Bridging Digital Divide in Oakland

A Data-Driven Analysis

For MACSS222- Data Visualization
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#OaklandUndivided

Introduction

The Oakland Undivided Dataset originates from devices distributed to students in need across the City of Oakland as part of an initiative to bridge the digital divide.

Despite efforts to provide equitable internet access, reports indicate that students from certain areas still face difficulties connecting to the internet.

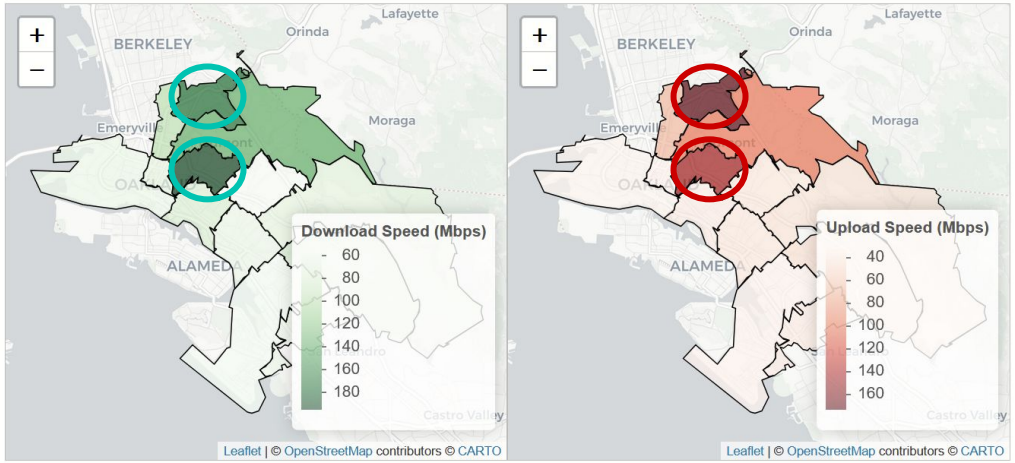
- Geographic
- Socioeconomic
- Infrastructure-related

CITY OF OAKLAND

Research Question

01

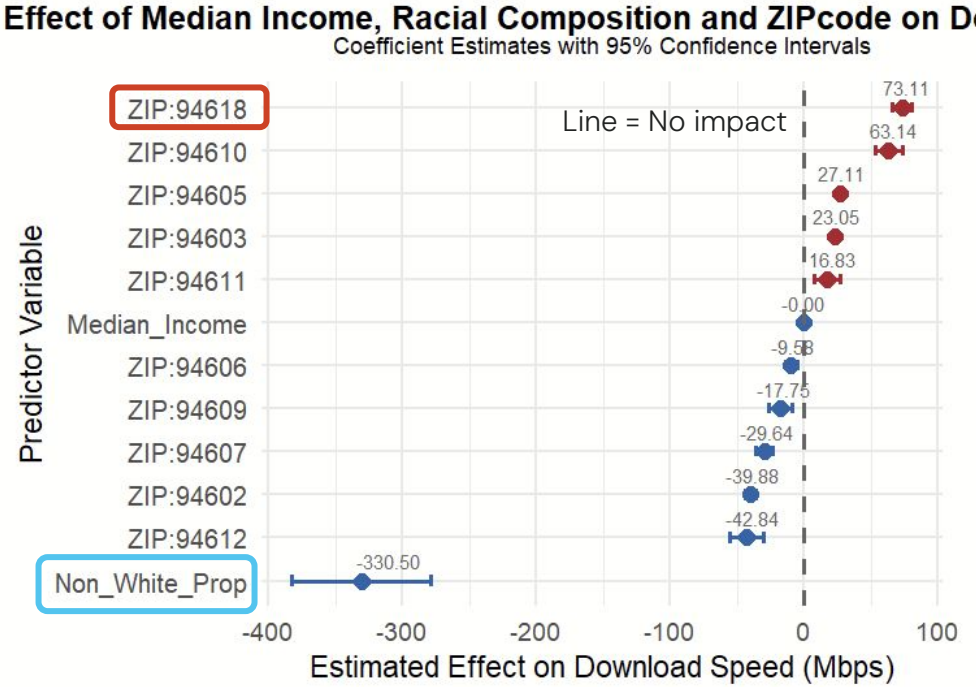
To what extent do socioeconomic status , racial demographics, and geography location predict variation in internet download speeds within Oakland?



Interactive Map for visualizing distribution of average internet speed (See Rmd)

Coefficient Estimates Plot

01



lm(formula = Download ~ Median_Income + Non_White_Prop + factor('Zip Code))

Research Question

02 Do Zip Code Areas with Lower Income Suffer from a Digital Divide?

Welch Two-Sample t-test: Download Speed by Poverty Category

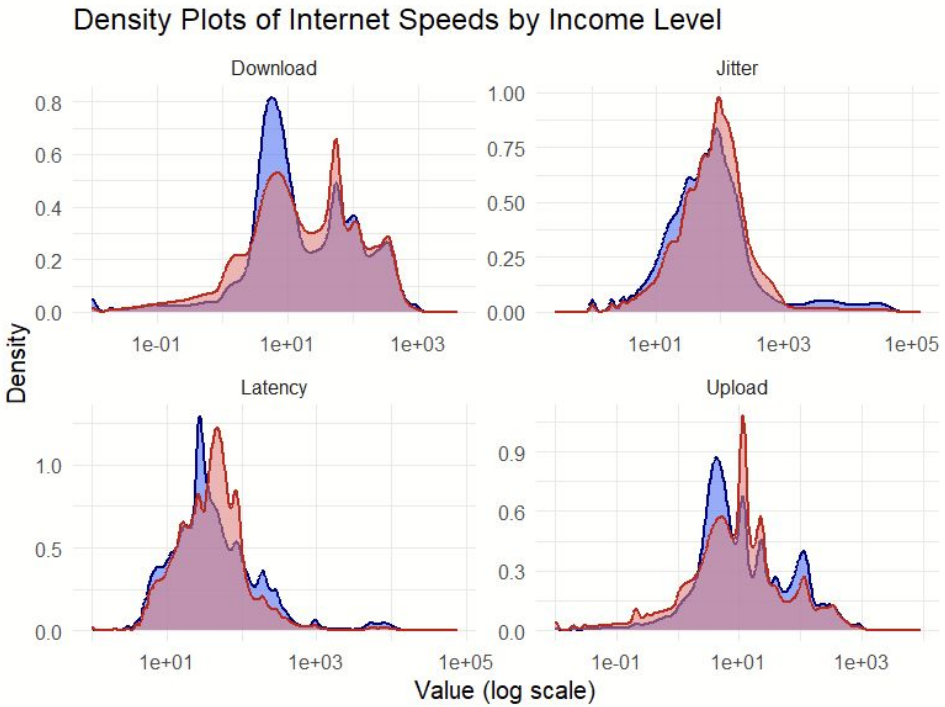
```
##
##  Welch Two Sample t-test
##
## data:  Download by Poverty_Category
## t = -9.1902, df = 633998, p-value < 2.2e-16
## alternative hypothesis: true difference in means between group High Income and group Low Income is
## 95 percent confidence interval:
##  -3.296593 -2.137643
## sample estimates:
## mean in group High Income  mean in group Low Income
##                  64.62887                  67.34599
```

The **mean download speed for the Low-Income group (67.35 Mbps)** is **slightly higher** than that of the High-Income group (64.63 Mbps).

The **confidence interval (-3.2966, -2.1376)** confirms that **Low-Income areas have slightly higher download speeds** on average.

Distribution of Internet Service Quality in High and Low Income Areas

02

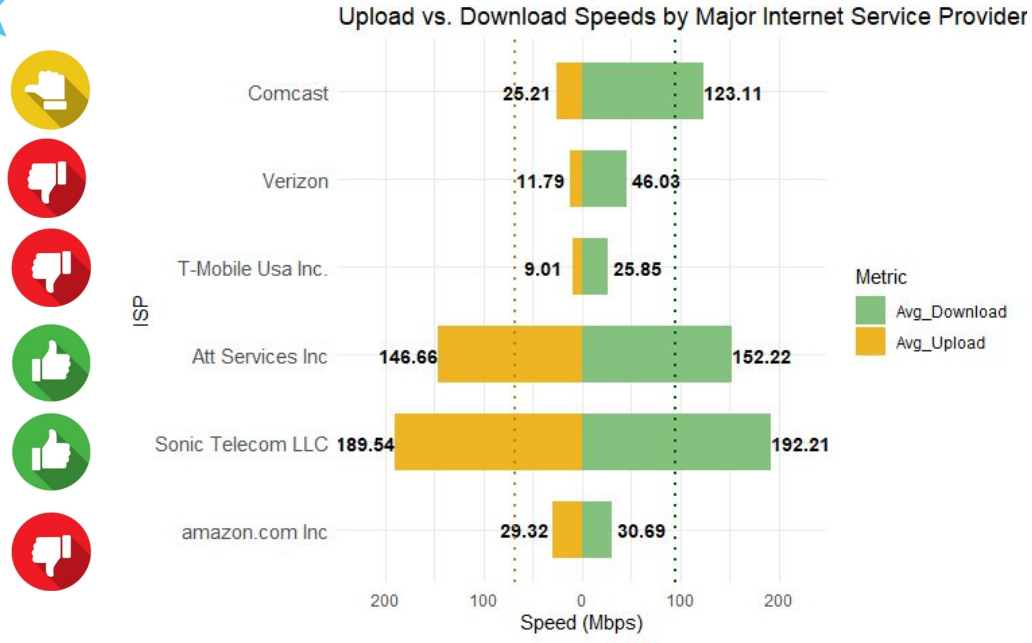


Statistical test result contradicts the common assumption that higher-income areas always have better internet speeds, so...

Research Question

03

Does different ISP provide different quality of service?

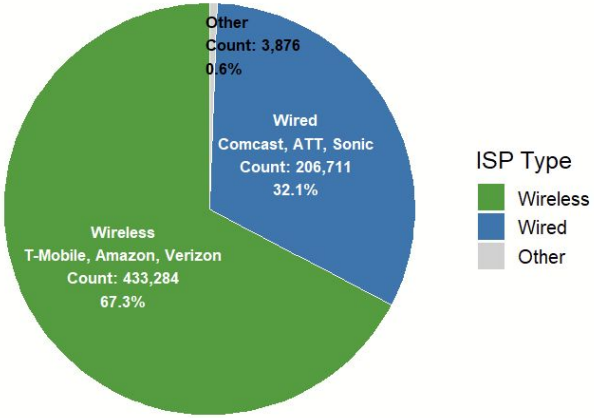


Research Question

04

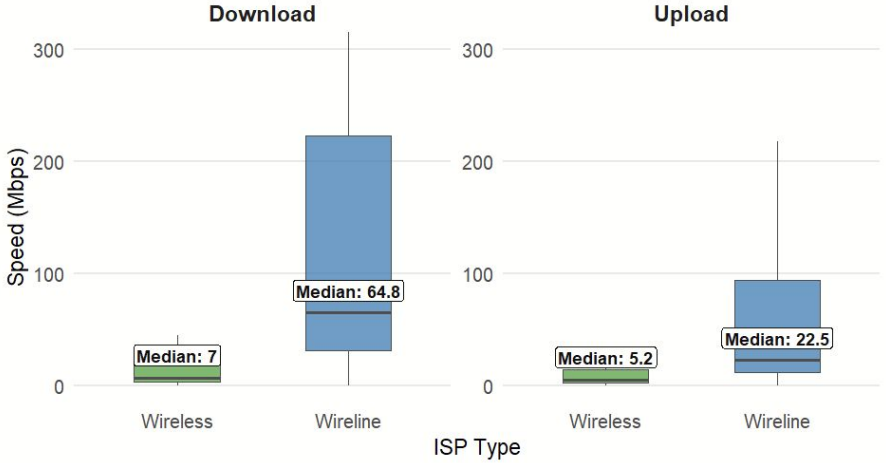
Do Internet Speeds Differ Between Wired and Wireless Services?

Internet Service Provider User Distribution by Type



Comparison of Internet Speeds by Internet Service Provider Type

Wireline (Comcast, ATT, Sonic) vs. Wireless (T-Mobile, Amazon, Verizon)



Summary

1. Internet speed disparities in Oakland are largely driven by local demographic factors and service provider differences.

2. Non-white and low-income areas tend to experience less stable connections.

3. Wireline services consistently deliver superior performance compared to wireless alternatives.

Limitations & Discussion

1. **Selection Bias:** Test results are from public school laptop recipients, often low-income students, even in high-income zip codes.

2. **Travel Factor:** Tests may be conducted while students are traveling, not necessarily at their home addresses.

3. **Data Improvement:** Knowing the distribution of laptop recipients by Zip code could enhance the analysis.

4. **Location Accuracy:** Grouping tests by device serial number might help identify where tests are most commonly conducted, approximating students' home locations.