"How has the temporal trend of hate crime rates in New York City evolved over the past decade, and how does it compare to hate crime rates in the top and bottom cities in the 10 most populated cities in the United States, ranked based on the influence of median household income as a socio-economic indicator?"

Anne A. Mercado
Center of Urban Science and Progress, New York University
CUSP-GX 7013 AB: Introduction to Applied Data Science
Professor Stanislav Sobolevsky
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Abstract

Hate crime has been a long-standing issue in New York City, the biggest and one of the most diverse cities in United States. Charles Fain Lehman conducted a study understanding hate crimes in New York City. Using data from Hate Crime Statistics of FBI's Uniform Crime Reporting (UCR) program, this report investigates the progression of hate crimes reported in New York City and the top and bottom cities, San Francisco and Phoenix, based on their median household income as identified by Statista (2023). It aims to analyze and visualize the contours of hate crime in New York City including the trends, spikes and falls in its numbers. This report also aims to present comparative analysis between the cities in scope with regards to hate crime activity trends and spikes over time and explore possible correlation between median household income and hate crime rates in the city.

Introduction

The history of hate is long, and unfortunately bias crimes continue to occur and greatly damage society. (Mills, 2019) In 1968, the first federal hate crime statute was already signed into a law making it a crime to use, or threaten to use, force to willfully interfere with any person because of their race, color, religion or national origin. Prejudice and discrimination are the usually the foundation of hate-based violence. (Novotney, 2023) Hate crime, as defined by the Federal Bureau of Investigation, is a "criminal offense against a person or property motivated in whole or in part by an offender's bias against race, religion, disability, sexual orientation, ethnicity, gender or gender identity." Years after the first hate crime act was passed, the call to collect better data regarding hate crime was reintroduced through the Hate Crime Statistics Act in 1989. With the Hate Crime Statistics Act, there is now a better grasp of the gravity of the situation in terms of its occurrence, motivation and general characteristics, from the reports made.

Literature Review

There have been multiple reports in the recent month of the surgency and continuous increase of hate crimes in the country. According to CNN, hate crimes have seen to double between 2014 to 2022, surpassing the numbers from 1991 when it was first recorded. New York City, with more than 8 million in population, is widely recognized as America's melting pot. The city has developed into a diverse make up of people of all genders and from all different continent and

religions. (Medium, 2023) As of 2022 Census, the city was roughly composed of white (37.5%), Hispanic or Latino (29%), Black or African American (23.1%) and Asian (14.5%). (Census, 2022) This cultural diversity has been serving the city with wide perspective of ideas that has contribute to its economic and social dynamism. (Lehman, 2022) But, alongside the positive impacts of diversity are its adverse effects to the community brought by cultural tension, distrust causing social fragmentation (Jonas, 2007), miscommunication due to language barriers and offenses motivated by bias and hatred (Espiritu, 2019). These have caused the continuous persistence and growth of hate crime in the city.

Diversity is just part of the picture as there have already been multiple studies looking into other factors that can have influence such crimes. There has been a study regarding the link of social disadvantage and the crime by Wikström and Treiber (2016). There was also a study done by Graif et al. (2014) regarding urban poverty and it neighborhood effects on crime. Yan et al. (2021) did a study on hate crimes against Asian Americans. Cai (2021) did an analysis of hate crimes and its relation to several socioeconomic factors. This study will follow Cai's report looking into the possible correlation of a socioeconomic factor specifically the median household income of the city.

Alongside New York City, Statista (2023) identified San Francisco, California as the top city in a list of 25 most populated cities based median household income while Phoenix was ranked 10th with the least median household income in the list. In this list, New York City ranks 11th. Using data from Hate Crime Statistics of FBI's Uniform Crime Reporting (UCR) program, this report will look into the hate crime reports for these three identified cities and compare the hate crime activities between them as well as explore the possible contribution of socioeconomic factors to the hate crime dynamics in these specific neighborhoods.

Data Exploration

Data Description

This research utilizes the Hate Crime Statistics dataset. This dataset provides annual statistics on the number of incidents, offenses, victims, and offenders in the reported crimes. These are reported

crimes motivated in whole, or in part, by an offender's bias against the victim's perceived race, gender, gender identity, religion, disability, sexual orientation, or ethnicity. (FBI Crime Data Explorer, n.d.) The report will be using data that were reported to each city as identified in the agency name and define "City" as type of the agency. This paper also references to the data provided by Statista with regards to the median household income in the top 25 most populated cities in the United States. (Statista, 2022) This includes information of the top 25 cities ranked in descending order by their median household income. The report, as well, utilizes the median household income estimates per city provided by the Bureau of Census.

Methodology

In summary, the current study analyzes and tests the following hypotheses:

1. *Temporal Trends*
    a. Trend of hate crime rates in New York City over the past decade
    b. Identifying any notable spikes, declines, or patterns in hate crime incidents
2. *Comparative Analysis*
    a. Comparison of hate crimes between NYC and identified cities over the decade
3. *Identification of Targeted Groups*
    a. Identification of groups more susceptible to hate crimes during this period
    b. Variations in the targeting of different communities
4. *Regional Disparities and Socioeconomic Influence*
    a. Investigation if there are regional disparities in hate crime rates within each city
    b. Regression analysis examining the relationship between hate crimes, time and median household income

Data Limitation

1. The data is limited to hate crimes reported and consolidated by FBI's Uniform Crime Reporting Program. As this data is only capturing crimes being reported to law enforcement agencies, this does not reflect the number of hate crimes that occurred.
2. The median annual income data from the Bureau of Census are estimates and does not reflect the actual median annual income for the cities in this research.

Analysis

Temporal Trend in New York City

Figure 1 shows the progression of hate crime incidents in New York City over the past decade. Indeed, from 2014, there has been a continuous increase, albeit inconsistent, in the number of hate crimes reported. Despite the studies like Han et al., 2023 regarding the increase of anti-Asian hate crime during the pandemic, data still shows a plummet of hate crimes reported in 2020 which may still be considerably low in number as compared to the previous years. After 2020, hate crimes being reported has significantly increased, surpassing the pre-pandemic numbers.

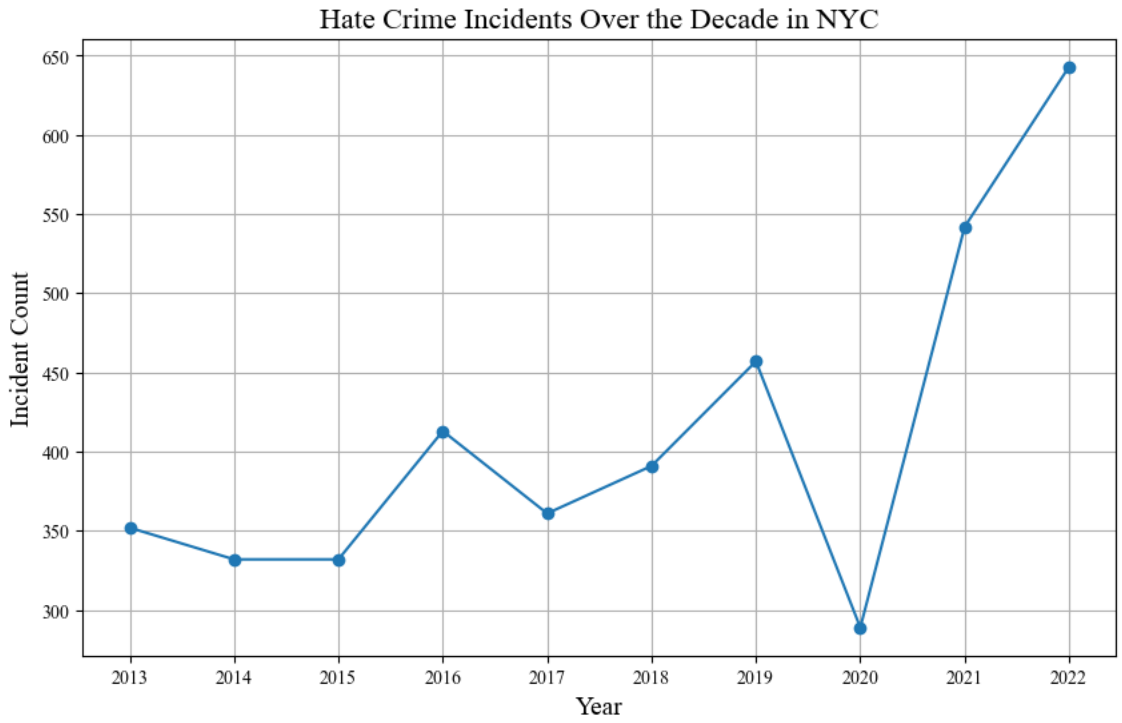

Figure 1. Temporal Analysis of Hate Crimes in NYC for the last 10 years

Distribution Analysis

Figure 2 presents the distribution of the data for New York City. According to the analysis, the central tendency of the data or the mean lies at 375.6. Data also shows a high standard deviation, in this case 103.52, that means data points gathered can deviate widely from the mean. The

percentiles are as follows, 1 percentile = 273.33, 5 percentile = 286.65, 25 percentile = 308.75, 50 percentile = 334.50, 75 percentile = 407.50, 95 percentile = 556.45 and 99 percentile = 584.89.

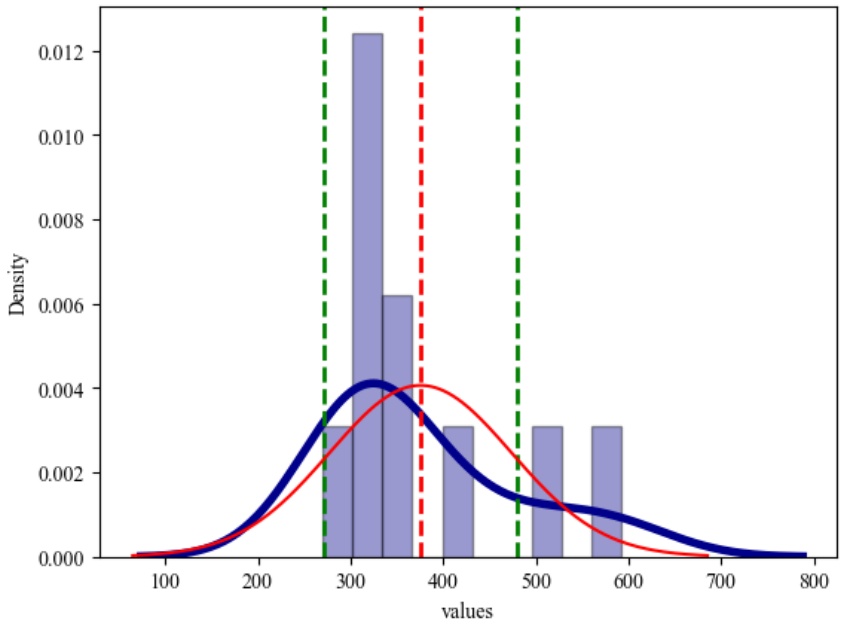

Figure 2. Distribution Analysis of Hate Crimes Reported in New York City

Comparative Analysis

Juxtaposing to the two cities in scope, San Francisco and Pheonix, the data shows in figure 2 the difference of the data from the three cities. The spike and decline seen in the data from New York City is not aligned to the dynamics of hate crime data in both San Francisco and Phoenix. Overall trend, San Francisco shows similar increasing trend, although minimal, compared to New York City. Phoenix, however, shows more of an overall decline trend in hate crimes being reported in the city. This is also showing how New York City, on average, has higher hate crime numbers with Phoenix coming in second. San Francisco presents the lowest hate crime numbers among the three.

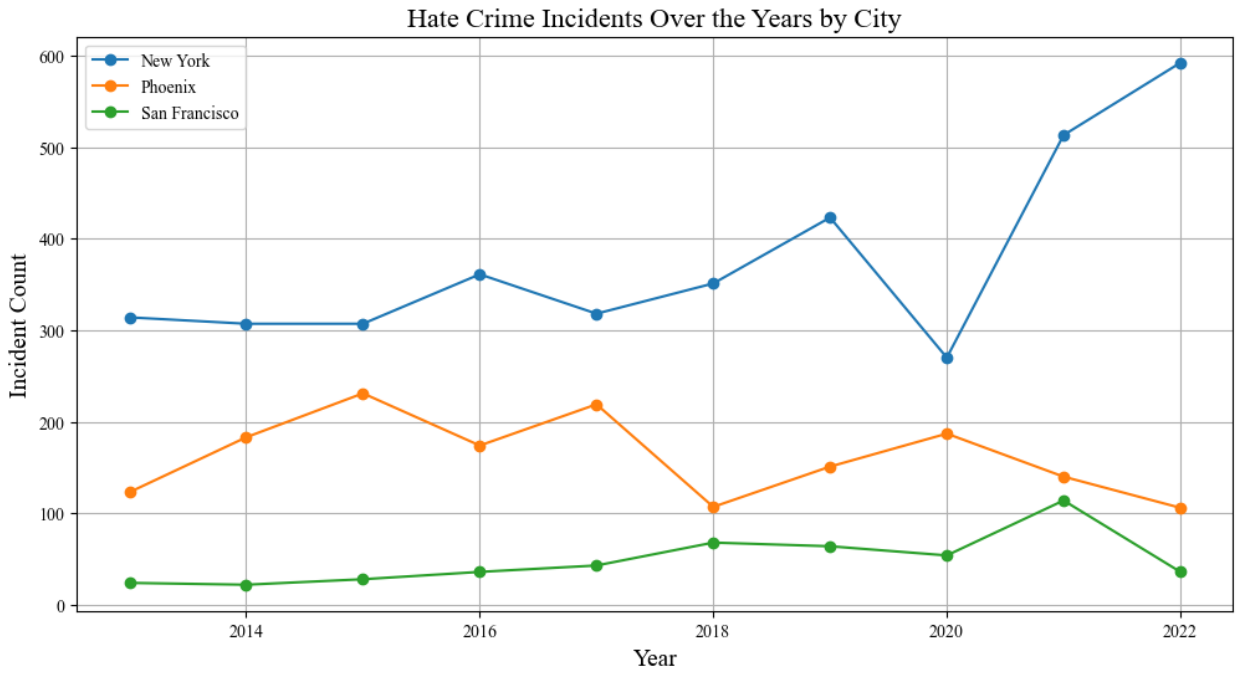

Figure 3. Comparative Analysis of Hate Crimes between NYC, San Francisco and Phoenix for the last 10 years

T-Test Analysis

The difference of data between the cities is then proven using the T-Test analysis, comparing New York City to San Francisco and New York City to Phoenix. New York City to San Francisco resulted to T-statistic of 9.636031586405965 and P-value of 1.5752538463642976e-08. For New York City and Phoenix comparison, T-statistic resulted 6.000008555980327 and P-value: 1.1269773625052149e-05. The absolute value of the t-statistic in the first result (9.64) is larger than that in the second result (6.00). This suggests that the difference between the means is relatively more substantial in the first result. The p-value in the first result (1.58e-08) is much smaller than the p-value in the second result (1.13e-05). A smaller p-value indicates stronger evidence against the null hypothesis. Both t-tests indicate a significant difference between the means of the two groups. However, the first result provides stronger evidence against the null hypothesis due to its larger t-statistic and smaller p-value.

Targeted Groups

Breaking down the numbers from these three cities, figure 3 shows the top 10 biases on which the hate crimes are based on. The top of the list is Anti – Jewish followed by Anti-Black and Anti-Gay (Male).

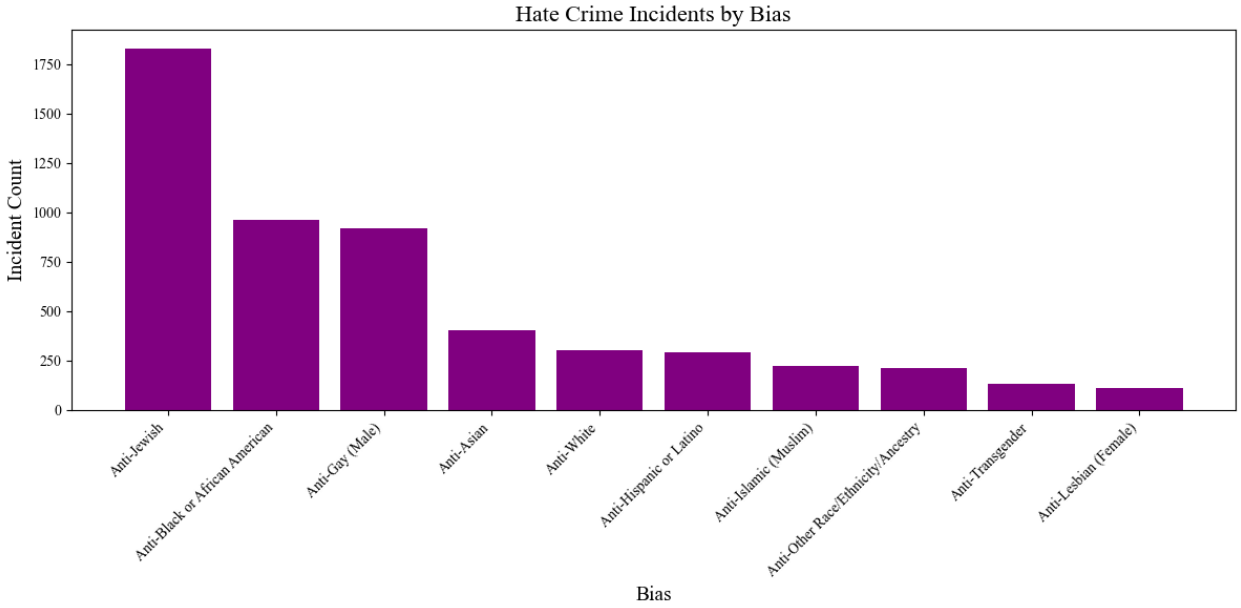

Figure 3. Hate Crimes Reported by Bias

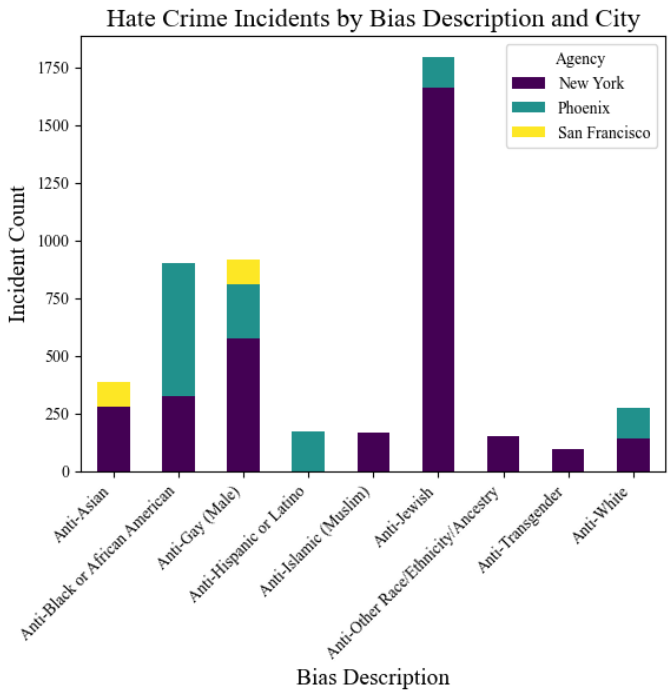

Figure 4. Hate Crimes Reported by Bias and City (Top 15)

Figure 4 breaks it down further by visualizing the share of each city to the identified top biases. For the top bias, Anti-Jewish, data shows that majority of the data is contributed by New York City. This is different with Anti-Black hate crimes reported where more than half are coming from the hate crimes reported in Phoenix. Anti-Gay (Male) bias are attributed by all three cities combined with still majority coming from those reported in New York City.

The data also shows percentage of share of the cities among the top biases identified. As figure 4 shows, San Francisco contributes minorly to the top biases while New York City shows up for almost all these biases except one.

Regional Disparities and Socioeconomic Influence

After looking into the temporal trends and how the data from New York City compare to the top 1 and 10 in median annual income in a list of most populated cities. The report will now investigate the correlation in one of the factors that has been studied by scholars, the socioeconomic influence. This report will specifically analyze further analyze the influence of the median annual income of the cities identified.

Correlation Analysis

	Year_x	incident_count	MHI
Year_x	1.000000	0.090213	0.269927
incident_count	0.090213	1.000000	-0.662141
MHI	0.269927	-0.662141	1.000000

Figure 5. Correlation of Year, Incident Counts and Median Household Income in all three cities

Figure 5 shows the correlation between the variables that this report is looking into, time, incident counts and median household income. Incident count shows weak positive correlation with time with the value of 0.0902. However, there seem to be a medium to strong negative correlation between incident count and median household income with the value of -0.6621. This means that as the median household increases, the incident count decreases.

Regression Analysis

Regression analysis is done to further test the relationship of the variables being studied.

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                            OLS Regression Results
==============================================================================
Dep. Variable:         incident_count   R-squared:                       0.438
Model:                            OLS   Adj. R-squared:                  0.420
Method:                 Least Squares   F-statistic:                     24.20
Date:                Sun, 10 Dec 2023   Prob (F-statistic):           2.70e-05
Time:                        15:04:10   Log-Likelihood:                -195.67
No. Observations:                  33   AIC:                             395.3
Df Residuals:                      31   BIC:                             398.3
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept    397.4486     53.232      7.466      0.000     288.882     506.015
MHI           -0.0032      0.001     -4.920      0.000      -0.005      -0.002
==============================================================================
Omnibus:                        3.278   Durbin-Watson:                   0.495
Prob(Omnibus):                  0.194   Jarque-Bera (JB):                2.626
Skew:                           0.690   Prob(JB):                        0.269
Kurtosis:                       2.926   Cond. No.                     2.65e+05
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 2.65e+05. This might indicate that there are
strong multicollinearity or other numerical problems.
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Figure 6. Regression Analysis of Median Household Income and Hate Crimes Incidents Reported

Figure 6 presents of the regression analysis done between median household income and hate crimes reported in all the three cities. R-squared with the value of 0.438 suggests that the model explains a substantial fraction of the total variance. The F-stat resulted to 24.3 while P-Value resulted to 2.70e-05 suggests that the model is statistically significant. Now, looking at the coefficients, the model estimates an intercept value of 397.4486. The median household income coefficient, -0.0032, indicates a negative relationship.

Conclusion

The research shows how hate crime varies in different geographic areas. Both t-tests prove, through significant difference between the means of the two groups, the independence of each set of data for each city. The report was also able to point out the top targeted groups or top biases influencing

the hate crimes being reported in these three cities. Top biases include anti-Jewish, anti-Black and anti-gay with New York City contributing largely to the numbers of these identified top biases.

When it comes to influences on the data, through correlation analysis, the report is able to identify a medium to strong negative (-0.6621) correlation of median house income to hate crimes reported. This is further proven by the regression analysis model where the negative coefficient for 'MHI' suggests a negative relationship between Median Household Income and the number of hate crime reported. This model is then showed as statistically significant based on the F-statistic and associated p-value. The R-squared value then indicates that this model explains a significant portion of the variance in the number of hate crimes reported. This analysis align with the comparative analysis done in the beginning of the research. San Francisco with the highest median household income reported in 2022 shows the lowest number of hate crimes reported among the three cities. In contrast, New York City being at the 11th spot of the list, reports the highest number of hate crimes among the three cities.

This, of course, only investigates a fraction of the bigger picture that of hate crime. Hate crimes need further study and research to be able to address what are the factors influencing these such violent crimes. Further research and analysis of hate crime data in the future will help us gain clarity and better grasp the hate crime situation.

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