Final Project

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Project Plan

For our final project we will look at a dataset that tracked the Covid-19 cases in each state and compare 3 states with strict mask laws to 3 states with lenient mask laws. We will be observing the data from these states from 1/22/2020 to present day. We will be looking at the total positive cases vs total negative cases in each one of these states over time in relation to the total tests. We also will be looking at the number of people on ventilators and that have been hospitalized in each state from the coronavirus. We will use these numbers to prove that states that impose stricter mask regulations have overall lower numbers than states that don't. And that states with an overall more rural population will have higher hospitalization rates and mortality rates due to the coronavirus. This information is meaningful to society because it will ultimately end the numerous negative impacts this virus has had on our country. The staggering loss of life and severe economic setbacks have affected everybody. And if we can get everybody on the same page and quantitatively show that these states that have been hit so hard can attribute this to their leniency towards the virus. Then we can finally move towards opening up our country again.

Import the Data

```
Data = table2struct(readtable('covid.xlsx', 'PreserveVariableNames', true));
```

Scrub the Data

Here we used a simple data scrubbing method to loop through all the fields we wanted to use and replace all the nan values with zero.

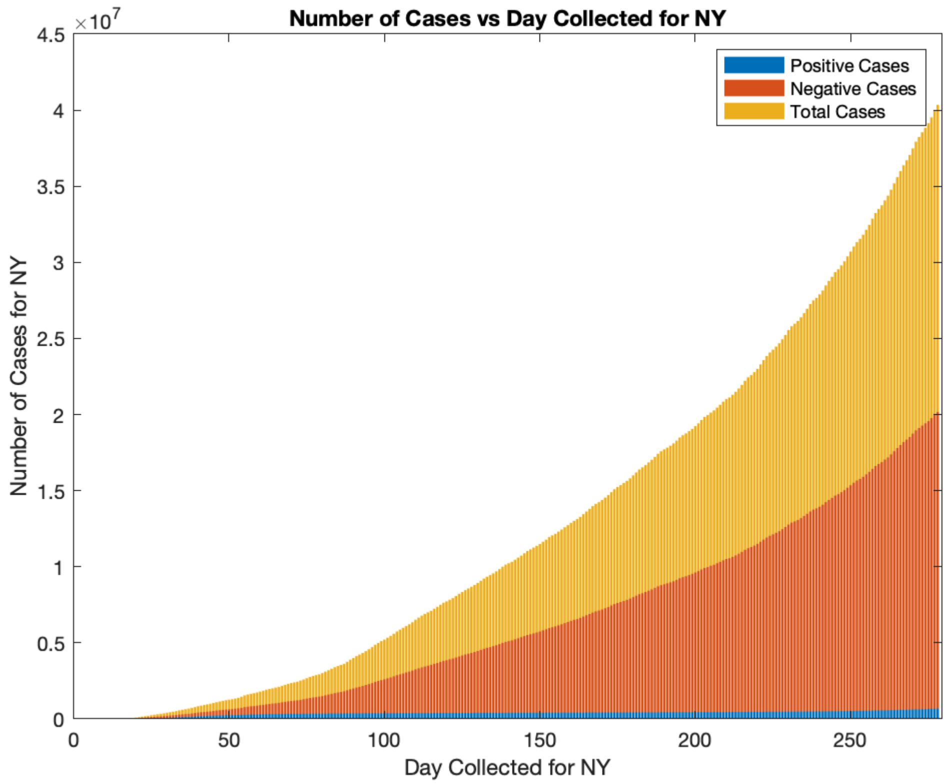
```
[r, c] = size(Data);
fnames = fieldnames(Data);
for i = 1:r
for j = 3:5
    cfields = Data(i).(fnames{j});
    if isnan(cfields)
        Data(i).(fnames{j}) = 0;
    end
end
for j1 = 8:15
    cfields = Data(i).(fnames{j1});
    if isnan(cfields)
        Data(i).(fnames{j1}) = 0;
    end
end
for j2 = 20:21
    cfields = Data(i).(fnames{j2});
    if isnan(cfields)
        Data(i).(fnames{j2}) = 0;
    end
end
```

```
for j3 = 23:48
    cfields = Data(i).(fnames{j3});
    if isnan(cfields)
        Data(i).(fnames{j3}) = 0;
    end
end
end
```

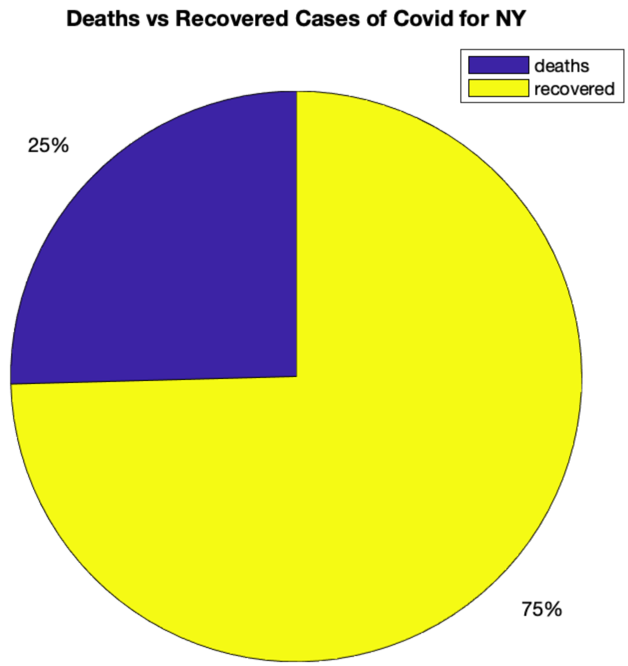
Graphs

For all of the graphs we created the vectors we wanted to use for the bard graphs and just created integer values for the pie charts. Then to assign values to these variables we looped through all of the field that contained the state abbrevations and everytime it matched the specified state abbreviation we took that row and then went though every desired field and assigned value to all our variables. Then we used these variables to plot our stacked bar and pie graph for each of the six states we examined.

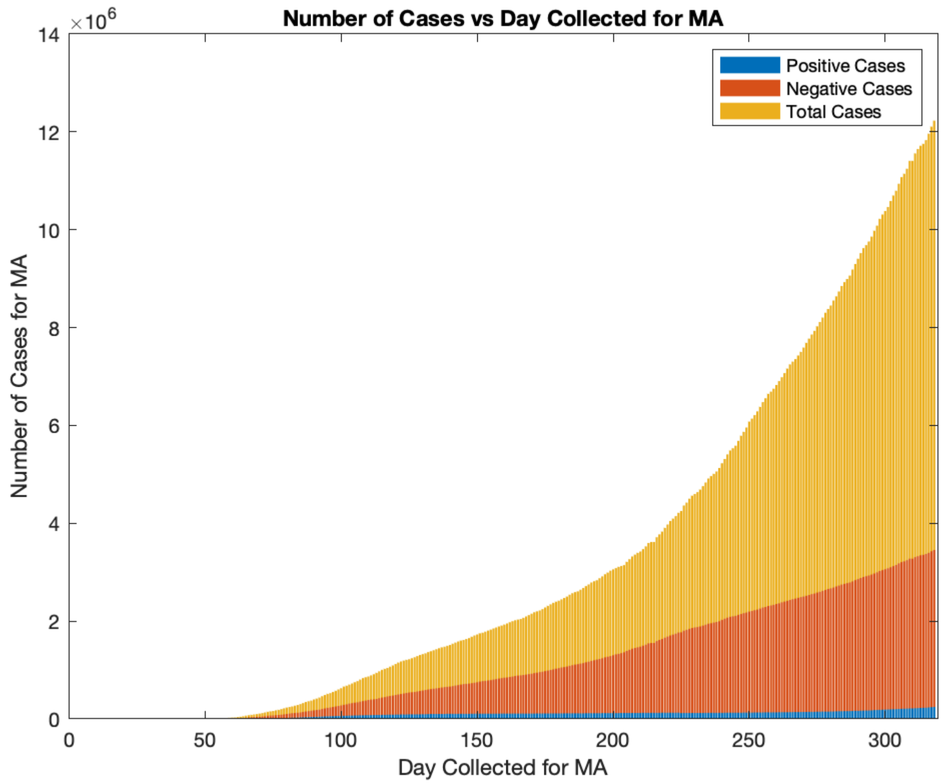
```
ypos = [zeros(1,269)];
yneg = [zeros(1,269)];
ytot = [zeros(1,269)];
ydeath = 0;
yrec = 0;
x = [1:278];
index = 1;
for i2 = r:-1:1
    if Data(i2).(fnames{2}) == 'NY'
        ypos(index) = Data(i2).(fnames{3});
        yneg(index) = Data(i2).(fnames{5});
        ytot(index) = Data(i2).(fnames{8});
        ydeath = ydeath + Data(i2).(fnames{20});
        yrec = yrec + Data(i2).(fnames{15});
        index = index + 1;
    end
end
yfin = [ypos; yneg; ytot];
bar(x,yfin,'stacked')
legend('Positive Cases', 'Negative Cases', 'Total Cases')
ylabel('Number of Cases for NY');
xlabel('Day Collected for NY');
title('Number of Cases vs Day Collected for NY')
```



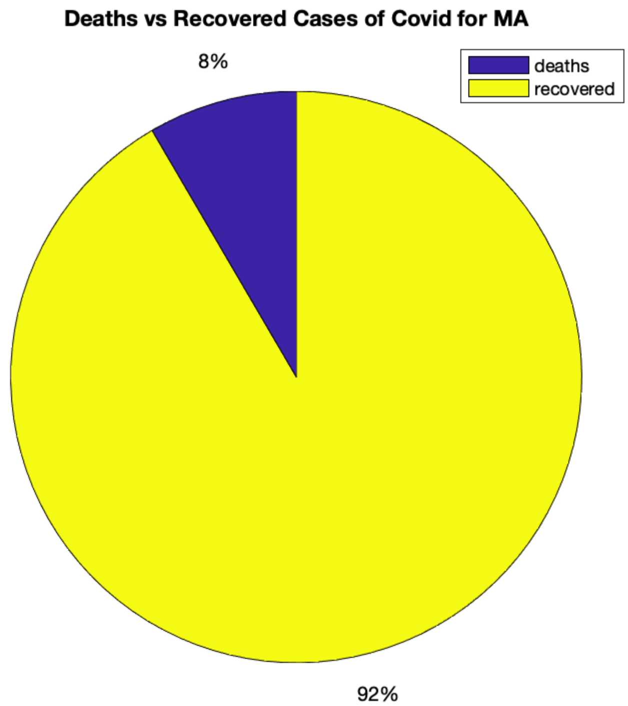

```
xpie = [ydeath yrec];
pie(xpie);
legend('deaths', 'recovered')
title('Deaths vs Recovered Cases of Covid for NY')
```



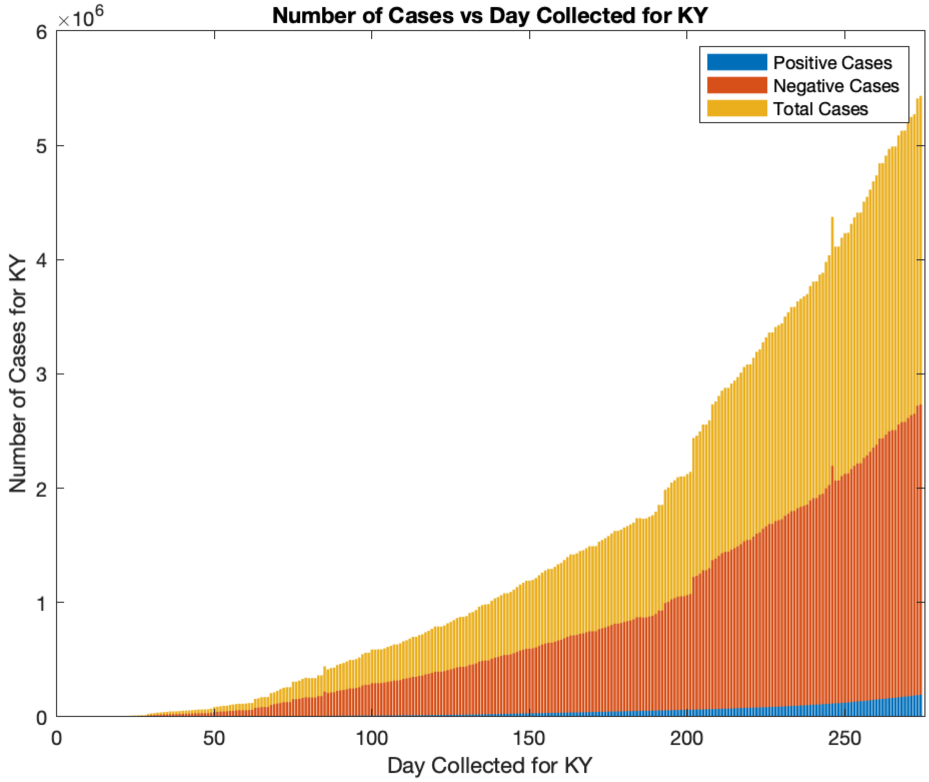

```
ypos = [zeros(1,269)];
yneg = [zeros(1,269)];
ytot = [zeros(1,269)];
ydeath = 0;
yrec = 0;
x = [1:318];
index = 1;
for i2 = r:-1:1
    if Data(i2).(fnames{2}) == 'MA'
        ypos(index) = Data(i2).(fnames{3});
        yneg(index) = Data(i2).(fnames{5});
        ytot(index) = Data(i2).(fnames{8});
        ydeath = ydeath + Data(i2).(fnames{20});
        yrec = yrec + Data(i2).(fnames{15});
        index = index + 1;
    end
end
yfin = [ypos; yneg; ytot];
bar(x,yfin,'stacked')
legend('Positive Cases', 'Negative Cases', 'Total Cases')
ylabel('Number of Cases for MA');
xlabel('Day Collected for MA');
title('Number of Cases vs Day Collected for MA')
```



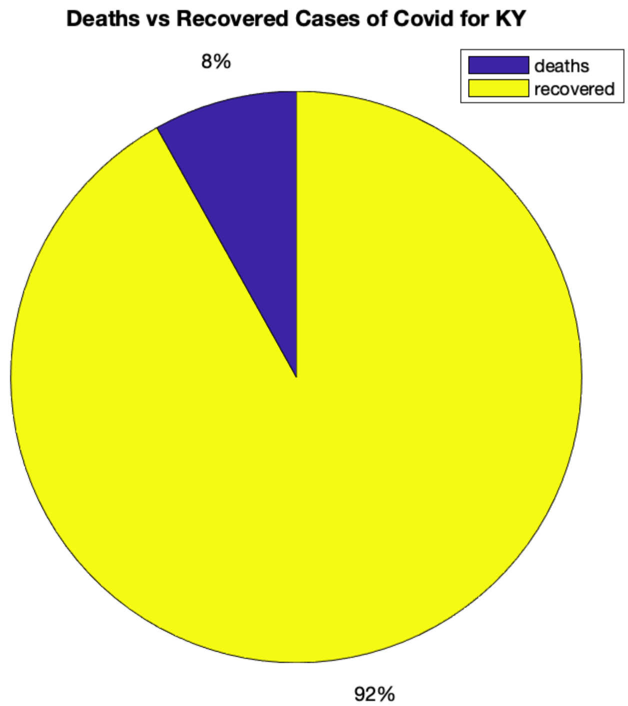

```
xpie = [ydeath yrec];
pie(xpie);
legend('deaths', 'recovered')
title('Deaths vs Recovered Cases of Covid for MA')
```



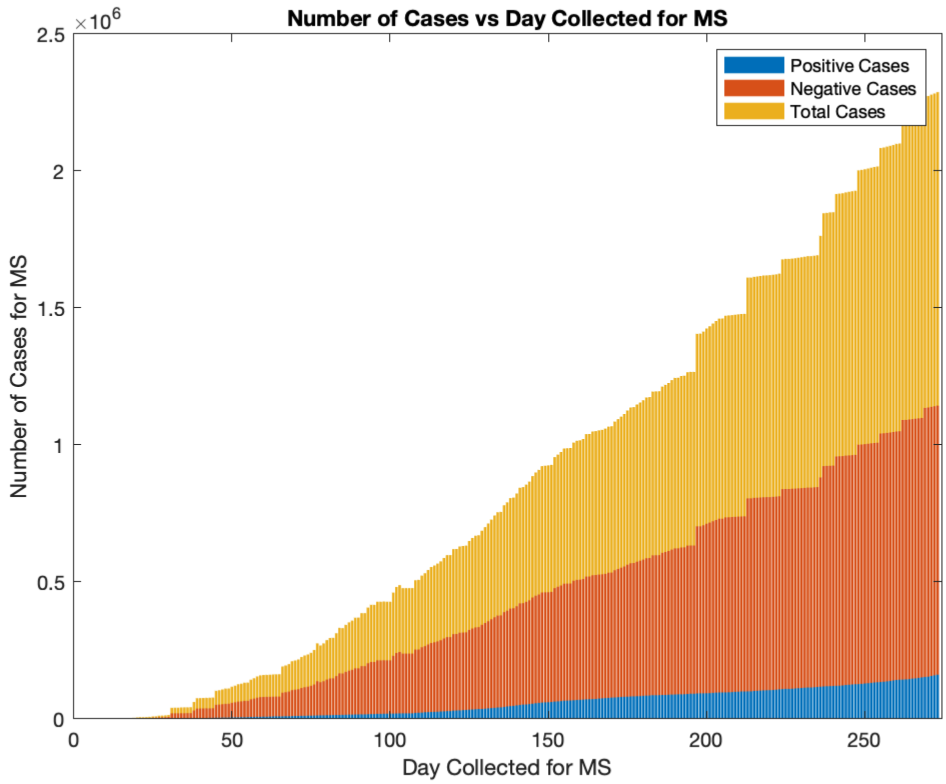

```
ypos = [zeros(1,269)];
yneg = [zeros(1,269)];
ytot = [zeros(1,269)];
ydeath = 0;
yrec = 0;
x = [1:274];
index = 1;
for i2 = r:-1:1
    if Data(i2).(fnames{2}) == 'KY'
        ypos(index) = Data(i2).(fnames{3});
        yneg(index) = Data(i2).(fnames{5});
        ytot(index) = Data(i2).(fnames{8});
        ydeath = ydeath + Data(i2).(fnames{20});
        yrec = yrec + Data(i2).(fnames{15});
        index = index + 1;
    end
end
yfin = [ypos; yneg; ytot];
bar(x,yfin,'stacked')
legend('Positive Cases', 'Negative Cases', 'Total Cases')
ylabel('Number of Cases for KY');
xlabel('Day Collected for KY');
title('Number of Cases vs Day Collected for KY')
```



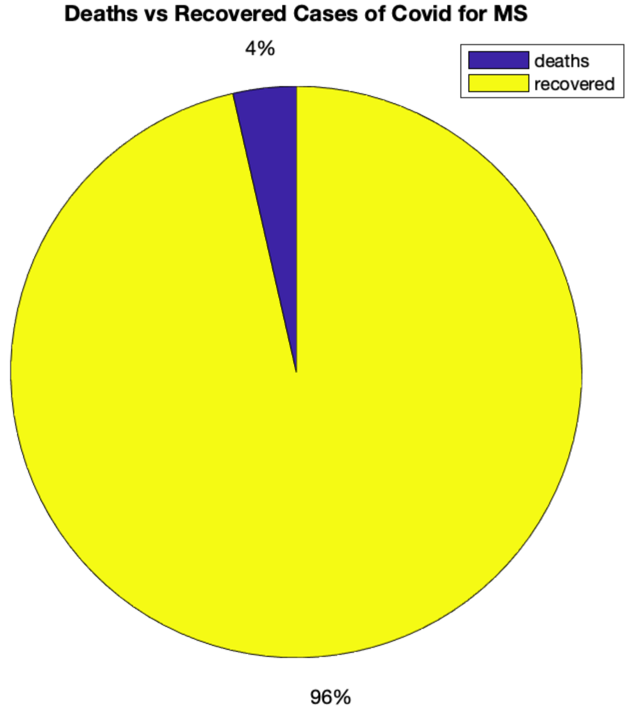

```
xpie = [ydeath yrec];
pie(xpie);
legend('deaths', 'recovered')
title('Deaths vs Recovered Cases of Covid for KY')
```



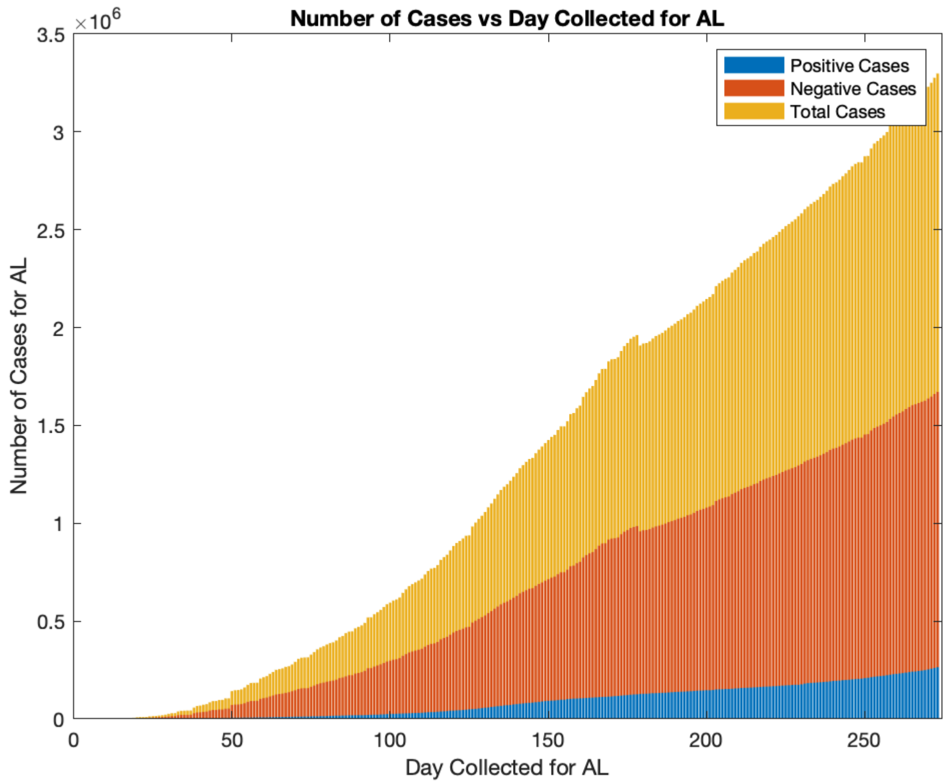

```
ypos = [zeros(1,269)];
yneg = [zeros(1,269)];
ytot = [zeros(1,269)];
ydeath = 0;
yrec = 0;
x = [1:273];
index = 1;
for i2 = r:-1:1
    if Data(i2).(fnames{2}) == 'MS'
        ypos(index) = Data(i2).(fnames{3});
        yneg(index) = Data(i2).(fnames{5});
        ytot(index) = Data(i2).(fnames{8});
        ydeath = ydeath + Data(i2).(fnames{20});
        yrec = yrec + Data(i2).(fnames{15});
        index = index + 1;
    end
end
yfin = [ypos; yneg; ytot];
bar(x,yfin,'stacked')
legend('Positive Cases', 'Negative Cases', 'Total Cases')
ylabel('Number of Cases for MS');
xlabel('Day Collected for MS');
title('Number of Cases vs Day Collected for MS')
```



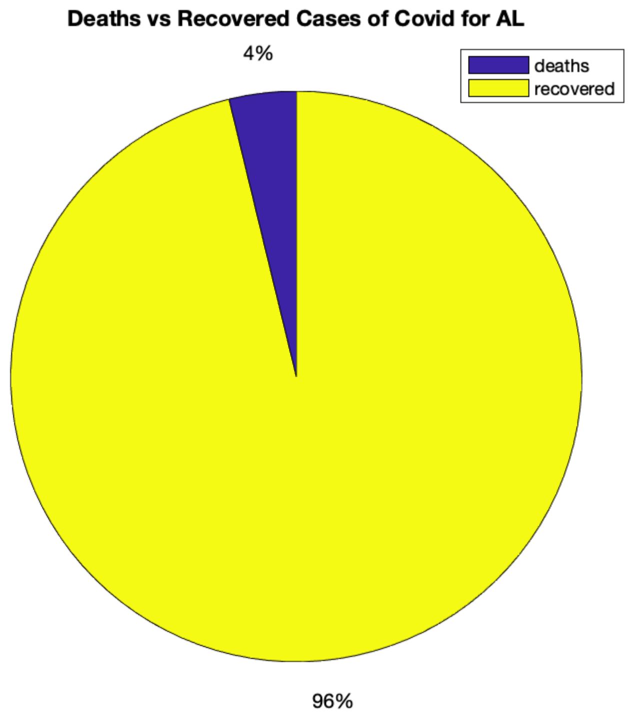

```
xpie = [ydeath yrec];
pie(xpie);
legend('deaths', 'recovered')
title('Deaths vs Recovered Cases of Covid for MS')
```



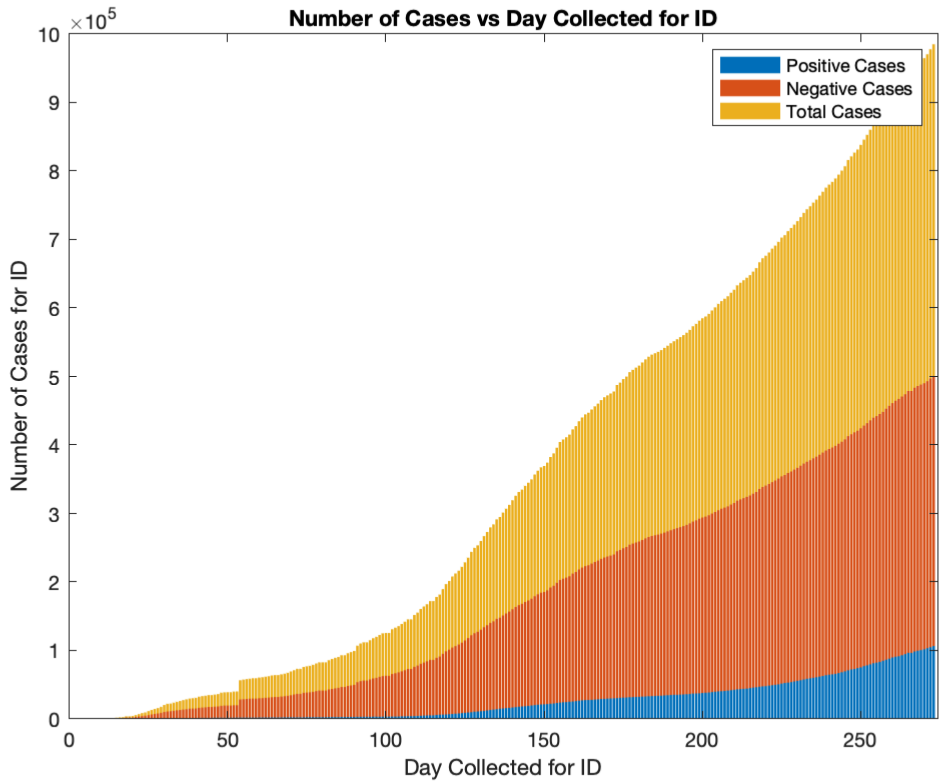

```
ypos = [zeros(1,269)];
yneg = [zeros(1,269)];
ytot = [zeros(1,269)];
ydeath = 0;
yrec = 0;
x = [1:273];
index = 1;
for i2 = r:-1:1
    if Data(i2).(fnames{2}) == 'AL'
        ypos(index) = Data(i2).(fnames{3});
        yneg(index) = Data(i2).(fnames{5});
        ytot(index) = Data(i2).(fnames{8});
        ydeath = ydeath + Data(i2).(fnames{20});
        yrec = yrec + Data(i2).(fnames{15});
        index = index + 1;
    end
end
yfin = [ypos; yneg; ytot];
bar(x,yfin,'stacked')
legend('Positive Cases', 'Negative Cases', 'Total Cases')
ylabel('Number of Cases for AL');
xlabel('Day Collected for AL');
title('Number of Cases vs Day Collected for AL')
```



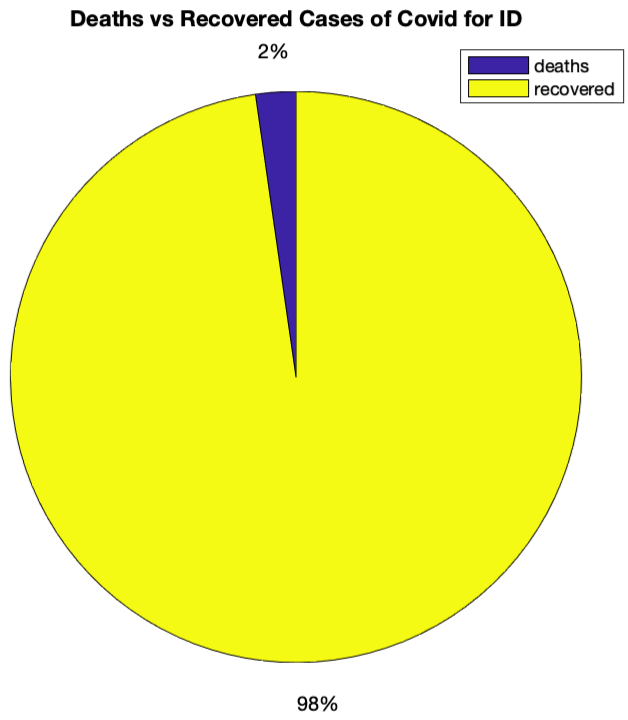

```
xpie = [ydeath yrec];
pie(xpie);
legend('deaths', 'recovered')
title('Deaths vs Recovered Cases of Covid for AL')
```




```
ypos = [zeros(1,269)];
yneg = [zeros(1,269)];
ytot = [zeros(1,269)];
ydeath = 0;
yrec = 0;
x = [1:273];
index = 1;
for i2 = r:-1:1
    if Data(i2).(fnames{2}) == 'ID'
        ypos(index) = Data(i2).(fnames{3});
        yneg(index) = Data(i2).(fnames{5});
        ytot(index) = Data(i2).(fnames{8});
        ydeath = ydeath + Data(i2).(fnames{20});
        yrec = yrec + Data(i2).(fnames{15});
        index = index + 1;
    end
end
yfin = [ypos; yneg; ytot];
bar(x,yfin,'stacked')
legend('Positive Cases', 'Negative Cases', 'Total Cases')
ylabel('Number of Cases for ID');
xlabel('Day Collected for ID');
title('Number of Cases vs Day Collected for ID')
```




```
xpie = [ydeath yrec];
pie(xpie);
legend('deaths', 'recovered')
title('Deaths vs Recovered Cases of Covid for ID')
```



Discussion on Lenient States

For each state with lenient mask laws, the stacked bar graphs help visualize the number of positive tests in comparison to the total of tests and the number of negative tests. Each bar in the stacked bar graph has a width with the value of one day and height representing the number of reported cases on that day. Although this makes each individual bar extremely narrow, it generates the most accurate data chart possible. The pie charts are a representation of the number of deaths and recovered patients out of all the positive cases. Because Covid-19 is not a fatal disease the recovery rate is quite high, more positive cases will cause the patients recovered percentage to increase which is why the strict states have small values (4%,4%, and 2%) as the percentage of deaths. To further elaborate on this point, it is clear from the graphs that Idaho has the highest percent positive cases and the death percentage is the lowest.

Discussion on Strict States

States with strict mask laws also have stacked bar graphs to show the number of positive tests in comparison to the total of tests and the number of negative tests. Along with this each bar has a width of one day and a height of reported tests, positive cases, and negative cases in their respective colors. The stacked bar graph clearly shows minimal positive cases of Covid-19 throughout the entire year but the pie charts show relatively high death rates. Although Covid-19 is not a fatal disease New York was hit extremely hard with Covid-19 because they have a death rate of 25% and a recovery rate of 75%. While Kentucky and Massachusetts have lower death rates but are still relatively high with a death rate of 8% for both states. Due to the relatively high death rates of these states it makes a lot of sense why the mask laws are extremely strict.

Discussion on Lenient States vs Strict States

Our graphs were able to show us exactly what our hypothesis predicted. We clearly saw that the three states with stricter mask laws had far fewer positive covid tests when compared to their total number of tests. And that these states also had a much higher recovery percentage when compared to states with relaxed mask laws.

From this data we can see clear evidence that states with stricter mask laws experience fewer covid cases and a higher recovery rate. This data is important to collect because despite all that has happened there are still those out there who refuse to accept that small sacrifices must be made to help stop this virus. And the easiest way to do this is through mask regulations to slow the spread. So we wanted to present this data to help quantify the effects of covid on a few key states in easy to read graphs. To ultimately show how many lives these choices can save.