Message from Police Chief McCullough
December 22, 2023

As your Police Chief, my foremost duty is to ensure that every community member is treated with dignity and respect and receives equitable treatment in every encounter with all members of the police department. The women and men of the Baltimore County Police Department readily accept and embrace the input and oversight that comes with serving our communities.

In 2020, the Baltimore County Equitable Policing Advisory Group conducted an analysis of the County's traffic enforcement data. That study prompted a deeper dive analysis of the data. In this subsequent review, it is clear that while there are several indicators demonstrating that trends are moving in a positive direction, we must continue to make efforts to combat disparities a strong focus. While we recognize traffic stops are a deterrent and a vital tool in promoting public safety, we also recognize that each of those elements should be free from bias.

The Department is proud of efforts in recent years to add extensive training initiatives to help mitigate implicit biases and enhance de-escalation techniques. For example, we have implemented several ongoing trainings, including: Fair and Impartial Policing (FIP), Implicit Bias, Active Bystandership for Law Enforcement (ABLE), Integrating Communications, Assessment, and Tactics (ICAT - de-escalation training), and Blue Courage (mindfulness training). The findings included in this new updated study underscore the importance of these efforts, the need for continued review of policies and procedures, and an ongoing commitment to transparency in this work.

We understand the significance of engaging in open dialogue with community leaders and residents. Diverse perspectives and insights are crucial as we work collaboratively to enact meaningful and stronger partnerships with the community and, moving forward, we will continue to emphasize the importance of ensuring that all community members are heard and valued. We also understand the importance of examining ourselves and being transparent about our policies and actions.

I thank County Executive Johnny Olszewski and his administration for their leadership in developing and supporting the Baltimore County Advisory Group on Equitable Policing to help ensure more equitable policing practices across Baltimore County. I also thank Dr. Lauren Hamilton Edwards and Dr. Mir Usman Ali, from the University of Maryland Baltimore County, as well as Baltimore County's Chief Diversity, Equity and Inclusion Officer Sevetra Peoples-Brown for the efforts in this update. In addition, we remain thankful for the continued efforts of dedicated partners, including the Equitable Policing Advisory Group members, such as the NAACP - Baltimore County Chapter, State Senator Charles Sydnor, and County Council Chairperson Julian Jones, the members of the Baltimore County Police Accountability Board, and countless community leaders.

It is equally important to acknowledge the unwavering commitment and dedication of our Department's hardworking men and women. They uphold their duty to serve and protect with integrity and compassion, often under challenging and unpredictable circumstances. Their tireless efforts are essential to maintaining the safety and well-being of our community.

Please be assured that we are decisively committed to upholding the principles of fairness, integrity, and justice in all our endeavors. As I previously stated upon assuming this role, we are resolute in reviving our proud legacy of community policing.

We express gratitude for your sustained support and partnerships, and encourage you to communicate with us regarding any concerns, suggestions, or feedback as we strive to ensure a safe, just, and equitable environment for all.

Chief Robert O. McCullough

Baltimore County Traffic Stop Deep Dive 2017-2022

Final Report

Prepared by:
Lauren Hamilton Edwards, Ph.D.
Mir Usman Ali, Ph.D.
Tanguy Ringoir
Taylor West

Blank page

Executive Summary

The purpose of this evaluation is to better understand racial disparities of traffic stops in Baltimore County in response to a previous analysis completed by the Workgroup on Equitable Policing (hereafter the Workgroup) in 2020. The Workgroup called for better use of the available data, including traffic stop data.

We approached this evaluation with two questions:

1. Have traffic stop disparities between Black individuals and those of other races/ethnicities persisted since the 2019 report on the same topic?
2. What explains the differences in the racial disparities of drivers in traffic stops and post-stop actions with the available information?

We analyzed six years (2017-2022) of traffic stop data from Baltimore County using a variety of methods, informed by previous research and best practices using traffic stop data. In our review, we found that researchers are hesitant about only using percentages of a race to illustrate possible racial bias in traffic stops. Instead, they use these percentages as a starting point. To that end, we use other methods to help us infer the severity of the disparity and possible bias. This includes looking at racial disparities relative to the population and a method called the veil of darkness. We also analyzed data on what occurred as a result of stops, including warnings, citations, searches, and arrests.

Our findings indicate that the disparity in traffic stops persist for Black drivers. However, there are several indicators that the trend is moving in a positive direction. While we can infer bias in traffic stops in the first period (2017-2019), we cannot in the second period (2020-2022). We also found that the most concerning disparity for Black drivers occurs post-stop. Black drivers are far more likely to have their person or vehicle searched for probable cause during a traffic stop, even though these stops are less likely to find contraband for Black drivers compared to White drivers. We also found that Hispanic drivers are issued citations at a higher rate than both Black and White drivers.

We conclude this evaluation with recommendations on how the Workgroup can use these findings and continue using the available data for analysis, future research on racial disparities in traffic stops, and potential changes to the E-tix system that would make this type of analysis easier.

Table of Contents

Tables

Figures

Background

Baltimore County

In 2019, the County released a report on 2018 traffic stops by race, gender, and precinct. County Executive, John Olszewski, and then Police Chief, Melissa Hyatt, then took the extraordinary action of publicly reporting the findings that Black drivers, particularly men, were stopped at a higher rate than other residents. Black drivers were 73% more likely to be stopped by Baltimore County Police Department (hereafter the Police Department) officers than white drivers, even though they only represented 26.1% of the population at the time (Amara 2019).

This finding prompted County Executive Olszewski to several actions, including:

- creation of the Workgroup on Equitable Policing,
- making data regarding police actions and performance more transparent through new dashboards, including BCSTAT, and
- executive actions regarding policy revisions, body worn cameras, hiring/training/accountability, etc.

Additionally, the Baltimore County Council passed the SMART policing Act in October 2020 to modernize police tactics, put rules regarding use-of-force into law, improved training and accountability, and expanded transparency.

The Workgroup studied issues through study groups and listening sessions with the community. Their findings were compiled and reported in the December 4, 2020 *Report of Initial Findings & Recommendations* (linked). The most important sections for the purpose of this report are recommendations regarding the use and transparency of traffic stop data. The Report found that "The development and analysis of data is an area that is still ripe for significant inquiry…" (p. 26).

Our report is within this call for better use and analysis of the available data.

Nation-Wide Disparities

Racial disparities in traffic stops are not unique to Baltimore County. These disparities are seen nationwide. One report from the Open Policing Project at Stanford University found that Black drivers are more likely than White drivers to be stopped across 35 U.S. cities, varying in size and region of the country.

However, racial disparities in the data do not tell us a complete story of what happens before, during, and after a traffic stop. Disparities in the data may not necessarily reflect discrimination on the part of individual officers. Such disparities could be related to traffic patterns, driving patterns, offending patterns, or the focus on policing activity in particular areas of the locality. Indeed, solely reporting the rates of traffic stops by race without further context might cause more fractures between policing and advocacy communities (Ross et al. 2020). Better analyses of this data would aid in better understanding this context.

Approaches for Traffic Stop Data

As noted, using raw racial differences in traffic stop rates is a good first step but incomplete. The following are summaries of different approaches for adding more context to traffic stop data.

Veil of Darkness Method

Traffic stop data are used by focusing on traffic stops in two time periods, one during Daylight Savings Time (DST) and the other during standard time. Researchers compare the stops during the same time of day (during the inter-twilight time of day) in the two time periods. The assumption is that biased officers will stop Black drivers more often during DST because they can see the race of the driver more clearly than they are able to during the darkness of winter. This method is a conservative test of bias, meaning that a null result does not preclude discrimination. Even a small amount of disparity can indicate a serious problem in the department (see Grogger and Ridgeway 2006 and Hannon et al. 2021).

Vehicle Search Threshold (Hit Rate)

Equally important to data on the initial traffic stop is what occurs after the stop. Post-stop actions include warnings, citations, searches, and arrests. This method compares data on the racial differences in stops resulting in searches to contraband being found because of searches. Suspicion

stops resulting in searches are typically more probable for Black drivers than White drivers. Bias is inferred when these searches do not produce contraband at an equal or higher rate for Black drivers (Hannon 2021).

Deployment Hypothesis

Hot spot policing tactics may also lead to higher racial disparities in traffic stops, particularly if higher crime areas, targeted by police activities, are correlated with where Black residents live. If police are deployed to an area at higher rates due to crime statistics, traffic stops might also increase because of the greater police presence in the high-crime area, regardless of what crime is targeted (Akbas et al. 2022). While we do not test this hypothesis in this study, we note it here as a future possibility.

An Important Note

While these methods attempt to add more context to the traffic stop data, they still fail to produce a complete understanding of traffic stop disparities. Missing in the data are two critical perspectives: officers and the community. Traffic stop data does not, and cannot, uncover officer motivations in making traffic stops. Furthermore, traffic stop data does not convey how the driver feels during the interaction. The Workgroup's report on their listening sessions with the community should be considered a complementary volume to this report.

Evaluation Purpose/Questions

Purpose:

To better understand the racial disparities in Baltimore County traffic stops using traffic stop data.

Questions:

1. Have traffic stop disparities between Black individuals and those of other races/ethnicities persisted since the 2019 report on the same topic?
2. What explains the differences in the racial disparities of drivers in traffic stops and post-stop actions with the available information?

Our Approach

Our findings are divided into two sections: traffic stops and post-stop actions (warnings, citations, searches, and arrests). In each section, we first report the item by race and how that compares to other local governments that we deemed similar enough in racial composition and/or population density in Maryland: Anne Arundel County, Baltimore City, Howard County, Montgomery County, and Prince George's County. As Maryland has few local governments, direct comparisons are difficult to make. We present them here as a way for the Workgroup to situate how Baltimore County operates within the context of Maryland. Comparisons are from 2017 to 2021, as the State of Maryland has not yet updated their traffic stop dashboard for 2022.

We then use more sophisticated methods to provide more context to data available. For traffic stops, we use the veil of darkness method to determine if racial bias can be inferred from the data. In post-stop actions, we were particularly interested in searches relative to the contraband being found because of a search. We use racial comparisons of hit rates to determine possible racial bias in post-stop searches.

In some cases, we report the action by year. In other cases, we compare Period 1 (2017-2019) to Period 2 (2020-2022). We chose to divide the years based on County actions regarding policing. The initial report on racial disparities in traffic stops was made public in 2019, which prompted several executive and legislative actions, including the creation of the Workgroup. In our review of relevant policy documents from the Police Department, we determined that these broader changes were most important for determining years for comparison. Essentially, Period 1 is the pre-period where disparities were accounted for and actions began. Work continued into Period 2, which we consider the post-period. Given that each period is only three years, great improvement should not be expected simply because there has not been enough time for these changes to be implemented and in place long enough.

A quick note about the data: the data are messy! Traffic stop data in Maryland is gathered using the E-Tix system (part of Delta+) created by the Maryland State Police. The State has a dashboard that allows anyone to obtain high-level, aggregate data on traffic stops, post-stop actions, and some demographic information for drivers who were stopped. However, the data are difficult to analyze

for anyone needing to conduct in-depth research of traffic stops, whether using the dashboard or raw data, when made available. To illustrate, there is not a codebook for the data. Had it not been for our partners in the Baltimore County Police Department, we would not have been able to understand some of the variable labels or meaning of variable categories.

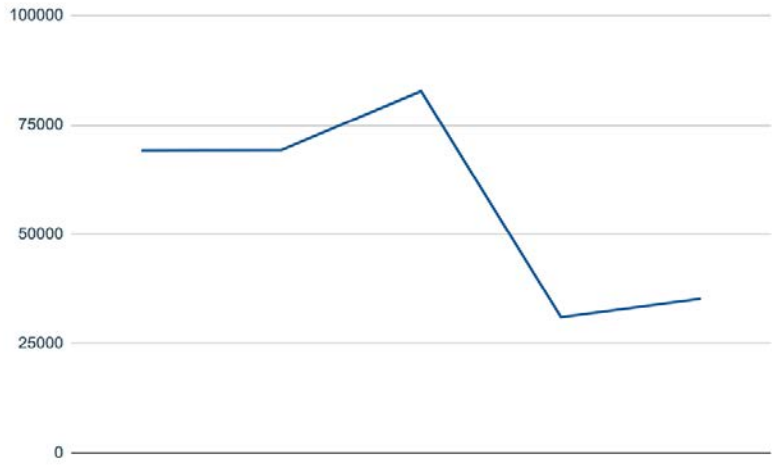
Data are only as good as the system created to gather it. Data input is prone to all sorts of error because data gatherers are human. This data, in particular, is gathered by officers in the field. Error is highly likely as different officers might interpret the stop differently than others. Officers are also under immense pressure in the field as they enter traffic stop information. This is yet another reason to use traffic stop data as a starting point and not the final word. We will note limitations throughout our analysis, where applicable.

Findings: Traffic Stops

Overall Traffic Stops

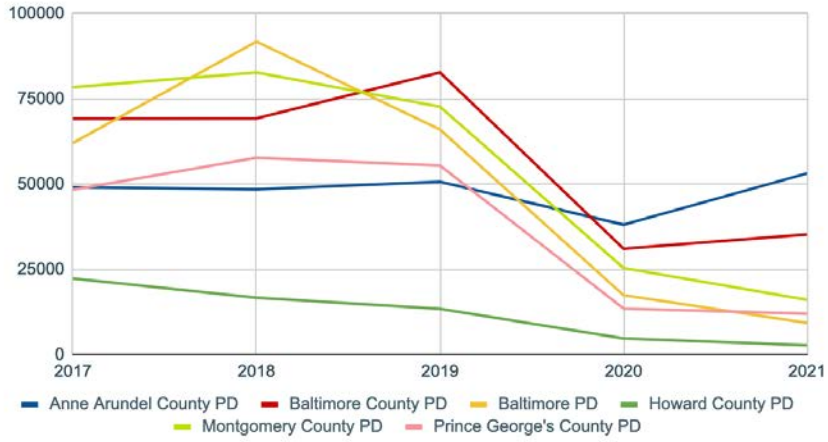
Overall, traffic stops have fallen significantly between 2019 and 2020. This is undoubtedly due to the COVID-19 pandemic as fewer drivers were on the road (Figure 1).

Figure 1: Traffic Stops by Year



For the most part, other, similar counties experienced similar drops in traffic citations. Anne Arundel County is the one exception.

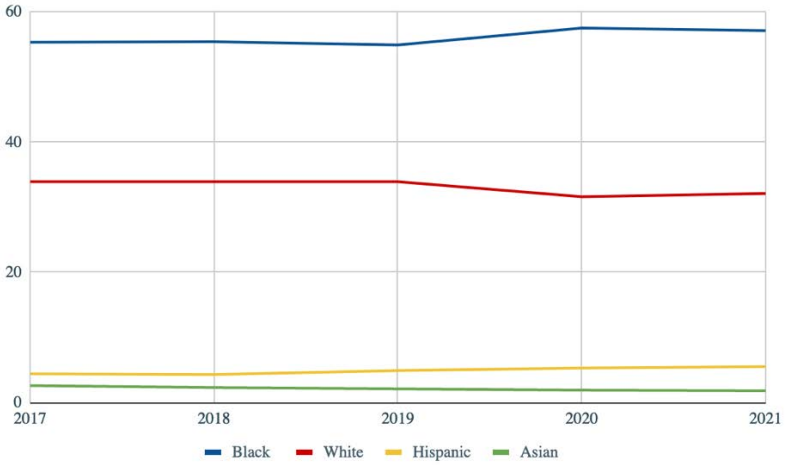
Figure 2: Traffic Stops by Year, Comparison



Traffic Stops by Race

Figure 3 shows that Black drivers are more likely to be stopped than White, Hispanic, or Asian drivers in the County.

Figure 3: Racial Composition of Traffic Stops by Year



Traffic Stops of Black Drivers

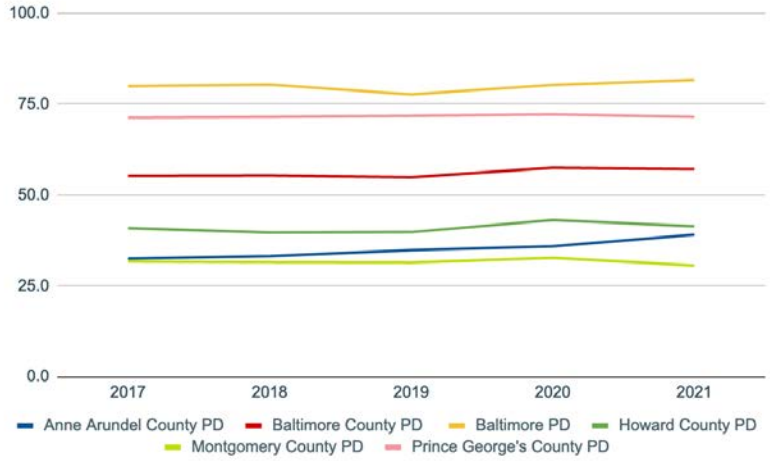
Digging deeper into the data, we used a ratio to demonstrate the overrepresentation of Black drivers to their proportion of the population (Table 1). First, note that the percentage of Black drivers per the total traffic stops has risen over the time period. This does not mean the disparity has grown, though. At the same time, the proportion of Black residents in the County has also grown. Second, note that the relative ratio decreases between the time periods. This means that the proportion of Black drivers stopped compared to the proportion of Black residents is decreasing. Thus, the disparity *slightly* decreased in the second time period.

Table 1: Traffic Stops of Black Drivers Relative to Population

	Year	In Population	In Stops	Relative Ratio
	2017	28.9%	55.3%	1.9
Period 1	2018	29.0%	55.5%	1.9
	2019	30.0%	54.9%	1.8
	2020	30.7%	57.5%	1.9
Period 2	2021	31.3%	57.1%	1.8
	2022	31.3%	58.5%	1.8

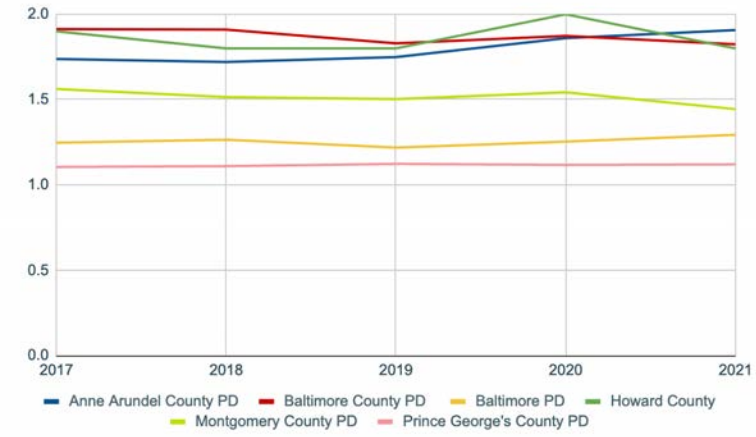
Baltimore County falls in the middle of the other five counties that we chose as comparison counties. Note that the percentage of traffic stops involving a Black driver remains fairly steady for all counties.

Figure 4: Percentage of Traffic Stops with Black Driver, Comparison



We also compared the relative ratios of Baltimore County with those from the five comparison localities. This graph demonstrates that relative ratios are fairly stable over the time period, for the most part. Howard County's relative ratio spikes in 2020 but goes down again in 2021.

Figure 5: Traffic Stops of Black Drivers Relative Population Ratios, Comparison



Where Black Drivers are Stopped

According to the deployment hypothesis, more traffic stops occur where police departments deploy their resources. Though we cannot analyze where police have deployed resources, we can at least show where Black drivers are stopped using census tracts. The areas in the highest range of traffic stops (in red) border Baltimore City. These areas around Lochearn, Woodlawn and Rosedale have a higher percentage of Black residents than Baltimore County as a whole. Please note that the ranges are different between the two time periods to account for the decrease in overall stops in the second time period.

Figure 6: Where Black Residents Live Compared to Where Black Drivers are Stopped, 2017-2019

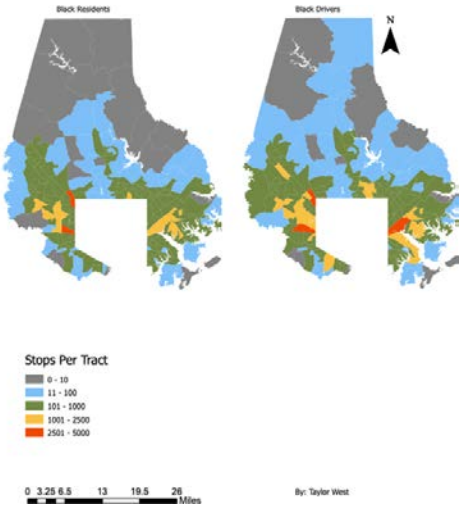
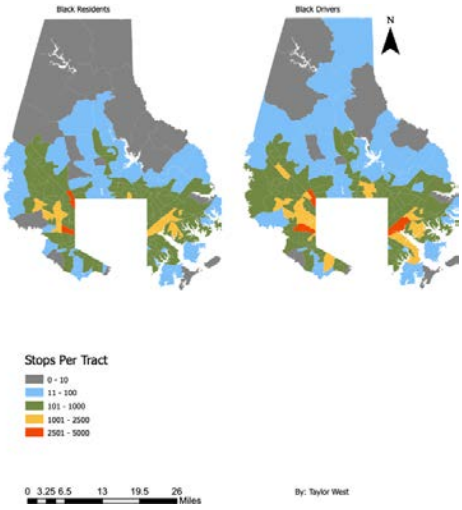


Figure 7: Where Black Residents Live Compared to Where Black Drivers are Stopped, 2020-2022



Veil of Darkness Method

As discussed in the Background section, the veil of darkness method focuses on racial differences in traffic stops based on how much light is outside when the stop occurs. If fewer Black drivers are stopped when it is dark – when a veil of darkness hides their race – then this could indicate potential bias.

We found little evidence of racial bias using the veil of darkness methodology proposed by Grogger & Ridgeway (2006) for the 2017-2022 time-period (for a full explanation of the method, see Appendix 1). Comparing the stops White and Black drivers during the inter-twilight period (between 5:00 and 9:00 pm) indicates that there were fewer stops of Black citizens when it was dark overall (see Table 2). When we ran the analysis, controlling for a number of factors, the result was statistically significant in the first period but not the second. This indicates bias in the first period but not in the second.

Table 2: Veil of Darkness Findings

	Inter-twilight Sample
Total	56.30% (n = 24,369)
Daylight	57.03% (n = 10,183)
Dark	55.77% (n = 14,186)

We also ran the same analysis for Black male drivers compared to White drivers and found that they are approximately 9% less likely to be stopped when it is dark in the first period (statistically significant at the .10 level). There is not a statistically significant finding for the second period, meaning that while we can infer bias in the first period for Black men, we cannot infer bias in the second period.

Conclusion on Traffic Stops

Overall, we found the large disparity of traffic stops involving Black drivers in Baltimore County remains. However, a deeper dive into the data indicates that this disparity *relative to the proportion of Black residents* is *slightly* less in Period 2 after the issue was brought to public attention. The second analysis, using the veil of darkness methodology, shows bias in the first period but not the second period for Black drivers and more specifically for Black male drivers. Though the disparity persists, there are some signs of improvement.

In the next section, we review post-stop actions.

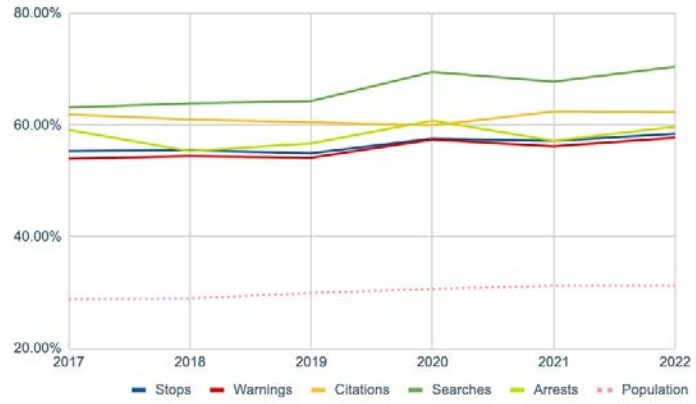
Findings: Post-Traffic Stop

Post-Stop Actions for Black Drivers

In this section, we review the data on what happens after the traffic stop, particularly stops resulting in warnings, citations, searches, and arrests.

Figure 8 is a representation of the percentage of Black Drivers involved in each post-stop action. We added the percentage of Black residents in Baltimore County, as well, to demonstrate that Black drivers are over-represented in each post-stop action when compared to other races. This is denoted with the dotted pink line. Findings show that that the percentage of Black drivers out of all those given a warning following a traffic stop was relatively stable over the six-year period. The percentage of Black drivers out of all stops resulting in a citation or an arrest trend downward. The percentage of Black Drivers out of those who had their vehicles and/or person searched after a stop is increasing.

Figure 8: Percentage of Black Drivers in Post-Stop Actions, by Year



Compared to other counties, Baltimore County remains in the middle of the comparison counties. Overall, post-stop actions are fairly constant for each county over time. The comparison on searches is not available on the state dashboard and, thus, not presented here.

Figure 9: Percentage of Black Drivers in Stops Resulting in Warning, Comparison

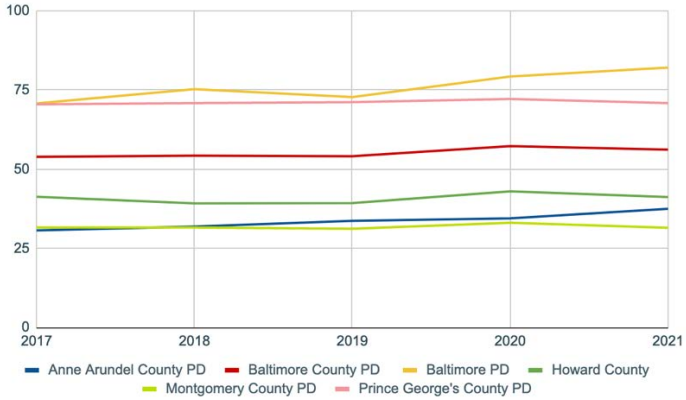


Figure 10: Percentage of Black Drivers in Stops Resulting in Citation, Comparison

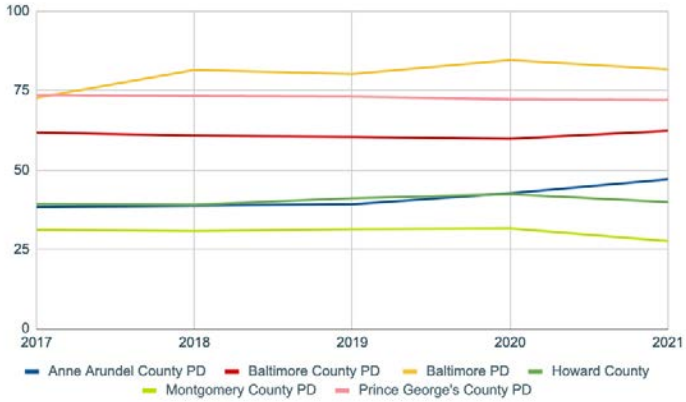
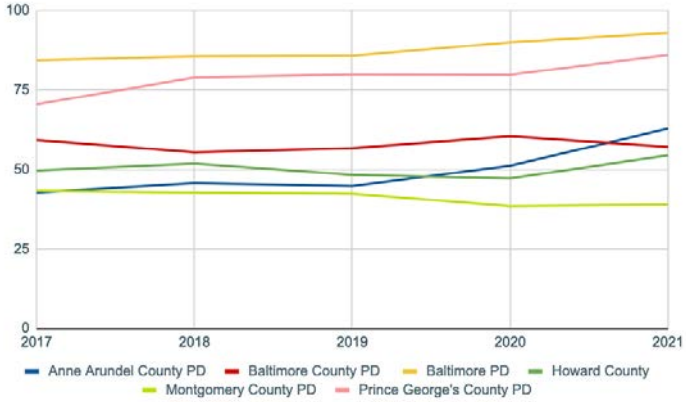


Figure 11: Percentage of Black Drivers in Stops Resulting in Arrest, Comparison



In Table 3, we show the odds ratios of post-stop actions occurring to Black drivers compared to White drivers. Odds ratios higher than one indicate that the event occurs more frequently for Black drivers. All odds ratios reported, except those for arrests, are statistically significant at the .05 level. Results suggest that Black drivers are more likely to be searched or cited compared to White drivers after controlling for a range of variables such as driver gender, age, whether contraband was found (for citations, warnings, and arrests), the reason and type of stop, hour of the day, and day of the week.

Black drivers are *less* likely to receive a light penalty (i.e., a warning) as compared to White drivers but *more* likely to receive a moderate penalty (i.e., a citation) as compared to White drivers while controlling for the above variables. These disparities increase in the post-period for searches and warnings but have stayed about the same for the likelihood of being cited or arrested.

Table 3: Odds Ratios for the Occurrence of Post-Stop Actions for Black Drivers, by Period

Post-stop Action	Entire Sample	Period 1	Period 2
Warning	0.88	0.90	0.84
Citation	1.35	1.35	1.34
Search	1.72	1.52	2.07
Arrest	0.93	0.93	0.95

We would like to note here that the available information that we have from the data is unclear on how post-stop actions are chosen. We are aware that a stop could result in a warning for one violation and a citation for another violation. The best we can tell from the available data is that the officer chooses which action they log after the traffic stop into the system, which adds to the messiness of working with this data. We can tell a bit more about traffic stops that result in searches, as this is logged as a separate item.

Searches Resulting from Traffic Stops

As demonstrated above, Black drivers are more likely than White drivers to have their person or vehicle searched during a traffic stop. It is concerning that this disparity increases in the second period. With that in mind, we further analyzed the search data.

First, we specifically analyzed two types of searches in the traffic stop data: consensual searches and probable cause searches. This is another area where the data are messy. The timing of these searches is unclear in the data. Most likely, probable cause and consensual searches occur before arrest but can occur after.

We analyzed the racial breakdown of each type of search and compare results for Black drivers by county. Then, we analyze the likelihood that contraband is found as part of the search for Black drivers. Following the logic of vehicle search threshold, discussed in Background, bias can be inferred when the probability of finding contraband is lower for Black drivers than White drivers. We once again use odds ratios to make this determination, controlling for a range of variables such as driver gender, age, the reason and type of stop, hour of the day, and day of the week. In this case, an odds ratio lower than one indicates the possibility of bias.

Consensual Searches

White drivers were more likely than other races to have their person or vehicle searched consensually in the first period; but that drops in the post-period. In this period, Black drivers consent to a higher proportion of searches. Though the likelihood of finding contraband because of a consensual search is lower in the second period, this result is insignificant. No bias can be inferred in consensual searches in either period using these methods.

The trend for consensual searches is interesting and may be due to larger societal changes. The literature on consensual searches demonstrates that consent is contextual. Consent to search may also be an indicator of how a driver feels about the officer's authority or trust in police overall (for an example see Gau 2012). As sovereign citizen movements and instructions for refusing searches during a traffic stop become more readily available, White drivers may be less likely to give their consent for a search.

Figure 12: Consensual Searches by Race

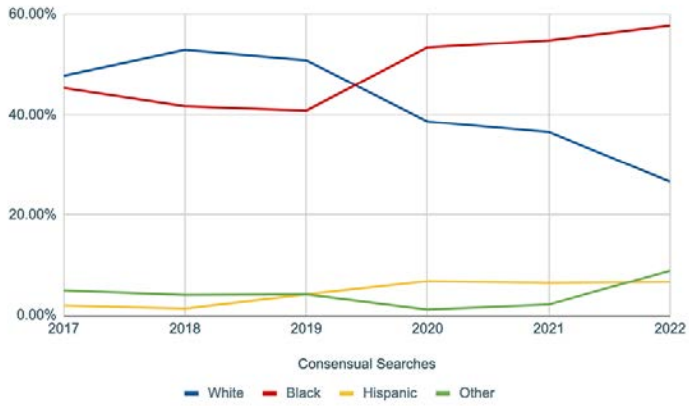


Table 4: Likelihood of Finding Contraband During Consensual Search, Black/White Comparison

	Odds Ratio
2017-2019	1.00
2020-2022	0.81

Results are statistically insignificant

Probable Cause Searches

Probable cause searches are typically the most interesting to researchers using hit rates to infer racial bias. Otherwise known as suspicion searches, these searches are presumed to occur at the officer's discretion. Search threshold or hit rates are particularly salient for these types of searches.

Black drivers are searched due to probable cause at a significantly higher rate than other races. They make up 75% or more of total searches due to probable cause through each year studied. Furthermore, contraband is less likely to be found as a result of these stops for Black drivers when compared to White drivers. These results are significant at the .05 level for both time periods, meaning that bias can be inferred in both time periods.

Figure 13: Probable Cause Searches by Race

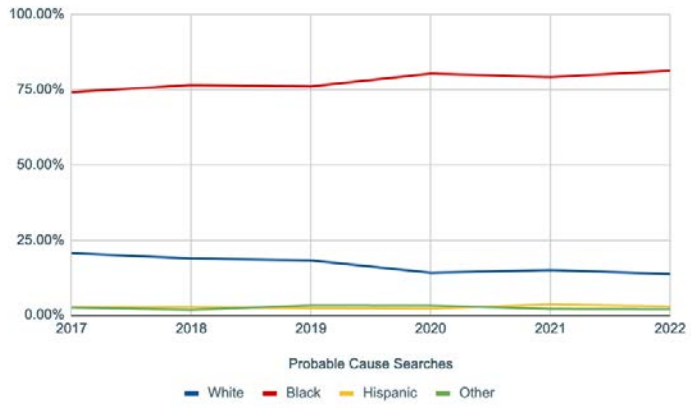


Table 5: Likelihood of Finding Contraband During Probable Cause Search, Black/White Comparison

	Odds Ratios
2017-2019	0.78*
2020-2022	0.73*

**significant at the .05 level*

Conclusion on Post-Stop Actions

Overall, a disparity of post-stop actions for Black drivers in Baltimore County was found. Black drivers are more likely to be searched than White drivers. Black and Hispanic drivers are more likely to be cited compared to White drivers after controlling for a range of variables such as driver gender, age, whether contraband was found, the reason and type of stop, hour of the day, and day of the week. They are also *less* likely to receive a warning as compared to Whites while controlling for the above variables. The most concerning finding in the evaluation is the disparity, and likelihood of bias, found in probable cause searches for Black drivers. Black drivers are *more likely* to have their person or car searched during a traffic stop due to probable cause but are *less likely* to have contraband found as a result of these stops than White drivers.

Conclusion and Recommendations

Our findings suggest that in most areas, disparities for Black drivers in traffic stops are moving in the right direction or remaining consistent over the six years analyzed. With continued effort, further improvement might be seen over a longer period of time. However, disparities are clear and appear to be increasing with respect to post-stop actions such as searches and warnings. Black and Hispanic drivers were also more likely to be cited than Whites in both the periods studied. Probable cause searches should be a particular concern to Baltimore County and the Workgroup. Not only does the disparity for Black drivers persist, but bias is also inferred through lower hit rates of contraband in these searches for Black drivers.

Our evaluation has several limitations. First, traffic stop data are notoriously messy! Any data set is subject to data entry error. In this case, data is entered by officers in the field in a variety of circumstances. Missing data are common; and officer error would be understandable. Additionally, the E-tix system, itself, does not create a readily usable data set for researchers and analysts at the local level who want to go beyond the State's dashboard. Variable labels and descriptions are at times unclear, complicated by the lack of a codebook or data dictionary. If we had not been working with partners in the Police Department, we would have interpreted some of these variables erroneously. If we had more time, we would have liked to interface with the officer side of the system to understand more about how the system works and to gain clarity about the data set overall.

Second, as noted in the Background, traffic stop data can only tell us so much about what happens during a stop as data are missing two very important perspectives: the driver and the officer. The data do not tell us anything about how the driver interprets officer actions or how those actions impact their overall feelings about police. The data also do not tell us how an officer operates during a stop. Each officer operates with a certain amount of discretion. Additionally, how officers make the decision to conduct a probable cause search, for example, is not part of the data.

Because of our findings, as well as these limitations, we offer the following recommendations for future Workgroup studies and future research using traffic stop data.

Workgroup Recommendations for Moving Forward

Our recommendations here are solely referring to traffic stop disparities. We realize that the Workgroup is reconvening; and these recommendations may not be an initial priority. However, there is much about traffic stops that cannot be determined by the data alone. Importantly, the Workgroup already included the voice of residents in their initial 2020 report. As they continue their work, we suggest that this engagement with the public should continue. We also suggest that they add the voices of officers from all ranks.

1. Build on the community feedback gathered as part of the first report in 2020:
    a. How do residents react to probable cause searches? How do such reactions impact how residents view the police more generally?
    b. How do residents react to being asked for consent to search?
2. Include the perspective of officers of all ranks in your information gathering:
    a. How much discretion is given to officers for each type of post-stop action?
    b. How do officers decide that a probable cause search is necessary?
    c. How do officers react/feel during a traffic stop? How does this influence their decision-making during the stop?

We also suggest that members of the Workgroup learn about the E-tix system and advocate for changes to the system, particularly so better analyses can be done at the local level.

Future Traffic Stop Analysis

We recommend that the County and Workgroup continue to engage community partners to continue analyzing traffic stop data annually or complete the analysis internally. Though the State dashboard offers high-level, aggregate traffic stop information, it does not offer the context that additional analyses, like veil of darkness and search threshold, do. These analyses should be done on an annual basis to ensure that the County and citizens have a more complete picture of what is happening in their county regarding traffic stops.

Second, we recommend that the County and Workgroup continue to do this work while valuing transparency, just as they did with the initial 2019 report on 2018 traffic stops. Transparency is one mechanism that helps the public keep government accountable. Even reporting concerning findings lets citizens know that the County cares enough to do the analysis, especially if that news is paired with solutions for solving disparities.

Finally, if possible, testing the deployment hypothesis, that traffic stops of Black drivers are more likely to occur where police department resources are deployed, would help tell a more complete traffic stop story. Our understanding is that resource deployment varies for many reasons, including the time of year and department priorities. It may be too difficult to gauge deployment in a way that is comparable to where stops of Black drivers occur. The County should continue to consider how to do such an analysis.

Acknowledgements

We want to specifically thank members of the Baltimore County staff for the trust they put in us to do this work and their partnership throughout the process. We could not have completed this study without the opportunity to ask questions and discuss our progress at our weekly meetings. It truly felt like a partnership and that each of you were part of our small team!

Thanks to:
Sevetra Peoples-Brown, Chief Diversity, Equity, and Inclusion Officer
Ra'Mona Brown-Carter, Program Manager, Human Relations
Joseph Conger, Colonel, Baltimore County Police Department
Orlando D. Lilly, Major, Baltimore County Policy Department
Nicole DeMotto, Director of Crime Strategies and Analysis, Baltimore County Police Department

We are also grateful for the support and feedback from County Executive Olszewski, County Administrator Rodgers, and Interim Police Chief Delp.

Bibliography

Akbas, H., Ozer, M., & Akgul, A. (2022). Crime concentration, African-American density, and racial disparity in police arrests. Crime Prevention & Community Safety, 24(1), 1–13. https://doi.org/10.1057/s41300-021-00132-y

Amara, K. (Reporter). (November 1, 2019). Work group to examine racial disparities in Baltimore County police traffic stops. *WBALTV 11* [news program].

Gau, J. M. (2013). Consent searches as a threat to procedural justice and police legitimacy: An analysis of consent requests during traffic stops. *Criminal Justice Policy Review, 24*(6), 759-777.

Grogger, J., & Ridgeway, G. (2006). *Testing for racial profiling in traffic stops from behind a veil of darkness*. RAND Corporation.

Hannon, L., Neal, M., & Gustafson, A. R. (2021). Out-of-Place and In-Place Policing: An Examination of Traffic Stops in Racially Segregated Philadelphia. Crime & Delinquency, 67(6/7), 868–890. https://doi.org/10.1177/0011128720926122

Ross, M. B., Kalinowski, J. J., & Barone, K. (2020). Testing for disparities in traffic stops: Best practices from the Connecticut model. *Criminology & Public Policy, 19*(4), 1289–1303. https://doi.org/10.1111/1745-9133.12528

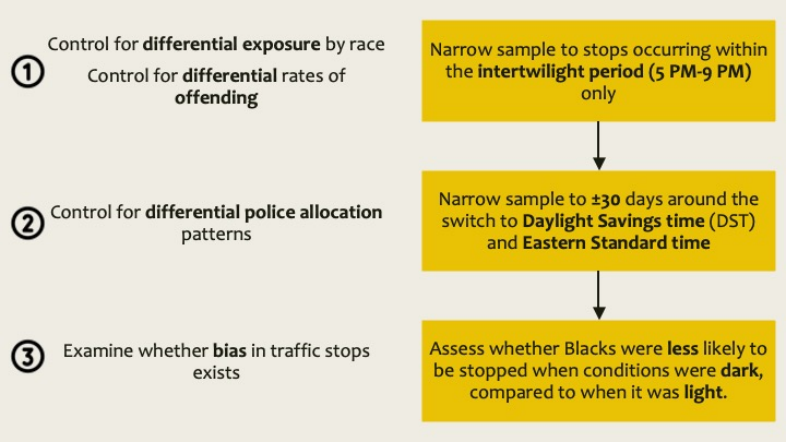
Appendix 1
Veil of Darkness Explanation

The veil of darkness method is an approach to assess racial bias in traffic stops. It is based on the intuition that if there is no racial profiling targeted at Black drivers in traffic stops, then lighting conditions should not be associated with the race of the driver being stopped. On the other hand, if racial profiling of Black drivers exists then such drivers would be *less* likely to be stopped when conditions are dark (as compared to when it is light outside), when it is harder for officers to identify the race of the driver when a "veil of darkness" obscures the race the driver.

The veil of darkness (VOD) method applies the above logic to assess racial bias in traffic stops by attempting to control for (1) differential exposure to law enforcement by race, (2) differential rates of offending by race, and (3) patterns of deployment. Because each of the foregoing factors are likely to change over the course of a 24-hour period as well as time of the year, the VOD method partitions the total population of traffic stops during a given year in a way so that the above factors are plausibly stable. Figure A1.1 illustrates the logic and procedure for the VOD method in schematic form.

VOD is considered a conservative method of assessing bias. We can infer bias when there are less stops of Black drivers in dark conditions, compared to when it was light. However, a null finding does not rule out bias (Hannon et al. 2021).

Figure A1.1: Veil of Darkness Method – Logic and Procedure



First, the VOD method focuses only on stops that have occurred in the inter-twilight period – defined as the period between the earliest and latest time civil twilight ends in a given year (this ranges from 5 PM to around 9 PM in Baltimore County). The assumption is that the mix of White and non-White drivers, and the kinds of drivers who commit offenses for which police make stops is not likely to change in the inter-twilight period. Partitioning the sample in this manner is thus intended to address factors 1 and 2 above.

Second, the VOD *further* narrows the sample to a time window of ±30 days around the switch to Daylight Saving Time (DST) and the switch back to Eastern Standard Time (EST). The assumption is that the allocation of police officers to various locations will not suddenly change following the time switch. Drivers at 6 PM are likely to be exposed to the sample distribution of police on either side of the switch. Narrowing the sample in this way is thus intended to address factor 3[1].

Finally, we use a statistical model to assess whether Black drivers are less likely to be stopped when it is dark, and therefore, hard to see. The statistical model controls for the time of day (separated into 12 discrete, 15-minute intervals) and the day of the week.

[1] We also removed the traffic stops that occurred in the thirty minutes between sunset and the end of civil twilight, since it is ambiguous whether that period is light or dark and would muddle the analysis.

Appendix 2
Post-Stop Actions by Race, compared to White Drivers

Explanation of Odds Ratios

We examined racial disparities in various post-stop actions in the two time periods under study (i.e., 2017-19, and 2020-22). These disparities reported below are in the form of odds ratios, which represents the likelihood of a certain outcome for members of a racial group compared to a control group, while controlling for a range of variables such as driver gender, age, whether contraband was found (for citations, warnings, and arrests), the reason and type of stop, hour of the day, and day of the week. The control group for each analysis here are White drivers.

Odds ratios are interpreted as the odds that something will happen when an event occurs. In this study we are looking at the odds that a stop will result in a post-stop action depending on the driver's race compared to the same result for White drivers. Odds ratios over 1 indicate that a post-stop action is more likely to occur for driver from a minoritized group than a White driver. An odds ratio under 1, means that this is less likely. And the odds are the same when the odds ratio is close to or equal to 1.

The following figures, or coefficient plots, shows the distribution around the odds ratio of each post action stop by race as compared to White drivers. When the distribution crosses the red line, the difference is not statistically significant. We divide each post-stop action into the two periods for our analysis.

Warnings

Figure A2.1: Post-Stop Odds of Receiving a Warning Relative to White Drivers, 2017-19

Figure A2.2: Post-Stop Odds of Receiving a Warning Relative to White Drivers, 2020-22

Citations

Figure A2.3: Post-Stop Odds of Receiving a Citation Relative to White Drivers, 2017-19

Figure A2.4: Post-Stop Odds of Receiving a Citation Relative to White Drivers, 2020-22

Arrests

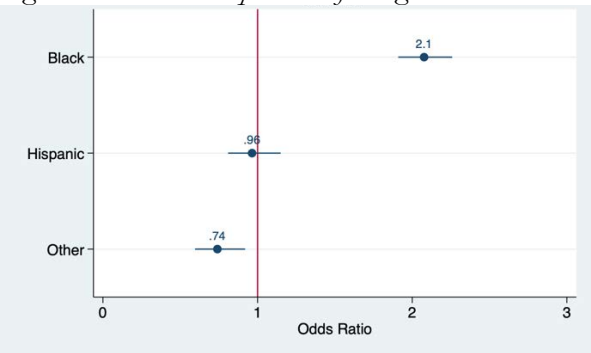
Figure A2.5: Post-Stop Odds of being Arrested Relative to White Drivers, 2017-19

Figure A2.6: Post-Stop Odds of being Arrested Relative to White Drivers, 2020-22

Searches

Figure A2.7: Post-Stop Odds of being Searched Relative to White Drivers, 2017-19

Figure A2.8: Post-Stop Odds of being Searched Relative to White Drivers, 2020-22



Appendix 3
Hit Rate by Type of Search and Race, Compared to White Drivers

Consensual Searches

Figure A3.1: Odds of Finding Contraband during Consensual Searches Relative to White Drivers, 2017-2019

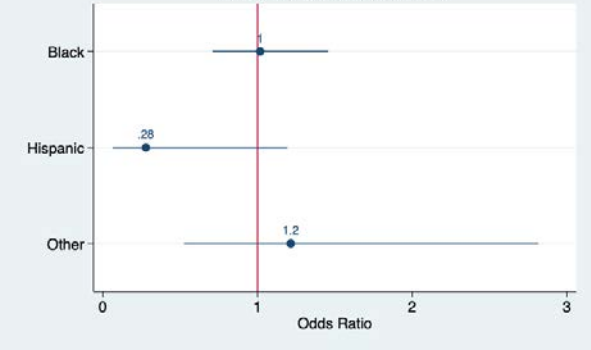
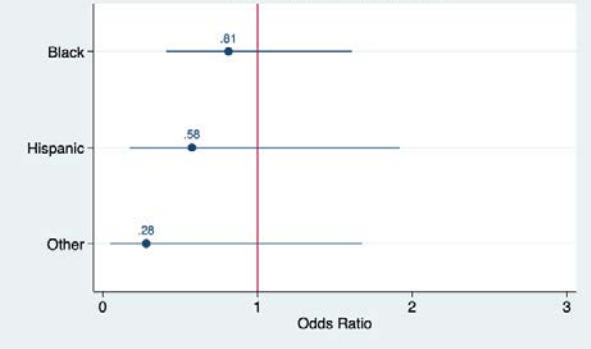


Figure A3.2: Odds of Finding Contraband during Consensual Searches Relative to White Drivers, 2020-2022



Probable Cause Searches

Figure A3.3: Odds of Finding Contraband during Probable Cause Searches Relative to White Drivers, 2017-2019

Figure A3.4: Odds of Finding Contraband during Probable Cause Searches Relative to White Drivers, 2020-2022