

Covid-19 based Data Analysis to Investigate Whether Lockdown is Effective in Decreasing Case

Shezadi Zahra Satti

Dept. Faculty of Engineering and Technology
International Islamic University Islamabad, Pakistan

Abstract:- COVID-19, previously named the 2019 Novel Coro- navirus (2019-nCoV), is a severe acute respiratory syndrome caused by SARS-CoV-2. The first case of this virus originated in Wuhan, China, in December 2019. As of December 26, 2021, over 278 million cases and approximately 5.4 million deaths have been reported globally. This study aims to show how lockdown affects the spread of COVID-19 in Pakistan. The government did not impose a complete lockdown on the country all at once; instead, it did it gradually. The COVID-19 data was statistically analyzed based on the government's decisions and the time frame of the lockdown in Islamabad, Pakistan. The study shows that the positivity rate in Islamabad reached 9.5% in March 2021, which was 0.6%.

Keywords:- Data Analytic, Predictive Analysis, Survey, Database, Decision Making, Data Science, Big Data, Data Collection, Data Visualization, Graphs, Data Base, Data Cleaning, CSV, Excel, Data Cleaning, COVID-19, NCOC.

I. INTRODUCTION

Data analytics is the science of turning raw data into useful information. Even the most abundant and high-quality data is useless if it is not adequately analyzed (see chi-sano2021breakthroughs). Big Data does not only refer to a large volume of data; it also refers to situations in which data is diverse, arrives in large quantities, and must be reliable to use [1]. Data analytics has a broad scope and is applicable in almost every field. Data analytics is used in security, transportation, risk detection, risk management, delivery, customer service, and health sciences. Data analytics on COVID-19 data is currently being performed to provide critical insights and aid decision-making.

The coronavirus has been part of our lives for two years now. The first case of the COVID-19 epidemic was reported in Wuhan, China, on December 31. On January 13, the first incidence outside of China was reported in Thailand [2]. Since then, the pandemic has spread to more than 50 nations worldwide [3]. On January 30 WHO designated the COVID-19 outbreak a Public Health Emergency of International Concern (PHEIC) [4]. As of February 20, approximately 76,000 confirmed COVID-19 cases globally [3].

Similarly, like many countries worldwide, Pakistan faced many difficulties due to the pandemic. On February 26 Pakistan announced the first two cases of COVID-19. Both patients had a travel history to Iran. Within two weeks, there were 20 cases, all of whom had traveled to Iran, China, Syria, and London. By March 23, there had been 892 cases reported, with six deaths. Since no vaccine was available, the only way to prevent and contain the sickness was through lockdown and social isolation. The country was placed on lockdown on March 24, which lasted more than a month. From April 2020 to December 2021, a total of 1,296,527 cases and 28,941 reported deaths were reported in Pakistan, according to the National Command Operation Center (NCOC) [5]. At the same time, the total number of tests conducted was 23,469,131. The rise and fall in the confirmed number of cases depends on many parameters. To control COVID-19 instances, the government of Pakistan has taken different preventive measures and made other decisions. The right timing of these decisions was critical to control the number of cases and deaths in each region of Pakistan due to the disease.

Pakistan is divided into four provinces or regions: Punjab, Sindh, Khyber Pakhtunkhwa, and Baluchistan, plus Islamabad Capital Territory (ICT). In addition, Azad Jammu Kashmir (AJK) and Gilgit Baltistan (GB) are occupied parts of Kashmir. The data collection is also done according to this division. The COVID-19 Stats from March 2020 to December 2021 are shown in the table I below. The stats include recovered cases, deaths, confirmed cases, and tests conducted in each province.

Table 1: Covid-19 Stats

	Recovered Cases	Total Deaths	Confirmed Cases	Total Tests
Islamabad	2,296,409	967	108,720	2,405,129
Punjab	8,493,065	13,073	445,228	8,938,293
Sindh	6,737,466	7,673	482,411	7,219,877
KPK	3,674,433	5,932	181,430	3,855,863
Balochistan	462,769	364	33,644	496,413
AJK	296,626	746	344,665	331,291
GB	211,836	186	10,429	222,265
Total	22,172,604	28,941	1,296,527	23,469,131

Since the start of the pandemic, lockdowns have been imposed in various parts of the world to slow the virus's spread. Other countries have imposed different types of restrictions to reduce the spread of the disease. Restrictions were made according to the situation of the country or part of that country. Travel restrictions were also made to stop the spread inside and outside the countries. The lockdown was such that people were advised to stay home and do all their work from home. In-person classes by academic institutions were also banned, forcing students to take online courses. Daily life was restricted during the lockdown. After the success of vaccines, new cases were quite under-controlled for a few months, and the lockdown was also lifted. Travel restrictions were removed, and students were happy to attend in-person classes. However, with the arrival of the new variant, Omicron, and its widespread use in different parts of the world, the question of whether lockdown will be imposed or the only option again arises.

II. DATA COLLECTION

Data-collection strategies enable us to gather information on our research subjects (people, things, and occurrences) and the context in which they occur. We must be systematic in our data collection. Answering our study questions conclusively will be impossible if data is collected at random [6]. Various data collection techniques include:

- Using Available Information
- Observing
- Focus Group Discussions
- Written Surveys
- Interviewing Face-To-Face
- Online Surveys

The government of Pakistan has collected a large amount of data on COVID-19. Daily stats related to COVID-19 are published on their respective websites. We have collected that data from the government website NCOC and analyzed it.

The National Command and Operation Centre is the nerve center for coordinating and articulating a cohesive national response to COVID-19 and putting the National Coordination Committee's COVID-19 decisions into action. The center is a one-stop shop for collecting, analyzing, and processing data based on digital input and human intelligence across Pakistan. Recommendations based on information/data, including health, financial, and all matters linked to COVID-19, are then analyzed and sent to NCC, led by PM, for real-time predictions and prompt actions [5].

The first case of COVID-19 was reported from Karachi on February 26, 2020 [7]. The data collection on NCOC's website was initiated in March 2020. The data collection process is done in two parts. It is done for the COVID-19 stats and the lockdown, as shown in Fig ???. Our data is from March 2020 to December 2021.

In Pakistan, lockdown restrictions were made according to each city's situation and province. It was not imposed abruptly but in different phases. Each phase depends on the situation of the case. Various types of restrictions were imposed at other times to stop the spread. At first, a complete lockdown was imposed all over Pakistan, and all the markets, transport, educational institutes, and offices were closed. Only grocery stores and medical stores were allowed to open. After some time, a partial or bright lockdown was imposed, requiring shops and transportation to adhere to a specific schedule. Each city and province has started to impose its smart lockdown to control the increase in cases. If the number of cases in a particular area or the city were increased, then lockdown restrictions would be stricter.

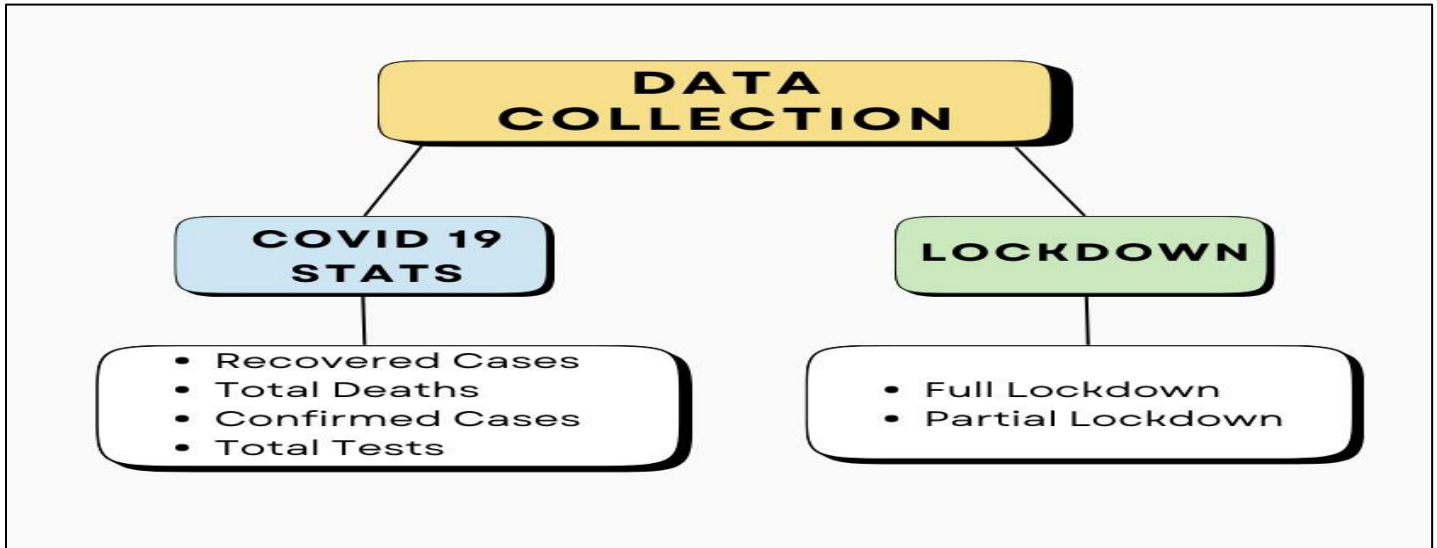


Fig. 1: Data Collection

For our data analysis of lockdown, we will solely concentrate on the Federal Capital of Pakistan, Islamabad. The data collection for the lockdown part will be made specifically for Islamabad. The lockdown restrictions were different in

different periods. Transport, weddings, schools, dine-in, shops, and lockdowns are standard features. These features are further split into respective features as shown in the fig 2.

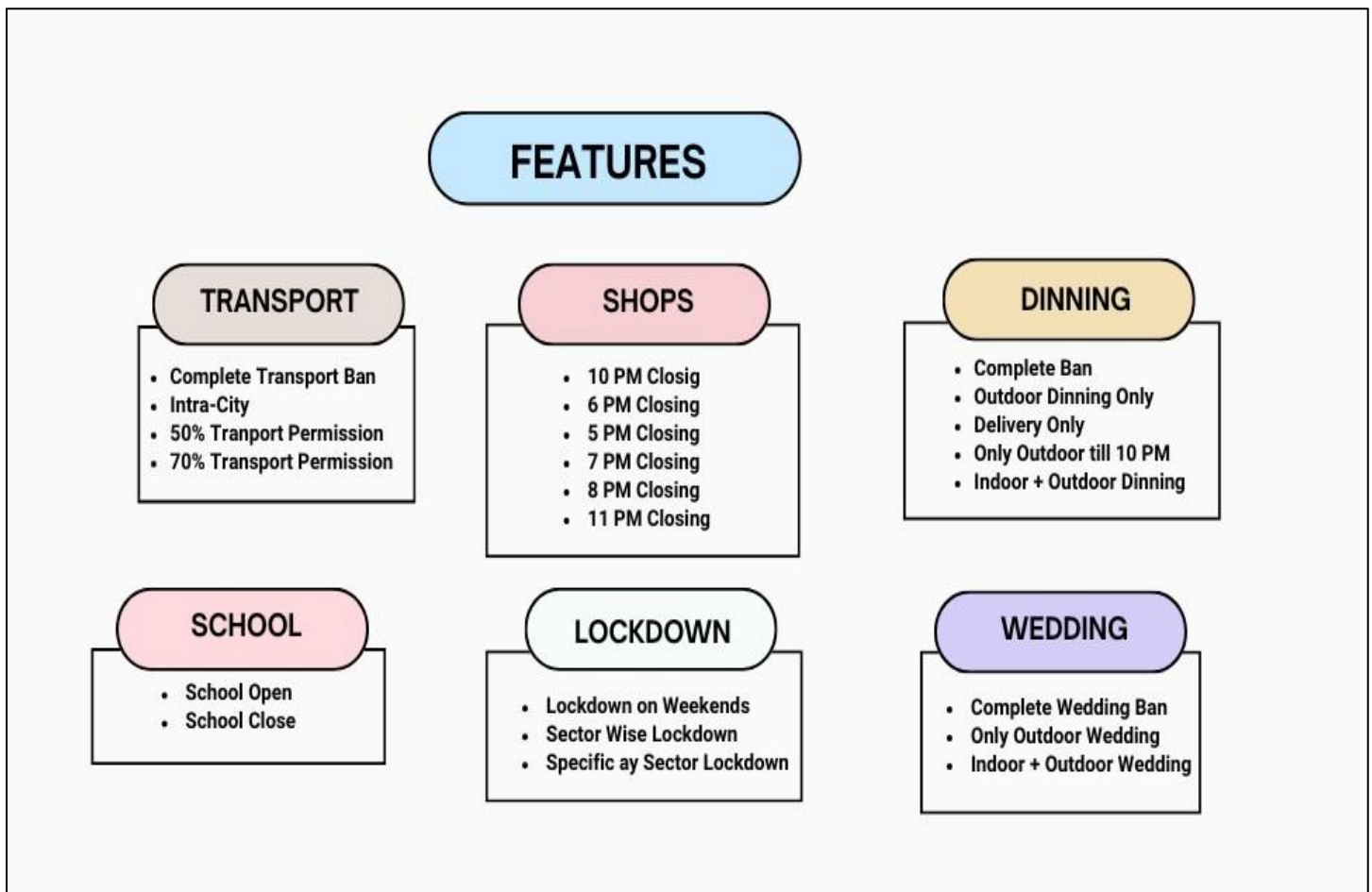


Fig 2: Lockdown Features

The effects of these features are further discussed in the next section. These features are according to the different restrictions imposed at other times due to decreased or increased cases.

III. METHODOLOGY

The dataset includes COVID-19 stats and the lockdown restriction data mentioned above. For the COVID-19 stats, we have collected data starting from March 2020 and ending in December 2021. The source of the data is the government website NCOC. At the same time, the lockdown data that we are observing is specifically for Islamabad, Pakistan. This data starts from March 2021 to September 2021, when a new lockdown phase was started in Islamabad after increased cases. This data is obtained from Twitter and other news sources. In these seven months, the government imposed several different types of restrictions

The table II shows the lockdown restrictions imposed by the government on the city of Islamabad. By observing the table, we can see that the limits imposed are different for different periods. These restrictions are by the situation of cases in the city. A complete lockdown was lifted before March 2021, and a partial lockdown was imposed in the town. Still, due to people’s incompetence in taking preventive measures, a rise in cases occurred. To handle this situation, the government had to impose an intelligent lockdown. As a third- world country, Pakistan could not afford another complete lockdown, so to handle the rising cases, the government had to come up with a plan for an intelligent lockdown. The smart lockdown was such that it was area-specific. A strict lockdown was implemented where cases were higher than in the other regions to contain them. Similarly, the lockdown restrictions were eased if the instances were lower in specific regions. This plan was followed throughout the country.

The lockdown features depicted in the figure 2 correspond to the lockdown restrictions depicted in the table II. Different restrictions at different time phases deduce these features or parameters.

Table 2: Covid-19 Restrictions in Islamabad

Mar 15th - 21st, 2021	10 PM Shops Closing, School Closed, Lockdown on Weekends, Only Outdoor weddings, Only Outdoor dining till 10 PM
March 22	10 PM Shops Closing, School Closed, Only Outdoor weddings, Only Outdoor Dining till 10 PM
Apr, 11th 2021	
Apr, 12th - 18th 2021	6 PM Shops Closing, School Closed, Sector- wise Lockdown, 50Percent Transport Permission, Complete Ban wedding, Dinning Iftar-11;59 PM (Ramzan)
Apr, 19th - 25th 2021	7PM Shops Closing, School Closed,50Percent Transport Permission, Complete Ban wedding, Dinning Iftar-11;59 PM (Ramzan)
Apr, 26th	8PM Shops Closing, School Closed, 50Percent Transport Permission, Complete Ban wedding, Dinning Iftar-11;59 PM (Ramzan)
May, 2nd 2021	
May 3rd - 9th, 2021	School Closed, Sectorwise Lockdown, Complete Transport Ban, Delivery Only
May 10th - 16th, 2021	School Closed, Complete Transport Ban, Delivery Only
May, 17th - 23rd 2021	School Closed, ,50Percent Transport Permission, Complete Ban wedding
May, 24th	School Closed, ,50Percent Transport Permission, Only Outdoor wedding, Outdoor Dinning Only
Jun, 6th 2021	
Jun, 7th - 20th 2021	School Open, ,50Percent Transport Permission, Only Outdoor wedding, Outdoor Dinning Only
Jun, 21st - 27th 2021	
Jun, 28th - 4th 2021	
Jul, 5th - 18th 2021	School Open, ,50Percent Transport Permission
Jul, 19th - 25th 2021	School Closed, Specific Day Sector Lockdown, In- door+Outdoor Wedding, Indoor+Outdoor Dinning
Jul, 26th	School Closed, Sector Wise Lockdown, 70percent Transport Permission, Indoor+Outdoor Wedding, In- door+Outdoor Dinning
Aug, 1st 2021	
August 2, - 8th 2021	School Closed, Specific Day Sector Lockdown, 70percent Transport Permission, Indoor+Outdoor Wedding, Indoor+Outdoor Dinning
Aug 9th - 15th, 2021	School Closed, Sector Wise Lockdown, 70percent Transport Permission, Indoor+Outdoor Wedding, In- door+Outdoor Dinning
Aug 16th - 22nd, 2021	Shops 5 PM Closing, Schools Closed, Lockdown on Weekends, 70percent Transport Permission, Only Outdoor Wedding, Outdoor Dining only
	Shops 6 PM Closing, School Closed, Lockdown on Weekends, 50Percent Transport Permission, Only Outdoor wedding, Outdoor Dining only

Aug 23rd - 29th, 2021	Shops 7 PM Closing, School Closed, Lockdown on Weekends, 50Percent Transport Permission, Only Outdoor wedding, Outdoor Dining only
August 30 Sep, 5th 2021	Shops 8 PM Closing, School Closed, Lockdown on Weekends, 50Percent Transport Permission, Only Outdoor wedding, Outdoor Dining only
Sep 6th - 12th, 2021	Shops 10 PM Closing, School Closed, Lockdown on Weekends, 50Percent Transport Permission, Only Outdoor wedding, Outdoor Dining only
Sep 13th - 19th, 2021	School Open, Sector Wise Lockdown, Transport Intra-city, Only Outdoor wedding, Outdoor Dining only
	11 PM Shops Closing, School Open, Sector Wise Lockdown, Intra-city Transport

IV. RESULTS

From March 2020 to December 2021, a total of 90 weeks in the pandemic. A constantly increasing trend in the daily confirmed cases can be seen in Figure 3. A total of 108,720 cumulative cases were reported in Islamabad.

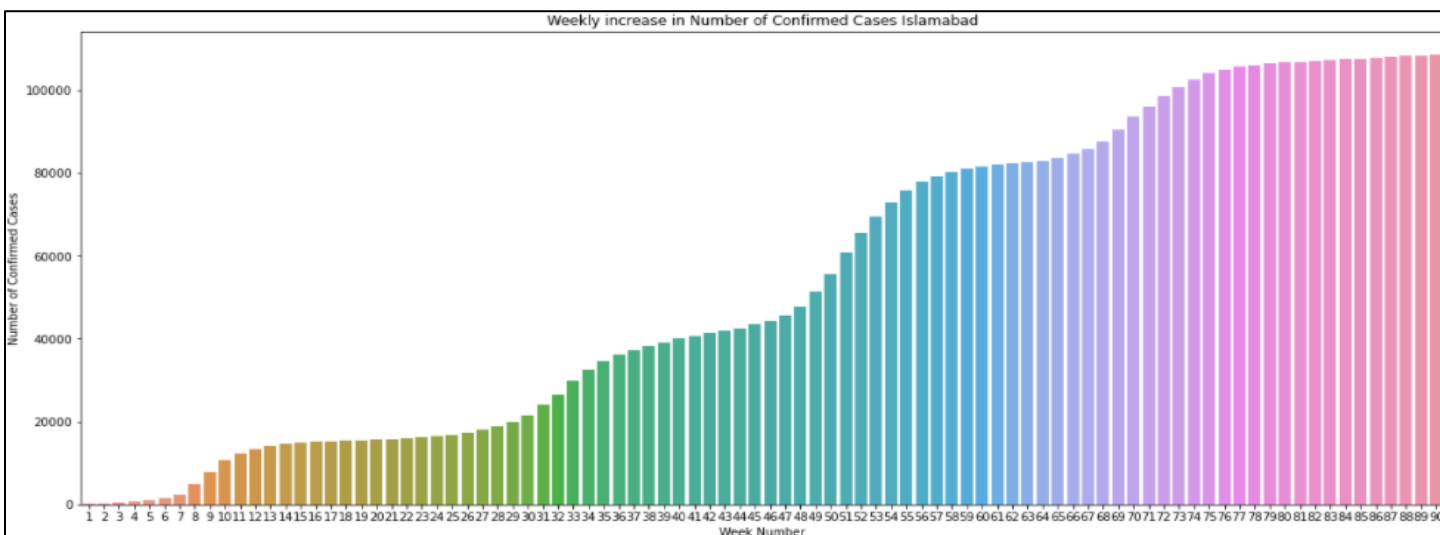


Fig 3: Weekly Increase in Number of Cases Islamabad (Cumulative)

Figure 4 shows a steadily increasing trend in daily confirmed cases. A total of 967 instances were recorded in Islamabad.

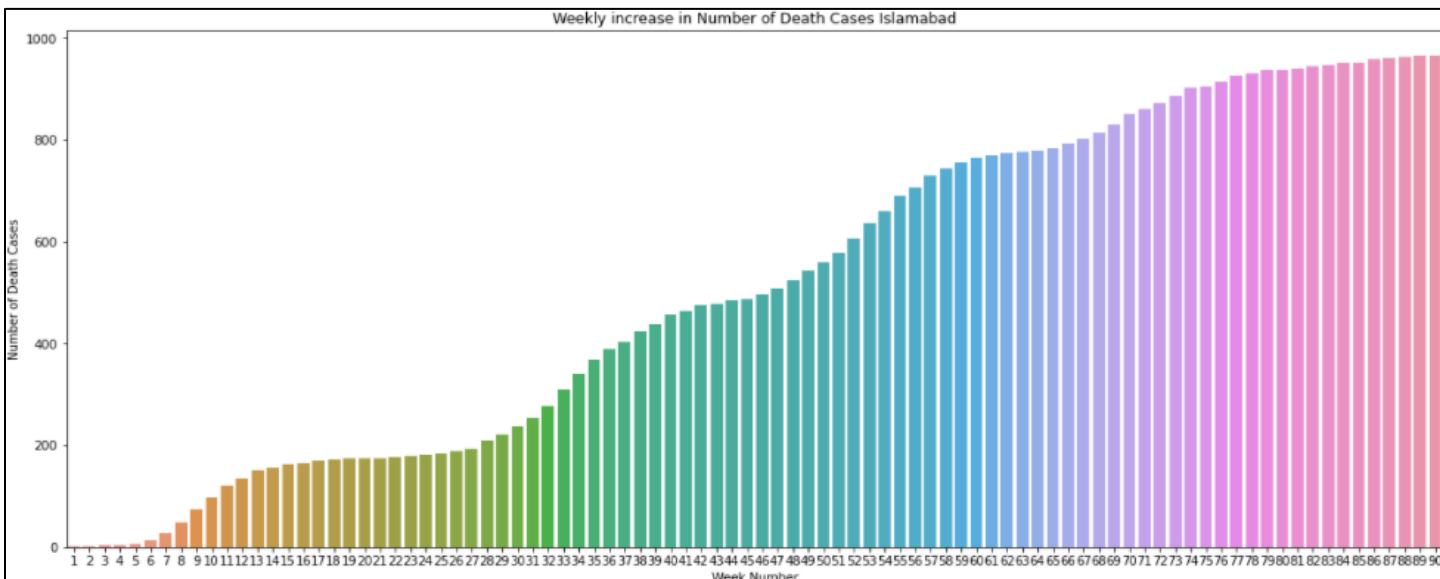


Fig 4: Weekly Increase in Number of Death Cases Islamabad (Cumulative)

Now, compare the results of all the lockdown features. The comparison is from March 2021 to September 2021. The comparison is that one graph shows the cumulative increase in cases with the restrictions, and the other graph shows the percentage difference with the limits. The percentage

differences show how, with different limits, there is a rise and fall in the number of cases. Figure 5 shows the limits on schools. Due to the increase in the number of cases, schools were closed and shifted to online, which caused a decrease in the number of cases in the following months.

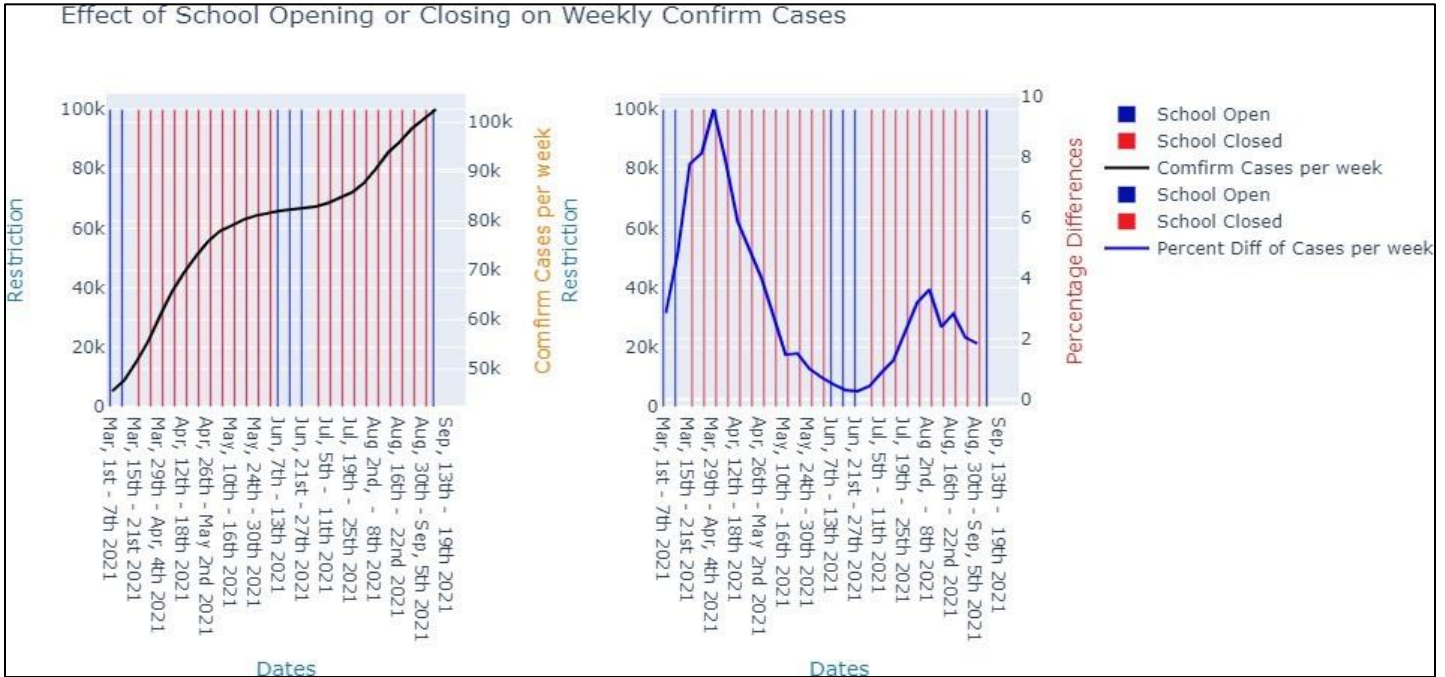


Fig. 5: Effect of School Opening or Closing on Weekly Confirm Cases

Figure 6 shows the effect of restrictions on shop closing times on the number of cases. In an increasing number of cases,

shops' closing times were reduced to force people to stay home.

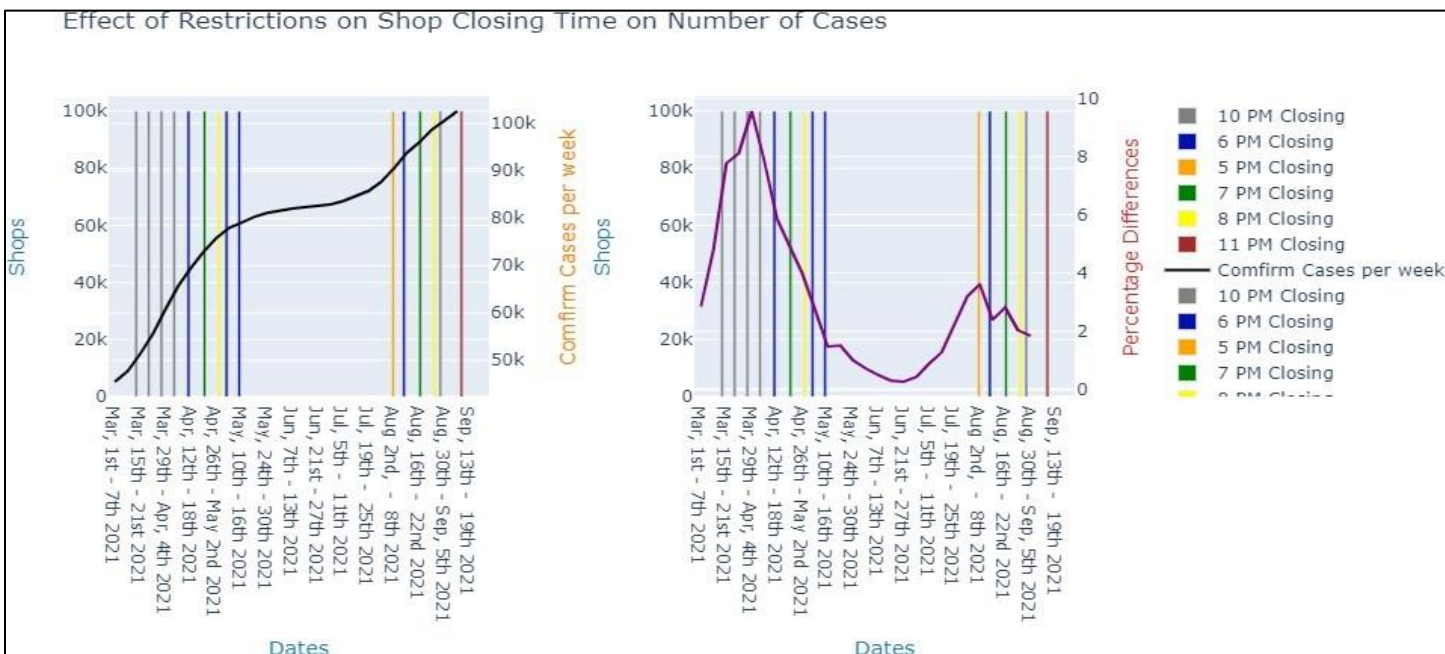


Fig. 6: Effect of Restrictions on Shop Closing Time on Number of Cases

➤ Figure 7 Shows the Effect of Restrictions on Transport on the Number of Cases.

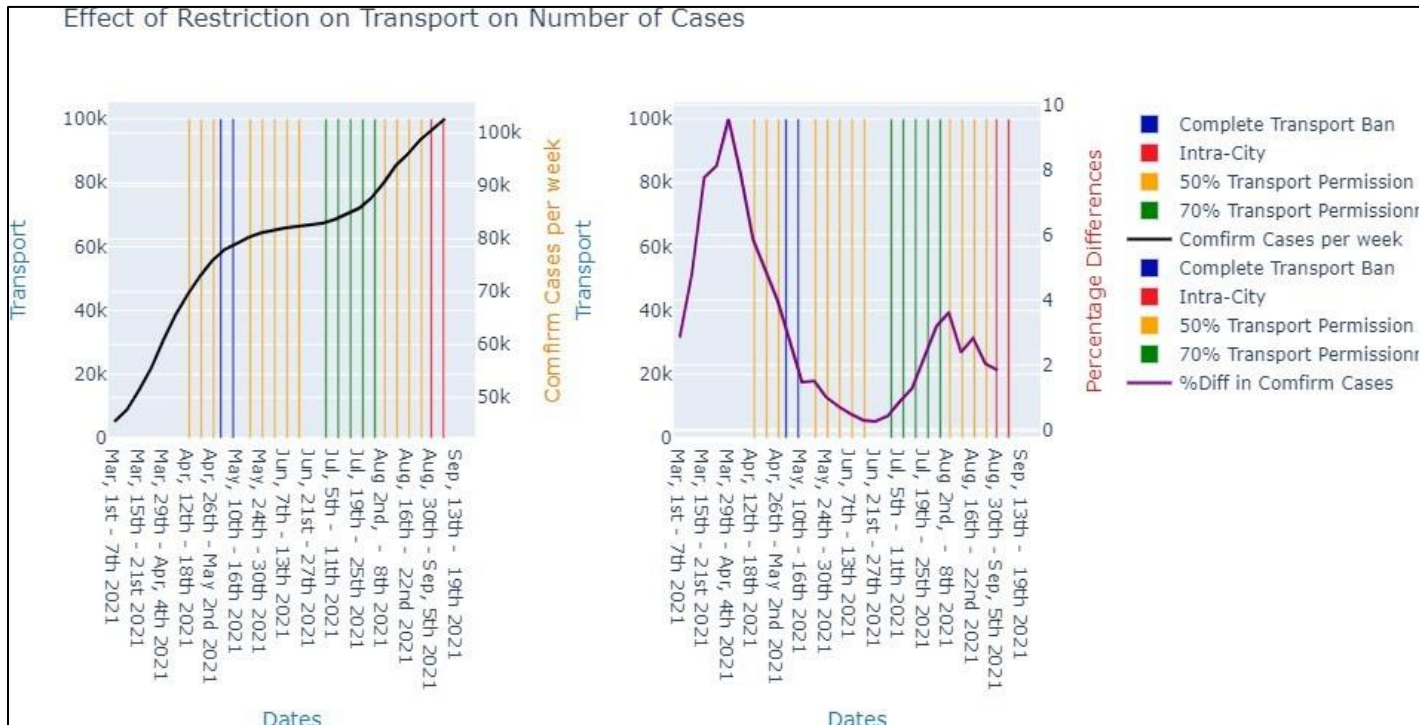


Fig. 7: Effect of Restriction on Transport on Number of Cases

➤ Figure 8 Shows the Effect of Restrictions on Weddings on the Number of Cases.



Fig. 8: Effect of Restriction on Wedding on Number of Cases

➤ Figure 9 Shows the Effect of Restrictions on Dining on the Number of Cases.

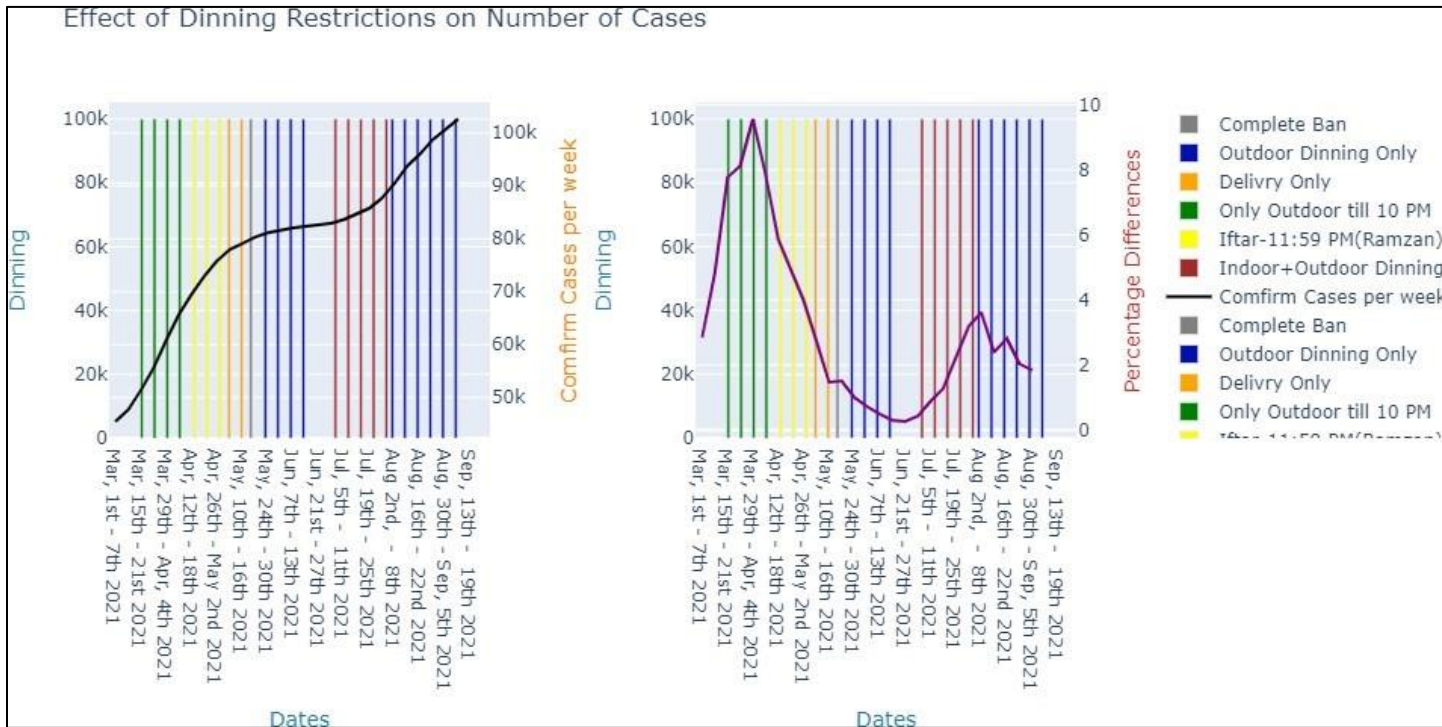


Fig. 9: Effect of Dining Restrictions on Number of Cases

➤ Figure 10 Shows the Effect of Different Restrictions on the Number of Cases.

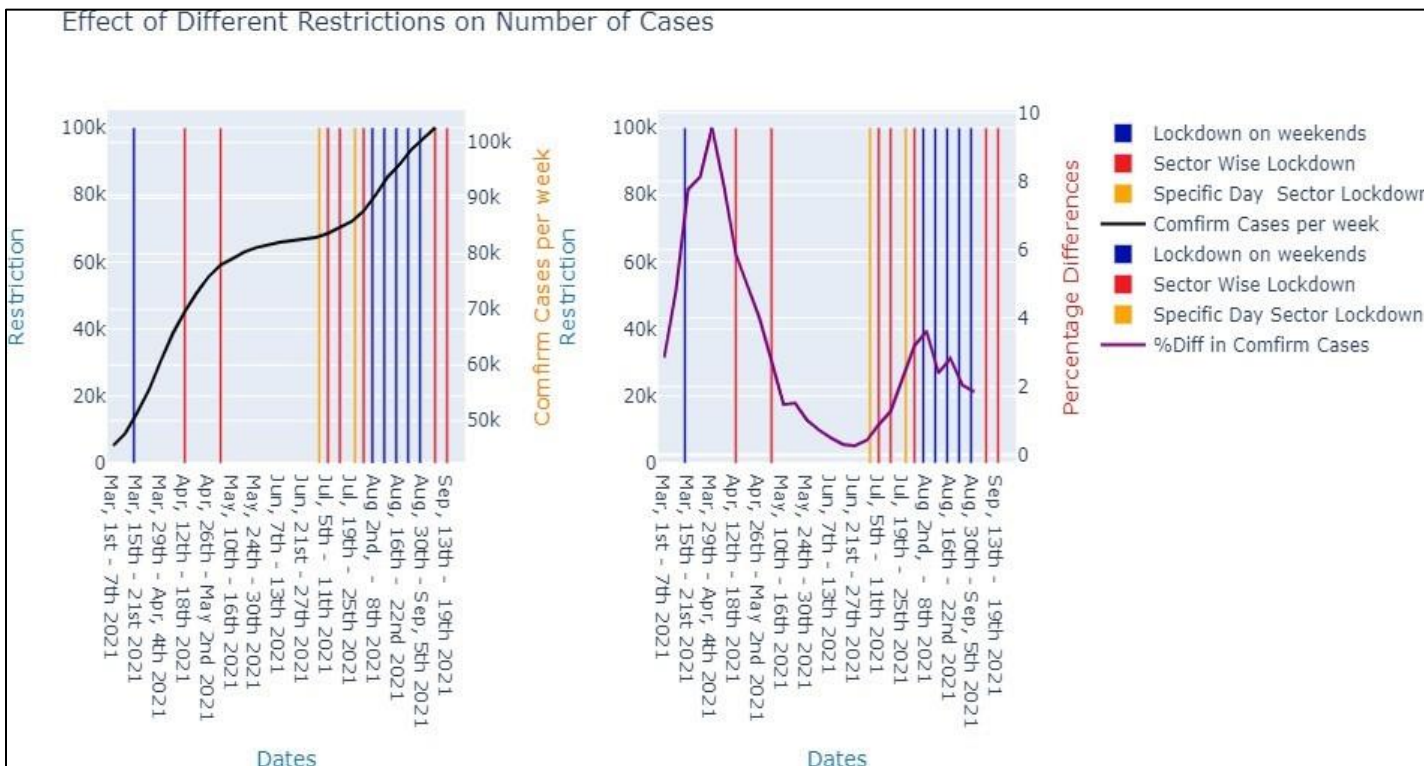


Fig. 10: Effect of Different Restrictions on Number of Cases

V. DISCUSSION

In February 2021, a strict lockdown was lifted, and most of the previously imposed restrictions were removed. This caused an increase in the number of cases in Islamabad in March, as shown in figure 11.

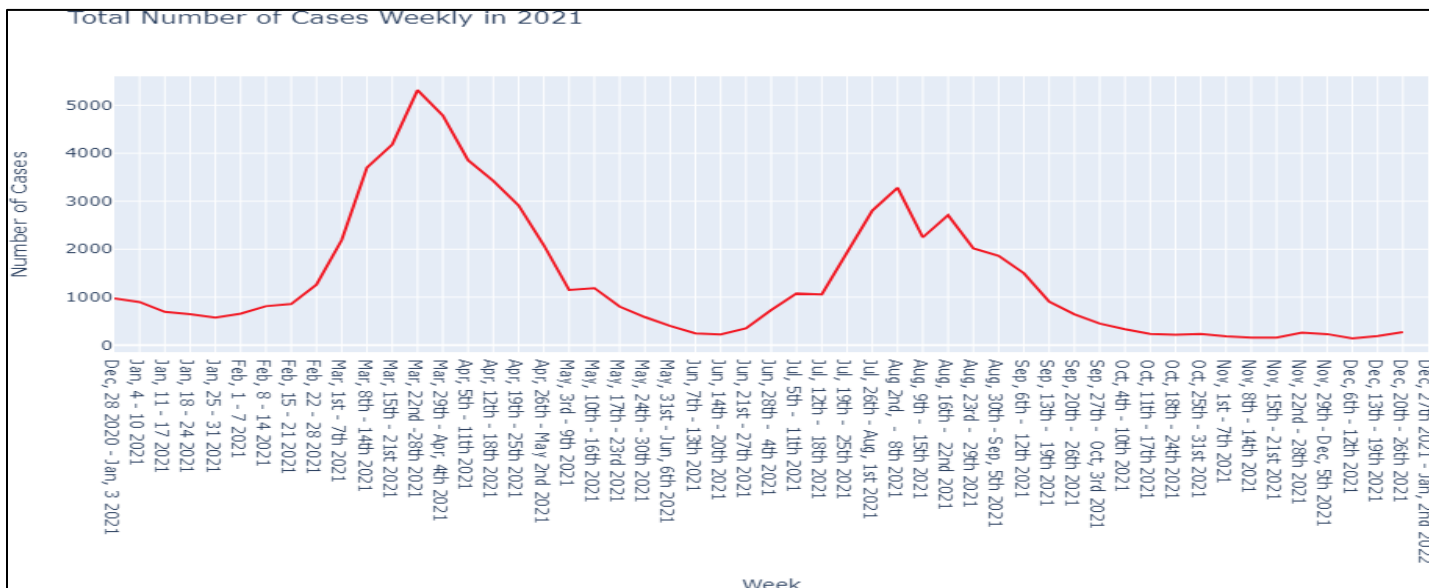


Fig. 11: Total Number of Cases Weekly in 2021

As the number of cases increases, so does the number of deaths, as shown in figure 12.

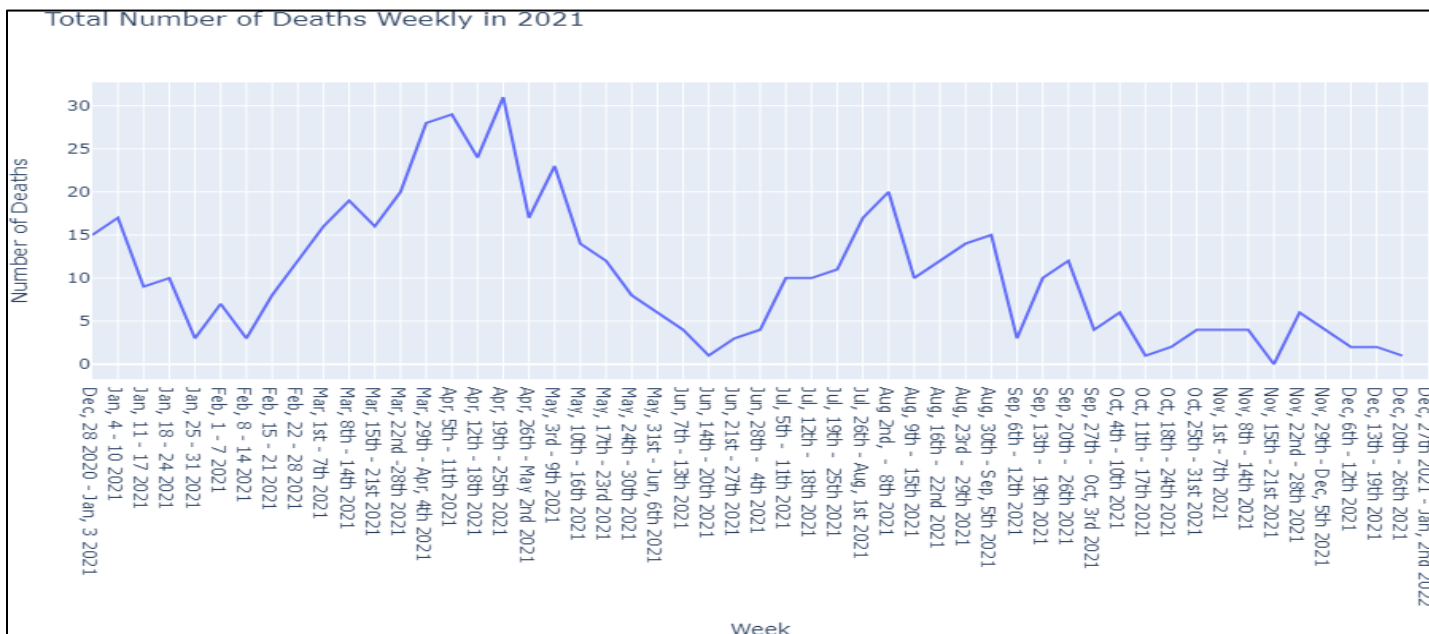


Fig. 12: Total Number of Deaths Weekly in 2021

The government had to take strict measures and impose a lockdown to handle this situation. But this time, it was not a complete lockdown, but an intelligent lockdown or partial lockdown that had to be imposed. As a developing country, Pakistan cannot afford a complete lockdown as most people are daily wagers. However, the decrease in restrictions caused an

increase in the number of cases. So, the government had to take measures against it effectively. For example, instead of closing down the whole city of Islamabad, the government proposed a sector-wise lockdown in the areas where cases were increasing or commercial areas where there was more rush than in residential areas.

If we compare all the results in the previous section, we can say that a lockdown is needed when the number of cases has increased. As with an increase in cases, this causes an increase in the number of deaths related to COVID-19. People

do not follow SOP regarding workplace cleanliness, use hand sanitizers and masks outdoors, and maintain social distancing. Figure 13 shows the percentage increase in cases in Islamabad, Pakistan, in 2021. The positivity rate peaked at 9.5%.

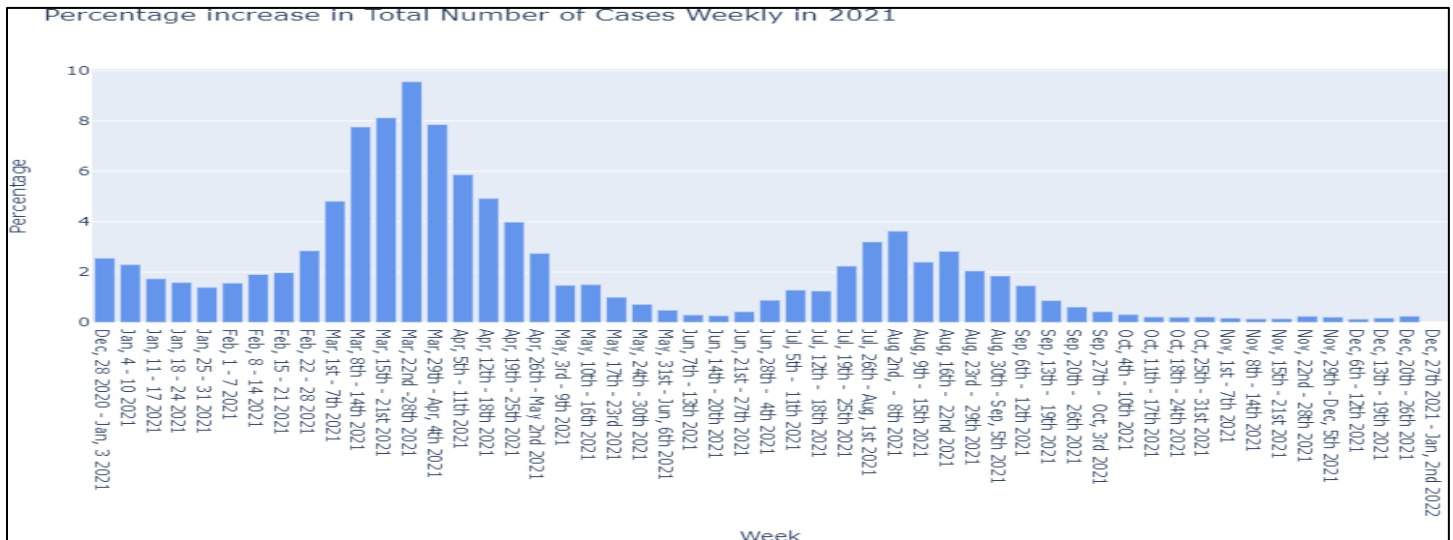


Fig. 13: Percentage Increase in Total Number of Cases Weekly in 2021

VI. CONCLUSION

For over two years, COVID-19 has been a part of our lives. When an infected person coughs, sneezes, speaks, sings, or breathes, the virus spreads in microscopic liquid particles from their mouth or nose. One can be infected by breathing these particles or touching them or by touching a contaminated surface and then your eyes, nose, or mouth. The virus spreads more easily indoors and in crowded settings. The most effective way to stop the spread of it is by washing your hands and keeping a social distance. Social distancing leads to lockdowns of places that are primarily crowded and can spread the virus in large numbers in a small amount of time. If we look at the results, the intelligent lockdown from March 2021 to September 2021 in Islamabad, Pakistan, effectively controlled the spread. The positivity rate peaked at 9.5%.

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