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Analysis of RPD Stop Data

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Introduction

This report provides a descriptive analysis of Rochester Police Department (RPD) traffic stop data. We analyzed 41,201 traffic stops performed by RPD between 2015 and 2023. The stop data consisted of 83 variables, but the analysis of many of those variables was hampered by high numbers of missing values.

Increased scrutiny of law enforcement practices has led to calls for the collection and analysis of police stop data. Such data analysis is essential for fostering accountability and transparency within the police departments. Police officers in the United States conduct at least 50,000 traffic stops every day, making these stops a central part of modern policing and the most common way in which the public interacts with law enforcement (Policing Project, 2019). Beyond the frequency, traffic stops often lead to significant financial hardship for individuals through fines and fees, and evidence suggests that both traffic and pedestrian stops disproportionately impact people of color (Policing Project, 2019). Despite how common these stops are, there is still much we do not understand about traffic stop practices and the full effects of traffic stops. Analyzing this data enables the identification of patterns and trends within policing practices, including disparities in traffic stops based on factors such as race, gender, or geographic location (Policing Project, 2019). This helps to assess the effectiveness of current policing strategies and ultimately develop informed policy reforms aimed at promoting equitable policing practices.

Transparency is crucial in law enforcement because it builds trust between police departments and the communities they serve. When the actions, decisions, and data of law enforcement agencies are open to public scrutiny, it demonstrates a commitment to accountability and ethical practices. This

openness allows citizens to understand the reasoning behind police actions, reducing misunderstandings and promoting cooperation. Strong relationships based on mutual trust between police and the communities they serve are vital for effective policing and public safety; community members are more likely to cooperate with law enforcement and provide crucial information when they trust that police actions are fair and reflect community values (Community Relations Service, n.d.). Transparency is a key element in fostering this trust, as timely and open communication about critical incidents helps reassure the public that information is not being deliberately withheld (Community Relations Service, n.d.).

This report is divided into the following sections. First, we provide an overview of the data. Second, we provide a descriptive analysis of the data that could be reliably analyzed. Third, we provide recommendations for future data collection.

Data Overview

The original file included 83 variables and 41,201 cases. Many of the variables included information that was repetitive or of no value for analysis. Several important variables had missing data. For example, the race variable had 34,502 missing values. Such a large number of missing values makes it impossible to perform a rigorous analysis of the link between race and stop dynamics. With so many missing cases it is difficult to justify imputation techniques for the missing data. Further, such a large number of cases likely means that the existing data are biased and do not represent the true nature of stops in the city.

Race was one of many variables with more than 50% missing data. It appears that most of the missing data are in categories that are not mandated by the state for collection. Below is a list of variables with the most missing cases:

- Registration Class of Vehicle: 27,014 missing values
- Violator's Race: 34,502 missing values
- Violation Mile Per Hour Zone: 30,947 missing values
- Precinct or Zone Number: 34,920 missing values
- Ticketing Officer's Station/Beat/Sector: 31,333 missing values
- Area: 32,614 missing values
- Violator Driving Alone: 28,693 missing values
- Number of Lanes: 31,809 missing values
- Light Conditions: 31,672 missing values
- Number of Violators: 32,732 missing values
- Officer's Activity: 31,735 missing values
- Pavement Condition: 31,695 missing values
- Tour of Duty: 31,820 missing values
- Weather Conditions: 31,817 missing values
- Traffic Violations Bureau Indicator: 21,396 missing values

In addition to the missing case values, the other major problem is that even cases with near complete data have data quality issues. For example, most of the address information for the stops is incomplete. Many of the stops have data on addresses without a zip code or only provide the nearest intersection where the stop occurred. Importantly, the dataset does not include longitude and

latitude information needed to map the stops using mapping software. The absence of complete addresses or mapping coordinates makes mapping the data very challenging, as each address would need to be manually corrected before being mapped.

Descriptive Analysis of Existing Stop Data

Despite the limitations noted above, there was some data that we were able to analyze. We hope this brief analysis will provide a partial picture of stops in Rochester and serve as an impetus for more complete collection of data that allows for a more rigorous analysis.

Figure 1.

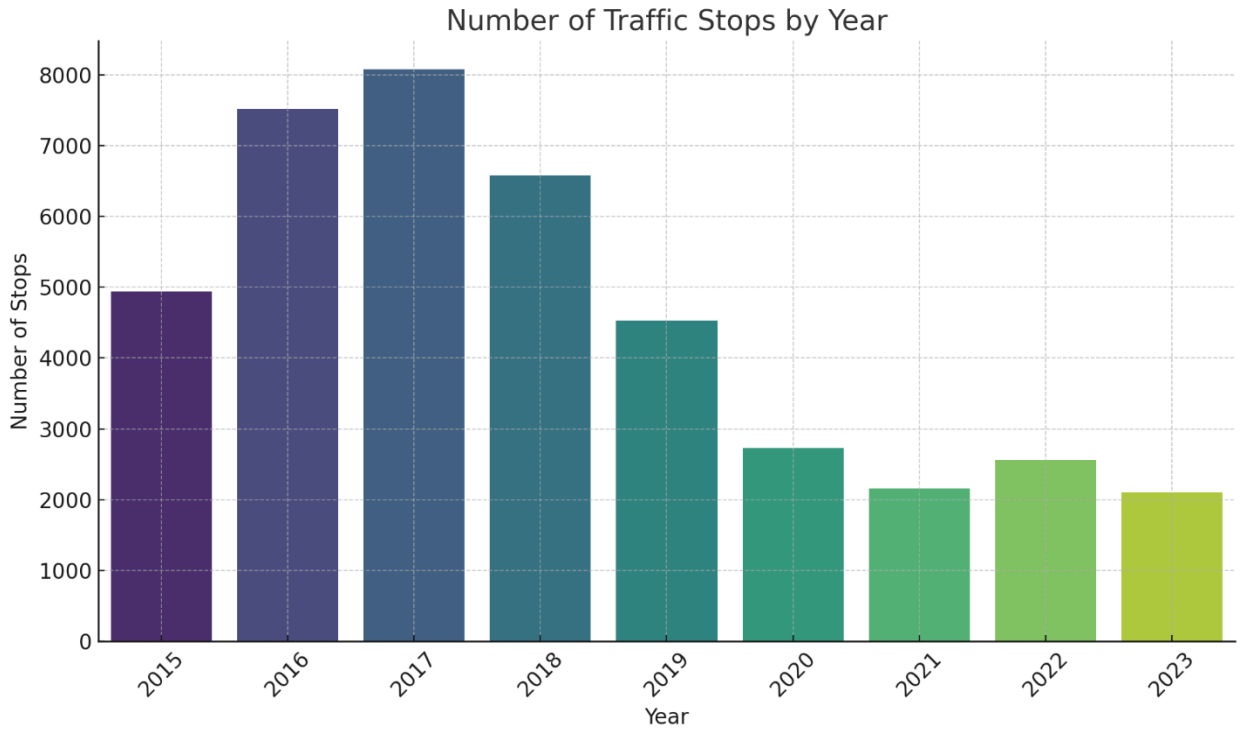

Figure 1 shows the number of traffic stops conducted by the Rochester Police Department from 2015 to 2023, revealing a clear declining trend over this period. The highest number of traffic stops

occurred between 2016 and 2017, exceeding 8,000 stops. The sharp decline observed in 2020 and 2021 can likely be attributed to the COVID-19 pandemic, which resulted in fewer vehicles on the road and reduced law enforcement activities.

We have converted the above histogram data into a table to aid in interpretation:

Table 1. Breakdown of Stops by Year

Year	Number of Stops
2015	4,937
2016	7,516
2017	8,076
2018	6,579
2019	4,530
2020	2,733
2021	2,161
2022	2,562
2023	2,107

Table 1 shows traffic stop statistics for the Rochester Police Department from 2015 to 2023, illustrating trends and changes over time. The starting point for our analysis was 4,937 traffic stops in 2015. In 2016, traffic stops increased by 52.3% over the previous year to 7,516. Increased enforcement and proactive policing are believed to have contributed to the large increase. The rising trend continued into 2017, with traffic stops peaking at 8,076, up 7.4% from the previous year. In 2018, traffic stops decreased by 18.5% to 6,579, indicating a potential shift in policing techniques or budget allocation. This decline persisted in 2019, with traffic stops falling to 4,530, a 31.2% decrease from 2018. This trend might reflect changing department priorities or other external factors affecting police activity. The year 2020 saw a dramatic decrease in traffic stops to 2,733, down 39.7% from 2019, likely influenced by the COVID-19 pandemic, which reduced road traffic and shifted police focus to pandemic-related issues. In 2021, traffic stops fell even lower to 2,161, the lowest in the dataset, a

20.9% fall from 2020. This persistent drop was most likely due to the ongoing epidemic effects and changes in policing tactics. Traffic stops increased slightly to 2,562 in 2022, up 18.6% from 2021, possibly signaling a return to routine enforcement as pandemic restrictions lifted. However, in 2023, traffic stops declined again to 2,107, a 17.8% fall from 2022. This implies that, despite a small rise after the pandemic, the main trend of decreasing traffic stops continued.

Figure 2.

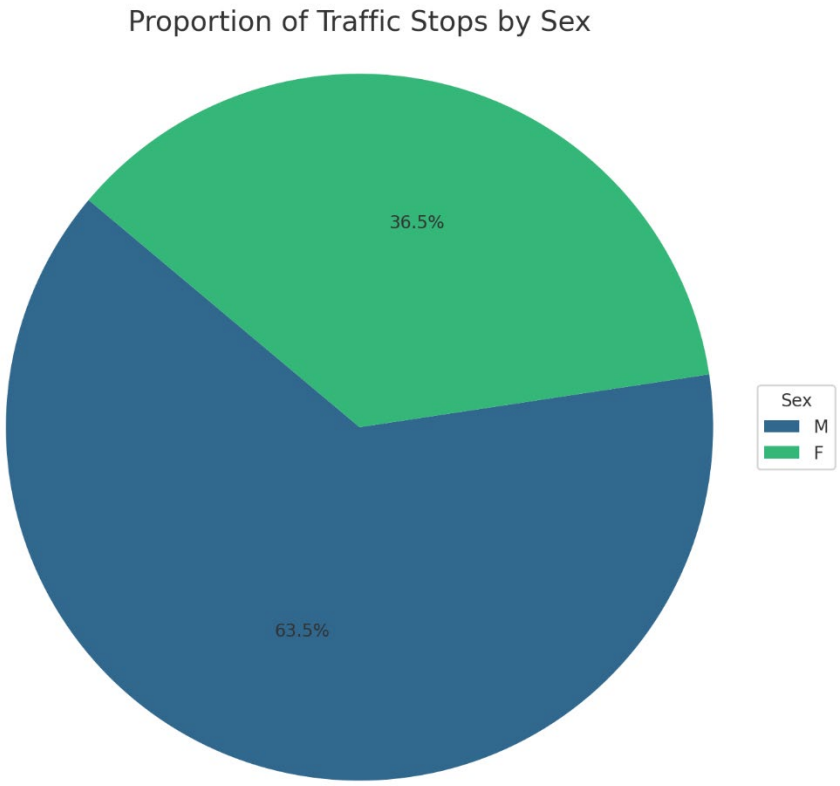

Figure 2 illustrates the proportion of traffic stops conducted by the Rochester Police Department broken down by the sex of the individuals stopped. Males account for 63.5% of the total traffic stops, while females make up 36.5% of the total traffic stops. The significant difference suggests that there may be underlying factors influencing the likelihood of being stopped based on one's sex. According to the data, there were 26,159 male stops and 15,037 female stops.

Figure 3.

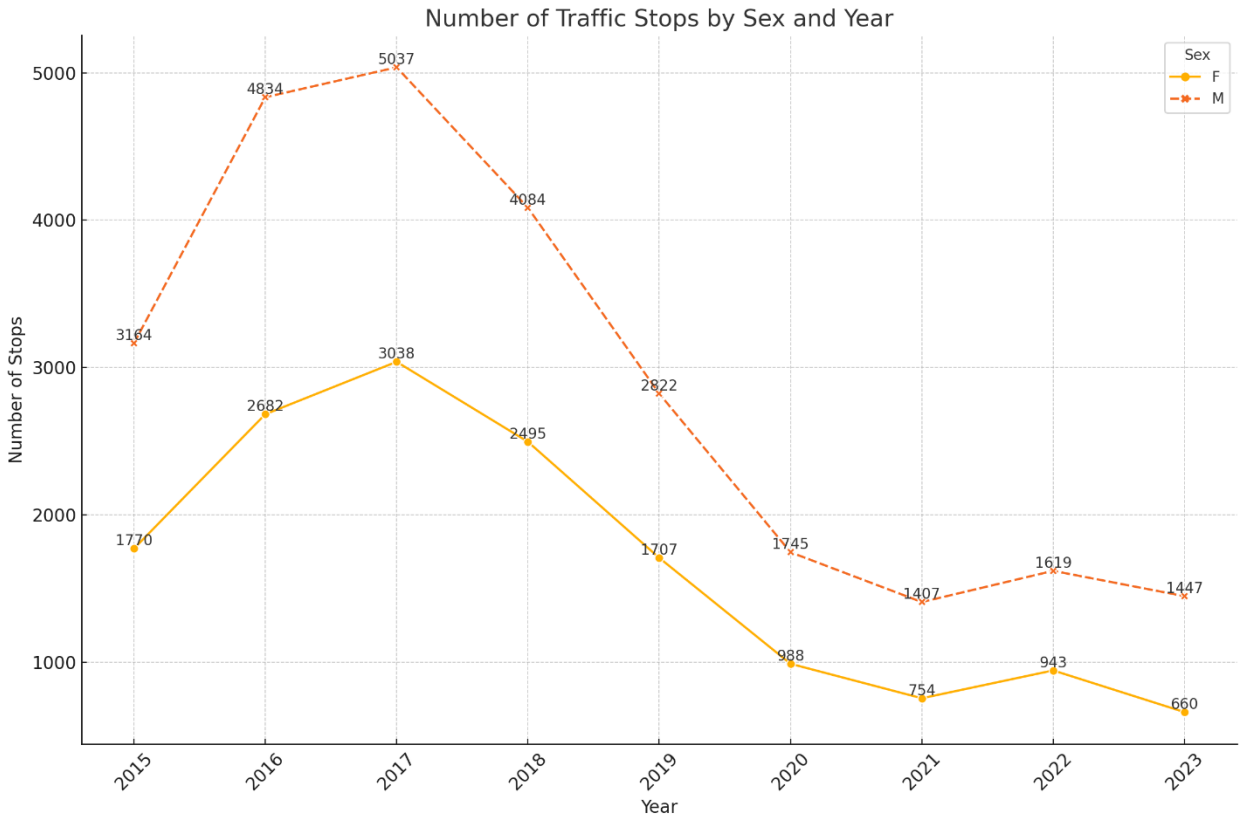

Figure 3 presents the number of traffic stops conducted by the Rochester Police Department from 2015 to 2023, broken down by sex (male and female). The dotted orange line represents the stops involving males, while the solid yellow line represents the stops involving females. Both male and female stops show a decline throughout the observed years. The number of stops for both sexes peaked in 2017 and then consistently declined, with a noticeable drop during the COVID-19 pandemic years.

Table 2. Ratio of Male Stops to Female Stops by Year

Year	F	M	Ratio (M/F)
2015	1770	3164	1.79
2016	2682	4834	1.80
2017	3038	5037	1.66
2018	2495	4084	1.64
2019	1707	2822	1.65
2020	988	1745	1.77
2021	754	1407	1.87
2022	943	1619	1.72
2023	660	1447	2.19

Table 2 displays the ratio of male to female traffic stops from 2015 to 2023, highlighting a consistent trend where males are stopped more frequently than females. In 2015, the ratio of male to female stops was 1.79, with 3,164 stops for males and 1,770 for females. This trend continued in 2016 with a slightly higher ratio of 1.80, indicating that males were stopped almost twice as often as females. The male to female ratio for 2017 was 1.66, showing a slight decrease in disparity but still reflecting a significant difference with 5,037 male stops compared to 3,038 female stops. By 2018, the ratio was 1.64, maintaining the pattern of higher stops for males. From 2019 onwards, the ratio fluctuated but remained above 1.60, except for a notable increase in 2023, where the ratio surged to 2.19, indicating males were stopped more than twice as often as females that year. These disparities may reflect differential enforcement, or differential driving behaviors among males.

Figure 4

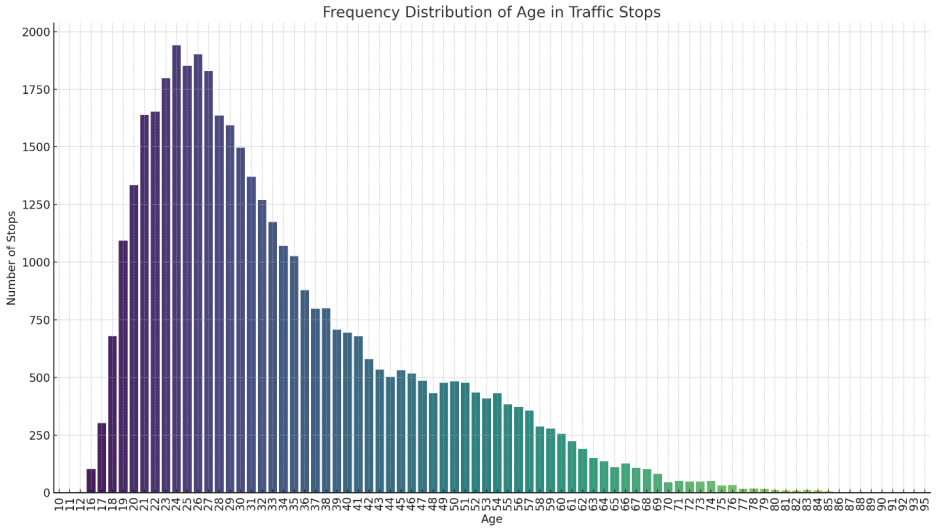

Figure 4 shows the frequency of traffic stops made by the Rochester Police Department based on the age of those stopped. The data ranges from ages 10 to 95, demonstrating how traffic stops fluctuate between age groups. The distribution is skewed to the right, with younger drivers being stopped more frequently, particularly those in their late teens to early thirties. The age bracket with the greatest traffic stops is 20 to 35 years old, with a peak of nearly 2,000 at age 24. As people get older, the number of traffic stops gradually decreases. Drivers under 20 experience fewer traffic stops than other age groups, possibly due to driving restrictions.

Table 3. Description of Frequent Stops	Number of Stops
SPEED IN ZONE	10,242
UNREGISTERED MOTOR VEHICLE	7,573
UNINSPECTED MOTOR VEHICLE	7,281
NO/INADEQUATE LIGHTS	2,117
SIDEWINGS/SIDEWINDOWS/NON/TRANSPARENT	1,316
INSUFF TURN SIG - LESS THAN 100'	1,033
NO/INSUFFICIENT TAIL LAMPS	862
UNINSPECTED MOTOR VEHICLE > 60 DAYS	569
NO/INADEQUATE PLATE LAMPS	483
REAR SIDE WINDOWS NON/TRANSPARENT	410

Table 3 outlines the top ten most common reasons for traffic stops, emphasizing major issues that result in drivers being pulled over. Speeding is the most common reason for stops, accounting for 10,242, demonstrating that officers prioritize speed enforcement efforts. Stops for unregistered and uninspected motor vehicles follow closely behind, with over 7,000 incidents each, indicating that a considerable percentage of drivers fail to comply with vehicle registration and inspection regulations. Other prominent reasons include poor lighting and non-transparent windows, which raise safety and visibility concerns on the roads. These concerns, combined with insufficient turn signals and tail lamps, highlight the necessity of vehicle upkeep in avoiding traffic stops. Less common but nonetheless significant breaches include long-term uninspected vehicles and insufficient plate lamps, which reflect ongoing maintenance and legal compliance concerns. Importantly, drivers with lower incomes are more likely to face difficulty with such maintenance costs.

Table 4. Stops by Vehicle Year	Number of Stops
2005	3,008
2006	2,800
2008	2,794
2004	2,791
2007	2,734
2003	2,680
2002	2,214
2009	1,830
2001	1,677
2012	1,655

Table 4 shows a breakdown of traffic stops by vehicle year, highlighting the top ten years with the highest number of stops. Vehicles manufactured in 2005 top the list with 3,008 stops, followed by

2006 with 2,800 stops, and 2008 with 2,794 stops. Vehicles from the year 2004 were stopped 2,791 times, making it the fourth most frequent year, while 2007 vehicles follow closely behind with 2,734 stops. The data shows that older vehicles, particularly those from 2003 (2,680 stops) and 2002 (2,214 stops), are also frequently stopped. The trend continues with vehicles from 2009 being stopped 1,830 times and those from 2001 with 1,677 stops. Interestingly, the year 2012, the only year from the 2010s in the top ten, recorded 1,655 stops. This distribution suggests a higher likelihood of traffic stops involving older vehicles, which may be due to factors such as increased likelihood of violations related to vehicle maintenance, registration, or inspections as vehicles age.

Implications and Final Recommendations

Based on the findings noted above, we recommend the following:

1. The city should assess the stop data collection process and explore ways to improve data collection. This should result in more of the missing fields in the stop form being completed. Officers should be encouraged to fill out the forms completely and the city could perform random checks of a subset of data to see if the desired collection is occurring.
2. The city should require officers to collect data on the race of the person being stopped. Although the state does not mandate this, there is nothing that precludes the city from doing so. Collection of race data will aid efforts to address racial disparities in police stops.
3. The city should explore the impact of the financial burden of fines and fees on low-income residents.
4. The city should provide precise longitude/latitude data for each stop like it does for each shooting. This will make it easier to assess location dynamics when analyzing police stops.

Improving data collection and transparency in traffic stop practices can enhance accountability and build trust between the Rochester Police Department and the community. Accurate data is critical for addressing concerns about biased policing and ensuring equitable treatment of all citizens.

References

Policing Project at NYU School of Law (2019, September 30). *It's time to start collecting stop data: A case for comprehensive statewide legislation*. https://www.policingproject.org/news-main/2019/9/27/its-time-to-start-collecting-stop-data-a-case-for-comprehensive-statewide-legislation

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The Center for Public Safety Initiatives (CPSI) is a multi-disciplinary research center that examines strategies to reduce crime and enhance the administration of justice. It provides program evaluation, data analytics, and project management services to area law enforcement, community non-profits, and other criminal justice professionals, and it contributes to general knowledge generation of the nature and causes of crime and violence. Its educational goals include training graduate and undergraduate students in strategic planning, program evaluation, and policy analysis.

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