PAKISTAN'S PANDEMIC RESPONSE: AN OVERVIEW OF THE FIRST WAVE OF COVID-19

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Abstract

Pakistan registered its first COVID-19 related deaths in last week of February 2020. South Asia as a region remained considerably affected by the deadly pandemic with countries like India, Iran and Bangladesh registering a high rate of fatalities and alarming rise in positive cases. Initial impact of the disease on Pakistan was quite severe and with a weak economy and broken public health system, it was anticipated that Pakistan might not be able to withstand the economic, social and psychological impact of the pandemic. However, the Pakistan government adopted the whole-of-the-nation approach by integrating its well-organized military institution along with other state and civilian institutions and tackled the pandemic proactively. The paper, using the Explanatory Case Study technique, analyses Pakistan's dynamic response mechanism from February to October 2020, referred to as "First Wave of COVID-19 Pandemic". The conclusions show that Pakistan orchestrated a coherent response mechanism by creating an effective governance structure, integrating multiple institutions, resorting to smart lockdowns, taking pro-poor economic measures and converting the challenges into opportunities by making indigenous COVID-19 related medical innovations through research universities. Capacity building of testing facilities, protective equipment and specialized patient care coupled with awareness through effective media campaigns paid rich dividends. Implementation of coordinated and effective response measures not only restricted the disease spread but also helped in sustaining the fragile economy of the country.

Keywords: COVID-19, Pakistan, First wave, Whole-of-the-nation approach, Pandemic, Smart lockdown

Introduction

Since December 2019, COVID-19 has impacted the world at an unprecedented scale. Quick assimilation of the scale of this challenge and consequent timely measures by Pakistan yielded positive results. Pakistan maintained a balanced approach between 'lives and livelihood' that initially seemed novel to most and seemed to be difficult to adopt considering the fragile economy and weak health system. Unprecedented comprehensive approach, effective coordination with federating units/provinces and fast-tracked decision making was ensured through establishment of National Coordination Committee (NCC) and National Command

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and Operation Centre (NCOC). The response was well integrated covering all affected sectors. The positive results achieved became a reflection of harmony between various departments, ministries, provinces and federating units, that involved all elements of national power, both civil and military. Coherent, apt and balanced policy implementation with all out support of all elements of national power remained the cornerstone of Pakistan's anti-COVID-19 response.[1]

It traces that initially, Pakistan got off-guarded by the severity of the disease and it was anticipated that it might not withstand the economic, social and psychological impact of the pandemic, especially its likely fallout on an economically struggling and fragile country like Pakistan. However, as the events unfolded, converting challenges into opportunities, despite having weak institutional capacity, the Pakistan government took its well-organized military institution on board along with other state institutions and made an effort to tackle the situation through the whole-of-the-nation approach (a US concept, also called "comprehensive approach" in which all organizations, civil and military, integrate in conflict/emergency conditions to achieve common goals)[2] and reduced the impact of the pandemic through a well-targeted and comprehensive approach covering all elements of national power.

The paper is developed in the form of an Explanatory Case Study and takes into account the time period from February to October 2020, which can be referred to as "First Wave of COVID-19 Pandemic". Data quoted is mostly from primary and secondary sources including first hand data from documents of NCOC. After data comparison and analysis, some prudent conclusions have been made to depict the national response in the given period as a success story for Pakistan despite having adverse conditions.

Chronology of Important COVID 19 Related Happenings in Pakistan

Following is the chronology of important happenings as part of first wave of the pandemic in Pakistan (data compiled from various sources including government documents, NCOC briefs, National Disaster Management Authority (NDMA) documents and open source material).

Dates	Happenings	References
26 Feb	First two cases of COVID-19 reported in Pakistan from Karachi and the capital Islamabad	World Health Organization (WHO) COVID dashboard. COVID19.who.int
27 Feb	Just 4 laboratories could conduct 472 tests	NCOC, Documentation of Best Practices, October 2020

28 Feb	Pak-Iran border closed due to increased cases in Iran	www.dawn.com dated 28 Feb 2020
9 Mar	First COVID related death in Pakistan	www.who.int
13 Mar	National Coordination Mechanism, NCC established, an apex body to manage COVID-19 through all instruments of state response especially the federating units/ provincial governments	ncoc.gov.pk
21 Mar	Screening started for domestic travelers at Karachi Jinnah Airport	Passenger guidelines, Karachi airport. http://karachiairport.com.pk/
24 Mar	Prime Minister approved Rs1.2 trillion economic relief package. Of this, a total of Rs150 billion was allotted for low-income groups, particularly laborers while 280 billion rupees ($1.76 billion) was assigned for wheat procurement.	NCOC, Documentation of Best Practices, October 2020
26 Mar	NCOC established as an intermediator at Islamabad	Prime Minister (PM) Secretariat Order No 1130/M/S/PM dated 26 Mar 2020
28 Mar	Through NDMA, 50,000 testing kits, face masks, ventilators and Personal Protective Equipment (PPE), which were combined around two tons of supplies worth Rs 67 million imported from China	NDMA Brief dated 28 Mar 2020
30 Mar	Institution of Army incorporated in national COVID response and a three-star General officer made as Chief Coordinator of NCOC	PM Secretariat Order No 1130/M/S/PM dated 26 Mar 2020

31 Mar	Chairman NDMA shared that Sindh had been provided 20,000 testing kits, Punjab 5,000, Balochistan 4,800 and that up to 37,000 kits had been put into reserve	NDMA media brief dated 31 March 2020
1 Apr	Nationwide lockdown imposed	NCOC Brief dated 1 Apr 2020
1 Apr	PM established National COVID Relief Fund	https://foreignpolicy.com/2020/05/11
2 Apr	19 laboratories could conduct 6584 tests	NCOC Brief dated 2 Apr 2020
3 Apr	The Ministry of Planning estimated that 12.3 million to 18.5 million people would become jobless due to pandemic	NCOC Brief dated 3 Apr 2020
8 Apr	Through "Ehsaas Emergency Cash Program", 12 million families provided with financial assistance of Rs. 12,000 per family	NCOC Brief dated 8 Apr 2020
11 Apr	State Bank of Pakistan introduced a temporary refinance scheme for businesses to discourage them from laying off workers in the wake of the pandemic	www.sbp.org.pk
9 May	General lockdown eased out	NCOC Brief dated 9 May 2020
14 Jun	Maximum single day positive cases reported – 6825	COVID-19 cases in Pakistan. https://COVID.gov.pk/
20 Jun	Maximum fatalities recorded in Pakistan with 153 deaths	COVID-19 cases in Pakistan. https://COVID.gov.pk/
6 Jul	Pakistan rolled out its first ever locally produced portable ventilator 'SafeVent SP100' for	www.voanews dated 6 Jul 2020

	deployment at hospitals treating coronavirus patients. PM Imran Khan handed over first batch of ventilators to the NDMA	
15 Aug	Single day positive cases reduced to 747	COVID-19 cases in Pakistan. https://COVID.gov.pk/
16 Aug	Single day fatalities reduced to 6	COVID-19 cases in Pakistan. https://COVID.gov.pk/
8 Sep	Single day positive cases reduced to 397	COVID-19 cases in Pakistan. https://COVID.gov.pk/
19 Sep	Single day fatalities reduced to 1	COVID-19 cases in Pakistan. https://COVID.gov.pk/
20 Sep	National University of Technology (NUTECH) produced indigenous ventilator, "NuVent" and shared it for hospital trials	NUTECH Brief, 20 September 2020
1 Oct	147 laboratories get established with capacity to test more than 73000 individuals per day	NCOC, Documentation of Best Practices, October 2020
25 Oct	Single day fatalities reduced to 3	COVID-19 cases in Pakistan. https://COVID.gov.pk/

Fragility of Pakistan's Health and Economy vis-a-vis Pandemic

Misbah, Siraj and Nawaz (2020) argue that a country of over 220 million people with a fragile democracy, brittle health system, and the sinking economy was vulnerable to the drastic politico-economic implications of COVID-19[3] where it was feared that a country-wide lockdown would result in roughly more than 25 percent of Pakistanis already living below the poverty line being forced to remain at home without means of income (Neha 2020).[4] The International Crisis Group (2020) placed Pakistan among the twelve countries hardest hit by coronavirus, largely attributed to the federal government reopening the country too early to balance out the opportunities for daily wage earners (Dmello and Sheetal 2020).[5] As the Pakistani government was planning to deal with COVID-19's medical side in the initial weeks (marking a possibly exponential spread), severe concerns arose as to whether or not Pakistan would be able to survive

such a multi-pronged challenge financially (Fahim, Shujaat and Nabila, 2020).[6] Mid-to long-term economic impact was inevitable. Initial projections made in April 2020 were as under:[7]

Table – 1: ADB Pre and Post COVID Projections for Pakistan

Indicators	*Financial Fear (FY) 2019*	*FY 2020*	
		Pre COVID 19	*Post COVID 19*
GDP %	*3.29*	*3.24*	*-1.5 to 1.5*
FBR Revenue Bn Rs	*3828.5*	*4800*	*3905*
Fiscal Deficit %	*8.9*	*7.4 to 7.6*	*9.2 to 9.4*
Exports – Bn $	*24.3*	*25.5*	*21 – 22*
Imports – Bn $	*51.9*	*47.1*	*40-42*
Remittances – Bn $	*21.7*	*23*	*20-21*

Rana (2020) quoted that according to Asian Development Bank (ADB), Pakistan's economy would lose around US$ 16 million in the best-case scenario and around US$ 61 million in the worst-case scenario. In the event of a significant outbreak of COVID-19, the loss would amount to approximately US$ 5 billion, the GDP would contract by 1.57 percent, and nearly a million people would lose their jobs.[8] Both ADB and Moody's projections—2.6 percent and two percent, respectively—were in line with Pakistan's growth estimations. In the third week of March, Pakistani authorities projected a GDP loss of PKR 1.3 trillion due to supply shocks, disruption in foreign trade, suspension of operations of 48 service and manufacturing industries.[9]

Pakistan's health care system has not been very efficient.[10] Pakistan is considered to be a low- and middle-income country ranked 152 out of 189 countries having Human Development Index value of 0.560.[11] Pakistan's public health care system has for decades suffered from neglect, lack of funding and corruption, which encouraged expensive hospitals in the private sector to flourish in a country where about 25 percent of the population live below the national poverty line.[12] Around 78 percent of the population pay out of pocket at the point of health care. The private sector provides three-quarters of the health services, and physicians outnumber nurses and midwives by a ratio of about 2:1. Complex governance challenges and underinvestment in health have hampered progress.[13] During the first few days, Pakistan lacked medical facilities and suspected samples were sent to China for testing and confirmation. Moreover,

only a few specific quarantine centers were present with limited diagnostics and treatment facilities (Khanain 2020).[14] WHO also depicted that the country encountered a variety of healthcare challenges in last several decades and endured a great deal from many epidemics like acute respiratory infections and diarrhea creating devastating effects on people in terms of morbidity, mortality and economic burden.[15] In 2017, lower respiratory tract infections and tuberculosis were among the top causes of mortality in Pakistan.[16] The dilemma could even be gauged by the reemergence of polio virus cases in Pakistan, which has been exterminated elsewhere.[17] It was speculated that Pakistan's health system might not be able to withstand the severity of COVID-19 spread.

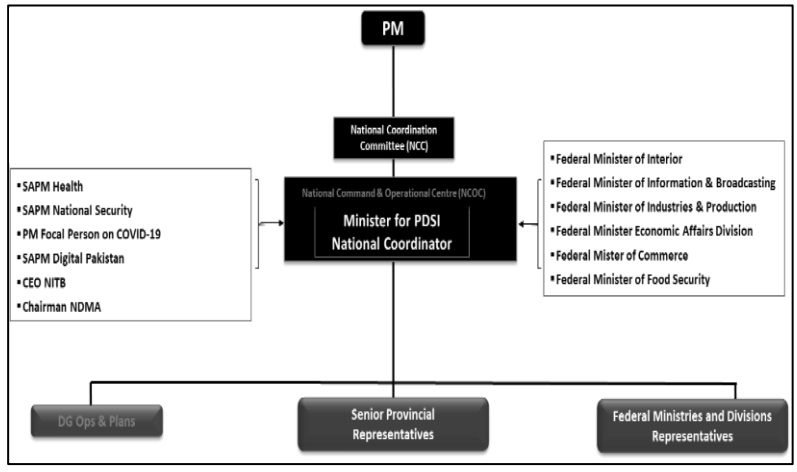
Modalities of National Response Strategy

Evidently, every state tried to make efforts to minimize the risks posed by COVID-19, including Pakistan, where there had been some crucial interventions vital for containing the novel pandemic. With not a very elaborate and supportive health system, Pakistan started to tackle the impact of COVID-19 with a whole-of-nation-approach. Following key areas need mention:

Creation of National Command and Operations Centre (NCOC). In order to improve the National Coordination Mechanism, NCC was established on 13 March 2020, as an apex body to manage COVID-19 through all instruments of state response especially the federating units/provincial governments. Even after the creation of NCC, the speed of the crisis was deemed too fast due to a long feedback chain. A need was therefore felt to further shorten the process, improve the coordination and ensure optimized implementation of anti-COVID policy. Consequently, on 27 March 2020, NCOC was established as an intermediator at Islamabad.[18] NCOC's intended objective were to synergize and articulate National Anti-COVID effort for informed decision making. It was also tasked to produce a daily National Situation Report (SITREP) about spread and effect of disease and determine level of risk in Pakistan and data about suspected patients and cases. Moreover, it had to assess the appropriate level of stockpiles for PPE, availability of essential commodities, medical and diagnostic equipment. Daily update to Ministry of Planning, Development and Special Initiative (PDSI) created the ministerial oversight on all the undertakings.

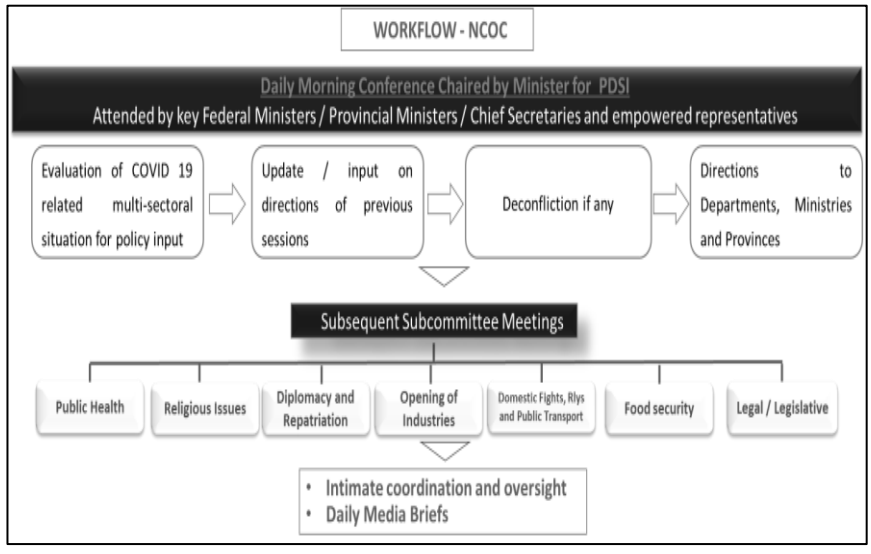
NCOC's Hierarchy. NCOC had representation from all relevant ministries, departments and federating units. It was a fine blend of civil and military components; the former in the lead and the latter in supporting role. The detailed organogram is as under in the Figure below:[19]

Figure-1: Organogram NCOC



Functioning of NCOC. In order to address the initial threats/challenges and to generate a coherent national response, there were no set piece procedures. All the processes were developed ground up, and the procedures involved were continuously customized according to evolving needs as the events unfolded. Following chart depicts the workflow of NCOC:

Figure-2: NCOC Workflow Chart

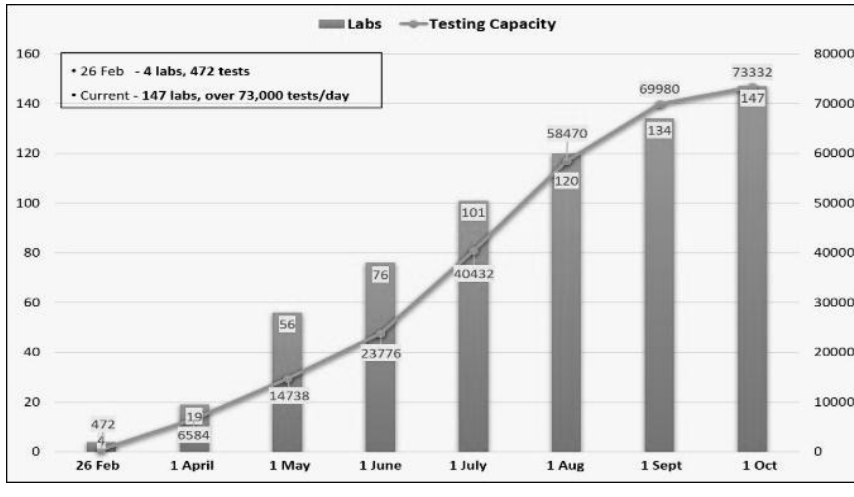


Efforts for Disease Prevention & Containment

Test, Trace and Quarantine (TTQ) Mechanism. NCOC identified very early that in the absence of an effective Test, Trace and Quarantine (TTQ) mechanism, controlling the spread of the disease would be impossible. With the same in view, a local TTQ solution was evolved ground up by developing new Information Technology (IT) applications as a collaborative effort of NCOC resident IT team, Pakistan's premier medical agencies and establishment of a dedicated TTQ team at NCOC. The provincial field networks as well as software databases were seamlessly integrated into a comprehensive architecture with the executive and administration channel of all Federating units, fully taken on board to make the initiative a success

Dynamic and Focused Testing. Testing remained an essential component of disease surveillance. During the early days of COVID-19, Pakistan lacked any diagnostic facilities, and suspected samples were sent to foreign laboratories.[20] However, daily testing capacity increased from 472 tests in February to more than 73000 tests per day. Number of laboratories were increased from 4 to 147. As per figures till end September, cumulatively 3.85 Mn tests were conducted, with the highest tally of 42300 tests on 23rd September.[21] There were intermittent declines in testing however they were revived with consistent efforts and focus.

Figure-3: Gradual Buildup of Lab Testing Capacity



Aggressive Contact Tracing. One of the three key products of TTQ system was an effective contact tracing mechanism. Pakistan's contact tracing effort is a combination of technology enablers and a responsive field mechanism with Digital Data Flows actualized through customized software being the key enabler. More than 1.62 Mn contacts were traced (against 0.32 Mn infected people) out of which 85 percent were tested (12 percent found positive).[22] Of

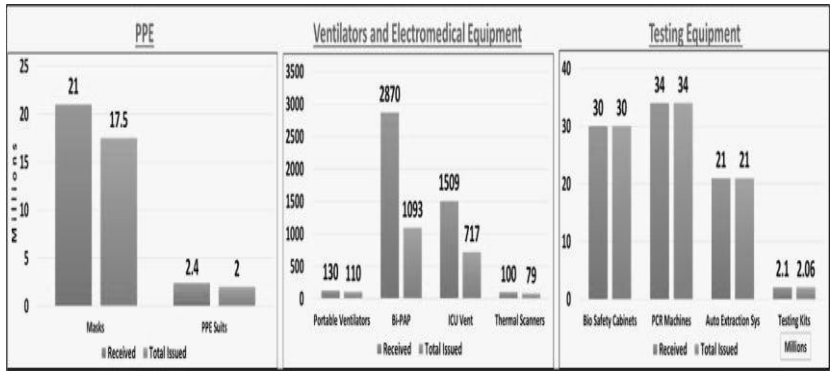
more than 3.9 Mn overall tests conducted in Pakistan, 42 percent were of the contacts traced through TTQ mechanism; 38 percent of the disease mapping was made possible through contact tracing, which would otherwise have slipped through the disease surveillance net.

Lock Down Policy. Pakistan's lockdown strategy remained dynamic and adaptive to disease trends. The government of Pakistan also imposed a nationwide lockdown on April 1st, 2020. The total number of cases reported at this time were 2,039, with 26 deaths. It was extended twice and lasted until May 9, 2020, after which the government decided to ease it out slowly.[23] Hamza and Salar (2019) further argue that the world had been struggling to combat the COVID-19 pandemic and unless there is a viable treatment or vaccine available to treat COVID-19, lockdown (complete or partial) would remain to be one of the most evident and widely used preventive measures.[24] Following varieties of lockdown strategy were enforced by the country:

- **General lockdown**. Remained in effect from 24th Mar to 11th May 20.
- **Smart lockdown (SLD).** Remained in effect from 12th May to 12th August 2020. Overall, more than 2400 SLDs remained enforced during various stages across the country, locking down over 45 million population and 20-30 percent active infected persons.
- **Micro Smart Lockdowns (mSLD)**. These were enforced from 12th August 20 till mid-October. In this time period, over 5000 mSLDs remained enforced across the country locking down 70-80 percent of active infected persons.

Procurement of Critical Care Equipment / PPE. Government's early focus was on PPE procurement through NDMA to meet the emerging requirements. Summary of the critical care equipment / PPE procured till September remained to be:

Figure-4: Critical Care Equipment Procurement



Capacity Building of Hospitals. To prepare for the projected stress period, hospital energization plan was focused at national level, especially after disease spread picked

up in late May. Through Ministry of Industries and NDMA, domestic oxygen manufacturing was enhanced through various measures (465 Metric Tonne (MT) to make it sufficient for net medical requirement of 343 MT. Initially, availability of oxygenated beds was a major issue of concern and to address the same, through NDMA, the government added more than 2800 oxygenated beds in national health system in brief period of two months, July and August 2020 with following details[25].

Table-2. Region-wise Addition of Oxygenated Beds

Province / Region	Number of Oxygenated Beds
Islamabad Capital Territor	626
Punjab	804
Sindh	537
Khyber Pakhtunkhwa	400
Balochistan	264
Azad Kashmir	80
Gilgit Baltistan	100
Total	**2811**

Integration of Armed Forces Medical Mechanism. Armed Force in collaboration with NCOC, accelerated efforts of awareness of health care workers along with training and planning to enhance medical facilities to deal with the threat. Liaison was established between the Army Medical Corps and stake holders including representatives of NDMA, Provincial Governments and the Ministry of Health for a collective plan of action. The Army, in their respective deployment areas throughout the country integrated with their civilian counterparts. On military side, Directors of Medical Services in all Headquarters Logistics of Corps Headquarters, assessed ground situations in their respective areas of responsibility with regard to medical assets in both civil and military sectors for a comprehensive response in case of emergency. Even the Army troops helped in implementing the lockdowns throughout the country and creating the awareness amongst citizens.[26]

Miscellaneous Measures Undertaken

Management of Stranded Pakistanis. Another mammoth and uphill task faced by Pakistan was repatriation of laid-off Pakistani diaspora and those stranded in different countries due health safety measures during the earlier phase of the

pandemic. After declaration of the COVID-19 epidemic, the Pakistan government took several measures to cope with the situation. The federal government, in collaboration with the Civil Aviation Authority (CAA), established a system to screen every passenger who had traveled directly or indirectly from China and other infected countries, including South Korea, Japan, and Thailand. After the importation of COVID-19 from Iran, Pakistan also started closed monitoring and more active screening of passengers travelling from Iran.[27] Again, a multi-agency approach was adopted, through the forum of NCOC. Concerted efforts by Aviation Division, CAA and Ministry of Foreign Affairs, helped in repatriating around 4,51,373 stranded Pakistanis from 86 countries in a phased manner with repatriation priority given to bringing back the laid-off labor from the Gulf countries and the Middle East. During this period, NCOC also handled COVID-19 related borders and ports management issues, particularly on western border entry points. Special health guidelines were developed, which were adapted to suit the prevailing conditions and limitations.[28]

Steps Towards Indigenous Developments. As per the famous maxim. "Adversity is the mother of invention", the COVID-19 crises also presented a few opportunities for Pakistan. The emerging shortages of PPE, ventilators and testing kits spurred the domestic industry to step up. Some developments in this regard remained to be:[29]

- From dependence on imports, Pakistan gradually transited to indigenous production of PPE. Other than N-95 face masks, a large variety of PPE started being produced in the country. Export of PPE was also allowed that contributed positively in economy.
- Research and Development for local manufacturing of ventilators also got started. National Research and Training Centre (NRTC) and Pakistan Ordnance Factories (POF) were at the forefront in this regard. Co-produced and local models were developed in a short period of time. The facility increased capacity to be rapidly scaled up during any emergency/ spike.
- Local Polymerase Chain Reaction (PCR) testing kits also started being developed by National University of Science and Technology (NUST).

Development of Mobile Application. The application "COVID-19 Gov Pk" was developed by National Information Technology Board (NITB), an organization under Ministry of Information Technology and Telecommunication. The application provided awareness to citizens about all the actions to be taken for the prevention of COVID-19. The application contained four different functions including Dashboard for current status of COVID-19, Alarms for washing hands, Chatbot for awareness of COVID-19 and sharing of WHO videos for prevention of Coronavirus.[30]

Impact of Adopting Pro-active Policy

Positivity Percentage. Pakistan's positivity percentages visibly declined since early June as indicated in the figure. Despite challenges, gradually Pakistan's positivity reduced from 20s to very low single figures as depicted in the graph below:

Figure-5: Positive Cases Graph First Wave

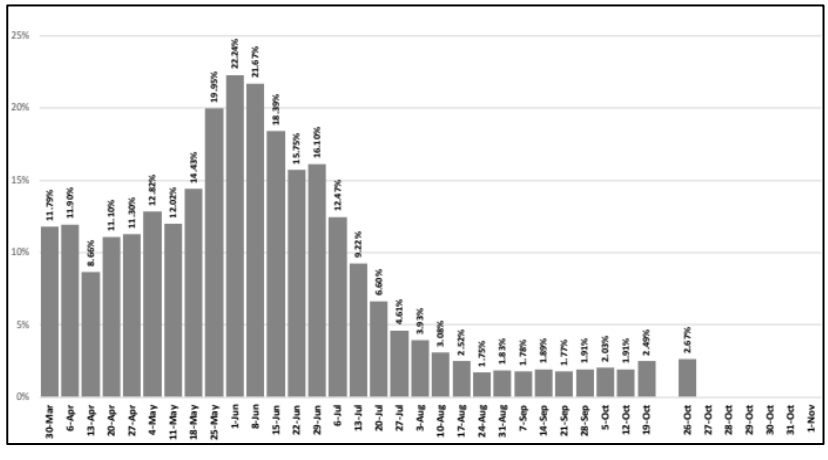
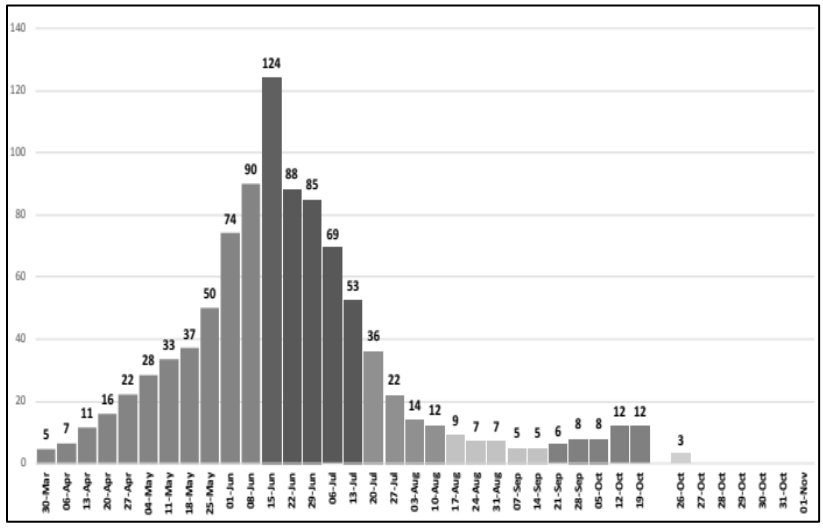


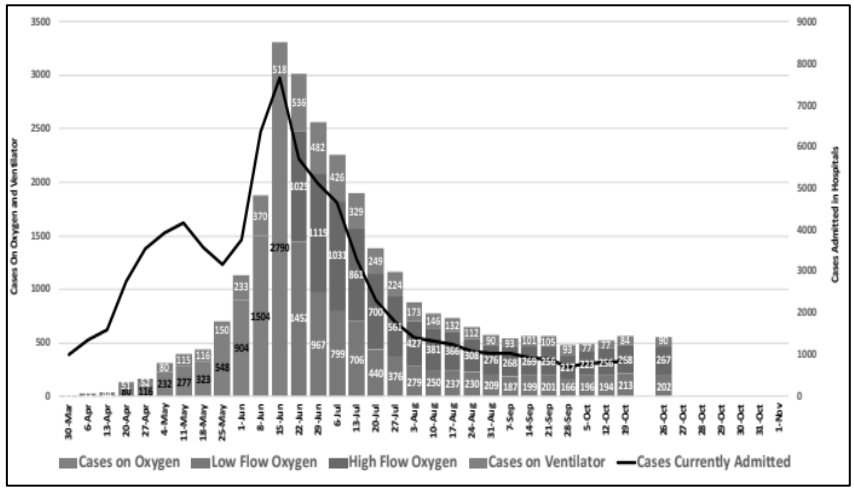
Figure-6: **Mortalities Graph First Wave**



Mortalities. Mortalities figures registered a sharp decrease after June 15**.**

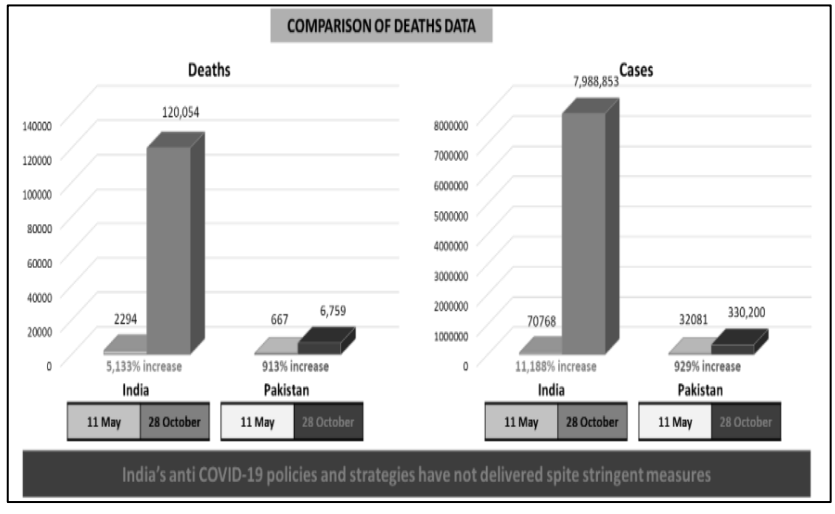
Hospital and Critical-care Occupancy. Concurrently, number of critical cases demonstrated signs of stabilizing. There had been a significant reduction in stress on critical care resources.

Figure-7: Critical Care Occupancy Graph- First Wave



Regional Comparison. South Asia remained severely affected by the pandemic. Rise in death numbers in neighboring India was significantly higher, as indicated in the figure below indicative of a better strategy for Pakistan especially within South Asian context. Pakistan also did considerably better than other regional countries like Bangladesh and Iran.

Figure-8: **India-Pakistan Pandemic Comparison First Wave**



Conclusion

Seeing the wholesome positive effects of the adopted policies, it can be safely concluded that during the first wave of pandemic, Pakistan, with far less

resources did better as compared to many regional countries that had elaborate resources at their disposal. Policy-wise, Pakistan acted quickly and formulated a comprehensive National Action Plan for COVID-19 in early February 2020. Focus remained on the whole-of-the-nation approach and a well-orchestrated strategy based on national leadership's intent, maximum delegation of power by NCC to NCOC and integration of Armed Forces in full support of civilian government to bridge the capacity issues. Evidence-based and data-driven approach was followed that considerably shortened the decision-making processes. Moreover, decisions once made were uniformly applied with feedback loop referred back to NCOC for consideration.

Endnotes

[1] National Command and Operation Centre, Documentation of Best Practices, October 2020.

[2] Brett Doyle, The Whole-of-Nation and Whole-of-Government Approaches in Action: Lessons on Collaboration from Recent Conflicts, 2019, Arthur D. Simons Center for Interagency Cooperation, Fort Leavenworth, Kansas, USA, InterAgency Journal Vol. 10, No. 1

[3] Misbah Shaheen, Uzma Siraj, Muhammad Nawaz Bhatti. (2020). COVID-19 Pandemic and its Politico-Economic Implications: A Study of Pakistan, Liberal Arts and Social Sciences International Journal, Vol 4 Issue 2, December 2020.

[4] Neha Maqsood. (2020, May 11). On the coronavirus, Pakistan's government is missing in action. Foreign Policy. https://foreignpolicy.com/2020/05/11/on-coronavirus-pakistans-government-is-missing-in -action/

[5] Jared R. Dmello & Sheetal Ranjan (2020): Lock Unlock: The Impact of COVID-19 on Health Security in Pakistani and Indian Prisons, Victims & Offenders, DOI: 10.1080/15564886.2020.1822973

[6] Muhammad Fahim Khan, Shujaat Ali, Nabila Aftab. (2020). The Coronomics and World Economy: Impacts on Pakistan. Electronic Research Journal of Social Sciences and Humanities, Vol 2 Issue 3, September 2020. www.eresearchjournal.com

[7] NCOC Brief 14 April 2020.

[8] Shahbaz Rana, "Coronavirus may cause $61m loss to Pakistan: ADB," Express Tribune, 07 March 2020, https://tribune.com.pk/story/ 2171093/1-coronavirus-may-cause-61m-loss-pakistan-adb/

[9] Mehtab Haider, "Coronavirus: Pakistan may face initial economic loss of Rs1.3tr," The News International, 20 March 2020, https://www.thenews.com.pk/print/631789-coronavirus-pakistanmay-face-initial-economic-loss-of-rs1-3tr

[10] Kurji, Z., Premani, Z. S., Mithani, Y. (2016). Analysis of the health care system of Pakistan: lessons learnt and way forward. Ayub Med Coll Abbottabad, 28(3), 601-604.

[11] UNDP, Human Development Report 2019

[12] Ayaz Gul, Pakistan Rolls Out First Locally Produced Ventilators, 6 July 2020, www.voanews.com

[13] Dr Sania Nishtar, Ties Boerma, Sohail Amjad. Pakistan's health system: performance and prospects after the 18th Constitutional Amendment

[14] Wajiha Khanain. 2020. Pakistan now equipped to test for novel coronavirus, says PM's aide. *Dawn*, 12 February 2020. https://www.dawn.com/news/1532077

[15] World Health Organization. Coronavirus disease 2019 (COVID-19) Situation Report – 43. 2020; https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200303-sitrep-43-COVID-19.pdf?sfvrsn=2c21c09c_2. Accessed 01 September, 2021.

[16] Atif M, Malik I, Asif M, Qamar-Uz-Zaman M, Ahmad N, Scahill S. Drug safety in Pakistan. In: Al-Worafi Y, Drug Safety in Developing Countries: Achievements and Challenges. India: Elsevier; 2020:686

[17] Muhammad Atif, Iram Malik. Why is Pakistan vulnerable to COVID-19 associated morbidity and mortality? A scoping review. (2020) https://onlinelibrary.wiley.com/doi/full/10.1002/hpm.3016

[18] National Command and Operation Centre, Documentation of Best Practices, October 2020.

[19] ibid.

[21] NCOC Daily Brief 25 September, 2020.

[22] NCOC Brief 23 July 2020.

[23] Salman Tariq, Naveen Tariq, Waris Qidwai. COVID-19 in Pakistan: A Grim-looking Trajectory. World Family Medicine. 2020; 18(7): 43-49 DOI: 10.5742MEWFM.2020.93834

[24] Hamza Umar and Salar Khan, Evaluating the Effectiveness of Regional Lockdown Policies in the Containment of COVID-19: Evidence from Pakistan, https://arxiv.org/ftp/arxiv/papers/2006/2006.02987.pdf

[25] NDMA Brief, September 2020.

[26] The Army Medical Corps COVID-19 Digest, October 2020.

[27] Muhammad Saqlain, Muhammad Munir, Is Pakistan Prepared to Tackle Coronavirus Pandemic, Drugs & Therapy Perspectives (2020) 36:213–214 https://doi.org/10.1007/s40267-020-00721-1

[28] NCOC Brief 5 September 2020.

[29] Data acquired from Ministry of Science and Technology, October 2020.

[30] Ministry of Information Technology and Telecommunication. Application Developed to Deal with Coronavirus. https://moitt.gov.pk/. Accessed on 14 June 2021.