SciMedCentral

Annals of Public Health and Research

Commentary

COVID-19: We Peaked Once. NYC Should Take All Precautions to Avoid a Second Wave

Vishal Shirke*

Investigator at kindred healthcare, USA

*Corresponding author
Vishal Shirke, Investigator at kindred healthcare, USA,
Tel: 7184143324; Email: vishal.shirke@yahoo.com

Submitted: 21 December 2020

Accepted: 06 January 2021

Published: 11 January 2021

Abstract

The COVID-19 pandemic called for different measures to help stop its spread within communities. Such measures included the cancellation of any events or gatherings that included a large group of people, distance learning for schools and colleges, shutting down of nonessential businesses, mandating mask-wearing in public places, and enforcing social distances, to a name a few. We saw the COVID-19 cases reach their peak -- the first wave -- from March 2020 to May 2020. The hospitals were overwhelmed during this time and the mortality rate due to COVID-19 during these months (compared to other months) told the tale. As of December 2020, we are seeing an increase of cases again; and with this paper, I hope to shed a light on the first wave that happened -- the horrific number of cases and the higher mortality rate -- to help people see the devastation of it all and how we should take all necessary precautions to avoid a second wave.

INTRODUCTION

Topic

According to the New York City data, since the end of February 2020, there are a total of 307,268 COVID-19 cases with 19,619 deaths so far that the city has seen. The city saw its first wave of pandemic -- the highest cases -- from March 2020 to May 2020. And after that, with effective measures that were taken, the cases count subsided. Unfortunately, we are seeing a sharp increase of cases in the month of December and the fear of second wave looms.

Disclaimer: The data used in this paper is up until December 3, 2020. [The recent daily cases count is still showing a surge in the month of December as of today - December 19, 2020.]

Data

The data used in this paper comes from New York State database -- which only included cases from New York City. It is a complete data, and no data cells were missing. The data consists of all the COVID-19 patients in the city from 2/29/2020 to 12/3/2020. The data does not have any discrepancies as they were directly reported by hospitals and COVID-19 testing sites. The data is complete, valid, and accurate.

New York City (and the world) has been through a lot these past months due to a pandemic that is difficult to contain. The target population within the analysis is the total number of COVID-19 cases in New York City. On the other hand, the reduced target population used is the total number of COVID-19 cases in the city during the first wave of pandemic only. This sampling scheme was done through convenient sampling and the data represents multistage sampling scheme. The primary stage is all hospitals in New York City, the secondary stage is all hospitals with COVID-19 cases, and the tertiary stages is all hospitals with COVID-19 related deaths. The data was taken with equal probability because each hospital is required by the law to submit the COVID-19 data.

EXPLORATORY ANALYSIS

As of December 2020, New York might be heading to another COVID-19 wave - its second. I hope that the analysis of the daily COVID-19 cases compared to that during the peak (first wave) makes people understand the necessity to not let the second wave become a reality. New York City saw its first wave of COVID-19 during April 2020. For the sake of comparison and convenience, both the target population and reduced target population analysis are done simultaneously to clearly show the horrors of a pandemic wave.

Observing one Variable from Target Population and Reduced Target Population

The one variable that I would like to focus on is the daily COVID-19 cases. Comparison of daily COVID-19 cases throughout the pandemic and during the peak will help us see the dire picture of a pandemic during its peak. At the same time, at the beginning of the pandemic, the hospitals in New York City were also not ready for such a rise in cases - due to the lack of PPE, ventilators, other medical equipment, COVID-19 beds, and the limited capacity of hospitals. That said, the other variable that I would like to briefly expand on is the mortality rate - the percentage of total death counts to total case counts -- and compare it to the mortality rate during the first wave when the hospitals were not prepared.

Measures of Central Tendency: The central tendency values will help us understand the difference between the COVID-19 cases as a whole compared to during the peak (first wave). The average of total number of cases in 279 days compared to the

average of cases in 46 days of the peak.

Target Population:

$$\mu_y = \frac{(1+0+0+1+5+\ldots+5047+5116+3479+3563+6130+\ldots+2665+2087+1126)}{279}$$

$$\mu_y = 1101.32$$

Reduced Target Population:

$$\mu_z = \frac{\sum zi}{N} = \frac{(2971+3707+4007+\ldots+2022+1887+1058)}{46} = 3693.46$$

The daily average COVID-19 case count during the first wave was almost four times higher compared to overall daily average COVID-19 case count. This is also a good example of the fact that the simple average is not always completely satisfactory -- especially since the data is so spread out (Table 1).

Table 1 shows, as expected, that the mortality rate was almost +3% higher during the peak when the hospitals were not prepared for such pandemic and were also at capacity. Hence, it is

Important for health officials and leaders to keep this mind as we prepare for a second wave or any future health crisis -- we need to have enough stockpiles of PPE, ventilators, necessary medical equipment, and possible solutions to create more beds if the need arise.

Range: As discussed above, we expect a huge range for both target population and reduced target population (target population little more compared to our reduced target population).

Target Population: Range: Highest Daily Count - Lowest Daily Count = 6353 - 0 = 6353.

Reduce Target Population: Range: Highest Daily Count - Lowest Daily Count 6353 - 1003 = 5350.

Unadjusted Variance : Target Population: The population variance is 1,867,102. This massive number tells the tale of a pandemic wave. The cases went from zero to thousands and then to hundreds (due to measures taken by the government) and it shows in its distribution of the data.

$$\sigma^2 z = \frac{\left[(2971-3693.46)^2+\ldots+(1887-3693.46)^2+(1058-3693.46)^2\right]}{46}$$

$$\sigma^2 y = 1,867,102$$

Reduced Target Population: The reduced population variance is also very high at 1,890,887.

$$\sigma^2 z = \frac{\left[(2971-3693.46)^2+\ldots+(1887-3693.46)^2+(1058-3693.46)^2\right]}{46}$$

$$\sigma^2 z = 1,890,887$$

Plot of Data:

Target Population: (Figure 1)

Reduced Target Population: (Figure 2)

Sampling Distribution

Initially, with my reduced target population, I wanted to stick with the pandemic wave at N=46 -- to show the impact of a wave. However, here, I would like to reduce it further to N=8 -- with those eight days being the ones at the top of the peak.

These days (N=8) and their daily COVID-19 case counts are as follows: 3/30/2020 = 6130, 3/31/2020 = 5459, 4/1/2020 = 5449, 4/2/2020 = 5748, 4/3/2020 = 5670, 4/4/2020 = 3865, 4/5/2020 = 3781, 4/6/2020 = 6353.

A sampling distribution is created using this data points of N=8 by creating combinations of values to make samples of n=3. This sampling distribution was created with equal probability without replacement 8C3 = 8!/5!3! = (8x7x6)/6 = 56 different samples. For each sample, mean is calculated, and the Table 2 is called the sampling distribution of sample means (Table 2) (Figure 3).

Table 1: Mortality Rate of COVID-19 cases: Total *vs* First Wave Only.

COVID-19	Overall	First Wave
Case Count	307268	169899
Death Count	19619	15296
Mortality Rate	6.39%	9.00%

Table 2: Sampling Distribution of All Sample Means.

Sampling Distribution of y (3 values from 8)		
Sample Number	**Sample Units**	**Sample Mean y**
1	6130,5459,5449	5679.33
2	6130,5459,5748	5779
3	6130,5459,5670	5753
4	6130,5459,3865	5151.33
5	6130,5459,3781	5123.33
6	6130,5459,6353	5980.67
7	6130,5449,5748	5775.67
8	6130,5449,5670	5749.67
9	6130,5449,3865	5148
10	6130,5449,3781	5120
11	6130,5449,6353	5977.33
12	6130,5748,5670	5849.33
13	6130,5748,3865	5247.67
14	6130,5748,3781	5219.67
15	6130,5748,6353	6077
16	6130,5670,3865	5221.67
17	6130,5670,3781	5193.67
18	6130,5670,6353	6051
19	6130,3865,3781	4592
20	6130,3865,6353	5449.33
21	6130,3781,6353	5421.33
22	5459,5449,5748	5552
23	5459,5449,5670	5526
24	5459,5449,3865	4924.33
25	5459,5449,3781	4896.33
26	5459,5449,6353	5753.67
27	5449,5748,5670	5622.33
28	5449,5748,3865	5020.67
29	5449,5748,3781	4992.67
30	5449,5748,6353	5850
31	5748,5670,3865	5094.33
32	5748,5670,3781	5066.33
33	5748,5670,6353	5923.67
34	5449,5670,3865	4994.67
35	5449,5670,3781	4966.67
36	5449,5670,6353	5824
37	5449,3865,3781	4365
38	5449,3865,6353	5222.33
39	5449,3781,6353	5194.33
40	5748,3865,3781	4464.67
41	5748,3865,6353	5322
42	5748,3781,6353	5294
43	5670,3865,3781	4438.67
44	5670,3865,6353	5296
45	5670,3781,6353	5268
46	3865,3781,6353	4666.33
47	5459,5748,5670	5625.67
48	5459,5748,3865	5024
49	5459,5748,3781	4996
50	5459,5748,6353	5853.33
51	5459,5670,3865	4998
52	5459,5670,3781	4970
53	5459,5670,6353	5827.33
54	5459,3865,3781	4368.33
55	5459,3865,6353	5225.67
56	5459,3781,6353	5197.67

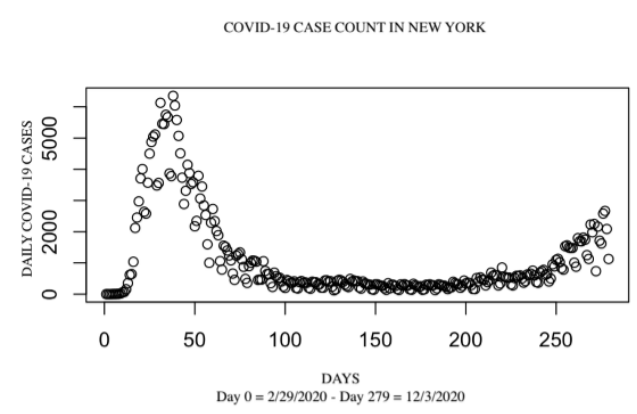

Figure 1 This scatterplot shows the first wave (with the peak) initially, followed with the cases slowing down with all the measures and restrictions in place. However, at the end of the graph, we see an increase -- a start of a new wave -- that we should be worried about.

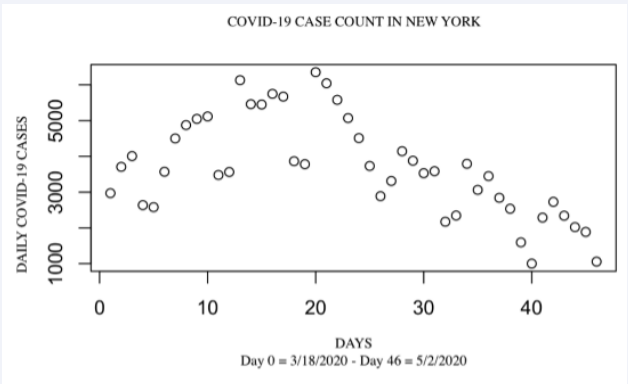

Figure 2 This scatterplot shows only the first wave. With our calculations before, we know there is a lot of variation here as well, however, note that no daily case count is less than 1000.

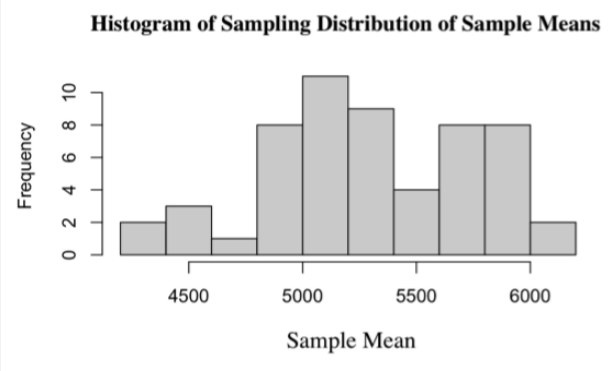

Figure 3 The histogram of the sampling distribution of sample means does not represent a shape that is approaching the shape of the familiar bell curve. The graph shows a negative skew, with tail on the left. This skew means that as the sample mean got larger there were more samples with those means -- this was expected as the reduced population is from the first wave of the pandemic.

DISCUSSION

Results and Conclusion

The results showed us the effect on mortality rates when the hospitals are not prepared for a pandemic. Initially, with a lack of necessary medical equipment, we saw the mortality rate due to COVID-19 cases rose to 9.00%. Due to this, there has been an awareness among politicians and healthcare leaders about the need of being prepared for a pandemic -- stockpiling necessary medical equipment and revising protocols on how to deal with such an increasing number of cases.

The dispersion of the data was as expected. The data is spread out quite a bit, and it showed in the results of the range, variance, and standard deviation for both target population and reduced target population. However, the key statistic within the results was the comparison of the overall average of daily COVID-19 to that of during the first wave. The average overall daily cases (which included the first wave) was 1101.32, while that during the first wave was a whopping 3693.46. As the cases have begun to increase again at a rapid pace, it is important to look at these results of the first pandemic wave -- not only the number of cases were more than three times the overall average, the mortality rate was also +3% greater. With more cases during a pandemic wave, the +3% means a lot more deaths.

Hence, it is necessary to take the appropriate steps to keep this pandemic under control. Especially now, with COVID-19 vaccines rolling out, the next few months will be crucial that will test our NYC health systems. I know that people are fed up with masks and restrictions -- but this is not the time to be short-sighted. With effective vaccines, the end of the pandemic might be near -- but it is still quite a few months away -- and hence, we should not let our guard down and we should be proactive in keeping the COVID-19 cases down. This is the time we need to watch the infection rate meter before making any decisions so that we do not trigger the second wave of new infections.

REFERENCES

COVID-19 daily counts of cases, hospitalizations, and deaths | NYC open data. (n.d.).

Cite this article

Shirke V (2021) COVID-19: We Peaked Once. NYC Should Take All Precautions to Avoid a Second Wave. Ann Public Health Res 8(1): 1102.