

## Checkpoint 2: Data Visualization

### The Brave Ducks

#### Introduction

Recall in the previous checkpoint, we identify the population for different income neighborhoods as following:

- low income neighborhoods population: 401,566
- middle income neighborhoods population: 1,904,676
- high income neighborhoods population: 410,739

In this checkpoint, we are interested in answering questions 3 and 4 using packed bubbles and treemaps. These questions we intend to investigate further are:

- What is the percentage of misconduct allegations (illegal search, use of force, etc) out of all allegations for these **low, middle, high** neighborhoods?
- Among the officer allegations with complaints filed in the **low, middle, high** neighborhood, what percentage of the cases are dismissed?

#### Analysis

During our analysis, we observed from our visualizations that the misconduct category of "Operation/Personnel Violations" to be a very broad categorization; seemingly used as a "miscellaneous" or "catch-all" categorization when a misconduct complaint doesn't fit into any other category. Due to this, our analyses below will focus on gaining further insight into misconduct complaints categorized as **Drug/Alcohol, Illegal-search, and Use-of-force**.

The first question that we want to analyze:

- What is the percentage of misconduct allegations (drug/Alcohol, illegal search, use of force, etc) out of all allegations for these **low, middle, high** neighborhoods?

What is the proportion of allegations (illegal search, use of force) out of all allegations for low income neighborhoods?

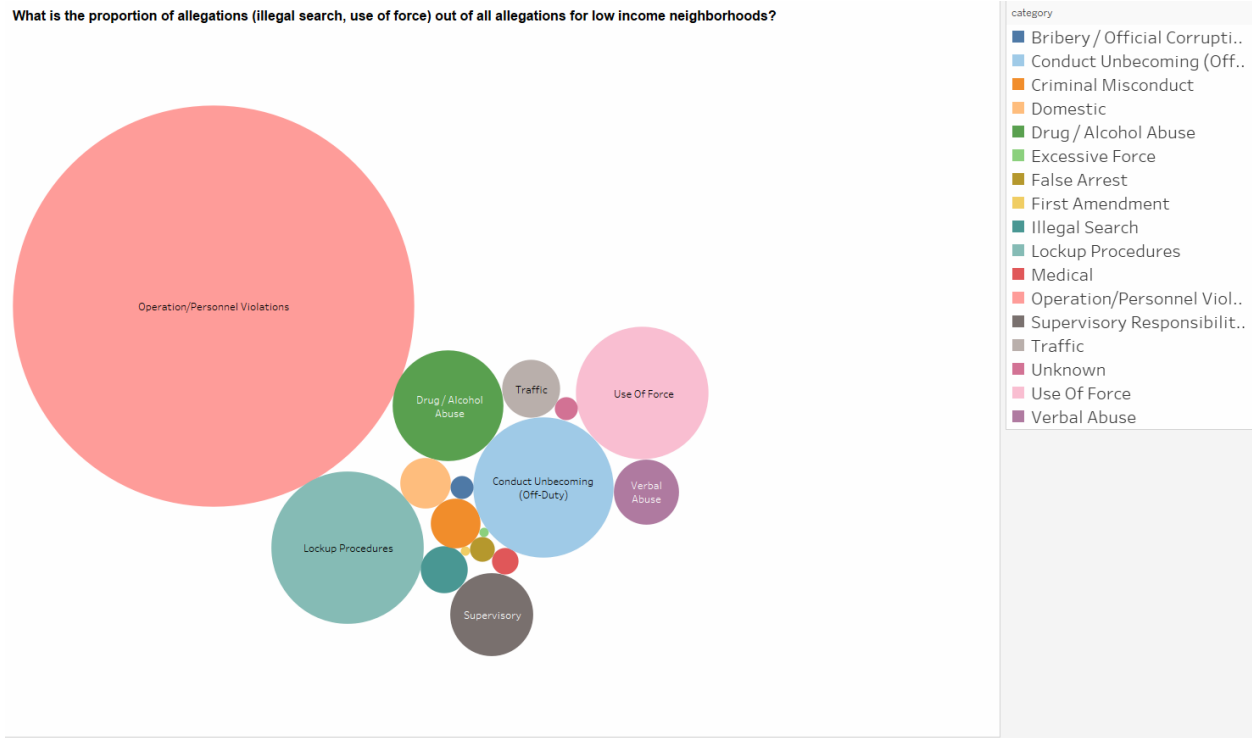


Figure 1: number of cases for each allegation category in low income neighborhoods

Firstly, we see that the total sum of allegation counts for this low income demographic is 2924. The allegation category counts for Drug/ Alcohol, Illegal search and Use Of Force are 139, 25 and 199 counts respectively. This means that the percentage of officer misconduct related to Drug/ Alcohol is **4.7%**. The percentage of officer misconduct related to Illegal search is **0.85%**. The percentage of officer misconduct related to Use Of Force is **6.8%**.

Furthermore, we want to also identify the allegations counts for these misconduct allegation categories with regards to the whole low income demographic, to control for population size differences between demographics. Recall that the population for low income neighborhoods is 401,566. This means that the misconduct related to Drug/ Alcohol is **0.000346** per capita, Illegal Search misconduct complaints are **0.0000625** per capita, and Use of Force complaints are **0.000495** per capita.

What is the proportion of allegations (illegal search, use of force) out of all allegations for middle income neighborhoods?

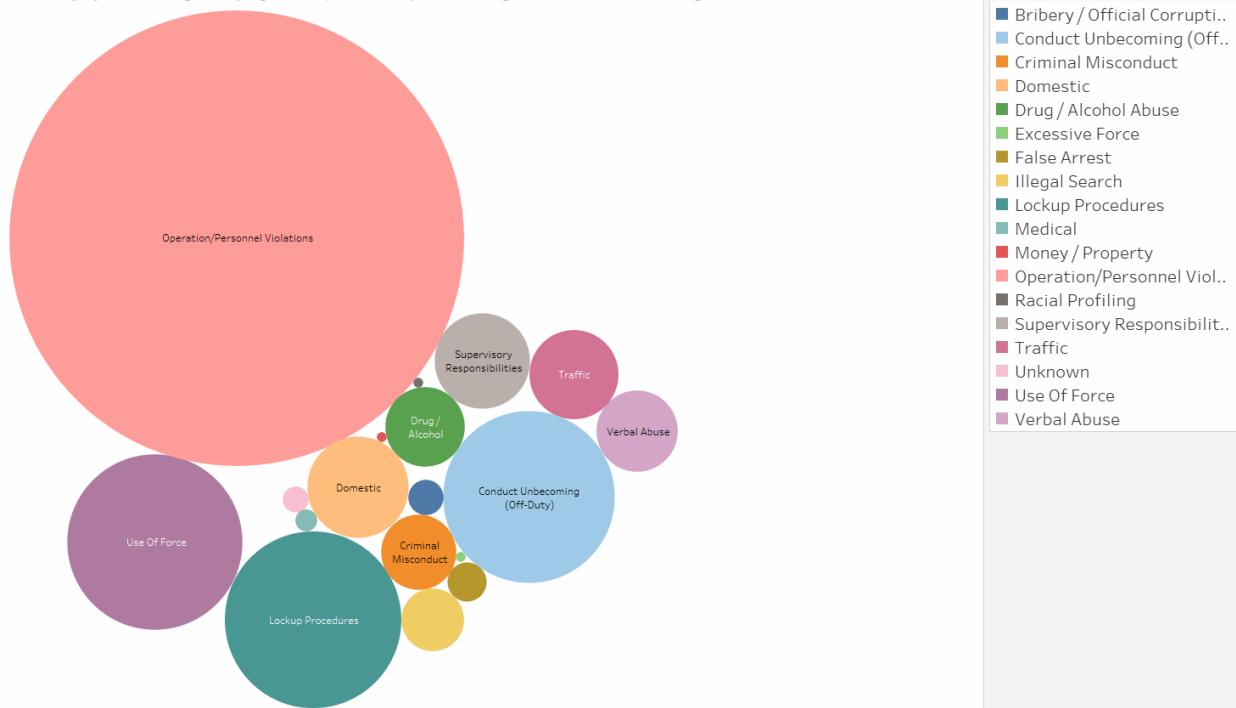


Figure 2: number of cases for each allegation category in middle income neighborhoods

Secondly, we see that the total sum of allegation counts for this middle income demographic is 3683. The allegation category counts for Drug/ Alcohol, Illegal search and Use Of Force are 66, 41 and 321 counts respectively. This means that the percentage of officer misconduct related to Drug/ Alcohol is **1.8%**. The percentage of officer misconduct related to Illegal search is **1.1%**. The percentage of officer misconduct related to Use Of Force is **8.7%**.

Furthermore, we want to also identify the allegations counts for these misconduct allegation categories with regards to the whole middle income demographic, to control for population size differences between demographics. Recall that the population for middle income neighborhoods is 1,904,676. This means that the misconduct related to Drug/ Alcohol is **0.0000346** per capita, Illegal Search misconduct complaints are **0.0000215** per capita, and Use of Force complaints are **0.000168** per capita.

What is the proportion of allegations (illegal search, use of force) out of all allegations for high income neighborhoods?

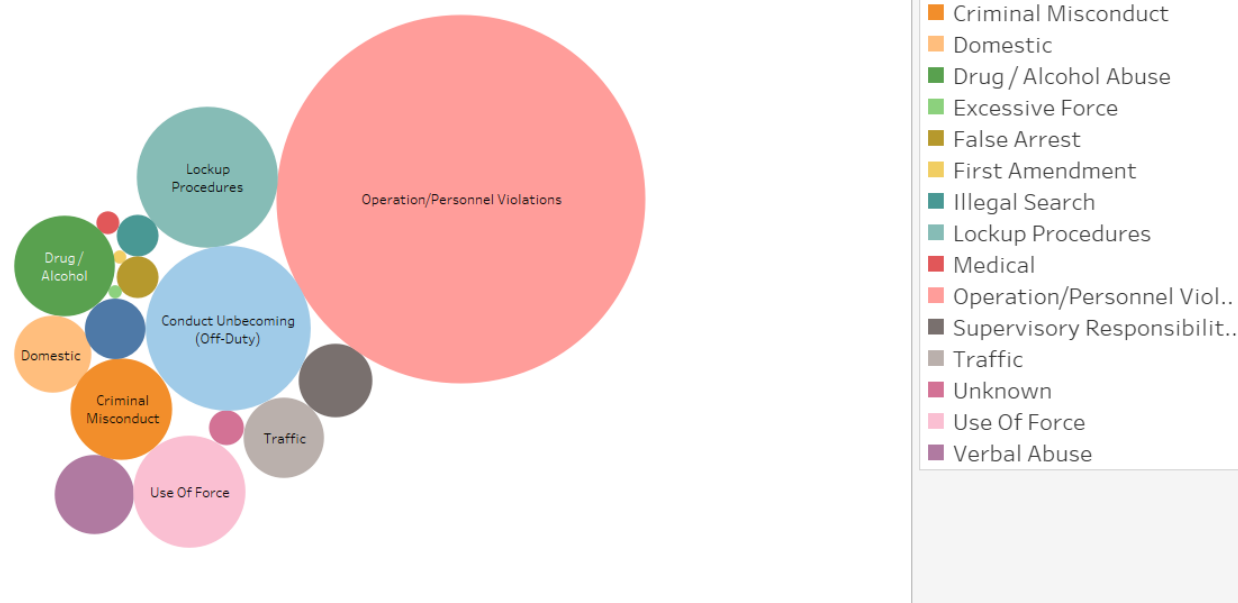


Figure 3: number of cases for each allegation category in high income neighborhoods

Thirdly, we see that the total sum of allegation counts for this high income demographic is 1429. The allegation category counts for Drug/ Alcohol, Illegal search and Use Of Force are 58, 10 and 72 counts respectively. This means that the percentage of officer misconduct related to Drug/ Alcohol is **4.1%**. The percentage of officer misconduct related to Illegal search is **0.7%**. The percentage of officer misconduct related to Use Of Force is **5.0%**.

Furthermore, we want to also identify the allegations counts for these misconduct allegation categories with regards to the whole high income demographic, to control for population size differences between demographics. Recall that the population for high income neighborhoods is 410,739. This means that the misconduct related to Drug/ Alcohol is **0.000141** per capita, Illegal Search misconduct complaints are **0.0000243** per capita, and Use of Force complaints are **0.000175** per capita.

The first observation we have is that for the Drug/ Alcohol category, the low income neighborhood has the highest percentage out of all allegation counts with **4.7%**. Meanwhile, for both Use Of Force and Illegal Search categories, the middle income has the highest percentage out of all allegation counts with **1.1%** and **8.7%**. Meanwhile, to apply these categories with regards to the whole demographic, for the Drug/ Alcohol category, the low income neighborhood has the highest per capita case, **10x** more than the middle income neighborhoods, **2x** more than the high income neighborhoods. For Use Of Force, the low income neighborhood has the highest per capita case again, nearly **3x** more than the middle income neighborhood and high income neighborhood. Finally for Illegal search, the low income neighborhood has the highest per capita case yet again, nearly **3x** more than the middle income neighborhood and high

income neighborhood. This really shows that the low income neighborhood has been disproportionately affected by police misconduct across all three categories.

The second question that we want to analyze:

- Among the officer allegations with complaints filed in the **low, middle, high** neighborhood, what are the final outcomes?

**Among the officer allegations with complaints filed by low income people, what is the allegation outcome?**



Figure 4: Case resolutions for low income neighborhoods

Firstly, we see that the total sum of allegation outcome counts for this low income demographic is 4580. The count for No Action Taken is 2033, which is **44.4%** of out all allegation outcomes. Recall that the population for low income neighborhoods is 401,566. To apply this number with regards to the whole demographic, No Action Taken Outcome is **0.00506** per capita.

Among the officer allegations with complaints filed by middle income people, what is the allegation outcome?



Figure 5: Case resolutions for middle income neighborhoods

Secondly, we see that the total sum of allegation outcome counts for this middle income demographic is 5766. The count for No Action Taken is 2609, which is **45.2%** of out all allegation outcomes. Recall that the population for middle income neighborhoods is 410,739. To apply this number with regards to the whole demographic, this is **0.00228 per capita**.

Among the officer allegations with complaints filed by high income people, what is the allegation outcome?

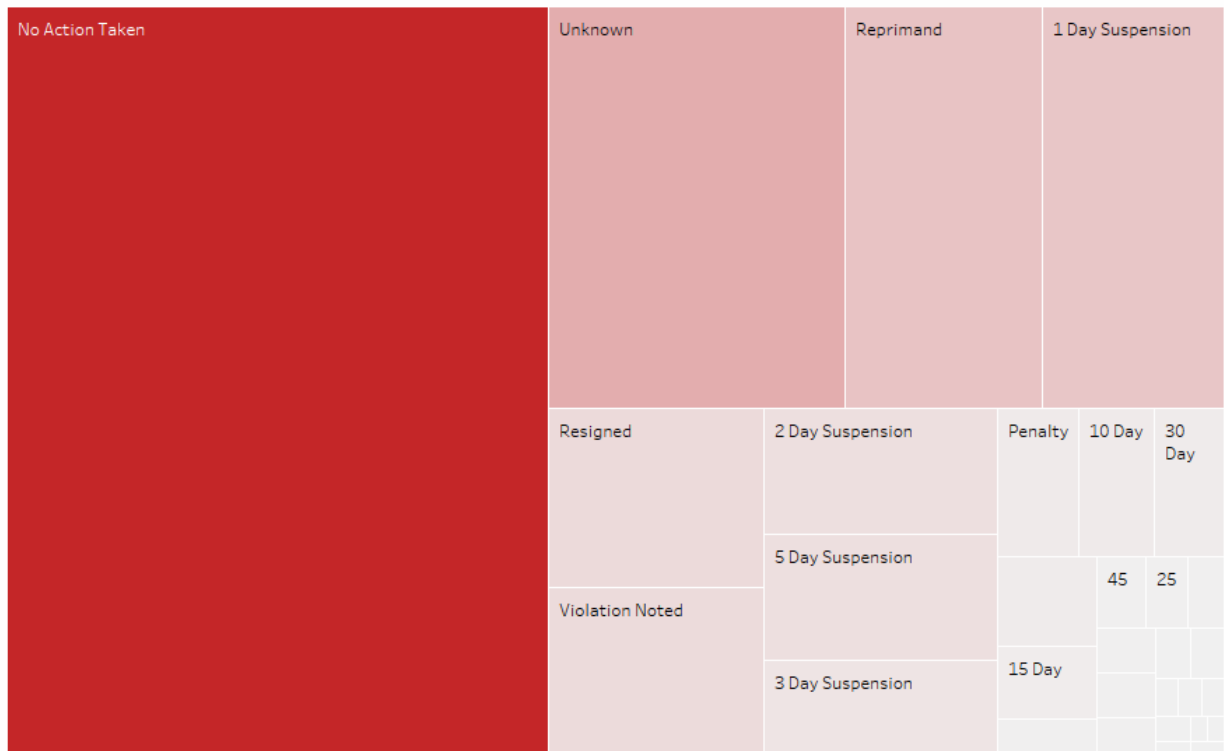


Figure 6: Case resolutions for high income neighborhoods

Thirdly, we see that the total sum of allegation outcome counts for this high income demographic is 2107. The count for No Action Taken is 938 which is **44.5%** of out all allegation outcomes. Recall that the population for high income neighborhoods is 1,904,676. To apply this number with regards to the whole demographic, this is **0.00136**.

An astonishing observation we can make from our analysis, is that when corrected for population size, if a low-income person files an officer misconduct complaint, it is 3x as likely to go uncorrected than if a middle-income person filed a complaint and nearly 4x as likely to go uncorrected than if a high-income person filed a complaint. This insight draws light to an imbalance of fairness when treating misconduct complaints against officers in charge of their respective neighborhoods.

### Experience with Tableau

- Query result is very slow.
- Tableau never saves the password.
- Poor documentation.
- Need to manually do the data cleaning - filter off the null value during visualization