
COVID-19 Epidemic Spread and the Impact on Public Health & Safety Policy: An Analysis of the Adoption of Preventive Measures and Effective Management: Evidence from Pakistan

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Abstract

Many severe pneumonia cases were reported at the end of December 2019 in Wuhan city, Hubei province of China. The Center for Disease Control China (CDC) collected the samples, diagnosed the disease and named it as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2). Later on, it was named as COVID-19 by World Health Organization (WHO). After China, it has rapidly spread all over the world, affecting almost 216 countries including Italy, Germany, Russia, Brazil, USA, UK, Spain, Indonesia, India, Turkey, and France. According to an estimation of overall COVID-19 cases, 5.8 million (5,819,962) people got infected while 0.36 million (362,786) lost their lives across the world. It is spreading in Pakistan as well, and being a developing country, many challenges are being faced, such as limited resources, lack of medical facilities, low poverty rate, uneducated people, poor hygienic conditions or habits and unawareness. Pakistan has a very low level of resources & fighting conditions; fortunately, Pakistan has 92% of recovery rate of the COVID-19 cases as compared to other developing countries. The Central & Local governments in Pakistan have implemented many preventive and safety measures to completely eradicate the corona transmission through the effective utilization of organized task force, quick mitigation response policy, and strengthening the abilities to fight against COVID-19. This study highlights the current situation in the country with a focus on the province of Punjab, to notice the total number of COVID-19 cases & analyse the effectiveness of preventive measures taken as a quick response by the provincial governance for public health & safety. Analysing the overall situation in country, a total of 286,674 confirmed cases, including 16,475 active, 6139 deaths, and 264,060 recoveries (92%), were reported. While, in the province of Punjab, 94,805 cases were reported including 2,179 deaths and 86,389 (91%) recoveries. The study reveals that strict compliance and enforcement of government policies through effective leadership, and unity at public level led to better control the pandemic spread. The impact of social distancing and protective measures in confronting the epidemic COVID-19 in Pakistan could also be used as a tool for combating coronavirus in other developing countries having equal working performance and similar financial limitations.

Keywords: COVID-19 Pandemic, Prevention Measures, Governance Response, Public safety Policy. 151 Days Survey, Pakistan

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1. Introduction

In late Dec 2019, impenetrable 27 severe Pneumonia cases were reported in the mainland city of China, Wuhan (Hubei Province). All infected cases were linked to the wholesale seafood market in Wuhan where fish, poultry, snake, bat, and marmots were traded commonly. The Chinese Centre of Disease Control (CCDC) approached the infected cases, and collected the samples through cotton swabs on 7th Jan 2020, and subsequently named the virus as Severe Acute Respiratory Disease Coronavirus 2 (SARS-COV-2), later named as COVID-19 by World Health Organization (WHO) (Ha et al., 2020). It belongs to coronavirus family and consists of small size diameter of 65-125 nm as well as enclosed with single-stranded ribonucleic acid (RNA) material that contains 26-32 kbs in length. It has a crown-like appearance on the upper surface that is the reason it is designated as coronavirus. There are two types of virus (less and more lethal virus) such as: alpha (229e and NL63) and beta (OC43 and HKU1) virus, known as a less lethal virus; and Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) coronavirus, known as a more lethal virus (Yang et al., 2020). The current COVID-19 is also a more lethal virus. The estimated prevalence of coronavirus is different on different materials such as: 3-4 hours in aerosol, 3 days on plastic, up to 2 days on stainless steel or cardboard, and up to 8 hours on copper. If people touch such materials, they would either infect themselves or might spread it to others. Epidemic Coronavirus can be categorized into possible three phases: Phase 1, patients have no symptoms with or without detection of the virus; Phase 2, patients have symptoms but not severe, with limited virus detection; Phase 3, patients have more severe symptoms with high detection of virus load (Wang et al., 2020). The COVID-19 is SARS that existed in the past as well. There were other SARS syndromes, such as an outbreak of SARS corona virus-2002, that was spread in Guangdong province of China. Likewise, MERS-2012 had spread in Saudi Arabia. During the initial stage, civets palm food was considered as causative host for SARS-2002 but later on, bats were also considered as causative agents for MERS-2012. Their description is presented in Table 1. Several

unreliable statements or hypotheses are circulating to make a close connection between coronavirus and weather conditions but there is not a single study to support or prove such a hypothesis or statements. Some people consider that Influenza, humidity, and dry environment conditions are more feasible for transmission of flu than cold weather. It was reported that the epidemiological model is consistent with previous studies in the USA and Vietnam (Ceraolo & Giorgi, 2020; Chinazzi et al., 2020).

The countries (like Pakistan and Saudi Arabia) with hot weather conditions and extreme level of solar radiations have fewer chances of COVID-19 transmission as compared to some other developing countries in Asia. The sign and symptoms of COVID-19 observed in the infected patients include mild fever, sore throat, and dry cough but some of patients reported fatal symptoms like severe pneumonia, septic shock, pulmonary edema, organ failure, and Acute Respiratory Distress Syndrome (ARDS) abdominal pain, shortness of breath, anorexia along with other comorbidities such as endocrine, cardiovascular, respiratory, digestive, and cerebrovascular diseases. The WHO declared the health emergency on 30 Jan 2020 all over the world to minimize the spread of this virus as well as optimize the prevention and treatment. Many efforts had been made such as European Union (EU) fixed €10,000,000 research fund for early detection and preparedness for the virus, UK announced £20,000,000 for developing a vaccine, and China confirmed ¥150 billion to stabilize the market Crises (Sanchez-Caballero & Selles, 2020). WHO declared on 11 March 2020 that the novel coronavirus is globally pandemic and briefed to all countries to establish guidelines and SOPs in controlling the spread of coronaviruses, such as enforcing prevention and symptomatic treatment protocol, early screening, detection and isolation, and establishment of quarantine facilities (Rothen & Byrareddy, 2020). According to WHO, a total number of 5,819,962 confirmed cases and 362,786 deaths were reported worldwide till 30 May 2020 (WHO, 2020a).

Table 1. Comparison of SARS-CoV, MERS-CoV and SARS-CoV-2 (Lupia et al., 2020).

Disease Name	Severe Acute Respiratory Syndrome Corona Virus (SARS-CoV)	Middle East Respiratory Syndrome Corona Virus (MERS-CoV)	Severe Acute Respiratory Syndrome Corona Virus-2 (SARS-CoV-2)
Symptoms	Fever, cough, breathing difficulties, sore throat, muscle pain, headache, lethargy, diarrhea, and shivering	Fever, cough, shortness of breath, muscle pain, abdominal pain, and vomiting	Fever, cough, shortness of breath, pneumonia, and breathing difficult
Origin	China (Guangdong)	Saudi Arabia	China (Wuhan)
Emergence	July 2002	Dec 2012	Dec 2019
Receptor	ACE2	DPP4 (CD26)	ACE2 (most probably)
Primary host	Bats	Bats	Bats (most probably)
Intermediate host	Civet cats and Raccoon dogs	Dromedary camels	Yet not identified
Duration	2002-2003	2012-2020	Dec 2019- to date
Countries affected	29	26	216
Infected people	8098	2506	5,819,962
Fatality rate	10%	35%	About 6.18%
Mortality rate	776	862	362,786

Corona's first case was reported in Pakistan on 26 Feb 2020 and it is rapidly spreading across the country especially in the Province of Punjab. Pakistan is a developing country and financially not very strong as compared to other developed countries. Pakistan has four provinces including Punjab, Sindh, KPK and Baluchistan. In addition, two autonomous territories of Azad Jammu & Kashmir and Gilgit-Baltistan are part of Pakistan (National Institute of Health, 2020a). On 31 March 2020, a total of 2039 confirmed cases and 26 deaths were reported by Government of Pakistan. However, after a month, the number of cases rapidly increased, as on 1st May 2020, 18,114 confirmed cases, 417 deaths and 4715 recovered cases were reported. While on 21st May, 50,694 confirmed cases, 1067 deaths and 15201 recovered cases were reported across the country. As of 30 May 2020, a total of 69,496 cases were reported across the country, including 42,742 active, 1483 deaths, and 25,271 recoveries (WHO, 2020b). This research investigates the current situation in Pakistan due to Coronavirus with a focus on province of Punjab. The Punjab has an area of 205,344 sq km and 110 million populations. It has 36 districts and Lahore is the provincial capital which is the largest and most famous city of Punjab. It is also known as the heart of Pakistan. According to the availability of various facilities & State functions, it can be divided into upper and lower Punjab. We have collected the data of upper and lower Punjab's districts that are crucially affected by the current epidemic. The total number of affected cases in upper Punjab areas are: Lahore (50273), Rawalpindi (8967), Faisalabad

(7288), Gujranwala (10033), Sargodha (2438), Gujranwala (10033) and recovered cases are: Lahore (46562), Rawalpindi (7504), Faisalabad (6945), Gujranwala (9320), Sargodha (1953), Gujranwala (9320). While in lower Punjab, the most affected districts as per COVID-19 cases are: Multan (7301), Dera Ghazi Khan (3323), Rahim Yar Khan (277), Bahawalpur (3515). Overall, there were 94,805 total cases along with 2,179 deaths and 86,389 recoveries in Punjab till August 12, 2020 (Govt of Punjab, 2020). The distribution of confirmed, recovered and death cases (division wise) in Punjab is shown in Figure 1.

Before the corona outbreak in Pakistan, the Ministry of National Health Services, Regulation & Coordination (M/O NHSC), Government of Pakistan has presented a National Action Plan (NAP) for preparedness and response to tackle the corona outbreak in the country. The government has implemented many plans for how to perform detection, isolation, and handling of corona patients. The NAP introduced guidelines and SOPs for waste management and infection, prevention and control (National Institute of Health, 2020c). Meanwhile, laboratories, hospitals, and quarantine centers were established at national and provincial levels, according to WHO protocols and Chinese health care guidelines. Pakistan has implemented strict lockdown in the national interest to control the spread of pandemic across the country particularly in province of Punjab.

The government announced complete lockdown from 24 March to 9 May 2020. Except food market and pharmacies, all academic institutions,

restaurants, shopping malls, all flights operation, and borders were closed until further orders (Gulf News, 2020).

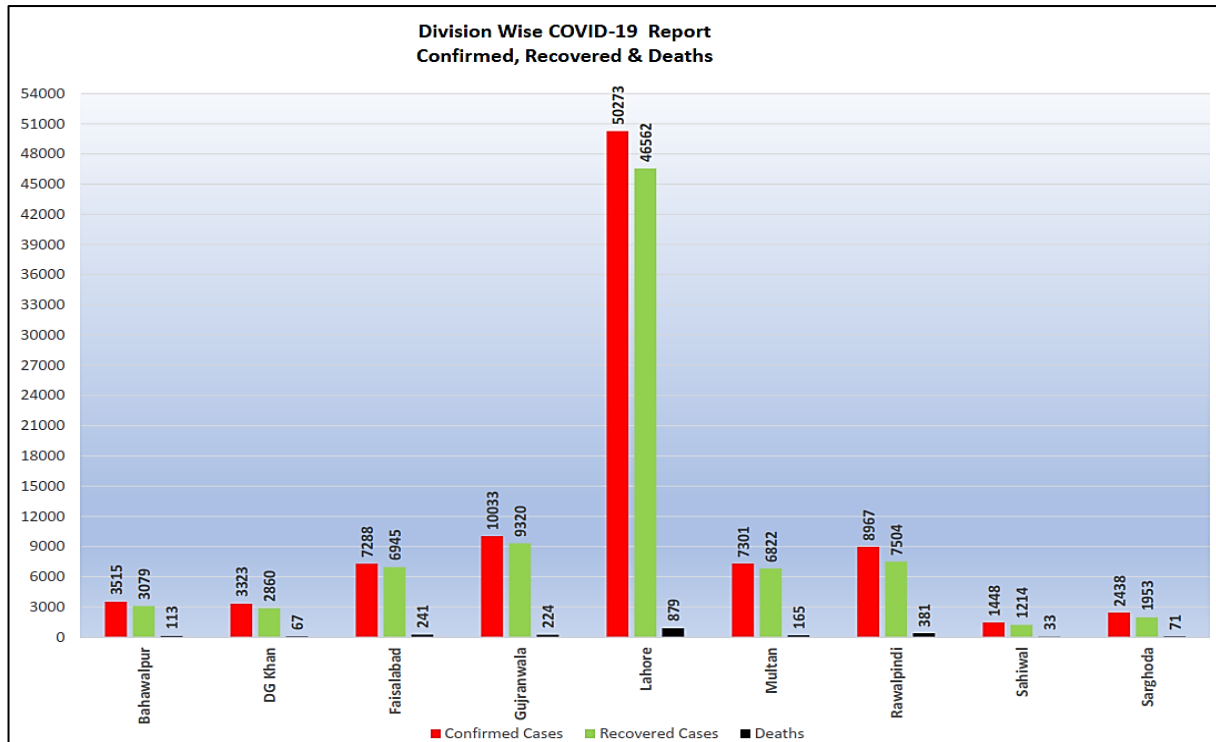


Figure.1 Division Wise COVID-19 Cases-(151 days) Survey

Many developed countries have early adopted epidemiological measures to combat the COVID-19 because they had a sound budget for controlling this pandemic. However, Pakistan has adopted strict measures considering the limited resources and financial constraints to combat the pandemic. It resulted in higher recovery rate 92 % in country and 91% in province Punjab (Nawaz et al., 2020).

This study has investigated the total COVID-19 cases in Pakistan focusing on the province of Punjab. Provincial governance has implemented many safety measures and precautionary guidelines to fulfil targeted objectives and control the COVID-19 transmission across province of Punjab. They organized a team with the collaboration of law enforcement agencies for provision and implementation of government policies and preventive measures all over Punjab. Meanwhile, they have strengthened their abilities for early screening, detection, tracing contact history of infected persons. Besides, community emergence program was prepared to ensure effective, efficient and timely response to combat the pandemic coronavirus and other pathogenic diseases. COVID-

19 has negatively impacted the country's economy as well as public health & safety. To completely eradicate the COVID-19 throughout the country, public support to strictly adhere to the preventive measures is essential.

This study presents the real time scenario of the administration at local & provincial levels. It also analyzes the quick response driven by the provincial government to mitigate and control the effect of COVID-19. Besides, the study discusses the epidemiological analysis of the COVID-19 data as shown in Figure 2, for the province of Punjab for the first 151 days (Mar 15, 2020 to Aug 12, 2020). The research study has been alienated in four sections. The first section defines and gives a clear overview of the COVID-19 origination & its background. The emerging COVID-19 situation in the developing & non-developing countries has been discussed, based on previous literature in section 2. Section 3 elaborates on the COVID-19 survey of 151 days, and the quick governance response and public health & safety. The scope of work, discussion & concluding remarks have been described in section 4.

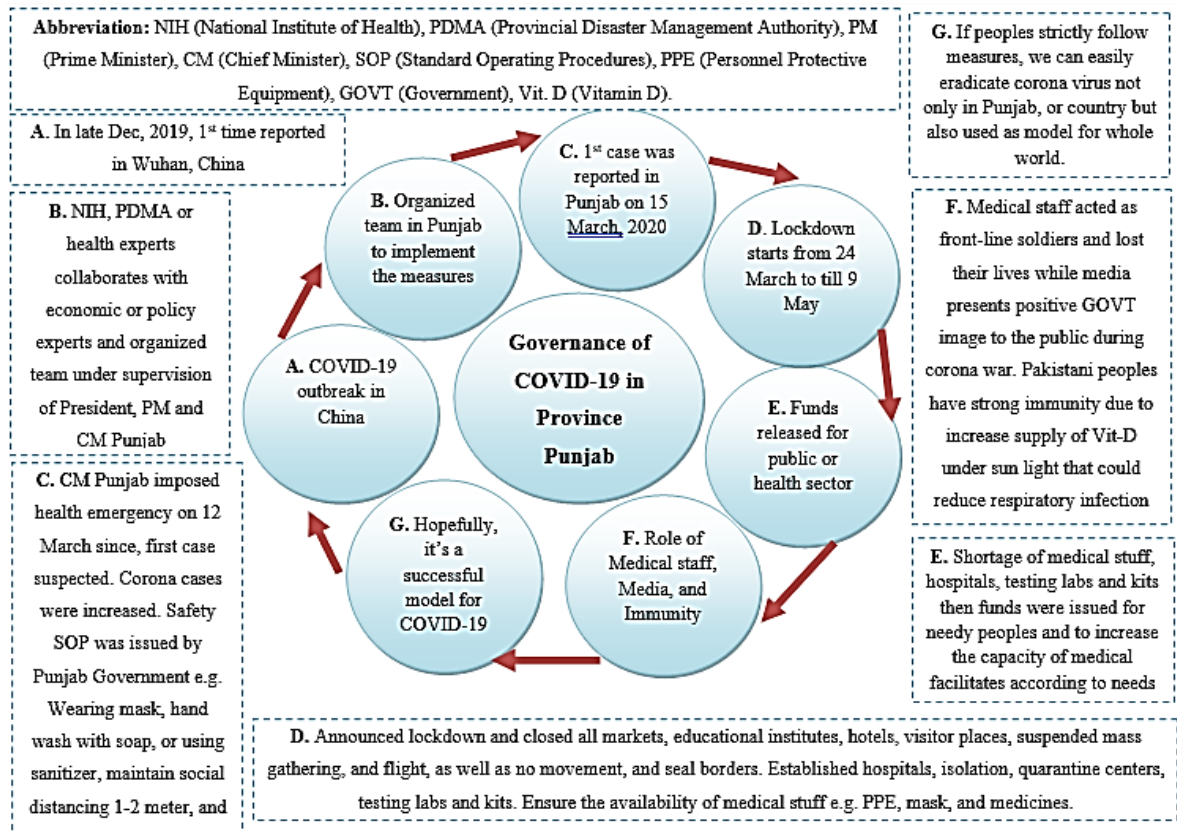


Figure 2. Governance measures-model adopted by Punjab province during COVID-19

2. Materials & Methods

The results of this study were analyzed and anticipated using three types of data: (i) Data collected from the statistics of World Health Organization (ii) Data collected at district & provincial levels, and (iii) Data collection from social media, Newspapers & Electronic Media.

Some of the raw data was obtained from the documents of implemented policies of the Government of Punjab, with the collaboration of National Institute of Health (NIH), Punjab Disaster Management Authority (PDMA), National Disaster Management Authority (NDMA), law enforcement agencies, and economic and health experts. Information collected from various sources was compiled, refined, and then validated by the respective authorities (Pakistan, 2020).

Matlab 18, Sigma Plot, Origin 19 have been used for the Data analysis & Graphic work. This study investigates and analyzed the information using methods and policies taken by the Local (District) and Central Government (Provincial) to react quickly to the consequences of COVID-19 mitigation. This study was aimed at providing a realistic scenario of

the reported COVID-19 cases, stating the rapid policy responses for public health and safety, analyzing the governance policies for mitigating the epidemic, and to provide a pathway (guidelines) for neighboring states to counter the current hard situation. A thematic and narrative approach was adopted to analyze and identify the emerging lessons.

3. Analysis & Results

The Government of Pakistan, particularly the provincial Government of Punjab, implemented many safety precautions and preventive measures to completely eradicate the coronavirus. Punjab Government realized the coronavirus as a big challenge and organized an efficient team with the collaboration of law enforcement forces, administration authorities, NIH and PDMA, NDMA for implementation of measures to slow down the coronavirus transmission. They identified the most affected areas and ensured safety of their lives. They also endeavoured to stabilize the economy which was adversely affected. The steps taken by the government for eradicating the spread of COVID-19 have been described in Table 2 in

chronological order. These steps could also be used as guidelines by neighbouring states & developing countries.

Table 2. Radical steps taken by the Government of Punjab against COVID-19 Epidemic (Ministry of National Health Services, 2020)

Date	Radical Steps
11 March	About 76 suspected Corona cases were reported in different cities of Punjab such as Hafizabad, Gujranwala, Lahore, Lodhran, and Sargodha. The Health Department stated that there was no confirmed corona case in Punjab till 11 March.
12 March	Government of Punjab declared a health emergency after the suspected corona patients in Punjab, and established quarantine and isolation centers particularly at Iran-Pakistan Border e.g. Dera Ghazi Khan quarantine center.
15 March	The first corona patient was confirmed by Lahore Health Secretary, who recently arrived from UK on 10 March. He was admitted to the isolation center of Mayo Hospital, Lahore, Punjab.
22 March	To slow down the corona transmission, Chief Minister (CM) of Punjab announced that all academic institutions, restaurants, shopping malls, all flights operation, and borders will remain closed till further notice, except food markets and pharmacies. He requested the public to stay at home and maintain social distancing.
23 March	Local bus services were temporarily closed to control the spread of coronavirus. It was announced that a new 1000-bed hospital will be constructed in Lahore. Five more hospitals were equipped with necessary equipment and facilities. Public places in cities and towns were also disinfected.
24 March	The public ignored the government preventive measures including social distancing. Thus, Punjab Government declared lockdown for two weeks throughout the province till 6 April. Meanwhile, provincial government demanded military force to implement preventive measures among the public.
27 March	Punjab Government announced that Police force will present guard of honor to healthcare staff at Mayo hospital during 27-29 March, Lahore, as they are working as frontline soldiers in the COVID-19 epidemic war.
28 March	A 10 billion relief package was released to fulfill the needs of 2.5 million poor families. Each family received 4000 rupees for 3 months as financial assistance during the corona epidemic war.
1 April	CM Punjab announced additional Insaf Imdaad Programme (IIP), and released Zakat fund of 870 million rupees, from which 170,000 needy people would be benefitted.
2 April	The government extended lockdown till 14 April to combat COVID-19 because the number of corona cases and deaths were increasing.
6 April	It was announced that field hospitals, only for corona infected patients, would be constructed in Rawalpindi and Jhelum.
14 April	The best option to combat coronavirus was extending the lockdown till 30 April due to rapidly increased number of Corona cases in Punjab. On 14 Apr, total cases reached 5000, while 342 new cases were reported in one day.
24 April	It was estimated that a religious gathering increased 27% cumulative corona cases throughout the country, hence lockdown was further extended till 9 May, to stop the uncontrolled corona outbreak.
2 May	Corona was suspected in a healthcare staff. Initially, normal fever was diagnosed but later on, it was confirmed as coronavirus case. She bravely fought against the corona but unfortunately, lost her life on a ventilator in the holy family hospital, Rawalpindi.
6 May	Lockdown, from 23 March to 9 May, had badly affected the country's economy, thus Punjab Government decided to open lockdown under some restrictions.
9 May	Finally, the lockdown ended in Punjab.
11 May	It was reported that 85 doctors, 111 nurses, 215 paramedics got infected with coronavirus; 89 cases were hospitalized and 23 were isolated at homes.
15 May	Punjab Government again implemented 3 days lockdown on weekend from Friday to Sunday to slow the spread of coronavirus.

30 May	Another health professional got infected with Corona. He was admitted in hospital on 20 May but lost her life at Doctors Hospital in Lahore.
20 June	Corona cases were reached up to 67,000 and mostly cases were reported in Lahore, Punjab. Smart Lockdown Imposed
3 August	Smart Lockdown Lifted
12 August	Total Cases reached in Province Punjab up to 94,805 cases and 86,389 (91%) recoveries.

3.1 Prevalence of COVID-19 in different Locations of Punjab

The first corona case was reported in Punjab (Lahore city) on 15 March 2020, who travelled from UK to Lahore. He was admitted in isolation ward of Mayo Hospital, Lahore. On 11 Mar, 76 more suspected cases were found in different districts of Punjab including Lahore, Lodhran, Sargodha, Hafizabad, and Gujranwala. The Health Department performed their Corona tests, 55 were found negative, while 10 were isolated. The Punjab

Government declared health emergency in the province and established quarantine centers in Dera Ghazi Khan for suspected corona victims who returned from Iran (Gulf News, 2020). Meanwhile, 13 new suspected cases, who reached Dera Ghazi Khan via Taftan border, were referred to Mirpur quarantine center. The number of Corona cases, reported, has been presented in Table 3. Till 12 August the recovery rate has been reached to 91% which shows the best performance of the health management system.

Table 3. Number of reported COVID-19 cases in Punjab province from 15 Mar to 12 August 2020 (Health, 2020). (151 days survey)

Date	Confirmed	Recovered	Deaths
15-21 March	152	0	0
22-28 March	558	4	5
29 March-04 April	1163	25	12
05 -11 April	2425	258	21
12-18 April	3649	684	41
19-25 April	5378	1126	81
26 April-02 May	7106	2206	120
03 May-09 May	11093	4240	192
10-16 May	14584	4883	252
17-23 May	19557	6050	332
24-30 May	25056	6901	475
31 May-6 June	37,090	8,109	683
07-13 June	52,601	17,650	969
14-20 June	65,739	18,692	1,407
21-27 June	74,202	25,162	1,673
28 June 04 July	81,317	44,671	1,871
05-11 July	86,556	55,175	2,006
12-20 July	90,444	66,021	2,090
26 July-01 Aug	93173	82552	2144
02-08 Aug	94360	86266	2169
09-12 Aug	94865	86389	2179

3.2 Declaration of Lockdown in Punjab-Smart-lockdown impact

Most of the cases in Punjab were locally transmitted because people ignored preventive measures and social distancing. Hence, Government of Punjab decided to enforce lockdown for two days across Punjab. CM Punjab requested to close all markets, shopping malls, and public places as well as maintain social distancing, stay home-stay safe.

Sadly, people didn't adhere to the precautionary measures and opened markets and restaurants. Lockdown was therefore extended for two weeks from 24 March to 6 April 2020 (Ministry of National Health Services, 2020). It was decided that all markets, public places, restaurants, traffic, and academic institutions will remain closed until further notice. Government introduced preventive and safety measures, such as wear face mask, gloves,

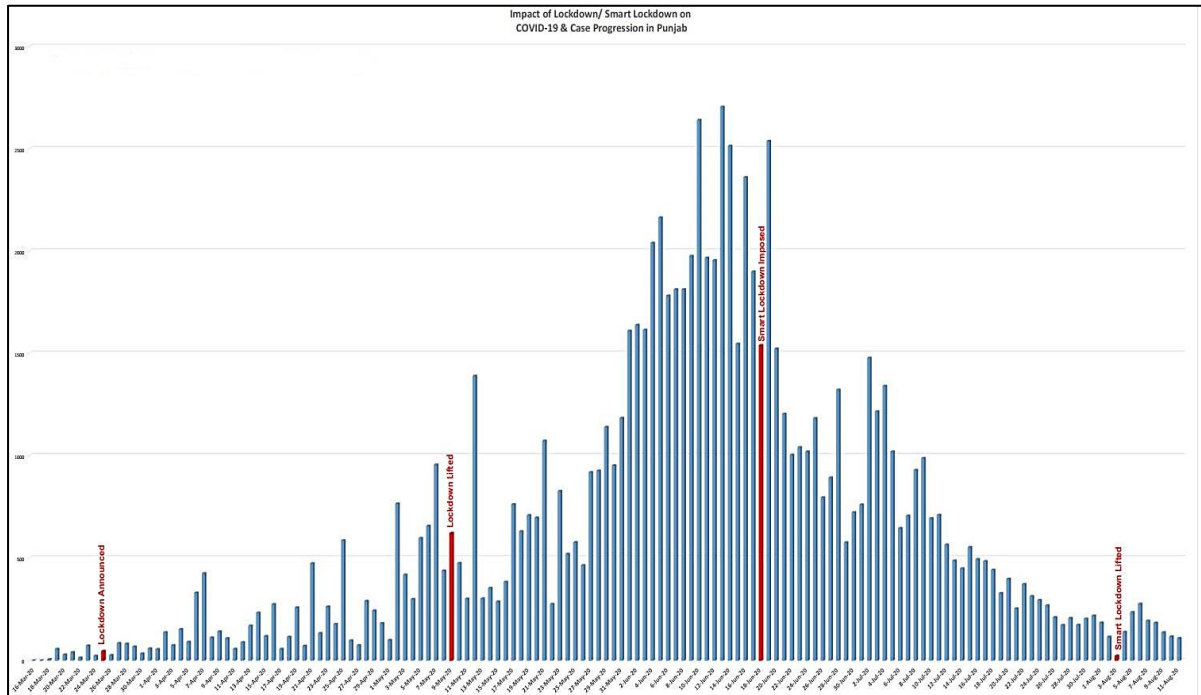


Figure 3. Smart Lockdown in COVID-19 in Punjab and case progression (Health, 2020)

stay home-stay safe, wash hands with soap or sanitizer, and maintain a 2-meter distance from each other. Meanwhile, lockdown was further extended till 14 April, and then till 30 April. The Punjab Government suspended all religious activities and established two more hospitals in Jhelum and Rawalpindi cities (N. News, 2020). On 10 April 2020, a total of 2336 corona cases, 19 mortalities and 39 recovered cases were reported. On 30 April 2020, a total of 6340 corona cases, 106 mortalities and 1921 recovered cases were reported. To reduce the number of infected cases, lockdown was again extended till 9 May 2020. However, Prime Minister of Pakistan was not in favor of complete lockdown,

as it was impossible for the government to fulfill the financial needs of public due to limited resources and not having a stronger economy. He emphasized that 25% of the country's population lives below poverty stage, thus lockdown will multiply the hardships of poor people. On 20 June Smart lockdown strategy has been applied by the Punjab Governance which has changed the whole scenario of COVID-19 cases. The country economy start boosting and the recovery rate were up to maximum of 91% till 3 August when smart-lockdown was lifted as shown in figure 3 (Health, 2020; National Institute of Health, 2020; N. News, 2020)

3.3 Public Relief Fund

Despite economic crises, Government of Punjab released funds to support the miserable conditions of the poor people. Likewise, industries were facilitated by giving them subsidies, as industrialists, particularly lower level businessmen, were worried about their financial losses. On 28 March 2020, the 10 billion rupees relief fund was announced by the Government of Punjab for 2.5 million poor families. It resulted in distributing 4000 rupees to each family as a mark of assistance. The Punjab ordinance for disease control and prevention implemented the

preventive measures and control to combat COVID-19 across the province, and a one-month additional salary package was provided to medical staff throughout the province. In addition, 11.5 billion rupees fund was released for the health sector and PDMA to fight against the transmission of Corona in the province. Insaf Imdaad Program (IIP) was declared on 1st April for the affected COVID-19 cases. Besides, 870 million rupees Zakat fund was released to support 170,000 poor families across the province (National Institute of Health, 2020; N. News, 2020; WHO, 2020b)

3.4 Provision of Health Facilities by Government of Punjab

The Punjab Government health structure has certain constraints, such as having limited beds, ventilators and isolation wards due to limited funds. Moreover, most of the facilities in public hospitals are not free, while private sector hospitals are very expensive. The CM Punjab announced to construct a new 1000-bed hospital in Lahore. He also informed to upgrade five more hospitals for the treatment of corona patients. The Punjab University manufactured hand sanitizers, disinfected wet tissues, and corona testing kits. Besides this, quarantine centers were established in the University of Agriculture Faisalabad, and the largest quarantine center was established in Multan Industrial Estate having 3000 rooms, where 1247 patients could be accommodated (Nationa News, 2020). The CM declared that all laboratories would perform 3200 tests daily. Likewise, 10,000 medical staff including doctors and paramedics were recruited to deal with COVID-19 pandemic. A 1000-bed hospital was immediately made operational in Lahore Expo Centre, and to speed up the corona testing, 620 million rupees fund was released for the establishment of eight new corona testing laboratories in the province. Meanwhile, many hospitals, isolation and quarantine centers, and testing labs were established with the collaboration of NIH and NDMA (Ministry of National Health Services, 2020). Therefore, six tertiary hospitals were established in different cities of Punjab, which are equipped with advanced instruments. In addition, preventive measures and guidelines were issued on how to manage or admit the infected patients in hospitals. Likewise, to dispose of the waste material in hospitals, elaborated instructions were provided. Fifty medical centers in 34 districts of Punjab were established along with 955 beds, while six quarantine centers were established for the public in different districts of Punjab along with 10,948 beds, as shown in Figure 4. Infected people were asked to stay in these centers for 14 days. Moreover, 19 labs in major cities (such as Lahore, Rawalpindi, Multan, Faisalabad, and Wazirabad) were established, with a capacity of testing 5810 cases daily. However, a huge number of persons could not be tested due to lack of testing kits and presence of limited labs at district level (National Institute of Health, 2020a). Unfortunately, federal and provincial governments could not record the travelling history of many persons who recently visited the infected countries such as China, Iran, UK

and Italy. Although, Punjab Government is endeavouring to facilitate the health care centers, there is a still a need to enhance the capacity of hospitals and labs. Moreover, all those people who visited infected countries must be traced. Punjab has attained recovery rate of 91% till 12 August by efficient management at provincial level.

3.5 Rapid Response to Healthcare Professionals and Media

The healthcare staff (doctors and paramedics) played a pivotal role in slowing down the spread of COVID-19 across the province despite limited facilities. The problems faced by healthcare staff include lacking PPE, goggles, caps, face masks, and gloves. The Punjab Government approached and facilitated the manufacturers and suppliers to ensure the supply of medical stuff according to public needs. They also arranged necessary training for medical staff to control the spread of corona in collaboration with NIH and the Chinese expert team. The medical experts suggested the CM Punjab to implement social distancing and other precautionary measures in the province. Medical staff is continuously providing their selfless services with valor as front line warriors against the corona epidemic war without any fear (T. News, 2020). Unfortunately, many doctors (85), nurses (111), and paramedics (215) also got infected from coronavirus. Hence, 89 cases were hospitalized while 23 cases were isolated at homes in Punjab until 11 May 2020. Sadly, two doctors and a few paramedics lost their lives who were treating the corona patients in Punjab. To recognize the services of healthcare staff and to express nation's solidarity, police force presented the Guard of Honor at Mayo hospital in Lahore. It was also declared that if any doctor or paramedic staff dies during the treatment of the corona outbreak, he would be considered as martyr and the Government of Punjab will hand over a relief package to their family members. Moreover, doctors and health experts were invited in many talk shows who emphasized to strictly follow the preventive measures, such as wearing a face mask and gloves, stay home-stay safe, wash hands with soap or sanitizer, and keep 2-meter social distancing. Media has repeatedly broadcasted such preventive measures, provided the updated corona information on the screen, so as to present a clear picture of government action against coronavirus (Pakistan Today, 2020).

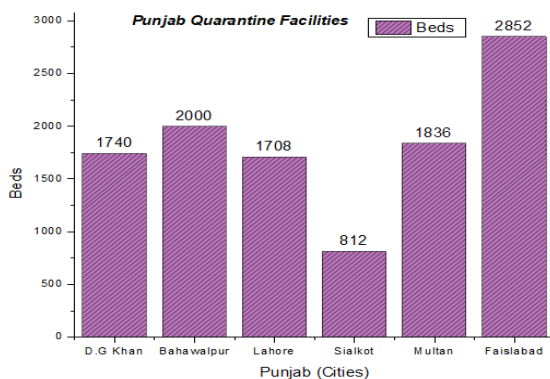


Figure 4. Quarantine Facilities in Province of Punjab (Health, 2020)

3.6 Strong Immunity Level in People of Pakistan

Pakistan is situated in the Asian Continent where daylight is effectively accessible to people in general. Consistently while the term of the winter season is short. It is accepted that winter season is the greatest for the transmission of pandemic infections, for example, pneumonia, typhoid fever, dengue fever, and other respiratory sicknesses (Cirrincione et al., 2020). A speculation exists about daylight and its belongings that a presentation to daylight produces melatonin color and nutrient D. So also, nutrient D diminishes intense respiratory plot disease). At the point when occasional components change as indicated by climate periods or district conditions, new levels of helplessness show up among the populace, thus, intermittent scenes of the pandemic infections might be created every year simultaneously like ebb and flow pestilence illness (Di Gennaro et al., 2020).

For COVID-19, it may be sending effectively in the winter season instead of summer with accidental component for example pandemic influenza. It is accepted that novel human coronavirus for the most part assaults a resistant traded off patient and it can at present be communicated outside of the wintertime frame. Already, it was accepted that coronavirus doesn't influence the youngsters yet ongoing investigations demonstrated that it may be influencing the kids like grown-ups (Takian et al., 2020).

Past studies stated that Bacille Calmette Guerin (BCG) immunization is an effective vaccination for Tuberculosis (TB) but it was not successful in the US and EU, thus, they are more affected by coronavirus. In Iran, BCG vaccination started in 1984 and only limited people lost their lives from infection in that year (Zhang et al., 2020). Even in Pakistan and many other countries, administration of BCG vaccine is necessary for new born babies.

According to Expanded Program on Immunization (EPI), BCG vaccination was given to newborn babies in Pakistan since 1949. It was concluded that any type of vaccine may boost up the immune system of patients. As BCG vaccine was administered in many countries, it resulted in increasing the immune system of people, and such vaccinated people have been less affected by COVID-19 (Kuniya, 2020). Pakistan has attained recovery rate of 92% by till 12 August by efficient management.

3.7 Challenges

Pakistan is not an economically strong country as compared to other Asian countries. Its provinces are struggling in the fight against current corona outbreak despite financial constraints. Due to limited resources and shortage of funds, Government of Punjab is endeavoring to effectively deal with corona outbreak. However, it is facing many problems due to large population, such as shortage of isolation wards in hospitals, emergency medicines, PPE, face masks, gloves, labs and diagnostic kits.

Secondly, most of the people are uneducated and unaware of the implications of current pandemic disease. Though the government has implemented many measures to control pandemic spread, people ignored such measures. Resultantly, the government had to deploy Armed Forces and Police Force to implement necessary preventive measures. Thirdly, most of the people do not follow the living standards because of poverty (Tribune, n.d.). It was estimated that about 25% people live below the poverty line. Other challenges include lack of hygienic habits, severe environmental conditions, and shortage of food. Unfortunately, traveller history of those people who visited the infected area or country is also not properly maintained. Such people might infect other healthy people and their elders. Yet, Punjab Government is trying its best to figure out such problems and eradicate or reduce the risk or transmission of COVID-19 across the province (National Institute of Health, 2020b).

8.8 Governance Success Policy

At the point when the COVID-19 had begun in the nation, it was expecting that it will influence hugely to general society and economy of the nation. Government had actualized numerous administrations polices, total lockdown and preventive measures yet number of recently corona cases expanded quickly in May. Due to having a creating nation, Pakistan couldn't bear a total lockdown for long time along these lines, Prime Minister Imran Khan had chosen to brilliant lock

down. The Bill Gates and Nobel Prize-winning researcher Michael Levitt had acknowledged to keen lock down approach of our Prime Minister Imran Khan and expressed that total lockdown isn't useful for individuals' safety. Besides, a great many individuals were influenced with hunger and around 40 million jobless because of complete lockdown in India. The WHO has adulated Pakistan arrangements against corona infection and the head of WHO was glad to see the decrease in number of corona cases since toward the finish of June. Seven significant clinics in Lahore have been cleared from corona

patients and 75-80% virus contaminated patients were recouped. It was seen that 28% decrease in the utilization of oxygen chambers and ventilators for corona patients and the brilliant lockdown has dropped to under 3000 the quantity of dynamic corona cases the nation over because of hostile to corona crusade and home confinement strategy for infected people groups (WHO, 2020a). Hardly any weeks prior, the day by day corona disease proportion was somewhere in the range of 22% and 23% however as of now this proportion has declined to 12% and 13% per 100 patients as appeared in Figure 5.

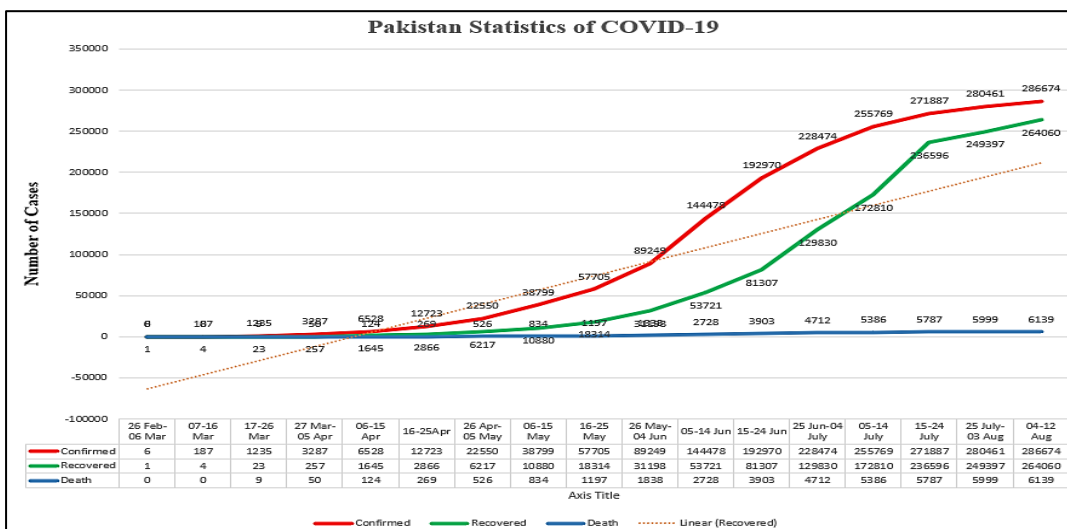


Figure 5. Covid-19 (Confirmed, Recovered, Death) cases in Pakistan

Because of execution of shrewd lock down, SOP's, administration approaches and preventive measure, the quantity of new detailed instances of COVID-19 and passing's has been decreased, moreover, recuperations were more after the 10 July, 2020 in

the nation especially in Punjab. In this way, the administration methodologies, for example, sorted out team, total lockdown, open alleviation reserves, proficient job of safety specialists, social separation, use hand sanitizer or cleanser to sterilize hands, wear

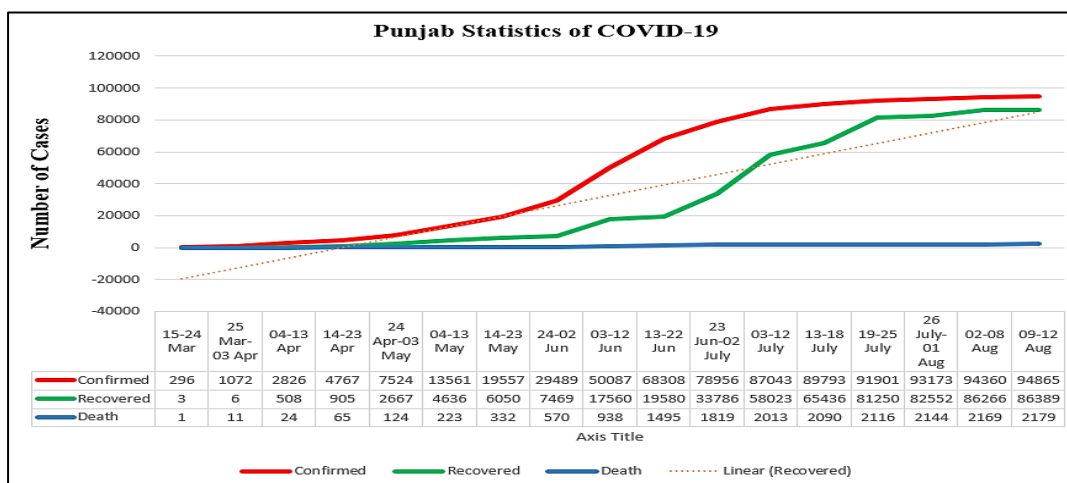


Figure 6. Covid-19 (Confirmed, Recovered, Death) cases in Punjab

face veil and particularly shrewd lock down has gotten fruitful against the COVID-19. Pakistan has nearly countered the impact of COVID-19 and the cases are nearly declined up to least. Further, an away from of effective safety the executive’s framework can be seen after usage a proficient crisis the board framework that affirmed to detailed cases proportion began to diminish time by time as can be seen in Figure. 6 and extra significant concern was to lessen the change of affirm cases to death which

additionally began to decrease after usage of productive administration framework as can be seen in Figure 7. Green lines show that enhancement for patients and red lines shows decline in death, drifting drawback. At provisional level (Punjab), there was an unexpected effect of crisis and passing rate has expanded however a productive administration framework has countered the issue and lessening in death proportion can be watched through read line in Figure 8.

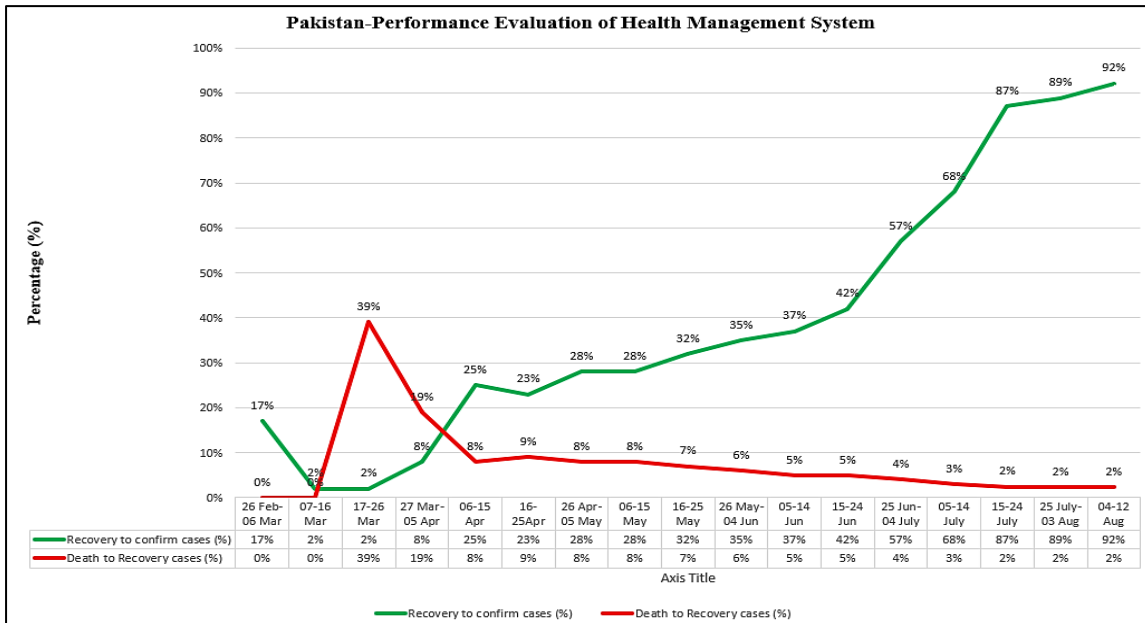


Figure 7. Efficient Response Management during Emergency at Country level

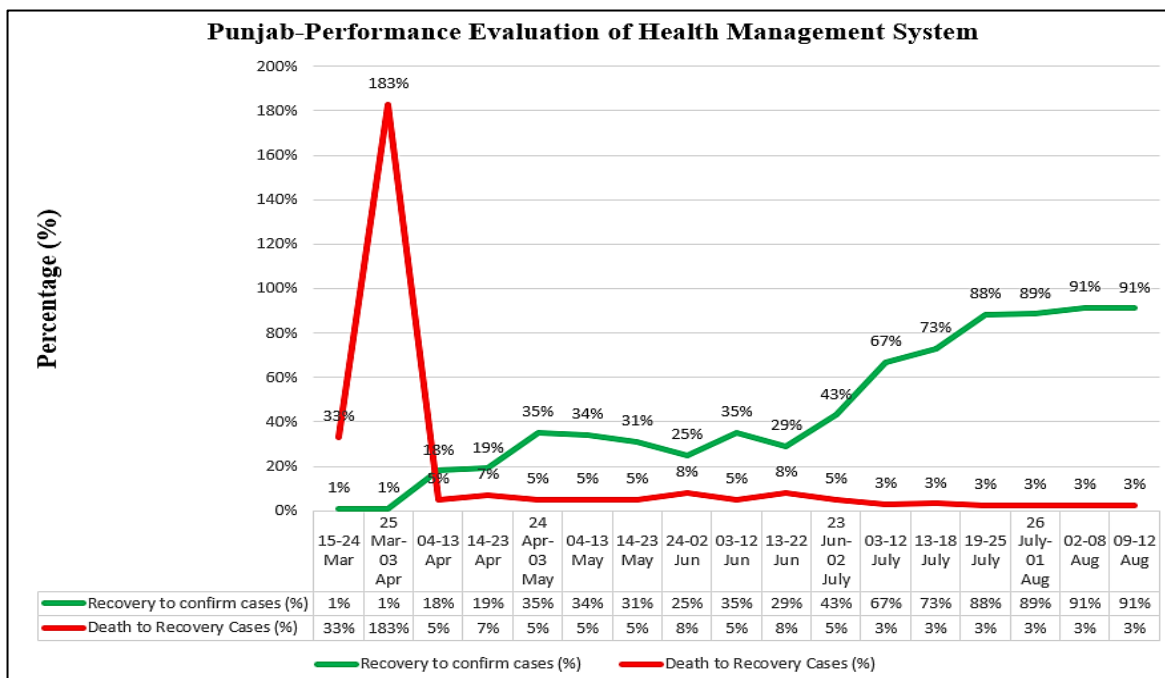


Figure 8. Efficient Response Management during Emergency at Punjab level

4. Discussion and Scope of Work

Predicting the rapid spread of coronavirus throughout the world, the Government of Punjab has acquainted numerous rules and SOPs with equitably lessen the COVID-19 transmission over the region. Under the oversight of President and Prime Minister of Pakistan, CM Punjab has sorted out a team to help the general population, with the solid help of law authorization organizations, wellbeing specialists, authoritative staff, and strategy creators. They are investigating every possibility to actualize government strategies, authorize preventive estimates everywhere throughout the territory, fortify their capacity for early screening and recognition of corona speculated people, and give opportune reaction against corona and other pathogenic maladies. These techniques would help in destroying and diminishing the corona infection in territory of Punjab just as the nation over. They could likewise be received as a viable counteraction and control system by other tainted states whose are encountering comparable plague circumstance. The corona was first time diagnosed in Punjab on Mar 15, 2020. Unfortunately, it rapidly penetrated to all cities, resulting in declaring health emergency in the province. Most of the affected corona patients entered in Pakistan from Iran via Taftan border. Iran has many religious places and many Pakistani people go to Iran to visit such religious places throughout the year. When corona was diagnosed in Iran, their government decided to push all visitors back to their countries, hence, virus had spread throughout the country, especially in Punjab and Sindh provinces. In Punjab, Lahore, Gujranwala and Rawalpindi were the most corona affected cities.

The Government of Punjab enforced safety and preventive measures according to WHO guidelines to prevent corona outbreak. However, the number of infected cases gradually increased due to not following the preventive measures and maintaining social distancing. Hence, a higher-level meeting with Federal & Provincial stakeholders was held, to decide either to impose complete or partial lockdown. Prime Minister was not in favor of imposing lockdown due to economic crises and increase in poverty, however, government was left with no other option except lockdown to effectively control the spread of coronavirus among people. Hence, CM Punjab imposed lockdown for two weeks from 24 April to 6 April 2020 which was further extended till 9 May, due to rapid increase in number of infected cases. It

happened due to not following the precautionary measures by the public, despite deploying the

military and police force, and or imposing fine to the public for non-adherence to instructions.

During the lockdown period, all business set ups, industries, markets, educational institutes, social and religious activities, land borders, flight operations, and all types of movements were closed. The Punjab Government released many funds and introduced financial assistance programs, such as Insaf Imdaad Program, Zakat Fund, and others, to provide relief package to needy people and daily wagers, as 25% population of Pakistan lives below poverty level. The government also improved health facilities, such as PPE, gloves, masks and ventilators. Likewise, they increased the capacity of hospitals, isolation and quarantine centers and laboratories. Testing kits were provided at national, provincial and divisional levels. Ministry of Health arranged training for healthcare staff, as well as issued guidelines and SOPs for the prevention and control of epidemic, and to efficiently treat the infected persons.

The healthcare staff is continually providing their selfless services in the war against corona epidemic, despite limited facilities. They have complained regarding the shortage of medical facilities, insufficient beds, fewer isolation wards and limited corona testing laboratories and kits. Punjab Government ensured the availability of all lacking facilities through efficient leadership. Unfortunately, many doctors, nurses, and paramedics were also infected from coronavirus. In Punjab, two doctors and a few paramedics lost their lives who were dealing with corona patients. The government has compensated them by announcing that they would be ranked as Martyrs and provided financial compensation to their families. Moreover, Police force also worked as a front-line protector to ensure that government policies and preventive measures, regarding epidemic control, are implemented.

Media also played a very important role in the war against corona pandemic. They started a media campaign and daily updated the corona cases and educated the public through 1-2 minutes video messages.

Strong immune system is likewise critical to human safety, as it gives first-line guard against pestilence sickness especially COVID-19. Corona for the most part influences the safe traded off feeble patients. The invulnerable framework can be helped up by a nonstop flexibly of nutrient D by annihilating the respiratory parcel disease. Vitamin D can be acquired in an overabundance rate under the

daylight that is effectively accessible in Pakistan. As Pakistani individuals normally have solid insusceptibility level, a smaller number of corona cases are seen than different nations. Pakistan, particularly province of Punjab, faced many challenges, such as limited resources, poor hygienic environment, shortage of medical facilities, and unawareness. Moreover, it is essential for the government to financially support the poor people and take strict actions to follow the preventive measures. To do so, even Police and Armed forces should be employed. Likewise, punishment or fine should be imposed to the violators. Corona can easily be eradicated from all provinces and cities, if public cooperates with the government by adhering to the preventive measures.

5. Conclusion and Future Perspective

Severe acute respiratory syndrome corona virus-2 (COVID-19) is rapidly spreading worldwide. It has affected many developed as well as developing countries. The first case of corona was detected in Pakistan on 26 Feb 2020 and in province of Punjab on 15 Mar 2020. Luckily, the 91% recovery rate has been achieved which are much higher than other countries, might be due to strong immune system, good governance or weather conditions. Government of Punjab has implemented many protective measures and issued necessary guidelines, such as lockdown declaration, public relief fund, health facilities, rapid response of healthcare staff, and positive role of media. However, these measures are not fully utilized to prevent the spread of corona disease due to limited resources and financial constraints. Pakistan is a developing country and its economy is not strong like other developed countries. Hence, many challenges are being confronted by the government, such as poor living standards or hygienic conditions, lower literacy rate, food problems, and inadequate health facilities. However, despite limited resources, the government is determined to ensure the availability of necessary health facilities. There is also a need to enhance public awareness to follow the preventive measures, maintain social distancing, stay at home, and not going outside without any emergency. If the public positively collaborates with the government, task force and law enforcement agencies, war against corona can easily be won but still Pakistan is already in a strong position because the 91% cases has been countered (91% recovered). Most importantly, government is trying to create corona antibody vaccine with the coordinated effort of Sinopharm (a Chinese pharmaceutical organization)

since April 2020. It is accepted to be the best clinical development venture in the examination history of Pakistan. The discoveries of this examination will help the key partners in the administration to improve the health safety management system in the nation during the battle against COVID-19 annihilation.

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Conflict of Interest

The authors declare no conflict of interest.

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