched set of NYCHA communities not participating in MAP using a statistical technique known as propensity score matching (see **MAP Evaluation Update 1**). Each site involved in MAP was paired with another NYCHA site that was similar in demographics and recent crime rates. After matching sites were identified, crime trends across all MAP developments were compared with all matching non-MAP developments using more rigorous analytic techniques.

The study examined group-level differences between MAP sites and comparison sites using two-way fixed effects negative binomial model (Table 2). The analysis first examined the distribution of each outcome and assessed overdispersion (when the variation between data points is greater than expected for a given model). All seven outcomes appeared to be non-normally distributed and overly dispersed, which is often true in studies analyzing law enforcement data due to large numbers of low rates and small numbers of high rates. For this reason, the research team used non-parametric models to test the effects of MAP.[2]

Researchers tested 35 count regression models across all seven outcomes to estimate changes before and after the launch of MAP. Each model measured the amount of change in an outcome in MAP sites compared with matched non-MAP sites while accounting for monthly and unit fixed-effects with robust standard errors for units.

2. Rydberg, Jason and Danielle Marie Carkin (2016). **Utilizing Alternate Models for Analyzing Count Outcomes**. Crime & Delinquency, 63(1): 61-76.

TABLE 2: TREATMENT EFFECTS AND COMPARATIVE CHANGE IN CRIME OUTCOMES IN MAP DEVELOPMENTS VERSUS NON-MAP DEVELOPMENTS: 2010-2019

Compstat Categories

	Seven Majors		Other Felonies		Misdemeanors	
Variables	IRR	Std. Error	IRR	Std. Error	IRR	Std. Error
Group	1.096 *	0.038	1.242 *	0.072	1.169 *	0.026
Time (MAP Launch)	1.242	0.148	0.603	0.189	0.832	0.097
Treatment Effect	0.956	0.061	1.045	0.108	0.926	0.038
Difference	– 4%		+ 5%		**– 7%** *	

Incident Rate Ratio (IRR) values:
1 = No Change
<1 = Decreased Risk
>1 = Increased Risk

Alternate Categories

	Person Related Felonies		Property Related Felonies		Person Related Misdemeanors		Property Related Misdemeanors	
Variables	IRR	Std. Error	IRR	Std. Error	IRR	Std. Error	IRR	Std. Error
Group	1.027	0.043	1.265 *	0.044	1.170 *	0.039	1.195 *	0.031
Time (MAP Launch)	1.490 *	0.231	0.794	0.129	1.201	0.211	0.730 *	0.104
Treatment Effect	0.973	0.075	0.953	0.062	0.862 *	0.053	0.947	0.045
Difference	– 3%		– 5%		**– 14%** *		– 5%	

* Difference in the change of reported crimes in MAP and non-MAP communities was statistically significant ($p < .10$).

Source: Reported crimes ("complaints") recorded by the New York City Police Department and analyzed by John Jay College of Criminal Justice.

The coefficients of count regression models are typically represented in either logged form or as incidence rate ratios (IRR), an exponentiated form of the coefficient. The IRR for a binary predictor variable is a ratio of the number of events in one category to the number of events in another category. In this case, the IRR is a ratio of crime incidence counts after MAP compared with counts before MAP. Each model included a binary indicator for the time periods before and after MAP, an indicator for treatment group (MAP versus comparison), and an interaction term (examining each treatment group before and after MAP).

Across all outcomes, MAP sites had higher counts of crime events throughout the study period, and the difference was statistically significant for all three of the CompStat outcomes, as indicated by the coefficients for the group variable. This is not a surprising finding, however, as the treatment areas were selected to host the MAP initiative specifically because they needed more help with public safety issues. More central to the analysis was the variable for treatment effect, which explored whether changes in crime over time favored MAP.

Results of the analysis suggest that, relative to comparison sites and controlling for other factors, the presence of MAP was associated with meaningful declines in two of seven crime outcomes: all misdemeanors monitored by NYPD and especially person-related misdemeanors. Felony offenses remained stable after the launch of MAP relative to the comparison communities. In sum, the analysis suggests that, holding all else constant, and relative to crime trends exhibited in a set of matching NYCHA developments not involved in MAP, the presence of MAP in NYCHA developments was associated with statistically significant declines in misdemeanors with the sharpest decline in misdemeanors against persons.

CONCLUSION

While effects are modest and largely found in misdemeanor offenses, this rigorous test of the Mayor's Action Plan for Neighborhood Safety indicates that New York City's effort to improve the safety of public housing communities was beginning to show benefits by the end of 2019. Based on these findings, the results of MAP are promising.

TECHNICAL NOTES

Monthly counts of reported crimes for each of 313 public housing developments in New York City from 2010 to 2019 were obtained from the NYC Open Data Portal. To choose the most appropriate type of count data regression model, the research team relied on the Bayesian Information Criterion (BIC). For the seven principal outcomes used in the study, BIC values were consistently lower for negative binomial models. Researchers conducted 35 models, or five model specifications per outcome:

Model 1 - group, intervention, and an interaction term

Model 2 - group, intervention time, interaction term, and covariates

Model 3 - group, intervention time, interaction term, and significant covariates

Model 4 - group, intervention time, interaction term, significant covariates, and dummy variables for fixed effects.

Model 5 - group, intervention time, interaction term, and dummy variables for fixed effects.

Several covariates were explored. Researchers generated a dichotomous monthly-surge-in-arrests variable to measure unusually high arrest activity—i.e. when arrests in a given month were two standard deviations away from the annual mean. Using 311 non-emergency data, the study also tested variables for monthly counts of citizen complaints about noise, heat and hot water, street potholes, and street lights. Some measures were significantly associated with one or more crime outcomes, but none changed the association between MAP and reported crimes when incorporated into multivariate analyses. All five models yielded almost nearly identical results.

This report presents results based on model 5, which included two-way fixed effects for each study site and each time period (120 total periods). Fixed-effects were used when characteristics between entities (i.e., study site) may have biased an outcome. To account for the unique trend of each outcome, all models included a time effect as well.

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RECOMMENDED CITATION

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