IPAC | INSTITUTE FOR PREDICTIVE ANALYTICS IN CRIMINAL JUSTICE

A Research Initiative of The Texas A&M University System at Tarleton State University

Additional Analysis of State of Texas 2021 Racial Profiling Data

Hispanic Data Analysis Report
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Introduction

The Institute for Predictive Analytics in Criminal Justice (IPAC) issued its annual report regarding racial profile data for the State of Texas and noted some potential concerns centered around anomalies detected in Hispanic data.[1] The purpose of this addendum report is to publish more detailed findings after conducting additional analysis of the data of concern. What follows in this report are the completed findings of that analysis.

Methodology

As noted in the original IPAC report, there were some categories of data which included either underreporting or overreporting. Furthermore, while the State publishes composite data in many of the data fields, when agencies disaggregate their dataset by race, the numbers are not always perfectly balanced. As an example, an agency may report 1000 searches, but when they disaggregate the data by race (say, 600 White, 200 Hispanic, 100 Black, and 85 Asian which sums to 985) it may not be completely balanced with the original number.

Thus, the methodology used in this report, was to accept the sums of the disaggregated data as the final total, even when it did not perfectly balance with the composite data published by the State. It should be noted, however, that the composite totals and the disaggregated totals were always very similar. However, since this report is centered on a deep analysis of Hispanic data, the fully disaggregated dataset was used.

The Full Dataset

The analysis began by pulling the full dataset and constructing a table for easy review (see **Table 1**). The State reports nearly seven million traffic stops in 2021, with the vast majority of them between Whites and Hispanics. Likewise, Whites and Hispanics comprise the majority of each of the reported categories in Table 1.

Notable findings in Table 1, highlighted in the red boxes below, is that although there were nearly 400,000 less traffic stops of Hispanic drivers than White drivers, Hispanics comprised a larger portion of arrests, inventory searches, and incident to arrest searches. These data will be tested for statistical significance and the findings stated later in this report.

[1] 2021 Racial Profiling Data Analysis for the State of Texas Annual Report, IPAC. April 2022. https://web.tarleton.edu/ipac/

Table 1—Full Dataset

Data	Race	Stop Data	Search Data						Contraband Data
		Stops	Consent	Contraband in View	Probable Cause	Inventory	Incident to Arrest	All Searches	Contraband Hit
	Native	21,543	158	18	229	64	98	**567**	260
	Asian	199,156	934	112	1,510	609	710	**3,875**	1,624
	Black	1,116,090	16,356	3,073	54,909	9,248	13,645	**97,231**	49,057
	White	2,964,008	41,428	4,499	52,294	16,731	17,724	**132,676**	62,250
	Hispanic	2,591,626	39,657	4,144	52,431	22,641	24,985	**143,858**	56,214
	Totals	**6,892,423**	**98,533**	**11,846**	**161,373**	**49,293**	**57,162**	**378,207**	**169,405**

Percentages

After reviewing the full dataset, a table was constructed displaying the percentages of each race for each type of data. The results are shown in **Table 2**. Since this is the sum of all reported races, each data type must sum to 100%. Reading the table from left to right, provides quick context to the data for each race. That is, it may be possible to detect anomaly in the data if a race comprises, say 40% of stops, but 60% searches. That 20-point disparity would occasion further analysis.

The formula used in this calculation is as follows:

$$\frac{n\ (data\ type)}{\Sigma\ (data\ type)} = Percentage\ of\ the\ data\ type$$

Where (n) is the number of events per race in a data type, and ∑ is the total for all races in that data type. For example, if Race X was subjected to 100 consent searches, and there was a total of 1,000 consent searches of all races, then Race X would account for 10% of consent searches.

$$\frac{100\ consent\ searches\ (Race\ X)}{1000\ consent\ searches\ (all\ races)} = 10\%$$

In **Table 2**, Hispanics account for nearly 38% of all stops, but account for only 33% of all contraband discoveries. These data will be statistically tested for significance later in this report.

Table 2—Percentages of the Whole

Percentages	Race	Stop Data	Search Data						Contraband Data
		Stops	Consent	Contraband in View	Probable Cause	Inventory	Incident to Arrest	All Searches	Contraband Hit
	Native	0.3%	0.2%	0.2%	0.1%	0.1%	0.2%	0.1%	0.2%
	Asian	2.9%	0.9%	0.9%	0.9%	1.2%	1.2%	1.0%	1.0%
	Black	16.2%	16.6%	25.9%	34.0%	18.8%	23.9%	25.7%	29.0%
	White	43.0%	42.0%	38.0%	32.4%	33.9%	31.0%	35.1%	36.7%
	Hispanic	37.6%	40.2%	35.0%	32.5%	45.9%	43.7%	38.0%	33.2%
	Totals	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Search Rates

Another examination of the data may be conducted by analyzing the search rate. These rates may be written as a percentage. The formula for this calculation is as follows:

$$\frac{n(search)}{\Sigma\,(stops)} = search\ rate$$

Where n is the number of searches for a race, and ∑ is the total number of stops for that same race. For example, if Race X was searched three times in one hundred stops, this would result in a search rate of 3%.

$$\frac{3\ searches}{100\ stops} = 3\%\ search\ rate$$

In **Table 3**, the search rate of Hispanics was 5.6% compared to the rate for Whites at 4.5%. This disparity will be statistically tested and documented later in this report.

Table 3—Search Rates

Rates	Race	Search Data					
		Consent	Contraband in View	Probable Cause	Inventory	Incident to Arrest	All Searches
	Native	0.7%	0.1%	1.1%	0.3%	0.5%	2.6%
	Asian	0.5%	0.1%	0.8%	0.3%	0.4%	1.9%
	Black	1.5%	0.3%	4.9%	0.8%	1.2%	8.7%
	White	1.4%	0.2%	1.8%	0.6%	0.6%	4.5%
	Hispanic	1.5%	0.2%	2.0%	0.9%	1.0%	5.6%

Contraband Hit Rate Analysis

An additional area of analysis centers on the rate at which contraband is discovered as a result of a search, referred to as the contraband hit rate, which was first proposed by Nobel laureate, Gary Becker (1957).[2] Under the Becker Theory, hit rates should remain relatively consistent among all races in order to indicate that peace officers are operating without racial bias. Becker suggested that the contraband hit rate of Whites should be established as the baseline and races which fall below that baseline, could be subjected to further analysis.

For example, if two races are subjected to 100 searches each, and contraband is discovered in 60 cases for Whites, but only 40 cases for Race Y, the low contraband hit rate of Race Y could be indicative of potential bias toward Race Y. That is, it may be possible that officers have less evidence to support the searches of Race Y. Conversely, the low hit rate means there are more searches that fail to produce contraband. This may be classified as a Type I error, or a false positive. Thus, a lower hit rate will be accompanied by a higher Type I error.

Table 4 displays the raw data for searches and discovery of contraband, along with the hit rates and false positive rates. It is worth noting here that contraband hit data, as reported to TCOLE, may not necessarily be binary. That is, rather than reporting whether a search resulted in contraband, which would be binary (yes or no), some agencies may have reported the volume of contraband discovered in a search. Thus, if an agency discovered two contraband items in one search, and zero on another search, they may have two contraband discoveries after conducting two searches, which gives the appearance of a hit rate of 100%. However, based on the data from the TCOLE database, the following table is the best attempt to classify the data, assuming that most of the searches were reported as binary.

As noted in this table, the Hispanic hit rate is nearly eight points lower than the White hit rate. This will be statistically tested and documented later in this report.

Table 4—Contraband Hit Rates and Type I Errors

Contraband Hit	Race	Search	Hits	No Hit	Hit Rate	False Positive Rate
	Native	567	260	307	45.9%	54.1%
	Asian	3,875	1,624	2,251	41.9%	58.1%
	Black	97,231	49,057	48,174	50.5%	49.5%
	White	132,676	62,250	70,426	46.9%	53.1%
	Hispanic	143,858	56,214	87,644	39.1%	60.9%
	Totals	**378,207**	**169,405**	**208,802**	**44.8%**	**55.2%**

Equity Index

Another method of analysis is to set the data as a relative frequency against a standard threshold. Again, as suggested by Becker, if all the frequencies of events are set against the standard of Whites, then a

[2] Gary S Becker. The economics of discrimination. University of Chicago Press, 1957

relative frequency may be calculated for each race for each data type. For purposes of this report, this relative frequency is referred to as the Equity Index. The formula for the Equity Index is as follows:

$$\frac{(Race\ X\ rate)}{(White\ rate)} = Equity\ Index$$

Thus, for example, if the search rate of Race X was 4%, and the search rate of Whites was 3%, the Equity Index for Race X with regard to searches would be 1.33 (4/3 = 1.33). This translates to mean that Race X is 1.33 times more likely than Whites to be subjected to search.

Table 5 displays the Equity Index findings.

Regarding the Equity Index table, note the following points.

1. As Whites are set as the standard, the Equity Index value for Whites is 1.00 in all data types.
2. Races which have an Equity Index of higher than 1.00 indicate a greater relative frequency than Whites. Thus, an Equity Index of 1.25 for searches of Race X, means that Race X is 1.25 times more likely than Whites to be subjected to a search.
3. Races which have an Equity Index of less than 1.00 indicates a lesser relative frequency than Whites.
4. The exception to items 2 and 3 above, is the Contraband Hit Rate column in **Table 5**. There, an Equity Index of less than 1.00 indicates a higher relative frequency than Whites.

Reading **Table 5**, Hispanics were, for example, 1.09 times more likely to be subjected to a consent search, 1.15 times more likely to be subjected to a probable cause search, and 1.61 times more likely to be subjected to a search incident to arrest. Regarding contraband hit rates, however, Hispanics were only .83 times as likely to have contraband discovered as a result of a search. As noted in the contraband hit discussion above, this significantly lower rate is a possible indication of systemic bias, even if unconscious, toward Hispanics.

Table 5—Equity Index

Equity Index	Race	Consent Rate	Contraband in View Rate	Probable Cause Rate	Inventory Rate	Incident to Arrest Rate	All Search Rate	Hit Rate
	Native	0.52	0.55	0.60	0.53	0.76	0.59	**0.98**
	Asian	0.34	0.37	0.43	0.54	0.60	0.43	**0.89**
	Black	**1.05**	**1.81**	**2.79**	**1.47**	**2.04**	**1.95**	1.08
	White	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Hispanic	**1.09**	**1.05**	**1.15**	**1.55**	**1.61**	**1.24**	**0.83**

Statistical Testing

The tables above have noted areas of concern. These areas require further analysis by way of statistical testing. The test used in this report is the X^2 (Chi Square) test for statistical significance. The formula used for the X^2 test is listed below.

$$X^2 = \sum_i \frac{(O_i - E_i)^2}{E_i}$$

Where O is the observed values, E is the expected values, and ∑ is the sum.

The results of the test produce three outcomes of interest to interpreting the data analyzed in this report.

- **X^2 (Chi Square) Test Statistic.** The X^2 test statistic is a numerical value of the relationship between variables. It is a statistical measure of the *relationship between variables.*
- **P-Value.** The p-value indicates *the statistical significance of the relationship between variables.*
- **Phi Coefficient of Association.** The phi coefficient of association indicates *the strength of the relationship between variables.* For this report, a phi value of greater than .5 is indicative of a strong relationship, a value of .3 to .5 is an indication of a mild relationship, and a value of less than .3 is an indicator of a weak relationship.

As this report is centered on analysis of Hispanic data, it is measured against the values for White data, which is used as the standard. Since there are only two variables tested at a time (White and Hispanic), the degrees of freedom is set to one (1). The test evaluates the distribution of data and calculates the differences of the distributed data (observed values) from the expected values. Once the X^2 test statistic is calculated, a p-value may be determined. For this report, the p-value for statistical significance is set at .05. Thus, any p-value greater than .05 results in acceptance of the null hypothesis, and a value of less than .05 results in a rejection of the null hypothesis. The null hypothesis for this report is that there is no evidence of racial profiling.

Testing Search Data

The first X^2 test was conducted on the overall search data. In **Table 6**, the results of the test are displayed. The p-value of .000 is below the .05 threshold, meaning the null hypothesis should be rejected, which indicates the possibility that this distribution of data *may be the result of* racial profiling. The phi coefficient returns a value of .025, which is an indicator of a weak relationship between variables.

Table 6—X^2 Test for Search Data

Race	Stops	Search	No Search	Chi Search	Chi No Search	Chi Stat	P Value	Phi
White	2,964,008	132,676	2,830,391	3207.97	168.05	3376.03	0.00000	0.025
Hispanic	2,591,626	143,858	2,448,356					
Sum	5,555,634	276,534	5,278,747					

Testing Consent Search Data

The next X^2 test was conducted on consent search data. For purposes of this test, all search data were dichotomized into either consent search or not consent search. The sum of these two binary classifications equals the total searches reported. In **Table 7,** the results of the test are displayed. The p-value of .000 is below the .05 threshold, meaning the null hypothesis should be rejected, which indicates the possibility that this distribution of data *may be the result of* racial profiling. The phi coefficient returns a value of .040, which is an indicator of a weak relationship between variables.

Table 7—X^2 Test for Consent Search Data

Race	Search	Consent	No Consent	Chi Consent	Chi Non Consent	Sum Chi	P Value	Phi
White	132,676	41,428	91,248					
Hispanic	143,858	39,657	104,201	315.00	130.68	445.69	0.00000	0.040
Sum	**276,534**	**81,085**	**195,449**					

Testing Contraband Hit Data

The next X^2 test was conducted on the contraband hit data. **Table 8** displays the results of this test. As noted earlier, not all contraband discoveries may be reported as binary (yes for discovery, no for no discovery), but based on the data from TCOLE, the following table is the best attempt to classify the data.

The results show a p-value of .000 which is below the .05 threshold, meaning the null hypothesis should be rejected, which indicates the possibility that this distribution of data *may be the result of* racial profiling. The phi coefficient returns a value of .079, which is an indicator of a weak relationship between variables.

Table 8—X^2 Test for Contraband Hit Data

Race	Search	Hit	No Hit	Chi Hit	Chi No Hit	Sum Chi	P Value	Phi
White	132,676	62,250	70,426					
Hispanic	143,858	56,214	87,644	991.01	742.71	1733.72	0.00000	0.079
Sum	**276,534**	**118,464**	**158,070**					

Statistical Summary

While each of these X^2 tests returned statistically significant p-values of .000, these are merely indicators of imbalance in the data between the variables and not necessarily de facto evidence of racial profiling. However, the test on contraband hit rates is of greatest concern. As noted in the IPAC Annual Report, it is the data on discretionary actions of peace officers which is most likely to produce evidence of racial profiling.[3] Regarding searches, although testing on all searches returned a low p-value, many of those searches may have been mandated by law or policy (for example, contraband in view, inventories, etc.), which reduces the significance of the statistical test findings.

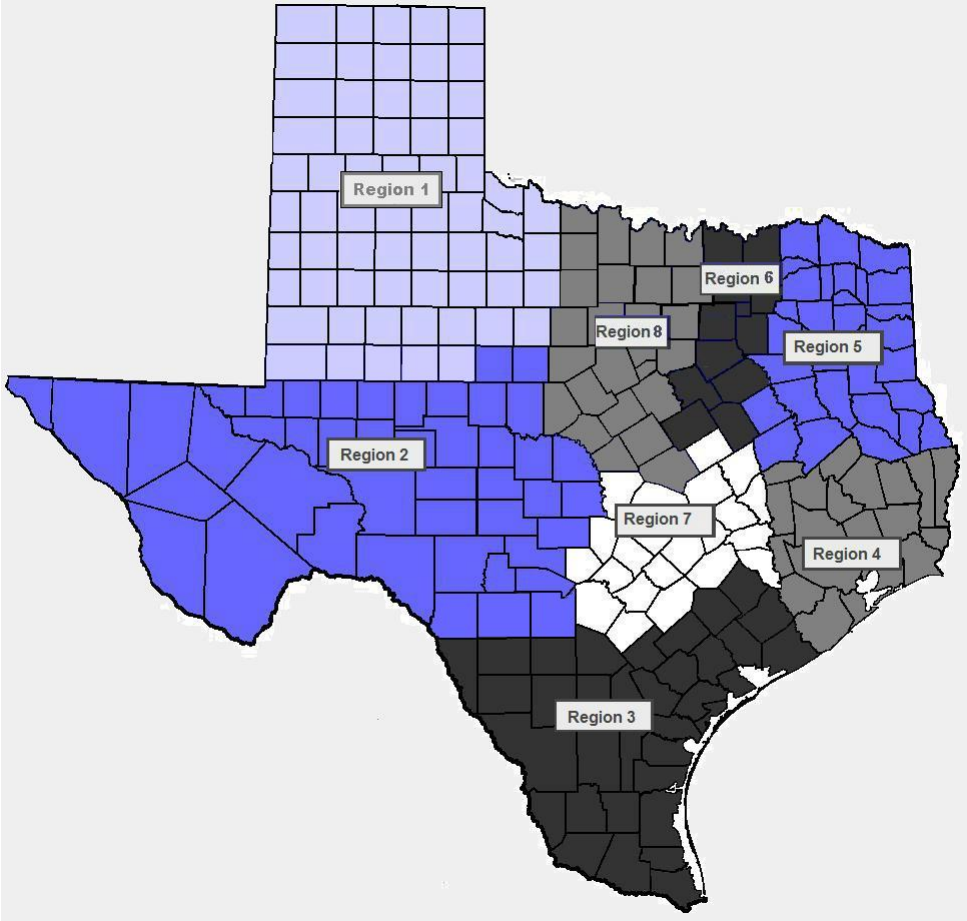
While the effects of the Sandra Bland law now require greater reporting and transparency of racial profiling data, one area that is not fully disaggregated is the relationship between consent searches and contraband discoveries. As consent searches are entirely discretionary, one highly valuable metric for analysis would be contraband discoveries that were the result of consent searches. Current racial profiling reporting disaggregates types of searches by race, and it disaggregates contraband discovery by race, but it does not disclose the type of search which produced contraband. This means researchers

[3]2021 Racial Profiling Data Analysis for the State of Texas Annual Report, IPAC. April 2022. Page21. https://web.tarleton.edu/ipac/

cannot distinguish those contraband discoveries which were the product of mandatory actions and those which were the product of discretionary actions.

Regional Analysis

As the findings at this point have indicated some possible statistical significance regarding Hispanic data, a deeper analysis of possible contributing factors was conducted. This included the analysis of statewide data disaggregated by geographic regions of the state. The Texas Commission on Law Enforcement (TCOLE) divides the state into eight regions. The map below displays the boundaries of each TCOLE region.



This regional analysis was conducted with a view toward detecting the imbalance within regions which may then be contributing to the statewide imbalance. The regional analysis is an attempt to provide further context with regard to Hispanic racial profiling data.

Regional Stop Data

Table 9 displays the full dataset of stops is disaggregated by TCOLE region. As indicated in the data below, the largest regions are Region 4 (Southeast Texas), Region 6 (North Central Texas), and Region 7

(Central Texas). The regions with the greatest proportion of Hispanic stops include Region 2 (West Texas), Region 3 (Lower Rio Grande Valley), and Region 7 (Central Texas).

Table 9—Stop Data Disaggregated by Region

Stops	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	473	666	1,343	5,144	625	4,290	5,903	3,099	**21,543**
Asian	3,730	5,006	4,334	63,149	2,848	44,701	50,478	24,910	**199,156**
Black	21,732	22,353	19,932	366,374	67,183	218,947	254,600	144,969	**1,116,090**
White	125,454	142,721	175,498	581,333	179,365	358,673	969,071	431,893	**2,964,008**
Hispanic	85,821	220,371	371,489	365,875	42,671	209,191	1,149,470	146,738	**2,591,626**
Sum	**237,210**	**391,117**	**572,596**	**1,381,875**	**292,692**	**835,802**	**2,429,522**	**751,609**	**6,892,423**

Regional Search Data

Table 10 displays the statewide search data are disaggregated by region. Four regions had higher search totals for Hispanics than Whites. The searches of Hispanics relative to those of Whites is significantly higher in Region 2 (West Texas), Region 3 (Lower Rio Grande Valley), and Region 7 (Central Texas).

Table 10—Search Data Disaggregated by Region

Searches	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	24	24	29	119	22	107	166	76	**567**
Asian	134	95	128	1,265	116	588	1,115	436	**3,877**
Black	2,341	1,960	1,450	35,915	7,157	15,358	22,715	10,335	**97,231**
White	5,225	6,373	6,790	30,147	11,837	14,537	39,037	18,730	**132,676**
Hispanic	6,043	10,883	17,335	21,900	2,529	10,818	66,811	7,539	**143,858**
Sum	**13,767**	**19,335**	**25,732**	**89,346**	**21,661**	**41,408**	**129,844**	**37,116**	**378,209**

Regional Consent Search Data

As this report is especially concerned for discretionary actions as a possible indicator or racial profiling, the consent search data were also disaggregated by region. The results are displayed in **Table 11**. Four regions had higher consent search totals for Hispanics. The consent searches of Hispanics relative to those of Whites is significantly higher in Region 2 (West Texas), Region 3 (Lower Rio Grande Valley), and Region 7 (Central Texas).

Table 11—Consent Search Data Disaggregated by Region

Consents	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	7	5	12	34	7	28	46	19	**158**
Asian	61	36	65	218	30	142	272	110	**934**
Black	508	457	338	7,111	1,963	2,191	2,426	1,362	**16,356**
White	1,690	2,491	2,725	10,000	5,474	4,696	7,951	6,401	**41,428**
Hispanic	2,098	3,302	6,471	4,404	953	2,171	18,701	1,557	**39,657**
Sum	**4,364**	**6,291**	**9,611**	**21,767**	**8,427**	**9,228**	**29,396**	**9,449**	**98,533**

Regional Contraband Hit Data

Table 12 displays the statewide contraband hit data were disaggregated by region. Consistent with the other regional tables above, three regions showed significantly more contraband hits of Hispanics relative to Whites (Region 2, Region 3, and Region 7).

Table 12—Contraband Hit Data Disaggregated by Region

Hits	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	15	11	11	49	11	47	77	39	**260**
Asian	64	39	72	513	19	253	446	218	**1,624**
Black	1,365	996	780	16,677	4,034	8,084	11,098	6,023	**49,057**
White	2,925	2,926	2,623	14,249	5,589	7,188	17,035	9,715	**62,250**
Hispanic	3,198	4,721	6,178	8,902	1,270	5,497	22,262	4,186	**56,214**
Sum	**7,567**	**8,693**	**9,664**	**40,390**	**10,923**	**21,069**	**50,918**	**20,181**	**169,405**

Regional Search Rates

After a review of the raw regional data in the tables above, the data may be converted into rates for better analysis. Using the search rate formula from **Table 3** earlier in this report, the data from all eight regions may evaluated by search rates.

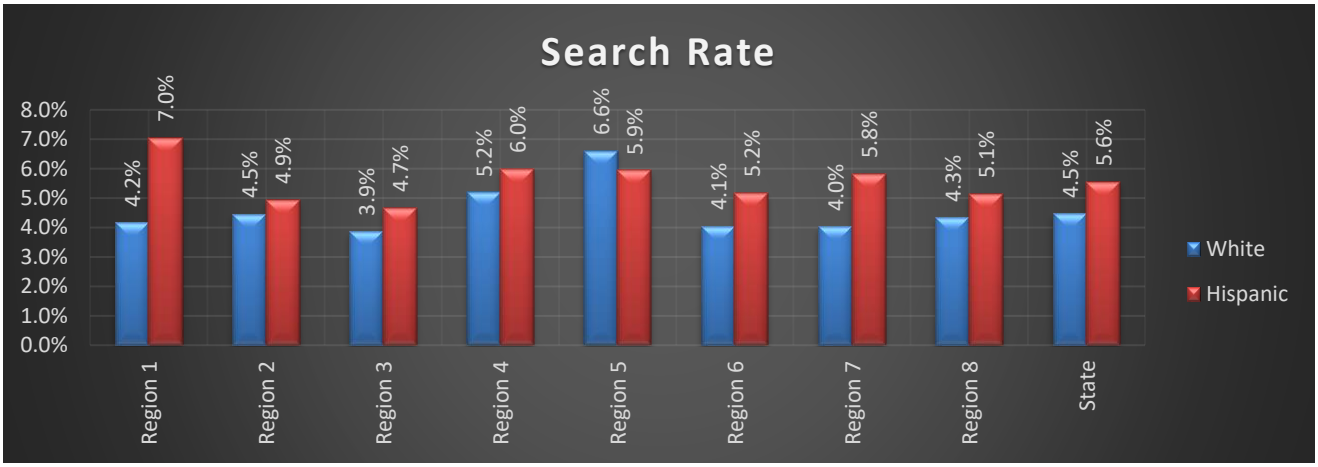
$$\frac{n(search)}{\Sigma\,(stops)} = search\ rate$$

Table 13 displays the search rates for the regional disaggregation. Region 1 and Region 7 show significantly higher search rates for Hispanics relative to Whites.

Table 13—Search Rates Disaggregated by Region

Search Rate	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	5.1%	3.6%	2.2%	2.3%	3.5%	2.5%	2.8%	2.5%	**2.6%**
Asian	3.6%	1.9%	3.0%	2.0%	4.1%	1.3%	2.2%	1.8%	**1.9%**
Black	10.8%	8.8%	7.3%	9.8%	10.7%	7.0%	8.9%	7.1%	**8.7%**
White	4.2%	4.5%	3.9%	5.2%	6.6%	4.1%	4.0%	4.3%	**4.5%**
Hispanic	7.0%	4.9%	4.7%	6.0%	5.9%	5.2%	5.8%	5.1%	**5.6%**

When the data from **Table 13** regarding Whites and Hispanics are isolated and displayed graphically, the result appears in the chart below. Only Region 5 had a lower search rate for Hispanics than Whites.



Regional Consent Search Rates

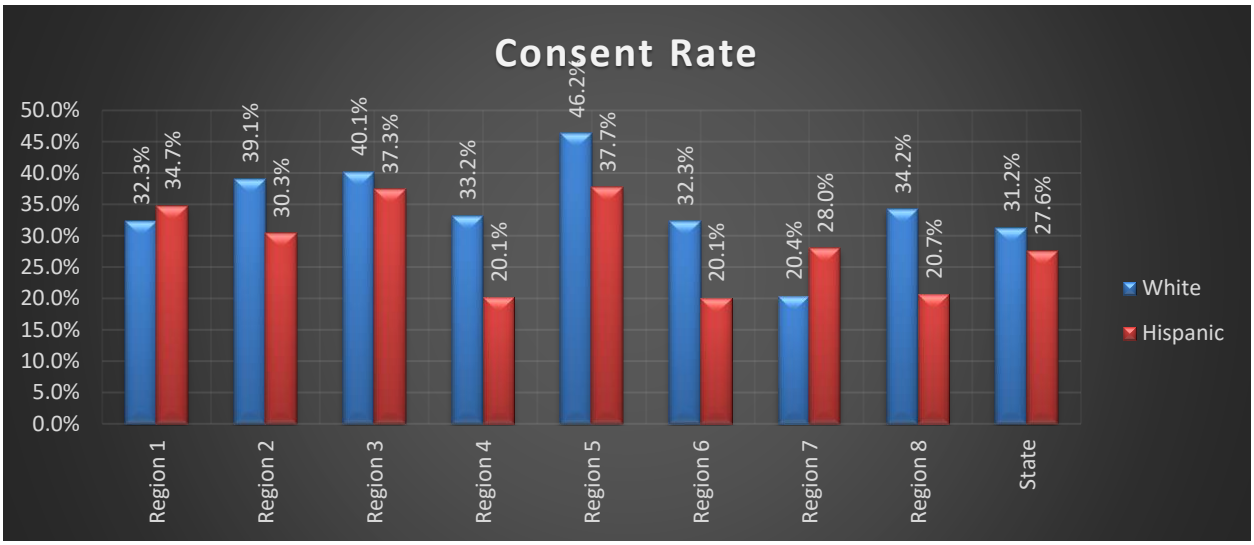
Consent searches are important to this report due to their discretionary nature. When the percentage of consent searches, relative to all searches is analyzed, the results are displayed in **Table 14**. The formula to calculate consent search rates is as follows:

$$\frac{n(consent\ searches)}{\Sigma\ (searches)} = consent\ search\ rate$$

Thus, if Race X was subjected to 100 consent searches, and 500 total searches, the consent search rate would be 20%. **Table 14** and the chart which follows, present the results of the calculations of consent search rates for each region. Only Region 1 (Panhandle Texas) and Region 7 (Central Texas) had a higher consent rate for Hispanics than Whites.

Table 14—Consent Search Rates Disaggregated by Region

Consent Rate	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	29.2%	20.8%	41.4%	28.6%	31.8%	26.2%	27.7%	25.0%	**27.9%**
Asian	45.5%	37.9%	50.8%	17.2%	25.9%	24.1%	24.4%	25.2%	**24.1%**
Black	21.7%	23.3%	23.3%	19.8%	27.4%	14.3%	10.7%	13.2%	**16.8%**
White	32.3%	39.1%	40.1%	33.2%	46.2%	32.3%	20.4%	34.2%	**31.2%**
Hispanic	34.7%	30.3%	37.3%	20.1%	37.7%	20.1%	28.0%	20.7%	**27.6%**



Regional Contraband Hit Rates

As noted earlier in this report, contraband hit rates, as a percentage of searches producing contraband discoveries (hits), can be counterintuitive in that the lower the hit rate, the greater the probability that racial profiling is a contributing factor (Becker Theory). **Table 15** displays the contraband hit rates disaggregated by region and the following chart displays the Hispanic rates relative to Whites. With the exception of Region 5, Region 6, and Region 8, all the remaining regions had lower hit rates for Hispanics relative to Whites.

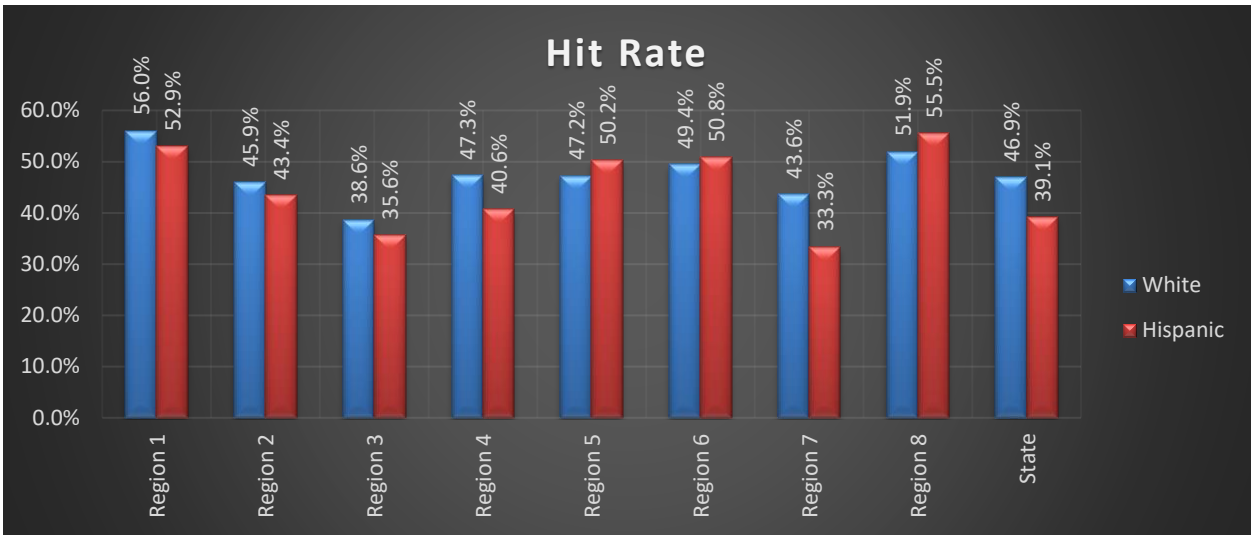
The formula for contraband hit rate is as follows:

$$\frac{n(hits)}{\Sigma\,(searches)} = contraband\ hit\ rate$$

Table 15—Contraband Hit Rates Disaggregated by Region

Hit Rate	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	62.5%	45.8%	37.9%	41.2%	50.0%	43.9%	46.4%	51.3%	**45.9%**
Asian	47.8%	41.1%	56.3%	40.6%	16.4%	43.0%	40.0%	50.0%	**41.9%**
Black	58.3%	50.8%	53.8%	46.4%	56.4%	52.6%	48.9%	58.3%	**50.5%**
White	56.0%	45.9%	38.6%	47.3%	47.2%	49.4%	43.6%	51.9%	**46.9%**
Hispanic	52.9%	43.4%	35.6%	40.6%	50.2%	50.8%	33.3%	55.5%	**39.1%**

The chart below isolates and displays the hit rates for Whites and Hispanics. Note that Region 4 had a 7-point disparity between Whites and Hispanics, and Region 7 had an 11-point disparity. The statewide 8-point disparity appears, in part, to be driven by the disparities in these two regions.



Equity Index

As noted earlier in this report, another methodology of analysis is to calculate an Equity Index. The Equity Index normalizes the data between races by setting them against a single standard. Thus, this metric helps create immediate context to the data. When the data on Whites are set to 1.00, the other races may be measured against similar actions taken with Whites.

Regional Equity Index for Search Rate

The statewide data on search rates may be disaggregated by region. The results of this disaggregation and subsequent calculation of Equity Index for each region appear in **Table 16**. With Whites set as the standard against which all other races are measured (Whites = 1.00), any frequency greater than 1 is highlighted in red font.

With the exception of Region 5, every region posted a higher Equity Index for both Blacks and Hispanics. However, it is important to keep in mind that this metric includes all searches, whether mandatory or discretionary.

Table 16—Equity Index for Search Rates Disaggregated by Region

EQ Search Rate	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	**1.22**	0.81	0.56	0.45	0.53	0.62	0.70	0.57	**0.59**
Asian	0.86	0.42	0.76	0.39	0.62	0.32	0.55	0.40	**0.43**
Black	**2.59**	**1.96**	**1.88**	**1.89**	**1.61**	**1.73**	**2.21**	**1.64**	**1.95**
White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**1.00**
Hispanic	**1.69**	**1.11**	**1.21**	**1.15**	0.90	**1.28**	**1.44**	**1.18**	**1.24**

Regional Equity Index for Consent Search Rate

The statewide data on consent search rates may be disaggregated by region. The results of this disaggregation and subsequent calculation of Equity Index for each region appear in **Table 17**. With

Whites set as the standard against which all other races are measured (Whites = 1.00), any frequency greater than 1 is highlighted in red font.

With regard to Hispanics, only Region 1 and Region 7 posted higher Equity Indexes.

Table 17—Equity Index for Consent Search Rates Disaggregated by Region

EQ Consent Rate	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	0.90	0.53	**1.03**	0.86	0.69	0.81	**1.36**	0.73	**0.89**
Asian	**1.41**	0.97	**1.27**	0.52	0.56	0.75	**1.20**	0.74	**0.77**
Black	0.67	0.60	0.58	0.60	0.59	0.44	0.52	0.39	**0.54**
White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**1.00**
Hispanic	**1.07**	0.78	0.93	0.61	0.81	0.62	**1.37**	0.60	**0.88**

Regional Equity Index for Contraband Hit Rates

The statewide data on contraband hit rates may be disaggregated by region. The results of this disaggregation and subsequent calculation of Equity Index for each region appear in **Table 18**. The contraband hit rate Equity Index functions differently than those presented in the previous two tables. That is, where the contraband hit rate for Race X is lower than Whites, this is a greater concern, as it is a possible indicator of racial profiling. With Whites set as the standard against which all other races are measured (Whites = 1.00), any frequency less than 1 is highlighted in red font below.

Table 18—Equity Index for Contraband Hit Rate Disaggregated by Region

EQ Hit Rate	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	State
Native	1.12	**1.00**	**0.98**	**0.87**	1.06	**0.89**	1.06	**0.99**	**0.98**
Asian	**0.85**	**0.89**	1.46	**0.86**	**0.35**	**0.87**	**0.92**	**0.96**	**0.89**
Black	1.04	1.11	1.39	**0.98**	1.19	1.06	1.12	1.12	**1.08**
White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**1.00**
Hispanic	**0.95**	**0.94**	**0.92**	**0.86**	1.06	1.03	**0.76**	1.07	**0.83**

Texas Department of Public Safety Analysis

After discovery of potential concerns embedded within Region 7, further analysis of that region was conducted. There are 327 reporting agencies within Region 7, with the largest being the Texas Department of Public Safety (DPS). The Texas DPS reports all their data collectively in Region 7, regardless of where the actual vehicle stop occurs. The final data analysis in this report takes the following methodological approach. The data for the entire State of Texas is dichotomized into DPS data and the data for the rest of the state. Applying this methodology may allow researchers to understand how much effect the DPS has on the entire state. This also removes the statistical problem of endogeneity.

As with the previous analysis in this report, there are four types of data that are of interest.

- Stops

- Searches
- Consent Searches
- Contraband Hits

Stop Data

After dichotomizing the data between the DPS and the remainder of the state, the raw data on stops are displayed in **Table 19.** Of note here, the DPS accounts for approximately 14% of all Black stops, 20% of all White stops, and 35% of all Hispanic stops in the state.

Table 19—DPS v. State Stop Data

Stops	DPS	State	Totals
Native	2,701	18,842	**21,543**
Asian	28,820	170,336	**199,156**
Black	161,813	954,277	**1,116,090**
White	598,926	2,365,082	**2,964,008**
Hispanic	895,635	1,695,991	**2,591,626**
Sum	**1,687,895**	**5,204,528**	**6,892,423**

Search Data

The search data were dichotomized, resulting in **Table 20**. The DPS accounts for approximately 15% of all Black searches, 19% of all White searches, and 34% of all Hispanic searches.

Table 20—DPS v. State Search Data

Searches	DPS	State	Totals
Native	110	457	**567**
Asian	759	3,118	**3,877**
Black	14,951	82,280	**97,231**
White	24,615	108,061	**132,676**
Hispanic	48,353	95,505	**143,858**
Sum	**88,788**	**289,421**	**378,209**

Consent Search Data

The consent search data was dichotomized, resulting in **Table 21**. The DPS accounts for approximately 9% of Black consent searches, 12% of all White consent searches, and 39% of all Hispanic consent searches.

Table 21—DPS v. State Consent Search Data

Consents	DPS	State	Totals
Native	35	123	**158**
Asian	194	740	**934**
Black	1,403	14,953	**16,356**
White	4,797	36,631	**41,428**
Hispanic	15,529	24,128	**39,657**
Sum	**21,958**	**76,575**	**98,533**

Contraband Hit Data

The contraband hit data were dichotomized, resulting in **Table 22**. Of all stops producing contraband the DPS accounts for approximately 14% of all Black contraband, 16% of all White contraband, and 25% of all Hispanic contraband.

Table 22—DPS v. State Contraband Hit Data

Hits	DPS	State	Totals
Native	47	213	**260**
Asian	268	1,356	**1,624**
Black	6,779	42,278	**49,057**
White	9,742	52,508	**62,250**
Hispanic	13,803	42,411	**56,214**
Sum	**30,639**	**138,766**	**169,405**

Rates

With these four datasets (stops, searches, consent searches, contraband hits), further analysis may be conducted regarding search rates, consent search rates, and contraband hit rates. **Table 23** displays the search rates for the DPS and the remainder of the state. Note the similar pattern in both the DPS and the State where Blacks had the highest search rates, followed by Hispanics. As noted earlier in this report, the general search data do not distinguish between mandatory actions and discretionary actions. Thus, while these data are of interest on their own, they are insufficient to demonstrably prove any pattern of racial profiling.

Table 23—DPS v. State Search Rates

Search Rate	DPS	State
Native	4.1%	2.4%
Asian	2.6%	1.8%
Black	9.2%	8.6%
White	4.1%	4.6%
Hispanic	5.4%	5.6%

Table 24 shows the consent search rates for the DPS and the remainder of the state. Note that consent rate is calculated as the percentage of all searches which were conducted by consent. As noted in this report, consent searches are of great interest to this research since they are entirely discretionary. As noted in this table, for the state, Whites had the highest percentage of the consent searches (33%), but Hispanics had the highest percentage of consent searches for the DPS (32%). Also note the disparity between White consent search rates (19.5%) and Hispanics (32.1%) in the DPS data. This means, when there were no other constitutional means for conducting a search, the DPS only asked for and were granted consent by 19.5% of White drivers, but they asked and were granted consent by 32.1% of Hispanic drivers.

Table 24—DPS v. State Consent Search Rates

Consent Rate	DPS	State
Native	31.8%	26.9%
Asian	25.6%	23.7%
Black	9.4%	18.2%
White	19.5%	33.9%
Hispanic	32.1%	25.3%

Table 25 displays the contraband hit rates for the DPS and the remainder of the state. As noted in the Becker Theory cited earlier, in order to be confident that no racial profiling is occurring, contraband hit rates (the portion of searches that produce contraband), should remain relatively equal across races. In the state column below, the hit rate of Blacks is 51.2%, Whites 48.2%, and Hispanics at 44.7%. Using Whites as the standard, Hispanics were slightly lower, by 3.5%. In the DPS column, the hit rate of Blacks is 45.3%, Whites 39.6%, and Hispanics at 28.5%. The disparity between Whites, set as the standard, and Hispanics at 11% less than the White rate, is concerning. The 28.5% discovery rate for Hispanics may also be stated as a false positive rate (Type I error) of 71.5%. This means that when DPS officers searched Hispanics, they were wrong (no contraband discovered) over 71% of the time.

Table 25—DPS v. State Contraband Hit Rate Data

Hit Rate	DPS	State
Native	42.7%	46.6%
Asian	35.3%	43.5%
Black	45.3%	51.4%
White	39.6%	48.6%
Hispanic	28.5%	44.4%

Department of Public Safety Summary

When the DPS data are reviewed collectively, a narrative begins to emerge which includes these points.

- DPS searched Hispanics at a higher rate than Whites.
- DPS conducted a significantly greater portion of consent searches on Hispanics relative to Whites.
- DPS had a significantly lower contraband hit rate with Hispanics relative to Whites.

These points lead researches to consider the possibility that these figures may be the result of racial profiling which occurred among the Texas Department of Public Safety. The findings in this report are concerning, given recent investigative report findings published regarding DPS on this matter.[4] Together, these findings may indicate that the DPS has not made appropriate organizational course corrections through policy, training, and analysis of their own data.

In order to definitively conclude that racial profiling is the driver of the disparity in the DPS data, researchers would need access to officer-level data and/or the ability to parse the DPS data further into the regional DPS stations situated across the state, rather than the aggregate DPS data. However, the aggregate findings of this report do suggest a reasonable probability that racial profiling is a significant contributor to the disparity in their data.

Statewide Summary of Findings

After an analysis of statewide data indicated that Hispanics were searched at a higher rate than Whites, and that these searches produced a lower contraband hit rate, further analysis was conducted across the eight (8) TCOLE regions. A summary of the findings is listed below.

1. Although more Whites than Hispanics were stopped statewide (Table 1), Hispanics were searched at a higher rate of 5.6% v. Whites at 4.5% (Table 3).
2. Hispanics were subjected to consent searches at nearly the identical rate of Whites (Table 2).
3. Hispanics had a lower contraband hit rate at 39.1% than Whites at 46.9% (Table 4). Conversely, this translated to a higher Type I error, or false positive, rate for Hispanics (60.9%) than Whites (53.1%).
4. X^2 testing for search data (Table 6), consent search data (Table 7), and contraband hit data (Table 8) all returned statistically significant p-values.
5. Regional disaggregation of data showed Hispanics were searched at a higher rate than Whites in every region except Region 5 (Table 13), with significant disparities in Region 1 and Region 7.
6. Regional disaggregation of data showed Hispanics were subjected to consent searches at a lower rate than Whites in every region except Region 7 (Table 14).
7. Regional disaggregation of data showed searches produced a lower contraband hit rate for Hispanics as compared to Whites in five (5) of the eight (8) TCOLE regions. Two regions (Region 4 and Region 7) had significant disparities (Table 15).
8. Regional disaggregation of data for Equity Index calculations of consent searches showed Hispanics are 1.37 times more likely than Whites to be subjected to a discretionary search (Table 17).
9. Regional disaggregation of data for Equity Index calculation of contraband hit rates showed Hispanic searches were less likely to produce contraband in five regions (Table 18). Region 7 shows that Hispanics are only .76 times as likely as Whites to have a contraband hit.
10. With DPS accounting for more than a third of all Hispanic stops, searches, and consent searches, some of the findings related to the state, must be attributed to the DPS.

[4] Hall, Katie. "Study: DPS Stops Not Based on Race." Austin American Statesman, Dec. 17, 2018, Study: DPS stops not based on race (statesman.com). June 1, 2022.

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