SYSTEMS REFLEX AND RESPONSE TO THE SPREAD OF CORONA VIRUS IN MOST AFFECTED COUNTRIES AROUND THE WORLD- A Qualitative study

A summer internship report submitted to IIHMR University

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TABLE OF CONTENTS

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ABSTRACT:

Introduction: By the time, World Health Organization has declared corona virus , as a pandemic disease, most countries are affected by the virus and there is unusual number of fatalities caused due to the virus among human beings. There are no known drugs or vaccination is available to deal with the disease as it is completely new to mankind. Hence, the government and the people have followed few measures in tackling the rapid spread of virus. However, the countries have approached different mechanisms in order to control and restrict the virus transmission. This article mainly concentrates on how the steps taken by the systems had an impact on controlling the pandemic in most affected countries so far.

Aim: to find out how the reflexes and responses have played a role in controlling or causing the pandemic to curb or spread.

Methodology: In this article, the initial steps taken before or from the first appearance of a corona virus case in a country are considered to be reflex and, the gradual measures implemented as the cases hiked are considered to be responses to prevent the adverse situation. Lockdown and social distancing measures, testing and mortality rates including healthcare facilities and medical team preparation are the factors that are considered in evaluation of whether these measures have an impact in the control of transmission of the virus among people.

Findings: major findings in the study have concluded that healthcare systems are not properly equipped in performing to tackle such adverse situations. Similar steps taken to combat the virus in different countries had not proven to be the best strategy to tackle or fight the situation, rather little improvement was observed when strict measures were followed by government doing overall surveillance, as well as with the help of effective cooperation from public as in case of china.

INTRODUCTION

In December 2019, reports emerged that a virus that specialists had never before seen in humans had begun to spread among the population of Wuhan, a large city in the Chinese province of Hubei. Since then, due to the high transmissibility of the virus, it has spread to other countries, inside and outside of Asia, leading the World Health Organization (WHO) to declare this as a pandemic on March11, 2020. To date, the novel corona virus — called severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) or COVID-19— has been responsible for millions of infections globally, causing hundreds of thousands of deaths. As the origin and the transmission pattern of the virus are unknown, the control of the spread has been out of hands. In different countries, various kinds of preventive steps and measures have been taken in order to control or slow down the transmission of virus among people.

In this article, the reflex is considered as the initial action taken as soon as first case of virus is detected in a country and response is considered as initial steps taken till the situation or transmission control is out of hand. Each country's initial reflex action and initial steps of response are considered and evaluated whether if those actions and measures have an impact in the spread and control of virus among population. Some of the most affected countries are considered in this article to study and evaluate how their mechanisms of control had an impact on the virus transmission.

Those countries are USA, RUSSIA, CHINA, INDIA, ITALY, and SPAIN.

OBJECTIVES:

The main objective of this article is to analyze if the initial steps taken by the government and health systems have prevented or at least controlled the rapid transmission of corona virus since the detection of the first case in a country. Eventually, how different actions have led the course of virus transmission developed in causing a large number of case fatalities are to be explained. Another objective is to find out if the readiness and previous experience of containing an outbreak has helped in reducing the transmission rate. Also, to compare and contrast the systems among the countries which are supposed to be worst hit by COVID-19 till date.

METHODOLOGY:

For this article, qualitative data has been collected for the analysis. The data related to COVID 19 has taken from World health organization website(WHO), PUBMED, Centre for Disease Control(CDC) and few research articles published in NEJM, WILEY etc., some of the information was gathered from news articles published in government channels, GOOGLE SCHOLAR, SCIENCE DIRECT etc., The data is analyzed for different steps taken to control the spread and the outcome results are compared whether those measures have had an impact in decreasing or increasing trend in the confirmed cases in later phase. How different actions have led to create the present situation is described with relation to the outcome of comparison.

UNITED STATES OF AMERICA

America is one of the top countries in the world known for being self sufficient, having strong political and economical influence with powerful military base and having best health care facilities. America is well known for providing best healthcare services and its healthcare system. However, it ended up being stood in first position in recording the total confirmed cases of corona virus patients globally.

First case: On January 20, 2020, first positive case of corona virus was reported in America. Till the end of the month, no secondary cases were found which were related to this case as close monitoring of contacts is done. However, the second case was confirmed on 24 January from another patient in Illinois who has returned from Wuhan on January 13th. According to an article published in New England journal of medicine, the understanding of the clinical spectrum of

2019-nCoV infection at that time was very limited. The patients exhibited symptoms such as respiratory failure, severe pneumonia, cardiac injuries and ARDS, including fatal outcomes in china, though the initial case patient initially shows symptoms of mild cough and low-grade intermittent fevers, without any visible evidence of pneumonia for 9 days and later developed to show on chest radiography. In the mid march, the country has experienced a spike of cases with increased mortality despite of continuous warnings and alerts, no specific and strict measures were followed to contain the transmission.

Reflex: Initially, Centre for Disease Control (CDC) has been proactively preparing for the introduction of 2019-nCoV in the U.S. for weeks, including:

- Alerting clinicians about the chance of getting cases related to respiratory symptoms especially those with travel history to china on Jan8.
- Developed guidance for clinicians for testing and management of 2019-nCoV, as well as guidance for home care of patients with 2019-nCoV.
- Has developed a diagnostic test to detect this virus in clinical specimens
- Implemented public health entry screening at major cities such as Atlanta, Chicago, Los Angeles, New York, and San Francisco airports.
- By January 16, CDC has announced that it will monitor and screen the passengers arriving from china
- On January 31, travel restriction has banned from china

Response:

As March reached its midpoint, it became clear that COVID-19 cases were starting to pick up and that the United States had already ventured past the point of no return. It was during this time that various rules and regulations were put in place to encourage social distancing and to "flatten the curve". These regulations ranged significantly, from closing down schools and parks to enforcing strict "shelter in place" rules for all citizens.

- **Testing**: Initially testing was limited to only those who have travelled to china recently or those who came in contact with them. Mean while, American president Donald trump has stated that those who need test will be tested. Testing was not expanded to private labs till late. Only diagnostic test makers were initially allowed to develop tests for the corona virus, while public health laboratories were not. Amid pressure from laboratory organizations and facing the wildfire spread of COVID-19 — as well as problems with CDC's test —on Feb 29, the FDA later changed its policy and allowed high-complexity, CLIA-certified labs to develop their own assays. With a few months left until a second wave of corona virus infections is expected in the fall, that could leave the U.S. once again unprepared and vulnerable not all people are tested and those who have symptoms

are tested for corona virus and the test results are provided within minutes near testing sites and takes around 1-2 days in some places if done at laboratory. Initially, the tests were carried out by government and later it gave permission and approval for outside agencies to develop test kits and at home sample collection testing kit. (LabCorp COVID-19 RT-PCR Test for at-home collection of nasal swab specimens) Initially, tests were limited to people with travel history, upper respiratory problems and high fever, as the community transmission began, for example, travel history was no longer essential.

- Problems faced: Abbott Laboratories, which currently has three approved tests, noted on its first-quarter earnings call in mid-April that increasing manufacturing has been difficult. CEO Robert Ford said on the call that Abbott had the capacity to produce 4 million antibody and PCR tests and 50,000 rapid points of care tests in the month of April. Since then, the firm said that it could manufacture 2 million points of care tests per month in June. But that's still not enough tests to keep up with the demand, Ford said, adding that while Abbott is scaling up manufacturing, it will take time. Similarly, since Mesa Biotech's 30-minute PCR point-of-care assay received EUA from the FDA in March, the company is struggling with scaling up manufacturing and increasing manufacturing lines by increasing automation and hiring additional employees, as well as speeding up on boarding processes, to ensure it has enough employees and manufacturing capability to meet demand. U.S. testing volumes are still limited although the diagnostics industry is producing more tests as related to early problems, shortage of supplies and not sick enough.

- ✓ One reason is that many of these tests are run on manual or semi-automated systems, putting a tremendous strain on lab technicians who are in short supply to begin with.
- ✓ Test makers are also facing shortages of reagents, swabs, and various collection devices. Entire global supply chain is strained right now due to both an overwhelming demand for materials and required diagnostic testing capacity around the world. This includes the RNA extraction kits, primers, probes, and enzymes, as well as the physical sample collection materials — swabs and containers for storage and transportation."
- ✓ According to a recent survey conducted by AMP, more than 70% of respondents said they experienced supply chain interruptions, resulting in testing delays and reduced testing capacity. Smaller labs also reported favoritism in who are getting supplies: 60% of respondents reported that some of the government's supplies and reagents are being allocated to the larger reference laboratories,
- ✓ Longstanding relationships with suppliers enabled it to obtain testing supplies and other products in competition with other companies.

- ✓ Guidelines stipulating who can get tested are now the greatest barrier to broader testing. A patient has to be perfectly symptomatic to get a test from a lot of the labs that have capacity as the supply was constrained.

- **Lockdown measures**: All the lockdown measures in USA are implemented at different times according to state governments. So, as a result of this difference, there is no unique response running at a time all over America. This led to spike in cases in states following lesser restrictions and those which have delayed implementation in imposing movement restrictions

  The Oxford COVID-19 Government Response Tracker (OxCGRT) systematically collects information on several different common policy responses that governments have taken to respond to the pandemic on 17 indicators such as school closures and travel restriction Schools closure, Workplace closure, Cancellation of public events and gatherings, Restriction of public gatherings, Stay at home restriction ,international and domestic travel ban, Public transport restriction, Internal movement restriction, National emergency declaration. According to it, during the peak of cases, US has recorded and maintained a stringency index of 72.69 from March 21 to June 16 for about 56 days approximately. But, however, a score of 100 was not achieved which is a drawback in strict implementation of the measures. Also, since june17, the score remained constantly at the score of 68.98. though social distancing and wearing masks are suggested for better protection against the virus transmissions, there were several protests stating that it's against their individual freedom.

- **Health facilities and medical team preparation**: In USA, the doctor patient ratio is 2.95 per 1000 population. As the cases with symptoms of corona virus has started to get admitted in the hospitals, Hospital systems have postponed elective surgeries, asking cancer patients to reschedule regular checkups (not treatment), and taking other steps to reduce demands on doctors and nurses so they can handle Covid-19 cases to concentrate on the adequacy of our equipment and supplies during this challenging period. On March 11, the president has promised free treatment to those who have been infected with corona virus. US Food and Drug Administration (FDA) gave authorization to use Hydrochloroquine for emergency use authorization (EUA) in treatment of COVID-19 patients. Several hospitals have used HCQ in the treatment of corona virus as they showed improved rate of recovery in initial phases. Also, HCQ is recommended to be used as prophylaxis measure for front line health workers to treat the cases. As USA is running shortage, India has exported 50 million tablets of HCQ upon request of the president.

- **Mortality**: America has stood at a mortality rate of 1.3% rate due to COVID-19. The calculation is based on cumulative deaths and detected cases across the United States, but it does not account for undetected cases, where a person is infected but shows few or no

symptoms. The elderly are at the greatest risk of dying, if infected with this virus. Those with underlying health conditions are at a higher risk. Though social distancing measures are followed in did not have a big impact in controlling or reducing the mortality rate in US. According to statistics, just over 34 percent of the US population is aged 50 and seemingly, if they are infected with corona virus, the chances of increase in mortality rate cannot be neglected. However, the cause of attribution of death still remains as a challenge in calculating the death rates.

Analysis: when the cases showed up in the January, the lack of clinical knowledge about disease transmission and progression has also acted as a constraint in containment. But, the situation was not taken into serious consideration as a result of denial and dysfunction at the highest levels of government. For at least six weeks after the first cases of COVID-19 arrived in the U.S., the federal government—and most state governments—made no attempt to put in place measures like stay-at-home orders, aggressive testing, isolation, contact tracing, or quarantine. Financial barriers to isolation and care remain. This sluggish response gave the virus weeks to spread unfettered and virtually undetected. Also, as testing was initially confined to those who have a travel history to china, has given a jumpstart to the spread of undetected virus transmission. Also, the industry is not equipped to churn out such massive numbers of tests. Because of the restricted social movement and lockdown, supply chain management has also been affected which was in turn required at a point of crisis. Decentralized power in implementation of preventive measures at different levels acted as drawback. Limited testing and challenges in the cause of attribution of death also does not give clear picture of mortality rate.

RUSSIA

Russia stood at 2nd place globally in total confirmed positive cases of corona virus by the end of June with cases above 6lakhs. Although delayed compared to outbreaks in other countries, the Covid-19 pandemic has taken hold in Russia, compared to elsewhere in Europe and Asia. The first case in Russia appeared on January 31.the infected person has been well contained and quarantined by providing health service. Second case has not reported till the start of March.

Reflex:

- A corona virus taskforce was created on January 29.
- Russia has closed the border with China on January 30, then screening incoming passengers and finally halting all incoming air traffic to keep the invading viral army out. Hospitals were refitted, doctors retrained, and protective gear and equipment sent to every hospital in the country.

- People who arrived from china has been placed under quarantine on Feb. 21 and government has used facial recognition technology for monitoring
- Following nation-specific restrictions, the entry of all foreign nationals was barred on March 18, and a "high alert status" was introduced nationwide the following day.

Response:

Russia implemented preventive measures to curb the spread of COVID-19 in the country by imposing quarantines, carrying raids on potential virus carriers and using facial recognition to impose quarantine measures. There has been a genuine decentralization of command that has left responsibility and the margin of error to local authorities' initially stronger response at the regional and municipal level. Around 20 regions have adopted mandatory isolation measures.

As the second case was detected in the start of March, cases slowly started to rise. On March 31, a state of emergency has been declared during which citizens would face stiff penalties for violating quarantine or knowingly spreading false information. Russia had declared a week-long nationwide work "holiday" which was extended later and introduced measures, such as tax deferments for small- and medium-sized businesses and an increase in maternity capital for eligible families..

- **Testing:** The first testing systems were developed and deployed to laboratories around the country in the end of January itself. Russia has carried out over 165 thousand tests for the virus which is among the highest testing numbers in the world by March end. Russia passed the 1 million test mark by april9th. On 27 April, Russia passed the 3 million test mark. Though testing was done, it was a very convoluted, three stage testing regime that involved sending tests to Western Siberia and waiting a few days for the results. People could have been carrying the virus for a week or more without knowing the test results

- **Lockdown measures**: though the country had been warning its people to maintain social distancing, as of March 22, lockdown was implemented with a very little warning. The restrictions are quite severe, allowing people to go outside only to "seek emergency medical care, shop for food or medicine, go to work, walk pets, or take out the garbage." the situation has evolved resulting in a presidential executive order granting additional authority to the governors to take measures to deal with the pandemic. Quite unlike the top-down Russian decision-making system, this decree means regional leaders will take decisions based on variations in spread of corona virus. Few of the cities have gone even further. Nizhny Novgorod adopted measures requiring residents to download QR codes that authorities can use to keep tabs on their movement before leaving the house. Working at home and stay at home orders were strictly imposed nationwide since March 30 to May 11. According to Oxford COVID-19 Government

Response Tracker (OxCGRT) the stringency index calculated by oxford for Russia has initially been 0 during January, but, suddenly plummeted to score 85 by the end of March, continued the same for the entire April, and started to drop down slightly. Lockdown measures including movement restriction were slightly eased in May and June; as a result, the cases have now taken the spike again.

- **Health facilities and medical team preparation**: According to WHO, Russia has 81.75 hospital beds / 10000 population and 3.74 doctors/1000 population. Russia has a higher number of ventilators per capita than many western countries and the government has insisted it has over 40000 ventilators besides adequate supply of medicines and PPEs. According to the OECD, Russia ranks third in the number of beds per capita Even though, Shortages of personal protective equipment (PPE) equipment have led to a high transmission rate within hospitals among patients, doctors, nurses and healthcare workers. Russia's doctors and nurses have been outspoken about the lack of medical supplies and the false information being propagated by the government concerning the corona virus. Doctors have set up their own website to count the medical personnel who have died from the virus, titled the List of the Remembered.
    - Foreign aid: Russia has delivered medical assistance to some hard-hit countries in a public relations gesture designed to highlight Russia as a reliable partner and public goods provider. So far, Russian assistance has focused on three countries: Italy, Serbia, and the United States. In addition to medical supplies, over 100 Russian military personnel trained in biological, chemical, and nuclear decontamination are now present in the country for a campaign named "From Russia with Love." To Italy. A Russian Air Force cargo plane landed in New York on April 1 carrying protective gear and ventilators. Russia has also sent military medics and medical equipment to Serbia. This assistance included 11 flights and 87 military medics. Russian state media has reported that personnel have now disinfected arenas, provided consultations, trained Serbian personnel, and "analyzed the epidemiological situation."

- **Mortality**: The mortality rate due to corona virus has stood at 0.9%. Though the number of positive cases is rising day by day, the mortality rate has remained below the world average mortality rate of corona virus. Russia has a near-perfect Core Capacities Index score, the monitoring framework developed to assess a nation's compliance with standards and requirements promulgated under the World Health Organization's (WHO's) 2005 International Health Regulations .The nation also has a higher number of ventilators per capita than most Western states, which could help explain the remarkably low mortality rate throughout April. The Core Capacities Index is notably based on a nation's self-assessment, and the Russian medical supplies that were so plentiful proved to be largely defective. Even if Russia's health system was prepared, the

country would have to overcome a national problem of widespread underlying health conditions. Since the collapse of the Soviet Union in 1991, the nation has faced disproportionately high rates of heart disease and alcoholism. Nearly one-third of the Russian population is smokers, and the life expectancy of men is just 66 years. Though the number of positive cases is rising day by day, the mortality rate has remained below the world average mortality rate of corona virus.

- **Issues**: On 25 March, President Putin announced that the 2020 Russian constitutional referendum would be postponed due to the epidemic. In Russia's major cities, nurses and doctors are resigning in protest over conditions, and sick doctors are being forced to continue to treat patients. The situation has worsened to the point where falsified reports can no longer project an image of stability doctors are taking to YouTube in order to show the dire situation in some of Russia's biggest hospitals. regions across the country have seen the introduction of criminal liability for the dissemination of "false information" about the corona virus, hefty fines for violators of quarantine, and laws mandating the download of mobile tracking apps for the government to monitor individual's locations and activities. The State Duma has already passed laws allowing individuals to be held criminally responsible for circulating information that has not been approved by the government. According to analysis published by the Financial Times on May 11, the national death toll could be more than 70% higher than the official data show Moscow Mayor Sergei Sobyanin admitted on May 7 that the real number of infections in the capital city was at least three times higher than the official figure. Political conflict has also interfered in creating strong response in later stages when there is a spike of cases, as the approval ratings of the president Vladimir Putin has been consistently decreasing ahead of the postponed public vote on the constitutional amendments that could keep him in power beyond the end of his current term in 2024.

Analysis: The country had reacted promptly to potential danger in the early stages. Though testing centers were established earlier in January, even after conducting higher testing numbers, the country has experienced a spike in positive cases day by day. This might be due to the fact that results of tests occurred way late and the virus might have spread before a patient is confirmed positive or negative. Having lost faith in the government's reporting of cases and deaths, doctors started protesting about their issues with the lack of PPE and medical equipments. Before the appearance of peak of cases, the Russia has chosen to help other countries by sending medical supplies and required personnel. This act may somehow lead to exertion of the resources when needed, by the time when the cases started to rise in their own country. There were many questions raised regarding the accuracy of the numbers reported related to the confirmed cases and deaths overall. Thus, ambiguity in the current situation of the country with respect to corona virus has led to inadequate information given to the people in the

country. The disturbances in the administrative authorities and uncertainty of the presidential power have also caused weak response from the government to combat the battle with the virus.

CHINA

The corona virus which is said to be pandemic has emerged from a live stock market in Wuhan city. The virus is said to have originated from bats to pigs and then transmitted to humans. The corona virus, previously unknown to science, causes severe acute respiratory infection with symptoms including a fever and cough. As the origin of the virus is unknown, cases showing symptoms of pneumonia, short breath and breathing difficulties have been reported in the province late in December.

Reflex

- In the late December, a cluster of people have reported in the hospitals of Wuhan city with pneumonia of unknown etiology. However, investigations were done and the outbreak was traced to be originated from a seafood market where live bats were sold. These are believed to be the origin of the virus.
- 27 December - The Chinese authorities were informed about a cluster of cases reported in hospitals in the province and warned of danger to be a pandemic.

- 30 December - The health commission in Wuhan notifies local hospitals of a “pneumonia of unclear cause", and asks them to report any related information of suspicious cases in the past week.
- On 31 December 2019, cases of pneumonia of unknown etiology were informed to WHO china office.
- The Wuhan Public Security Bureau detains eight people for spreading rumors about the virus. Soon, the market was closed on jan1st, to prevent further transmission.
- On jan7, novel corona virus is reported and detected as the causative agent. COVID-19 genome sequencing made released publicly to be available for countries on January, 10.
- On 11 and 12 January 2020, WHO received further detailed information from the National Health Commission China that the outbreak is associated with exposures in one seafood market in Wuhan City
- On 12 January 2020, China shared the genetic sequence of the novel corona virus for countries to use in developing specific diagnostic kits.

Response

- **Case identification and large scale surveillance**: As for infected patients, clinical case identification was provided by WHO China and CDC China to have clear criteria for identifying cases under the outbreak investigation. A team of 1800 epidemiologists were appointed by the authorities to trace the contacts. It has introduced a smart phone application which relates to health color code system that categorizes people into groups based on their travel history and health status and determines whether the person is to be quarantined or not. Also, there was another system in which street camera is used to detect those who travel without mask publicly and identify people showing symptoms. This method was introduced during SARS outbreak.

- **Lockdown measures**: After a series of continuous reporting of cases, lockdown was imposed in Wuhan and Hubei province on jan24. Suspension of public transport and airports are closed to retrict public movement. However, this decision was taken a day ahead the spring festival where there are higher chances of public movement. In addition, except for medical shops and grocery stories, everything was closed shops. Restrictions were placed on public movement and schools and colleges were shut extending holidays. Disinfection campaigns were run at larger scale and awareness was created mainly with population having higher risk to be effected. However, this effect of lockdown and restriction of public movement along with sanitation and disinfection campaign has changed the rising curve of pandemic

.

- **Healthcare facilities**: china has a doctor patient of 1.8 per 1000 of population. but, china started to build hospitals to accommodate patients affected with COVID-19 , as the transmission rate was high. It was a similar step taken as in past, when it controlled to prevent the spread of SARS outbreak (Xiaotangshan hospital was built). The decision was made on January 24 to build Huoshenshan Hospital in Wuhan city, which can accommodate 1000 patients at a time. The building of the 269,000-square-foot hospital was completed within 10 days and started receiving patients on February 3. During the same period, the Leishenshan Hospital project with a 1,500-bed capacity was announced and completed on February 5. As many of the deaths were from the older age groups, China focused on building special centers to treat old and critically ill patients where the principle of “Four Concentrations” was implemented with a focus on concentrating on the patients, medical experts, resources, and treatment. As for the healthcare team, more than 40,000 healthcare workers were deployed and medical resources were mobilized from across the country to support the response in Wuhan

Analysis: Though the deadly virus which caused pandemic has originated from china, through its intense measures to control the transmission, somehow, the country has reduced the numbers of new positive cases to very few now. Though, the outbreak was sudden and unexpected, with the immediate act of lockdown and providing treatment to those who were affected in strictly maintained quarantine facilities has proven to be working strategy. The number of cases that appear now remained to be in single digits. However, it may have worked in china due to their strong communist party's effective command and control mechanisms and its uncompromising restrictions on information in the early stages of the crisis helped.

INDIA

Almost 3 months after the first Corona virus case was reported to the world and one month after it was declared a global pandemic by the World Health Organization, India, the second most populous country in the world with 1.35 billion people, has announced lockdown to prevent the spread of virus. The lockdown which has extended for 4 months approximately with gradual relaxations give in each of five phases, has been slowly lifted. The cases started to rise despite such tremendous effort compromising the country's economic condition. Now, India was worst hit and stood at 3rd place globally in total number of confirmed cases of corona virus patients.

Reflex

- The first positive case in India was reported on Jan, 30 in Kerala, where the patient was a returnee from Wuhan, china. Later, tracking all the close contacts and surveillance and risk based categorization was done to all the travelers from china.
- A health emergency was declared in the state. Later, as the cases started to show up in different states, they followed protocol of quarantine and healthcare service to the affected, sanitization protocols were followed. The country has by the time the cases started to show up in almost all the states, India has enough knowledge on the virus from the experiences of china and Europe. But, in order to respond or react to the situation, the Indian government has imposed a strict lockdown as a measure to control the spread of virus.
- Screening international passengers as early as mid-January. The nation had 6 COVID testing labs ready even before it recognized its first patient.

Response:

As the world health organization has declared COVID as a pandemic on March 11, 2020, India was having less than 1000 confirmed cases of corona virus. The country has mainly concentrated on limiting the contact among people by imposing strict lockdown measures.

- **Lockdown measures**: In order to prepare the people for lockdown situation, the prime minister has implemented one day lock down as JANATA CURFEW on 22March, 2020. When the total positive cases were still under 500. A strict lockdown has been implemented from 25, March to curb and prevent the transmission of virus among people till April 14 as phase 1 of lockdown. Later, as the cases raised day by day, it was extended by four phases where slight relaxations were provided in each phase. In lockdown 5.0, the restrictions were permitted only to containment areas with positive cases. According to the Oxford COVID-19 Government Response Tracker (OxCGRT) , stringency index of India stood at 100 score almost for a period of one month till April 19. Later, the strictness in implementation of lockdown has eased slowly giving allowances to roam around with permissions. After 2months, un-lockdown protocols have been introduced opening restaurants, public places and malls. During un-lockdown, as the country allowed public movement from one place to other, the migrants who live far away from their home town have started returning back to their villages. A heavy increase in the movement was observed later which, some of the states have imposed quarantine to those who travelled and few states did not follow this measure as a compulsory. The total confirmed cases have risen up to reach seven lakh.

- **Testing**: Two types of Covid-19 tests have so far been approved for use in India. The first is a PCR (polymerase chain reaction) test that detects the presence of the SARS-CoV-2 virus in a sample collected from the throat, nose or pharynx, and is considered the gold standard test for Covid-19 diagnosis. The second category (immunoassays) includes rapid tests that either detect particles of the virus, indicating active infection (antigen tests), or antibodies in a blood sample that would have been produced by the body if it had previously fought off an infection (antibody tests). In line with the "Make in India" spirit, NITI Aayog and the Department of Biotechnology (DBT) have launched the Consortium for Affordable and Rapid Diagnostics (CARD), which aims to roll out 10 million antibody-based tests by July. Though during lockdown period, testing was not done vigorously due to lack of testing kits and the deliberate procedure to get the results. Also, states have been performing tests according to their comforts and hence, there is no proper graph to say that every state has been on the same page while some are testing vigorously and some states are very poor at tackling the situation. Maharashtra has gradually observed community transmission at a point of time. In such case, testing for those only who had symptoms was done.

- **Mortality**: Though Indian population has been suffering with non communicable diseases such as diabetes and hypertension, are considered to act as co-morbidities when a person is infected with corona virus. India has higher demography dividend compared to other most affected countries. The fatality rate because of corona virus in India is probably the lowest in the world around 2.8% . However, fluctuations were seen as the

lockdown has lifted, the number of confirmed cases was increased, as a result the fatality rate has increased to 3.36% in June compared to what has been recorded a fortnight ago.

- **Health services and medical team preparation**: India has a doctor patient ratio of 1:1445 which is less than 1:1000 recommended by WHO. Hence, there is a clear shortage of doctors in Indian society. Initially, when low cases were detected, the patients were taken utmost care of and safely isolated in hospitals which are dedicated to treat corona affected patients and service was provided free of cost. As, the cases surged, private hospitals were also given permission to treat the patients and hence as a result the cost of treatment burden fell on the affected patient.

Analysis of response: The response of India was mainly concentrated on flattening the before it has reached its peak in the beginning itself. Implementation of lockdown before even reaching the peak of curve or at least 1000 cases has had both positive and negative consequences. However, this step has given a slow momentum to the spread of virus in the community while, sudden restriction on movement made While it was necessary to move quickly to prevent the spread of the virus, the manner of implementation showed a remarkable lack of awareness of the vulnerability of millions of the country's migrant workers, who were made to suffer needlessly because of the panicky approach of completely shutting down all domestic transport. This was in late March, when there was enough data from China and Europe to plan an intelligent lockdown. Different states have responded with varying levels of effectiveness, reflecting not just their resource levels but also their institutional capacities. The crisis has highlighted the importance of state and city governments in the delivery of public services included the rapid development of testing capabilities and access to protective equipment. The internal trade in the country has also taken a huge hit due to a series of lockdowns. Testing strategies should prioritize more vulnerable and susceptible populations including symptomatic and asymptomatic contacts of known Covid-19 patients, those dwelling in crowded spaces such as slums, migrant population, healthcare workers, elderly population and those with co-morbidities. Although India claims of conducting enough tests, in regions where community transmission has started, testing only symptomatic people is also considered a backdrop in identifying cases. Few of the reports say that there maybe lot more asymptomatic cases in India , hence testing enough of population should be mandatory in such cases which was not given ultimate importance.

ITALY

Italy was the first European nation to be affected by COVID-19. The virus was first confirmed to have spread to Italy on 31 January 2020, when two Chinese tourists in Rome tested positive for the virus. One week later an Italian man repatriated back to Italy from the city of Wuhan, China, was hospitalized and confirmed as the third case in Italy In a matter of weeks (from February 21 to March 22), Italy went from the discovery of the first official Covid-19 case to a government decree that essentially prohibited all movements of people within the whole territory, and the closure of all non-essential business activities. Within this very short time period, the country has been hit by nothing short of a tsunami of unprecedented force, punctuated by an incessant stream of deaths. It was the biggest football game in Atlanta's history and a third of Bergamo's population made the short trip to Milan's famed San Siro Stadium. Nearly 2,500 fans of visiting Spanish club Valencia also traveled to that Champions League match. More than a month later, experts are pointing to the February 19 game as one of the biggest reasons why Bergamo has become one of the epicenters of the corona virus pandemic - a "biological bomb" was the way one respiratory specialist put it - and why 35% of Valencia's team became infected. Cases started to peak in mid march and continued to descend gradually by April end.

Reflex

- On 31 January, the Italian government suspended all flights to and from China and declared a state of emergency.
- On 22 February, the government announced a new decree imposing the quarantine of more than 50,000 people from 11 municipalities in Northern Italy. The Italian military and law enforcement agencies were instructed to secure and implement the lockdown
- People with symptoms were advised to call the 112 emergency number, instead of going directly to hospitals, in an effort to limit the disease's spread.
- The Ministry of Health announced that it had engaged 31 laboratories in Italy to carry out the analysis of swabs from suspected COVID-19 cases.
- On 6 March 2020, the Italian College of Anesthesia, Analgesia, Resuscitation and Intensive Care (SIAARTI) published medical ethics recommendations regarding triage protocols that might need to be employed
- On 8 March 2020, Prime Minister Giuseppe Conte expanded the quarantine to all of Lombardy and 14 other northern provinces, and on the following day to all of Italy, placing more than 60 million people in quarantine.

Response

Though, the first COVID case was reported in the January end, Italy has faced the peak of the curve of confirmed cases as well as deaths from mid march to mid April. A series of measures were followed initially to restrict social movement but later it was confined only to save lives as deaths were higher day by day.

- **Lockdown measures:** On 1 March, the Council of Ministers approved a decree to organize the containment of the outbreak. In the decree, the Italian national territory was divided into three areas namely red zone (where the entire population is under quarantine), yellow zone (where social and sport events are suspended and schools, theatres, clubs and cinemas are closed) and The rest of the national territory, where safety and prevention measures are advertised in public places and special sanitization are performed on means of public transport. As the country has reached 100 deaths, schools and public places were closed all over the nation. Penalties for violations range from a €206 fine to three months of imprisonment. The Italian military and law enforcement agencies were instructed to secure and implement the lockdown. On 19 March, the army was deployed to the city of Bergamo, the worst hit Italian city by the corona virus, as the local authorities can no longer process the number of dead residents. On the following day, the Army was called in to assist the police forces in enforcing the lockdown. On 21 March, Conte announced further restrictions within the nationwide lockdown, by halting all non-essential production, industries and businesses in Italy, following the rise in the number of new cases and deaths in the previous days

- **Testing:** In Italy, the tests for COVID-19 have been performed mainly on symptomatic subjects. Tests were not performed initially in health care professionals (who could, therefore, have contributed to the spread of the disease) as well as in symptomatic patients at home.

- **Mortality rate:** The mean age in Italy of those who have died is approximately 80 years. No patient less than 20 years of age has been hospitalized or has died. Only 1% of the deaths have been detected in patients less than 50 years of age. More than two-thirds of these patients had diabetes, cardiovascular diseases, or cancer, or were former smokers. The cause of the high mortality is because of the age factor and the underlying co morbidities. However, inaccessibility to the health services is also considered as one of the reasons for the highest reporting of the deaths.

- **Health services**: Italy have approximately 5200 beds in intensive care units. patients had underlying health conditions, but it is also worth noting that they had acute respiratory

distress syndrome (ARDS) caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) pneumonia, needed respiratory support, and would not have died otherwise. According to most recent data from OECD, there are 4 doctors per 1000 of its population. Healthcare workers in Italy paid a very high price with more than 11,000 confirmed cases, 100 clinicians killed by COVID-19 and many with burnout syndrome. On 17 March, undersecretary at the Ministry of Health Sandra Zampa announced the purchase of many new ventilators as well as the importing of one and a half million masks from South Africa. In order to deal with the numbers of COVID-19 patients, intensive care units were expanded, and new hospitals were created, especially in Lombardy. A letter published on the New England Journal of Medicine Catalyst Innovations in Care Delivery claimed that one of the reasons for the high death count in the area of Bergamo was hospital contamination. The workforce of the healthcare system underwent massive reorganization. Pediatricians were assigned to adult patients. At the peak of the pandemics volunteers from the rest of the country were sent to hospitals in critical areas of northern and central Italy. Healthcare workers were also affected by corona virus infections, with a higher percentage of the infected healthcare workers being women because of their predominance among nurses. This resulted in death in a considerable amount of cases, especially amongst general practitioners.

Analysis of response: Different regions in Italy ended up putting in place different policies, which had a clear impact on the virus' spread. The most striking example was the contrast between the crisis management of Lombardy and Veneto, two neighboring regions that were hit first by the outbreak. Lombardy – Italy's wealthiest region , still has the grim record of more than 28,300 current cases and 9,400 deaths, in a population of 10 million. Veneto fared significantly better, with about 9,900 current cases and 695 deaths in a population of about 5 million. Veneto's outcome was due to a much more extensive approach than Lombardy, based on broad testing of both symptomatic and asymptomatic cases, together with active tracing of possible positives and a strong emphasis on home diagnosis and care, which reduced the hospitals' burden. Italy, like the majority of nations, was not prepared for the rapid spread of the pandemic, and many protection systems such as masks, produced almost exclusively abroad, were not sufficient even for health personnel. In addition, there are simply not enough ventilators for all patients who need them, raising important ethical issues. By losing the front line warriors in healthcare due to the infection spread, proper health care delivery was compromised leading to even graver situation.

SPAIN

The virus was first confirmed to have spread to Spain on 31 January 2020, when a German tourist tested positive for SARS-CoV-2 in La Gomera, Canary Islands. Post-hoc genetic analysis has shown that at least 15 strains of the virus had been imported, and community transmission began by mid-February. By 13 March, cases had been confirmed in all 50 provinces of the country. After the World Health Organization declared on March 11 2020 that the Covid-19 outbreak had reached the level of a global pandemic and as the rapid escalation of the public health crisis caused by the virus became apparent across the globe, several countries, including Spain, implemented a number of emergency measures with a twofold objective: (i) protect citizens' health and (ii) mitigate the economic consequences of the lockdown measures. The cases started to peak in the end of March and continued till April with a count of 4000-5000 confirmed positive cases per day and then gradually reduced to 300-400 cases now. Spain has registered more than 245000 registered cases and 28000 deaths till now.

Reflex

- In Spain, the first COVID-19 case was reported on Jan. 31. The first death occurred on Feb. 13, but it was not diagnosed post-mortem until early March.
- On March 8, the same day a quarantine zone was declared across much of Northern Italy, the Spanish government was encouraging people across the country to take to the streets for International women's day protests.
- At the time, 10 people had already died of COVID-19 in Spain and 520 cases had been confirmed. On the day of the massive protests, Spain's health minister held a press conference telling people to stay home if they were feeling ill. Among those who joined the women's march, three Cabinet ministers from the country's left-wing coalition and the first lady were later diagnosed with COVID-19. Irene Montero, the minister of equality, tested positive just four days later.

Response

Spain's response to combat virus was started late when already the situation was out of hands.

- **Lockdown measures**: The lockdown was imposed on 14 March 2020. On 29 March, it was announced that, beginning the following day, all non-essential workers were ordered to remain at home for the next 14 days. By late March, the Community of Madrid has recorded the most cases and deaths in the country. As of 23 March 2020, there were 240,245 police officers and more than 2,500

military deployed across the country. Some police made trips to quarantined populations and played music to lift spirits.

- **Testing:** earlier this month in June, Spain published the results of a country-wide sero-prevalence survey, which tested 60,000 residents for antibodies that suggest they had already been infected with and thus may be safe from a future infection by—SARS Cov-2, the virus that causes COVID-19. The survey estimated that about 5 percent of the country's population had been exposed to the virus, varying from 1.1 percent to 14.2 percent between regions of the country(however, there are questions over the accuracy of the tests)
- **Mortality:** From 17 March to 14 April, the death rate in Spain was 68% higher than usual and 21,882 excess deaths occurred, with the vast majority of excess mortality observed among those older than 74 years. The peak of excess deaths occurred during the week of 27 March to 3 April and was five times larger than the flu season of 2019. On 23 March, *The Guardian* reported that hospitals in the Madrid area were being overwhelmed by corona virus patients. Medical professionals and those who live in retirement homes have experienced especially high infection rates. There were reports stating the deficiency in availability of Personal protective gears.

Analysis of response: Spain, despite the added advantage of seeing what was happening in Italy, also failed to recognize the exponential spread in the critical early weeks of the virus's introduction into the country. Despite the measures taken, there are many characteristics to be considered such as highly social citizens, fair weather, densely populated cities, physically affectionate social interactions, and large elderly populations. The rally which was taken place on occasion of international women's day has acted as a atom bomb to set off the virus spread enormously among people. Being doctors affected by the virus, personnel required to treat the affected patients have been decreased as most of the doctors and health line workers are to be placed in quarantine.

FINDINGS

As per the data collected and mentioned above, it is evident that, the countries despite taking measures to combat the virus transmission, have failed in containing it. More or less, the measures such as lockdown implementation, testing have been followed by every country did not incur much change in the wave pattern of virus transmission despite the timeline. However, when the virus transmission has started to show up in a country, if the lockdown was not implemented for more than 1 or 2 months, the progression of virus has expanded beyond the usual (as in case of Spain and Italy) when compared to those which implemented immediate lockdown (china). However, in India, the scenario might be different, as despite following a strict lockdown, because of low testing rates and internal migration during un-lockdown, the cases started to hike. The case fatality has largely depended on the age factor and co morbidities irrespective of the imposture of virus containing measures. The previous experience of containing an outbreak has also played an important part in flattening the curve as China had a previous experience of dealing with SARS outbreak implemented some of the techniques in case identification and surveillance which led to early detection and containment of virus. Though, Chinese Communist Party's ineffective command and control mechanisms and its uncompromising restrictions on information in the early stages of the crisis helped transform a localized epidemic into a global pandemic, it proved efficiency in middle and later stages of the pandemic where the numbers started to decline slowly and now, the new cases reported are in single digits. Allocation of scarce health resources has become the most difficult part in treating the COVID-19 patients. Patients with other health problems have suffered with lack of healthcare service during this period in many countries. Though testing was done, in most affected countries, it was either inadequate or the duration to interpret the results too long. Most of the healthcare system was not strong enough to handle such pandemic situations as there was inadequate supply of required equipment related to treatment like PPE's, ICU beds or doctors.

CONCLUSION:

Despite the measures taken by the governments to curb the virus transmission, the cases are still prevalent and continue to show up till date. In many countries, Under reporting of confirmed cases, deaths has remained a biggest concern. However, this scenario may also have a problem of limited knowledge among people about the current situation condition which may eventually lead to negligence in following the measures to prevent the infection. Every country has different governing system, healthcare system and also the attitude perception towards contracting the infection. In such circumstances, Considering that each community is unique, assessment should be done of the possible benefits and negative consequences of each strategy adopted. In addition, countries should work on enhancing their systems and personnel in order to be more prepared for future outbreaks and reduce consequences when they strike. Effective crisis management requires more than whole-of-society mobilization rather than to depend completely on the government to take care. Individuals should also play a major role in taking precautions and maintaining social distance despite the lockdown and follow all the steps recommended by the World health organization. China provides hope for the rest of the world and reminds other countries that even the most severe situations can be turned around. Their response to the COVID-19 epidemic and the high level of collective action in a modern city with more than 11 million people are to be appraised. Although, there are opinions that it might seem easy in a society or political system as that available in China, it is actually not easy to get this kind of passion, commitment, interest, and an individual sense of duty. Till the vaccine or proper medication has developed which is available around the globe, the situation remains the same if there is no change in the systems approach to fight the virus. Enough testing and contact tracing is to be done initially and necessary resources and personnel are to be employed with immediate priority. In a scenario, where, in most countries, there was insufficient medical equipment, limited doctors, also the risk of front line healthcare workers being most affected by the infection, a new reformed health infrastructure has to be formed. In an era of global transformation and lifestyle change, such outbreaks are expected to be common in future. Hence, considering this experience as a wakeup call, necessary changes are to be taken in different sectors.

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