

# **Analysis of Racial/Ethnic Disparity in TriMet Fare Enforcement Outcomes on the MAX 2014-2016**

**December 6, 2016**

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**Submitted to:  
TriMet**

## **INTRODUCTION**

The purpose of this report is to first examine whether there exist racial/ethnic disparities in TriMet fare enforcement outcomes. If disparities exist a second purpose of the report is to ascertain what factors may be contributing to the disparity, including racial/ethnic bias. This report only focuses on fare enforcement conducted on the MAX light rail. Two years of fare enforcement incidents occurring from March 29, 2014 to March 29, 2016 are used for this study. Out of 56,308 fare enforcement incidents recorded by TriMet during this two-year time frame, *98% occurred on the MAX*, therefore fare enforcement on the MAX accounts for almost all enforcement activities.

An “official” fare enforcement incident can entail the following actions: 1) a warning, 2) a citation, or 3) exclusion. The incident is “official” because a record including the rider’s name, date of birth, and race/ethnicity has been recorded in a centralized database. The numbers and demographics of riders who show inspectors valid fare are not officially recorded in a database. Fare enforcement incidents can also entail an arrest, which is not part of the data received for this report. TriMet fare enforcement officers and representatives of local law enforcement agencies conduct fare enforcement.

The term “disparity” used in this report refers to differences in enforcement outcomes between racial/ethnic groups of riders *based on an expectation of each group’s likelihood* of receiving a warning, citation, or exclusion. Differences in warnings, citations, and exclusions between the following racial/ethnic groups are examined:

- 1) African American
- 2) Asian
- 3) Hispanic
- 4) Native American
- 5) Multi-Racial
- 6) Other
- 7) White
- 8) *Non-White* (an aggregation of racial/ethnic groups 1 through 6)

### **Disparity and the Expected Likelihood of Being Caught**

Determining whether a disparity exists between racial/ethnic groups begins with an assessment of the expected likelihood of each group being caught on the MAX for having no fare or improper fare.

A common approach in disparity studies is to assume that the percentage of warnings, citations, and exclusions for each racial/ethnic group *should be equal to their percentage of the local population*, if enforcement is conducted in a random fashion. However, *this traditional assumption can be fallible* for four reasons:

- 1) Certain racial/ethnic groups may utilize public transportation at higher rates than their percentage of the general population, thus putting them at greater risk for fare enforcement activity.
- 2) Certain racial/ethnic groups may commit fare enforcement violations at higher rates than their percentage of the general population, thus putting them at greater risk for fare enforcement activity.
- 3) Local census population figures cannot accurately measure racial/ethnic populations using transit because an unknown percentage of transit riders come from counties or states outside the Portland metro area.
- 4) Deployment of enforcement personnel may tend towards a MAX line or stop that happens to be frequented by higher proportions of certain racial/ethnic groups increasing their likelihood of an enforcement incident.

These measurement issues have been referred to as the “baseline problem” common to race disparity studies. Attention to the baseline problem was recognized in a recent transit fare enforcement report conducted by *Metro Transit* in Minneapolis (2015, p. 2, 13).

Since *true incident rates* by racial group *are unknown*, this analysis cannot distinguish whether uneven enforcement rates are due to bias in enforcement or reflect differences in actual incident levels across racial groups.

Caution is advised in interpreting the results of this report as true incident rates by demographic group are not known. Therefore, incident rates by demographic group cannot be directly compared to known baselines.

To rephrase the Metro Transit study, the best baseline for determining if racial/ethnic disparity in fare enforcement exists is knowledge of the “true incident rates” or *what proportion of riders of each race/ethnicity are actually evading fare*. In the national literature, the Metro Transit report is the only fare enforcement study that could be found through simple Google searches. It is safe to conclude there are few social science examinations of disparity in transit fare enforcement.

### **Disparity, Bias, and Profiling**

The act of fare enforcement shares some similarities with general law enforcement by police, therefore concern over “profiling” or “enforcement bias” can be relevant to transit fare enforcement. This report will use the terms “profiling” or “enforcement bias” interchangeably and defines this phenomenon in the following manner:

*“Profiling” and “Bias” means that an authorized transit enforcement officer uses (consciously or unconsciously) the race or ethnicity of an individual as a primary motivator for suspicion of a fare violation and*

*additional fare investigation. Bias can also mean that institutionalized practices of fare enforcement may inadvertently have a differential impact on some races/ethnicities.*

The methodological tests used in this study *look for patterns in fare enforcement data that indicate large thresholds of disparity between racial/ethnic groups that are unlikely due to random statistical or measurement issues.* If a threshold in disparity is reached it could signify systemic causes within organizational policy, practices, enforcement officers, or ridership demographics is causing the pattern, including racial bias or profiling. A more thorough investigation of the issue is then warranted.

It is critical that the reader understand the following three principles that guide the analysis and frame the conclusion discussion:

*Principle 1: Descriptive and statistical evaluation of fare enforcement data is limited to finding racial and ethnic disparities that may be “indicative” of systemic racial and ethnic bias but that, in the absence of more extensive examination, cannot be considered comprehensive evidence or proof of profiling.*

*Principle 2: The best strategy for assessing racial and ethnic disparities is to apply multiple benchmarking approaches. Each statistical benchmarking approach has empirical limitations impacting the validity of the results; therefore, a holistic approach is necessary.*

*Principle 3: Even if the results are not indicative of a pattern of systemic bias it does not mean a transit agency should be any less vigilant in ensuring its enforcement practices are fair and un-biased through continued training, data monitoring, and policy reflection.*

### **Developing a Baseline: Ridership and Fare Evasion Surveys**

The research for this study has a great advantage compared to the Minneapolis Metro Transit study because of two surveys conducted with MAX riders. Instead of using racial population census estimates for a comparison baseline, survey estimates obtained from MAX riders are used for the baseline populations to compare enforcement outcomes to. Two surveys sponsored by TriMet in 2016 are utilized for the analysis and are referred to as the: 1) *Ridership Survey* and 2) *Fare Evasion Survey*. Data from the surveys were provided to Portland State University for this report. The researcher and author of this report was not involved in either survey design or data collection effort.

### *Ridership Survey 2016*

Third party surveyors were hired through a temporary employment agency to implement a ridership survey. Surveyors wore a vest in TriMet colors and labeled TriMet Survey Team. The surveyors approached transit riders and asked them to voluntarily fill out a twenty-four-question survey. Riders are given a computer tablet to complete the survey, which recorded their answers. Riders are asked to check all races/ethnicities they identify with (question # 17). Therefore, the ridership survey provides an estimate of the racial/ethnic makeup of the typical MAX rider.

What is your race or ethnicity? (*check all that apply*)

- Asian/Pacific Islander
- African American/Black
- Caucasian/White
- Hispanic/Latino
- Native American Indian
- Multi-racial/bi-racial
- Other (specify)

Results for the 2016 Ridership Survey are based on 17,719 completed surveys (bus, MAX, and WES). Refusals were recorded on the tablet. The overall response rate for the survey was 65% according to TriMet officials. Only survey results of MAX riders are used for this study.

The *first column of Table 1* shows the results of the racial/ethnic breakdown of MAX riders that completed the survey. The survey results indicate that 65% of riders identify as White and 35% of riders identify as non-White (which is broken into 6 sub-categories).

The ridership survey results provide a better baseline than using general census estimates for race because it provides a more accurate representation of who actually rides the MAX. However, using the ridership survey estimates as a baseline for disparity research on enforcement outcomes *assumes all riders are equally likely to violate fare enforcement rules*. Despite this serious limitation to the ridership survey it will still be used in analyses for comparison purposes. The use of the Fare Evasion Survey helps address this limitation to the Ridership Survey.

### *Fare Evasion Survey 2016*

The Fare Evasion Survey addresses what the Metro Transit study in Minneapolis recommends – the need for an estimate of the “true incident rate” of fare evasion to compare enforcement outcomes to. The TriMet fare evasion survey has been conducted in partnership with TriMet fare enforcement officers since 2011. Contractors hired by TriMet shadow inspection personnel and note the number of passengers with valid fares, no fares or invalid fares. The perceived race/ethnicity

of persons with no fares or invalid fares is recorded by the contractor. Persons with no fare or invalid fare who are approached by the surveyors are not given citations or exclusions, thus no official fare enforcement action is undertaken. The race/ethnicity of persons with valid fares are not recorded, but a count of riders with valid fares is estimated. According to TriMet reports all times and locations of the fare checks were selected randomly.

The 2016 survey entailed 10,740 fare inspections. Out of those inspections 85.6% had valid fares, 13% had no fare, and 1.5% had an improper fare. Thus, it is estimated for 2016 that approximately *14.5% of MAX riders engage in fare evasion*. Since 2011 the average fare evasion rate reported by TriMet is 13.6% across nine survey efforts with a high of 20% in the spring of 2011 and a low of 9% in 2015. The data for this report uses a 3-year average of the fare evasion survey results that span the study timeframe 2014, 2015, and 2016.

**Table 1: Ridership and Fare Evasion Survey Results**

<b>Race</b>	<b>% of MAX Riders (Ridership Survey 2016)<sup>1</sup></b>	<b>% Fare Evaders (Fare Evasion Surveys 2014-16)</b>	<b>Difference</b>
African American	7.0%	14.8%	-7.8%
Asian	9.0%	3.4%	5.6%
Hispanic	12.0%	12.9%	-.90%
Native American	4.0%	NA	
Multi-Racial	5.0%	NA	
Other	2.0%	NA	
Unknown	NA	6.4%	
Non-White	35.0%	37.6%	-2.6%
White	65.0%	62.3%	2.7%

<sup>1</sup> Note: The Ridership Survey results presented here are from the weekday survey table provided by TriMet. A weekday survey is appropriate because 81% of fare enforcement incidents occur on weekdays. The percentages for the racial/ethnic groups do not add up 100% because multiple race responses are reported in the table. The survey results are also weighted by TriMet to originating rides, plus youth, and route type.

The *third column of Table 1* shows the percentage of fare evasion attributed to each racial/ethnic group based on the Fare Evasion Survey results from 2014-2016. The final column in Table 1 shows the difference between ridership and fare evasion percentages for each racial/ethnic group. The Table 1 results indicate a large discrepancy between these two survey estimates for African Americans, which is noted by the red shading. According to the Ridership Survey 7% of MAX riders self-identify as African American. However, the Fare Evasion Survey finds that 14.8% of those engaging in fare evasion are perceived to be African American, a difference of 7.8%, that difference is even bigger (12%) in 2016. The average fare evasion rate

for African American riders across the six survey efforts where race/ethnicity was recorded is 17% (2012-2016). *This difference signifies that African American riders appear to be differentially involved in fare evasion compared to their percentage of estimated MAX ridership, this would put African American riders at greater risk for fare enforcement.* Differences between the ridership and fare evasion survey results for other racial/ethnic groups presented in Table 1 are relatively small.

### **Fare Enforcement Incidents: Warnings, Citations, and Exclusions**

Table 2 provides a breakdown of fare enforcement incidents for the study time frame March 29, 2014 to March 29, 2016. Over this two-year period there were 54,594 fare enforcement incidents on the MAX where the race/ethnicity of the rider was coded. There were 564 incidents during this timeframe that were missing a code for race/ethnicity of the rider and are not included in any analyses. The appendix to the report provides a more detailed discussion of the race coding and data issues. The results in Table 2 provide a breakdown of incident outcome and *the perceived race/ethnicity of riders as recoded by the fare inspector.* During this time frame over three-fourths of incidents entail a citation given (42,836; 78%), followed by exclusions (5,904; 11%), and warnings (5,854; 11%). White MAX riders comprise 66% of fare enforcement incidents followed by African American (18%) and Hispanic (8.8%) riders.

**Table 2: Fare Enforcement Outcomes (3/29/14 – 3/29/16)**

<b>Race</b>	<b>incidents</b>	<b>% incident</b>	<b>citations</b>	<b>% cite</b>	<b>warnings</b>	<b>% warn</b>	<b>exclusions</b>	<b>% excl<sup>1</sup></b>
Grand Total	54,594		42,836		5,854		5,904	
African American	9,807	18.0%	7,579	17.7%	906	15.5%	1,322	22.4%
Asian	2,595	4.8%	2,063	4.8%	358	6.1%	174	2.9%
Hispanic	4,796	8.8%	3,628	8.5%	605	10.3%	563	9.5%
Native American	415	0.8%	316	0.7%	48	0.8%	51	0.9%
Unknown	962	1.8%	692	1.6%	178	3.0%	92	1.6%
Non-White	18,575	34.0%	14,278	33.3%	2,095	35.8%	2,202	37.3%
White	36,019	66.0%	28,558	66.7%	3,759	64.2%	3,702	62.7%

<sup>1</sup>Note: “excl” refers to the percentage of exclusions for each racial/ethnic group.

Table 3 examines within each racial/ethnic category the percentage of incidents that entailed a warning, a citation, or an exclusion. The results in Table 3 show that African American riders are slightly more likely to receive an exclusion compared to others and less likely to receive a warning, a trend that will be explored later to see if these differences are statistically significant.

**Table 3: Fare Enforcement Outcomes within Race %'s (3/29/14 - 3/29/16)**

<b>Race</b>	<b>% warn</b>	<b>% cite</b>	<b>% excl<sup>1</sup></b>
African American	9.2%	77.3%	13.5%
Asian	13.8%	79.5%	6.7%
Hispanic	12.6%	75.6%	11.7%
Native American	11.6%	76.1%	12.3%
Unknown	18.5%	71.9%	9.6%
Non-White	11.3%	76.9%	11.9%
White	10.4%	79.3%	10.3%

<sup>1</sup> Note: "excl" refers to the percentage of exclusions for each racial/ethnic group.



**DISPARITY TEST 1: COMPARING BASELINE POPULATIONS TO FARE ENFORCEMENT OUTCOMES**

The first disparity test involves comparing enforcement outcomes (warnings, citations, exclusions) to a baseline expectation for each racial/ethnic group’s risk for fare enforcement. Tables 4 & 5 present results for the first test used to examine racial/ethnic disparity in fare enforcement outcomes. The ridership and fare evasion survey results are re-presented in Table 4 along with the fare enforcement outcome percentages by race/ethnicity. The differences between the survey proportions (i.e. baseline populations) and fare enforcement outcome percentages, a measure of disparity, are shown in Table 5. As previously discussed, the Fare Evasion Survey conducted by TriMet provides the best baseline option for comparing enforcement outcomes to because it is the closest approximation of “true incident rates”; however, both baseline results are shown in Table 5.

***Table 4: Racial/Ethnic Proportions for Baseline Survey and Fare Enforcement Outcomes***

<b>Race</b>	<b>% Riders</b>	<b>% Evaders</b>	<b>% incident</b>	<b>% warn</b>	<b>% cite</b>	<b>% excl<sup>1</sup></b>
African American	7.0%	14.8%	18.0%	15.5%	17.7%	22.4%
Asian	9.0%	3.4%	4.8%	6.1%	4.8%	2.9%
Hispanic	12.0%	12.9%	8.8%	10.3%	8.5%	9.5%
Unknown	5.0%	6.4%	1.8%	3.0%	1.6%	1.6%
Non-White	35.0%	37.6%	34.0%	35.8%	33.3%	37.3%
White	65.0%	62.3%	66.0%	64.2%	66.7%	62.7%

<sup>1</sup>Note: “excl” refers to the percentage of exclusions for each racial/ethnic group.

A critical question for disparity research is how big should a disparity difference be to raise concern and need for further assessment? The study will draw upon the threshold used in law enforcement racial profiling literature which *recognizes disparity differences above 5% as being noteworthy* (Lovrich, et al. 2007; McMahon, et al. 2002).

**Table 5: Disparity Between Ridership and Fare Evasion Baselines and Fare Enforcement Outcomes**

Race	Differences between baseline survey % and enforcement outcome %							
	Incident% - rider%	Warn% - rider%	Cite% - rider%	Excl% - rider%	Incident% - evasion%	Warn% - evasion%	Cite% - evasion%	Excl% - evasion%
African American	11.0%	8.5%	10.7%	15.4%	3.2%	0.7%	2.9%	7.6%
Asian	-4.2%	-2.9%	-4.2%	-6.1%	1.4%	2.7%	1.4%	-0.5%
Hispanic	-3.2%	-1.7%	-3.5%	-2.5%	-4.1%	-2.6%	-4.4%	-3.4%
Unknown	-3.2%	-2.0%	-3.4%	-3.4%	-4.6%	-3.4%	-4.8%	-4.8%
Non-White	-1.0%	0.8%	-1.7%	2.3%	-3.6%	-1.8%	-4.3%	-0.3%
White	1.0%	-0.8%	1.7%	-2.3%	3.7%	1.9%	4.4%	0.4%

The difference results presented in Table 5 illustrate two opposing disparity results, particularly for African Americans. The difference between the estimated MAX ridership for African American (7%) and African American proportion of fare enforcement incidents and outcomes is large and ranges from an 8-15% difference or overrepresentation. However, the differences between the estimated proportion of African American riders engaging in fare evasion (14.8%) and their proportion of fare enforcement outcomes (18-22%) are closer in proximity, but do *exhibit a difference above the 5% noteworthy threshold for exclusions*, which is shaded in Table 5. This racial/ethnic difference in exclusion outcomes will be examined further.

For other races and ethnicities, the estimated proportion of their ridership compared to fare enforcement outcome proportions are very similar. For example, Hispanics represent 12% of estimated MAX riders and 12.9% of estimated fare evaders, which is similar to the 8-10% proportion of fare enforcement incidents and outcomes for Hispanic riders. White MAX riders represent 65% of estimated riders and 62% of estimated fare evaders, which is similar to the 62-66% of fare enforcement incidents and outcomes.

Greater weight should be placed on the findings using the fare evasion survey as the baseline because it provides a more accurate estimate of the populations at risk for receiving a fare enforcement outcome. It is the best approximation of the true incident rate necessary for disparity research. Therefore the following conclusion is reached: *Differences between the fare evasion survey results and enforcement outcomes are small and indicate little disparity. Thus, it does not appear TriMet fare enforcement on the MAX is systemically biased towards certain races and ethnicities, however the elevated percentage of African American riders being excluded should be examined more closely.*

The validity of this conclusion rests solely on the accuracy of the fare evasion survey utilized for the baseline. Although the researcher and author of this report has confidence in the fare evasion survey effort and its results, it is recommended that

the design and implementation include third-party involvement and oversight for further validation purposes.

### Validation Using Repeat Violations

As a check on the validity of the fare evasion survey a search for repeat violators in the enforcement data was conducted. Enforcement incidents involving riders with the same exact first name, last name, and date of birth were flagged in the two-year data set. The results of the search for repeat violators are presented in Table 6. The first column in Table 6 shows the percentage of enforcement incidents that involved a repeat violator broken out by race/ethnicity. The results indicate that *25.5% of enforcement incidents over the two-year period involved the same person at least once*. These repeat violators totaled 5,271 individuals over the two year period, they represent only 11% of the distinct individuals involved in enforcement incidents, but are involved in 25% of the total incidents.

African Americans comprised 25.5% of all enforcement incidents involving a repeat violator which is well above the 14.8% estimate of African American fare evasion measured by the fare evasion survey and much larger than the 7% estimate of their ridership. This finding strengthens the validity of the fare evasion survey estimate, which finds higher fare evasion rates compared to general ridership rates for African Americans.

**Table 6: Repeat Fare Enforcement Violators**

Race	% repeat (all)	% repeat (within race)
Total Repeat	25.5%	
African American	25.5%	36.1%
Asian	2.7%	14.3%
Hispanic	6.2%	18.0%
Native American	1.0%	34.5%
Unknown	0.3%	4.0%
Non-White	35.6%	26.7%
White	64.4%	24.9%

The second column within Table 6 shows the percentage of enforcement incidents within each race/ethnicity that involved a repeat violator. The results indicate that 36.1% of fare enforcement incidents with African American riders involved a repeat violator, which was the highest percentage of any race/ethnicity. Further analysis reveals that only 17% of distinct African American individuals involved in fare enforcement incidents were involved in 36% of the total incidents entailing an

African American. The next highest percentage of repeat violations was Native American riders (34.5%) and White riders (24.9%).

The seemingly high proportion of repeat fare evasion violators on the MAX is an unexpected finding and represents a unique challenge for TriMet fare enforcement. A quarter of all enforcement incidents involve someone who has already been caught without fare or improper fare in the prior two years, including a number of high rate violators. Approximately one-third of all repeat violators were caught 3 or more times in the two-year study period. It appears that fare enforcement is not a deterrent for some riders. Repeat violations are important because they may evolve into situations meriting an exclusion (i.e. the harshest form of punishment), interaction with local law enforcement, and possible arrest.

Developing a better understanding of the underlying individual and situational dynamics of repeat violations is an important next step. Are punishments given to repeat violators having a desired impact (e.g. lower rate of evasion over time, actual payment of fines) or unintended consequences? In particular, future research should explore economic, health, and other hardship factors that may trigger repeat violations.

The results of Table 6 help form a second conclusion from the research: *Repeat violations (i.e. getting caught without fare/improper fare more than once in the two years of data) comprise 25.5% of all enforcement incidents and 36% of African American incidents. This percentage appears high and represents a unique challenge for TriMet fare enforcement.*

## Exploration of Exclusions

The elevated exclusion percentage for African American riders noted in Table 5 indicates a need for further inquiry. The results in Table 7 represent a preliminary inquiry into this issue. The table shows the relationships between the race/ethnicity of excluded riders and the proportion of persons excluded that were repeat violators and the agency type involved in the exclusion decision. In the column titled “% Repeat Violator” we find that almost half of African American riders who were excluded (46%) were repeat violators, more than any other race/ethnicity. Repeat violators comprised 37% of exclusion incidents. Keep in mind the data used for this analysis is only two years. It’s quite possible if the data went further back, the percent of exclusions involving repeat violators would be higher. Another important finding is that local law enforcement agencies are much more involved in exclusion decisions. Table 7 shows that 43% of exclusions involved local law enforcement and 57% were by Tri-Met inspectors.

**Table 7: Exclusions by Repeat Violations and Fare Inspector Agency**

Race	Total Excl <sup>1</sup>	% Repeat Violator	% Non-Repeat Violator	% TriMet Inspector	% Local LE agency
Total Avg.		37%	63%	57%	43%
African American	1322	46%	54%	59%	41%
Asian	174	24%	76%	72%	28%
Hispanic	563	23%	77%	58%	42%
Native American	51	45%	55%	57%	43%
Unknown	92	0.4%	2.1%	63%	37%
White	3702	37%	63%	55%	45%

<sup>1</sup> Note: “excl” refers to the percentage of exclusions for each racial/ethnic group.

The results in Table 7 represent a brief examination of the types of analyses that are needed to further examine the disparity found in exclusions. The results reinforce the impact of repeat violations, which are a contributing factor to exclusions, particularly for African American riders. Understanding the potential social and economic obstacles that may correlate with repeat violations is an important avenue to explore. The fact that a large proportion of exclusion decisions involve local law enforcement agencies (43%) makes the examination of exclusion causes and any policy approaches more complex. Thus, any solutions will need to be multi-agency to have an impact.

## Exploration of Geographic Variation in Fare Enforcement Incidents

A potential factor that could influence racial/ethnic distributions of fare enforcement incidents is the geographic deployment of fare enforcement officers. If fare enforcement officers are differentially deployed to stop locations in more racially/ethnically diverse neighborhoods that would increase the likelihood of finding fare violators in those areas and lead to unfair distributions in fare enforcement outcomes. An examination of this perspective is presented in Table 8. Out of the 54,595 fare enforcement incidents examined in this report, 50% occurred at just 11 stop locations. These top 50% stop locations are examined in Table 8. The racial/ethnic distribution of incidents across these 11 stop locations is very similar to the distribution across all stops combined and all other locations combined. In other words, there is no particular stop location that appears to be a potential driver of any racial/ethnic distributions. In addition, these top 11 incident locations also represent common entry and exit points for all public transit riders.

**Table 8: Top 50% Stop Locations Where Fare Enforcement Occurs by Race/Ethnicity**

	Number of incidents	% of total incidents	African American	Asian	Hispanic	Native American	Unknown	White
All stops, % of incidents	54,594		<b>18.0%</b>	<b>4.8%</b>	<b>8.8%</b>	<b>0.8%</b>	<b>1.8%</b>	<b>66.0%</b>
<i>Top 50% of stop locations</i>								
Rose Quarter TC	10,755	19.7%	19.0%	4.2%	7.6%	0.8%	4.2%	67.0%
Gateway TC	2,457	4.5%	20.4%	4.6%	8.5%	0.7%	4.6%	63.8%
82 <sup>nd</sup> Ave	2,213	4.1%	23.8%	4.4%	8.3%	1.0%	4.4%	60.9%
Old Town/Chinatown	2,182	4.0%	21.2%	4.5%	9.0%	1.0%	4.5%	62.9%
Hollywood/42nd Ave	2,009	3.7%	20.7%	3.5%	8.1%	0.3%	3.5%	66.1%
Lloyd Center/11th	1,803	3.3%	19.6%	5.0%	8.8%	0.9%	5.0%	64.6%
Providence Park	1,484	2.7%	12.3%	4.5%	7.8%	1.2%	4.5%	72.2%
Hollywood/42nd Ave	1,461	2.7%	22.7%	4.4%	7.0%	0.8%	4.4%	63.7%
PSU South/5th & Jackson	1,167	2.1%	14.2%	11.1%	6.2%	1.0%	11.1%	65.5%
Skidmore Fountain	1,123	2.1%	17.1%	4.8%	9.7%	0.4%	4.8%	66.9%
Albina/Mississippi	803	1.5%	23.9%	3.0%	5.2%	0.7%	3.0%	65.0%
% of incidents at top 50% stops		50%	<b>19.7%</b>	<b>4.9%</b>	<b>7.8%</b>	<b>0.8%</b>	<b>1.6%</b>	<b>65.2%</b>
% of incidents at all other stops		50%	<b>17.2%</b>	<b>4.0%</b>	<b>8.7%</b>	<b>0.8%</b>	<b>2.5%</b>	<b>66.8%</b>

## **DISPARITY TEST 2: RELATIONSHIP BETWEEN RACE/ETHNICITY OF RIDERS AND MORE SERIOUS ENFORCEMENT OUTCOMES**

There are three outcomes of fare enforcement incidents that this study has been able to examine: warnings, citations, and exclusions. These outcomes range in seriousness with a warning being the least serious, followed by a citation, and finally an exclusion being the most serious enforcement outcome. An arrest may also occur after exclusions, but is not part of the data received for this study. The second disparity test examines whether race/ethnicity of riders is related to more serious enforcement outcomes while simultaneously controlling for other factors that may explain the outcome. The relationship between race/ethnicity and enforcement outcomes is tested by comparing the likelihood of an enforcement outcome for White riders to African American, Asian, Hispanic, and all Non-White riders. The analysis focuses on two comparisons: 1) Is race/ethnicity related to receiving a citation over a warning? 2) Is race/ethnicity related to receiving an exclusion over a citation? The results are presented in two tables. Table 9 focuses on juvenile enforcement outcomes only and Table 10 on adult enforcement outcomes.

Separate logistic regressions are computed for each race/ethnicity compared to Whites. For example, the results presented in the first row (African American) and column (Citations vs. Warnings) in Table 9 note whether African American juveniles are significantly more likely to receive a citation over a warning compared to White juveniles controlling for other factors. The first row (African American) and second column (Exclusions vs. Citations) in Table 9 notes whether African American juveniles are significantly more likely to receive an exclusion over a citation compared to White juveniles controlling for other factors. Each of the logistic regression results presented in Tables 9 and 10 control for the following additional variables that could also be related to enforcement outcomes:

- Perceived sex of rider (64.7% of incidents the rider was a male)
- Whether the enforcement incident occurred at one of the top 5 MAX stop locations (32.3% of all incidents occurred at these 5 stops)
- Whether the incident involved one of the top 2 inspection officers (these officers were involved in 22.6% of incidents).
- Whether the enforcement officer was a non-TriMet employee (5.4% of incidents involved local law enforcement)
- Whether the incident occurred on a Weekend (19.6% of incidents occurred on the weekend, according to ridership survey weekend riders are more racially diverse).
- Whether the violation entailed “no proof of payment” compared to all other violations (No proof of payment comprised 92.2% of all incidents compared to other types like fare amount, expired time, zone).
- Whether the rider was involved in more than one incident in the past two years (25.5% of incidents involved a repeat violator).

The results in Tables 9 and 10 note whether the logistic regression findings for each of the races and ethnicities in the rows is significantly related to a more serious enforcement outcome. Statistical significance of race needed be achieved in both a bivariate relationship (no controls) and in the analysis with all the control variables. A result that is “statistically significant” means there is a probability level of less than .05 that the difference in enforcement outcome between the specific race compared to Whites *is large enough that it didn’t occur by chance*. In other words, there appears to be “something” about the race of MAX riders that still exerts an influence on the enforcement outcome even after the relationship between race and the other variables is taken into consideration. Exactly what is causing that influence between race of the rider and the enforcement outcome *is unknown*.

Even though a relationship may be “statistically significant” it may not be of “practical significance.” This is an issue faced by this study because the number of enforcement incidents (i.e. sample size) is very large, over 50,000 incidents, which increases the likelihood that the analysis will find a statistical relationship. Therefore the “strength” of the relationship should be examined too. Strength of the relationship was examined in two ways. First, the size of the odds ratio is considered. Odds ratios close to 1 illustrate a small effect size. An odds ratio close to 2 or above indicates a large effect size and means that the odds of that race receiving a citation or exclusion is two times the odds for Whites (or 100% greater odds). A second way to explore the strength of the relationship is to examine a Chi-Square table for the bivariate relationship between the two races and the outcomes. These tables illustrate what the expected results of fare enforcement outcomes would be if there were no statistically significant race differences. These numbers can be compared to the actual enforcement outcomes to assess whether any significance was based on small or large differences in the data and how that may look on a daily or monthly context of enforcement activity.



In Table 9 we find that none of the analyses reveals a statistically significant relationship between the race of juvenile riders and fare enforcement outcomes.

The strongest factor related to whether a juvenile received a citation instead of a warning was if the violation entailed “no proof of fare” compared to other violation types. Juvenile fare enforcement incidents occurring on weekends were also more likely to entail a citation over a warning.

**Table 9: Relationship between race/ethnicity and warnings, citations, and exclusions using logistic regression (Juveniles only)**

Race	Comparing Citations vs. Warnings	CI (EXP)	Comparing Exclusions vs. Citations	CI (EXP)
African American	Non-significant <sup>1</sup>	.688-1.114	Non-significant	1.000-1.566
Asian	Non-significant	.585-1.376	Non-significant	.528-1.259
Hispanic	Non-significant	.712-1.196	Non-significant	.952-1.535
Non-White	Non-significant	.736-1.068	Non-significant	.962-1.371
White	<i>Comparison group</i>		<i>Comparison group</i>	

<sup>1</sup> Note: “non-significant” means that the p-value in the relationship between race/ethnicity and a citation or exclusion, compared to Whites, was not less than .05 controlling for other factors.

The results presented in Table 10 show the findings for fare enforcement involving adult MAX riders. Three analyses revealed a statistically significant relationship between the race of adult riders and fare enforcement outcomes, although in one case the relationship was in a negative direction (Asian riders were significantly less likely to get a citation than a warning compared to White riders.) Adult African American riders were more likely than White riders to receive a citation compared to a warning controlling for other factors. This difference was statistically significant, however, the odds ratio for this analysis had a confidence interval range close to 1, indicating a small relationship. A chi-square analysis of this relationship revealed that a difference of 118 citations and warnings between African American and White adults over a two-year period would have changed the result to insignificant. Given that enforcement officers over this two-year study gave out on average 1,803 citations a month and 248 warnings per month, a difference of 118 over two years is very small.

African American adults were also more likely than White adults to receive an exclusion instead of a citation. This difference was statistically significant, however, the odds ratio for this analysis had a confidence interval range close to 1, indicating a small relationship. A chi-square analysis of this relationship reveals a difference of 152 citations and exclusions between African American and White adults over a two-year period would have changed the result to insignificant. Fare enforcement officers gave out on average 246 exclusions per month over the two-year study

period. A difference of 152 exclusions/citation over a two-year period is more practically meaningful than the other significant relationships found, and reinforces the need to examine exclusion practices. *Although there were two positive significant relationships in the adult analysis, the size of the relationship and difference between significance and insignificance was relatively small enough that the results are unlikely based on a systemic bias in TriMet fare enforcement, future studies should continue to assess these relationships.*

The strongest factors related to whether an adult MAX rider received a citation instead of a warning was if the violation entailed “no proof of fare” compared to other violation types, if the fare inspector was one of the top enforcers, and the rider had a repeat incident in the past two years. Male riders were more likely to receive citations than female riders. The strongest factor related to receiving an exclusion compared to a warning was if the enforcement officer was a non-Trimet employee and second most important factor was being a repeat violator.

**Table 10: Relationship between race/ethnicity and warnings, citations, and exclusions using logistic regression (Adults only)**

Race	Comparing Citations vs. Warnings	CI (EXP)	Comparing Exclusions vs. Citations	CI (EXP)
African American	Small positive, but statistically significant <sup>1</sup>	1.097-1.326	Small positive, but statistically significant <sup>1</sup>	1.098-1.342
Asian	Small negative, but statistically significant <sup>1</sup>	.723-.952	Non-significant	.679-1.048
Hispanic	Non-significant	1.025-1.312	Non-significant	.696-.970
Non-White	Non-significant	.994-1.144	Non-significant	.980-1.161
White	<i>Comparison group</i>		<i>Comparison group</i>	

<sup>1</sup> Note: “significant” means that the p-value in the relationship between race/ethnicity and a citation or exclusion, compared to Whites, was less than .05 controlling for other factors.

## CONCLUSION

The purpose of this report is to first examine whether there exist racial/ethnic disparities in TriMet fare enforcement outcomes. If disparities exist a second purpose of the report is to ascertain what factors may be contributing to the disparity, including racial/ethnic bias. The term “disparity” used in this report refers to differences in enforcement outcomes between racial/ethnic groups of riders *based on an expectation of each group’s likelihood* of receiving a warning, citation, or exclusion. Only fare enforcement incidents occurring on the MAX light rail are utilized for this study. Fare enforcement on the MAX comprises 98% of all TriMet fare enforcement incidents. Enforcement officers, which include TriMet personnel and representatives of local law enforcement, record the perceived race/ethnicity of the rider when officially recording the enforcement incident. The data used in this report include 54,594 fare enforcement incidents on the MAX that included a perceived race code and occurred between March 29, 2014 and March 29, 2016.

White MAX riders are involved in the highest percentage of enforcement incidents (66%), warnings (64%), citations (67%), and exclusions (63%). African American riders comprise the second largest group involved in fare enforcement incidents (18%), warnings (16%), citations (18%), and exclusions (22%). Hispanic riders represent the third largest group involved in fare enforcement incidents (9%), warnings (10%), citations (9%), and exclusions (10%).

To determine whether racial/ethnic disparity exists in the above fare enforcement outcomes, two disparity tests were used in the research. The methodological tests used in this study *look for patterns in fare enforcement data that indicate large thresholds of disparity between racial/ethnic groups that are unlikely due to random statistical or measurement issues*. The first test involves comparing enforcement outcomes (warnings, citations, exclusions) to a baseline expectation for each racial/ethnic group’s risk for fare enforcement. The major methodological hurdle in this first test is determining the risk (or likelihood) of a fare enforcement incident for each racial/ethnic group. Traditional disparity approaches might consider comparing enforcement outcome proportions to population census figures or, even better, the racial/ethnic proportion of MAX riders. However, both of these traditional baseline approaches are based on an assumption that all MAX riders are equally likely to engage in fare evasion, which may be a fallacious assumption. Riding the MAX without fare or improper fare puts one at risk for an enforcement action. Thus, knowledge of the “true incident rates” or *what proportion of riders of each race/ethnicity is actually evading fare* is the best baseline to compare enforcement outcomes to in order to assess disparity. The Fare Evasion Survey conducted by TriMet provides the best baseline option for comparing enforcement outcomes to.

A fare evasion survey has been conducted in partnership with TriMet fare enforcement officers since 2011. Contractors hired by TriMet shadow inspection

personnel and note the number of passengers with valid fares, no fares or invalid fares. Since 2012 the contractor also records the perceived race/ethnicity of persons with no fares or invalid fares. According to TriMet reports all times and locations of the fare checks were selected randomly.

### *Disparity Test 1 Results*

The first test for disparity entailed examining the difference in racial proportion estimates between both the TriMet ridership (2016) and fare evasion surveys (2014-16) and fare enforcement outcomes. Differences of more than 5% are considered noteworthy and an indication that further inquiry is needed. The results of the test produced mixed findings, particularly for African Americans, depending on whether the MAX ridership or fare evasion survey is used as the baseline. Since the fare evasion survey is the best approximation of the true incident rate of fare evasion its findings are given more weight.

The differences between the estimated proportion of African American riders engaging in fare evasion (14.8%) and their proportion of fare enforcement incidents and outcomes (15-22%) are within the 5% disparity threshold with the exception of exclusions (22.4%). For other races and ethnicities the estimated proportion of their fare evasion rates compared to fare enforcement outcomes are also very similar. For example, Hispanics represent 12% of estimated MAX riders and 12.9% of estimated fare evaders, which is similar to the 8-10% proportion of fare enforcement incidents and outcomes for Hispanic riders. White MAX riders represent 65% of estimated riders and 62% of estimated fare evaders, which is similar to the 63-67% of fare enforcement incidents and outcomes.

*Conclusion 1: Differences between the fare evasion survey results and enforcement outcomes are small and indicate little disparity. Thus, it does not appear TriMet fare enforcement on the MAX is systemically biased towards certain races and ethnicities, however the elevated percentage of African American riders being excluded should be examined more closely.*

An examination of repeat violations by race/ethnicity of MAX riders was conducted as a type of validation of the fare evasion survey results. This validation is important because the fare evasion survey comprises the best baseline for the first disparity test. The results indicate that 25.5% of enforcement incidents over the two-year period involved the same person at least once. African Americans represented 25.5% of all enforcement incidents involving a repeat violator which is much higher than the 14.8% estimate of African American fare evaders measured by the fare evasion survey and much larger than the 7% estimate of their ridership. This finding strengthens the validity of the fare evasion survey estimate, which finds higher fare evasion rates compared to general ridership rates for African Americans.

The analysis of repeat violations also found that 36.1% of fare enforcement incidents with African American riders involved repeat violators, which was the

highest percentage of any race/ethnicity. The next highest percentage of repeat violations was Native American riders (34.5%) and White riders (24.9%). The seemingly high proportion of repeat fare evasion violators on the MAX was an unexpected finding leading to the following conclusion.

*Conclusion 2: Repeat violations (i.e. getting caught without fare/improper fare more than once in the two years of data) comprise 25.5% of all enforcement incidents and 36% of African American incidents. This percentage appears high and represents a unique challenge for TriMet fare enforcement.*

A quarter of all enforcement incidents involve someone who has already been caught without fare or improper fare in the prior two years, including a number of high rate violators. Approximately one-third of all repeat violators were caught 3 or more times in the two-year study period. It appears that fare enforcement is not a deterrent for some riders. Repeat violations are important because they may evolve into situations meriting an exclusion (i.e. the harshest form of punishment), interaction with local law enforcement, and possible arrest.

Developing a better understanding of the underlying individual and situational dynamics of repeat violations is an important next step. Are punishments given to repeat violators having a desired impact (e.g. lower rate of evasion over time, actual payment of fines) or unintended consequences? In particular, future research should explore economic, health, and other hardship factors that may trigger repeat violations.

Given the elevated proportion of African American exclusions, a brief examination of exclusions was undertaken. The results reinforce the impact of repeat violations, which are a contributing factor to exclusions, particularly for African American riders. In addition, a large proportion of exclusion decisions involve local law enforcement agencies (43%) making the examination of exclusion causes and any policy approaches more complex. Thus, any solutions will need to be multi-agency to have an impact.

An additional analysis looked at whether there appears to be differential enforcement of racial/ethnic groups across geographic stops locations. The racial/ethnic distribution of incidents across 11 stop locations that comprise 50% of all incidents is very similar to the distribution across all stops combined and all other locations combined. In other words, there is no particular MAX stop location that appears to be a potential driver of any racial/ethnic distributions.

### *Disparity Test 2 Results*

The second disparity test examines whether race/ethnicity of riders is related to more serious enforcement outcomes while simultaneously controlling for other factors that may explain the outcome. Separate logistic regressions for juvenile and adult riders examine whether each race/ethnicity compared to Whites is related to

receiving a citation over a warning and an exclusion over a citation. The regressions control for other factors that may be related to an enforcement outcome including the sex of the rider, type of violation, location of incident, whether the incident involved the top enforcement officers, whether the incident involved TriMet officers or local law enforcement, weekend incidents, and incidents involving repeat violators.

If race/ethnicity remained significantly related to a more serious enforcement outcome in the regression analysis, the strength of the relationship was also assessed. Given the large sample size this study utilizes even small differences between races in outcomes can produce a significant relationship. Race was significantly related to more serious outcomes in 2 out of 16 logistic regressions comparing enforcement outcomes between African American, Asian, Hispanic, and Non-White riders to White riders. Adult African American riders had statistically significant greater odds compared to adult White riders to receive a citation over warning and exclusion over a citation. The effect size of these relationships was small, but statistically significant, when looking at the odds ratios and at the “practical impact”, leading to the following conclusion.

*Conclusion 3: Although there were two positive significant relationships in the adult analysis, the size of the relationship and difference between significance and insignificance was relatively small enough that the results are unlikely based on a systemic bias in TriMet fare enforcement, future studies should continue to assess these relationships.*

Overall the evidence of disparity found in this study was not large enough, or dramatically pronounced, to conclude some form of *systemic bias in TriMet fare enforcement exists*, nor identify the source of disparity. *The most noteworthy finding that represents a significant factor related to overall incidents, exclusions, and racial/ethnic disparities is the high rate of repeat violators overall, but particularly among African American riders, who had the highest percentage.* Attention to the phenomenon repeat violations is a centralizing issue that could have the most impact on these outcomes and distributions in the future.

Although the research did not find disparity in fare enforcement outcomes large enough to be indicative of systemic biases in fare enforcement practices, the readers of this report need to carefully understand the principles, which have guided the analysis and frame the conclusion discussion.

*Principle 1: Descriptive and statistical evaluation of fare enforcement data is limited to finding racial and ethnic disparities that may be “indicative” of systemic racial and ethnic bias but that, in the absence of more extensive examination, cannot be considered comprehensive evidence or proof of profiling.*

*Principle 2: The best strategy for assessing racial and ethnic disparities is to apply multiple benchmarking approaches. Each statistical benchmarking approach has empirical limitations impacting the validity of the results; therefore, a holistic approach is necessary.*

*Principle 3: Even if the results are not indicative of a pattern of systemic bias it does not mean a transit agency should be any less vigilant in ensuring its enforcement practices are fair and un-biased through continued training, data monitoring, and policy reflection.*

Given the results of this report, the third principle is particularly important. The possibility for bias is real and efforts to ensure practices in enforcement are fair for all should continue.

## **APPENDIX: Race Coding in TriMet Enforcement Data**

During an analysis of repeat violators the author attempted to pull from the data the violation histories for all persons identified as a repeat violator by matching names and DOB. *Examination of the repeat violators revealed different races were often perceived by the enforcement officer for the same individuals.* Out of the 54,594 incidents there were 1,251 instances where the race recorded for a repeat violator was different from a race recorded in a previous incident. Based on this finding the author decided to recode the race variable for the 1,251 instances that did not match. The following coding rules were utilized:

- For repeat violators who had 3 or more incidents, the race that was recorded most frequently was used as the race.
  - If there was a tie, the race was randomly chosen.
- For repeat violators who had 2 incidents, if a non-White racial code was given it was used as the race. If there were any ties between non-White racial codes, they were randomly chosen.

The result of the recoding effort increased the number of non-White persons in enforcement incidents by a small amount. For example, no race or ethnicity's fare enforcement outcomes increased more than 1%. Most changes were approximately 2-tenth's of a percent increase. This does raise an issue for TriMet going forward whether racial breakdowns of their data should be recoded in a similar fashion; however, the changes to the overall percentages due to recoding was very small.