

# A Three Months Study of COVID-19 in Pakistan

Jabir Ali<sup>1</sup>, Hafiz Muhammad Asmar Naeem<sup>2</sup>, Sultan Ali<sup>1</sup>, Sajjad Rahman<sup>1</sup>, Kainat Gull<sup>1</sup>, Ujalla Tanveer<sup>1</sup>, and Muhammad Ahmad Mushtaq<sup>1</sup>

<sup>1</sup>University of Agriculture Faisalabad

<sup>2</sup>University of Agriculture, Faisalabad(UAF)

July 7, 2020

## Abstract

COVID-19 is a new pandemic caused by SARS-CoV-2 which has created a havoc worldwide. Within no time it prevailed throughout the world compelling all countries to take emergency measures to overcome the pandemic. To overcome the disease, there is still no vaccine developed, however, different drugs are under trial. So, the only strategy to overcome the deadly virus is to avoid each and every way of contact with the already infected patients. For the assurance of avoidance policy, different countries took different measures according to their circumstances. Developing countries are much more infected than the developed ones as they already lack in fulfilling many basic necessities of life including economy. Pakistan is one of those developing countries whose economy is badly hit by following the model strategies of developed countries. So, Pakistan introduced different strategies like smart lock down, tiger force, etc. Pakistan has faced the worst peak of pandemic latter than most of the countries, so, to walk with the world in all aspects, Government should put its best efforts in the health zone to overcome COVID-19 as soon as possible.

## Introduction

Coronavirus Disease 2019 (COVID-19) is caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). SARS-CoV-2 is a single stranded (SS), enveloped, positive sensed, RNA beta  $\beta$  coronavirus (Raza et al., 2020) which is a close relative of Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV). It shows poor resemblance with Middle East Respiratory Syndrome Coronavirus (MERS-CoV) (Wassenaar & Zou, 2020). Initially, disease was considered as pneumonia of unknown etiology and was associated with commercial city of South China, Wuhan (Decaro & Lorusso, 2020). Soon after the investigations of Chinese authorities, it has been declared that it is an outbreak of novel coronavirus (Zhu et al., 2020). It was a 3<sup>rd</sup> zoonotic outbreak of Coronavirus in the 21<sup>th</sup> century after the SARS-CoV and MERS-CoV outbreaks (Gorbalenya et al., 2020)(MacKenzie & Smith, 2020). According to the Centre of Disease Control (CDC) SARS-CoV infected only 8089 individuals of several countries with 774 deaths having 9.6% death rate (Navas-Martin & Weiss, 2003), whereas, MERS-CoV infected 2494 people with 858 deaths having 35.2% mortality rate. The outbreak remained confined to Saudi Arabia (Alfaraj et al., 2019) (Ahmed, 2017). The recent SARS-CoV-2 has much more transmission abilities than the previous coronaviruses SARS-CoV and MERS-CoV. It has paralyzed the entire globe by infecting 6 million people with 367166 deaths as per May 31, 2020 having 3.7% mortality rate (Mehta et al., 2020). Facts clearly show about how much SARS-CoV-2 is contagious. It also has higher transmission rates than common flu which harbors 4.7% (Mehta et al., 2020). SARS-CoV-2 can be transmitted through direct contact, aerosols, breathing, talking and contact with contaminated electrical devices and surfaces (Prather et al., 2020).

Fortunately, Pakistan remained safe from previous two outbreaks of coronaviruses (SARS-CoV and MERS-CoV). First case of Coronavirus in humans documented in Pakistan was confirmed by Ministry of health and Government of Pakistan in February 26, 2020 in Karachi, which is most populated city and considered

as economic hub of Pakistan. On the same day, another person tested positive (+) from Islamabad, the capital of Pakistan (Culp, 2020). Initially, all the cases reported from Pakistan had the travelling histories of Iran, UK, Syria, Italy and other European countries (Waris et al., 2020). Recently, it is spreading very fast by local human to human transmission into the entire country. As per May 31, 2020 SARS-CoV-2 infected approximately seventy thousand people with 1483 deaths in Pakistan. Government of Pakistan is trying her level best to tackle this virus but lack of experience of health professionals by Government, political instability and uneducated common public are the significant barriers to fight against COVID-19. Therefore, Pakistan is facing a very troublesome situation to make suitable policies for the whole country (Javed et al., 2020). It is suggested that people of Pakistan must change their living standards, diet and social behaviors to defeat this terrifying virus. Government has to formulate a revised policy for the whole country in order to combat the disease. Presently, people of Pakistan are feared about their future and a huge panic is created throughout the entire nation.

### Current Situation of COVID-19 in Pakistan: From Past Three Months to date

According to the Ministry of Health, Government of Pakistan, there are total 181,088 cases as on 21<sup>st</sup> June, 2020 with 3,590 deaths, following highest cases 69,628 in Sindh province then Punjab with 66,943, 21,997 in KPK, 9,475 in Baluchistan, 10,912 in Islamabad, 1,288 in Gilgit-Baltistan and 845 in Azad Jammu and Kashmir (*Covid-19 Cases in Pakistan in Real Time*, 2020). If we look three months back in March, 2020, Coronavirus was to start rising its curve in Pakistan. The number of COVID-19 patients when reached 500, people of Pakistan start fearing that Pakistan's trajectory of Coronavirus will match that of Italy. At that moment, many celebrities started tweeting to address Prime Minister and urged him to initiate lock down in the country to protect people, even Sindh's Chief Minister Murad Ali shah initiated partial lock down in his province and urged people of Karachi to self-isolate themselves for three days ("Lockdown Pakistan": Twitterati Urge PM Imran to Take Stronger Measures against Covid-19 - Pakistan - DAWN.COM," 2020). So, regarding ongoing situation of COVID-19 in spite of having poor economy and limited resources, a complete lock down in Pakistan was initiated on 24<sup>th</sup> March, 2020 to control the further spread of COVID-19 (Guns & Scanners, 2020) at time when there were 884 cases.

However, the Coronavirus curve remained stable during lock down. The only cases reported were from the visitors coming back from Iran and other countries. They were sent for 14 days isolation in quarantine centers. The decision of lock down resulted good in combating Coronavirus spread to other people, but, as Pakistan is a developing country, its large population consists of daily wagers who work and earn on daily basis. Due to lock down, they suffered a lot in two ways, they either get less suffered by COVID-19 but suffered more by starvation due to the closure of Market and Industry. They started saying that this lock down should be eliminated. A brief timeline of COVID-19 in Pakistan is shown in figure 1.

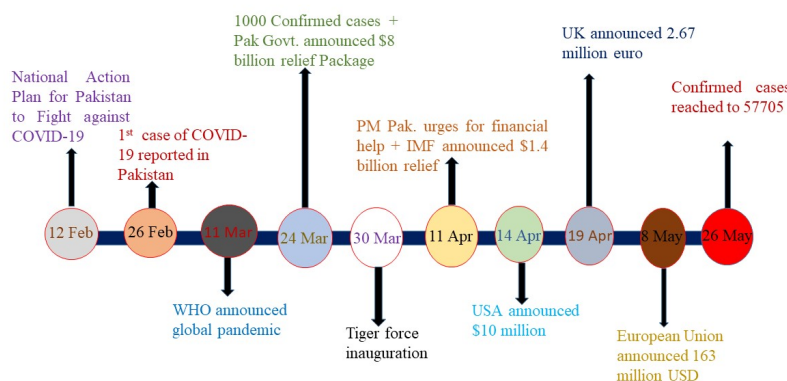


Fig:1. Timeline of COVID-19 in Pakistan

The number of COVID-19 cases keep on rising even after lock down, so, it led to more misconceptions among the people. So, in that current scenario, a leniency in lock down was operated. As a result, total number of COVID-19 cases in Pakistan raised to 4,601 on 10<sup>th</sup> April, 2020 (Conducted & Cases, 2020). This graph kept on rising from 8,418 cases on 20<sup>th</sup> April, 2020 to 14,885 cases on 29<sup>th</sup> April, 2020 (Conducted & Cases, 2020). On 4<sup>th</sup> May, 2020 situation got worst and COVID-19 patients increased to 20,186, as people did not bother to maintain any precautionary measures due to their misconceptions about COVID-19 (Report, 2020).

On 20<sup>th</sup> May, 2020, Sindh became most affected province with 17,947 cases and total COVID-19 cases were 45,898 (Plan, 2020). Then the Coronavirus made its biggest hit in Pakistan with total of 69,496 cases on 31<sup>st</sup> May, 2020 with a death rate of 2.1% and this situation is getting worst day by day (Report, 2020). On 9<sup>th</sup> June, 2020 the nationwide tally of COVID-19 patients stood at 108,317 cases and Pakistan became the 14<sup>th</sup> country to cross 100k COVID-19 cases with death toll troops of 2000 (“JUNE 7: Pakistan Becomes 14th Country to Cross 100k Covid-19 Cases; Death Toll Tops 2,000 | The Express Tribune,” 2020). If this graph keeps on rising, soon Pakistan will leave all the countries behind in COVID-19 race and it could not afford another lock down to control spread of virus due to its disastrous effects on economy. So, spreading awareness is the only strategy that can work if people take it seriously otherwise, all the people should be ready to face a situation worse than any nightmare (Acter et al., 2020).

The delicate health system of Pakistan has braced for the recent imminent COVID-19 peak for the last couple of weeks. Number of cases already surpassed China and many other countries resulting Pakistan at 13<sup>th</sup> place worldwide for this pandemic. Hospitals of two largest cities of Pakistan, Karachi and Lahore respectively, have already reached their limits. In Karachi, 136 ventilators in 15 government, private and charitable hospitals are dealing with coronavirus patients for the population of 15 million people describe its pitiable situation clearly. Similarly, 539 beds and just 200 ventilators are available in whole Lahore to tackle 11.13 million people. In addition, about 2,200 doctors self-isolated themselves after being tested positive for Coronavirus (“Pakistan’s Health System Braces for Covid-19 Peak | The Express Tribune,” 2020)

Dr. Ayub Jadoon, a microbiologist from Abbottabad University of Science and Technology, claimed that the current viral attack may be the second exposure for the people of Pakistan. He illustrated due to the low mortality rate and explained that it is quite possible that people of Pakistan are already, more or less, immune to SARS-CoV-2 because it might be the second exposure of Coronavirus in Pakistan and the antibodies or memory B cells that were produced during the first exposure are already present in an individual and this help in defending the body against the recent virus, even if this is another strain of the virus (“Pakistan’s Low Coronavirus Fatalities May Be Due to ‘Second Exposure’ | The Express Tribune”)

A tabular data about the number of COVID-19 cases, deaths due to COVID-19 and the recoveries from this disease is summarized in tables 1, 2 and 3 respectively.

**Table 1: Number of COVID-19 Cases Province-wise**

	Punjab	Sindh	Khyber Pakhtunkhwa	Baluchistan	Islamabad	Gilgit-Baltistan	Azad J
<b>24<sup>th</sup> March</b>	296	174	78	115	16	81	1
<b>10<sup>th</sup> April</b>	2,336	2,106	652	220	113	215	34
<b>29<sup>th</sup> April</b>	6,061	5,695	2,381	978	313	307	66
<b>4<sup>th</sup> May</b>	8,103	7,882	3,288	1,321	464	372	71
<b>20<sup>th</sup> May</b>	17,382	18,964	6,815	2,968	1,235	579	148
<b>31<sup>st</sup> May</b>	26,240	28,245	10,027	4,393	2,589	711	255
<b>4<sup>th</sup> June</b>	33,144	33,536	11,890	5,582	3,946	852	299
<b>7<sup>th</sup> June</b>	38,903	38,108	13,487	6,516	5,329	932	396
<b>9<sup>th</sup> June</b>	43,460	41,303	14,527	7,031	5,963	974	444

	Punjab	Sindh	Khyber Pakhtunkhwa	Baluchistan	Islamabad	Gilgit-Baltistan	Azad J
<b>21<sup>st</sup> June</b>	66,943	69,628	21,997	9,475	10,912	1,288	845

**Table 2: Number of Deaths due to COVID-19 Province-wise**

	Punjab	Sindh	Khyber Pakhtunkhwa	Baluchistan	Islamabad	Gilgit-Baltistan	Azad J
<b>24<sup>th</sup> March</b>	1	2	3	1	0	1	0
<b>10<sup>th</sup> April</b>	19	26	25	1	1	3	0
<b>29<sup>th</sup> April</b>	103	100	137	14	4	3	0
<b>4<sup>th</sup> May</b>	136	137	185	21	4	3	0
<b>20<sup>th</sup> May</b>	297	316	351	38	10	4	1
<b>31<sup>st</sup> May</b>	497	481	475	47	28	11	6
<b>4<sup>th</sup> June</b>	629	575	521	53	41	12	7
<b>7<sup>th</sup> June</b>	715	650	575	54	52	13	8
<b>9<sup>th</sup> June</b>	807	696	610	62	57	14	9
<b>21<sup>st</sup> June</b>	1,435	1,089	821	102	101	22	20

**Table 3: Number of Recoveries from COVID-19 Province-wise**

	Punjab	Sindh	Khyber Pakhtunkhwa	Baluchistan	Islamabad	Gilgit-Baltistan	Azad J
<b>24<sup>th</sup> March</b>	3	5	0	0	2	0	0
<b>10<sup>th</sup> April</b>	39	365	131	95	13	125	1
<b>29<sup>th</sup> April</b>	1,780	1,169	614	180	44	228	37
<b>4<sup>th</sup> May</b>	2,716	1,629	856	197	56	279	49
<b>20<sup>th</sup> May</b>	5,112	5,645	2,130	636	151	402	79
<b>31<sup>st</sup> May</b>	7,021	13,810	2,912	1,507	169	496	168
<b>4<sup>th</sup> June</b>	7,806	16,782	3,221	2,057	629	541	182
<b>7<sup>th</sup> June</b>	8,109	18,776	3,542	2,313	843	577	197
<b>9<sup>th</sup> June</b>	8,643	19,896	3,631	2,462	843	616	217
<b>21<sup>st</sup> June</b>	19,100	36,278	6,536	3,650	4,681	865	348

### COVID-19: Impacts on Pakistan's Economy

The pandemic which started as a minute viral outbreak in Wuhan has now engulfed the whole planet, this Coronavirus pandemic has created a havoc and wreaked the international economy. Both developing and developed countries are seeking to grapple with the pandemic. All of them are facing limitations in their resource capacities with short fall being more severe in the developing countries like Pakistan (Chohan, 2020). Pakistan is on the brink and there is a tight rope in front of a weak economy. The virus which was introduced through the travelers coming from countries like Iran has now more than eighty thousand coronavirus cases with almost one and a half thousand deaths which is increasing by each passing day. The only way to limit the spread of virus is social distancing and isolation which can only be achieved by strict lock down of cities and villages as well. If this step is not persuade, then there will be a risk of massive infection outbreak, while, by taking this step, complete lock down can suffocate the economy of country in numerous ways (Butt, 2020).

Due to lock down, the movement of imports and exports in the whole world has been disturbed. The business in European countries specially in U.S has shut down due to which exporters from Pakistan are unable to process their orders and also the payment from previous orders has also been adjourned. The Cargo and

goods movements has also been blocked making it more arduous to maintain the flow of business (Baloch, 2017). Similarly, imports also cannot be completed as every major city in the world is hanged due to lock down. There is a large number of private companies in Pakistan that rely heavily on imports for running successfully, and now. due to lock down, they are badly suffering by financial means. Commercial importers will suffer in a way of complete shortage or delay of material goods. Similarly, the industrial importers will suffer from the shortage of raw material that will lead to salary cuts and then finally job losses (Rehman, 2020). According to PIDE (Pakistan Institute of Development and Economics) around 2.4% of annual GDP will be lost due to COVID-19 pandemic which is enough to send the country into a spiraling recession (Butt, 2020). Recently, The Economic Coordination Committee (ECC) approved firing 9,350 employees of the Pakistan Steel Mills (PSM) and another 250 will be let go within three months. (Shahzad Paracha, June 3, 2020)

Secondly, the closure of offices, school, factories and markets will hit the daily wagers and middlemen. There is a possibility of mass bankruptcies which can lead to complete collapse of country's economy. Also, on the other hand, Pakistan's key currency earner, the textile industry which rely on other countries for bulk of their capital goods inputs, is highly effecting because due to this pandemic, all countries have shut down their trades. Loses to this sector is highly going to affect Pakistan's economy (Almas & Macroeconomics, 2020). This year is perhaps the most formidable challenge the Pakistan is facing, but, if we fail in managing these economy crises and spread of virus then the coming year would be going to worsen than our darkest nightmare's (Butt, 2020). A comparison of Pakistan's economic condition is shown in table 4:

**Table 4:**

<b>Pakistan's economic condition before and after COVID-19 pandemic</b>	<b>Pakistan's economic condition before and after COVID-19 pandemic</b>	<b>Pakistan's economic condition before and after COVID-19 pandemic</b>
<b>Before COVID-19</b>	<b>After COVID-19</b>	<b>References</b>
Unemployment rate was 10.8	Now it is 14.7 per cent According to ADB (Asian development bank) estimate 946,000 people will be unemployed in Pak due to this pandemic	(International, 2021)
Inflation rate of goods was 9.4pc	Now after this pandemic it goes down to average 7.4pc	(International, 2021)
Pakistan's currency situation: 1 US\$= 160.8 rupee	Pak rupee depreciate against US\$1 by 17.7 and expected to be 1 US\$=178.5 rupee in 2024	(International, 2021)
Imports profit: 36.56 billion	It declined to 31.42 billion	(Baloch, 2017)
GDP expected growth was 3.3-3.4 per cent	Now it is only expected to be 2-2.8 per cent Pakistan loses textile export share from 2.2pc to 1.7pc	(Almas & Macroeconomics, 2020) (Mustafa, 2018)
Before crisis government was expecting to contain deficit at 7.4-7.5 per cent	It is now expected to hit 9 per cent due to increasing expenditure demand and fall in taxes In hypothetical worst scenario discussion ADB projected that there will be \$1.5 billion loss to agriculture sector	(Almas & Macroeconomics, 2020) (Rana, 2020)

Pakistan's economic condition before and after COVID-19 pandemic	Pakistan's economic condition before and after COVID-19 pandemic	Pakistan's economic condition before and after COVID-19 pandemic
	And hotel and restraints will face \$2.4 million losses	(Rana, 2020)

## Measures taken by Government of Pakistan against Covid-19

### 1 Pakistan Civil Aviation Authority:

After declaration of the Covid-19 pandemic, the Civil Aviation Authority in collaboration with federal government of Pakistan enact a system to screen every person who has travelled directly or indirectly from China and other infected countries (Saqlain, Munir, Ahmed, Tahir, & Kamran, 2020). Importation of coronavirus from Iran, during early days Pakistan lacked proper screening methods to tackle this epidemic. In media briefing, Prime Minister of Pakistan admitted that we did not have enough funds to provide adequate facilities for travelers (Khan, 2020).

To tackle this worst situation government started closed monitoring and active screening of passengers arriving from infected countries (Saqlain et al., 2020). They had also sealed borders with Afghanistan, Iran, China and India to prevent the spread of disease. Pakistan government also called in troops to assist civilian authorities across the country providing medical facility in dealing with deadly virus (Gul, 2020).

### 2 National Institute of Health (NIH):

The Pakistan National Institute of Health (NIH) has important role in preventing virus by circulating protocols regarding Covid-19 prevention, transmission and also launching public awareness campaigns throughout country (Khanain, 2020). These can be related to use biosafety hazards such as wearing facemasks and gloves, use of personnel protective equipment, handling of suspected cases, sample collection and transport of virus, adequate hand washing and body hygiene, etc. (Saqlain et al., 2020).

During the starting days of epidemic Pakistan lacked proper diagnostic facility and suspected samples were sent to foreign laboratories for testing (Saqlain et al., 2020). Later Pakistan receive test kits from the China and primers from the Japan to detect virus. According to federal government Pakistan is now capable of testing samples within the country at the main laboratory at the NIH. The federal NIH also supports all Pakistani provinces for establishing provisional surveillance units (Khanain, 2020).

### 3 Quarantine Centers:

The Quarantines being used to prevent the spread of infection by restricting the activities of a person not yet developed a disease, but who might be exposed to an infectious agent such as Covid-19. The Pakistan government has established many quarantine centers throughout the country to tackle this worst situation (Khanain, 2020). The government has also tried to convert local hotels into quarantine centers to provide facility for medical staff due to prevent the spread of virus in country (Qureshi, 2020). The total approximate number of quarantines 23, 557 in 139 districts of Pakistan which provide good gesture being use throughout country to prevent spread of this outbreak (Qureshi, 2020). Apart from this containment, government also established many isolation wards in hospitals to control virus (Waris, Khan, Ali, & Baset, 2020).

### 4 Closure of Education Institution:

The government of Pakistan had closed all education institutions throughout the country to avoid quick spread of coronavirus. According to first announcements, all educational institution was closed till 31 March 2020 which can be considered as summer vacation. Later on, this outbreak was spread rapidly so government has decided to increase these vacations up to 15 July 2020 (Nafees & Khan, 2020). Initially this act was criticized for the reasons that no alternate arrangements were made for students. All exams throughout country were also cancelled by education Minsters. They should promote students based on their previous

results (Training, 2020). According to HEC universities should make arrangements to take online classes, quiz programs, reading material, assignments and exams. But still students have faced many problems related to internet facilities all around the country. Pakistan government may need to arrange special programs to save the precious time of the students (Training, 2020).

## **5 Partial lock down:**

Pakistan government have begun to re imposing a partial lock down and made wearing masks mandatory as the country comes to turning as a coronavirus hub (Mehmood, 2020). Pakistan government were closed almost 3, 000 shops and markets until 4 June 2020 as cases neared 90, 000. The medical associations have warned government about serious consequences when complete lock down is not imposed (Gandhara, 2020). The world health organization has been ranked Pakistan among top 10 countries that have highest number of new cases. For this government has needed to make some other arrangements to prevent the spread of this deadly virus (Latif, 2020).

## **6 National Action Plan:**

The Ministry of Health Services, Regulation and Coordination, Government of Pakistan, has established National Action Plan to tackle this epidemic. The objective of this plan was to make policies and arrangements to support provisional governments to guide them about Covid-19 (Chaudhry, 2020b). By using this guidance provisional governments design better quarantine centers and containment facilities. This action plan can also be used by Armed Forces of Pakistan to prevent the spread of virus across the country (Services, 2020).

## **7 Corona Relief Fund:**

The fear of country wide economic downturn already bothered economy coupled with fear of declines in jobs and ability of a person to provide facilities for their families. Further enforcement of the government to lockdown cities and markets to prevent the transmission of pathogen, as ordinary citizens omitted their calls and urging human beings to stay safe at home (NEWS, 2020). The package worth 900 billion Pakistani Rupees was approved in cabinet to support low income persons particularly labor and also improved health care facilities in hospitals. Government has also launched corona fund for the persons who have faced this worst situation due to lockdown and deadly virus. The prime Minister of Pakistan had also announced relief package for small industries to tackle this epidemic (Javed, Sarwer, Soto, & Mashwani, 2020)

## **Barriers in Lock Down**

The only and most effective strategy is lock down, but, more than all over the world, people of subcontinent especially Pakistan is facing a lot of problems in making its people understand about the severity of the disease. First issue is with the unawareness or illiteracy of the people. People do not even bother to make sure the safety measures. The lock down partially lifted by the Government in order to pursue the economy of Pakistan before Eid resulted in an enormous and rapid increase in the graph of daily cases of COVID-19 in Pakistan (Organization & organization, 2020). Obviously, all of this happened due to unawareness and non-serious behavior of people against this pandemic.

Second major problem is the myths wandering in the public about novel coronavirus. People specially living in villages are not ready to accept the reality about virus. They do not believe until they see many patients by their own eyes. Rumors revolve that the virus is being spread by the will of World's Superpowers or it's a source to uplift the economy of the developed countries by selling their vaccines, etc. Another problem faced by the Government of Pakistan is the firm belief of its people in religion. However, more than 95% population in Pakistan is Muslim (Organization & organization, 2020), Islam never preached about not having safety measures, in fact, Islam preached the ways to tackle the pandemics. Some people in Pakistan who are not well literate about the preaching of Islam, mis concept the belief and hence face horrifying situation.

## **Available treatments of COVID-19 in Pakistan**

The Covid-19 pandemic has thrown the medical community into disarray. It's just not an increase of new cases, high mortality rates and lack of personnel protective equipment's, but without any curative or

preventive medicine, doctors are left treating patients with series of trial and errors. According to world Health Organization (WHO) world's doctors are trying to make vaccines and trails of different drugs and their cocktail against Covid-19 but still there is no define treatment available (Waris et al., 2020).

Similarly, Pakistani doctors have used different approaches of treatments against Covid-19. A national webinar, Management of Severe COVID Patients, which was hosted by the Indus Hospital, demonstrated how the doctors were collaborating across hospitals, cities and provinces to pool their clinical resources. In this they decided that there is no medicine for mild patients except supportive care. They had also approved some treatments for severe Covid-19 patients (Ahmed, 2020) summarized in table 2 and 3:

#### **(i) Chloroquine and Hydroxychloroquine:**

These are the anti-malarial drugs that have gained popularity after research from China and France showed they improved patient outcomes. However, Dr Mahmood from Agha Khan University said the study from China on 100 COVID-19 cases was poorly designed while that of France was open-labelled, non-randomized and only conducted on 36 patients. According to some doctors in Pakistan these both are cardiotoxic, means they damage heart by changing its rhythm (Ahmed, 2020).

#### **(ii) Steroids:**

Steroids are chemicals that can be used as hormones to reduce inflammation in the body. In early days these can be used and show permissive results but in later days they shown adverse side effects on patients in Pakistan (Waris et al., 2020).

#### **(iii) Tocilizumab and Sarilumab:**

These are monoclonal antibodies which can be used to treat rheumatoid arthritis. They can help in preventing cytokine storm which can be happens when there is an overproduction of immune cells which attacking self-antigens instead of defending it (Ahmed, 2020).

The Punjab government has approved the use of Actrema, a lifesaving drug for critical patients. This can be prescribed to patients who develop lung complications and abnormal level of interleukin 6 in the blood. The IL-6 is an endogenous chemical which causes inflammation. These can be useful for some patients only because there is a high risk of increase infection level (Chaudhry, 2020a).

#### **(iv) Convalescent plasma or immunoglobulins:**

Plasma therapy has been made world headline as one of the most successful treatment against Covid-19. Convalescent plasma has been used for passive immunization because it contains antibodies against coronavirus in recovered individual.

The Drug Regulatory Authority of Pakistan approved clinical trials for this therapy. Some hospitals of Pakistan have begun to use this therapy for severe patients of Covid-19 (Ahmed, 2020).

#### **(v) Proning:**

Proning is placing the patient in a prone position, on their stomach with chest down and back upwards. It helps to improve oxygenation during acute respiratory diseases. Some doctors in Pakistan use proning for patients who faced difficulty in breathing during Covid-199 infection. But it can be effective for some patients, other critical patients need ventilators (Javed et al., 2020).

#### **(vi) Remdesivir**

Remdesivir is a broad-spectrum antiviral drug used to treat many viruses. It has effective inhibitory effects against many zoonotic pathogens and human coronaviruses such as Severe Acute Respiratory Syndrome (SARS). It can limit onset of symptoms from 15 days to 11 in clinical trials around the world (Bandi, 2020).

“It’s a very safe and effective drug,” said Eric Topol, founder and director of the Scripps Research Translational Institute. “We now have a definite first efficacious drug for Covid-19, which is a major step forward



and will be built upon with other drug combinations (Herper, 2020)."

The Gilead and five generic companies of Pakistan and India have signed agreement so they can help 127 countries for making Remdesivir medicine to fight against Covid-19 (Bandi, 2020).

A brief review about the available treatments for COVID-19 being practiced yet is described following in table 5:

**Table 5: Available Treatments being practiced against COVID-19**

Drug	Generic Name	Chemical Structure	Drug class
Remdesivir	Remdesivir		Inhibits Viral Synthesis
Clexan	Enoxaprin		Anticoagulant
Xarelto	Rivaroxaban		Anticoagulant
Depo-Medrol	Methyl-prednisolone		Corticosteroid
Stromectol	Ivermectin		Anti-parasite
Azasite/ Z-max	Azithromycin + Chloroquine		Antibiotic/ additional immunodulatory effects
Acterma	Tocilizumab	$C_{6428}H_{9976}N_{1720}O_{2018}S_{42}$	Interleukin-6 inhibitor

Treatments other than drug therapy are summarized following in table 6:

**Table 6: Non-chemical Treatments:**

Treatment	Methodology	Clinical trials
Plasma Therapy	Convalescent plasma is used for passive immunization of patients as it contains antibodies formed against the novel coronavirus in a recovered individual.	The Drug Regulatory Authority of Pakistan approved clinical trials for plasma therapy on April 8. Some local hospitals have begun considering the experimental use of this therapy on patients in a critical state. Initially 350 members were selected to undergo Clinical Trials, said Dr. Tahir Shamsi. (Latif, 2020)
Proning	Placing the patient in a prone position, on their stomach with the chest down and back upwards. It helps in increasing oxygenation during acute respiratory distress syndrome.	Dr Fakhir Raza, an intensivist at SIUT, said proning had been very effective in most of their patients. Out of 20 patients in SIUT who were prone, 11 had been intubated (placed on a ventilator) out of which seven were extubated successfully, he added. "We prone for up to 16 hrs., then we de-prone and check the patient's vitals," explained Dr Raza. "There was a remarkable improvement within three to four hours." (Ahmed, 2020)

## Perspective about Convalescent plasma technique regarding past CoV-epidemic

SARS represents first transmissible pandemic disease of Coronaviruses. During its outbreak, 176 patients who were suffered from this viral infection and treated with convalescent plasma, their SARS-specific antibodies were collected and maintained for an average of two years. These antibodies were monitored regularly showing their percentage largely continued to increase till two years showing the immune response of these people as maintained. Initially, after two years their IgG antibodies percentage started reducing, and after three years, these convalescent population show no SARS-CoV specific-IgG antibodies. It indicated that these people are again susceptible to SARS infection (Wu et al., 2007). So, based on these findings, we can predict that duration of current ongoing convalescent plasma technique to treat COVID-19 in Pakistan will not be lifelong. Government with the help of scientists should think of some alternative lifelong curative strategy. (Wu et al., 2007).

### **Can Herd Immunity be an effective way to tackle COVID-19?**

Herd immunity is the risk of infection among susceptible individuals in a population that can be reduced by the presence and proximity of immune individuals, referred to as “herd effect” or “indirect protection” (Fine, Eames, & Heymann, 2011). It is actually a strategy of indirect protection from an infectious disease that occurs when a population is immune either through immunity developed from previous infection or vaccination. This means that even people who are not vaccinated, or people in whom the vaccine doesn’t trigger immunity, are protected because people around them who are immune can act as buffers between them and an infected person (Randolph & Barreiro, 2020).

Once herd immunity is established for a while, and the ability of the disease to spread is hindered, the disease can eventually be eliminated, this is how the world wipe out smallpox (Bazin & Jenner, 2000). The more infectious a disease, the greater the population immunity needed to ensure herd immunity. For example, measles is highly contagious and one person with measles can infect up to 18 other people. It means that about 95% of people are needed to be immune in order for the wider group to have herd immunity (Dowdy & D’Souza, 2020).

While this novel coronavirus has a lower infection rate than measles, with each infected person passing it on to two or three new people, on average. This means that herd immunity can be achieved when around 60% of the population will become immune to COVID-19, this strategy can be economical and beneficial for developing countries like Pakistan who can’t afford to vaccinate their whole population due to limited resources and current ongoing financial crisis. However this can only be achieved when a vaccine will develop for COVID-19. (Kwok, Lai, Wei, Wong, & Tang, 2020).

Another type/ way of herd immunity, natural herd immunity, that is achieved through infection rather than vaccination. It means that if a large number of population is infected with certain infectious strain, antibodies against that infectious agent will naturally be formed in the body that will protect them from reinfection. It can be challenging to induce it through unchecked infection as there would be a very high rate of serious illness and death. Health systems will be overwhelmed well beyond their surge capacity, even in high-income countries (Bethune & Korinek, 2020). That is why herd immunity is generally pursued through vaccination programs, even when vaccines are available, it is not always possible to achieve herd immunity for very long duration. Some viruses, such as seasonal flu, mutate frequently and evade body’s immune response. So, immunity does not always last forever due to which flu shot is necessary every single year. Similarly, in the case of coronavirus, natural immunity to the virus may also last only a year or two (Wu et al., 2007).

### **Recommendation for future**

As COVID-19 pandemic is totally novel for the whole world, it effected all the countries equally, but developing countries like Pakistan has faced much more severe damage. One of the reasons is that Pakistan is being under developed countries and was not in the position to cope up such viral outbreak with having no previous history of tackling pandemics. So, the following lessons can be learned from this pandemic to handle such circumstances in future:

- Quarantine centers should be established in all major cities of Pakistan, as in future if such incident occur again there be no shortage of space and patients can be easily isolated to prevent spread of any infection
- Screening system should be established at all international airports that should screen every individual coming from other country every time not only in specific days i.e. when there is some outbreak or danger of infection
- The online education system should be practiced in all institutes even during normal days as a future strategy so students don't have to suffer from such academic gap that they are currently facing in Pakistan
- There should be a proper computational record of all labor community in Pakistan, so that whenever such situation occurs where lock down has to be initiated, they can easily be approachable and helped.
- COVID-19 has shown that Pakistan lacked strong health care capacity, in future it can become a major challenge if it is not dealt now.
- To prevent such a big economic loss in future, Pakistan should establish a life long funding system to save money to tackle such circumstances effectively in future

## Conclusion

The current ongoing Coronavirus situation is under checked in Pakistan. It has already caused severe losses to Pakistan's economy and health care system. As being a developing country, Pakistan was not in the position to tackle this novel pandemic efficiently and its health care system is very fragile. Poor health literacy among its public is leading towards more disastrous condition. These are one of those reasons due to which all the steps taken by the government are not giving fruitful results. Now government and all other related organizations should be at high alert condition to tackle any unusual circumstances. As soon as a promising treatment or vaccine is not introduced, this pandemic will keep on going with the same rate and as a result, all resources of country will be finished and everyone will have to face their hast incubus.

**Acknowledgments:** None.

**Ethical Statement:** The authors confirm that the ethical policies of the journal, as

noted on the journal's author guidelines page, have been adhered to. No ethical approval was required as this is a review article with no original research data.'

**Conflicts of Interest:** All authors report no conflicts of interest relevant to this article.

## References:

- Ahmed, A. E. (2017). The predictors of 3- and 30-day mortality in 660 MERS-CoV patients. *BMC Infectious Diseases* , 17 (1), 1–8. <https://doi.org/10.1186/s12879-017-2712-2>
- Alfaraj, S. H., Al-Tawfiq, J. A., & Memish, Z. A. (2019). Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection during pregnancy: Report of two cases & review of the literature. *Journal of Microbiology, Immunology and Infection* , 52 (3), 501–503. <https://doi.org/10.1016/j.jmii.2018.04.005>
- Almas, Z., & Macroeconomics, C. (2020). ' COVID -19 : – Economic Impact of Coronavirus on Pakistan ' ( 1st Session ) Pakistan ' s economy to face more corona virus pain next fiscal year : Expert .
- Bai, Y., Yao, L., Wei, T., Tian, F., Jin, D.-Y., Chen, L., & Wang, M. (2020). Presumed asymptomatic carrier transmission of COVID-19. *Jama*, 323 (14), 1406-1407.
- Baloch, G. U. (2017). » Impact of inflation on economy of Pakistan. In *Daily Balochistan Express Quetta* . <http://www.bexpress.com.pk/2017/01/impact-of-inflation-on-economy-of-pakistan/>
- Bazin, H., & Jenner, E. (2000). *The eradication of smallpox* : Elsevier.
- Bethune, Z. A., & Korinek, A. (2020). *Covid-19 infection externalities: Trading off lives vs. livelihoods* (0898-2937). Retrieved from

- Butt, I. R. (2020). *Pakistan's economy and impact of COVID-19* . <https://dailytimes.com.pk/594644/pakistans-economy-and-impact-of-covid-19/>
- Conducted, T., & Cases, C. (2020). *COVID-19 – Pakistan Updates*(Issue April).
- Chohan, U. W. (2020). Forecasting the Economic Impact of Coronavirus on Developing Countries: Case of Pakistan. *SSRN Electronic Journal* . <https://doi.org/10.2139/ssrn.3563616>
- Covid-19 cases in Pakistan in Real Time* . (2020). Government of Pakistan. <http://covid.gov.pk/>
- Culp, W. C. (2020). Coronavirus Disease 2019. In *A & A Practice*(Vol. 14, Issue 6). <https://doi.org/10.1213/xa.0000000000001218>
- Decaro, N., & Lorusso, A. (2020). Novel human coronavirus (SARS-CoV-2): A lesson from animal coronaviruses. *Veterinary Microbiology* ,244 (March), 108693. <https://doi.org/10.1016/j.vetmic.2020.108693>
- Dowdy, D., & D'Souza, G. (2020). Early herd immunity against COVID-19: A dangerous misconception. *Johns Hopkins Coronavirus Research Center* .
- Fine, P., Eames, K., & Heymann, D. L. (2011). “Herd immunity”: a rough guide. *Clinical infectious diseases*, 52 (7), 911-916.
- Gorbalenya, A. E., Baker, S. C., Baric, R. S., Groot, R. J. De, Gulyaeva, A. A., Haagmans, B. L., Lauber, C., & Leontovich, A. M. (2020). The species and its viruses – a statement of the Coronavirus Study Group. *Biorxiv (Cold Spring Harbor Laboratory)* , 1–15. <https://doi.org/10.1101/2020.02.07.937862>
- Guns, T., & Scanners, T. (2020). *COVID-19 – Pakistan Updates .March* .
- International, T. N. (2021). *Impact of COVID-19 pandemic : Pak GDP to contract by 1 . 6pc in current fiscal , says Economist Intelligence Unit* . 19–21.
- Javed, B., Sarwer, A., Soto, E. B., & Mashwani, Z. U. R. (2020). Is Pakistan's Response to Coronavirus (SARS-CoV-2) Adequate to Prevent an Outbreak? *Frontiers in Medicine* , 7 (April), 7–10. <https://doi.org/10.3389/fmed.2020.00158>
- JUNE 7: Pakistan becomes 14th country to cross 100k Covid-19 cases; death toll tops 2,000 | The Express Tribune. (2020). *Dawn News* . <https://www.google.com/amp/s/tribune.com.pk/story/2237323/1-live-pakistans-death-toll-crosses-2000-nationwide-tally-jumps-98943/%3Famp=1>
- Kwok, K. O., Lai, F., Wei, W. I., Wong, S. Y. S., & Tang, J. W. (2020). Herd immunity—estimating the level required to halt the COVID-19 epidemics in affected countries. *Journal of Infection*, 80 (6), e32-e33.
- “Lockdown Pakistan”: Twitterati urge PM Imran to take stronger measures against Covid-19 - Pakistan - DAWN.COM. (2020, March 21).*Dawn News* . [www.dawn.com/news/1542640](http://www.dawn.com/news/1542640)
- MacKenzie, J. S., & Smith, D. W. (2020). COVID-19: A novel zoonotic disease caused by a coronavirus from China: What we know and what we don't. *Microbiology Australia* , 41 (1), 45–50. <https://doi.org/10.1071/MA20013>
- Mehta, P., McAuley, D. F., Brown, M., Sanchez, E., Tattersall, R. S., & Manson, J. J. (2020). COVID-19: consider cytokine storm syndromes and immunosuppression. *The Lancet* , 395 (10229), 1033–1034. [https://doi.org/10.1016/S0140-6736\(20\)30628-0](https://doi.org/10.1016/S0140-6736(20)30628-0)
- Mustafa, K. (2018). Pakistan loses textile export share from 2.2pc to 1.7pc. In *The News* . <https://www.thenews.com.pk/print/326564-pakistan-loses-textile-export-share-from-2-2pc-to-1-7pc>
- Navas-Martin, S., & Weiss, S. R. (2003). SARS: Lessons Learned from Other Coronaviruses. *Viral Immunology* , 16 (4), 461–474. <https://doi.org/10.1089/088282403771926292>

- Nishiura, H., Kobayashi, T., Yang, Y., Hayashi, K., Miyama, T., Kinoshita, R., . . . Suzuki, A. (2020). The rate of underascertainment of novel coronavirus (2019-nCoV) infection: estimation using Japanese passengers data on evacuation flights: Multidisciplinary Digital Publishing Institute.
- Organization, W. H., & organization, W. h. (2020). Coronavirus disease (COVID-2019) situation reports.
- Pakistan's health system braces for Covid-19 peak | The Express Tribune. (2020, June 6). *Tribune* . [tribune.com.pk/story/2236875/3-pakistans-health-system-braces-covid-19-peak/](http://tribune.com.pk/story/2236875/3-pakistans-health-system-braces-covid-19-peak/)
- Pakistan's low coronavirus fatalities may be due to 'second exposure' | The Express Tribune. (, April). *Express Tribune* . <https://tribune.com.pk/story/2207806/1-pakistans-low-coronavirus-fatalities-may-due-second-exposure/>
- Plan, R. (2020). *HUMANITARIAN RESPONSE PLAN FOR COVID-19 PANDEMIC 2020* .
- Prather, K. A., Wang, C. C., & Schooley, R. T. (2020). Reducing transmission of SARS-CoV-2. *Science (New York, N.Y.)* , 6197 , 1–5. <https://doi.org/10.1126/science.abc6197>
- Rana, B. S. (2020). *Coronavirus may cause \$ 61m loss to Pakistan : ADB* .
- Randolph, H. E., & Barreiro, L. B. (2020). Herd Immunity: Understanding COVID-19. *Immunity* , 52 (5), 737-741.
- Raza, H., Wahid, B., Rubi, G., & Gulzar, A. (2020). Molecular epidemiology of SARS-CoV-2 in Faisalabad, Pakistan: A real-world clinical experience. *Infection, Genetics and Evolution : Journal of Molecular Epidemiology and Evolutionary Genetics in Infectious Diseases* , 104374. <https://doi.org/10.1016/j.meegid.2020.104374>
- Rehman, B. F. (2020). *Covid-19 and impact on economy* .
- Report, S. (2020). 195,781 (Issue May).
- Waris, A., Atta, U. K., Ali, M., Asmat, A., & Baset, A. (2020). COVID-19 outbreak: current scenario of Pakistan. *New Microbes and New Infections* , 35 (20), 100681. <https://doi.org/10.1016/j.nmni.2020.100681>
- Wassenaar, T. M., & Zou, Y. (2020). *Editor ' s Choice* . <https://doi.org/10.1111/lam.13285>
- Wu, L.-P., Wang, N.-C., Chang, Y.-H., Tian, X.-Y., Na, D.-Y., Zhang, L.-Y., . . . Liang, G.-D. (2007). Duration of antibody responses after severe acute respiratory syndrome. *Emerging infectious diseases* , 13 (10), 1562.
- Zhu, H., Wei, L., & Niu, P. (2020). The novel coronavirus outbreak in Wuhan, China. *Global Health Research and Policy* , 5 (1), 2019–2021. <https://doi.org/10.1186/s41256-020-00135-6>
- Acter, T., Uddin, N., Das, J., Akhter, A., Choudhury, T. R., & Kim, S. (2020). Evolution of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) as coronavirus disease 2019 (COVID-19) pandemic: A global health emergency. *Science of the Total Environment* , 138996.
- Bai, Y., Yao, L., Wei, T., Tian, F., Jin, D.-Y., Chen, L., & Wang, M. (2020). Presumed asymptomatic carrier transmission of COVID-19. *Jama* , 323 (14), 1406-1407.
- Bazin, H., & Jenner, E. (2000). *The eradication of smallpox* : Elsevier.
- Bethune, Z. A., & Korinek, A. (2020). *Covid-19 infection externalities: Trading off lives vs. livelihoods* (0898-2937). Retrieved from
- Dowdy, D., & D'Souza, G. (2020). Early herd immunity against COVID-19: A dangerous misconception. *Johns Hopkins Coronavirus Research Center* .
- Fine, P., Eames, K., & Heymann, D. L. (2011). “Herd immunity”: a rough guide. *Clinical infectious diseases* , 52 (7), 911-916.

- Kwok, K. O., Lai, F., Wei, W. I., Wong, S. Y. S., & Tang, J. W. (2020). Herd immunity—estimating the level required to halt the COVID-19 epidemics in affected countries. *Journal of Infection*, 80 (6), e32-e33.
- Nishiura, H., Kobayashi, T., Yang, Y., Hayashi, K., Miyama, T., Kinoshita, R., . . . Suzuki, A. (2020). The rate of underascertainment of novel coronavirus (2019-nCoV) infection: estimation using Japanese passengers data on evacuation flights: Multidisciplinary Digital Publishing Institute.
- Organization, W. H., & organization, W. h. (2020). Coronavirus disease (COVID-2019) situation reports.
- Randolph, H. E., & Barreiro, L. B. (2020). Herd Immunity: Understanding COVID-19. *Immunity*, 52 (5), 737-741.
- Wu, L.-P., Wang, N.-C., Chang, Y.-H., Tian, X.-Y., Na, D.-Y., Zhang, L.-Y., . . . Liang, G.-D. (2007). Duration of antibody responses after severe acute respiratory syndrome. *Emerging infectious diseases*, 13 (10), 1562.
- Ahmed, T. (2020, April 23, 2020). What treatment approaches has Pakistan used for COVID-19 so far? *SAMAA* .
- Bandi, V. K. (2020, May 14, 2020). Remdesivir: Five Indian and Pakistani firms to make drug to 'fight coronavirus'. *BBC* .
- Chaudhry, A. (2020a, May 28, 2020). Punjab okays drug to treat Covid-19 patients. *DAWN* .
- Chaudhry, A. (2020b, June 10, 2020). WHO urges two-week lockdown, more tests. *DAWN* .
- Gandhara, R. (2020, June 05, 2020). Pakistan Reinforces Partial Lockdown As It Becomes A Coronavirus Hub. *Gandhara* .
- Gul, A. (2020, March 23, 2020). Pakistan Deploys Army to Deal With Coronavirus Outbreak. *Voice of America* .
- Herper, M. (2020, May 22, 2020). Covid-19 study details benefits of treatment with remdesivir, and also its limitations. *Stat News* .
- Javed, B., Sarwer, A., Soto, E. B., & Mashwani, Z.-u.-R. (2020). Is Pakistan's Response to Coronavirus (SARS-CoV-2) Adequate to Prevent an Outbreak? *Frontiers in Medicine*, 7 , 158.
- Khan, B. A. a. N. (2020, BAKER ATYANI AND NAIMAT KHAN). Hundreds still entering Pakistan from Iran despite border closure over coronavirus. *ARAB NEWS* .
- Khanain, W. (2020, February 02, 2020). Pakistan now equipped to test for novel coronavirus, says PM's aide. *Dawn* .
- Latif, A. (2020, April 04, 2020). Pakistan extends COVID-19 lockdown until May 9. *Anadolu Agency* .
- Mehmood, A. (2020, May 19,2020). COVID-19: Education in Pakistan gets mundane attention. *The NEWS* .
- Nafees, M., & Khan, F. (2020). Pakistan's Response to COVID-19 Pandemic and Efficacy of Quarantine and Partial Lockdown: A Review. *Electron J Gen Med*. 2020; 17 (6): em240.
- NEWS. (2020, April 30, 2020). PM Imran Khan Announces New Corona Relief Fund For Unemployed People. *92 NEWS* .
- Qureshi, Z. (2020, April 04, 2020). COVID-19: Pakistan allows converting local hotels into quarantine. *Gulf News* .
- Saqlain, M., Munir, M. M., Ahmed, A., Tahir, A. H., & Kamran, S. (2020). Is Pakistan prepared to tackle the coronavirus epidemic? *Drugs & Therapy Perspectives* , 1-2.

Services, M. o. N. H. (2020). *National Action Plan for Coronavirus disease (COVID-19) Pakistan* : Government of Pakistan.

Training, M. o. F. E. a. P. (2020). *PAKISTAN NATIONAL EDUCATION RESPONSE AND RESILIENCE PLAN (K-12)*

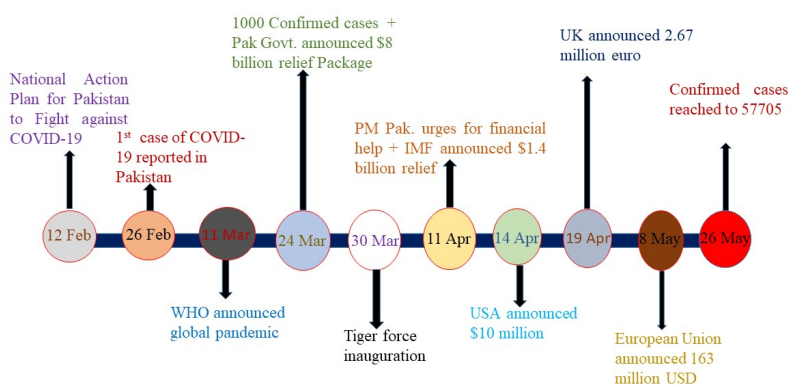
for

*COVID-19* : Government of Pakistan.

Waris, A., Khan, A. U., Ali, M., Ali, A., & Baset, A. (2020). COVID-19 outbreak: current scenario of Pakistan. *New Microbes and New Infections* , 100681.

## Figures

**Figure:1** Timeline of COVID-19 in Pakistan



## Tables

**Table:1** Number of COVID-19 Cases Province-wise

	Punjab	Sindh	Khyber Pakhtunkhwa	Baluchistan	Islamabad	Gilgit-Baltistan	Azad J
<b>24<sup>th</sup> March</b>	296	174	78	115	16	81	1
<b>10<sup>th</sup> April</b>	2,336	2,106	652	220	113	215	34
<b>29<sup>th</sup> April</b>	6,061	5,695	2,381	978	313	307	66
<b>4<sup>th</sup> May</b>	8,103	7,882	3,288	1,321	464	372	71
<b>20<sup>th</sup> May</b>	17,382	18,964	6,815	2,968	1,235	579	148
<b>31<sup>st</sup> May</b>	26,240	28,245	10,027	4,393	2,589	711	255
<b>4<sup>th</sup> June</b>	33,144	33,536	11,890	5,582	3,946	852	299
<b>7<sup>th</sup> June</b>	38,903	38,108	13,487	6,516	5,329	932	396
<b>9<sup>th</sup> June</b>	43,460	41,303	14,527	7,031	5,963	974	444
<b>21<sup>st</sup> June</b>	66,943	69,628	21,997	9,475	10,912	1,288	845

**Table:2** Number of Deaths due to COVID-19 Province-wise

	Punjab	Sindh	Khyber Pakhtunkhwa	Baluchistan	Islamabad	Gilgit-Baltistan	Azad J
<b>24<sup>th</sup> March</b>	1	2	3	1	0	1	0
<b>10<sup>th</sup> April</b>	19	26	25	1	1	3	0
<b>29<sup>th</sup> April</b>	103	100	137	14	4	3	0
<b>4<sup>th</sup> May</b>	136	137	185	21	4	3	0
<b>20<sup>th</sup> May</b>	297	316	351	38	10	4	1
<b>31<sup>st</sup> May</b>	497	481	475	47	28	11	6
<b>4<sup>th</sup> June</b>	629	575	521	53	41	12	7
<b>7<sup>th</sup> June</b>	715	650	575	54	52	13	8
<b>9<sup>th</sup> June</b>	807	696	610	62	57	14	9
<b>21<sup>st</sup> June</b>	1,435	1,089	821	102	101	22	20

**Table:3 Number of Recoveries from COVID-19 Province-wise**

	Punjab	Sindh	Khyber Pakhtunkhwa	Baluchistan	Islamabad	Gilgit-Baltistan	Azad J
<b>24<sup>th</sup> March</b>	3	5	0	0	2	0	0
<b>10<sup>th</sup> April</b>	39	365	131	95	13	125	1
<b>29<sup>th</sup> April</b>	1,780	1,169	614	180	44	228	37
<b>4<sup>th</sup> May</b>	2,716	1,629	856	197	56	279	49
<b>20<sup>th</sup> May</b>	5,112	5,645	2,130	636	151	402	79
<b>31<sup>st</sup> May</b>	7,021	13,810	2,912	1,507	169	496	168
<b>4<sup>th</sup> June</b>	7,806	16,782	3,221	2,057	629	541	182
<b>7<sup>th</sup> June</b>	8,109	18,776	3,542	2,313	843	577	197
<b>9<sup>th</sup> June</b>	8,643	19,896	3,631	2,462	843	616	217
<b>21<sup>st</sup> June</b>	19,100	36,278	6,536	3,650	4,681	865	348

**Table:4**

Pakistan's economic condition before and after COVID-19 pandemic	Pakistan's economic condition before and after COVID-19 pandemic	Pakistan's economic condition before and after COVID-19 pandemic
<b>Before COVID-19</b>	<b>After COVID-19</b>	<b>References</b>
Unemployment rate was 10.8	Now it is 14.7 per cent	(International, 2021)
	According to ADB (Asian development bank) estimate	
	946,000 people will be unemployed in Pak due to this pandemic	
Inflation rate of goods was 9.4pc	Now after this pandemic it goes down to average 7.4pc	(International, 2021)
Pakistan's currency situation: 1 US\$= 160.8 rupee	Pak rupee depreciate against US\$1 by 17.7 and expected to be 1 US\$=178.5 rupee in 2024	(International, 2021)
Imports profit: 36.56 billion	It declined to 31.42 billion	(Baloch, 2017)
GDP expected growth was 3.3-3.4 per cent	Now it is only expected to be 2-2.8 per cent	(Almas & Macroeconomics, 2020)
	Pakistan loses textile export share from 2.2pc to 1.7pc	(Mustafa, 2018)



Pakistan's economic condition before and after COVID-19 pandemic	Pakistan's economic condition before and after COVID-19 pandemic	Pakistan's economic condition before and after COVID-19 pandemic
Before crisis government was expecting to contain deficit at 7.4-7.5 per cent	It is now expected to hit 9 per cent due to increasing expenditure demand and fall in taxes In hypothetical worst scenario discussion ADB projected that there will be \$1.5 billion loss to agriculture sector And hotel and restraints will face \$2.4 million losses	(Almas & Macroeconomics, 2020)  (Rana, 2020)  (Rana, 2020)

**Table:5**

**Available Treatments being practiced against COVID-19**

Drug	Generic Name	Chemical Structure	Drug class
Remdesivir	Remdesivir		Inhibits Viral Synthesis
Clexan	Enoxaprin		Anticoagulant
Xarelto	Rivaroxaban		Anticoagulant
Depo-Medrol	Methyl-prednisolone		Corticosteroid
Stromectol	Ivermectin		Anti-parasite
Azasite/ Z-max	Azithromycin + Chloroquine		Antibiotic/ additional immunodulatory effects
Acterna	Tocilizumab	$C_{6428}H_{9976}N_{1720}O_{2018}S_{42}$	Interleukin-6 inhibitor

**Table:6**

**Non-chemical Treatments:**

Treatment	Methodology	Clinical trials
Plasma Therapy	Convalescent plasma is used for passive immunization of patients as it contains antibodies formed against the novel coronavirus in a recovered individual.	The Drug Regulatory Authority of Pakistan approved clinical trials for plasma therapy on April 8. Some local hospitals have begun considering the experimental use of this therapy on patients in a critical state. Initially 350 members were selected to undergo Clinical Trials, said Dr. Tahir Shamsi. (Latif, 2020)

Treatment	Methodology	Clinical trials
Proning	Placing the patient in a prone position, on their stomach with the chest down and back upwards. It helps in increasing oxygenation during acute respiratory distress syndrome.	Dr Fakhir Raza, an intensivist at SIUT, said proning had been very effective in most of their patients. Out of 20 patients in SIUT who were prone, 11 had been intubated (placed on a ventilator) out of which seven were extubated successfully, he added. “We prone for up to 16 hrs., then we de-prone and check the patient’s vitals,” explained Dr Raza. “There was a remarkable improvement within three to four hours.” (Ahmed, 2020)