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# Risk governance, resilience, and response against COVID-19 in the Republic of Korea

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## 1. Introduction

The outbreak of the novel coronavirus—officially called the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)—has become a global pandemic (colloquially known as COVID-19), with severe health, societal, economic, and political implications. As of March 31, 2021, 128,791,795 confirmed cases of COVID-19 have been reported globally ([Johns Hopkins University, 2020](https://doi.org/10.1016/B978-0-323-99277-0.00022-X)), including 2,821,266 deaths, with a fatality rate of approximately 2.19%.

Many countries have taken various measures to tackle this unprecedented threat, ranging from blanket entry bans or locking down entire cities to keeping borders and societies open. The Republic of Korea (hereafter “Korea”) has responded to COVID-19 through a tapestry of measures aimed at improved transparency, governance, extensive use of innovative technologies, and informed citizenship. A month after the first confirmed case was reported on January 20, 2020, Korea faced an unanticipated crisis. The number of new confirmed cases started increasing rapidly soon after the 31st confirmed case was reported on February 19 in Daegu City, followed by a peak on February 29, 2020. However, Korea was successful in flattening the epidemic curve by the end of March 2020. A moderate-scale second wave of the pandemic started in August of the same year; however, that was also managed well. The third wave, beginning in mid-November, was much more severe. A total of 1030 new cases were reported on December 13, 2020, exceeding 1000 for the first time, followed

by a serious situation involving a persistent number of about 1000 confirmed cases daily for more than 20 days. However, Korea overcame this crisis too and has since been taking various proactive measures to return society to the path of normalcy.

This chapter investigates the various disaster risks faced by Korea from January 2020 to March 2021 and describes the measures used to deal with COVID-19 from the perspectives of risk governance, resilience, and response management. First, the authors explored Korea's infectious disease response system, centered around the standard risk management manual and national crisis warning system. Next, the disaster risks caused by the novel coronavirus and the countermeasures taken by the Korean authorities and citizens were identified based on risk-related data extracted from the official database and the press briefings of the Korean government and various news media for the period January 2020 to March 2021. Finally, the authors highlighted the key findings and proposed recommendations for the enhancement of the national response system against infectious diseases.

## **2. Korea's infectious disease response system**

Korea has dealt with various types of epidemics in the past.<sup>1</sup> One precedent for an infectious disease manual is the *Shinchanbyeokonbang* written by Jun Heo in 1613, a book about an epidemic that swept the Joseon kingdom between 1612 and 1613. The guidelines in the book, emphasizing leadership, community effort, and medical technology as key tools for responding to infectious diseases, are still applicable today to overcome a crisis such as COVID-19. Korea also experienced the severe acute respiratory syndrome (SARS) in 2003, Influenza A Virus subtype (H1N1) in 2009, and the Middle East respiratory syndrome (MERS) in 2015. Korea's response manual against infectious diseases has been continually improved based on the lessons (Kim & Sohn, 2018) and knowledge gained while dealing with each epidemic, including the establishment of screening centers, quarantine treatment of suspected patients, and an assigned one-on-one system to monitor the self-quarantined (Lu et al., 2020; Oh et al., 2018). All the manuals explain the roles and responsibilities of each authorized agency and describe a stepwise approach based on the crisis level—Blue (Level I), Yellow (Level II), Orange (Level III), and Red (Level IV). As per the Infectious Disease Standard Risk Management Manual (Standard Manual), a crisis warning is gradually upgraded through the “Blue-Yellow-Orange-Red” phases based on the severity level of the infection's spread. Additionally, emergency response institutions coordinate their actions according to the crisis alert level; these include the Central Disease Control Headquarters (CDCHQs) led by the head of the Korea Centers for Disease Control and Prevention (KCDC) or the Korea Disease Control and Prevention Agency (KDCA),<sup>2</sup> the Central Disaster Management Headquarters (CDMHQs) led by the Minister in the Ministry of Health and Welfare (MoHW), and the Central Disaster and Safety Countermeasures Headquarters (CDSCHQs) led by the Minister of

<sup>1</sup> According to the Annals of the Joseon Dynasty, a statewide record of significant events from 1392 to 1863, there are more than 1000 records of epidemics in the Joseon Dynasty.

<sup>2</sup> On September 12, the KCDC became an independent agency and was renamed as the Korea Disease Control and Prevention Agency (KDCA). To avoid confusion, the authors will continue to use the term “KCDC” to refer to this agency hereafter, not “KDCA.”

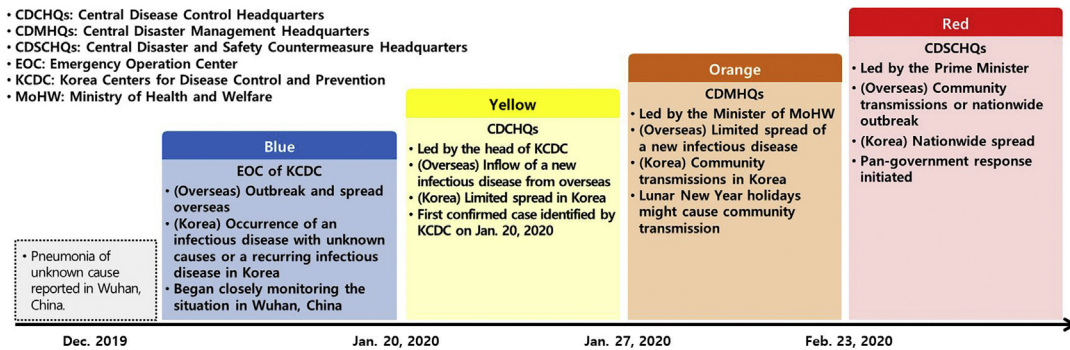


FIGURE 9.1 National crisis alert levels and corresponding emergency response institutions. Prepared by authors using the infectious disease response manual.

the Ministry of Interior and Safety (MoIS) or the Prime Minister (Fig. 9.1). In addition to the manual, when a new coronavirus emerges, the KCDC develops and distributes a standard operating procedure entitled “New Coronavirus Infectious Disease Response Guideline,” to ensure that all medical and other institutions work in unison.

Korea’s COVID-19 response has been led by the CDSCHQs chaired by the Prime Minister while the KCDC served as the command center to prevent and control infections. The Minister in the MoHW served as the first Vice Head of the CDSCHQs as well as the Head of the CDMHQs for pan-governmental cooperation. In addition, the Minister of MoIS, as the second Vice Head of the CDSCHQs, had the responsibility of monitoring and managing self-quarantined people, arranging temporary accommodations for inbound travelers, and coordinating other central ministries’ support and local governments’ countermeasures. Each regional and local government operates its own emergency response institution, referred to as the Regional Disaster and Safety Countermeasures Headquarters, lending regional know-how and efficacy in various emergencies, including those involving infectious diseases. These institutions’ organizational charts related to COVID-19 management are presented in Fig. 9.2.

### 3. Korea’s response to COVID-19

The authors categorized Korea’s response process against various risks triggered by COVID-19 into five phases (Fig. 9.3).<sup>3</sup> Phase I began with the detection of pneumonia cases of unknown etiology (unknown cause) in Wuhan City, China, regarding which the WHO China Country Office was informed (WHO, 2020). The total number of confirmed COVID-19 cases in Korea between January 20, 2020, and February 16, 2020, was 30. Phase II began from February 18, when the number of new cases began skyrocketing in Daegu Metropolitan City and Gyeongsangbuk province (hereafter “the Daegu and

<sup>3</sup> For the categorization, the authors mainly referred to the Korean government’s publication titled “All About Korea’s Response to COVID-19.”

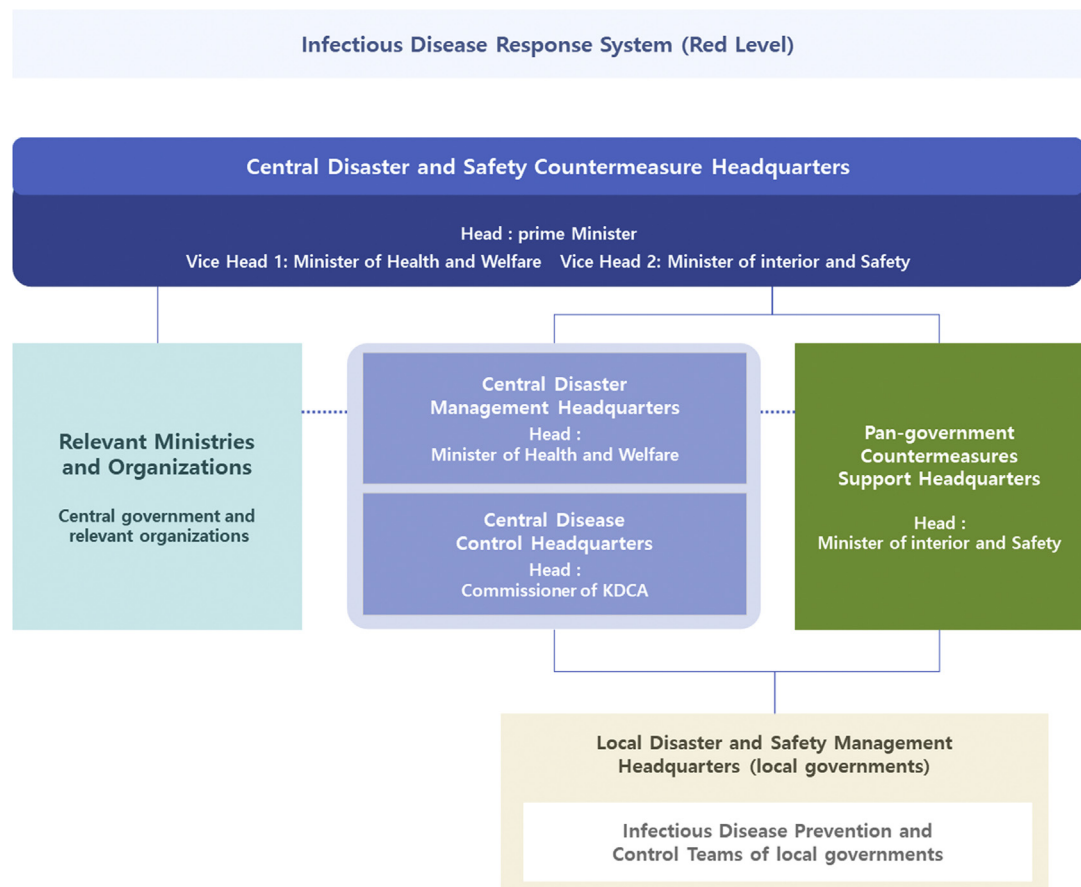


FIGURE 9.2 Emergency response institute against COVID-19, corresponding to the red level. From: <http://ncov.mohw.go.kr/en/baroView.do?brdId=11&brdGubun=111&data%20Gubun=&ncvContSeq=&contSeq=&board%20id=>.

Gyeongbuk regions”), before gradually decreasing March onward, with less than 10 cases reported on May 5, 2020. Phase III, from May 6, 2020, to August 13, 2020, recorded an average of 100 confirmed cases daily. Phase IV primarily reported group infections in multiuse and religious facilities in the Seoul Metropolitan City, Incheon Metropolitan City, and Gyeonggi Province (hereafter “the capital area”) with 441 confirmed cases recorded on August 27. In Phase V, the third wave of COVID-19 created ripples across Korea. The daily number of confirmed cases soared, and from mid-December, more than 1000 confirmed cases were reported around the country.

### 3.1 Phase I: January 1, 2020, to February 17, 2020

In December 2019, rising cases of pneumonia of unknown causes in Wuhan, China, started to alarm health authorities worldwide. On January 7, 2020, a 36-year-old Chinese woman, who had visited Wuhan in December 2019, was classified by the KCDC as the first suspected

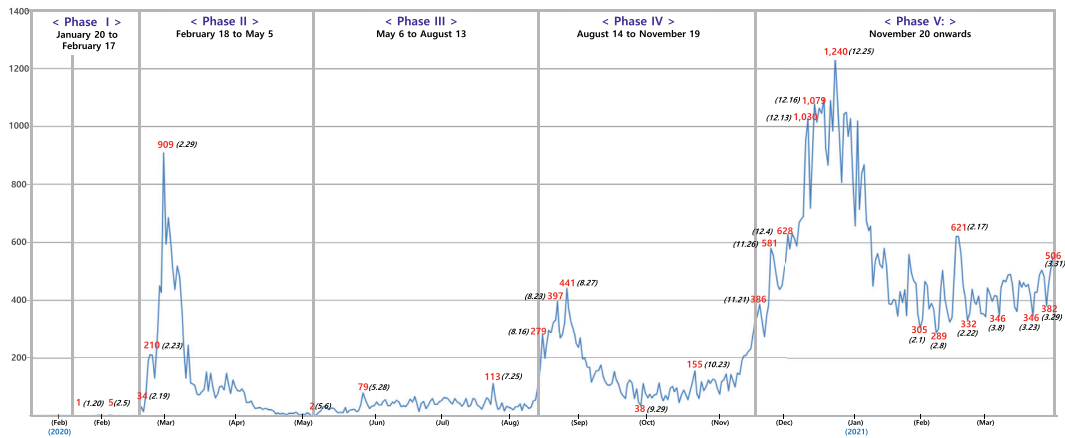


FIGURE 9.3 COVID-19 phases in Korea. Prepared by authors from original KCDC data.

case of a new type of coronavirus.<sup>4</sup> On January 20, 2020, a 35-year-old Chinese woman who had departed from Wuhan was identified as the first confirmed person to arrive at the Incheon Airport National Quarantine Station (Kim et al., 2020). During this period, insufficient information about the novel coronavirus, an influx of infected people from China, and public anxiety made it difficult for the Korean government to respond. Large population movements during the Lunar New Year holidays in January were also suspected of causing community transmissions (KDCA, 2020a). The Korean government managed these risks expeditiously by implementing disease manuals and declaring the appropriate national crisis level while closely monitoring the situation in China.

Korea's initial response was quick and was rolled out according to preplanned response manuals. Since the WHO China Country Office was informed of the new pneumonia cases on December 31, 2019, KCDC's Emergency Operation Center began to closely monitor the situation based on the Standard Manual, indicating that a Blue-level alert should be issued when a new infectious disease emerges and spreads in overseas countries. The alert level was raised to Yellow on January 20 and subsequently to Orange on January 27, when emergency response institutions were initiated to take appropriate measures, such as special entry procedures and pan-government engagement (Fig. 9.4). Special entry procedure refers to a system introduced by the Korean government to effectively block the spread of COVID-19 in the country through the entry screening and early detection of confirmed cases among inbound travelers. In addition, as designated in the Standard Manual, the MoHW and the KCDC conducted epidemiological investigations, diagnostic tests, and patient treatments while the MoIS, as a coordination agency, facilitated pan-government support and set up a monitoring system for those in 14-day self-quarantine, in cooperation with the relevant local governments.

<sup>4</sup> A suspected case is defined as a person exhibiting fever (37.5°C or higher) or respiratory symptoms within 14 days of contact with a confirmed COVID-19 patient during the confirmed patient's symptom-exhibiting period. A confirmed case is defined as a person who has been confirmed to be infected with the COVID-19 virus according to the standard diagnostic test, regardless of clinical manifestations (Source: KCDC).





FIGURE 9.4 Special immigration checkpoint operated by the Ministry of Justice. From: *All About Korea's Response to COVID-19*, Page 80.

Second, the Korean government took timely measures right from the beginning of the first stage: operationalizing transparent public disclosure of COVID-19 information, rapidly approving the Real-time Reverse Transcription Polymerase Chain Reaction (RT-PCR) diagnostic kit, and developing a self-diagnosis mobile application. Furthermore, the KCDC and local governments, under the aegis of the Infectious Disease Control and Prevention Act of Korea (IDCP Act) and in agreement with confirmed infected persons, worked on tracing their contacts who could also have been infected, using credit card transactions, closed-circuit television (CCTV) footage, and mobile phone GPS data (Yoo & Hong, 2020). The identified information, except for personal information, was disseminated to the local residents through mobile phone cell broadcasting system (CBS) messages and the local government's homepage (KDCA, 2020b). Locals were alerted so that they could voluntarily report to public health centers if they had been in contact with an infected person. The KCDC ensured that all reporting citizens were tested, by approving an RT-PCR diagnostic kit in 6 h via a fast-track authorization path, in cooperation with the Ministry of Food and Drug Safety (MFDS); simultaneously, it requested all regional health research institutes to conduct an RT-PCR diagnostic test (KDCA, 2020c). Additionally, the MoHW developed a self-check mobile application that allowed inbound travelers to self-evaluate their COVID-19 symptoms (Lee & Yook, 2020) (Fig. 9.5).

Despite these efforts, Phase I was not problem-free. When the Korean government brought Korean nationals residing in Wuhan back to Korea in mid-January and decided to place them in temporary residential facilities under a 14-day quarantine, they had to face fierce opposition from local residents, who were concerned about community transmission. The MoIS secured local residents' approval by ensuring that the Wuhan returnees would adhere to

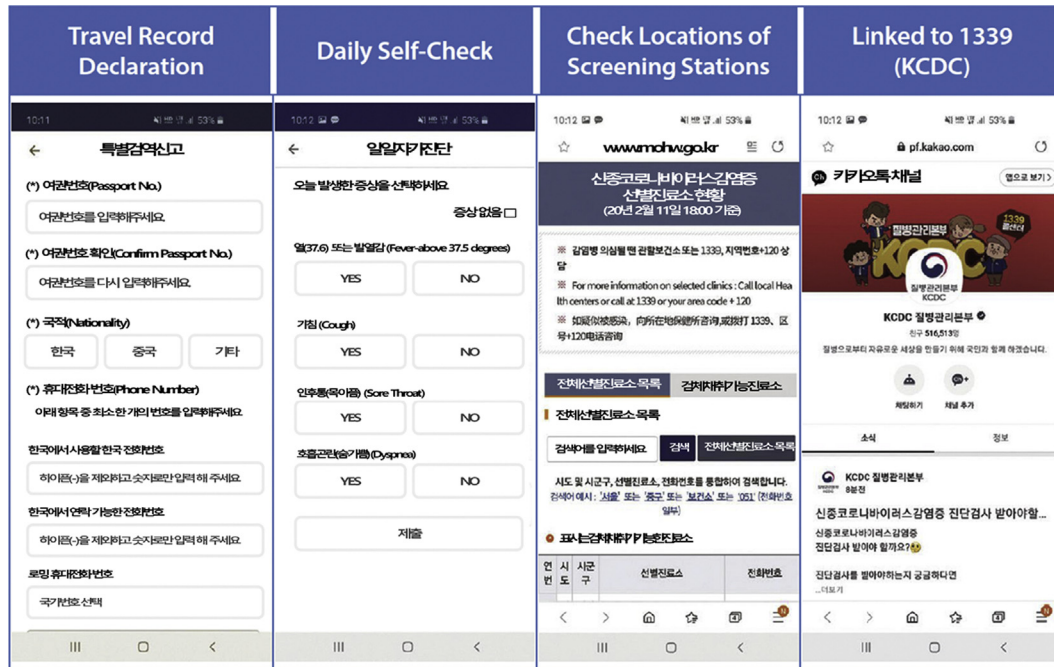


FIGURE 9.5 Self-check mobile app screens. From: *All About Korea's Response to Covid-19*, Page 84.

the quarantine rules through self and administrative monitoring. Another issue was the surge in calls from citizens enquiring about the new coronavirus. The “1339 Call Center” operated by KCDC was ill-equipped to handle the massive volumes of calls, resulting in further complaints from citizens. However, the KCDC resolved the issue quickly by increasing the number of call center employees.

### 3.2 Phase II: February 18, 2020, to May 5, 2020

On February 19, 2020, the total number of newly confirmed COVID-19 cases was 34, compared to the 30 confirmed cases reported from January 8 to February 18. The number started to increase rapidly, with 909 cases reported on February 28 (KDCA, 2020c)—the highest in a single day during Phase II. Subsequently, the number of confirmed cases gradually dropped, with 107 cases recorded on March 13, 2020. With government-encouraged social distancing implemented from March 22 through April 5, the daily count of new confirmed cases decreased to less than 30 from April 13 and to less than 10 from May 4 (KDCA, 2020d).

Several unanticipated risks emerged during this period. The count of confirmed cases surged in the Daegu and Gyeongbuk regions following a nationwide religious gathering organized by the Shincheonji Church of Jesus in early February 2020 (Shim et al., 2020). This caused two serious problems: a lack of hospital beds and medical personnel in the Daegu and Gyeongbuk regions and an increase in the demand for face masks, followed by widespread anxiety. As the infected Shincheonji members returned home, Korea faced the



TABLE 9.1 Number of RT-PCR tests and confirmed cases.

Period	1.19–1.25	1.26–2.1	2.2–2.8	2.9–2.15	2.16–2.22	2.23–2.29	3.1–3.7	3.8–3.14
RT-PCR test	70	719	2264	5070	19,406	91,025	87,089	75,101
Confirmed cases	2	10	12	4	528	2887	3691	1028

*Prepared by authors using original KCDC data.*

potential threat of a nationwide outbreak, including sporadic mass infections in the capital area, particularly in business call centers, hospitals, and small local churches. In addition, preventing domestic spread by inbound travelers emerged as another important task for Korea in containing the pandemic.

Korea overcame the crisis without isolating the infected regions by taking proactive countermeasures such as: (a) conducting mass diagnostic tests and providing central support to the affected regions, (b) enhancing mutual aid and participation based on transparency and raising of community consciousness, (c) using innovative medical technologies, (d) taking proactive local action in at-risk regions, and (e) ensuring mandatory self-quarantine along with special entry procedures for inbound travelers using an information and communication technology (ICT)-based smartphone application (Normile, 2020).

First, the Korean government thoroughly investigated the members of the Shincheonji cluster and conducted an average of 10,000 RT-PCR tests per day and quickly identified the infected people. Table 9.1 shows that the number of RT-PCR tests and confirmed cases sharply increased since the middle of February.

Additionally, Korea raised the national crisis alert level to “Red” on February 23 and established the CDSCHQs led by the Prime Minister. The President, after receiving KCDC’s reports and the expert group’s advice, requested that all national capabilities be devoted to cope with COVID-19 (Cheongwadae, 2020). The Prime Minister stayed in the Daegu and Gyeongbuk regions for 3 weeks, mobilizing all available resources to resolve various on-field problems. As follow-up activities, the Daegu City government, in cooperation with the KCDC, acquired the list of Shincheonji members registered in the city and conducted diagnostic tests according to the IDCP Act. The national government provided the necessary support, such as by dispatching medical resources and extending tax exemptions to Daegu City and other severely affected areas. In addition, the KCDC categorized patients into four groups (mild, moderate, severe, and extremely severe) to prioritize medical resources, treating severe patients in designated hospitals and the rest in “Residential Treatment Centers” (Kang et al., 2020). It also established several “Screening Centers” to conduct RT-PCR tests and designated 67 hospitals as centers dedicated to infectious diseases for the exclusive treatment of COVID-19 patients (Peck, 2020).

Second, the extensive use of innovative methods for testing, tracing, and treating contributed to the fewer number of new confirmed cases in late Phase II. Robust diagnostic testing capability—up to 20,000 tests per day—enabled the early detection of confirmed cases, thereby preventing a nationwide spread of the disease. Innovative ways to access the test site, such as drive-through and walk-through screening stations, and open walk-through screening stations at airports, helped reduce the specimen collection time, protect medical staff from contamination, and prevent cross-infections between patients (Lee & Lee, 2020).



FIGURE 9.6 Drive-through screening clinic. From: <https://www.korea.kr/news/policyPhotoView.do?bbsKey=35155>.

Drive-through screening stations (Fig. 9.6) allowed the examinee to complete the entire process from reception to specimen collection within 6 h while remaining inside the vehicle (Lee & Lee, 2020). This method was first pioneered by a private hospital in Korea and the KCDC developed the relevant Standard Operating Procedure Manual and distributed it to the local governments on March 4, 2020.

Third, people from other regions and regional governments also helped the Daegu and Gyeongbuk regions overcome their crises. Doctors and nurses from across the country volunteered to go to the region, managing the surge of COVID-19 patients for more than a month (MOHW, 2020). The regional governments of Gwangju City and Gyeonggi Province also extended hospital services to patients from the Daegu and Gyeongbuk regions, which were experiencing a severe shortage of hospital beds. In addition, the Prime Minister disclosed the opening remarks made at CDSCHQs meetings to the media, seeking public understanding, while the director of KCDC candidly explained the current situation and government measures during daily briefings. This open communication built trust among citizens regarding the government's policies (Kye & Hwang, 2020). According to a survey conducted by HanKook Research from February 28 to March 2, 76% of those surveyed trusted the KCDC (HanKook Research, 2020). In addition, the government publicized COVID-19 precautionary measures via TV broadcasts and other media, and most people around the country supported the fight against COVID-19 by adhering to preventative rules, such as reporting COVID-19-related symptoms, washing hands, and wearing face masks (Kim, 2020).

Fourth, as public concern about COVID-19 increased in the early part of Phase II, the demand for face masks exploded across the country. Although the MFDG had intervened to

quell market disturbances, such as the stalling of sales since early February 2020, it was not able to resolve the explosive nationwide demand for face masks. On March 9, the MFDG implemented a 5-day rotational face mask distribution system, which allowed citizens to purchase two face masks a week on a designated day. Local governments notified citizens of the mask sales time through mobile CBS text messages and urged them to be considerate of more needy people. The MFDG, in cooperation with mask production companies, also gradually increased the public supply of masks. As a result, from mid-March, the problem of mask distribution started to dissipate, with the added benefit of reducing group transmissions.

Fifth, as the pandemic spread globally, the influx of COVID-19 suspected or confirmed cases into Korea rapidly increased. For example, on March 24, 49 of the 100 confirmed cases were domestic and 51 were inbound travelers. Since January 2020, by continuously fine-tuning measures according to the seriousness of the global situation, Korea kept its international airports open without imposing extreme travel restrictions. Initially, only inbound travelers from Wuhan were subjected to the special entry procedures, including health checks; this measure was later expanded to inbound travelers from five European countries (France, Germany, Spain, the United Kingdom, and the Netherlands) on March 15, 2020, and to all countries on March 19, 2020. From April 1, 2020, the Korean government mandated all inbound travelers to enter a 14-day self-quarantine except those on special waivers, such as A1, A2, and A3 visa holders.<sup>5</sup> It also announced that from April 5, 2020, anyone violating the quarantine requirement would be imprisoned for up to a year or would have to pay a maximum fine of 10 million KRW according to the revised IDCP Act. Foreigners violating the requirement would be deported or banned from reentry in accordance with the Immigration Control Act. This requirement imposed a burden on local authorities because the assigned officials had to call or visit the quarantined people regularly (MoIS, 2020). However, the MoIS solved this problem by developing a smartphone application through which the GPS location of the self-quarantined person could be tracked with their consent, and a warning message could be sent to a dedicated official if the concerned person left his or her residence without approval. All inbound travelers were mandated to download the app on their smartphones from April 1, 2020. Doing so helped local officials monitor the status of self-quarantined people.

Finally, the Korean government devised measures for events that posed a risk of mass infection, such as the National Assembly election held on April 15, 2020. Various methods for safe voting were implemented—for example, maintaining a 1-meter distance between voters, using disposable plastic gloves, and installing a disposable box at polling stations. In addition, after consulting frontline teachers, educational administrators, educational organizations, and after a direct dialogue with citizens, the Ministry of Education (MoE) announced on March 31, 2020, that all primary, secondary, and special schools nationwide would begin online classes from April 9, 2020. The Prime Minister mentioned that further delay in starting school would not only sacrifice children's right to learn (Choe & Choi, 2020), but also

<sup>5</sup> The A visa is for Diplomatic Service; A1 for Diplomacy, Diplomatic officers and their families; A2 for Public Service, Officials of foreign governments or international organizations and their families; A3 for Agreement, USFK active duty and reserve service; and A3\_1 for US military personnel. US military personnel in Korea, invited contractors, family members, etc. (A3\_2), Other Agreements (A3\_99) (Source: "Integrated Guidance Manual by Stay Qualification" (<https://hikorea.go.kr>)).

jeopardize Korea's future. The Korean government also took this opportunity to bridge the digital divide and provide equitable education to the vulnerable (CDSHQs briefing, 2020). Following up, the MoE provided smart devices to needy students and temporary wireless access in all classrooms. Many problems occurred during the early stage of the implementation of online classes, such as connectivity issues and the temporary shutdown of the Korea Education Broadcasting System (EBS) homepage due to a surge in usage. The Korean government, in cooperation with IT corporations and EBS, resolved these issues quickly, while extending the requirement of enhanced social distancing to April 19, 2020, in order to provide a safer environment for students.

### 3.3 Phase III: May 6, 2020, to August 13, 2020

From May 8 through mid-June 2020, the number of confirmed cases remained steady between 10 and 100 owing to ongoing government intervention (KDCA, 2020e). Nonetheless, the cases started increasing from mid-June; 113 new confirmed cases were recorded on July 25, 2020 (KDCA, 2020f). The government responded by enhancing the disinfection management system for inbound travelers, resulting in an average daily case load of 36 from July 26 through August 13, 2020.

In this phase, a mass infection occurred at entertainment facilities in Itaewon, during the national holidays in early May. Conducting an epidemiological investigation was very difficult as visitors to the entertainment facilities were reluctant to reveal their identities. Additionally, the summer holiday season from July through August witnessed a rise in travel, regional movement, and the number of beach users, which further increased the infection risk in vulnerable areas, such as high-density living facilities and large gathering shelters, due to a heat wave and damage from a storm and flood.

To deal with this rise in cases, first, measures for preventing mass infection at public facilities were formulated. Considering that people were reluctant to identify themselves, the government implemented anonymous diagnostic testing and predicting that such cases would occur in the future. Fig. 9.7 the KI-PASS (digital customer register and QR code-based entry logs) system, which was introduced on June 9, 2020, centering around mass-use facilities for entertainment, sports, study, religion, and so on (Yang et al., 2020).

Second, social distancing was systematized, and a plan for the revitalization of the local economy was prepared. Enhanced social distancing was executed in the capital area from late May through mid-June 2020. On June 28, the multiple names for physical distancing were unified as "social distancing," which was implemented by dividing it into Phase I to III according to the severity of the pandemic and the intensity of preventive measures. Although deemed one of the most effective measures for preventing the spread of COVID-19, social distancing was linked to an economic slowdown, including reduced consumption and increased job losses. Thus, for the revitalization of the local economy, the government introduced emergency coronavirus relief funds for the needy (Fig. 9.8), through local gift certificates or electronic money transfer (Government of the Republic of Korea, 2020).

Third, the government had already predicted the risk of a rise in COVID-19 infections due to an increase in regional movement and users of waterside excursions. Thus, it prepared and promoted relevant guidelines so that people could enjoy a safe holiday. In addition, the CDSCHQs recommended that groups vulnerable to heatwaves—common during summers—





FIGURE 9.7 : The introduction of electronic access register (KI-PASS) using QR code. From: <https://www.korea.kr/news/policyPhotoView.do?bbsKey=37335>.

should utilize green spaces like neighborhood parks, rather than staying at indoor cooling shelters with high population densities.

### 3.4 Phase IV: August 14, 2020, to November 19, 2020

In Phase IV, the number of mass infections increased because of rallies and religious events in the capital area. On August 14, 2020, the number of daily new cases exceeded more than 100, and 279 new cases were reported on August 16 with a peak of 300 cases on August 21. The number of patients started gradually decreasing to fewer than 100 from September 26, 2020. Accordingly, the government adjusted the nationwide social distancing level to Level 1 from October 12, 2020. However, the number of confirmed cases increased to 100 per day at the end of October and to 200 in mid-November due to mass infections at vulnerable facilities, such as convalescent hospitals and indoor sports facilities (KDCA, 2020g, 2020h).

This phase saw large-scale gatherings, religious ceremonies, and meetings of families and friends during national harvest holidays like Chuseok, resulting in community transmissions and mass infections at convalescent hospitals, gyms, and local churches. Additionally, the advent of winter posed the joint risk of seasonal influenza and COVID-19. The government took the following measures to address this risk.

First, social distancing regulations were strengthened according to the risk level. As the number of confirmed cases in the capital area continued to increase, especially in religious facilities and convalescent hospitals, the government raised the social distancing level in the capital area and across the country to level 2 on August 19 and August 23, 2020, respectively. On November 7, 2020, social distancing was subdivided into stages from 3 to 5 in order to respond to various risk situations in more detail.



FIGURE 9.8 Emergency disaster subsidies paid to revitalize the local economy. From: <https://www.korea.kr/news/policyPhotoView.do?bbsKey=36123>.

Second, the command center for responding to COVID-19 was reinforced. On September 12, 2020, the KCDC, previously a part of MoHW, became an independent agency, like the KDCA. In addition, to prepare for the simultaneous outbreak of influenza and COVID-19 during the winter season, the list of beneficiaries of the free influenza vaccination was expanded (KDCA, 2020i) (Fig. 9.9).

Third, the government intensively checked adherence to quarantine rules at high-risk facilities. Considering that COVID-19 could spread rapidly around the Autumn holiday season, the government conducted onsite inspections to investigate whether the quarantine regulations were being followed at vulnerable facilities, such as call centers, nursing hospitals,





FIGURE 9.9 Hoarding specifying the mandate to wear a mask. From: <https://www.korea.kr/news/policyPhotoView.do?bbsKey=37538>.

and small churches (KDCA, 2020j). As a strict precaution, once a facility was found to have violated quarantine regulations, the “One Strike Out System” was applied, under which the facility was immediately closed or a severe fine was imposed (KDCA, 2020k).

### 3.5 Phase V: November 20, 2020, onward

In Phase V, the confirmed cases were largely owing to daily life events such as gatherings of family and friends, as well as crowding at schoolrooms, workplaces, restaurants, and religious facilities. The government officially announced a nationwide outbreak of COVID-19 on November 20, 2020. From November 20 to November 25, an average of 344 daily cases were reported. From November 26, the number of cases started to increase rapidly, with 1030 cases reported on December 13, 2020, and a peak of 1240 cases on December 24. The number of confirmed cases began to decrease gradually after that, and by mid-January 2021, the daily average was around 500 cases. The number of people who died due to COVID-19 in Phase V accounted for about 40% of the total number of deaths from January 20, 2020, to January 15, 2021 (KDCA, 2020l). Apart from the increased risk of community transmission, other risks emerged, such as a lack of hospital beds, an increase in the number of confirmed cases of unknown infection transmission, an increased risk of a COVID-19 mutant virus entering Korea, and large population movements in terms of students taking college entrance exams.

Despite the government announcing the nationwide outbreak of COVID-19 and taking strong preventive measures, contagion spread. With the sharp increase in the number of patients in the capital area, and despite the elevation of the social distancing level to Level 1.5 on November 19, 2020, the number of cases rose to more than 300 on 5 successive days. In response, the government officially acknowledged a third wave of COVID-19 on November



FIGURE 9.10 Declaration of emergency stop period for Seoul's 10 million citizens. From: <https://www.korea.kr/news/policyPhotoView.do?bbsKey=38735>.

22, 2021, and elevated the social distancing level in the capital area to Level 2. Since the number of COVID-19 cases did not decrease, the government further raised the level in the capital area to Level 2 and 2.5, for other regions on December 8, 2021 (KDCA, 2020m). In Seoul, where the number of cases had increased sharply, the government declared an “Emergency Pause Period for 10 Million Citizens” on November 26, 2021, and implemented preventive measures equivalent to Level 3 social distancing. Additionally, on December 14, 2020 (Fig. 9.10), the government started to operate temporary screening clinics to provide anonymous testing. This temporary screening center was later found to be very effective in identifying confirmed cases with unknown transmission (KDCA, 2020n) (Fig. 9.11). People who were reluctant to reveal their personal information used these new facilities, which greatly prevented them from unintentionally infecting others.

Second, the government made efforts to prevent the spread of COVID-19 during college entrance exams, requiring students to take their exams at dedicated test centers. The government moved senior high school students from the offline learning mode to online learning at home to manage the disinfection of the sites for the College Scholastics Aptitude Test (CSAT) held on December 3, 2020 (KDCA, 2020o). From December 2, 2020, the test-takers underwent COVID-19 diagnostic tests on priority. If an infection was confirmed, they were notified to self-quarantine and their examination centers were separately assigned to provide them with a chance to take the test.

Third, after a sharp increase in the number of cases, the government recognized the importance of equipping a large number of treatment facilities for serious patients. Accordingly, it mandated large general hospitals and national university hospitals to secure at least 1% and more than 1% of the number of permitted hospital beds, respectively, for treating serious COVID-19 cases. This mandate was also applied to private general hospitals (MOHW, 2020).



FIGURE 9.11 Establishment of a temporary screening center for COVID-19 and voluntary inspection. *From: <https://www.korea.kr/news/policyPhotoView.do?bbsKey=39113>.*

Fourth, it strengthened preventive measures to check the inflow of a COVID-19 variant into Korea. At the end of December, in the Republic of South Africa, a spike protein receptor-binding domain (RBD) mutant of COVID-19 virus was reported. Thus, the government took measures for monitoring and screening inbound travelers from the countries where this COVID-19 variant had originated (KDCA, 2020p).

## 4. Findings

### 4.1 The principles of openness, transparency, and citizenry participation

Korea's successful response to COVID-19 was based on the principles of openness, transparency, and citizenry participation. The government openly held public discussions and shared information on all disease-control measures, conducted fast diagnostic checks and epidemiological investigations, and managed the situation without imposing travel limits or blockades. This openness and transparency were particularly effective for the implementation of social distancing—a key feature of Korea's control measures—for curbing the transmission of COVID-19. In addition, people voluntarily wore masks and actively practiced social distancing, thus contributing individually and collectively to disease control measures.

### 4.2 Three-T strategy of testing, tracing, and treatment

The Korean government's rapid response to COVID-19 was made possible through strong diagnostic testing capabilities, contact tracing using ICT tools, and rigorous treatment, labeled the Three-T strategy. This was made possible through technological innovation and extensive use of ICT tools, along with an enhanced security protocol for data protection.

Specifically, the RT-PCR diagnostic kit helped medical doctors and health authorities receive the test results within 6 h. These rapid results can be attributed to the Emergency Use Authorization System, which shortens the approval period for vital medical supplies from 1 year to a month during emergency situations. In addition, innovative methods to access testing sites helped medical staff and suspected cases in administering and taking, respectively, the diagnostic tests safely. These methods included drive-through centers and walk-through test booths and testing sites at Incheon Airport, providing simultaneous diagnostic testing for inbound passengers as well as numerous other people. The ICT-based Quarantine Information System enabled public officials to identify people coming from high-risk regions and monitor them during the incubation period of the infection. Mobile phone data, credit card records, and CCTV footage were utilized by government authorities and the KCDC in order to locate people who may have encountered a confirmed case. Various apps were developed for self-isolators and self-quarantined people to promote self-diagnosis and for identifying their locations. Some local governments also applied Artificial Intelligence technology to conduct a regular check of self-quarantined persons. These methods proved that a national crisis like COVID-19 can become an opportunity for technological innovation.

### 4.3 Political leadership in crisis situations

The leadership of politicians and administrators played a critical role in combating COVID-19 in Korea. The President, Prime Minister, and the head of KCDC proved that identifying emerging risks and related issues, making evidence-based decisions, and unifying administrative efforts through democratic processes are essential features of crisis leadership. The President quickly comprehended the crisis and made appropriate decisions based on expert advice. He declared that the national priority was the mobilization of all available resources to prevent the nationwide spread of COVID-19. When confirmed cases rapidly increased in Daegu City in February, the Prime Minister stayed in the region for 3 weeks and addressed on-field issues. He also chaired daily public video conferences along with the relevant ministers, city mayors, and provincial governors. The conferences consisted of situational reports, feedback sessions from participants, and debates about expected problems and solutions. This helped reduce the gaps between the measures prepared by the central government and field implementations. Both the President and the Prime Minister provided the head of KCDC with complete authority to combat the spread of COVID-19. This empowerment enabled all emergency situations to be effectively managed and controlled. During daily briefings, the head of KCDC candidly and sincerely shared information on the current situation and the government's measures with the public. These efforts secured the citizens' trust in the government's response, contributing to Korea's success in its public health efforts to combat COVID-19.

### 4.4 Enhanced infectious disease manual and the quarantine system

The enhanced response manual and the quarantine system, based on the lessons learned from the response to SARS in 2003, H1N1 in 2009, and MERS in 2015, played an important role in facilitating the Korean government's proactive and rapid response against COVID-19. Although the COVID-19 situation presented many new risks compared to past epidemics, the



response plans and quarantine systems developed as a result of past successes and failures, helped each ministry to respond quickly on the basis of delineated roles and responsibilities. For example, the roles of direct response agencies like the KCDC and a coordinating agency like the MoIS were clearly delineated in the Standard Manual. The MoIS took charge of monitoring and managing self-quarantined people, operating temporary accommodations for inbound travelers, and coordinating other central ministries' support and local governments' countermeasures. With this backup, the KCDC was able to serve as the command center to prevent and control infections from spreading. The preplanned response manual may not cover all aspects of emergent risks; however, clearly delineated roles and responsibilities among response organizations can minimize decision errors and mismanagement of resources during the early stages. In addition, Korea's improved quarantine system helped in the early detection of cases through rapid and accurate diagnostic tests, prompt dissemination of related information to those who may have been in contact with the pathogen, and protection of medical staff, along with the physical separation of testing and treatment facilities.

#### 4.5 Understanding the systemic risk of COVID-19

Understanding the characteristics of disaster risks faced by Korea was essential to respond to COVID-19 effectively, which was composed of (a) difficulties in developing appropriate countermeasures due to insufficient information and knowledge about the novel coronavirus; (b) occurrence of mass infections in vulnerable sectors to quarantine; (c) emergence of unanticipated risk through measures taken according to standard manuals or adaptive plans. When the novel coronavirus first entered Korea, the health authorities did not have much information pertaining to this new infectious disease. It subsequently emerged that the virus has a long incubation period and an infected person can pass on the virus even if asymptomatic. However, during the early stage, it was difficult for the patient and even medical doctors to distinguish whether the infected person's symptoms were caused by the coronavirus. Thus, a number of patients with mild symptoms who did not restrict their daily activities might have acted as vectors of infection. For example, the 31st confirmed patient had continued to move around freely for 20 days after being infected. These characteristics of COVID-19—fast, light, and hard to distinguish—made it difficult for the health authorities to cope with it. Another problem faced by Korea was that the novel coronavirus caused infections in places vulnerable to mass transmissions. At places such as the Shincheonji cluster, a business call center, entertainment clubs, and door-to-door sales corporations, neither was the infectious disease prevention and control system well established, nor did most of the infected people follow the preventive rules of maintaining physical distancing and wearing face masks. The other challenge was that the responsive measures by the Korean authorities dynamically affected the initial risk; an improper response measure could amplify a risk, while a countermeasure taken to resolve a problem could cause unexpected risk in other sectors. For example, enhanced social distancing was effective in preventing the spread of COVID-19, but it led to economic regression. Similarly, though moving classes online secured educational opportunities, it created a division among students based on their quality of life because students who could not afford a computer and Internet access faced difficulty in attending online classes.

## 5. Conclusion

In this study, the authors investigated the COVID-19 risks faced by Korea and identified key lessons from the perspectives of risk governance, resilience, and response management. The authors examined Korea's response to the novel coronavirus by extracting risk-related data from official reports by the KCDC and the daily press briefings of the Korean government as well as various news media for the period January 2020 to March 2021. The result reveals that Korea's successful response to COVID-19 relied on keeping the principles of openness, transparency, and citizenry participation as well as adopting the Three-T strategy consisting of strong diagnostic testing capabilities, contact tracing using ICT tools, and rigorous treatment. The leadership of politicians and administrators also played a critical role in combating COVID-19 through identifying emerging risks, making evidence-based decisions, and unifying administrative efforts. In addition, the infectious disease response manual was useful in clearly defining the roles of responsible agencies and avoiding confusion since the earliest stage. Finally, understanding the characteristics of the systemic risk of COVID-19 was essential to respond to COVID-19 effectively. These findings can aid other countries battling COVID-19 in the development of effective response strategies.

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