JOURNAL OF
EMERGING INVESTIGATORS

Article

A Data-Centric Analysis of "Stop and Frisk" in New York City

[1]Sachin Bhat, [1]Dinkar Bhat
[1]South Brunswick High School, South Brunswick, NJ, USA

SUMMARY

Recent incidents in the United States involving police action against people of color has created a lot of controversy and public turmoil. There have been many calls for reform in police practices and the way they are funded, and debates have reached legislative bodies across the country. However, to make any substantive changes in laws and rules regarding practices, data needs to be collected in a systematic fashion and analyzed critically to form the basis for change. In this paper, we look at one police practice: "Stop and Frisk" in New York City, which has received a lot of coverage in the media regarding its partiality towards people of color. We examined publicly available data for 2003–2019. The data analysis clearly shows that the practice was biased until 2012 but has since improved, possibly due to subsequent legal action.

INTRODUCTION

For some years now, police practices across the United States have been scrutinized to determine whether they have a racial bias. For instance, state agencies studied the practice of racial profiling on the New Jersey Turnpike, finding that over 80% of automobile searches carried out by state troopers there from 1990 to 2000 were conducted on vehicles driven by Blacks and Hispanics. The practice of targeting Black and Hispanic drivers evolved as part of the drug war when local police forces began to intercept drug traffickers on highways (1). While this practice did result in drug traffickers getting arrested, it disproportionately affected minorities.

Here, we examine a police practice called "Stop and Frisk" in New York City or "Terry Stop" in other parts of the United States. A stop-and-frisk is legally defined as brief non-intrusive police stop of a suspect, although in practice many people experienced harsh force during stops (2). According to the Cornell Legal Information Institute, "The Fourth Amendment requires that before stopping the suspect, the police must have a reasonable suspicion that a crime has been, is being, or is about to be committed by the suspect. If the police reasonably suspect that the suspect is armed and dangerous, the police may frisk the suspect" (2). However, this practice became the subject of a racial profiling controversy. Seventy percent of those stopped in 2017 were innocent, and a vast majority were young African-American or Latino men (3).

There have been several analyses related to the "Stop and Frisk" practice both from a legal and academic viewpoint (4). A wide-ranging study of this practice across New York City and Philadelphia and concluded that big data analysis of police practices can provide policymakers with information about law enforcement methods. We think such data-centric approaches are beneficial, and decided to use such an approach to address whether the arrest rate is in line with the stop rate between Blacks and Whites. We feel that examining this question gives clarity into the problem even for those unfamiliar with the issue.

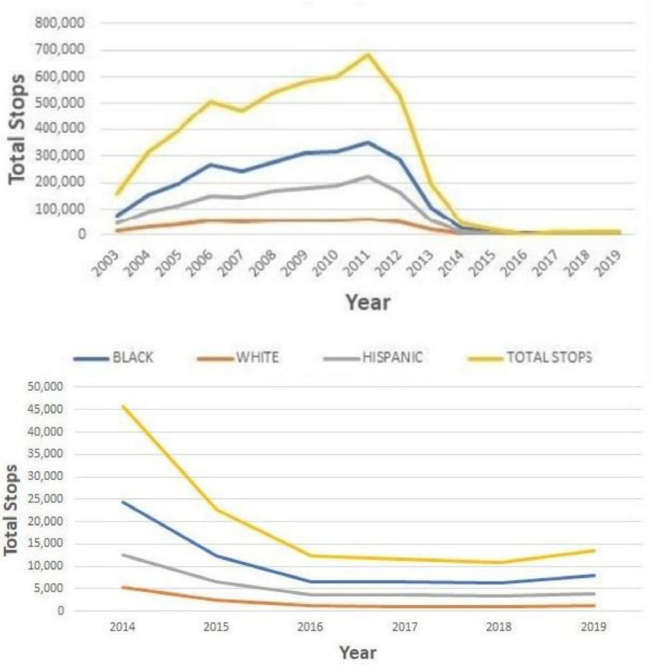

Figure 1. NYPD stops from 2003-2019. (**A**) Total number of stops in New York City from years 2003-2019. This graph illustrates the overall effect of the "Stop and Frisk" policy and how it has changed over the years. The breakdown of stops by race (White, Black, and Hispanic) is included as well to highlight that the stops of Hispanics and Blacks were far greater than that of Whites for all the years. (**B**) Total number of stops in New York City from years 2014-2019 with the scale adjusted to easily visualize the differences between groups after total stops decline.

RESULTS

Examining stop-and-frisk data in New York City from 2003-2019, the number of stops rose to a peak in 2011 (685,724 stops), fell greatly every year till 2016, and then plateaued to around 12,000 stops thereafter (**Figure 1A**). A similar pattern is seen for each of the races, but particularly for Blacks and Hispanics. A drop in stops is seen from 2014-2019 due to a major class action suit in 2012 arguing against "Stop and Frisk" by the New York City Police Department (NYPD) (**Figure 1B**). The lawsuit claimed that the practice was unconstitutional and racially discriminatory.

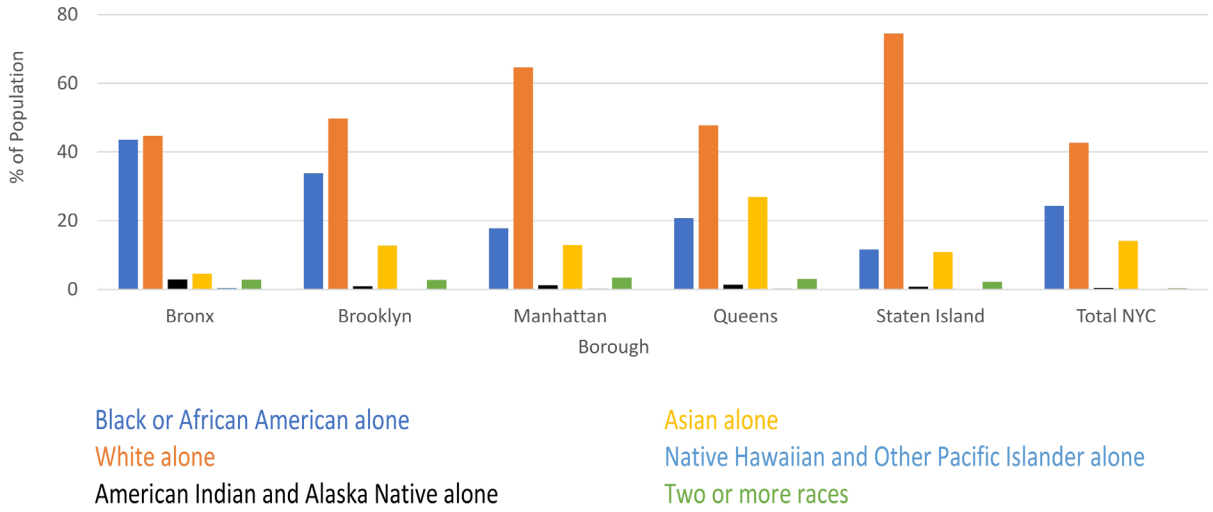

Figure 2. Demographics of each borough. This plot shows the demographics of each borough and totals for New York City.

Borough (WS)	Mean (Age)	Median	Variance	Standard Deviation	Min	Max	Count
BRONX	29.6	28	139.1	11.8	15	63	82
BROOKLYN	29.1	26	135.4	11.6	12	67	343
MANHATTAN	33.1	29	160.1	12.7	13	76	289
QUEENS	29.3	24	160.2	12.7	14	89	308
STATEN ISLAND	29.2	23	162.0	12.7	13	62	178
ALL BOROUGHS	30.1	26	154.1	12.4	12	89	1200

Table 1. Descriptive Statistics of ages of Whites stopped (WS) in 2011, broken down by borough. This table shows the application of "Stop and Frisk" in each borough for WS with respect to age. The statistics of each borough are shown as well as for whole sample of 1200 (last row).

Borough (BS)	Mean (Age)	Median	Variance	Standard Deviation	Min	Max	Count
BRONX	27.2	24	121.7	11.0	14	62	217
BROOKLYN	27.2	23	124.6	11.2	13	62	396
MANHATTAN	27.4	22	153.9	12.4	13	69	354
QUEENS	26.1	22	114.9	10.7	14	62	177
STATEN ISLAND	27.3	25	99.4	10.0	13	51	56
ALL BOROUGHS	27.1	23	129.9	11.4	13	69	1200

Table 2. Descriptive Statistics of ages of Blacks stopped (BS) in 2011, broken down by borough. This table shows the application of "Stop and Frisk" in each borough for BS with respect to age. The statistics of each borough are shown as well as the whole sample of 1200 (last row).

To give an idea of the demographics in New York City, we generated a histogram that shows the breakdown of population by race within each borough (**Figure 2**). We used the July 1, 2019 population estimates from the US census as reference (5). Whites clearly outnumber Blacks in every borough except the Bronx. Note that Hispanics could be of any race, hence they were included in the White alone and Black alone categories.

We chose the data from the year 2011 to pursue further analysis due to the following reasons. As mentioned earlier, 2011 had the highest number of recorded stops between the years 2003–2019. Of those stopped, 53% were Black, 34% were Hispanic, and only 9% were White. The reason for stops ranged widely from "misdemeanor" to "criminal trespassing" to "assault". All boroughs of the city reported stops, indicating that the practice was implemented city-wide, thus making the data set very useful for further analysis and interpretation.

For illustrating some of the characteristics of the data set, like age and borough distribution, we took two separate random samples of 1,200 Whites stopped (WS) and Blacks stopped (BS) from the population and broke it down by borough (**Tables 1** and **Table 2**). The mean age of WS was consistently higher than BS in every borough but not notably. The clearest gap in the mean age was in Manhattan, where WS were about 5.5 years older than BS. Also, the median age for WS was also larger in all boroughs, except Staten Island. The numbers of WS in the Bronx was much smaller than the BS (82 vs. 217), while the opposite was true in Staten Island (178 vs. 56). The total sample data shows that the mean and median age of BS was about 3 years younger than WS.

The median age of BS was lower than that of WS in all boroughs except Staten Island (**Figure 3**). Ignoring outliers, the ages captured in the fourth quartile (the highest 25% ages stopped) were always greater for WS compared to BS. The outliers in the plots pull the mean age higher, but does not significantly affect the median, a robust measure of center. The lower medians for BS imply that the frequency of BS will be skewed further right (i.e., towards a younger age) than that of WS for the Bronx, Brooklyn, Manhattan, and Queens. In Staten Island, the opposite is true. We confirmed this by calculating the skewness of WS and BS ages, which is a measure that characterizes the degree of asymmetry of a

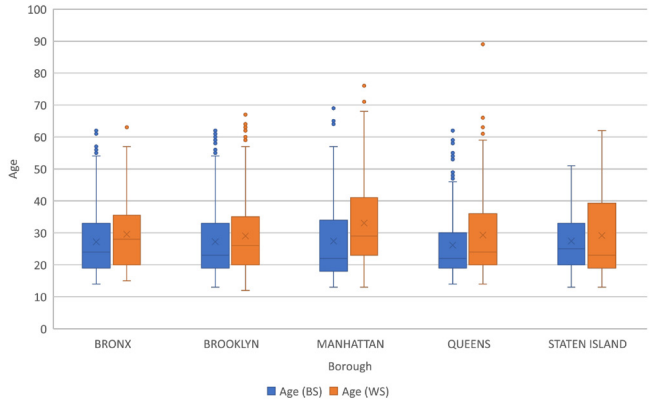

Figure 3. Box and Whisker Age Plot for Whites stopped (WS) and Blacks stopped (BS), broken down by borough. This plot shows the interquartile range of age and outliers for WS and BS by borough that represents the data in **Table 1** and **Table 2**.

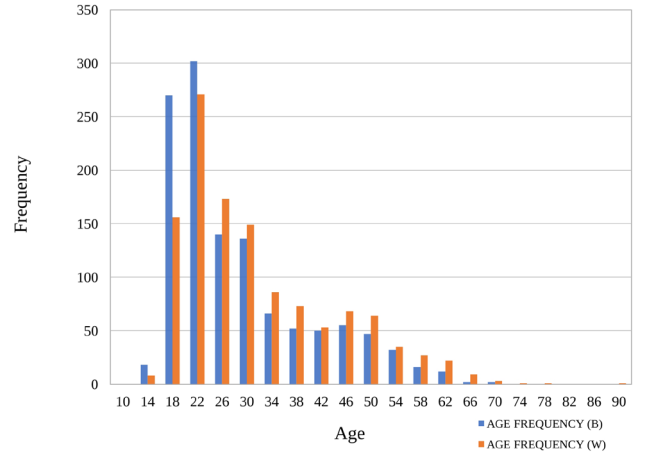

Figure 4. Histogram of Whites stopped (WS) and Blacks stopped (BS) by age in 2011 for the random sample. The age frequency of BS and WS in the sample of size 1200 is shown. The ages were separated by years of four to capture the largest demographic of 14-22.

distribution around its mean. For all boroughs except Staten Island, the skew was more positive for BS compared to WS (**Table 3**).

The shape of the distribution of ages for both BS and WS was skewed to the right (Figure 4). Notably, the number of BS from ages 14–22 was much higher than WS, with there being over 150 more BS than WS. This fact leads us to enquire if Black Arrest Rate (BA) and White Arrest Rate (WA) follow a similar pattern when looking at the complete data set for selected years.

WA and BA are nearly identical to each other and to the population arrest rate (**Table 4**). We can also conjecture that because most of the arrest data of both races is concentrated within the 14–22 age range, the WA and BA would be similar in this group.

DISCUSSION

The peak in stops (**Figure 1**) can be explained as follows: in 2012, a major class action suit arguing against "Stop and Frisk" by the New York City Police Department (NYPD) was

WS Skewness	BS Skewness	Borough
0.78	1.14	Bronx
1.07	1.15	Brooklyn
0.93	1.14	Manhattan
1.23	1.40	Queens
1.10	0.90	Staten Island

Table 3. Skewness of the age data for Whites stopped (WS) and Blacks stopped (BS) for each borough. Skewness is a statistical measure that characterizes the degree of asymmetry of a distribution around its mean. It was computed using the SKEW function in Microsoft Excel.

granted by a federal judge. The lawsuit claimed that the practice was unconstitutional and racially discriminatory and represented thousands of primarily Black and Latino New Yorkers who have been stopped without any cause. The lawsuit stated, "illegal stops-and-frisks are not limited to a few rogue police officers but are the product of a program designed at the highest level of the police department" (6). We strongly believe that the lawsuit and the negative publicity it garnered in popular media caused the dramatic fall in the number of stops starting 2012. It is likely that the NYPD became more objective in whom they stopped. Thus, the 2011 data offers the most insight into the intricacies of how and for what reason stops were carried out. In 2013, the case came to a conclusion. The judge noted in her decision, "Suspicionless stops should never occur. Defendants' cavalier attitude towards the prospect of a 'widespread practice of suspicionless stops' displays a deeply troubling apathy towards New Yorkers' most fundamental constitutional rights" (6). With this decision, community groups and the NYPD decided to work on a joint reform process (7).

Until 2013, the data clearly shows that, across the entire population, BS was much higher than WS, even though the arrest rates were very similar (**Table 4**). In other words, Blacks were stopped more often than Whites although most Blacks may have been innocent, suggesting that the "Stop and Frisk" policy adopted by New York was not color-neutral. Further, in addition to police bias, it is possible that societal prejudices caused bystanders to call police on Black people more often, hence resulting in higher BS. After 2013, for each year, we see an increase in BA and WA despite a decrease in BS and WS. In other words, we think that due to legal action, the police became more accurate in identifying those who should be stopped. The number of people stopped for frivolous reasons likely dropped for both races, much more so in the case of Blacks, though there is no conclusive data to prove this claim. Note that we assume in this study that arrests made of both races were for legally justifiable reasons. However, it is possible that there is racial bias not only during stop but also during arrest. For analyzing neutrality during arrest, we need data that takes into account post-arrest actions like court proceedings.

The distribution of BS and WS by borough cannot be

Year	BA	WA	Population Arrest Rate	BS	WS
2009	0.12	0.12	0.12	310,611	53,601
2010	0.13	0.14	0.14	315,083	54,810
2011	0.12	0.13	0.12	350,743	61,805
2012	0.11	0.12	0.11	284,229	50,366
2013	0.11	0.12	0.12	104,958	20,877
2014	0.17	0.16	0.18	24,319	5,467
2015	0.19	0.16	0.2	12,223	2,567
2016	0.23	0.24	0.24	6,498	1,270
2017	0.32	0.38	0.33	6,595	977
2018	0.30	0.31	0.3	6,241	1,074
2019	0.34	0.36	0.34	7,981	1,215

Table 4. The variation of arrest rates for Blacks (BA) and Whites (WA) for selected years. This table compares the BA and WA to the population arrest rate. The population arrest rate is defined as the proportion of those who were arrested from all the stops in the selected year. BS: Black stops, WS: White stops.

justifiably explained by their respective demographics. For instance, in the Bronx, where according to a 2013 Census Bureau estimate, "45.8% of the Bronx's population was White, and 43.3% was Black or African American," the number of BS was significantly greater than WS (217 vs. 82) (**Table 1** and **Table 2**). The same trend can be seen in Manhattan where the number of BS was also greater than WS (354 vs. 289), yet the population is 58.9% White and 15.5% Black or African American (8).

We saw that younger people of both Blacks and Whites are more likely to be stopped and possibly arrested (**Figure 4**). Also, BS was younger than WS for all boroughs except Staten Island. The reason may be because of a combination of factors including socio-economic reasons (higher unemployment, poverty rates, etc.) and police perception. We only speculate on the reasons as we do not have the data to arrive at a conclusion.

Throughout this analysis, we used data representing non-Hispanic Blacks and non-Hispanic Whites. The reason for this was because for the first three selected years, the breakdown of Hispanics by race was not available. If the breakdown was consistently available over the years, we could compare them as well.

"Stop and Frisk" by itself is not the problem. The basis was to use it in hot-spots of drug and firearm related crime in order to deter potential offenders, and it seems to have worked very effectively (9). City statistics shows that the reduced crime rate could be attributed in large part to the policy. As discussed above, however, the real problem was the unjustified stops of so many people of color. That is inexcusable even if the crime rate dropped. A healthy policy would build confidence in all people, irrespective of age, race, or gender, towards police.

In the future, we would like to study similar controversial policies that have been adopted by other cities, and if they have changed over the years. It is clear though that only by carefully analyzing data that changes can be enacted to make policies impartial.

METHODS

We used the official data set regarding "Stop and Frisk" published by the NYPD for the years 2003–2019 (10). For each year, the data set provides details for each stop made including race, age, borough, reason for stopping, and if an arrest was made after the stop. Black Hispanics and White Hispanics were not counted as Black or White, respectively, because the data had a separate Hispanic category. Note that the data is self-reported by police and is not subsequently corrected for errors. For instance, typographical errors and missing values were present in the data set but did not affect our analysis.

We took a random sample of 1200 stops by using the Microsoft Excel built-in function. This sample size was chosen because it satisfied the 10% rule of independence, but also provided sufficient data to compare the age distribution between boroughs. All graphs and tables were produced using Excel. The selected years were chosen because 2009–2013 represented years that lead up the peak in the number of stops, while 2014–2019 represented years after the peak (**Figure 1**). We computed the skewness values in Table 3 using the SKEW function in Microsoft Excel.

Using the July 1, 2019 population estimates from the US Census as reference (5), we generated the histogram shown in **Figure 2**. We selected July 1, 2019 because it was the most current population data we could find.

For Table 4, we computed BA and WA for years on each side of 2012, when the number of stops began to fall. WA and BA are each computed as (No. of Arrests)/(No. of stops). We calculated the population arrest rate = 1-innocence rate. The innocence rate is found in (3).

Received: August 4, 2020
Accepted: March 13, 2021
Published: April 18, 2021

REFERENCES

1. Kocieniewski, David, and Robert Hanley. "RACIAL PROFILING WAS THE ROUTINE, NEW JERSEY FINDS." *The New York Times*, 28 Nov. 2000, www.nytimes.com/2000/11/28/nyregion/racial-profiling-was-the-routine-new-jersey-finds.html. Accessed 18 July 2020.
2. Legal Information Institute. "Stop and Frisk: Overview." https://www.law.cornell.edu/wex/stop_and_frisk. Accessed 16 June 2020.
3. New York Civil Liberties Union. "Stop-and-Frisk Data." 2 Jan. 2012. https://www.nyclu.org/en/stop-and-Frisk-data. Accessed 14 June 2020.
4. Rudovsky, David and David A. Harris, "Terry Stops and Frisks: The Troubling Use of Common Sense in a World of Empirical Data." *Ohio State Law Journal*, Vol. 79, p. 501,

2018, pp. 501-546.
5. US Census Bureau. “Quick Facts.” 1 July 2019, https://tinyurl.com/yx8fuu4d. Accessed 3 January 2021.
6. Center for Constitutional Rights. “Class-action Lawsuit Challenges Stop-and-Frisk Policy.” 16 May 2012, https://ccrjustice.org/home/press-center/press-releases/class-action-lawsuit-challenges-stop-and-frisk-policy. Accessed 21 June 2020.
7. Center for Constitutional Rights. “Floyd, et al. v. City of New York, et al.” 13 Aug. 2012, https://ccrjustice.org/home/what-we-do/our-cases/floyd-et-al-v-city-new-york-et-al. Accessed 21 June 2020.
8. U.S. Census Bureau. “Summary File. 2007 – 2011 American Community Survey.” 2013, http://ftp2.census.gov/. Accessed 7 July 2020.
9. Rosenthal, Lawrence. “Crime Dropped under Stop-and-Frisk, Which Is Worth Remembering in the Rush to Criticize It.” *NBCNews.com*, 6 Mar. 2020, www.nbcnews.com/think/opinion/crime-dropped-under-stop-frisk-which-worth-remembering-rush-criticize-ncna1151121. Accessed 14 August 2020.
10. New York Police Department. “Stop, Question, and Frisk Data.” https://www1.nyc.gov/site/nypd/stats/reports-analysis/stopfrisk.page. Accessed 17 June 2020.