



# **Flattening the curve on COVID-19 : South Korea's measures in tackling initial outbreak of coronavirus**

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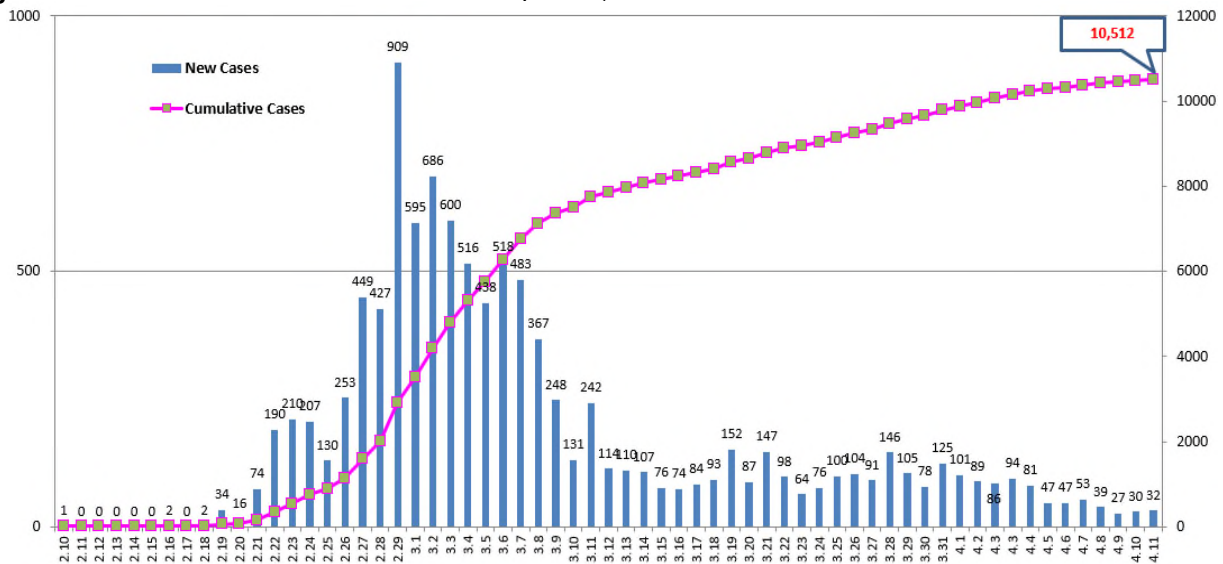
## **Abstract**

The spread of COVID-19 is causing an unprecedented crisis around the world, with South Korea being no exception. South Korea experienced a surge of COVID-19 cases on February 19 2020, but was able to flatten the COVID-19 curve in only 20 days without enforcing draconian measures that restrict the freedom and movement of people. To analyze how South Korea achieved as such, this study is based on the actual field experience of the Korean government's COVID-19 response team who participated in drafting the 'Tackling COVID-19: Korean experience' and in-depth analysis on past South Korean government experience from the Middle East Respiratory Syndrome of 2015. This paper finds three prominent factors behind Korea's responses against COVID-19. First, it is crucial that the government responds as 'one team' efficiently to cooperate and respond to COVID-19. Second, a novel approach is needed to combat the spread of the novel coronavirus. Information and communication technology (ICT) had a key role in South Korea's strategy to contain COVID-19. Third, an effective response to COVID-19 was possible due to the successful partnership between the general public and state authorities.

**Key Words** : 3T; TESTING; CONTACT TRACING; COVID-19; KOREA; MERS

On February 29, the number of new positive COVID-19 cases surged to 909 in South Korea [1]. This was the worst COVID-19 outbreak outside of China at that time [2, 3]. However, South Korean government did not impose strict lockdown measures on personal movement or airport shutdowns. Two weeks later, on March 15, the number of new positive cases dropped to 76. South Korea has slowed the spread of COVID-19 and flattened the curve of new infections without taking extreme measures that restrict the movement of people and core businesses (Figure 1) [1, 4].

**Figure 1.** COVID-19 curve in Korea as of April 12, 2020<sup>a</sup>



<sup>a</sup> According to Korea Ministry of Health and Welfare [1]  
Abbreviation : COVID-19, 2019 Coronavirus Disease

The purpose of this study is to examine South Korean government's response to the initial outbreak of COVID-19 from February to May 2020. In particular, we will examine how South Korea flattened the COVID-19 spread of infection curve even after the virus was widely dispersed at the community level without enforcing a lockdown. The study is based on the actual on-site experience of those participating in the South Korean Ministry of Economy and Finance's COVID-19 response team. It examines previous responses from the Middle East Respiratory Syndrome (MERS) in 2015 and analyzes the changes made in combatting the spread of epidemics at the national and local level.

## **EPIDEMICS AND COVID-19**

With the spread of COVID-19 [5], the world is facing an unprecedented economic and health crisis. Many global leaders see COVID-19 as the gravest challenge the world has faced since World War II [6]. Current academic research on COVID-19 focuses primarily on health, quarantine, and medical research. Given that COVID-19 continues to diffuse and affect the lives of people around the world, this study focuses on the government policy measures that are taken to tackle the highly infectious virus at initial outbreak stage.

Many countries are endeavoring to identify the most effective response to contain COVID-19 at the national level by imposing a temporarily lockdown of selected cities or the entire state and declaring a total ban on foreigners from entering the country. Meanwhile, South Korean government chose to maintain the existing health, quarantine, and immigration measures without implementing lockdown measures. COVID-19 in South Korea is currently controlled only by containment and mitigation measures [7]. South Korea has become a unique case in maintaining mitigation measures from the beginning of COVID-19. As such, it can be a guiding case for countries that are currently exposed to COVID-19 without having taken any containment measures at an early stage [8]. This study presents three factors that contributed to flattening the curve of COVID-19 from historic, quarantine, and implicit contexts.

## **EVOLUTION FROM PREVIOUS EPIDEMICS**

The successful response and control of the COVID-19 outbreak evolved from lessons learned from previous outbreaks especially MERS in 2015. MERS is a respiratory illness that was first reported in 2012 in Saudi Arabia [9]. South Korea experienced a significant MERS outbreak in 2015 when a total of 186 confirmed cases, including 38 associated deaths were reported [10]. South Korea suffered the worst damage outside of the Middle East. Table 1 explains the lessons learned from the MERS crisis [11]. After the MERS

outbreak, South Korea strengthened the functions of Central Disease Control Headquarters and implemented major changes in the hospital infection control system, the emergency medical service system, and the enhanced nursing system in order to reduce and prevent infections in hospitals and healthcare facilities. The most extensive health and quarantine reform occurred on reducing infection among health care workers in hospitals and healthcare facilities.

**Table 1.** Lessons learned from the MERS outbreak in 2015 <sup>a</sup>

|                                 | <b>Lessons Learned</b>  |
|---------------------------------|---|
| <b>Public health governance</b> | <ul style="list-style-type: none"> <li>• Clear roles and responsibilities between the central and local governments via the Central Disease Control Headquarters.</li> <li>• Robust coordination structure between the health and medical authorities.</li> </ul> |
| <b>Contact tracing</b>          | <ul style="list-style-type: none"> <li>• Accurate epidemiological investigations of the first confirmed case.</li> <li>• New legal standards for scope of close contacts.</li> </ul>  |
| <b>Health care systems</b>      | <ul style="list-style-type: none"> <li>• Proper government management of medical institutions and hospitals.</li> <li>• Medical staff from the local health centers.</li> <li>• National R&amp;D investment in epidemic diseases.</li> </ul>                      |
| <b>Communication</b>            | <ul style="list-style-type: none"> <li>• A quick and accurate relay of information to the general public.</li> </ul>  |

<sup>a</sup> According to Korea's Ministry of Health and Welfare [10]

## TACKLING COVID-19

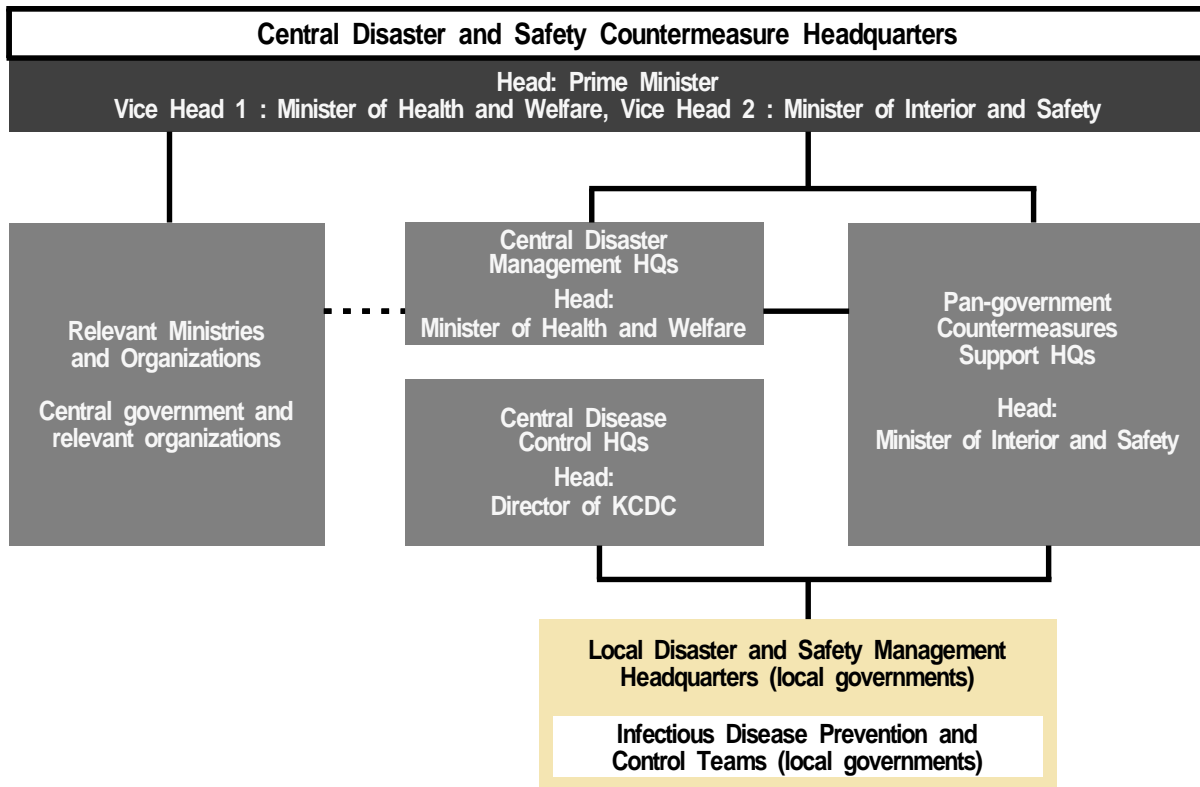
Without resorting to blockades, lockdowns, the suspension of public transportation or other large-scale restrictions, South Korea has maintained people's day-to-day freedoms with minimal interference in their movement even at the height of the COVID-19 outbreak. The heart of this strategy consists of agile and comprehensive testing to identify positive cases; robust contact tracing of their contacts to prevent further spread; and rigorous treating those infected at the earliest stage possible [12, 13]. This section describes how South Korea responded to COVID-19 with the 3Ts strategy, namely testing, contact tracing, and treating.

### Governance and Institutions

Figure 2 shows how COVID-19 response intergovernmental task forces share responsibilities [1]. Since raising the national infectious disease alert level to 'serious' (on February 23,

2020), South Korean government has assembled a Central Disaster and Safety Countermeasures Headquarters, headed by the Prime Minister to double down on government-wide responses to COVID-19.

**Figure 2.** Response Systems of South Korean Government <sup>a</sup>



<sup>a</sup> According to Korea Ministry of Health and Welfare [1]

The Prime Minister chairs the Central Disaster and Safety Countermeasure (CDSC) Headquarters Meeting, comprising all relevant ministries of the central government as well as the 17 provinces and major cities. Given the specialty and expertise required in the infectious disease response, the Central Disease Control Headquarters (KCDC, Korea Centers for Disease Control & Prevention) serves as the command center of the prevention and control efforts. The Vice Head 1 of the Central Disaster and Safety Countermeasure Headquarters, who also serves as the Head of the Central Disaster Management Headquarters (Minister of Health and Welfare), assists the Central Disease Control Headquarters (Head: Director of the Korea Centers for Disease Control and Prevention). The Minister of Interior and Safety, head of the Pan-government Countermeasures Support

Headquarters, assumes Vice Head 2 of the Central Disaster and Safety Countermeasure Headquarters to provide necessary assistance such as coordination between the central and local governments. Each local government establishes Local Disaster and Safety Management Headquarters led by the heads of the local governments to secure an adequate number of Infectious Disease Hospitals and beds. If the countermeasure required is beyond the capacity of local governments, the central government may supply the necessary resources including beds, personnel, and supplies.

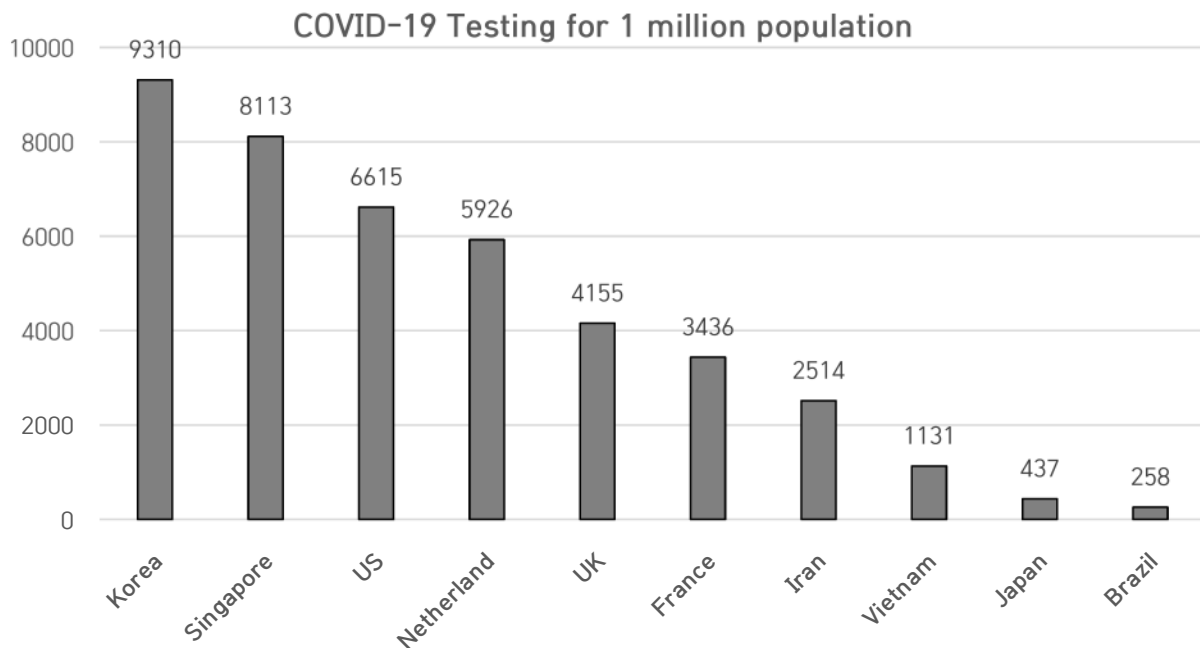
Taking lessons from the past MERS outbreak, the status of KCDC has been upgraded to a vice minister level organization [14]. The crisis management manual was revised in June 2016 so that the head of KCDC can lead the quarantine regardless of the level of the alert stage. KCDC also receives various types of assistance such as those from MOHW. The Minister of the Interior and Safety took the role of the director of the Government-wide Countermeasures Support Center connecting the central and local governments. Each local government also forms its own Local Disaster and Safety Countermeasures Headquarters. The central government provides assistance in terms of sickbeds, manpower, supplies, and other areas where local governments face shortages. This close partnership between the central and the local governments, along with a strengthened capacity to control epidemic diseases at the local government level are important consequences of the MERS experience [15].

### **Agile and Comprehensive Testing System of COVID-19**

South Korean government carried out an impressive number of tests within a short period of time to diagnose potential cases and to block the spread of the virus as early as possible. This became possible due to an amendment to the law that allows for prompt testing and diagnosis by local public health centers and private hospitals along with KCDC, the National Medical Center and the National Institute of Health. As of April 8, a total of 486,003 tests have been conducted. As shown in Figure 3, Korea's COVID-19 testing performance is higher than that of Japan, Vietnam and Singapore [1, 15]. South Korea

turned to a network of public and private laboratories to develop tests. On February 4, South Korean government granted a fast-track approval of one company's COVID-19 test and began shipping the kits. A second company's test was approved a week later, and two more soon followed.

**Figure 3.** COVID-19 tests per million people as of April 8, 2020<sup>a</sup>



<sup>a</sup> According to Korea Ministry of Health and Welfare [1] and Worldometer [17]  
Abbreviation : COVID-19, 2019 Coronavirus Disease

South Korean government set up screening centers at public health centers and healthcare institutions to ensure easy access to diagnostic testing. It also diversified their operating models to respond more effectively to the increasing demand for diagnostic testing. South Korean government is collecting testing specimens through more than 50 drive-through screening centers, mobile facilities, and door-to-door visits to ensure greater efficiency and safety [1, 16, 17]. For the purposes of testing and managing COVID-19, there are three type of cases: confirmed cases, suspected cases, and patient under investigation cases as indicated in Table 2 [1, 13]. Currently, a diagnostic test for COVID-19 is conducted if the person has had contact with confirmed COVID-19 cases, has been released from self-quarantine, has had close contact with suspected COVID-19 cases and or has had symptoms of an unknown respiratory disease [1, 13, 17].



**Table 2.** Three types of COVID-19 cases in South Korea <sup>a</sup>

| <b>Types</b>                                 | <b>Description</b>  |
|--|---|
| <b>Confirmed case</b>                        | <ul style="list-style-type: none"><li>• A person who has tested positive for COVID-19 in accordance with testing standards, irrespective of clinical signs and symptoms.</li></ul>  |
| <b>Suspected case</b>                        | <ul style="list-style-type: none"><li>• A person who develops a fever (37.5°C and above) or respiratory symptoms (coughing, difficulty breathing, etc.) within 14 days of suspected contact.</li></ul>  |
| <b>Person under Investigation (PUI) case</b> | <ul style="list-style-type: none"><li>• A person who is suspected of having the COVID-19 virus as per a doctor's diagnosis due to pneumonia of unknown causes. <b>OR</b></li><li>• A person who develops a fever (37.5°C and above) or respiratory symptoms (coughing, difficulty breathing, etc.) within 14 days of traveling to a country with local transmissions* of COVID-19, such as China. <b>OR</b></li><li>• A person with an epidemiologic link to the collective outbreak of COVID-19, who develops a fever (37.5°C and above) or respiratory symptoms within 14 days.</li></ul> |

<sup>a</sup> According to Korea Centers for Disease Control and Prevention [1]  
Abbreviation: COVID-19, 2019 Coronavirus Disease

South Korea's COVID-19 testing is processed within 6 hours. First, the testing begins by collecting specimens from those suspected of being infected using three testing methods: nasopharyngeal swab, oropharyngeal swab, and sputum collection. Second, the collected specimens are packaged in triplicate and transported to a government-certified testing center. Third, the transferred specimen is subjected to an acceptance procedure. Fourth, to engage the testing, the genetic material, the nucleic acid, must be extracted from the specimen. This work is performed by clinical pathologists in a negative pressure room and usually takes about 90 minutes. Fifth, Real Time Reverse Transcription Polymerase Chain Reaction, a technique that can confirm the amount of DNA amplification in real time, is utilized. This takes about two hours. Sixth, when the augmentation reaction is over, the diagnostic specialist takes 30 minutes to analyze and read the results. Finally, the results are reported as positive, negative, or indeterminate (or undecided) and retested if necessary [1, 13, 18, 19].

### **Robust Contact Tracing System of COVID-19**

The Korean government is undertaking vigorous measures to trace those who were in contact with confirmed patients, by tracking down their credit card transactions, CCTV

recordings, and GPS data on their mobile phones when necessary. Anonymized information is disclosed to the public so that those who were in the vicinity of confirmed patients will go through the testing themselves. Those identified through epidemiological investigations are instructed to self-quarantine and monitored one-on-one by staff of the Ministry of the Interior and Safety and local governments. The swift response to the May outbreak in Seoul's nightclub district was also possible through rigorous contact tracing. After lifting strict social distancing measures in May, South Korea saw a surge in COVID-19 cases linked to nightclubs on May 2 which resulted in a total of 277 new cases [1]. The health authority asked all who had visited the clubs at that time to get tested, but there was a very low turnout due to fear of unwanted attention and social prejudice against LGBT groups. The nightclub incident in Korea confirms that contact tracing is difficult to achieve when relying solely on the voluntary participation of citizens.

South Korean government devised five steps in handling new confirmed patients [1]. First, upon identifying a new confirmed patient (including deaths), local public health centers immediately report the case to KCDC and register the case in the Integrated Systems for Disease and Health portal. Meanwhile, any confirmed case through a positive test must be registered on the same day.

Second, if a public health center finds that a confirmed patient needs to be isolated immediately, this is done so at their home, a treatment support center or hospital. The public health center categorizes the severity of the confirmed patient as mild, moderate, severe, or highly severe by measuring the patient's level of consciousness, body temperature and health risk factors. Those placed in the moderate, severe, or highly severe categories are transferred to a hospital for isolation. Mild case patients who do not meet the criteria for hospitalization are isolated and monitored at their home or at a treatment support center.

Third, South Korean government conducts in-depth epidemiological investigations into confirmed patients to identify spreaders and their movements. The investigation is jointly

conducted by the KDCD Rapid Response Team and the local government epidemiological investigation team. The investigation period lasts for a total of 10 days (incubation period + 3 days) before the occurrence of symptoms of the confirmed patients. The investigation includes details of the patient’s daily movements and identifies those with whom they have had physical contact over the previous 10 days by interviewing the patient, reviewing medical records, tracking CCTV, credit card usages, and immigration information to secure as much information as possible. Family members, housemates, and other contacts identified by epidemiological investigation on the patient’s travel and infection routes are put under self-quarantine for the maximum incubation period of 14 days beginning from the day after the date of contact and are monitored on a one-on-one basis by assigned public health officials. On 26 March, the government launched the COVID-19 Epidemiological Investigation Support System, a centralized data collection and multi-agency coordination platform. The system has upgraded the method of contact tracing from manual analysis by epidemiological investigators to automatic analysis, thus significantly reducing the time needed for each case analysis from 24 hours to 10 minutes. Table 3 details the different approaches of epidemiological investigation [1].

**Table 3.** Methods of Epidemiological Investigation <sup>a</sup>

| <b>Methods</b>                          | <b>Description</b>   |
|---|--|
| <b>Interview</b>                        | An epidemiology investigation is done mainly by conducting an interview in person. However, if this is not possible, an interview may be conducted with family, travel companions, or acquaintances. |
| <b>Medical history records</b>          | Additional information may be obtained through patient care and interviews with nursing personnel and access to all medical records.   |
| <b>CCTV</b>                             | If necessary, images and detailed data of the patient's circulation and movement path may be requested.  |
| <b>Credit card &amp; Transportation</b> | If necessary, the route of transportation, etc., credit card, debit card, or prepaid card usage statements may be requested.   |
| <b>Immigration</b>                      | If necessary, immigration records may be requested and checked.  |
| <b>Hospital visit records</b>           | If necessary, health insurance inquiries may be made to check if there is a history of visiting or using medical institutions.   |

<sup>a</sup> According to Korea Centers for Disease Control and Prevention [1]

Finally, the criteria for release from quarantine must meet two criteria. The first is that confirmed patients should show improvement of clinical symptoms such as having no fever without taking antipyretics. The second is that confirmed patients should show two negative results of body temperature tests taken at a 24-hour interval.

## Rigorous Treating System of COVID-19

The Establishment of a Patient Management System. South Korea expanded its infrastructure of infectious and epidemic disease treatment facilities after the MERS crisis. Through an amendment to the law, the government appointed hospitals specializing in epidemic control and prevention in each central and provincial government. Accordingly, the Emergency Medical Act was amended in December 2016 [10]. The measure was to secure screening and isolation facilities for patients suspected of having infectious diseases. Isolation beds in negative pressure rooms were secured by strengthening the standards of hospitals and medical institutions. In September 2016, a control and prevention management fee for infectious diseases was added to insurance premiums [10]. The service compensates the money spent on treatment materials for the prevention of infection and strengthens the evaluation criteria of hospitals and medical institutions in infection control and prevention.

**Table 4.** Patient Management System of South Korea <sup>a</sup>

|                           |   |   |
|---------------------------|---|---|
| <b>Treatment system</b>   | Classify patients based on severity<br>(1) Mild (2) Moderate (3) Severe or (4) Extremely severe case  |   |
|                           | <b>Mild case patient</b><br>isolated and monitored at residences or treatment support centers.  | <b>Moderate, severe, and extremely severe case patient</b><br>immediately hospitalized for treatment. |
| <b>Hospital bed</b>       | <ul style="list-style-type: none"> <li>• Beds at government-designated institutions for hospitalized treatment, regional hub hospitals, and infectious disease hospitals are allocated to confirmed cases.</li> <li>• 60 infectious disease hospitals designated.</li> <li>• Continually securing additional beds.</li> </ul>   |   |
| <b>Healthcare staff</b>   | <ul style="list-style-type: none"> <li>• Recruiting healthcare specialists via a range of channels and methods.</li> <li>• Protecting healthcare staff by self-isolation, infection control services and financial compensation.</li> <li>• Distributing government reserves of protective equipment to local governments and government-designated institutions for hospitalized treatment.</li> </ul> |   |
| <b>Medicinal supplies</b> | <ul style="list-style-type: none"> <li>• Supplying management with empirical therapies and sharing distributor information.</li> <li>• Clinical testing and R&amp;D of vaccines in collaboration with the private sector.</li> </ul>  |   |

<sup>a</sup> According to Korea Centers for Disease Control and Prevention [1]

South Korean government is classifying patients based on severity, and accommodating them accordingly at hospitals or living and treatment support centers according to the aforementioned criteria. The National Medical Center coordinates patient transfers between

cities and provinces when patient beds are in short supply in certain regions (Table 4) [1].

Patients showing mild symptoms are isolated at living and treatment support centers and are monitored by healthcare staff at least twice a day to be readily transferred to healthcare institutions if symptoms worsen, or to be discharged based on relevant standards when symptoms are mitigated (in about three weeks). City and provincial governments designate government-run facilities or lodgings as living and treatment support centers, and provide a relief kit (underwear, toiletries, masks, etc.) and a hygiene kit (a thermometer and medicine) (Table 5) [1].

**Table 5.** Response procedures for suspected cases and PUI cases <sup>a</sup>

| <b>Responses</b>              | <b>Suspected Cases</b>  | <b>Person under Investigation Cases</b> |
|-------------------------------|---|---|
| <b>1. Occurrence Report</b>   | First recognizing agency (medical institution / public health center) |   |
| <b>2. Specimen collection</b> | Screening clinic  | Screening clinic or medical institution |
| <b>3. Authority in charge</b> | Local epidemiological agency  | Screening clinic or medical institution |
| <b>4. Treating method</b>     | Self-isolation / treating center                                      | Health education                        |
| <b>5. Patient transfer</b>    | Own car / on foot / ambulance (info: screening clinic)                | Refrain from public transportation      |
| <b>6. Quarantine notice</b>   | 1) verbal notice 2) written notice                                    | -                                       |
| <b>7. Quarantine release</b>  | Local epidemiological agency  | -                                       |
| <b>8. Financial Support</b>   | Testing and quarantine costs  | Testing costs                           |

<sup>a</sup> According to Korea Centers for Disease Control and Prevention [1]

<sup>b</sup> Prior to notification of test results, the institution that performs the evaluation and testing will provide basic guidance regarding transportation, public health education, etc.

To support patient care and infection control for different regions, South Korean government is aggressively recruiting healthcare specialists through different channels such as requesting staff members from other institutions and stationing them at healthcare institutions in need, which are mainly based in Daegu City and Gyeongbuk Province. To secure additional healthcare staff, South Korean government posted an urgent recruitment announcement for doctors, nurses, clinical pathologists, and field safety managers for the treatment of COVID-19 patients. In addition, South Korean military provided active medical support by dispatching 300 military doctors and nursing officers. Seven hundred and fifty new public doctors have been appointed and stationed. Meanwhile, nurses are continually being recruited. After COVID-19 patient care, health care workers are not required to

self-quarantined. If a health care staff member wishes to self-quarantine, the government puts them under paid (65-75% of the normal work salary) self-quarantine for two weeks to protect them, and replaces them with another member of staff, thus providing infection control services as well as financial compensation. Furthermore, South Korean government has distributed its reserves of protective equipment to local governments and government-designated institutions for hospitalized treatment, with priority given to Daegu City and Gyeongbuk Province.

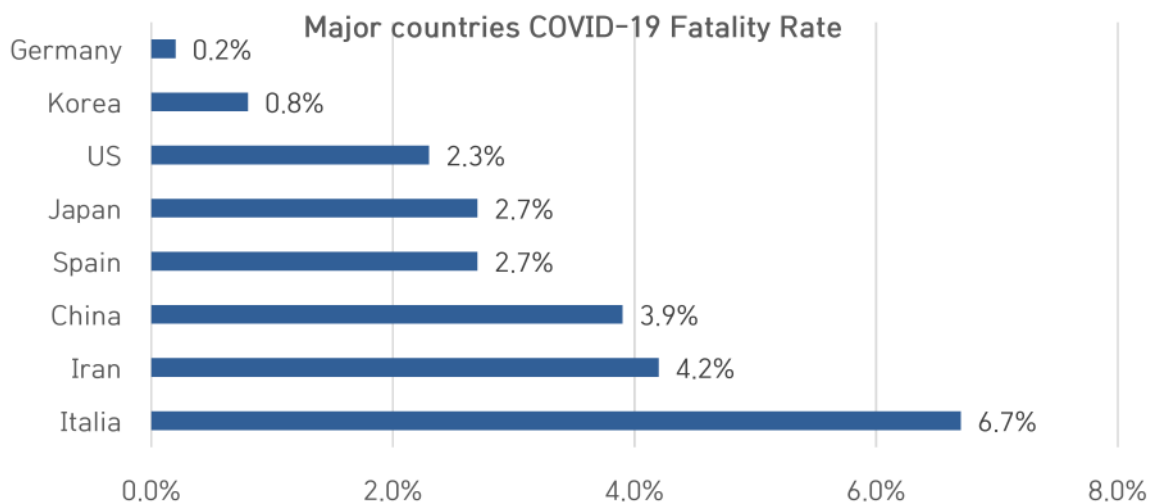
**Realignment of Healthcare Institution Use System.** South Korean government is trying to ensure hospital accessibility and safety for non-COVID-19 patients by designating separate areas for respiratory patients and non-respiratory patients. As of March 27, 337 hospitals were designated non-respiratory diseases hospitals in which COVID-19 patients were not treated. In addition, South Korea government has permitted non-respiratory patients to receive counseling and prescriptions by phone or proxy to prevent the spread of infection within healthcare institutions. Pneumonia patients are put through diagnostic testing before entering an intensive care unit to detect confirmed cases before they lead to infection. Suspected cases are required to undergo testing in a separate area before being allowed to enter the emergency center.

To reinforce infection control within healthcare institutions, South Korean government is providing infection control guidelines to healthcare institutions and focusing on expanding cooperation and communication in healthcare circles. Healthcare institutions are required to provide patients with guidance on hygiene, restrict the entry of visitors and adhere to visiting conditions, check each visitor's body temperature, and mandate the wearing of masks. Staff members must wear masks while on duty and immediately report to public health centers if a patient falls into any of the predefined categories. Staff members are excused from work for 14 days if they show any signs of illness.

### THREE PREREQUISITES TO FIGHT COVID-19

In response to the COVID-19 outbreak, it is important for governments to have well-functioning healthcare governance to implement the Test-Trace-Treat capabilities. If a country emulates South Korea's response against COVID-19, can it successfully overcome the virus and reduce the number of fatalities (Figure 4) [1]. Active testing, epidemiological investigation of confirmed patients, and effective treatment are crucial to curbing COVID-19, but there are important prerequisites in the medical, industrial, technical, and political factors that are required. South Korea's response to COVID-19 requires a good understanding of three basic requirements [1].

**Figure 4.** COVID-19 Fatality Rate among Major Countries as of April 8, 2020<sup>a</sup>



<sup>a</sup> According to Korea Centers for Disease Control and Prevention [1] and Johns Hopkins Coronavirus Resource Center [18]

Abbreviation : COVID-19, 2019 Coronavirus Disease

Fatality rate : the number of deaths divided by the number of confirmed cases

First, it is crucial that the government responds quickly to the spread of COVID-19. In the case of South Korea, more than 20 experts in the field of infectious diseases gathered in a conference room in Seoul on January 10, 2020 to discuss matters. It was at the time when the cause of the cluster of pneumonia cases reported in Wuhan, China was still unknown to the outside world. Until then, no deaths from COVID-19 were reported in China. South Korean experts at the time discussed methods to secure the country's diagnostic capabilities for novel COVID-19. In early February, South Korean government approved COVID-19

testing kits promptly. In addition to South Korean health authorities, various government agencies have been cooperating organically and efficiently to respond to COVID-19 as 'one team' [1].

Second, one of the secrets responses to COVID-19 is that South Korea has a high level of information and communication technology (ICT) capabilities. It can be said that a novel approach is needed to combat the spread of the novel virus. South Korea possesses the latest ICT capacities and infrastructure. In particular, South Korea is a leader in high-speed Internet, 5G mobile network, and optical cable penetration. South Korea responds to COVID-19 by utilizing various and innovative ICT technologies including COVID-19 infection tracking, testing, the dissemination of patient movement information, the identification of infected contacts, and smart phone self-quarantine and self-diagnosis apps. Through these ICT capacities and infrastructure, epidemiological investigators have automated the collection, processing, and analysis of contact tracing information and significantly reduced the time needed for each case analysis from 24 hours to 10 minutes [12].

Third, an effective response to COVID-19 was possible due to the successful partnership between the general public and state authorities. South Korea has avoided the phenomenon of panic buying since the emergence of COVID-19. South Koreans voluntarily wore masks to reduce the possible spread of the disease and also voluntarily underwent COVID-19 testing once they were informed of having had contact with people infected with the virus. Without this mature sense of citizenship, South Korea's measures against COVID-19 could not have delivered such successful outcomes.



## CONCLUSION

This paper discusses the COVID-19 outbreak in South Korea from January to April 2020 and the health and quarantine response of the South Korean government. After peaking at 909 cases on 29 February, the number of new cases per day has steadily decreased to double digits, starting from 15 March and eventually to single digits on 19 April. South Korean case provides policy implications for health and quarantine experts and government officials around the world that are useful in responding to the initial COVID-19 outbreak and flattening the virus spread curve. However, there are also clear limitations of South Korea's response. South Korean approach to COVID-19 may be difficult to emulate even for countries with advanced health and medical institutions and professionals like the U.S. and the U.K. but provides important policy implications for developing countries and needs for strengthening three core competencies.

First is the speedy and swift action in response to COVID-19. Just one week after the first case was confirmed in South Korea on January 27, government officials summoned representatives of major medical companies. By the end of January, KCDC had approved one company's diagnostic testing kit. A testing kit of another company was also approved soon after. The second action can be summarized as the 3Ts: 1) agile testing, 2) contact tracing and 3) rigorous treating. As of April 12, South Korea had identified over 10,512 confirmed cases of COVID-19 by testing 514,621 people [20, 21]. The third action is public-private cooperation and civic awareness. The high level of civic awareness and voluntary cooperation like adhering to personal hygiene measures such as the wearing of face masks, observing self-quarantine measures, and maintaining social distancing are crucial factors in fighting against COVID-19.

COVID-19 is an on-going pandemic. Many countries still haven't tackled the initial outbreak, and most are still enforcing high levels of social distancing and lockdown measures. Meanwhile, some countries are concerned about the upcoming second wave. It

could be said that we might be “sleeping with the invisible enemy” for quite a long time still to come. In this regard, further research on the COVID-19 response to the following topics seems both relevant and necessary.

The first issue is contact tracing and the protection of privacy. In South Korea, digital contact tracing was possible after the 2015 MERS outbreak through a revision to the Contagious Disease Prevention and Control Act (CDPCA). The revised CDPCA overrides certain provisions of the Personal Information Protection Act (PIPA) and other privacy laws and gives sweeping power to authorities to collect, profile, and share personal location information for epidemiological investigation. However, most countries do not have this legal framework nor power due to the protection afforded to privacy. After COVID-19, the issue of finding a suitable balance between the collection of personal information and the protection of the privacy of an infected individual will become important in the academic, political and political agendas of many countries.

The second issue is the reopening of the economy and the loosening of social distancing measures. Strong lockdown and social distancing measures have been successful in limiting the spread of COVID-19 and flattening the curve. However, there are significant economic, social, and political costs and consequences. The global economy expects to face its biggest crisis since the Second World War (reference). In countries that have recently relaxed social distancing, the spread of COVID-19 is again on the rise. So now, many are asking the following: when and how can we reopen our economies and get back to normal life?

And the third issue is preparing for the second wave of COVID-19. In South Korea, the average number of new cases per day had fallen to 6.4 in the first week of May with strong social distancing and adherence to the 3Ts. However, after the loosening of social distancing, it increased again to 43.6 in the last week of May and the first week of June with a small outbreak at the regional level. Anticipation of the second wave of COVID-19 will remain a major concern for all countries for the time being.

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