

## COMPARATIVE ANALYSIS - COUNTRIES

# Comparison of Measures adopted to combat COVID 19 Pandemic by different countries in WHO regions

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## Abstract

Since the emergence of Corona Virus Disease 19 (COVID 19) in China in December 2019, a lot of significant decisions have been taken by the World Health Organization (WHO) and several countries across the globe. As the world reels under the threat of rapid increase in the number of cases and is planning strategies with the limited information available on the virus, it is essential to learn from the experience of countries across the globe. Hence, we selected a few countries in five WHO regions based on their COVID 19 caseload, management strategies and outcome and compared some of the important measures taken by them to contain the spread of infection. Strategies like extensive testing and contact tracing, strict quarantine and isolation measures, Hospital preparedness, complete restriction of non-essential travel, strict border control measures and social distancing measures play a vital role in containment of the spread. All the countries faced the novel strain of virus and implemented similar strategies as per the guidance of WHO, but the extent of preparedness, swiftness with which the decisions were made and the scale of measures made the difference.

## Keywords

COVID-19; Containment measures; Lessons learnt; Contact tracing; Social Distancing; Continents.

The Coronavirus disease 2019 (COVID 19) was declared as a Pandemic on 11th March 2020 by the Director General of the World Health Organization (WHO). Majority of the cases in the initial few weeks were being reported from Western Pacific predominantly from China. By the third week of March, the epicentre shifted from western Pacific to Europe.(1) As of 9th April 2020, the 100th day after WHO was notified of the first cases of “pneumonia with unknown cause” in China, 1436198 confirmed cases and 85522 deaths were reported globally. It’s

incredible to reflect on how dramatically the world has changed in such a short period of time and learn from different countries' responses to this pandemic. Europe continues to report a major share of COVID 19 cases and deaths.(2) As the cases across the globe increase rapidly leaving the healthcare system overwhelmed with patients, in the absence of an effective treatment or vaccine, containment and mitigation measures appear to be the key public health interventions to slow down the spread and reduce the impact of the pandemic.

The containment strategy includes early identification of the cases through testing and contact tracing, thereby reducing the risk of transmission to others. Mitigation measures include social distancing, improved hygiene and practices like imposing restrictions on movement through lockdowns. This helps in slowing the spread of the disease.(3)

### Aims & Objectives

To discuss the measures taken by some of the countries across the globe and share the learnings from their best practices or mistakes that may guide the policy decisions in our country to handle COVID 19 better.

### Material & Methods

We selected few of the countries from all WHO regions except Africa that had the least number of cases and deaths due to COVID 19. The selected WHO regions share the maximum number of reported COVID 19 cases and deaths. We have compared the measures taken by the selected countries in each of these WHO regions to contain the spread of COVID 19. These countries and WHO regions were selected purposely based upon their COVID 19 caseload, management strategies (better or worse, early or delayed) and outcome (deaths and recovered).

### Result

The case fatality rate differs across the countries in different WHO regions and also within the countries based on the strategies planned and measures taken. ([Table 1](#))

China had sporadic cases of pneumonia of unknown cause since November 2019, but informed the WHO by Dec 31st, 2019. Delay in communications cost heavily to other countries, delaying the initiation of containment and mitigation measures.(9) From its prior experience of SARS in 2003, Singapore introduced several key measures to strengthen its pandemic management capabilities: Disease Outbreak Response System Condition (DORSCON) framework, augmented infrastructure for outbreak management, established National stockpiles of personal protective equipment (PPE), critical medications and vaccines for upto 6 months, trained Man power through simulation exercises to manage disasters including pandemics.(10) ([Table 2](#))

The preexisting number of Hospital beds/1000 population in Germany was 8.3 when compared to 3.4 in Italy.(20) Germany announced compensation to Hospitals for all non-essential surgeries postponed, payment for every ICU bed kept free for COVID and compensation for doctors who lost practice during COVID. Both countries announced sick leave for quarantined workers, assurance of 60% to 80% salaries to workers even the self-employed and loan waivers for next three months.(18,21) ([Table 3](#) & [Table 4](#))

The delay in initiating travel restrictions, social distancing measures/ lockdown and violations of measures lead to rapid increase of cases and deaths in Iran. KSA with prior experience of MERS-CoV since 2013 had scaled up Infection Prevention and Control (IPC) in the country and updated essential standard requirements for MERS to include COVID-19. Despite similar experience Iran had less epidemic preparedness partially due to sanctions from the US for several years.(59) ([Table 5](#) & [Table 6](#))

### Lessons Learnt and Conclusion

1. **Acting Early:** As the pandemic is starting as small outbreaks but intensifying exponentially it is necessary to initiate action when the threat appears small. Decisions on reporting, travel restrictions, ban on mass/religious gatherings should be taken early. Eg. KSA, Germany
2. **Epidemiological investigations, contact tracing and containment measures:** Countries with extensive testing and contact tracing like China, Singapore, South Korea and Germany showed better outcomes than countries with limited testing like Italy.
3. **Hospital Preparedness:** Enhancing testing capacity, manpower training and increase in hospital resources like isolation wards, ICU and Ventilator as done by countries like Germany which have a low CFR, Singapore and China.
4. **Monitoring and reporting:** Essential to have a data documentation and dissemination process to plan the resources wisely and provide right information to people. Ex. Singapore, China
5. **Low cost innovations in patient testing and treatment:** Eg. Srilanka
6. **Safety of health care staff:** Not Testing the health care staff on priority and shortage of PPE lead to nosocomial infections and deaths among Doctors as in Italy.

7. **Stringent Social Distancing measures:** Total lockdown has better outcomes than phase wise lockdown as observed in KSA in comparison with Iran.
8. **A prior experience of dealing with pandemic enables better preparedness and outcomes.** E.g. Singapore and KSA.

#### Authors Contribution

All authors have contributed equally.

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**Tables**

**TABLE 1 GLOBAL BURDEN OF DISEASE AS ON APRIL 9TH, 2020(2)**

WHO Region	Total Confirmed cases	Total Deaths	Case Fatality Rate, CFR (%)	Proportion of Global cases (Deaths)	Countries Selected
<b>Global</b>	1 436 198	85 522	5.9		NA
<b>European Region</b>	759 661	61 516	8.1	52.9% (71.9%)	Germany, Italy
<b>Region of the Americas</b>	454 710	14 775	3.2	31.7% (17.3%)	USA, Canada
<b>Western Pacific</b>	115 852	3944	3.4	8.1% (4.6%)	China, Singapore
<b>Eastern Mediterranean Region</b>	85 350	4459	5.2	5.9% (5.2%)	Iran and Kingdom of Saudi Arabia (KSA)
<b>South East Asian Region</b>	11 576	468	4	0.8% (0.5%)	India, Srilanka
<b>African Region</b>	8337	349	4.1	0.6% (0.4%)	None

**TABLE 2 WESTERN PACIFIC REGION**

Particulars	China	Singapore
Reporting of 1. First Case 2. First Death	1. 29th December 2. 11th January	1. 23rd January 2. 21st March
Travel Restrictions & Lockdown	<b>Partial Lockdown</b> <i>First stage:</i> Wet markets were closed in Wuhan and efforts were made to identify the zoonotic source. <i>Second stage:</i> Nationally, wildlife markets were closed. Wuhan implemented strict traffic restrictions by 23rd January. Extended the Spring Festival holiday and cancelled mass gatherings. <i>Third stage:</i> Normal social operations are being restored in a stepwise fashion. Health and welfare services were provided to returning workers in a targeted and 'one-stop' manner. (4)	<b>Complete Lockdown</b> From 23rd March, all short term visitors are banned from entering Singapore or transit through Singapore. Singapore also seized seaports. From 7th April, all schools, universities and workplaces are closed until May 4. Only essential businesses are permitted to function. All events until June 30 that included large gatherings are suspended.(5)
Screening Travelers (at airports, seaports & land borders)	Restarted the health declaration card system for entry and exit into cities as well as strict monitoring of the temperature of entry and exit passengers. Thousands of quarantine stations were set up in national service areas, entrances and exits at stations.	During the first week, testing was done for people who have visited Wuhan, then expanded to anyone who had been in China within the last 14 days. Later, for those coming to hospital with a respiratory illness and those with contact with a COVID-19 patient. (6)

<p>Social Distancing measures</p>	<p>At the national level, the State Council extended the Spring Festival holiday, suspended sport events, recreational and educational institutions in all parts of the country. Hubei Province adopted the most stringent traffic control measures, such as suspension of urban public transport, compulsory mask usage at public places. (4)</p>	<p>Singapore’s digital approach addressed the four stages of an epidemic: surveillance, prevention and containment, diagnosis, and treatment. All schools and universities were closed. Work from home strategy employed wherever feasible. Mass gatherings were discouraged. Patients displaying respiratory symptoms receive treatment including up to five days of medical leave for them to stay home.(7)</p>
<p>Containment Measures (Testing Strategy and Tracing of contacts)</p>	<p>China has a policy of meticulous case and contact identification. In Wuhan &gt;1800 teams of epidemiologists, with a minimum of 5/team, were tracing thousands of contacts a day. (4) Testing strategy included influenza like illness (ILI) attending the fever clinics and hospitals in different provinces.</p>	<p>One of the earliest countries to detect Covid-19, aggressive testing and transparent case reporting to both domestic and international stakeholders, Inter-agency cooperation helped rapidly determine links between individuals with confirmed Covid-19 and their contacts. Quarantining close contacts through contact tracing teams.(8)</p>
<p>Healthcare Preparedness</p>	<p><u>At Provincial level</u> By 29th January, all provinces across China had launched the highest level of response. The Strategies varied across different regions based on cases reported as follows:  <ul style="list-style-type: none"> <li>• <b>In areas without cases:</b> "Strictly prevent Introduction" through quarantine, strengthening of triage arrangements</li> <li>• <b>In areas with sporadic cases:</b> "Reducing importation, stopping transmission and providing treatment".</li> <li>• <b>In areas with community clusters:</b> "Stopping transmission, Preventing exportation, and strengthening treatment".</li> <li>• <b>In areas with community transmission:</b> the strictest prevention and control strategies are implemented, the entry and exit of people from these areas has been stopped and public health and medical treatment measures are comprehensively strengthened.</li> </ul> <p>In Wuhan, there are 45 <b>designated hospitals</b>, 10 <b>temporary hospitals reconstructed</b> for mild patients. Other surge measures undertaken in Wuhan include <b>two new temporary hospitals with 2600 beds</b>, plus many <b>makeshift hospitals</b>. Bed capacity increased to &gt;50,000.</p> </p>	<p>Singapore invested heavily in outbreak preparation and building health care capacity after the SARS wake-up call. Singapore built a task force across multiple government agencies to coordinate interventions and communications for future pandemics. This was tested again with H1N1 pandemic 2009 and Zika outbreak 2016. It was reassembled by January 2020 for SARS-CoV-2, built isolation hospitals and negative pressure rooms.</p>
<p>Usage of Mask by Public</p>	<p>Preferably All.</p>	<p>Preferably All.</p>

**TABLE 3 EUROPEAN REGION**

Particulars	Germany	Italy
Reporting of 1. First Case 2. First Death (1)	1.28th January 2. 10th March	1.31st January 2. 23rd February
Screening Travellers	All flights to China were cancelled from 29th January. These restrictions were further extended to other countries. Thermal screening not done. People were asked to declare their symptoms and fill the Passenger Locator where they can be followed up for the next 30 days.(11)	All direct flights from China were suspended. Thermal screening was done for all air travelers upon arrival on international and domestic flights at Italy’s major airports. People with raised temperatures were not allowed to board. The travelers arriving by any mode of transport were asked to quarantine themselves at home for 14 days if they have no symptoms.(12)
Social Distancing Measures (Travel Restrictions & Lockdown)	On 28th February all the residents of Heinsberg district were placed under quarantine as the outbreak worsened with 26 new cases being detected on the same day taking the total number of cases to 53. Schools and nurseries were closed across the district and residents were asked to stay at home. On 16th March all nonessential shops and Public places were closed. From March 22nd a ban was declared on a gathering of two or more people. People were asked to maintain a distance of 2 meter when outside. Schools were closed.(13)	Partial Lockdown: Initially in Northern Italy since 9th March due to an increase in number of cases in the region. Movement in public places was restricted except for justifiable work reasons, basic necessities and health emergencies. Schools closed & public gatherings banned. Cases increased as a massive exodus occurred following the public announcement of lockdown. Nationwide Lockdown was implemented by 11th March. All non essential businesses were shut down.(12)
Containment Measures (Testing Strategy and Tracing of contacts)	Germany developed a reliable test to detect the virus by January 16th. The testing capacity was enhanced in mid February when the spread was slow. Early and extensive testing was carried out for all suspected cases even for mild symptoms. By 20th March, the laboratories were conducting 1,60,000 tests per week and target is to reach 2lakhs tests/day. Once the number of new cases and deaths reduces to 100 or less per day following strict lockdown every case and their contact will be followed up.(14,15,16)	Decentralized approaches in testing and implementation of policies vary across regions in Italy. Lombardy tested only the symptomatic and outcomes were poor while Vinetto has extensive testing for all suspected cases and efficient contact tracing.Vinetto Model was able to contain the outbreak and was widely appreciated in Europe.(17)
Usage of Mask by Public	Recently proposed masks at public places and workplaces. Planned to set up a domestic Mask production unit.(16,18)	Only those with respiratory symptoms or caring for sick as per WHO.(12)
Healthcare Preparedness	Health care system was well equipped with increased capacity of Hospital Beds, ICU, ventilators and health care staff even before the pandemic.(16)	Preparation delayed. Following the rapid increase in the cases, the ICU capacity was increased in 48 hours from 130 to 482 COVID 19 dedicated ICU beds.(19)

**TABLE 4 SOUTH EAST ASIAN REGION**

ca	India	Srilanka
Reporting of first case	<b>January 30th 2020</b>	<b>March 10th 2020</b>
Travel Restrictions & Lockdown	Travel restrictions to various countries in a phased manner was given since 11th January 2020. All regular Visas or e-Visa on or before March 3, 2020,	Sri Lanka suspended all passenger arrivals from all countries starting from 19 March 2020. (23)

	were suspended.(22)	
Screening Travellers (at airports, seaports & land borders)	All people entering into India from any port were required to furnish travel history and undergo Universal Health Screening. (22)	The Ministry of Health had instructed the Quarantine Unit at International Airports to screen passengers for symptoms which was later extended to other ports as well. (24)
Social Distancing measures	The government enforced the lockdown under the provision of the colonial Epidemic Disease Act, 1897 and the National Disaster Management Act, 2005. (25) Instructed all companies and educational institutions to adhere to home quarantine measures, restrict hospital visits, limit gatherings; cancel parliament/assembly sessions and limit gathering to 10 people. (26,27)	The Sri Lankan government had requested the general public to practice proper hygiene methods and self-quarantine methods. (28) On 19 March, the government decided to further extend the public holidays upto 27 March 2020 to both private and public sectors. (29)
Containment Measures (Testing Strategy and Tracing of contacts)	Includes all symptomatic individuals who have undertaken international travel in the last 14 days and all symptomatic contacts of laboratory confirmed cases. It also includes all symptomatic health care workers and all patients with severe acute respiratory illness like fever, cough and shortness of breath. Asymptomatic direct and high-risk contacts of a confirmed case should be tested once between day five and day 14 of contact. (30)	Currently testing only those with suspected symptoms. (31)  Earlier strategy focused on detecting and quarantining close contacts of patients for 14 days. The new strategy is detection of antibodies to diagnose COVID-19. (32)
Healthcare Preparedness	Expanding laboratory capacity for testing all suspect samples. Private hospitals have been asked to earmark beds and isolation rooms. (33)	Innovative measures like - A remote-controlled smart appliance 'Medi Mate' to maintain distance from patients during testing and treatment.(34) A low cost Medical Ventilator. (35) A robot which will allow doctors to monitor patients remotely. (36)
Policy on who should wear mask	Triple Layer Surgical mask for Suspect cases and caregiver / bystander of the suspect case Homemade fabric masks for the general public.(37)	Not needed for those without respiratory symptoms. (38)
Social Security Measures	India announced a \$22.6bn economic stimulus plan that provides direct cash transfers and ensures food security measures. The government distributed 5kg of wheat or rice, 1kg of pulses and free cooking gas cylinders, and \$6.65 a month to poor women for next three months. Medical insurance worth 5 million rupees for every front-line health worker was given.Taxes were deferred for industries like aviation, hospitality and small companies. The last date to file an Income Tax Return was also extended. (39,40)	On 23 March, the Govt. introduced a relief fund called "COVID-19 Healthcare and Social Security Fund". The general public can delay the monthly electricity, water bills until 30 April. Plans were proposed to arrange home delivery of the essential goods. The supermarkets have been informed to sell the products via home delivery methods. (41)

**TABLE 5 EASTERN MEDITERRANEAN**

Particulars	Iran	Kingdom of Saudi Arabia
Reporting of 1. first case 2. first death	1. February 19th, 2020 2. February 19th, 2020	1. March 2nd, 2020 2. March 24th, 2020
Travel Restrictions, Lockdown & Social Distancing measures	<p><b>Partial Lockdown</b> On 17th March prohibited "unnecessary" travel in the country. Cancelled public events, Friday prayers, closed schools, universities, shopping centres and bazaars as well as holy shrines, and banned festival celebrations.(42,43) The government initially rejected plans to quarantine entire cities and areas, but later banned travel between cities.(44) Social distance measures were flouted as people continued visiting holy shrines, touching and kissing the shrine while praying. (45)</p>	<p><b>Complete Lockdown</b> Travel to China was banned early by 6th February. From 15th March all international flights were suspended. Domestic flights, trains, buses and taxis were suspended by 21st March. (46) On 24th March, a nation-wide curfew was imposed. Temporary suspension of Umrah pilgrimage initially followed by suspension of daily/Friday prayers in and outside the two mosques in Mecca and Madinah, later across the country.(47,48) 8th March, all educational institutions were closed. 14th March, all sports events suspended. Stadiums, sports centers and gyms, amusement parks and entertainment zones were closed. Banned all social events, including funerals and weddings.</p>
Screening Travellers (at airports, seaports & land borders)	Iran had deployed teams to screen travellers leaving major cities in 13 provinces, including the capital, Tehran that included Thermal Scanning and Quarantine.	Temperature screening of all airline passengers arriving from outside the KSA, including Saudi citizens and residents and health isolation for 14 days following their arrival. (49)
Containment Measures (Testing Strategy and Tracing of contacts)	<p>A national campaign launched to control COVID-19 emphasizes early case detection, contact tracing, isolation, treatment and community engagement. Scaling up of laboratories that test for COVID-19 – over 30 laboratories, 20 more will be added. WHO has provided lab testing kits enough to test at least 110,000 people and seven tons of protective equipment and supplies. More than 6,000 people are being tested for COVID-19 in Iran per day at about 50 state-run laboratories across the country. Contact tracing is expanding and new sanitariums have opened in Tehran and Qom to care for those who are recovering from coronavirus, so that overburdened hospitals can be decongested.</p>	<p>As per Saudi CDC, public health measures include obligatory reporting of Healthcare Facilities (HCFs) by calling a specific number and through the Health Electronic Surveillance Network. This would activate a rapid response team tasked with completing epidemiological investigation in HCFs and community spontaneously, categorizing household and community contacts as per their symptoms. Contacts are categorized by the presence or absence of suggestive symptoms at the first assessment: <u>Contacts without suggestive symptoms</u> should be listed for follow up on daily bases by phone or face-to face if feasible. <u>Contacts with suggestive symptoms</u> should be assessed clinically and referred to a designated healthcare facility if admission deemed necessary.</p>
Healthcare Preparedness	Despite the warning from Doctors of an increasing number of patients with lung infections and high fever in Qom, Iranian authorities delayed announcing the outbreak for weeks out of concern that releasing detailed information would	The KSA has a unique position among the rest of the world by dealing with a similar coronavirus infection: The Middle East Respiratory Syndrome Coronavirus (MERS-CoV) that has been epidemic in the country since 2013 with ongoing sporadic cases. (52)

	<p>unsettle the public ahead of parliamentary elections scheduled for February 21st, 2020.(50)</p> <p>As a result of sanctions on Iran by the US, the ability of Iran to provide the health, logistical and other essential infrastructure necessary to combat the disease has been drastically reduced.(51)</p>	<p>Infection Prevention and Control (IPC) has been scaled up across the country since then, and in response to COVID-19, the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) has updated its essential standard requirements for MERS to include COVID-19. (53)</p> <p>Currently the Ministry of Health (MOH) designated twenty-five hospitals for COVID-19 infected patients, with 80,000 hospital beds and 8,000 intensive care unit (ICU) beds, in addition, 2,200 beds have been allocated for isolation of suspected and quarantined cases.(54)</p>
Policy on who should wear Mask	The country is producing 400,000 nano-filters per day for N95 hospital masks after facing initial shortage. This capacity will soon multiply. (55)	Facing shortage of masks, increased hoarding of masks and rise in its price.
Free Health care	Medical services for coronavirus patients have been made free of charge, patients who are not under insurance coverage or are underprivileged and also foreign nationals need not pay for the healthcare services and the costs will be compensated by the national health insurance system.(56)	Provide free care to all infected individuals with COVID 19- citizens and residents including illegal workers. (57)
Social Security measures	Economic measures were also announced to help families and businesses. These include postponing health insurance, tax and utility bill payments for the next three months. The government has said that it will give cash payments to the three million poorest Iranians while another four million households will receive low-interest loans, partly subsidised by the government. (58)	Waiver of housing dues for 3months orphans, people with disabilities and social security beneficiaries.

**TABLE 6 REGION OF THE AMERICAS**

Particulars	USA	Canada
Reporting of first case	January 20th	January 28th
Screening of Travellers	<p>On March 11, all who were arriving from the impacted area were asked to travel through one of 13 airports where the United States Department of Homeland Security (DHS) established enhanced entry screening capabilities. (60)</p> <p>Individuals were to self-quarantine in their home upon arrival as per CDC.(61)</p>	<p>On March 29th, Canada announced to restrict any passengers with COVID-19 respiratory illness from boarding domestic flights or intercity passenger trains.(62)</p> <p>Travelers arriving at all major Canadian ports received information and, if coming from high-risk areas, were screened.(63)</p>
Social Distancing measures/Lock down	The various state govts. issued the first order for citizens to avoid non-essential outdoor activities in mid-March. <b>However, there is no national policy on lockdown as yet</b> , leaving many US citizens free to travel across	Federal, provincial, and territorial health officials and experts developed guidance on strategies to protect vulnerable populations including seniors and remote populations.(65)

<p>Healthcare Preparedness</p>	<p>states.(64) A checklist was prepared to identify specific activities to prepare for, respond to, and be resilient in the face of COVID-19. CDC COVID-19 came up with guidance and kept updating them on their website for the most current information.(66)</p>	<p>Some of the Canadian provinces have limited testing for COVID-19.(67) Priority was given to front-line health workers showing symptoms, hospitalized patients or recent travelers. Retired doctors and nurses were called back to duty. Pharmacists were allowed to extend prescriptions and to prescribe certain medications. The Government of Canada invested \$50 million towards the purchase of PPE and other necessary medical supplies and equipment. (68)</p>
<p>Social Security Measures</p>	<p>Legislation was passed on 18 March to private providers for COVID-19 diagnostic testing with no out-of-pocket costs. On March 27, 2020, the President signed the Coronavirus Aid, Relief, and Economic Security (CARES) Act This includes \$6.3 billion in additional funding for ACF (Administration for Children &amp; Families) to respond to coronavirus related needs. US states announced a paid sick-leave package for workers who become infected with the coronavirus.(69)</p>	<p>The Government of Canada waived the one-week waiting period for people claiming for Employment Insurance (EI) sickness benefits, at an estimated cost of \$5 million and also introduced enhancements to the Work-Sharing Program at an estimated cost of \$12 million. To support businesses should the experience tightening credit conditions, Canada's financial Crown corporations and private sector financial institutions, provided \$11 billion of additional credit support to 10,000 firms.(70)</p>