Checkpoint 3
Interactive Visualization

Disparities in the police department with respect to incentives and disciplinary actions

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Racial disparities refers to the objective differences that exist in our community. The report uses the term ***racial disparity*** to denote differences of the outcomes based on race. For example, if in certain communities, a large number of Black people are living below the poverty line than white people, Black people are more arrested for conducting a crime than the white people, in that case, this would be considered as racial disparity. In this report, we address the racial disparity in the following analysis:

Questions

1. Analysis of disparities in disciplinary actions against internal and external misconduct allegations based on the diversity of districts
2. Analysis of the districts in which the disparity of incentives based on races are the most. We will be using an interactive bar chart district wise that gives information about the proportion of awards officers of a certain race are getting and how much it differs from the proportion of that certain race in the population of officers.

Findings

Link to Observable Visualization

Question 1:

Tables Used

- For the allegation and disciplinary action information in question 1, we extracted data from
    - data_allegation [*CRID*, *is_officer_complaint*]
    - data_officer [*allegation_count*]
    - data_policebeat[*unit_description]*
    - data_officerallegation [*allegation_id*, *Disciplined*]
- For the racial makeup for question 1, we used
    - Data_racepopulation [*race*, *count*]

We are trying to find out if the racial makeup of the population affects how officers are disciplined. We can see that there are multiple possibilities shown in the table below

$$I = \frac{Number\ of\ Officers\ Disciplined\ based\ on\ internal\ complaints}{Number\ of\ Total\ officers\ involved\ in\ internal\ complaints}$$

$$E = \frac{Number\ of\ Officers\ Disciplined\ based\ on\ external\ complaints}{Number\ of\ Total\ officers\ involved\ in\ external\ complaints}$$

$$I/E\ Ratio = \frac{I}{E}$$

	Diverse Districts	Plural Districts	Single Race Districts
Comparable I/E Ratio	0	3	6
Disparate I/E Ratio	6	2	5

Table 1. Disciplinary I/E Ratio based on Diversity of the districts

Here

Single Race districts: districts with one race more than 65%
Plural Race Districts: districts with 2 races summing up to 80%
Diverse Districts: districts with no race more than 40%

Comparable I/E Ratio: I/E Ratio < 1.44 (Mean of the I/E Ratios)
Disparate I/E Ratio: I/E Ratio >= 1.44

From Table 1, we can see that there is an inverse relation between diversity and disciplinary actions. One-on-one hypothesis tests(Student's t-Tests) show that there is a linear relationship between racial percentage in a district and the I/E Ratio. Additionally, the tests have shown that for White and Hispanic races there is an inverse relationship as shown in Table.2

	Black	**Hispanic**	**White**
Coefficient	1.6096	-1.5754	-1.8917
Intercept	-0.0040	1.0386	1.2038
p-value	~0.00	0.08	0.01

Table 2. Disciplinary I/E Ratio based on Diversity of the districts

This inverse relation actually holds true for White and Hispanic races evidently. However for Black population, the linear relationship is proportional. This means as the percentage of black population increases in a district, the less serious the complaints from civilians are taken in comparison with the police officer complaints.

Conclusions

1. Racial Makeup of Population in a district causes differences in the way complaints are taken up
2. Higher the Black population in a district, lesser the % of officers disciplined based on external complaints

Further analyses which can be done in next checkpoints

- For our Graph Analytics checkpoint, we would be focusing on checking if the aforementioned conclusions are due to investigator - (misconduct alleged) officers networks. What we would know is whether these investigator - officer networks cause investigators to take external complaints in high black population neighborhoods lightly compared to lower black populations
- For our NLP checkpoint, we would go through the complaints and evaluate them against earlier sustained complaints to find potentially mishandled complaints. This might show how many complaints coming from civilians were not given due process and how this varies across districts.

Question 2:

Racial disparity in the number of awards given to officers

Tables Used

- For the the awards information along with districts and races of officers, we extracted data from
    - data_awards
    - data_officer
    - data_policebeat
    - data_area

Dataset Creation

- The join of the 4 tables above along with the data on the proportion of officers of each race in a department, (policerace.csv) which was obtained from the previous checkpoint, gives the information needed to analyze the proportion of awards received by officers of each race normalized with the proportion of their races in the department population of each district. This gives a metric that tells how much more/less awards each race is getting than their population in the department.

- Table 3 is a representation of how the data needed for the visualization looks like.

	district_number_name	officer_race	awardee	percent_by_dist	population_percentage	difference	awards_disproportion
0	Ogden	Asian/Pacific	416	1	2.5210084033613400	0.39666666666666700	-0.6033333333333330
1	Ogden	Black	1209	5	6.442577030812320	0.7760869565217390	-0.2239130434782610
2	Ogden	Hispanic	12199	52	56.022408963585400	0.9282	-0.07180000000000000
3	Ogden	White	9599	40	35.01400560224090	1.1424	0.14240000000000000

Table 3: Data used in the visualization

- The *percent_by_dist* column gives the percentage of total awards in Ogden that a particular race is given (blacks are given 5% of awards). The *population_percentage* column gives the percent of officer population of that race in Ogden (6.44% of the officers in Ogden police dept are black).
- The *difference* column is the division of the above two columns i.e *percent_by_dist / population_percentage.* This gives the normalized percentage of awards for each race. Ideally this number must be 1 if all the races of officers are getting the awards as per their population proportion in the department. The ***awards_disproportion*** column is basically the *difference-1.* So if this is negative that means the officers of that race are receiving less awards than an ideal situation and if it is positive then they are receiving more awards.
- The ***awards_disproportion*** column is the one that is used in the visualization as it clearly shows if the officers of a particular race are receiving awards disproportionate with respect to their population. If that is the case then it means that there is a racial disparity (as explained in the first paragraph of this document) in the department.

<u>Inferences from the Visualization</u>

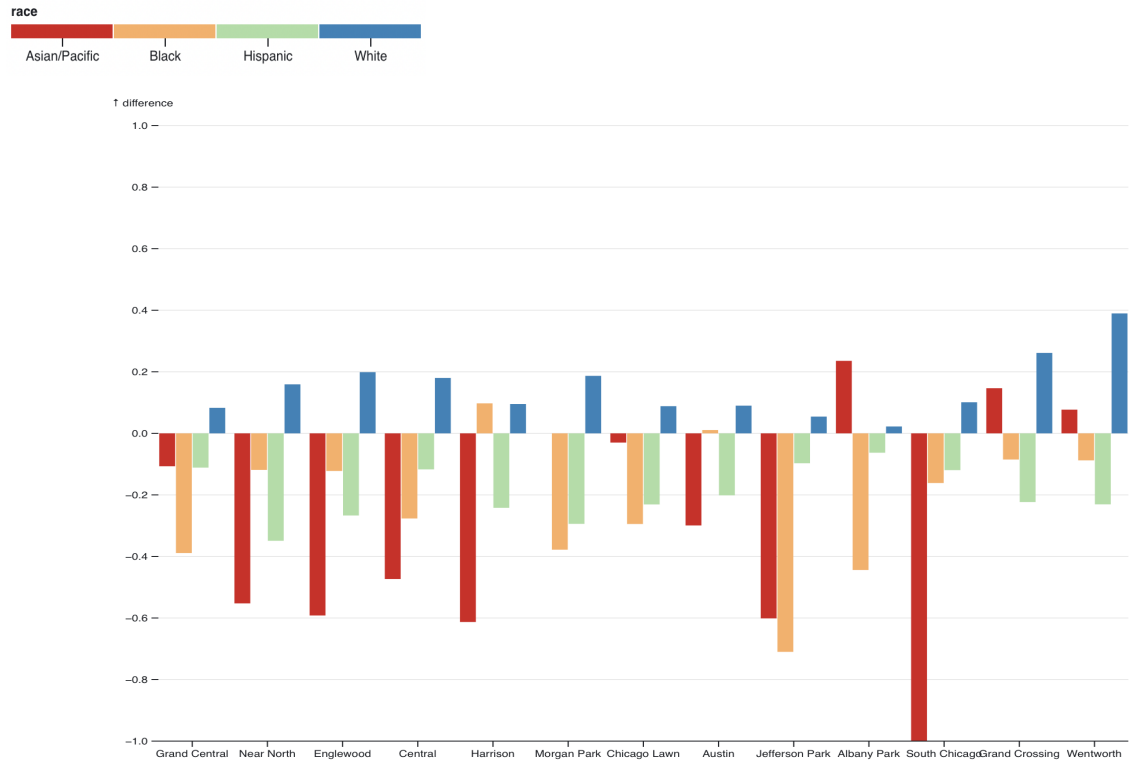

Figure 1: Observable visualization showing the disparity of awards in Chicago police departments.

From the figure 1, we can see that most of the districts have awards_disproportion for blacks and hispanics below 0 and for whites, it is greater than 0. This shows a trend in the police department that white officers are getting more awards than their black colleagues (metric normalized by the respective race population). This means that there is a racial disparity in the awards received by the officers. There could be many reasons for this including the administration, type of officers in the force, and the process of advancing in ranking etc. In all 24 districts, white officers are getting more awards than their represented population. This tendency is another reason why police departments are homogeneous and racially imbalanced. Only in districts such as Albany Park, Grand Crossing and Wentworth black officers are awarded more than their represented population in that area. As a whole, hispanic, black, and asian officers are recognized less than their white counterparts.

Conclusion:

Our findings indicate that there is a racial gap in award nominations in Chicago police departments. According to the research conducted by the HCEO, the potential reason for the observed racial gap in nominations may be due to lack of communication. Thus, police officers should be involved in frequent interactions with supervisors and fellow officers for career recognition and advancement. Another solution may include increasing racial diversity among police departments who are traditionally homogeneous. A diversity in police departments may improve the quality of policing in a variety of ways. Especially, inwardly, it may alter the internal dynamics of the department.

Further analysis for the next checkpoint:

- For Graph Analytics, we will look deeper into the relationship between award requesters and the awardees which gives more clarity onto the underlying reason behind this disparity.
- In particular, we thoroughly analyze 6 districts with the most racial gap in award nominations. During our analysis, we will investigate the unique patterns of racial gap by applying GraphX built in algorithms such as page rank, label propagation, and aggregateMessage to identify the kind of the racial demographics of police officers who are getting the most awards, and who are requesting awards for them. Investigating the network of award requester and awardees we will try to find the cause of racial gap in award nominations.

References:

Nayong R., Roman R., et al. 2020. The Black-White Recognition Gap in Award Nominations. HCEO Working Paper Series. Version 2.