COVID-19 Unemployment Rate EDA

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I. INTRODUCTION

The COVID-19 pandemic has had a drastic impact on the employment rate for the USA and globally. We will be analyzing US/Global unemployment rate. The COVID-19 pandemic has had a major effect on the labor market, the economic sector, and major demographics groups. This report utilizes multiple data visualizations for exploratory analysis and various data sets. The overall goal of the report is to visualize the data attributes and seek potential relationships of the data attributes of the unemployment rates. We will try to answer the following questions: What are the unemployment rates globally from 2020 to 2021 for various countries? What is unemployment rate in USA between the years of 2005 to 2021? How was the race and gender of the unemployment rate impacted by COVID-19? This will cover several analyses in the sections below. We will also take a look at some statistical data to discover to reasons as to why certain trends are noticed.

II. DATA DESCRIPTION

As described in Section I above, the dataset we are using is an Exploratory Data Analysis (EDA) to get insights from unemployment rate and how covid has impacted it. This report will first examine the trends nationally (US) and then globally. For this report, it was difficult to find dataset that contained all the attributes needed for visualizations. Therefore, we found separate datasets that were best for our use cases and generate visuals based on those separate datasets. For the given visualization below from figures 1 to 4 were generate in python using the matplotlib and seaborn libraries. We have also attached the python code with the submission of the report. There were 6 different dataset we used to generate these graphs. Each dataset had different amounts of instances and features, so it is difficult to list them here therefore, we have extracted and listed the main attributes from each file into the data attributes table below.

TABLE I.   DATA ATTRIBUTES

Attribute	Type	Example Value	Description
Date	Date	2/8/2016	Date with MM/DD/YYYY format
USA Unemployment Rate	Numeric	3.4	unemployment rate for given date of month
Race	Cateogrical	White	Race of individual
Men	Numeric	3.3	Value of unemployed men for given date
Women	Numeric	3.5	Value of unemployed women for given date
Country	Categorical	Algeria	Country of unemployment rate
Global Unemployemnt Rate	Numeric	3.5	Percent of global unemployment

III. METHODOLOGY AND RESULTS

The purpose of this analysis is to analyze the unemployment rate of the US and international population to see how COVID-19 caused an increase or a decreased the rate. We will also be analyzing how unemployment rate for genders and race were affected by COVID-19. We will be looking from 2005 to 2021 to see if there were any noticeable differences for these populations. We will be generating 4 visualizations through using python and 2 visualizations created in Tableau.
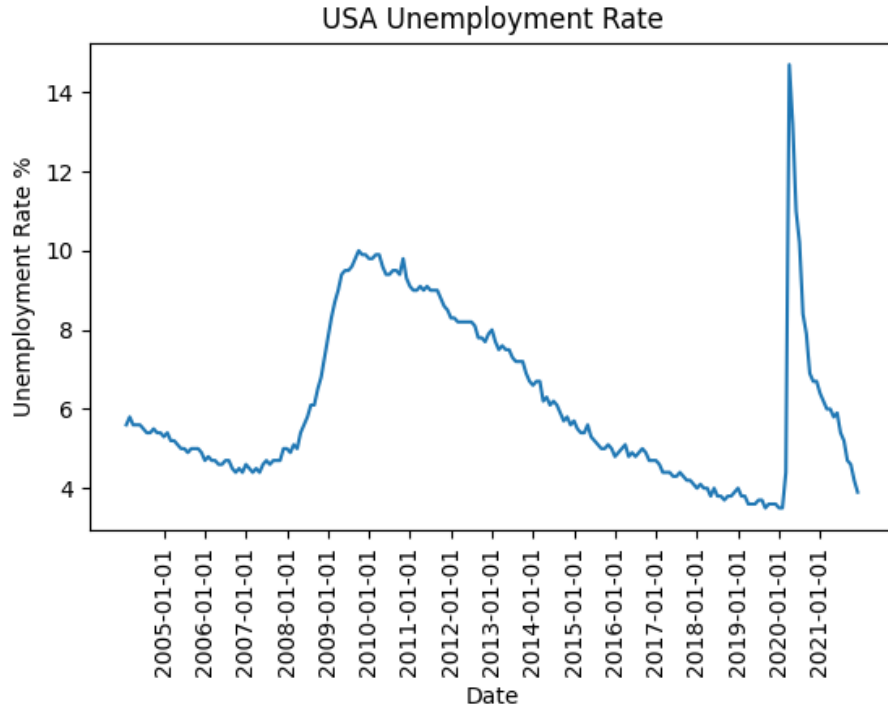
Fig. 1 Unemployment Rate of USA

Fig. 1 describes the unemployment rate of the United States from 2005 to 2021. [1] We can see that the first rise in the unemployment rate of these ranges happened in 2010. It appeared to be an exponential increase that gradually decreased until 2021. This is likely due to the economic troubles the USA had in 2010. However, in 2020 the unemployment spiked with no gradual indication of a rise. This is likely due to the effect of COVID-19 as the virus caused lockdowns and job loss. It was expected that COVID-19 would have a significant increase in the unemployment rate, but it is interesting how abrupt the unemployment rate increased. On top of this, the unemployment rate rose to a percentage approximately 4-5% higher than the unemployment rate in 2010. Overall, this shows us that COVID-19 did have a very significant impact on the lives of many living in the USA. We generated another figure to take a deeper look at who all were affected. Fig. 2 was generated to take a look at race.
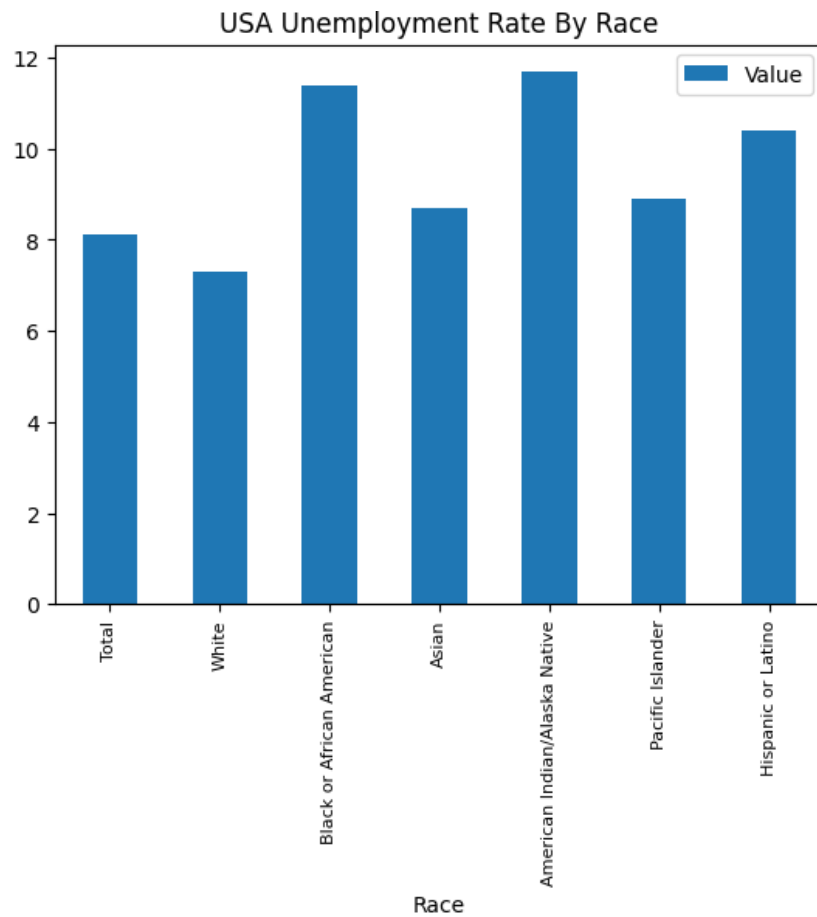
Fig. 2 USA Unemployment by Race in 2020

The USA unemployment rate by race can be seen in Fig. 2. Native Americans and African Americans were the most greatly affected by COVID-19 in 2020. It can also be seen that White Americans were the least affected by COVID-19 when it came to unemployment rate. The exact reasons for this may be unclear. It may also be noted that in the US, the population of White Americans are significantly greater than any other race in the United States and this could be an impact as to why. On average, before COVID-19 in 2019, the unemployment rate for Black Americans and Native Americans were also the highest out of any other race [2]. The unemployment rate almost doubled for every single race. An interesting comparison was that in 2019 the unemployment rate for Asian Americans were the lowest out of any other race, but in 2020 the unemployment rate for White Americans were the lowest. For Asian Americans, the unemployment rate almost tripled from 2018 which is very significant compared to most other races analyzed. In Fig. 3 we analyzed how the unemployment rate was broken down by gender.
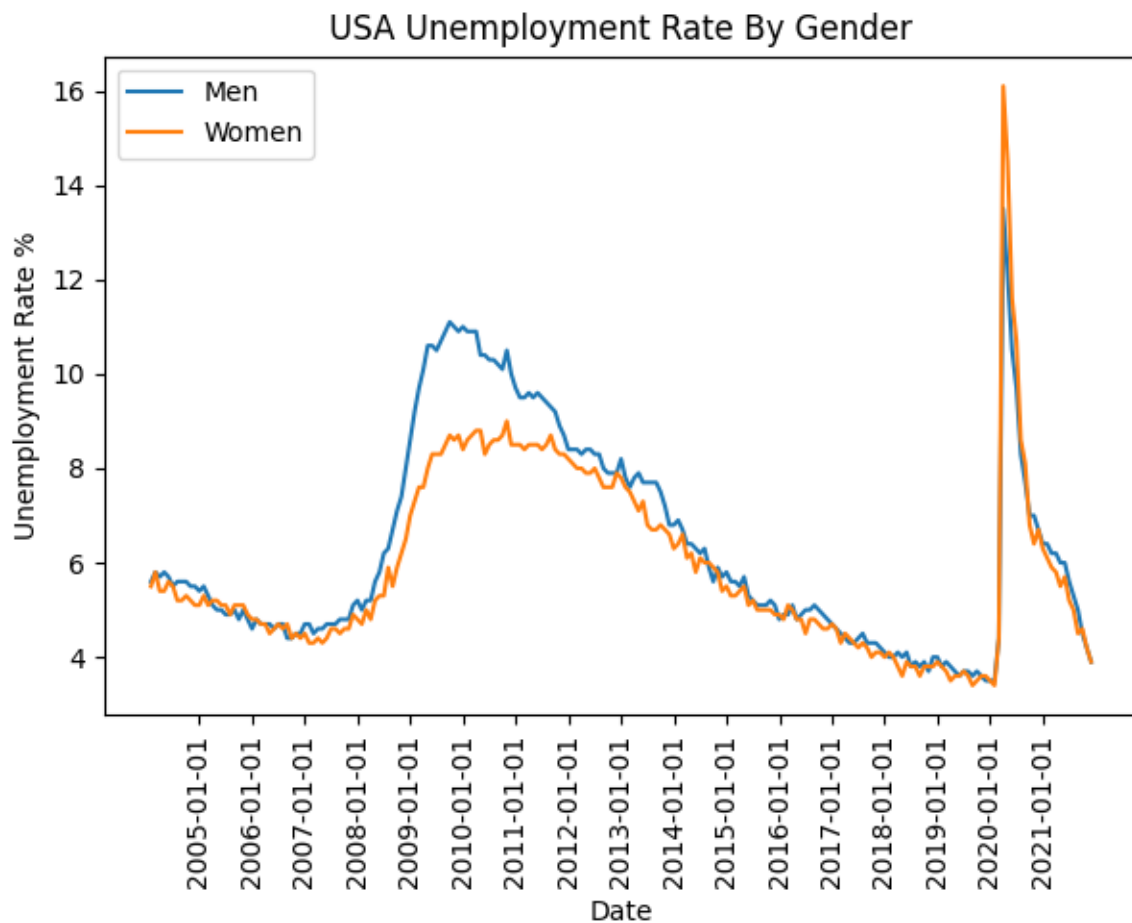
USA Unemployment Rate By Gender

Fig.3 US Unemployment Rate Gender

From 2005 to 2021, we can see how the unemployment rate was divided by gender. The following graph were generated using 2 datasets, one for men and another for women. [3,4] It appears that men were more affected in 2009-2013 with unemployment. However, in 2020 the unemployment rate women were more affected, which is an interesting contrast. The reasons for unemployment are difficult in several cases, but in 2010 there was a recession, but in 2020 there was a global pandemic. This could be due to the occupational differences and effects. The difference in gender in 2020 was almost 2% of a difference between men and women. In the workforce a significant impacted occupation were nurses and while the pandemic was occurring hospitals were completely filled and several health care professionals had a lot of mental pressure and left the job. On the other hand, a case can be made because hospitals needed nurses the employment rate for females should have been higher. Approximately 80-90% of nurses are female, and this could have an impact on how the unemployment rate was affected [5]. A similar case can be made about teachers. Most women are school teachers and due to the lockdown, several teachers were let go or worked remote [5]. According to a statistic of leading occupations, women do perform more tasks with interacting with other people which was affected when the pandemic hit. This data is not conclusive, but women's occupations could be a significant impact on how COVID-19 affected them.
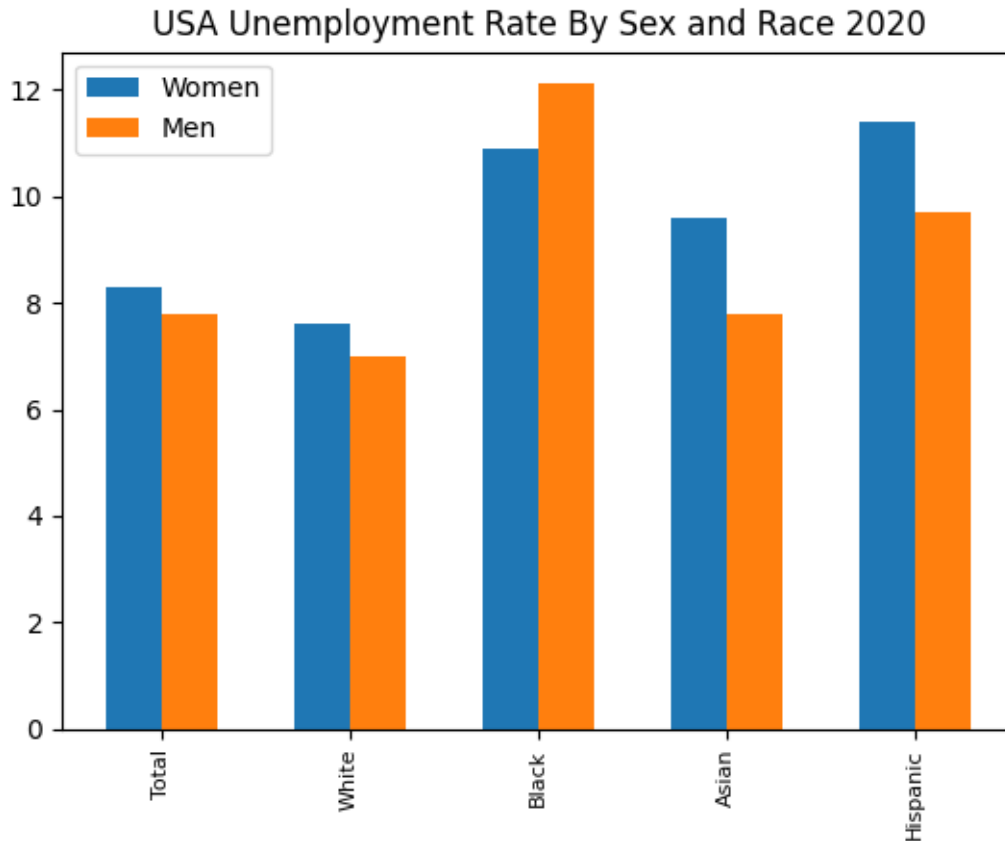
Fig. 4 Unemployment Rate by Sex and Race of 2020

The unemployment rate by sex and race can be seen in Fig. 4. This dataset was taken from U.S. DEPARTMENT OF LABOR. [6] Here we can see that male Black Americans are affected the most. For every other race the unemployment rate for women were higher than men. Only for Black Americans the unemployment rate is affected more for male than women. The analysis for Fig. 3 how the type of occupation is likely a significant cause for this, but it is fascinating how Black Americans were the most greatly affected. This could be due to the occupations taken by Black Americans that could be more labor intensive that were closed down due to COVID-19 lockdowns. The graphs below take a look at the unemployment rate in 2020 and 2021.
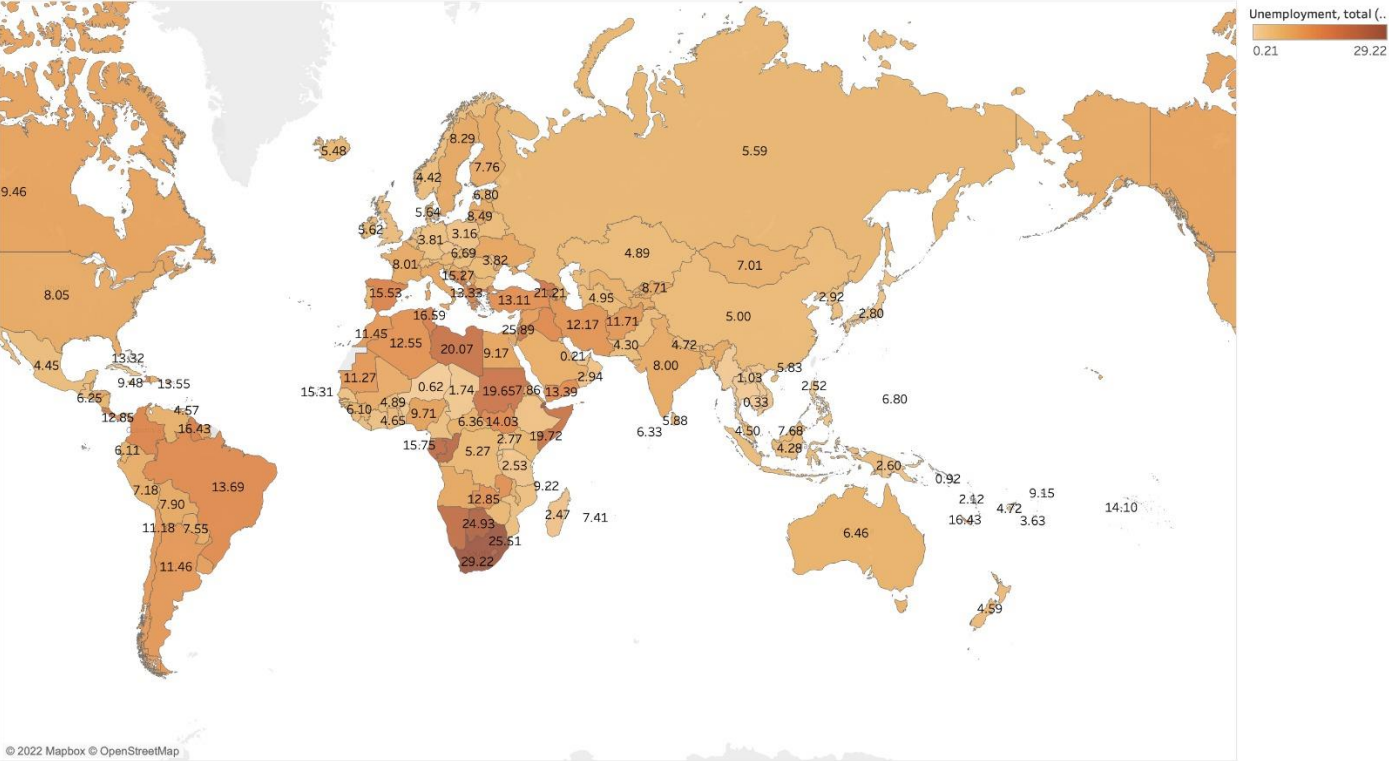
Map based on Longitude (generated) and Latitude (generated). Color shows sum of Unemployment, total (% of total labor force) (modeled ILO estimate). The marks are labeled by sum of Unemployment, total (% of total labor force) (modeled ILO estimate). Details are shown for Entity. The data is filtered on Year, which ranges from 2020 to 2020.
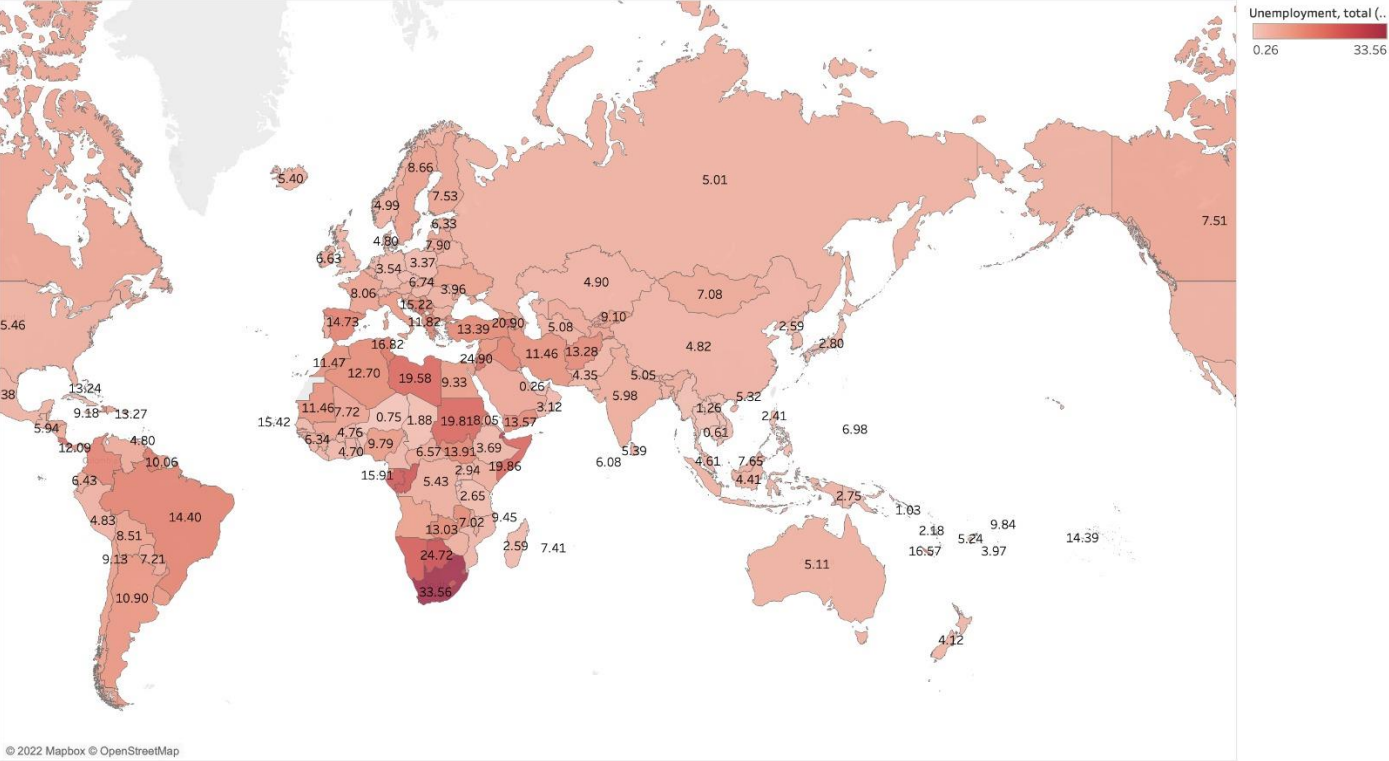
Fig. 5 Unemployment Rate of the World in 2020

Map based on Longitude (generated) and Latitude (generated). Color shows sum of Unemployment, total (% of total labor force) (modeled ILO estimate). The marks are labeled by sum of Unemployment, total (% of total labor force) (modeled ILO estimate). Details are shown for Entity. The data is filtered on Year, which ranges from 2021 to 2021.

Fig 6. Unemployment Rate of the World in 2021

We would like to take a look at the aftermath of the COVID-19 pandemic effect of the world from 2020 to 2021.[7] While the pandemic has not officially ended, this is where most of the cases and world status has improved. The graphs above are geographical maps of how the COVID-19 pandemic affected the unemployment rate of the world. The more intense the color, the greater the unemployment rate. There are countries in which we noticed the unemployment rate has decreased from 2020 to 2021 such as, the US (from 8.05 to 5.46%). This is a huge improvement. However, there are a few countries in which the unemployment rate did not improve from 2020 to 2021. A good example of this is Brazil. Even though this increase is slight, while most of the world had an improvement in their unemployment rate, Brazil had an increase in unemployment rate by a little less than one percent, going from 13.69 to 14.40. There are other countries that do not have a significant rise in unemployment rate such as the Republic of Congo who went from 5.59 to 5.01. This could be more deeply analyzed, but this does provide us with some information that not every nation was affected by unemployment rate as the US was from 2020 to 2021. Other countries could still be battling with other repercussions of the pandemic or their rise in unemployment rate could be happening in 2022 or 2023. Not every nation experienced COVID-19 in the same way the US did and didn't happen in the same time.

IV. Discussion

Overall, we were able to make several interesting analyses through the creation of data visualizations. In Fig. 1 we looked at how the unemployment rate in the US from 2005 to 2021. We found that there were two general increases, but the one in 2020 was a harsh spike in the unemployment rate. We then looked at the races and sexes in Fig. 2 and Fig.3 to see if there were any interesting correlations. It was found that in previous years the unemployment rate did seem similarly affected by each year, but from 2019 to 2020, the unemployment had the most significant impact on Asian Americans, although Black Americans and Native Americans had the highest employment rates. When we looked at the sex of the individuals, we found that females were most effected by the unemployment rate. When we looked at the combination of sex and race, we found that females for every race except Black Americans were affected the most. There is an indication that occupation impacts these results. The final graphs Fig.5 and Fig.6 generated in Tableau show how the overall world was affected by the COVID-19 pandemic from 2020 to 2021, when looking at the unemployment rate. We found that not every country experienced COVID-19 in the same way the US did. Certain countries such as Brazil or Egypt did not face a huge decrease in unemployment rate from 2020 to 2021. This could be due to when the pandemic hit those countries, or how different economical differences caused less of an affect in those countries. To gain more knowledge in this aspect, individual countries should be analyzed.

V. Conclusions

Overall, we found interesting results. We knew that COVID-19 pandemic did cause an impact in unemployment rate, but we were able to dive deeper and look at how specific races and sexes were impacted. There needs to a be a further analysis done into the occupation of women and Black Americans to confirm our suspicion that occupation impacted these individuals. We should also look at the occupation of Asian Americans to see whether this was also the reason they were impacted further. We were also able to look at the unemployment rate in different countries and find that each country is different.

References

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[5] "20 Leading Occupations of Employed Women, U.S." *Infoplease*, Infoplease, https://www.infoplease.com/us/society-culture/gender-sexuality/20-leading-occupations-employed-women-us.

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