



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

# Lessons learnt from easing COVID-19 restrictions: an analysis of countries and regions in Asia Pacific and Europe



Emeline Han\*, Melisa Mei Jin Tan\*, Eva Turk, Devi Sridhar, Gabriel M Leung, Kenji Shibuya, Nima Asgari, Juhwan Oh, Alberto L García-Basteiro, Johanna Hanefeld, Alex R Cook, Li Yang Hsu, Yik Ying Teo, David Heymann, Helen Clark, Martin McKee, Helena Legido-Quigley

The COVID-19 pandemic is an unprecedented global crisis. Many countries have implemented restrictions on population movement to slow the spread of severe acute respiratory syndrome coronavirus 2 and prevent health systems from becoming overwhelmed; some have instituted full or partial lockdowns. However, lockdowns and other extreme restrictions cannot be sustained for the long term in the hope that there will be an effective vaccine or treatment for COVID-19. Governments worldwide now face the common challenge of easing lockdowns and restrictions while balancing various health, social, and economic concerns. To facilitate cross-country learning, this Health Policy paper uses an adapted framework to examine the approaches taken by nine high-income countries and regions that have started to ease COVID-19 restrictions: five in the Asia Pacific region (ie, Hong Kong [Special Administrative Region], Japan, New Zealand, Singapore, and South Korea) and four in Europe (ie, Germany, Norway, Spain, and the UK). This comparative analysis presents important lessons to be learnt from the experiences of these countries and regions. Although the future of the virus is unknown at present, countries should continue to share their experiences, shield populations who are at risk, and suppress transmission to save lives.

## Introduction

The COVID-19 pandemic is an unprecedented global crisis. By mid-September, 2020, over 22 million confirmed cases of COVID-19 had been reported worldwide, with almost 930 000 deaths.<sup>1</sup> At least 186 countries have implemented varying degrees of restrictions on population movement to slow the spread of the severe acute respiratory syndrome coronavirus 2 and prevent health systems from becoming overwhelmed; these restrictions have amounted to lockdowns in 82 countries.<sup>2</sup> Although such measures might have saved lives, they have come at a heavy socioeconomic cost. The World Bank's projections point to the deepest global recession since World War 2, with millions of people falling into unemployment and poverty.<sup>3</sup> Lockdowns and other extreme restrictions cannot be sustained for the long term in the hope that there will be an effective vaccine or treatment for COVID-19. Rather, these restrictions give time for countries to reduce the incidence of disease and put in place robust, yet sustainable, measures to prevent and control transmission.

When and how a country should ease restrictions are the common challenges that governments worldwide now face as they seek to balance various health, social, and economic concerns. WHO has warned that a premature lifting of lockdowns could spark a resurgence of infections and cause even more severe, longer-term damage to the economy than exists as a result of lockdowns.<sup>4</sup> Rawaf and colleagues<sup>5</sup> have outlined four public health principles that should be considered in each country's exit strategy: infection status, community acceptance, public health capacity, and health-system capacity. Adapting and building on these principles, we developed a framework with additional components and subcomponents (panel). Using this comparative framework, we examined the measures taken in nine high-income countries and regions that have started to ease restrictions that were imposed in response to COVID-19, which were selected to

provide a range of epidemiological experiences and policy responses. Five countries or regions were in the Asia Pacific region (ie, Hong Kong [Special Administrative Region], Japan, New Zealand, Singapore, and South Korea) and four were in Europe (ie, Germany, Norway, Spain, and the UK). In Asia Pacific, they include countries and regions with and without experience of severe acute respiratory syndrome (SARS) or Middle East respiratory syndrome (MERS). In Europe they include countries that, in the initial wave of COVID-19, were (ie, Spain and the UK) or were not (ie, Germany and Norway) severely affected. In reviewing international experiences, we have been concerned about an apparent absence of clear and

### Panel: Comparative framework for COVID-19 lockdown exit strategies

#### Knowledge of infection status

- Indicators to monitor the epidemiological situation

#### Community engagement

- Safe policies for physical distancing and mask wearing
- Precautionary measures in schools and workplaces
- Communication to secure public trust and cooperation
- Protecting vulnerable populations
- Providing socioeconomic support

#### Public-health capacity

- Testing, tracing, and isolating
- Role of experts

#### Health-system capacity

- Treatment facilities
- Medical equipment
- Health-care workforce

#### Measures for border control

- Inbound travel restrictions

Lancet 2020; 396: 1525–34

Published Online  
September 24, 2020  
[https://doi.org/10.1016/S0140-6736\(20\)32007-9](https://doi.org/10.1016/S0140-6736(20)32007-9)

\*Joint first authors

Saw Swee Hock School of Public Health, National University of Singapore, Singapore

(E Han MSc, M M J Tan MSc, A R Cook PhD, L Y Hsu MBBS, Y Y Teo PhD,

H Legido-Quigley PhD);

Department of Nursing and Health Sciences, University of South East Norway, Drammen,

Norway (E Turk PhD); Medical Faculty, University of Maribor,

Maribor, Slovenia (E Turk);

College of Medicine and Veterinary Medicine, University of Edinburgh, Edinburgh, UK

(D Sridhar PhD); LKS Faculty of

Medicine, The University of Hong Kong, Hong Kong Special Administrative Region, China

(G M Leung MD); Institute for

Population Health, King's College London, London, UK

(K Shibuya DrPH); Asia Pacific Observatory on Health Systems and Policies, World Health

Organization Regional Office for South-East Asia, New Delhi, India (N Asgari MD); College of

Medicine, Seoul National University, Seoul, South Korea

(J Oh PhD); ISGlobal, Hospital Clínic, Universitat de Barcelona, Barcelona, Spain

(A L García-Basteiro PhD); Centro de Investigação em Saúde de

Manhiça, Maputo, Mozambique

(A L García-Basteiro); Department of Global Health and Development

(J Hanefeld PhD, H Legido-Quigley), Department of Infectious Disease

Epidemiology (D Heymann DTM&H), and Department of Health Services

Research and Policy (M McKee DSc), London School of Hygiene & Tropical Medicine,

London, UK; Centre for International Health Protection, Robert Koch

Institute, Berlin, Germany (J Hanefeld); and The Helen Clark

Foundation, Auckland, New Zealand (H Clark MA)

Correspondence to: Dr Helena Legido-Quigley, Saw Swee Hock School of Public Health, National University of Singapore, Singapore 117549 ephhlq@nus.edu.sg

consistent strategies for exiting restrictions. We have identified five prerequisites for easing COVID-19 lockdowns and restrictions: knowledge of infection status, community engagement, adequate public health capacity, adequate health-system capacity, and border controls. We describe how each of these nine countries and territories have addressed these issues. Although it might not be possible or beneficial to replicate the exact same measures in different countries due to varying socioeconomic contexts, countries can consider policy alternatives and novel solutions developed by other countries and calibrate them according to their domestic circumstances and resources.

**Overall approaches**

The timing of the imposition and easing of restrictions in each country has varied (figure 1), as have national responses (table). Countries will, ideally, base decisions regarding easing restrictions on some combination of the epidemiology of infections and the social and economic consequences of restrictions. Whichever combination is chosen, governments should be explicit about their goals and transparent in their decision making, and the measures taken should be parts of a clear overall strategy; however, this is not always the case.

Several countries have produced dashboards of indicators of the factors being considered, such as Japan, which considers the infection situation, the medical-service system, and the surveillance system.<sup>6</sup> Spain has published a panel of indicators, including epidemiological, mobility, social, and economic parameters,<sup>7</sup> although without any explicit weighting in the decision-making process.

There are two broad approaches to decision making. In Singapore, Norway, Spain, and (now for local outbreaks) the UK, politicians, drawing on expert advice, decide when and which restrictions to relax but without explicit

and public criteria. In some cases, the activities to be permitted are set out in advance, as in the Singapore Government’s three phases of reopening, moving progressively from lower to higher risk activities.<sup>8</sup> However, the basis on which risk is estimated is often unclear, with little evidence that the growing understanding of aerosol-related transmission has been considered. The four nations of the UK aligned in their strategy until mid-March, when each nation (England, Wales, Northern Ireland, and Scotland) diverged in their specific approaches and exit from lockdown.

Japan, Germany, South Korea, and, in some cases, the UK are lifting or reimposing restrictions on the basis of epidemiological thresholds. For example, Germany’s Federal Government has placed local authorities in charge of lifting lockdowns in individual states, subject to a so-called emergency brake mechanism that requires any region to consider reimposing a lockdown, if there are more than 50 new daily cases per 100 000 residents for 7 consecutive days. This mechanism has already been triggered in a few districts that had spikes in the number of new cases, many of which were linked to outbreaks in meatpacking plants.<sup>9</sup> Hong Kong adopted a similar suppress and lift strategy since the start of the outbreak, under which restrictions are tightened and relaxed in accordance with the epidemiological situation.<sup>10</sup> However, this approach risks reimposing restrictions for an entire region even when the outbreak is limited to a single factory or small community. The importance of continued surveillance is clear from New Zealand, with its four-level alert system. Having progressed from a full nationwide lockdown at level four in late March, 2020, to minimal restrictions at level one in early June, 2020, New Zealand has now had to revert to level two nationwide and level three in Auckland.<sup>11</sup> Although Singapore, South Korea, and the UK also have alert-level systems, the link to particular countermeasures has not been equally explicit, and it is not clear that the UK’s system is being used.

**Knowledge of infection status**

It seems intuitive that a country should not open up until it has a surveillance system of high quality in place and has confirmed that infections are being suppressed. Unfortunately, as shown in several countries, this principle has often been disregarded.

This principle involves more than producing a national picture; real-time data of high quality are essential to calculate the reproduction number (R) and to ascertain where the disease continues to spread, thereby enabling targeted responses. Authorities in Hong Kong, Japan, Germany, Norway, Spain, and the UK have been reporting estimates of R, which should be safely less than 1 to allow relaxation of restrictions. Since February, 2020, Hong Kong has been estimating its real-time R, the actual transmission rate of the virus, and minimising inaccuracies arising from time lags.<sup>12</sup> Countries and

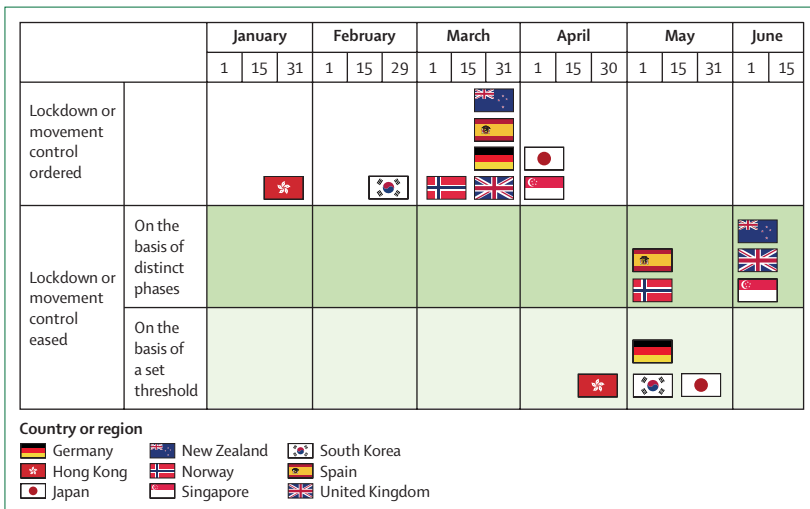


Figure 1: Timeline for imposing and easing of restrictions

regions have varied in their ability to implement effective find, test, trace, isolate, and support systems. Some locations in Asia, such as South Korea and Hong Kong, had systems that functioned well at the beginning of the pandemic, and other countries, such as Germany, were able to redeploy resources, whereas some countries, such as the UK and Spain, have struggled.

### Community engagement

For societies to reopen safely, communities should be fully engaged and empowered to protect themselves from the virus and the effect of the crisis, especially the most vulnerable populations (figure 2). Ideally, authorities should ensure that they fully understand the reality of the situation faced by the people affected by their decisions, drawing on principles of coproduction of policy. Advice should also be consistent and credible.

Messaging around what is considered a safe physical distance between people has been confusing and inconsistent, seemingly drawing on a range of biological and other considerations, such as whether a large distance

would preclude reopening of some facilities. Thus, a 1 m distance is recommended in Hong Kong, Singapore, and Norway; 1.5 m in Germany and Spain; and 2 m in Japan, South Korea, and, until late June, 2020, England. In England, the recommended distance is now at least 1 m, whereas 2 m distance is still recommended in other parts of the UK.<sup>13</sup> In New Zealand, 2 m distance between people is recommended in public spaces and 1 m is recommended in schools and workplaces at high alert levels, but there are no distancing requirements at level one. New Zealand also pioneered a social bubble model that allows a defined group of people to have close physical contact with each other while practising physical distancing rules with others outside that group.<sup>11</sup> According to this approach, what started off as household bubbles under lockdown were slowly allowed to extend to small and exclusive groups of family and friends, and then further allowed to expand and merge with other bubbles. The UK nations have endorsed this idea and started a similar support bubble arrangement since June, 2020.<sup>14</sup>

	Overall strategy	Knowledge of infection status	Community engagement	Public-health capacity	Health-system capacity	Measures for border control
<b>Asia Pacific</b>						
Hong Kong	Suppress and lift strategy	Real-time R estimated and reported since February, 2020	1 m physical distancing and mask wearing practised; despite serious mistrust in government, community has shown a high rate of adherence and built their own collective response to the pandemic	Daily PCR-testing capacity being increased from 4500 to >10 000; police supercomputer system used for contact tracing and electronic wristbands paired with mobile phone apps used to monitor people under quarantine	Second-tier isolation beds and community isolation facilities added to public hospitals; safety measures have been effective in protecting health-care workers from infection	Border closed to visitors; all arrivals must submit a health declaration form online, have temperature screening and testing on arrival, and serve a 14-day quarantine
Japan	Trigger-based approach	One indicator is an incidence rate of $\leq 0.5$ cumulative infections per 100 000 people in the past week	2 m physical distancing and mask wearing practised; citizens are encouraged to avoid so-called 3Cs (ie, closed spaces, crowded places, and close contact); adherence aided by existing social etiquette	Daily PCR-testing capacity is low but is being increased from 6000 tests per day in May to more than 22 000 tests per day; manual tracing done and new mobile phone app introduced in June, 2020	Initially, all patients were admitted but, due to low capacity, hospitals now focus on caring for people who are vulnerable or have moderate or severe disease; people with mild disease and people who are asymptomatic supported at home or at lodging facilities	All arrivals are subject to 14-day quarantine, and travellers from selected countries are denied entry or, if allowed for exceptional reasons, subject to testing
New Zealand	Four-level alert system	No publicly specified indicator	So-called social bubble approach allowed gradual expansion of small and exclusive social groups; no physical distancing required at alert level one	Testing capacity being increased; manual and app-based tracing being done	Efforts being made to increase number of ICU beds and number of staff trained to use ICU equipment	Border closed to most visitors; all arrivals are tested and quarantined for 14 days
Singapore	Three-phase plan	No publicly specified indicator	1 m physical distancing and face covering required; government messages have consistently emphasised individual responsibility, although policy changes have generated some initial public confusion	More than 13 000 PCR tests per day done in June, 2020, with plans to increase to 40 000 tests per day; manual and app-based tracing done	ICUs are well under capacity; to reduce pressure on public hospitals, patients with mild symptoms are transferred to private hospitals or community facilities for monitoring	Border closed to most visitors; all arrivals must submit a health declaration form, serve a 14-day Stay Home Notice, and be tested
South Korea	Trigger-based approach, three-level physical distancing scheme	Level one applies if number of daily new cases is <50, level two for 50–100 cases, and level three for >100 cases	2 m physical distancing and mask wearing practised; government has used transparent communication methods to secure public cooperation, including detailed reporting of new cases via websites, mobile phone apps, and text alerts	Mass testing at a rate of 20 000 PCR tests per day, including at drive-through and walk-through stations; records from medical facilities, global positioning system, credit card transaction history, and closed-circuit television used to supplement manual contact tracing	On the basis of a triage system, people with mild disease or who are asymptomatic are monitored at residential treatment centres; people with moderate or severe disease are cared for at government-designated hospitals	All arrivals must submit a health declaration form, install a mobile phone app, have temperature screening, testing, and 14-day quarantine

(Table continues on next page)

(Continued from previous page)

	Overall strategy	Knowledge of infection status	Community engagement	Public-health capacity	Health-system capacity	Measures for border control
<b>Europe</b>						
England	Three-phase plan	R estimated and reported	At least 1 m physical distancing required, and face covering required in many indoor settings; some controversies have undermined public support for the government	In theory, capacity exists to do >200 000 PCR tests per day but there are major logistical problems; centralised testing and tracing systems heavily criticised and local public health teams taking over some tracing; initial attempt to develop an app failed; Scotland and Northern Ireland have implemented their own apps	Temporary hospitals on standby; routine health services gradually resuming while maintaining capacity for patients with COVID-19	Arrivals from particular countries must provide their journey and contact details, and self-isolate at home for 14 days
Germany	Trigger-based approach	Uses R and 7-day incidence rate per 100 000 inhabitants as indicators	1.5 m physical distancing required, and face covering required where safe distancing not possible; despite initial public support, some fatigue has set in; inconsistent messages and policies across different states have caused public confusion	Continuous scale up of testing capacity to over 150 000 PCR tests per day; manual tracing done and new mobile phone app introduced in June, 2020	ICUs are under capacity; initially, there was a scarcity of protective equipment	People entering or returning to Germany from a country designated as a risk area are required to quarantine
Norway	Long-term timetable with sets of changes on specified dates	R estimated and reported	1 m physical distancing required and masks recommended for adults and young people travelling by public transport where safe distancing is difficult; citizens have generally complied with government advice and requirements; the call to join the collective effort has created a team spirit that is strong	Widespread testing not done; testing reserved for people with symptoms, health-care workers, and vulnerable populations; manual and app-based tracing done	Spare capacity varies between municipalities and hospitals, but the country has had sufficient health-care personnel to manage the local infection situation	Reopened borders to specified Nordic regions with low rates of transmission; arrivals from outside these regions are subject to 10-day quarantine
Spain	Four-phase plan	No publicly specified indicator	1.5 m physical distancing required, and face covering required where safe distancing not possible	As of April, 2020, PCR-testing capacity reached 40 000 tests per day, and capacity has continued to increase	ICUs were over their capacities in many hospitals at the end of March and April, 2020; other hospital wards and spaces have been adapted to accommodate critically ill patients; health workforce has decreased due to high infection rates	Fully reopened borders to all countries from July 1, 2020 (inbound travellers will not be quarantined)

Data have been organised according to the four public health principles developed by Rawaf and colleagues<sup>5</sup> and modified to include additional components suggested in this Health Policy paper. Countries are grouped by region and organised alphabetically. A more detailed table and full data sources are available in the appendix (appendix pp 1–16). ICU=intensive care unit. R=reproduction number.

**Table: Overview of approaches to easing COVID-19 restrictions in nine countries and regions as of September, 2020**

See Online for appendix

An absence of international consensus is especially apparent with respect to face coverings. This difference reflects a combination of cultural norms and evolving evidence for the effectiveness of face coverings, although not helped by scientific inertia in some countries and in WHO. In Hong Kong, Japan, and South Korea, the habit of mask wearing by people with respiratory conditions was already widespread before the pandemic (ie, mainly to protect others from seasonal viruses or as a reaction to air pollution). Other countries have been slower to adopt this practice. After months of counselling the public against wearing face coverings unless they were unwell, Singapore's Government made it mandatory for everyone to wear one outside from April, 2020, and provided reusable cloth masks to the entire population.<sup>15</sup> During the past 5 months, Germany and Spain have made it compulsory to wear a face covering where physical distancing is not possible, such as on public transport or

in shops. In the UK, face coverings are required in many indoor settings, such as in community centres.<sup>16</sup> Norway has recommended face coverings for adults and young people travelling by public transport where safe distancing is difficult. New Zealand has not recommended face coverings for the general public. Mixed messages and policy U-turns regarding face coverings have unfortunately generated public confusion and challenges to adherence in many countries and regions.

Various precautionary measures have been suggested for schools and workplaces. In all countries and regions, there was, at least initially, a push toward working from home as far as possible, while promoting compliance with distancing and hygiene rules for workers who needed to be physically present. In Singapore and South Korea, workplaces must appoint a manager who is responsible for implementing precautionary measures and monitoring employees' health. In Asian countries

and regions, workplaces and schools also practise mask wearing and temperature checking. Schools have largely facilitated a staggered return of students, with different countries and regions prioritising different groups of students. Singapore, South Korea, and Germany started with graduating students attending high schools (eg, aged approximately 15–18 years) to minimise disruption to education. New Zealand, Norway, and England started with younger children, such as children attending primary schools (eg, aged approximately 5–12 years). However, it was not always clear whether the primary focus was the interests of the child or the desire to enable parents to return to work. Hong Kong and Spain also started with older students, such as students attending higher secondary schools (eg, aged approximately 15–18 years), as they are presumably better able to follow complex rules on physical distancing and personal hygiene than are young children. Japan has staggered attendance, starting with graduating cohorts. Countries varied considerably in the extent to which they used the lockdown to prepare schools for reopening and provided resources for online learning.

With few exceptions, such as Germany, New Zealand, Norway, Scotland, and South Korea, political leaders have struggled to secure public trust and thus support for continued lifestyle changes. More generally, countries with female leaders have done better at securing public confidence and adherence to new measures than have countries with male leaders.<sup>17</sup> In England, controversy surrounding a trip made during lockdown by a close adviser to the prime minister has substantially undermined public confidence in the government and support for the measures that it was taking.<sup>18</sup> In Hong Kong, continuing political unrest has substantially eroded public trust in the government, although the community has generally shown a high level of adherence that could be attributable to lessons learnt from the previous outbreak of SARS in 2003.<sup>19</sup> Conversely, the South Korean Government has adopted a highly transparent communication strategy to gain public participation by disclosing detailed information of patients who are infected via government websites and text alerts, drawing on the country's past experience with MERS.<sup>20</sup> The prime minister of New Zealand and the director general of health have also won national and international praise for communicating firmly yet empathetically, as shown in formal televised briefings and casual livestreaming sessions on social media.<sup>21</sup>

COVID-19 has been a reminder of the importance of protecting vulnerable populations and addressing health inequalities, especially in countries that have previously paid little attention to these factors. In the UK, as in some other countries, COVID-19 mortality has been disproportionately high among residents of care homes, Black, Asian, and minority ethnic groups, socioeconomically deprived populations, and workers on low wages.<sup>22</sup> These inequalities are likely to exist elsewhere, but in many countries, such as Germany, data are not collected. In Singapore, migrant workers living in overcrowded

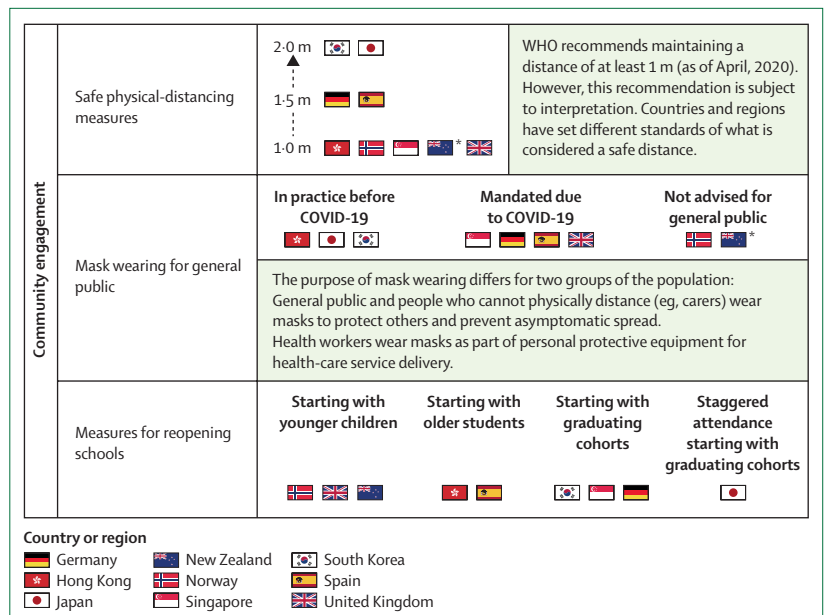


Figure 2: Key measures in place to allow safe easing of restrictions

Detailed data sources are available in the appendix (appendix pp 1–16). \*New Zealand adopts a so-called social bubble model that allows defined groups of people to have close contact with each other while maintaining safe distancing with other groups.

dormitories have constituted almost 95% of close to 58 000 confirmed cases.<sup>23</sup> In response, the government has improved disinfection regimens, established medical facilities onsite, and shielded workers older than 45 years by moving them to less dense accommodation than they were living in.<sup>24</sup> All nine countries and regions have also heightened practices for infection prevention and control in care homes, including active testing and isolating of symptomatic residents and staff, decreasing or banning visitors, promoting compliance with hand hygiene, and supplying protective equipment to these facilities.

Economic support to mitigate the effect of the pandemic on communities has been provided by the governments of all nine countries and regions, who have announced substantial emergency budgets to help businesses to stay viable, preserve jobs, and alleviate financial burdens on individuals and households. In the five Asian Pacific countries and regions, this financial assistance has included one-off cash handouts to the public. Japan, with the highest emergency spending, amounting to 42% of its gross domestic product (appendix p 17),<sup>25</sup> has handed out ¥100 000 (approximately US\$930) to every resident in the country. However, unclear legal grounds for paying leave allowance and delayed introduction of the expanded employment adjustment subsidy scheme have been heavily criticised. By contrast, the European countries have opted for long-term support programmes through strengthening their existing social safety nets. In Spain, the COVID-19 crisis has accelerated the approval of a scheme designed to provide a guaranteed minimum monthly income of €462 (\$500) for its poorest citizens.

This scheme is expected to benefit 2·5 million individuals and cost €3 billion annually.<sup>26</sup> The UK has also increased its Universal Credit and Working Tax Credit by £1040 (approximately \$1320) per year, alongside paying the wages of over 6 million furloughed workers until Oct 31, 2020.<sup>27</sup>

### Public-health capacity

As already noted, at the core of any effective exit strategy for COVID-19 restrictions should be a surveillance system that includes active case finding, testing of all people with suspected infection, tracing their close contacts, isolating people with a confirmed infection, and supporting them in isolation. In the Asian countries and regions, all people with a confirmed infection are isolated and supported in hospitals or other facilities, whereas in the European countries, patients who have mild symptoms are typically isolated at home.<sup>28</sup> Countries' testing and tracing strategies have also varied.

At the start of the outbreak, many countries reserved testing for people who were symptomatic, and in Japan and Europe, testing generally focused on people with severe symptoms. However, testing criteria have evolved with the local and global situation and new scientific evidence. Norway does not recommend widespread testing because of the country's low infection rate and high probability of false-positive results, thus limiting asymptomatic testing to staff and residents in nursing homes and close contacts of people with confirmed infection.<sup>29</sup> Since August, 2020, Norway has introduced new rules to allow everyone who suspects that they might be infected to get tested without an initial assessment by their local community doctor.<sup>30</sup> Meanwhile, South Korea mass tests individuals who have visited public venues or

events where people with COVID-19 were present, and thus who might have come into contact with them, regardless of symptoms.<sup>31</sup> Mass testing is made possible by having 638 screening centres and 118 public and private testing facilities, capable of running more than 20 000 diagnostic tests per day.<sup>32</sup> In Japan, testing capacity has not yet adequately increased, as tests are mainly done within the governmental public health service, where capacity is overstretched.<sup>33</sup> New models such as drive-through testing in South Korea and Germany and home-based testing in the UK and Hong Kong have helped to increase access to testing while reducing crowding and cross-infection at hospitals. The number of daily COVID-19 tests that have been done per 1000 people varies across the nine countries and regions (appendix p 17),<sup>34</sup> although considerable caution is required in interpreting the data because testing is based on differing strategies.

The rapid pace of the pandemic meant that many countries were poorly prepared. Early control in transmission in Asian countries and regions was mainly due to the intensive efforts of manual contact tracing by health workers, although many countries or regions have since supplemented the manual methods with digital methods (figure 3). South Korea uses electronic health records, records of credit card transactions, mobile phone-based global positioning system data, and closed-circuit television to triangulate patient claims objectively and address limitations in memory recall in patient interviews.<sup>35</sup> South Korea's experience emphasises the importance of so-called shoe-leather epidemiology, by use of tracers who have detailed local knowledge. At first, the system in England was based around a system of centralised contact tracers following up with individuals through telephone calls but with little success and, in many areas, local public health teams have had to take on this role. Hong Kong uses a police supercomputer system, normally used to investigate complex crimes, to track and map transmission.<sup>36</sup> Japan, Germany, Singapore, New Zealand, and Norway have launched smartphone apps that use Bluetooth signals, global positioning system tracking, or recording of location-specific QR codes to identify and notify individuals who have come into close proximity with a patient with COVID-19. The UK started developing a similar app, but has since halted development and decided to switch to an Apple–Google system.<sup>37</sup> Scotland has already launched an NHS Protect Scotland app on the basis of this system. After close contacts are identified in these nine countries, they are subject to self-isolation and monitoring for symptoms and adherence, again via telephone calls or apps.

In Hong Kong, Japan, New Zealand, Spain, and the UK, governments have appointed a temporary panel of experts in public health, epidemiology, and clinical medicine to provide scientific advice on handling the pandemic. In Japan, the association between the advice from the expert panel and the government's decision was

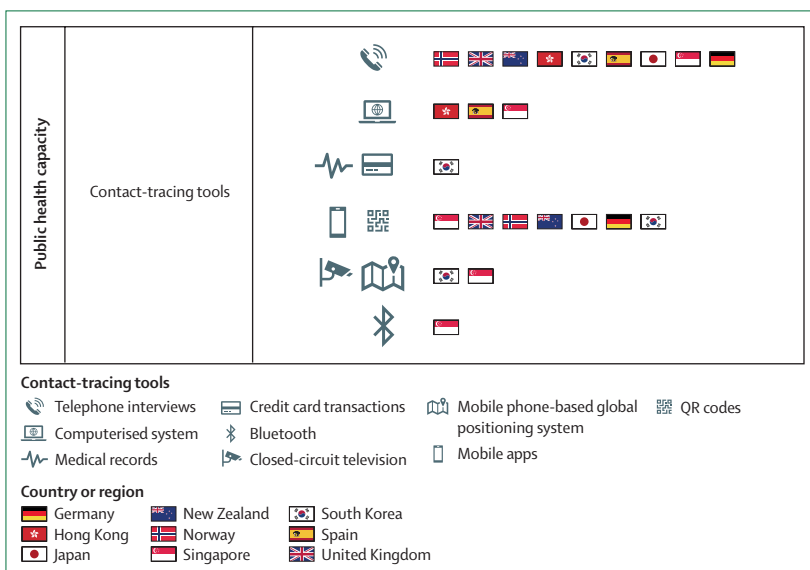


Figure 3: Contact-tracing tools in the nine countries and regions. Detailed data sources are available in the appendix (appendix pp 1–16).

not clear, in particular when the state of emergency was declared. In the UK, the Scientific Advisory Group for Emergencies was criticised for the delay in announcing its membership and the evidence on which its advice was given. In response, a former chief scientific adviser to the government convened a group of prominent scientists to form an Independent Scientific Advisory Group for Emergencies, which drew on a wider range of disciplines and emphasised transparency and public engagement.<sup>38</sup> The Scottish Government also formed its own scientific COVID-19 advisory group in late March, 2020, to advise on the release of lockdown measures.

In Germany, Singapore, South Korea, and Norway, experts on infectious diseases within established public health institutes are responsible for ensuring that scientific evidence drives policy making. The Korea Disease Control and Prevention Agency and the Norwegian Institute of Public Health, which have leading roles in each country's response to COVID-19, operate under their ministries of health rather than independently from them, although the director of the Norwegian Institute has, on occasions, publicly disagreed with the government.<sup>39</sup> Nonetheless, academics in these two countries have also started their own initiatives to offer recommendations to the government. Germany's national public health institute, the Robert Koch Institute, is nominally independent but owned and funded by the German Ministry of Health. The differing experiences have raised interesting questions about decision making in uncertainty. Can the quest for evidence of high quality, rather than application of the precautionary principle, delay important decisions?

### Health-system capacity

An adequate health-system capacity is crucial to cope with possible surges in infections after lockdowns are lifted. This capacity includes having sufficient treatment facilities (eg, from hospitals equipped with intensive care units to step-down services in the community), medical equipment (eg, from ventilators for patients to personal protective equipment for staff), and health-care workers. A failure to invest in adequate capacity before a pandemic constrains the choices that can be made.

Germany's experience shows the benefits of investing in the health system for the future. Before the COVID-19 outbreak, the country already had 34 critical care beds per 100 000 inhabitants, compared with 9·7 in Spain and 5·2 in Japan (appendix p 18).<sup>40,41</sup> Thus, Germany's intensive care units were well under capacity even during the peak of the outbreak, unlike many other European counterparts that had to adapt other wards and spaces within hospitals to accommodate critically ill patients with COVID-19. With the exception of Germany, all countries also adopted triage systems (although some were unofficial) in which only patients with severe disease would be treated at designated hospitals, whereas patients with mild disease would be monitored at makeshift community facilities or at home. Hong Kong,

Singapore, South Korea, and the UK repurposed large spaces, such as conference centres, to operate as community care facilities, although these facilities have been understaffed and underused in the UK compared with the other two countries.<sup>42</sup> As the number of cases has decreased, many of these facilities are now kept on standby to be reopened if needed.

Many countries' health-care systems have faced serious staffing problems during this pandemic, reflecting both an increase in demand and a decrease in staff, who were ill or self-isolating. In response, health-care workers were redeployed, volunteers were recruited, and non-emergency health-care services were scaled down or stopped. Once the peak of the outbreak has passed, it is important to resume routine services while retaining the ability to quickly repurpose resources if necessary during subsequent waves. Some hospitals in Hong Kong, Singapore, South Korea, Norway, and the UK have started to offer teleconsultations and remote monitoring to provide care for patients without unnecessary face-to-face visits.

In some countries, shortages of personal protective equipment have forced medical staff to work without adequate protection, and shortages of ventilators have forced staff to make difficult rationing decisions. In Spain, medical staff have made up more than 10% of total cases of COVID-19.<sup>43</sup> By contrast, in Hong Kong, South Korea, and Singapore, sufficient stockpiling alongside structured training to ensure appropriate use of personal protective equipment and compliance with other safety procedures have largely protected health-care workers from infection.<sup>44,45</sup> In all countries and regions, governments have increased efforts to procure necessary medicines and equipment, by sourcing from overseas and boosting the capacity of domestic companies.

### Border control measures

As countries and regions gradually reopen their borders, the inflow of travellers should be managed to reduce the risk of people with COVID-19 travelling into the area. The five countries and regions in Asia Pacific have implemented strict border control measures, with Hong Kong, New Zealand, and Singapore keeping their borders closed to most visitors. All arrivals entering these three countries or regions, and South Korea, are subject to mandatory COVID-19 testing and 14-day quarantine at home or at designated facilities. In Japan, all arrivals are also subject to a 14-day quarantine, and people from countries deemed to be a risk area are denied entry or required to undergo testing.

By contrast, European countries have been slow to require routine testing of travellers. As of June, 2020, Spain has exempted EU citizens from quarantine requirements, whereas Norway has exempted arrivals from specified Nordic regions with sufficiently low rates of transmission (ie, fewer than 20 confirmed cases per 100 000 inhabitants and less than 5% positive tests on average per week during the past 2 weeks<sup>46</sup>) and has



extended this exemption to the Schengen area as of July 15, 2020. In Germany, people entering or returning to Germany from a country designated as a risk area are required to quarantine. The UK removed the requirement on all inbound travellers to self-isolate at home for 14 days for people coming from some countries but has since reimposed the requirement for travellers from many of the countries. The EU reopened internal borders at the end of June, 2020, and Spain has also fully opened its international borders to all countries from July 1, 2020. To prevent the potential rise in imported cases, Spain will incorporate automated processes, such as computerised health declarations and thermal-imaging cameras to facilitate temperature screening of visitors,<sup>47</sup> which are already being used by many Asian countries and regions, including Hong Kong and Singapore.

### Discussion

There is increasing realisation that removing COVID-19 restrictions is not about returning to the prepandemic normal but about gradually and cautiously transitioning to a new normal, while being ready to reimpose measures if, and when, necessary. Nonetheless, countries have diverged in terms of the speed, scale, and intensity at which they have implemented similar interventions, and differences can be observed between Asia and Europe in this regard. For example, many Asian countries, except Japan, promptly did extensive testing, tracing, and isolating of all cases (ie, not just severe cases) from the start of the outbreak, strengthened by innovative surveillance technology, whereas these processes have been considerably delayed in most of Europe, except Germany. Furthermore, confirmed cases are mostly isolated at institutions in Asia rather than at home, such as in Europe.<sup>28</sup> Wearing of face coverings to protect others has also been adopted to a much greater extent in Asia than in Europe. These differences should be regarded against the background of experiences with past pandemics and economic policies adopted in the years leading up to this current crisis. In Europe, more than a decade of austerity measures have substantially weakened health systems and social protection in many countries. By contrast, major epidemics, such as SARS in 2003 and MERS in 2015, drove many Asian countries to invest in building robust health-care and public health infrastructure that would be well equipped to handle the next outbreak. The public has also been better conditioned to cooperate with strict rules and invasive surveillance in times of crisis compared with the public in countries without experience of major epidemics, with most people accepting a trade-off between their personal rights and the public good.<sup>20,48</sup>

Although the future of COVID-19 is unknown at present, countries should plan and prepare for the worst-case scenario. It is not too late for the following lessons to be learnt and applied now. First, as described here, countries can move forward mainly on the basis of the epidemiology or on the epidemiology in combination

with other considerations; however, a clear and transparent plan that describes which factors are being taken into account is essential. Ideally, these plans should explicitly state the levels or phases of easing restrictions, the criteria for moving to the next level or phase, and the containment measures that each level or phase entails.

Second, countries should not ease restrictions until they have robust systems in place to closely monitor the infection situation. Although much has been said about the use of R as a decision-making indicator, it requires data of high quality in real time (eg, use of R in Hong Kong) and it needs to be interpreted in the context of a good understanding of the epidemiology.<sup>14</sup> For example, a small localised outbreak can increase the R value for the whole country, but it does not necessitate a nationwide lockdown.

Third, continued measures to reduce transmission will be needed for some time. For example, decreasing interactions to a few repeated contacts to create social bubbles, as pioneered by New Zealand, can allow interaction while reducing transmission.<sup>49</sup> It is now accepted that cloth face coverings can significantly reduce person-to-person transmission, with one German study reporting that the use of face coverings reduced the daily growth rate of reported COVID-19 infections by 40–60%.<sup>50</sup> Crucially, governments should educate, engage, and empower all members of society, especially the most vulnerable, to participate in the pandemic response. Rather than crafting these measures on the basis of assumptions about what communities can or cannot accept, citizens should be directly involved in the process of coproducing tailored solutions appropriate for the local context.

Fourth, each country should have an effective find, test, trace, isolate, and support system in place. Preliminary data for testing suggests that identifying and isolating mild and asymptomatic cases can significantly reduce R, health-care burden, and overall fatality.<sup>51</sup> The novel drive-through and walk-through screening models in South Korea that encourage proactive testing of potential case contacts offer a safe and efficient way to expand and enhance case finding.<sup>52</sup> A modelling study has also suggested that institution-based isolation, as adopted by some Asian countries, is more effective than is home-based isolation at reducing household and community transmission.<sup>28</sup> On contact tracing, app-based tracing is estimated to stop transmission if there is a 56% uptake rate in the population, and can be effective at slowing transmission at lower uptake rates.<sup>53</sup> However, digital tracing cannot replace traditional manual tracing. As more evidence becomes available, some of these strategies might be able to aid countries in maintaining viral suppression and avoiding return to a full lockdown.

Fundamentally, this find, test, trace, isolate, and support system needs to be supported by sustained investment in public health capacity and health-system capacity in terms of facilities, supplies, and workforce. WHO and the International Monetary Fund have jointly appealed for governments to prioritise health expenditures, which

should go hand in hand with training and retaining skilled workers to fuel economic recovery.<sup>54</sup> Finally, the argument is strong for countries adopting a so-called zero-COVID strategy, which aims to eliminate domestic transmission. The New Zealand experience shows that this strategy is challenging but is an important aspiration, not least as the growing burden of so-called long COVID becomes apparent in people who have survived COVID-19 but continue to have symptoms for longer than expected.<sup>55</sup> As more countries start to reopen their borders, screening tools and quarantine measures become essential to identify potential cases and prevent further transmission in the community. To ensure that control measures are adequate, it is important for countries to review and optimise these processes regularly.

In the spirit of international collaboration, this Health Policy paper has presented lessons that can be learnt from nine countries and regions about the complex and challenging task of easing COVID-19 restrictions. As New Zealand's experience shows, easing restrictions is something that should be managed with great care and continued vigilance, and, at the time of writing, Spain, Germany, and the UK have offered a reminder of the enormous potential for resurgence if comprehensive safeguards are not in place. Given the rapidly evolving nature of the pandemic and the measures taken in response to it, our Health Policy paper inevitably provides a provisional snapshot, rather than a conclusive analysis, of the situations and strategies of various countries and regions. Nonetheless, the comparative framework developed in this Health Policy paper can continue to be used to facilitate cross-country learning and guide future policy making. We hope that countries will continue to share their experiences, information, and strategies as they respond to this virus that knows no borders.

#### Contributors

EH and HL-Q conceived and designed the Health Policy. EH, MMJT, ET, JH, and HL-Q collected the data. EH, MMJT, MM, and HL-Q analysed the data and drafted the manuscript with input from all authors. All authors contributed to revising the manuscript.

#### Declaration of interests

DS sits on the Scottish Government COVID-19 advisory group, has attended Scientific Advisory Group for Emergencies and UK Cabinet Office Advisory Group meetings, and sits on the Royal Society Data Evaluation and Learning for Viral Epidemics initiative that inputs into the Scientific Advisory Group for Emergencies. JH is part of the Crisis Management Committee at the Robert Koch Institute, Berlin, Germany. The views presented here do not necessarily reflect those of the Robert Koch Institute. MM is a member of the UK Independent Scientific Advisory Group for Emergencies, is a research director at European Observatory on Health Systems and Policies, which operates a COVID Response Monitor, is a Commissioner in the Pan-European Commission on Health and Sustainable Development: Rethinking Policy Priorities in light of Pandemics advising WHO EURO, and is an adviser to the WHO Regional Director for Europe. NA is employed by WHO. He alone is responsible for the views expressed here and they do not necessarily represent the decisions or policies of WHO. All other authors declare no competing interests.

#### Acknowledgments

This Health Policy was supported by the Singapore Ministry of Health's National Medical Research Council under the Centre Grant

Programme—Singapore Population Health Improvement Centre (NMRC/CG/C026/2017\_NUHS). The funder had no role in the study design, data analysis, interpretation, preparation, or writing of the manuscript.

Editorial note: the *Lancet* Group takes a neutral position with respect to territorial claims in published maps and institutional affiliations.

#### References

- 1 WHO. WHO coronavirus disease (COVID-19) dashboard. Geneva: World Health Organization, 2020. <https://covid19.who.int> (accessed Sept 16, 2020).
- 2 UNICEF. Don't let children be the hidden victims of COVID-19 pandemic. April 9, 2020. <https://www.unicef.org/press-releases/dont-let-children-be-hidden-victims-covid-19-pandemic> (accessed June 17, 2020).
- 3 World Bank. COVID-19 to plunge global economy into worst recession since World War II. June 8, 2020. <https://www.worldbank.org/en/news/press-release/2020/06/08/covid-19-to-plunge-global-economy-into-worst-recession-since-world-war-ii> (accessed June 17, 2020).
- 4 Lovelace B Jr. WHO: countries that rush to lift restrictions risk 'severe and prolonged' damage to economy. Englewood Cliffs, NJ: CNBC, 2020. <https://www.cnbc.com/2020/04/03/who-says-countries-that-rush-to-lift-coronavirus-containment-risk-more-severe-and-prolonged-damage-to-economy.html> (accessed June 29, 2020).
- 5 Rawaf S, Quezada Yamamoto H, Rawaf D. Unlocking towns and cities: COVID-19 exit strategy. *East Mediterr Health J* 2020; **26**: 499–502.
- 6 Government of Japan. Basic policies for novel coronavirus disease control by the Government of Japan (summary). May 25, 2020. <https://www.mhlw.go.jp/content/10900000/000634753.pdf> (accessed June 11, 2020).
- 7 Ministerio de Sanidad, Consumo y Bienestar Social. Plan para la transición hacia una nueva normalidad. 2020. <https://www.mscbs.gob.es/profesionales/saludPublica/ccayes/alertasActual/nCov-China/planDesescalada.htm> (accessed June 11, 2020).
- 8 Ministry of Health Singapore. End of circuit breaker, phased approach to resuming activities safely. May 19, 2020. <https://www.moh.gov.sg/news-highlights/details/end-of-circuit-breaker-phased-approach-to-resuming-activities-safely> (accessed June 11, 2020).
- 9 Eddy M. Flare-up in virus cases sets back Germany's efforts to reopen. New York, NY: The New York Times, 2020. <https://www.nytimes.com/2020/06/25/world/europe/germany-coronavirus-reopening.html> (accessed June 29, 2020).
- 10 Information Services Department, the Government of Hong Kong Special Administrative Region. Some anti-epidemic measures eased. May 5, 2020. [https://www.news.gov.hk/eng/2020/05/20200505/20200505\\_170734\\_576.html](https://www.news.gov.hk/eng/2020/05/20200505/20200505_170734_576.html) (accessed June 19, 2020).
- 11 New Zealand Government. COVID-19 alert system: unite for recovery. 2020. <https://covid19.govt.nz/alert-system/alert-system-overview> (accessed June 19, 2020).
- 12 Leung G. Lockdown can't last forever. Here's how to lift it. New York, NY: The New York Times, 2020. <https://www.nytimes.com/2020/04/06/opinion/coronavirus-end-social-distancing.html> (accessed June 11, 2020).
- 13 UK Government. Coronavirus (COVID-19): meeting with others safely (social distancing). <https://www.gov.uk/government/publications/coronavirus-covid-19-meeting-with-others-safely-social-distancing/coronavirus-covid-19-meeting-with-others-safely-social-distancing> (accessed Sept 21, 2020).
- 14 Roberts M. Coronavirus bubbles: how do they work and who is in yours? London: BBC News, 2020. <https://www.bbc.com/news/health-52637354> (accessed Sept 16, 2020).
- 15 Government of Singapore. How to redeem the new reusable mask. May 22, 2020. <https://www.gov.sg/article/when-should-i-wear-a-mask> (accessed June 29, 2020).
- 16 UK Government. Face coverings: when to wear one, exemptions, and how to make your own. Aug 27, 2020. <https://www.gov.uk/government/publications/face-coverings-when-to-wear-one-and-how-to-make-your-own/face-coverings-when-to-wear-one-and-how-to-make-your-own> (accessed Sept 21, 2020).
- 17 Coscieme L, Fioramonti L, Mortensen LF, et al. Women in power: female leadership and public health outcomes during the COVID-19 pandemic. *medRxiv* 2020; published online July 16. <https://doi.org/10.1101/2020.07.13.20152397> (preprint).

- 18 Haddon C. The government's handling of the Dominic Cummings row has led to a loss of public trust. London: Institute for Government, 2020. <https://www.instituteforgovernment.org.uk/blog/government-handling-dominic-cummings-loss-public-trust> (accessed June 12, 2020).
- 19 Peckham R. COVID-19 and the anti-lessons of history. *Lancet* 2020; **395**: 850–52.
- 20 Zastrow M. South Korea is reporting intimate details of COVID-19 cases: has it helped? *Nature* 2020; published online March 18. <https://doi.org/10.1038/d41586-020-00740-y>.
- 21 Cave D. New Zealand lifts lockdown as it declares virus eliminated, for now. New York, NY: The New York Times, 2020. <https://www.nytimes.com/2020/06/08/world/australia/new-zealand-coronavirus-ardern.html> (accessed June 24, 2020).
- 22 Public Health England. Disparities in the risk and outcomes of COVID-19. 2020. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/892085/disparities\\_review.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/892085/disparities_review.pdf) (accessed June 12, 2020).
- 23 Ministry of Health Singapore. 15 September 2020 daily report on COVID-19. Sept 15, 2020. <https://www.moh.gov.sg/docs/librariesprovider5/2019-ncov/situation-report--24-jun-2020fdc98941fcce4bdbbe3b116c9e2f6d13.pdf> (accessed Sept 16, 2020).
- 24 Government of Singapore. Tackling transmissions in migrant worker clusters: excerpt from PM Lee's address to nation on 21 Apr 2020. <https://www.gov.sg/article/tackling-transmissions-in-migrant-worker-clusters> (accessed June 29, 2020).
- 25 Elgin C, Basbug G, Yalaman A. COVID-19 economic stimulus index. 2020. <https://web.boun.edu.tr/elgin/COVID.htm> (accessed June 16, 2020).
- 26 Carreño B. Spain to fight poverty with income scheme for 2.5 mln people. London: Reuters, 2020. <https://www.reuters.com/article/health-coronavirus-spain-poverty/spain-to-fight-poverty-with-income-scheme-for-25-mln-people-idUSL8N2D3366> (accessed June 19, 2020).
- 27 UK Government. Our plan to rebuild: the UK Government's COVID-19 recovery strategy. May 11, 2020. <https://www.gov.uk/government/publications/our-plan-to-rebuild-the-uk-governments-covid-19-recovery-strategy> (accessed June 19, 2020).
- 28 Dickens BL, Koo JR, Wilder-Smith A, Cook AR. Institutional, not home-based, isolation could contain the COVID-19 outbreak. *Lancet* 2020; **395**: 1541–42.
- 29 Folkehelseinstituttet. Unødvendig å teste store grupper av friske ved lite koronasmitte. May 25, 2020. <https://www.fhi.no/nyheter/2020/unodvendig-a-teste-store-grupper-av-friske-ved-lite-koronasmitte> (accessed June 16, 2020).
- 30 Vignæs M. Nye testkriterier: slik tester du deg for korona nå. Aug 12, 2020. [https://www.nrk.no/norge/nye-testkriterier\\_-slik-tester-du-deg-for-korona-na-1.15119739](https://www.nrk.no/norge/nye-testkriterier_-slik-tester-du-deg-for-korona-na-1.15119739) (accessed Sept 21, 2020).
- 31 Korea Centers for Disease Control and Prevention. The updates on COVID-19 in Korea as of 29 May. May 29, 2020. [https://www.cdc.go.kr/board/board.es?mid=a0030&act=view&list\\_no=367370&tag=&nPage=17](https://www.cdc.go.kr/board/board.es?mid=a0030&act=view&list_no=367370&tag=&nPage=17) (accessed Sept 16, 2020).
- 32 Ministry of Health and Welfare (South Korea). COVID-19 response: Korean government's response system. Feb 25, 2020. <http://ncov.mohw.go.kr/en/baroView.do?brdId=11&brdGubun=111> (accessed June 16, 2020).
- 33 Park J, Takenaka K. As Japan reopens, coronavirus testing slowed by bureaucracy and staff shortages. London: Reuters, 2020. <https://www.reuters.com/article/us-health-coronavirus-japan-testing/as-japan-reopens-coronavirus-testing-slowed-by-bureaucracy-and-staff-shortages-idUSKBN23406H> (accessed June 29, 2020).
- 34 Our world in data. Coronavirus (COVID-19) testing. 2020. <https://ourworldindata.org/coronavirus-testing> (accessed June 17, 2020).
- 35 COVID-19 National Emergency Response Center, Epidemiology and Case Management Team, Korea Centers for Disease Control and Prevention. Contact transmission of COVID-19 in South Korea: novel investigation techniques for tracing contacts. *Osong Public Health Res Perspect* 2020; **11**: 60–63.
- 36 Hille K, White E. Containing coronavirus: lessons from Asia. London: Financial Times, 2020. <https://www.ft.com/content/e015e096-6532-11ea-a6cd-df28cc3c6a68> (accessed June 11, 2020).
- 37 Sabbagh D, Hern A. UK abandons contact-tracing app for Apple and Google model. London: The Guardian, 2020. <https://www.theguardian.com/world/2020/jun/18/uk-poised-to-abandon-coronavirus-app-in-favour-of-apple-and-google-models> (accessed June 23, 2020).
- 38 Davis N. Rival Sage group says Covid-19 policy must be clarified. London: The Guardian, 2020. <https://www.theguardian.com/world/2020/may/04/rival-sage-group-covid-19-policy-clarified-david-king> (accessed June 23, 2020).
- 39 Agence France–Presse in Oslo. Norway suspends virus-tracing app due to privacy concerns. London: The Guardian, 2020. <https://www.theguardian.com/world/2020/jun/15/norway-suspends-virus-tracing-app-due-to-privacy-concerns> (accessed June 23, 2020).
- 40 Organisation for Economic Co-operation and Development. Beyond containment: health systems responses to COVID-19 in the OECD. April 16, 2020. <https://www.oecd.org/coronavirus/policy-responses/beyond-containment-health-systems-responses-to-covid-19-in-the-oecd-6ab740c0/> (accessed June 16, 2020).
- 41 Phua J, Faruq MO, Kulkarni AP, et al. Critical care bed capacity in Asian countries and regions. *Crit Care Med* 2020; **48**: 654–62.
- 42 Neville S, Staton B, Warrell H, Bounds A, Tighe C. Nightingale hospitals largely empty as NHS weathers the storm. London: Financial Times, 2020. <https://www.ft.com/content/09897050-13bc-4ebe-99af-25b8d2ab5781> (accessed June 24, 2020).
- 43 Minder R, Peltier E. Virus knocks thousands of health workers out of action in Europe. New York, NY: The New York Times, 2020. <https://www.nytimes.com/2020/03/24/world/europe/coronavirus-europe-covid-19.html> (accessed June 24, 2020).
- 44 Cheng VCC, Wong SC, Chen JHK, et al. Escalating infection control response to the rapidly evolving epidemiology of the coronavirus disease 2019 (COVID-19) due to SARS-CoV-2 in Hong Kong. *Infect Control Hosp Epidemiol* 2020; **41**: 493–98.
- 45 Htun HL, Lim DW, Kyaw WM, et al. Responding to the COVID-19 outbreak in Singapore: staff protection and staff temperature and sickness surveillance systems. *Clin Infect Dis* 2020; published online April 21. <https://doi.org/10.1093/cid/ciaa468>.
- 46 Norwegian Institute of Public Health. Infection control advice for travel and entry quarantine. Feb 11, 2020. <https://www.fhi.no/en/op/novel-coronavirus-facts-advice/facts-and-general-advice/travel-advice-COVID19> (accessed Sept 16, 2020).
- 47 Linde P. Thermal imaging and e-forms: how Spain will screen for Covid-19 when the travel ban is lifted. Madrid: El País, 2020. <https://english.elpais.com/society/2020-06-12/thermal-imaging-and-e-forms-how-spain-will-screen-for-covid-19-when-the-travel-ban-is-lifted.html> (accessed June 24, 2020).
- 48 Cook AR, Zhao X, Chen MIC, Finkelstein EA. Public preferences for interventions to prevent emerging infectious disease threats: a discrete choice experiment. *BMJ Open* 2018; **8**: e017355.
- 49 Block P, Hoffman M, Raabe IJ, et al. Social network-based distancing strategies to flatten the COVID-19 curve in a post-lockdown world. *Nat Hum Behav* 2020; **4**: 588–96.
- 50 Mitze T, Kosfeld R, Rode J, Wälde K. IZA DP No 13319: face masks considerably reduce COVID-19 cases in Germany: a synthetic control method approach. Bonn: IZA Institute of Labor Economics, 2020. <https://www.iza.org/publications/dp/13319/face-masks-considerably-reduce-covid-19-cases-in-germany-a-synthetic-control-method-approach> (accessed June 16, 2020).
- 51 Mayorga L, Samartino C, Flores G, et al. Detection and isolation of asymptomatic individuals can make the difference in COVID-19 epidemic management. *medRxiv* 2020; published May 13. <https://doi.org/10.1101/2020.04.23.20077255> (preprint).
- 52 Choi S, Han C, Lee J, Kim SI, Kim IB. Innovative screening tests for COVID-19 in South Korea. *Clin Exp Emerg Med* 2020; **7**: 73–77.
- 53 Big Data Institute, University of Oxford. Digital contact tracing can slow or even stop coronavirus transmission and ease us out of lockdown. April 16, 2020. <https://www.research.ox.ac.uk/Article/2020-04-16-digital-contact-tracing-can-slow-or-even-stop-coronavirus-transmission-and-ease-us-out-of-lockdown> (accessed June 24, 2020).
- 54 Georgieva K, Ghebreyesus T. Some say there is a trade-off: save lives or save jobs—this is a false dilemma. London: The Telegraph, 2020. <https://www.telegraph.co.uk/global-health/science-and-disease/protecting-healthandlifestyles-go-hand-in-hand-cannot-save> (accessed June 29, 2020).
- 55 Greenhalgh T, Knight M, A'Court C, Buxton M, Husain L. Management of post-acute covid-19 in primary care. *BMJ* 2020; **370**: m3026.