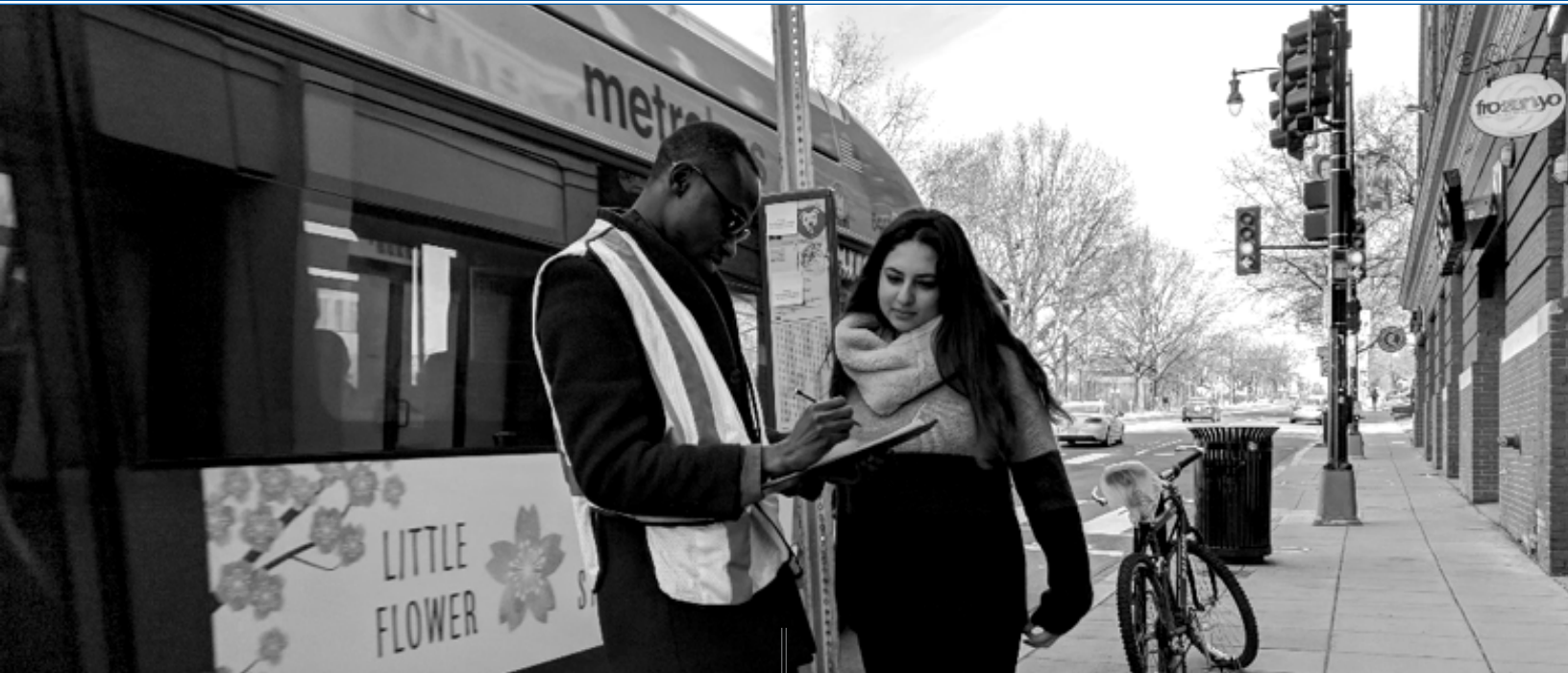


Predicting Acceptable Wait Times for Patrons at Transit Bus Stops by Time of Day

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The time spent waiting by bus patrons at bus stops is a primary measure for assessing the reliability of transit services. Uncertainty associated with waiting affects bus patrons' perception of quality of the service provided. Consequently, this study aimed at determining patrons' maximum and minimum acceptable wait times at bus stops in Washington, DC and developing prediction models to provide decision-makers with additional tools for improving patronage.

Study Methods

The data used in this study was obtained by surveying 3,388 bus patrons at 71 selected bus stops in Washington, D.C. over an eight-month period. Data obtained from patrons included their ethnicity, gender, minimum and maximum acceptable wait times (beyond the scheduled bus arrival time), alternate transportation mode choice, and knowledge of bus arrival times. Additionally,

data on the operational characteristic of the buses were obtained via video playback of video recordings of cameras installed at the selected bus stops. The data extracted from the video recordings included the bus arrival and departure times based on which the headway of each bus route was computed. In addition, information and conditions at each bus stop at the time of each survey was recorded, including bus stop ID number, bus direction of travel, the availability of shelter, and the temperature at the bus stop at the time of survey. Statistical analyses were conducted to determine if there are any statistically significant differences in the maximum acceptable wait time of patrons based on gender and ethnicity. Further, models were developed to predict the maximum acceptable wait time of patrons based on temperature, average headways, presence of shelter, and patrons' knowledge of bus arrival time.

The mean of the reported maximum acceptable wait time was 8.5 minutes for female patrons and 8 minutes for male patrons.

Findings

- The least reported acceptable wait time beyond the scheduled bus arrival time was 1 minute.
- The highest reported acceptable wait time beyond the scheduled bus arrival time was 20 minutes.
- The mean of the reported maximum acceptable wait time was 8.5 minutes and 8 minutes, for female and male patrons, respectively.
- The modal acceptable wait time, reported by approximately 33% of the patrons, was 5 minutes.
- In decreasing order, the mean of the maximum acceptable wait times of patrons categorized by ethnicity were as follows: African American (8.5 minutes), Asian (8.4 minutes), Hispanic (8.3 minutes), and White (7.0 minutes).
- In decreasing order, the preferred alternate mode of transportation for bus patrons were as follows: Train (40%), Ride Share (35%), Bike (11%), Walking (10%) and Other (4%).
- Patrons are willing to wait longer in warmer temperatures.
- Patrons are willing to wait longer at bus stops with longer headways.
- Although female patrons generally had lower maximum acceptable wait times than male patrons, the difference was not statistically significant.
- The mean differences between the maximum acceptable wait times of patrons grouped by ethnicity were determined to be statistically significant at a 5% significance level. Also, the results showed that White patrons had statistically significant lower maximum acceptable wait times than did patrons of other ethnic groups.
- Temperature, average headways, presence of shelter, and patrons' knowledge of bus arrival time were determined to be statistically significant predictors (with very low p-values <0.001) of maximum acceptable wait time.

Policy Recommendations

The findings and models developed in this research are potentially useful tools that transit

agencies could use to improve bus scheduling and operations in order to ultimately retain and improve ridership.

About the Principal Investigator

Dr. Arhin is an Associate Professor of the Department of Civil and Environmental Engineering of Howard University, the director of the Howard University Transportation Research and Traffic Safety Data Center (HUTRC), and the director of this transit research project, conducted under the Mineta Consortium for Transportation Mobility.

To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/project/1801.



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