RESEARCH ARTICLE

Eurasian Journal of Medical and Biological Sciences
AN INTERNATIONAL JOURNAL
Eurasian J Med Biol Sci **5(1): 70-76**

Statistical Approach to Covid-19 for Future Implications with Reference to Pakistan

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Received : 10/01/2025 Revised : 11/05/2025 Accepted : 18/05/2025

ABSTRACT: COVID-19 was a serious health problem that caused many physical and psychological health consequences among the masses, particularly in Pakistan. This research study aimed to assess the total ratio of COVID-19 and its effects from 2020 to 2022 in Pakistan. The Autoregressive integrated moving average (ARIMA) model, as a statistical model, was applied, and thus time series data of the past three years were collected from the World Health Organisation (WHO) and the Pakistan Health Commission and examined. Based on an analysis of serious time data from the previous three years, from 2020 to 2022. Based on the data analysis, the researcher concluded that COVID-19 was a severe health concern that affected 1.5 million people in Pakistan in one year. In addition, the researcher also concluded that the death ratio of COVID-19 was lower in Pakistan than in other countries, according to the data coming from the globalCOVID-199 pandemic during the first three years. Similarly, based on the conclusion, the researcher recommended that preventive measures, such as cleanliness, using a balanced diet and exercise, should be performed to avoid COVID-19 and other chronic health complications.

Keywords: Covid-19, Pakistan, Statistical Approach, ARIMA.

INTRODUCTION

The outbreak of Covid-19 affected national and global health, education and economics. The world health organization declared Covid-19 as a worldwide pandemic. Millions of people were affected by Covid-19 in the last few years. Pakistan is a developing country, and thus, Covid-19 negatively influence the education, economy and health status of the people in Pakistan. On February 26, 2020, Covid-19 was 1st time reported in Karachi and Islamabad (Abid et al., 2020). Pakistan is one of the overpopulated countries. Karachi, Lahore and Islamabad are overpopulated cities in Pakistan and thus most of the people of these three cities were affected due to being affected by Covid-19 (WHO, 2020).

Pakistan is not stable in terms of education, health and economy. Due to Pakistan's present economic, educational and healthcare conditions, A level 3 warning for foreign visitors to Pakistan has been issued by the Disease Control and Prevention Centre (CDPC, 2020). The application of safety measures is essential for avoiding Covid-19 and other health problems. To prevent and controlling the severity of Covid-19, it is the prime responsibility of stakeholders to implement safety measures among the masses. In the beginning of this global health concern, 4601 confirmed death cases were reported in Pakistan (PG, 2020).

According to The United Nations Conference on Trade and Development report states that Pakistan was affected by the worldwide pandemic Covid-19 (Siddiqui, 2020). According to the report of the Pakistan Labor Force Survey of 2017-2018, the rate of unemployment is 5.8 % (UNDP, 2020; Sohail, 2022). The author further stated that due to the outbreak of this global pandemic, the unemployment rate has increased and reached 8.1 in the last two years.

Covid-19 caused different psychological problems, and these problems may endure even after the eruption is ended. Due to the high psychological impact of covid-19, it is the need of the day to provide psychological bits of help to people (Edwards et al., 2020; Lazzari et al., 2020; PG, 2020; Siddiqui, 2020; UNDP, 2020; Dai et al., 2021; Sohail, 2022). Adapting safety measures such as social distancing, avoiding social gatherings, using face masks, and regular washing of hands can help us avoid the problem of Covid-19 (Siddiqui, 2020; Unger and Meiran, 2020; Madan et al., 2021; Sohail, 2022).

Keeping in view the above critical analysis of different issues of Pakistan and Covid-19 as a global health issue, the researcher intend to conduct a research study under the title “Statistical approach to Covid-19 for future implications concerning Pakistan.”

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This particular research study was carried out to find out the answer of the following questions; What was Covid-19 in real nature? How many people were affected by Covid-19 in Pakistan from 2020 to 2021? How much does Covid-19 affect the education, health and economy of Pakistan? This research study will helps in the clarification of concepts about the fact and figures about Covid-19 in Pakistan through the application of statistical models for one year period.

MATERIALS AND METHODS

In this study, the time series data was taken to accrue the required results of the investigation. Time series is a type of data concerned with a series of equal time segments. This type of data is helpful in prediction and forecasting. With the help of such data, a researcher can forecast when the under-study problem may occur and at what intensity. So remedial measures and proper planning become possible to tackle the problem. Stationarity of the time series data is very important for obtaining valid results from the time series data. In the present study, the Augmented Dicky Fuller (ADF) test was used to check the stationarity of the data. The augmented Dicky Fuller (ADF) test is a statistical tool to check that the weather the time series data using in the estimation process is stationary or not stationary? If the data is not stationary, then the researcher is unable to obtain significant results from the data. The unit root is a characteristic of time series data, making it not immobile. So with the help of ADF, it was checked whether there was a unit root in the data or not. And if there a unit root exists, then appropriate steps are taken to make it stationary. The expression below was used to explain the study.

$$Y_t = \alpha Y_{t-1} + \beta X_e + \varepsilon$$

In the above expression Y is the time series at period t while Xe is the time series explanatory variable.

In the present study, with the help of available time series data obtained from WHO and PHC and the ARIMA model was used to predict and forecast the future. ARIMA model is one form of regression analysis with the help of which the association strength of the dependent and independent variables can be estimated. And in this way, the future movement of the data can be predicted using the differences in the value of the variables included in the model.

Generally, the ARIMA models convert Non-stationary data into static data, and then the static data is used to predict the required future value. In the ARIMA model Autocorrelations, Regression and moving averages are used to predict and forecast the necessary future values. In the ARIMA model, the dependent variable is always stationaries, and the independent variables consist of the lag values concerning the dependent variable. Expression equation was given below:

$$Y_t = c + ay_{t-1} + e_t$$

In the above expression equation, dependent and independent variables were used.

RESULTS AND DISCUSSION

The graph shows the total number of cases of Covid is demonstrated (Figure 1). On the x-axis, dates are taken, while at the Y-axis number of cases is taken. According to the graph, no single point of covid detected in Pakistan until February 25, 2020.

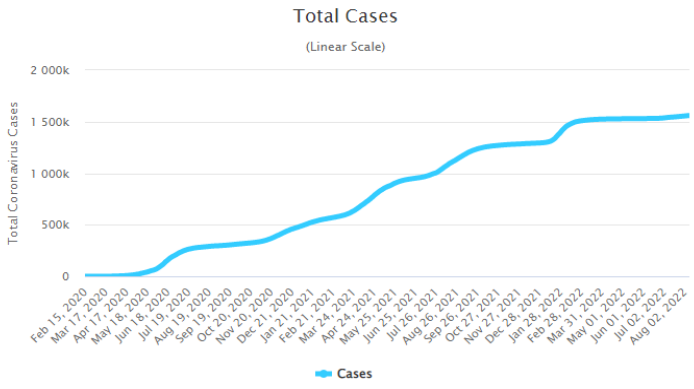

Figure 1. *Total Cases of Covid-19 from 2019 to 2021*

After that, patients began to start, and on January 11, 2021, the total number of Covid crossed the figure of 5 Lacs. On July 23, 2021, the total number of Covid cases crossed the figure of 10 Lacs, and on February 21, 2022, the number exceeded 15 Lacs and crossed the sculpture of 15.5 Lacs on August 2, 2022.

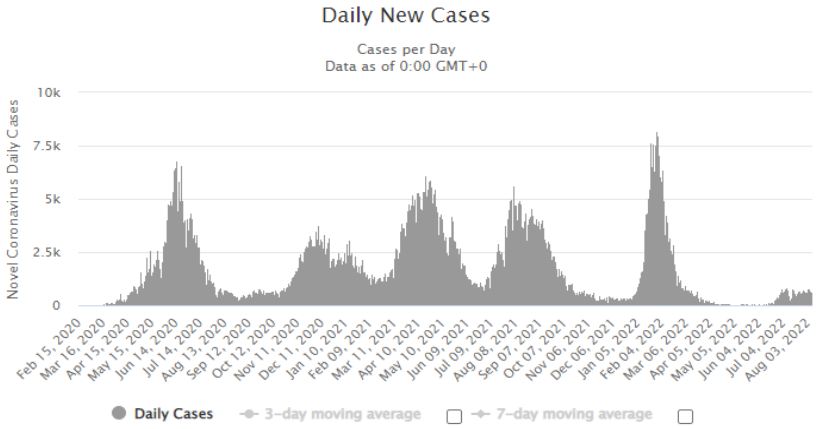

Figure 2. *Daily Cases of Covid-19 from 2020 to 2021*

The number of daily new cases was shown in the above graph (Figure 2). The first case of Covid was detected in Pakistan on Feb 27, 2020, reaching 6825 daily points on June 14, 2020. And decreased to less than 300 daily cases in September 2020. And in Dec 2020, everyday issues again raised to more than 3500 on daily basis. On April 18, 2021, more than 6000 new cases were registered. The highest figure for the daily cases was on Jan 28, 2022, when more than 8000 cases were recorded. And again, in May and June 2022, Pakistan's day-to-day issues were at the lowest rate.

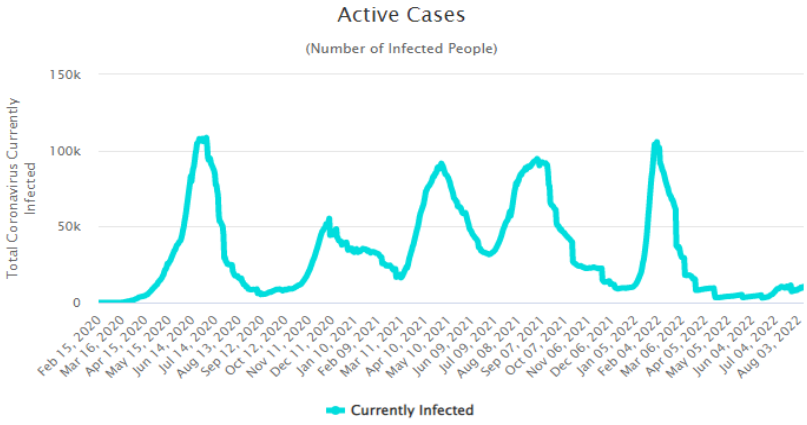

Figure 3. *Total Active Cases of Covid-19 from 2020 to 2021*

The above graph shows the daily active cases of Covid in Pakistan (Figure 3). The active cases started on Feb 2, 2020, and reached maximum active points on June 23, 2020, to a figure of 107723 active cases. On September 13, 2020, the total number of active cases was 5424 and increased to 53126 on December 06, 2020. On March 09, 2021, the active cases decreased to 16 349 and rose to 91547 on April 30, 2021. On Dec 24, 2021, the figure dropped to 9529 active cases and again increased to 104045 on Jan 31, 2022. Once again, the number of active instances decreased; on Aug 12, 2022, the total number of active cases was 10324.

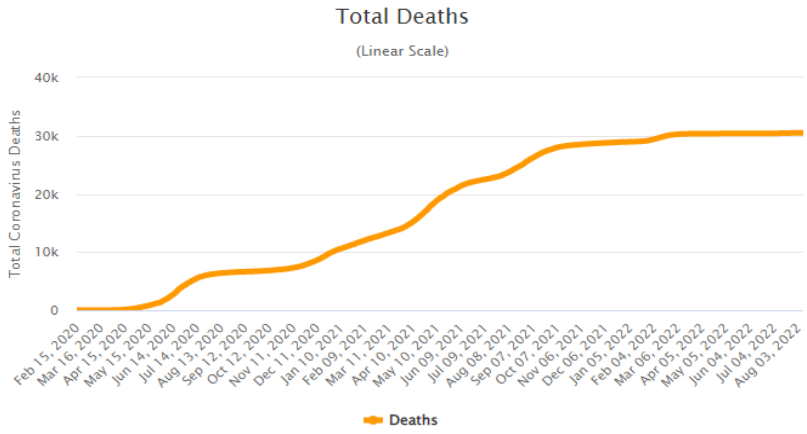

Figure 4. *Death Cases of Covid-19 from 2020 to 2021*

The above graph shows the total number of deaths caused due to Covid in Pakistan (Figure 4). The first death due to covid in Pakistan was recorded on March 18, 2020, and the number of deaths raised to 6000 on July 25, 2020. The number of fatalities cross the figure of 15000 on April 07, 2021, and on Aug 24, 2021, the toll crossed the 25000 figure. On Feb 20, 2022, the number of deaths due to Covid in Pakistan reached 30000 and recent figure showed 30500 deaths in Pakistan since the start of the Covid Pandemic (Figure 4).

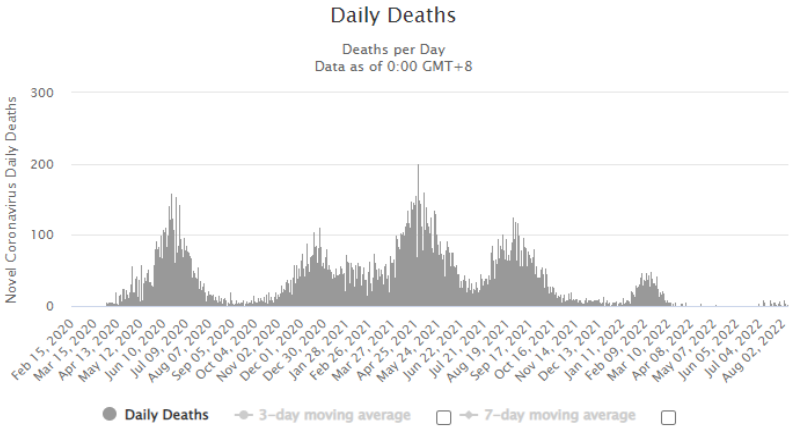

Figure 5. *Total Daily Death Cases of Covid-19 from 2020 to 2021*

The above graph shows the number of daily deaths in Pakistan due to Covid (Figure 5). The first death due to Covid was recorded on March 18, 2020, on June 20, 2020 total of 159 persons died due to Covid. On April 28, 2021, 201 persons died, the highest number in one day during the pandemic. On August 25, 2021, the number of deaths was 126, and now, on August 12, 2022, a total of 11 persons died due to Covid (Figure 5).

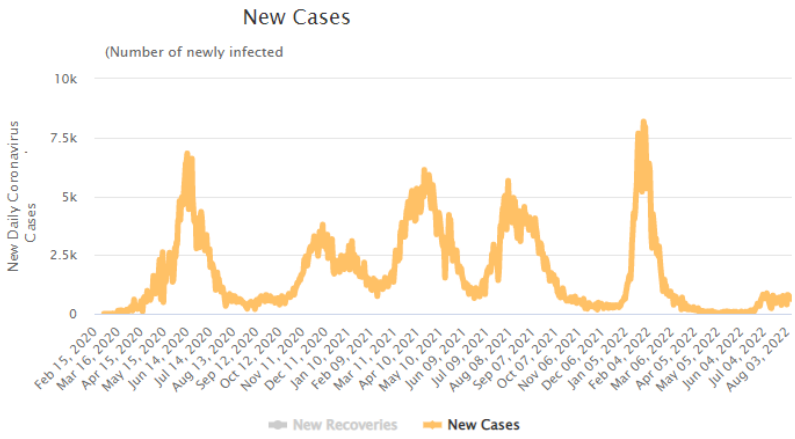

Figure 6. *Total New Cases of Covid-19 from 2020 to 2021*

As the Covid starts in March 2020 in Pakistan, and initial cases were detected at the beginning of March and reached 6397 daily cases on June 12, 2020. After that, the daily cases trend decreased to 213 on August 31, 2020 (Figure 6). Similarly, on Dec 07, 2020, the number of new cases was 3795, and 747 new cases were recorded on Feb 16, 2021. Once again, the covid cases raised and reached 6127 cases on April 18, 2021, and again dropped to 303 daily new cases on Nov 28, 2021. After the start of the year 2022, once again, the Covid cases increased on daily bases and reached 8183 new cases on June 28, 2022. Besides, the intensity of cases decreased; on Aug 12, 2022, the number of new Covid cases was 624 (Figure 6).

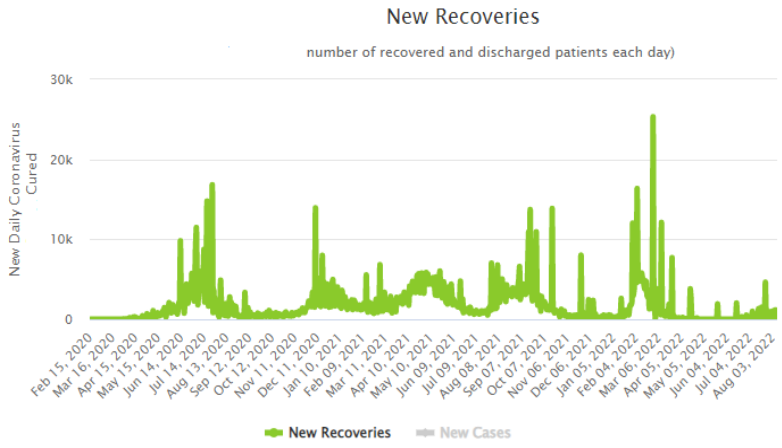

Figure 7. *Total New Cases of Covid-19 from 2020 to 2021*

The first recovery cases from Covid in Pakistan was recorded on March 10, 2020 and then the recovery process paced up and reached to daily recovery of 16813 on July 20, 2020. After that the number of recoveries decreased and 318 affected persons were recovered on Sep 29, 2020. The recovered cases raised to 14600 on Dec 10, 2020. On July 28, 2021 total 7020 persons were recovered from Covid and this figure reached again to 13716 on Sep 17, 2021. The highest recovery figure was achieved during the pandemic was 25313 persons which was on Feb 26, 2022. And on Aug 11, 2022, 211 persons were recovered from Covid (Figure 7).

The results show that the highest recovery figure achieved during the pandemic was 25313 persons on Feb 26, 2022. And on Aug 11, 2022, 211 persons recovered from Covid. Thus the result also shown that on Feb 20, 2022, the number of deaths due to Covid in Pakistan reached 30000, and the recent figure show 30500 deaths in Pakistan since the start of the Covid Pandemic. Such emerging findings are supported by (Kamran and Ali, 2021), conclusion that fatal coronavirus increased manifold in Pakistan. An average of 100 death cases per day were recorded in late spring of 2021.

The main reason for this entire situation is the late introduction of covid-19 vaccinations. This global health problem makes it clear that health, economy and human development are the interlinked parameters of our daily life (Mukarram, 2020; Shulla et al., 2021). Low literacy rates and lack of awareness are leading factors responsible for the spread of covid-19 worldwide (Senjam, 2020; Kanozia and Arya, 2021). TThe virus may spread more easily in Pakistan's big cities due to their dense

populations. To stop community transmission, which is the primary cause of an exponential rise in cases, a three-pronged strategy of trace, test, and treat must be actively implemented (Noreen et al., 2020). Although COVID-19 spread rapidly in Pakistan, the number of cases recorded was low as compared to other nations. The main reason was the implementation of safety measures, but the risk may increase in future if we fail to implement safety measures among the masses (Abid et al., 2020; Nawaz et al., 2020; Shafi et al., 2020).

CONCLUSION

Based on data analysis, the researcher concluded that a very little ratio of total population of Pakistan is effected by COVID-19. In addition, the researcher also concluded that the death rate of COVID-19 was lower in Pakistan as compared to other countries. Based on data analysis and conclusion, the researcher recommended that preventive measures, such as cleanliness, a balanced diet and hard work for earning, should be applied to avoid COVID-19 as well as other chronic health complications. In addition, most people become victims of many psychological health consequences due to fake reports on social media about COVID-19. Therefore, it is recommended that the government take severe steps against those unreliable public media channels.

ACKNOWLEDGEMENTS

None

CONFLICT OF INTEREST

No conflict of interest was declared by the authors.

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