OH RATS!: An Analysis of the Relationship Between Ward Wealth and Government Rat Treatment Services

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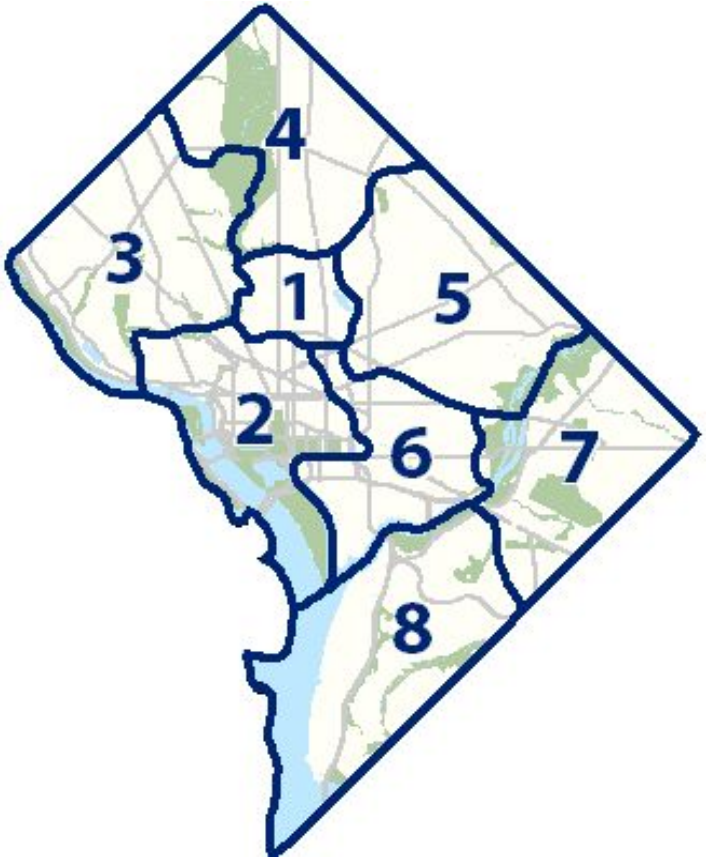
Overview

- Currently, there is a large income gap in Washington D.C.
  - wealthiest 5% earning roughly 52 times the amount of the bottom 20%
- Increasing amounts of rat service requests in recent years
  - As of November 2017, D.C. has received 4,869 requests
- One of the most rat infested cities in the United States
- Rats are not just inconvenient
  - Can cause serious damage to residents' homes, electrical wires, and contaminate food, among other things
- **Purpose:** examine whether there is a discrepancy between rat treatment wait times in wealthy and poor wards

Description of Data

- 311 call center rat service data from the D.C. Mayor's Office at DC.gov
- 379 observations with 29 variables
- Important variables:
  - Ward - Which ward the request came from
  - Add Date - When the rat request was initiated by a resident and added to the government's system
  - Resolution Date - When the service request was completed
  - Resolution Time - Variable created by subtracting Add Date from Resolution Date

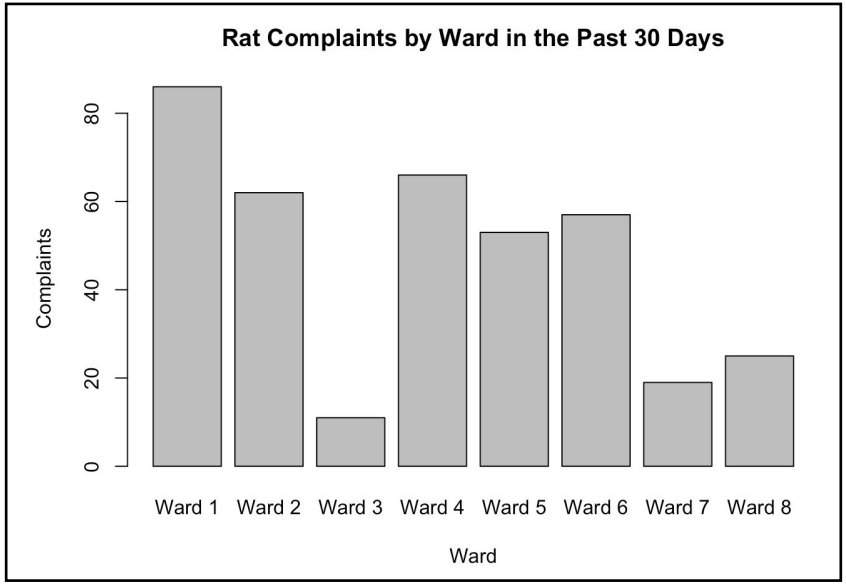


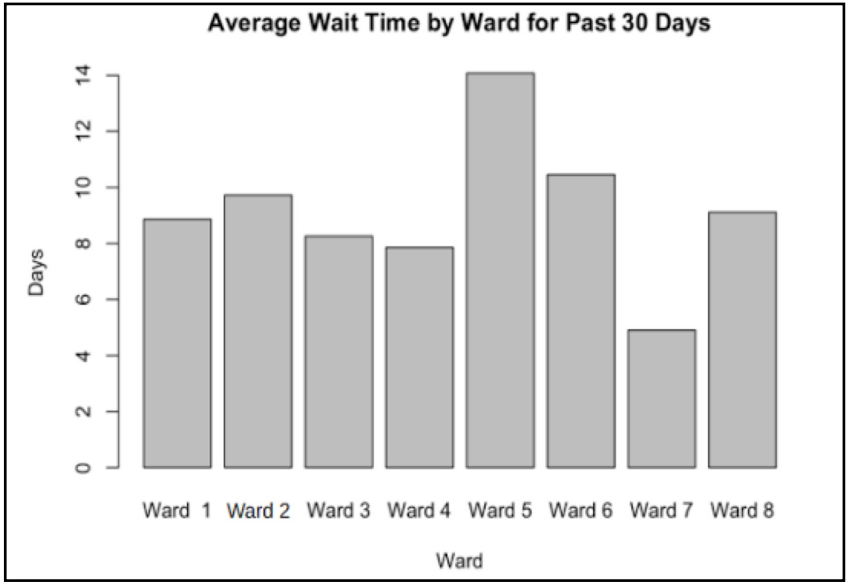
Source: D.C. Mayor, Office of Planning

Description of Data (cont.)

- Using NeighborhoodInfo DC, we classified each ward by socioeconomic status and created two cohorts: high income and low income wards
- High Income group: 3 & 4
  - Ward 3 = $257,224; Ward 4 = $123,353
- Low Income group: 7 & 8
  - Ward 7 = $56,759; Ward 8 = $45,239
- Overall, the average wait time was 9.44 days among all of the wards.

Description of Data (cont.)





Methods

- <u>Null Hypothesis</u> (H_0): there is no statistically significant difference in the mean wait time between the High Income group (Wards 3 & 4) and the Low Income group (Wards 7 & 8)
  - $H_0: \mu_{\text{rich}} = \mu_{\text{poor}}$
- <u>Alternative Hypothesis</u> (H_A): there is a statistically significant difference in the mean wait times between the two groups
  - $H_A: \mu_{\text{rich}} \neq \mu_{\text{poor}}$

Methods (cont.)

- Mean resolution wait times
  - μ_{rich} = 7.92 days
  - μ_{poor} = 7.49 days
- Difference in means = 0.42 days
- Confidence interval (95%)
  - -1.34 to 2.19 days

- Linear model
  - Y = 7.602 + 0.092x
- Two-sample t-test
  - α = 0.05
  - **P-value = 0.7935**

Fail to reject null hypothesis

Results

- Fail to reject the null hypothesis, so conclude there is no statistically significant difference in wait time between the groups
  - High Income = 7.92 days
  - Low Income = 7.49 days
  - P-value of 0.7935 was greater than the alpha level of $\alpha = 0.05$
- Confidence interval for the difference between the means spans from -1.34 and 2.19 days
  - Captures zero, which supports the conclusion that there is no difference between the means of the two groups

Discussion

- Significance
  - Residents in Wards 7 & 8 can expect to wait about as long as those in Wards 3 & 4
  - D.C. government does not favor high income areas when distributing services
- Limits/potential confounders
  - Individual wealth
  - Geography
- Avenues for further inquiry
  - Overall efficiency of rat treatment services
  - Urban versus suburban/rural rat treatment methods

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