

Unemployment Unplugged: Final Report

Britney Zhu and I did our project on how COVID 19 affected the unemployment rate as each of the states were getting their first covid cases. Please note that our project proposal was based on anxiety and depression rates during COVID 19 but we had to switch our topic to unemployment as we realized that the CDC did not make early 2020 anxiety and depression readily available. We decided to do our project on unemployment because we were curious about the behavior at the state level once COVID had taken over. Unemployment surged nationally as the pandemic took over the United States. According to the U.S. Bureau of Statistics, in the second quarter of 2020, the unemployment rate was 13%. Many businesses had to get suspended due to closures and the unemployment rate tripled compared to 2019 (BLS 2021). Unfortunately, many people lost their jobs and the economy was in turmoil.

There is plenty of data that is readily available for the United States, nationally was affected by the pandemic but there were not as many research articles about how each state was affected. Our hypothesis for this analysis was that the unemployment rate for each state will increase with each phase. I specifically was responsible for analyzing the data and creating python scripts to obtain results. Britney was responsible for deciding which results were most interesting and created all of the visuals for the presentation.

Since I was responsible for the data analysis part of the project, this is what I will be focusing on in my report.

```
import numpy as np
import pandas as pd

state_data = pd.read_csv(data)
state_data.head(10)
```

I started by looking at the csv file that we made and I saw that we had the population census values from 2019 and 2020. We also had the monthly unemployment rate for each of the states in October of 2019 to December of 2020. Please note that for this project, we were focusing on only the fifty states (not the District of Columbia or neighboring US territories).

```
for col in state_data.columns:
    if "2019" in col and "unemployment" in col:
        state_data[col] = state_data[col]
*state_data["2019_population_estimates"]
    elif "2020" in col and "unemployment" in col:
        state_data[col] = state_data[col] *
state_data["2020_population_estimates"]
state_data.to_csv("census_updated_state_data", index = False)
```

Since we currently have the state unemployment rates in percent form, we wanted to multiply that by the census population to get a better analysis of our data. For this project, we want to focus on the amount of people that were unemployed rather than the percent of people that were unemployed. We did this because many of the states had drastically different populations and ten percent of the population could mean a couple hundred in one state but hundreds of thousands of people in another state. We did this so we could have more clarity with the data. We utilized pandas for this and the majority of our code utilized pandas to make the code simple and faster to use.

```
def find_the_months(state_covid_month, num_of_phase_months,
forward_or_back):
    months_to_average = []
    for i in range(1, num_of_phase_months+1):
```

```
next_month = state_covid_month + i*forward_or_back
if next_month < 1:
    next_month += 12
elif next_month > 12:
    next_month -= 12
months_to_average.append(next_month)
return months_to_average
```

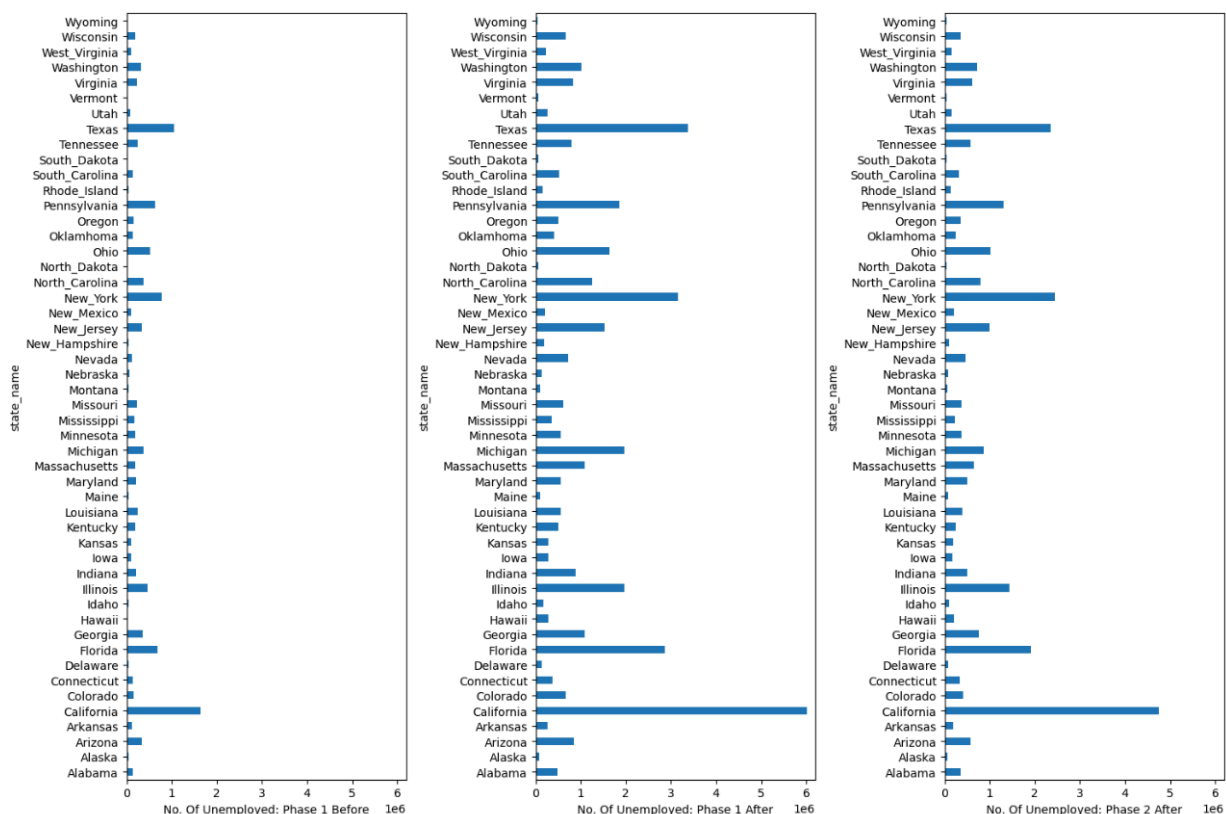
Then, we created this function to find the months that we would use for our calculations. To assess how the unemployment rate changed, we divided the data up into three phases: phase1before, phase1after, and phase2after. We found the first covid date for each state (the record of when each state got their first covid case) and then from there we were able to find the months for each of the phases.

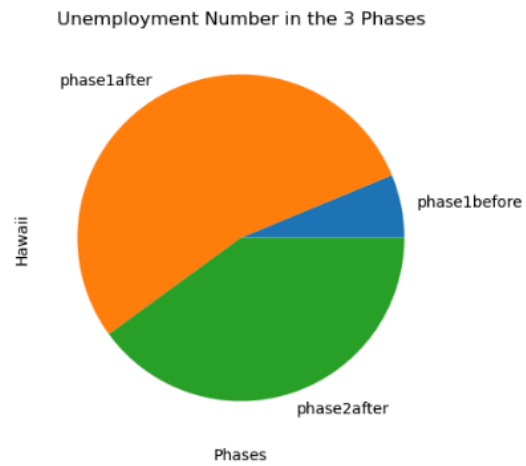
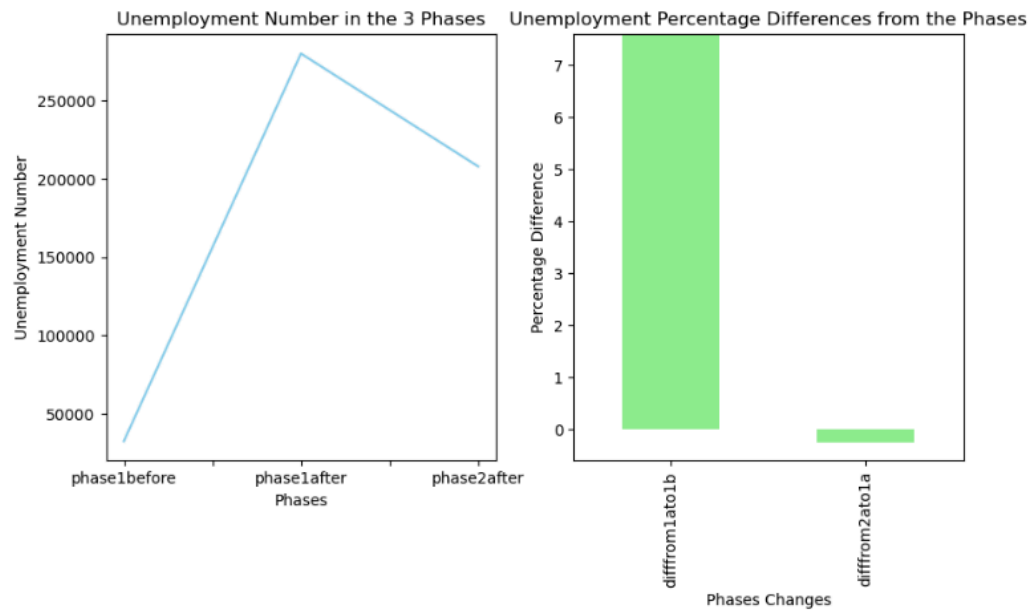
Each phase consisted of three months and we used them for our analysis. We took the first covid case of each date and looked at the behavior of the unemployment rate three months before covid began in the state (phase1before), the unemployment rate during the three months after covid began in the state (phase1after), and the unemployment rate 6 months after covid began in the state (phase2after). We took the three months before the covid date and averaged those three values to get phase1before, averaged the three months after covid began in the state to get phase1after, and then averaged the next three months of the unemployment rate for the three states to get phase2after. For example, the Illinois first covid case was in January. This means that for phase1before, we would need to look at the months December, November, and October in 2019. For phase1after, we would look at February, March, and April of 2020. For phase2after, we would look at May, June, and July of 2020. This specific function was used to find the three months that we would have to look at in order to determine what unemployment rates we would need to average. We also had to account for changing the year in this code so we

had if statements to see whether the month needed to be in 2019 or 2020. We then took the date of the first covid case and split it using python and converted the date to integers so we can make a proper comparison.

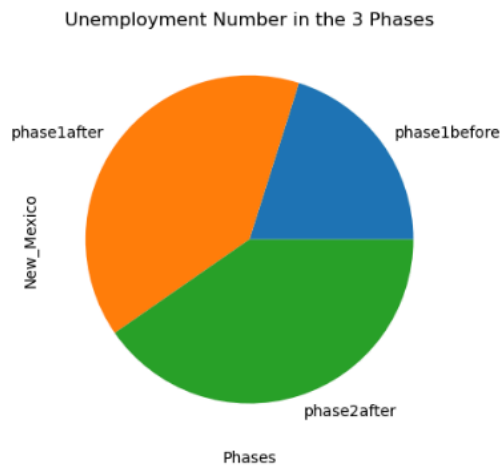
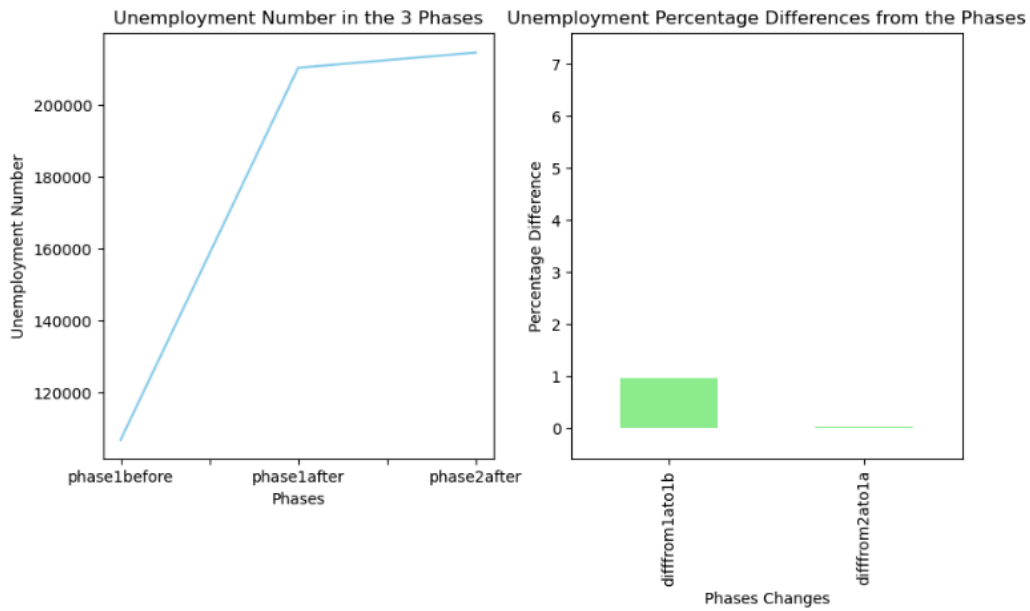
After using the month function for all of the phases, we then took the means of the unemployment rates to gain some perspective on how the unemployment rate was for the course of three months. We then were able to see whether our hypothesis was correct.

We had some limitations as we were performing this data analysis. There was limited data for 2019 so for some of the phase1before calculations, it only consisted of two months rather than three. We were using the census population estimate for each of the states, not the actual census population. Attached below are the images of the results that we found.

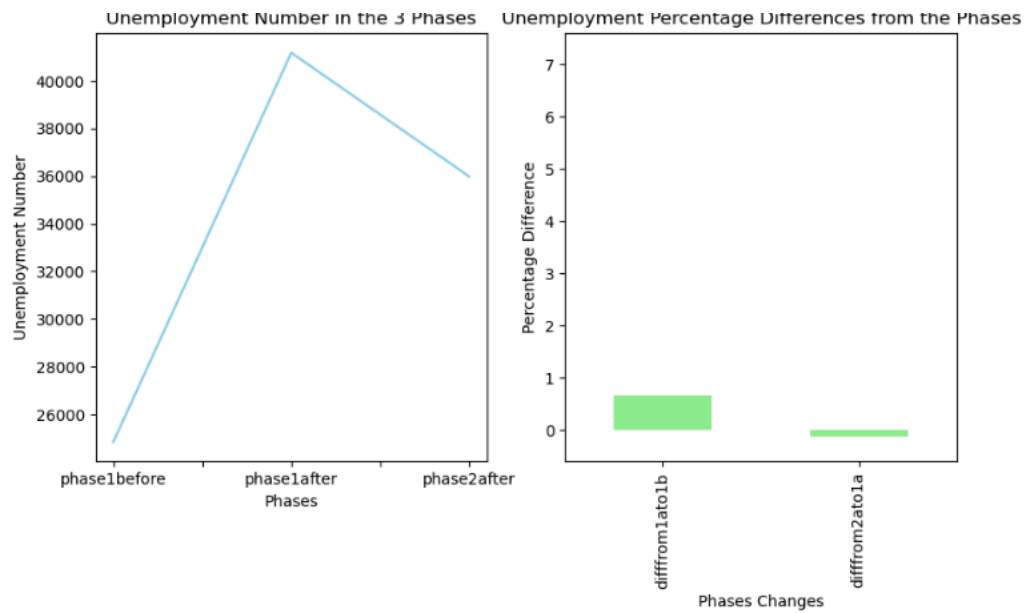




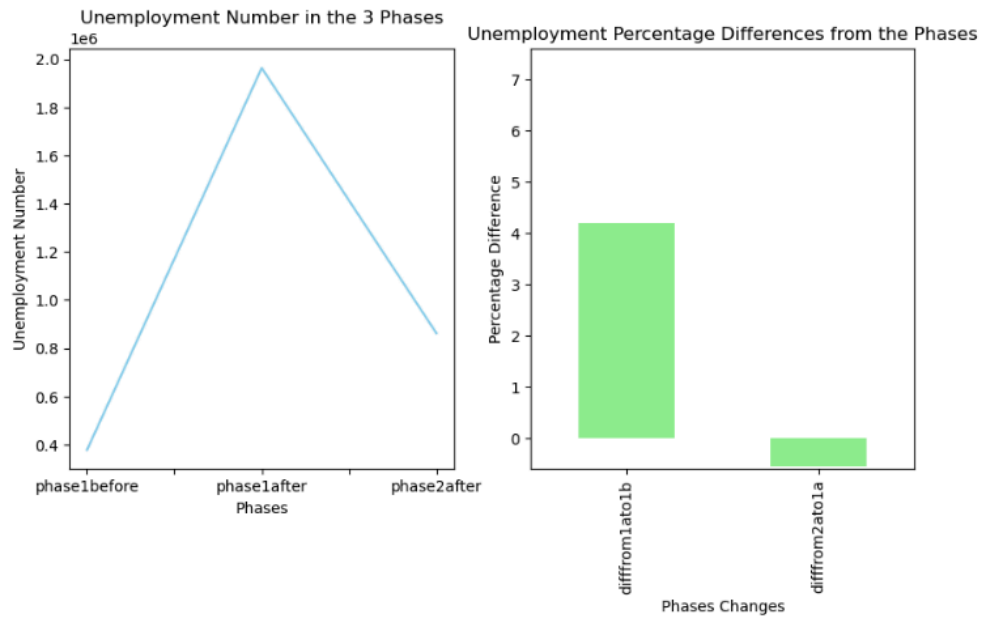
Caption: Hawaii Unemployment Data



Caption: New Mexico Unemployment Data



Caption: Wyoming Unemployment Data



Caption: Michigan Unemployment Data

References

U.S. Bureau of Labor Statistics. (2021). Unemployment rises in 2020, As the Country Battles the Covid-19 Pandemic. U.S. Bureau of Labor Statistics.

<https://www.bls.gov/opub/mlr/2021/article/unemployment-rises-in-2020-as-the-country-battles-the-covid-19-pandemic.htm>

Unemployment rate (seasonally adjusted). KFF. (2022, May 4).

<https://www.kff.org/other/state-indicator/unemployment-rate/?currentTimeframe=17&sortModel=%7B%22colId%22%3A%22Location%22%2C%22sort%22%3A%22asc%22%7D>

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