California: Deaths in Custody from 2010-2019

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Project Description

Rocky race relations and maltreatment of racial minorities are ingrained in the historical foundation of the United States. Although legislations have been passed in an attempt to counteract racial and ethnic discrimination (e.g., *United States v. Montgomery County Board of Education*)—and despite the shifts in cultural and social attitudes towards minority groups in America overtime—discrimination towards racial and ethnic minorities continues to permeate throughout multiple areas of American society today. The legal system is no exception.

Police officers are expected to aid civilians and uphold *peace* in the community (quite literally, police officers are legally categorized as "peace officers" in California).[1] However, within the past years, prompted by police brutality and unjust killings of black Americans, the relationship between civilians and police officers in the United States has resulted in mistrust and fear.

Our research project seeks to explore the current state of the American justice system, specifically the deaths that occurred while an individual is in custody within the state of California from 2010-2019. Here are our research questions:

1. **Does an individual's race/ethnicity affect their likelihood of dying in custody?**
2. **If an individual's race/ethnicity does affect their likelihood of dying in custody, then which races are more susceptible to dying in custody?**

Significance

In light of 2020's summer protests against police brutality across the nation, now more than ever, it is extremely important to study the effects of law enforcement and examine which groups of people they are adversely affecting the most. Our project can possibly help us pinpoint if there are issues of inequality—and where these issues arise—within the American justice system.

Our research can help readers become more informed about the current state of the American justice system. In addition, through being informed, we hope that readers can empathize with the racial groups who are receiving unequal treatment in the justice system. Ultimately, we hope that this project can urge and motivate readers to champion for social and legislative changes that addresses issues of inequality.

Audience

Broadly speaking, our audience is anyone who considers the United States their "home". In order to consider a place as one's "home" one has to interact with it in a specific manner (e.g., having familial or platonic ties here, spending the the majority of one's life here, reaping the benefits of the U.S. government, etc.). Issues related to the U.S. justice system affects *everyone* who considers the U.S. their home. Therefore, those who do consider the U.S. their home should care about the current legislative state of affairs.

Furthermore, we imagine coalition and social groups will attempt to make use of this project to further support the issue of policing against marginalized groups. This project addresses the needs of marginalized groups to aid them in their fight. Over the years, there has been constant backlash against over policing, police brutality, and unlawful police practices. Questions that this project answers are some that further support social movements like BLM.

Technical Specifications

We used a variety of tools to work with our data in order to create tables and solve statistical calculations: Excel, R, and Tableau.

We used Excel for cleaning, filter, and sorting our dataset. We also used Excel to construct our outcome and contingency tables and conduct our ANOVA and Least Significant Difference Test.

We used Excel to clean our dataset because we've used Excel to clean our data in the past and we felt comfortable using it for that purpose. The same applies to why we used Excel to construct our outcome and contingency tables. We chose to conduct our ANOVA test on Excel instead of R because we could not compare more than two groups at once on R. This setback would be time-consuming and it was extremely easy using Excel for the ANOVA test. Because we performed our ANOVA test on Excel, we also performed our Least Significant Difference Test on Excel as well because that test relies on data from the ANOVA test and it was more convenient to have both tests in one place.

We used R to solve statistical calculations like the 5 number summary and z-test. This software had intuitive methods that made it simple to work with the data. Since we learned about which commands to use, it was easier running that command in R to get the statistical results instead of searching for the formulas on Excel.

We initially created some visualizations, such as a box plot, in R but came to the agreement that Tableau creates more appealing and interactive graphs for the reader. Therefore, all of our data visualizations were created on Tableau.

Since we are documenting our project on Notion, there isn't a way for us to directly embed our Tableau data visualizations on this page. Because of that, we have to use a third-party tool, CodePen.io, to embed our visualizations.

Data Selection

Our dataset is titled, "Death in Custody & Arrest-Related Deaths" and we retrieved it from OpenJustice.[2] OpenJustice is a data-driven project that is part of California's Department of Justice. OpenJustice seeks to strengthen the trust between law enforcement and civilians through transparency, government accountability, and improving public policy in the criminal justice system.

We cleaned our dataset using Excel. The original dataset ranges from the years 2005-2020, and consists of various variables such as, an individual's race, gender, age, year of death, manner of death, county where the death occurred, etc. For our project, we focused on the years 2010-2019 because (1) the original dataset is too large (2005-2020 contains 11618 rows, while 2010-2019 contains 7311 rows) and (2) since we adjusted the deaths of a given race to the rate of per 100,000, we had to use California census records and data from the most recent census (i.e., 2020) has not been released yet.

Additionally, we omitted the races Cambodian, Laotian, Other, and Other Asian because the census records we used do not contain data for those racial categories; hence, we were unable to convert the deaths of those races to the rate of per 100,000.

5 Number Summary

For our 5 number summary, we first aggregated the cumulative count of deaths for each given race from 2010-2019 [Figure 1].

Race and Cummulative Count of Deaths

Race	Count of Deaths (2010-2019)
American Indian	73
Asian Indian	24
Black	1536
Chinese	15
Filipino	46
Guamanian	1
Hawaiian	1
Hispanic	2314
Japanese	5
Korean	12
Pacific Islander	19
Samoan	3
Vietnamese	29
White	2995

Figure 1

Afterwards, we used data from the United States Census Bureau, specifically the "American Community Survey Demographic and Housing Estimates"[3] to get the racial demographic population count in California from 2010-2019. We calculated the average racial demographic population count from 2010-2019 through adding up demographic population count from each individual year and dividing the final sum by 10 [Figure 2].

Race, Cummulative Count of Deaths, and Average Population Count in California from 2010-2019

Race	Count of Deaths (2010-2019)	Population Count 2010-2019 avg
American Indian	73	293,902
Asian Indian	24	678,214
Black	1536	2,266,179
Chinese	15	1,449,514
Filipino	46	1,245,908
Guamanian	1	24,148
Hawaiian	1	23,546
Hispanic	2314	14,877,081
Japanese	5	272,088
Korean	12	463,491
Pacific Islander	19	61,888
Samoan	3	40,479
Vietnamese	29	636,458
White	2995	23,525,475

Figure 2

Afterwards, we converted the count of deaths from the original dataset into the rate of per 100,000 in order to take into account how the racial demographic distribution in California is unequally distributed [Figure 3]. We used this formula to calculate that:

$$100,000 * (\frac{countofdeaths2010-2019}{populationcount2010-2019avg})$$

Race, Cumulative Count of Deaths, Average Population Count in California from 2010-2019, and Per 100,000 Rate

Race	Count of Deaths (2010-2019)	Population Count 2010-2019 avg	PER 100,000
American Indian	73	293,902	24.838
Asian Indian	24	678,214	3.539
Black	1536	2,266,179	67.779
Chinese	15	1,449,514	1.035
Filipino	46	1,245,908	3.692
Guamanian	1	24,148	4.141
Hawaiian	1	23,546	4.247
Hispanic	2314	14,877,081	15.554
Japanese	5	272,088	1.838
Korean	12	463,491	2.589
Pacific Islander	19	61,888	30.701
Samoan	3	40,479	7.411
Vietnamese	29	636,458	4.556
White	2995	23,525,475	12.731

Figure 3

We then used the per 100,000 data to construct our 5 number summary, variance, and standard deviation on R [Figure 4].

Results of 5 Number Summary, Variance, and Standard Deviation in R

```
> summary(race$`PER 100,000`)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  1.035   3.577   4.402  13.189  14.848  67.779
> var(race$`PER 100,000`)
[1] 328.4805
> sd(race$`PER 100,000`)
[1] 18.12403
```

Figure 4. The results of the 5 number summary, variance, and standard deviation ran on R.

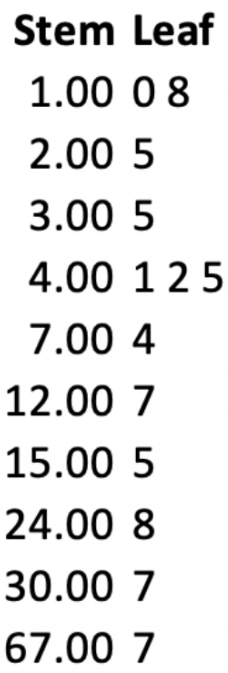
Here are our results:

The mean is 13.189. This means that on average, about 13 out of 100,000 individuals in California have died in custody from 2010-2019.

The median is 4.402. Since the mean is higher than the median, our graph is skewed to the right. This skewness is possibly due to how many Black (roughly 67) and Pacific Islander (roughly 30) individuals died in custody.

We do not have a mode. But if we were to convert our data from decimals into whole numbers, the mode would be 4 (represented by Filipino, Guamanian, and Vietnamese individuals) [Figure 5]. We constructed a steam and leaf plot on Excel in order to find the mode.

Steam and Leaf Plot: Mode of Per 100,000 Deaths in Custody (2010-2019)



Stem	Leaf
1.00	0 8
2.00	5
3.00	5
4.00	1 2 5
7.00	4
12.00	7
15.00	5
24.00	8
30.00	7
67.00	7

Figure 5

Our minimum is 1.035 (roughly 1); the race that has the least number of deaths in custody is Chinese.

Our maximum is 67.779 (roughly 67); the race that has the highest number of deaths in custody are Black individuals.

We created a box plot on Tableau to visualize our findings. Based on this visualization, Black is the only race that is not on the box plot. White is the closest to the mean. Races that are not located around the median are more spread out than the races that are located around there.

https://codepen.io/yvonne-nguyen/pen/RwLPQOr

This embedded Tableau box plot may be greyed out or it might still be loading. If it is loading, please click on the white space above and the box plot will appear. If it is greyed out, please click on the button "Run Pen" and then the box plot will appear. We constructed this box plot on Tableau using the "Per 100,000" data rounded to whole numbers.

The variance is 328.4805 and the standard deviation is 18.12403. The variance reflects how spread out the variables are relative to the mean. Factors that could affect the variance are outliers. We can calculate for lower and higher outliers through these two formulas:

$$Q1 - (1.5 * IQR)$$

$$Q3 + (1.5 * IQR)$$

Based on our 5 number summary, Q1 is 3.577 and Q3 is 14.848. In order to calculate IQR (inter quartile range), we use this formula:

$$IQR = Q3 - Q1$$

Our IQR is 11.271:

$$14.848 - 3.577$$

Here is the calculation for the lower outlier:

$$3.577 - (1.5 * 11.271) = -13.3295$$

Based on this result, we do not have a lower outlier.

Here is the calculation for the higher outlier:

$$14.848 + (1.5 * 11.271) = 31.7545$$

This result indicates that we have two higher outliers: Pacific Islanders (30.701) and Black (67.779).

ANOVA Test

For this one-way ANOVA test, we are testing for the differences among the mean rates of dying in custody for different races. We chose to conduct a one-way ANOVA instead of a two-way ANOVA test because we are only analyzing one independent variable: Race.

We first constructed a contingency table for this test. The contingency table has each individual race in the columns and the years (i.e., 2010-2019) are in the rows [Figure 6]. In order to construct this contingency table, we filtered the original dataset by race and year to get the number of how many individuals of a given died in each specific year. Afterwards, we converted that number to the rate of per 100,000 using California census records.[3]

Contingency Table: Count of Death for Each Race, Adjusted to a Rate of Per 100,000 from 2010-2019

	AmericanIndian	AsianIndian	Black	Chinese	Filipino	Guamanian	Hawaiian	Hispanic	Japanese	Korean	PacificIslander	Samoan	Vietnamese	White	Total
2010	2.457	0.194	8.058	0.078	0.338	0	0	1.398	0	0.214	1.857	2.357	0.166	1.286	**18.403**
2011	5.525	0	7.454	0.154	0.254	0	0	1.302	0.368	0	1.674	0	0.655	1.224	**18.61**
2012	3.855	0.171	6.67	0	0.409	0	0	1.479	0	0.426	3.083	2.762	0.64	1.261	**20.756**
2013	0.718	0.032	6.611	0.147	0.491	0	0	1.787	0	0.433	3.367	0	0.314	1.255	**15.155**
2014	1.047	0.585	5.974	0.141	0.467	0	0	1.428	0	0.209	3.585	0	1.101	1.264	**15.801**
2015	2.829	0.276	7.158	0.067	0.229	3.856	0	1.646	0	0.425	3.247	0	0.323	1.284	**21.34**
2016	1.723	0.662	6.092	0.13	0.559	0	0	1.453	0.372	0	4.739	0	0.149	1.225	**17.104**
2017	0.956	0.253	6.03	0	0.154	0	0	1.544	0.368	0.21	1.45	0	0.45	1.371	**12.786**
2018	2.642	0.735	6.918	0.185	0.538	0	4.496	1.789	0	0.213	4.9	0	0.297	1.245	**23.958**
2019	3.114	0.122	6.792	0.123	0.226	0	0	1.599	0.397	0.642	2.909	2.744	0.441	1.294	**20.403**
Total	**24.866**	**3.03**	**67.757**	**1.025**	**3.665**	**3.856**	**4.496**	**15.425**	**1.505**	**2.772**	**30.811**	**7.863**	**4.536**	**12.709**	**184.318**

Figure 6

https://codepen.io/yvonne-nguyen/full/dyVGYxp

This embedded Tableau line graph may be greyed out or it might still be loading. If it is loading, please click on the white space above and the line graph will appear. If it is greyed out, please click on the button "Run Pen" and then the line graph will appear. Due to Notion's formatting, a part of our title, ", White" got cut out. This line graph was created using the data from the contingency table. We constructed this line graph on Tableau and we used the results of the 5 number summary to choose which races/ethnicities to include.

We created this line graph on Tableau to accompany the contingency table we created for the ANOVA test. We did not include every race because it looks very cluttered. In the end, we decided on these races. We made our decision based on the results of our 5 number summary. We chose Black because that is the race with the highest death rate and we chose Chinese because that is the ethnicity with the lowest death rate. We chose Guamanian because that is the closest ethnicity to the median. We chose White because that is the closest race to the mean. We chose Asian Indian and Hispanic because those races are closest to the first and third quartiles, respectively.

We initially attempted to do our ANOVA test in R, but we could only input two groups at a time. This was problematic because we have too many groups. Therefore, we ended up using Excel to conduct our ANOVA test through using the “Data Analysis” tool.

This test aims at answering our first research question: does one’s race affect one’s likelihood of dying in custody? Here are our hypotheses:

💡 H_0 = one’s race does not affect one’s likelihood of dying in custody

💡 H_a = one’s race does affect one’s likelihood of dying in custody

Here is our alpha value:

💡 $\alpha = 0.01$

After running our ANOVA test, our P-value ended up being 8.5252E-43 [Figure 7]. Our P-value is smaller than our alpha value; therefore, we can reject our null hypothesis. This indicates that there is a statistically significant chance that one’s race does affect one’s likelihood of dying in custody.

ANOVA Test Results

	A	B	C	D	E	F	G
1	Anova: Single Factor						
2							
3	SUMMARY						
4	*Groups*	*Count*	*Sum*	*Average*	*Variance*		
5	AmericanIndia	10	24.866	2.4866	2.19627804		
6	AsianIndian	10	3.03	0.303	0.06950822		
7	Black	10	67.757	6.7757	0.44173201		
8	Chinese	10	1.025	0.1025	0.00410783		
9	Filipino	10	3.665	0.3665	0.0212385		
10	Guamanian	10	3.856	0.3856	1.4868736		
11	Hawaiian	10	4.496	0.4496	2.0214016		
12	Hispanic	10	15.425	1.5425	0.02648028		
13	Japanese	10	1.505	0.1505	0.03781539		
14	Korean	10	2.772	0.2772	0.04136684		
15	PacificIslande	10	30.811	3.0811	1.39874077		
16	Samoan	10	7.863	0.7863	1.61455023		
17	Vietnamese	10	4.536	0.4536	0.08124093		
18	White	10	12.709	1.2709	0.00181432		
19							
20							
21	ANOVA						
22	*urce of Variati*	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
23	Between Grou	428.259448	13	32.9430344	48.8399053	8.5252E-43	2.27439745
24	Within Groups	84.9883372	126	0.67451061			
25							
26	Total	513.247785	139				
27							

Figure 7

Least Significant Difference Test

Although the ANOVA test tells us if there's a difference between the means of the groups we're comparing, it does not tell us which specific groups are different from each other. In order to find this out, we need to perform a post hoc test. The specific post hoc test we're using is the Least Significant Difference (LSD) Test.

We first need to calculate the LSD. We used this formula:

$$LSD = t_{0.01,DF_w} * \sqrt{MS_w(1/n_1 + 1/n_1)}$$

First, we need to find the t-critical value. In order to do this, we used the T.INV.2T function on Excel. We plugged in our alpha value (0.01) and the degrees of freedom from the within groups from the ANOVA test (126). The t-critical value is 2.615.

The mean squares within groups from the ANOVA test is 0.6745.

The sample size of all the groups is 10. However, since we are performing a two-tailed analysis, we used 1/5 instead of 1/10.

Afterwards, we plugged all of the numbers into the formula, and ended up with an LSD of 0.96:

$$2.615 * \sqrt{0.6745(1/5)} = 0.96$$

Afterwards, we used Excel to calculate the mean difference between each group. We used the formula:

$$|meanofgroup1 - meanofgroup2|$$

If the difference is higher than the LSD, this signifies that there's a significant difference between the two groups. We highlighted that number [Figure 7]. For example, there is a significant difference between the rate of dying in custody between Black and American Indian individuals. Overall, there is a significant difference between Black and every other race, followed by Pacific Islander, American Indian, and Hispanic, respectively.

Least Significant Difference Test Results

	AmerInd	AsnInd	Black	Chinese	Filipino	Guanamanian	Hawaiian	Hispanic	Japanese	Korean	Pacific Islander	Samoan	Vietnamese	White
AmericanIndian	0	2.1836	4.2891	2.3841	2.1201	2.101	2.037	0.9441	2.3361	2.2094	0.5945	1.7003	2.033	1.2157
AsianIndian	2.1836	0	6.4727	0.2005	0.0635	0.0826	0.1466	1.2395	0.1525	0.0258	2.7781	0.4833	0.1506	0.9679
Black	4.2891	6.4727	0	6.6732	6.4092	6.3901	6.3261	5.2332	6.6252	6.4985	3.6946	5.9894	6.3221	5.5048
Chinese	2.3841	0.2005	6.6732	0	0.264	0.2831	0.3471	1.44	0.048	0.1747	2.9786	0.6838	0.3511	1.1684
Filipino	2.1201	0.0635	6.4092	0.264	0	0.0191	0.0831	1.176	0.216	0.0893	2.7146	0.4198	0.0871	0.9044
Guamanian	2.101	0.0826	6.3901	0.2831	0.0191	0	0.064	1.1569	0.2351	0.1084	2.6955	0.4007	0.068	0.8853
Hawaiian	2.037	0.1466	6.3261	0.3471	0.0831	0.064	0	1.0929	0.2991	0.1724	2.6315	0.3367	0.004	0.8213
Hispanic	0.9441	1.2395	5.2332	1.44	1.176	1.1569	1.0929	0	1.392	1.2653	1.5386	0.7562	1.0889	0.2716
Japanese	2.3361	0.1525	6.6252	0.048	0.216	0.2351	0.2991	1.392	0	0.1267	2.9306	0.6358	0.3031	1.1204
Korean	2.2094	0.0258	6.4985	0.1747	0.0893	0.1084	0.1724	1.2653	0.1267	0	2.8039	0.5091	0.1764	0.9937
PacificIslander	0.5945	2.7781	3.6946	2.9786	2.7146	2.6955	2.6315	1.5386	2.9306	2.8039	0	2.2948	2.6275	1.8102
Samoan	1.7003	0.4833	5.9894	0.6838	0.4198	0.4007	0.3367	0.7562	0.6358	0.5091	2.2948	0	0.3327	0.4846
Vietnamese	2.033	0.1506	6.3221	0.3511	0.0871	0.068	0.004	1.0889	0.3031	0.1764	2.6275	0.3327	0	0.8173
White	1.2157	0.9679	5.5048	1.1684	0.9044	0.8853	0.8213	0.2716	1.1204	0.9937	1.8102	0.4846	0.8173	0

Figure 7

https://codepen.io/yvonne-nguyen/full/Bawjvqq

This embedded Tableau tree map may be greyed out or it might still be loading. If it is loading, please click on the white space above and the tree map will appear. If it is greyed out, please click on the button "Run Pen" and then the tree map will appear. We constructed this tree map on Tableau using the total count of differences among race from our LSD test.

Findings

Based on our 5 Number Summary, we found that on average, approximately 13 out of every 100,000 individuals in the State of California have died in custody from 2010-2019. There are two outliers: Pacific Islander and Black. From 2010-2019, approximately 30 out of every 100,000 Pacific Islander individuals in the State of California have died in custody. Additionally, approximately 67 out of every 100,000 Black individuals in the State of California have died in custody from 2010-2019. **Black individuals have a higher chance of dying in custody than any other race. Black individuals are also two times more likely to die in custody than the next most likely race to die in custody (i.e., Pacific Islander).**

The ANOVA test answers our research question: does one's race affect one's likelihood of dying in custody? **Based on our results, there is a statistically significant chance that one's race does affect one's likelihood of dying in custody.**

The Least Significant Difference Test shows us if there is a statistically significant difference between two given groups. Based on the results of our test, there is a statistically significant difference that **Black individuals are more likely to die in custody than any other race, followed by Pacific Islander, American Indian, and Hispanic individuals, respectively.**

In theory, all Americans are considered "equal" under the legislative system. This striving for equality is expressed through the implementation of Due Process and the Equal Protection Clause in the Constitution. However, our findings indicate otherwise. This issue is pressing because it highlights how flawed the U.S. criminal justice system is. Additionally, the issue of racial discrimination does not end once the prisoner leaves the prison. Being a "criminal" only exacerbates being discriminated against.

In *The New Jim Crow: Mass Incarceration in the Age of Colorblindness*, legal scholar Michelle Alexander proposes that the criminal U.S. justice system functions as a form of racial control.[4] This has resulted in the justice system labeling Black Americans as felons and criminals, and denying them of basic rights and opportunities that would allow them to become law-abiding citizens. Alexander states:

> In the era of colorblindness, it is no longer socially permissible to use race, explicitly, as a justification for discrimination, exclusion, and social contempt. So we don't. Rather than rely on race, we use our criminal justice system to label people of color "criminals" and then engage in all the practices we supposedly left behind. Today it is perfectly legal to discriminate against criminals in nearly all the ways that it was once legal to discriminate against African Americans. Once you're labeled a felon, the old forms of discrimination—employment discrimination, housing discrimination, denial of the right to vote, denial of educational opportunity, denial of food stamps and other public benefits, and exclusion from jury service—are suddenly legal. As a criminal, you have scarcely more rights, and arguably less respect, than a black man living in Alabama at the height of Jim Crow. We have not ended racial caste in America; we have merely redesigned it.[4]

Based on our research, the issue of racial discrimination in the criminal U.S. justice system does not only result in fatal consequences, but it can also prove to be detrimental to one's livelihood once one leaves the prison.

Conclusion

Policing has always been a topic of concern and the media has attempted to dilute the issue, but our research has further exposed the issue. While policing affects many groups in California, the group most affected is the Black community and their struggles continue against police violence. Black individuals are two times more likely to die in custody than any other race.

Although the data exposes evidence of police violence against the Black community and other minority groups, our research did not uncover everything. Further research can examine the types of crimes individuals are arrested for before they die while in custody. As well as exploring the way individuals die while in custody. Our data set has a lot to offer in terms of qualitative data but made it difficult to run statistical tests due to the lack of quantitative data.

Nevertheless, this research supports the racial bias that lies within the legal system and should be heavily considered when looking toward police reform and structural reform as a whole.

To conclude, we would like to make an appeal to action. The cycle of racial inequality and discrimination will continue to persist unless we advocate for change. Yes, the criminal U.S. justice system is at fault, but we, you, the reader, and every U.S. citizen has played a role too. We have to advocate for change. We have to stay informed. We have to have empathy

for the struggles that others are facing. Does it matter if these struggles do not affect us personally? In our opinion, no. We owe it to each other, out of respect for the dignity of other *human beings*, to care about each other.

To end, we would like to mention the work of Immanuel Kant. In *Groundwork of the Metaphysic of Morals*, philosopher Immanuel Kant presents the radical Formula for Humanity.[5] Kant supposes that we should never treat humanity (wether it is in ourself or in others) as a means, but we should always treat it as an ends. Taking this into consideration, we should not treat minority groups as a means for championing what we believe is the correct path the criminal U.S. justice system ought to take. Championing for minority groups is the end itself.

Resources

1. “California Legislative Information”. *leginfo.legislature.ca.gov*, 1968.
2. “Death In Custody & Arrested-Related Deaths”. *Open Justice*, 2021.
3. “Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2019”. United States Census Bureau. 2010-2019, Accessed 21 Sept. 2021.
4. Alexander, Michelle. *The New Jim Crow: Mass Incarceration in the Age of Colorblindness*. *New York, The New Press*, 2010.
5. Kant, Immanuel. *Groundwork for the Metaphysics of Morals*. *Oxford University Press*, 2019.