

GLOBAL LESSONS IN TACKLING COVID-19

The Global Pathfinder Initiative

August 2020



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Foreword

The COVID-19 pandemic has posed unprecedented challenges to people and governments across the globe. The threat has forced governments to act in ways they could have barely imagined only a few months earlier – and at a scale and speed that was inconceivable too.

Because the situation was novel, there was no playbook and no firm evidence base to guide decision-making. As a result, governments around the world reacted in a variety of different ways in response to COVID-19. Now, as a number of countries begin to emerge from the crisis, it is becoming possible to learn what worked well and what worked less well.

This report attempts to capture those lessons by examining the actions of the twenty countries that, according to public health data, have been most effective in managing the crisis and limiting its impact. The variation in country performance is not solely a result of the actions of their governments; geography, for example, clearly plays a part.

In the past, we have both worked in senior positions in government. Since then, we have both worked with governments on every continent. We know how difficult it is to govern well, especially in a crisis of these proportions. Leaders have to make tough decisions under pressure in the full glare of publicity – and some of those decisions may not work out well. We respect and honour all those who faced up to the challenges and have worked hard to lead countries through this crisis, not just those whose approaches turned out to work best. Our intention is to enable learning, not to allocate praise or blame.

We realise we are still in an early phase of humanity's response to the crisis and that the conclusions we reach here have to be considered provisional rather than definitive. Nevertheless, we hope summarising them at this early stage will assist those responsible for the continuing response to COVID-19, which will potentially pose a major threat to us all for some years given the timetables required to develop universally applicable vaccines. These conclusions may also assist countries in ensuring preparedness for future pandemics.

In due course, we plan to release a follow-up report looking at the economic consequences of the pandemic and what we can learn about governments' responses to them.

Idris Jala and Michael Barber
June 2020

Preface

The COVID-19 pandemic has forced leaders in governments around the world to act urgently to manage a profoundly challenging situation under extraordinary pressure. The Global Pathfinder (GPF) initiative, a collaboration between PEMANDU Associates and Delivery Associates, aims to provide countries with fast and deep learning which will enable them to address the emerging public health challenges caused by the pandemic. This report is a compilation of effective practices from countries that have responded quickly to the crisis and are on the way to recovery. The initiative also intends to facilitate cross-country learning for governments as countries make future decisions in the fight against COVID-19. Findings from our analysis are derived from various indices (such as the Global COVID-19 Index (GCI), Global Health Security Index and the Oxford Stringency Index), as well as qualitative research and direct engagement with those at the frontlines in the fight against the pandemic. We hope that this sharing of effective practices will enable countries to learn fast and, in turn, increase the speed and effectiveness of their responses to COVID-19.

DISCLAIMER: The GPF report is based on information that has been derived from third-party sources which have not been independently validated by PEMANDU Associates or Delivery Associates. The opinions and observations expressed in this report are those of the authors. All data used from the GCI is correct as of 17 May 2020. The reader should conduct a more detailed investigation and analysis before making any decisions based on the opinions in this report. PEMANDU Associates and Delivery Associates shall not be obliged to maintain or update the report, nor shall they be liable, in any event, for any damage caused by the use of the report.

Contents

Executive Summary	7
1. The world as we now know it: Current impact of COVID-19	11
1.1 Chronology of events	11
1.2 Responding to COVID-19.....	13
1.3 The need for fast learning between countries: The Global Pathfinder Initiative	13
2. Lessons learnt: Effective practices to manage the COVID-19 pandemic.....	15
2.1 The place of testing in the management of COVID-19	17
2.1.1 Setting the context.....	17
2.1.2 Key findings from the analysis	22
2.1.3 Recommendations: Interventions for countries to consider	37
2.2 Utilising track and trace processes and technology to limit the spread of the virus.....	38
2.2.1 Setting the context.....	38
2.2.2 Key findings from the analysis	40
2.2.3 Recommendations: Interventions for countries to consider	59
2.3 Slowing down the spread through restricted movement measures	61
2.3.1 Setting the context.....	61
2.3.2 Key findings from the analysis	61
2.3.3 Recommendations: Interventions for countries to consider	71
2.4 Reopening the economy when the time is right based on data	72
2.4.1 Setting the context.....	72
2.4.2 Key findings from the analysis	72
2.4.3 Recommendations: Interventions for countries to consider	81
2.5 Risk communication and community engagement to manage public sentiment and response across stakeholder groups	82
2.5.1 Setting the context.....	82
2.5.2 Key findings from the analysis	83
2.5.3 Recommendations: Interventions for countries to consider	106
3. Healthcare infrastructure as a fundamental basis for which all other interventions are built ..	107
3.1 Setting the context: The GHS as a measurement of country readiness to manage in a pandemic	107
3.2 Key findings from the analysis: Correlations between country readiness and their recovery rate.....	108
3.3 Recommendations: Ensuring minimum healthcare infrastructure is in place to manage in a pandemic	109
4. Conclusion.....	110

APPENDICES	111
GLOSSARY	115
BIBLIOGRAPHY	116

Executive Summary

Introduction

The global impact of the COVID-19 pandemic has been unprecedented – it has changed all our lives drastically within a short period of time. Since the discovery of COVID-19 on 31 December 2019, more than fifteen million people have been infected,¹ 637,221 deaths have been recorded, nearly half of the global workforce are at risk of losing livelihoods² and social, behavioural and religious norms have changed overnight. By the time this report is read, the odds are these numbers have already risen considerably. Governments and industry leaders throughout the world have been forced to combat the exponential growth of the disease through strategies and initiatives which have required funding, expertise and resources, in many cases well beyond their means.

Despite the magnitude of the challenge, a number of governments have implemented strategies that have enabled their countries to recover significantly faster than others. These governments have demonstrated exemplary leadership in decision-making, communication and coordination. Data from the GCI Recovery Rating³ identifies those countries which have been better able to manage the impact of the virus through the successful implementation of these effective practices.

Given the importance of acting fast during this challenging time, the GPF initiative has pulled together these successful practices from around the world in order to provide countries with information on which to base solutions to the huge challenges they face. The GPF initiative taps a wealth of impactful interventions in countries that are now on the path to health recovery. The sharing of helpful practices quickly will enable countries to make critical decisions in the fight against COVID-19. Lessons learnt will facilitate cross-regional fast learning and serve to increase the chances of effective delivery in specific contexts. It will also help countries avoid approaches that others have applied and found unsuccessful. Whilst the adoption of interventions will necessarily differ between countries, these lessons learnt will be valuable as governments consider their paths forward.

The story of this pandemic – and governments' responses to it – is a fast-moving one. What you see here represents our best learning to date, with data accurate as of 17 May 2020. Given the rapidly changing dynamics, we hope to keep this information updated as this work continues.

Scope of Research

The GPF initiative has analysed interventions in twenty countries which have ranked highly in both the Severity and Recovery Indices of the GCI. The countries selected for review and analysis include low-middle, medium- and high-income countries with a range of population sizes across the world. Sweden has also been included in the research due to its unique approach to managing the spread of the virus.

This first version of the GPF report focuses on interventions and practices designed to improve the health recovery of countries; it does not focus on understanding the impact of economic stimulus or

¹ Our World in Data, 24 July 2020

² COVID-19: Stimulating the economy and employment, International Labour Organization (ILO), 29 April 2020

³ Global COVID-19 Index (GCI)

on policies on economic recovery, which will take longer to become apparent. The next phase of research will focus on the economic impact of interventions.

Summary of Recommendations

The analysis of effective practices of these top 20 countries includes examination of the impact of interventions in the areas of testing, contact tracing, movement restriction and public engagement. The aim is to identify common successful practices. Countries that have excelled in COVID-19 health recovery have been able to deploy all five health-recovery related interventions systematically and rapidly, independent of their socio-economic status and health security capabilities.

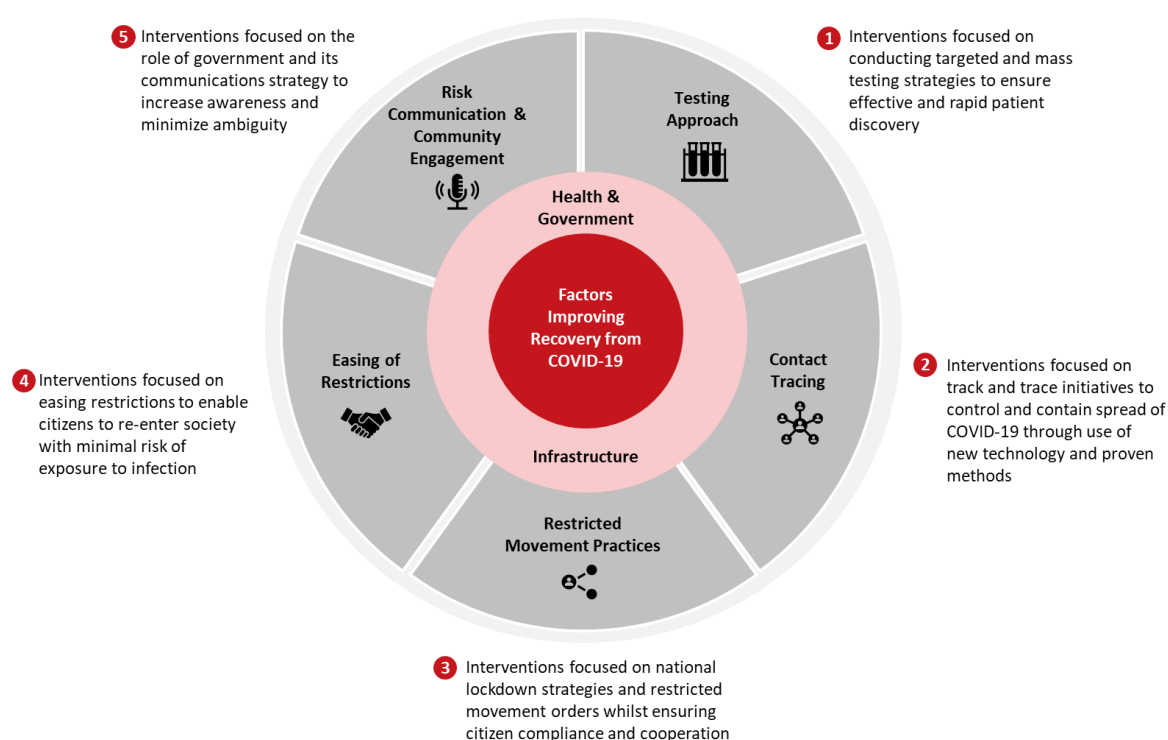


Figure 1: COVID-19 health recovery interventions

The five interventions are presented in no particular order and have equal importance in the fight against the COVID-19 pandemic.

Effective leadership and public compliance, however, serve as cross-cutting enablers to ensure successful implementation of the five key interventions. A pathway to recovery can be achieved through strategic and coordinated delivery of these interventions. Yet, how the government and public work together will be different in each country, contributing to a growing body of knowledge of effective practices, of which this publication is a start.






Intervention Category	Recommendations
Testing Approach 	Recommendation 1: Implement large-scale testing as soon as possible with priority target groups identified and isolation/quarantine protocols established and enforced.
	Recommendation 2: Encourage community participation in mass testing.
	Recommendation 3: Capitalise on public-private partnerships to optimise testing capacity and capability.
Contact Tracing 	Recommendation 1: Deploy digital contact tracing apps alongside clear and implementable data privacy laws to encourage high user adoption.
	Recommendation 2: Combine manual and digital contact tracing to address the gaps and limitations in the two approaches.
	Recommendation 3: Ensure adequate access to testing facilities and clear advice on self-isolation at the time of the launch of a digital contact tracing app.
Restricted Movement Practice 	Recommendation 1: Close international borders to prevent the import of foreign cases and buy time for adoption of preventive and protective measures.
	Recommendation 2: Implement and enforce lockdowns; adjust stringency based on capacity to test and isolate.
	Recommendation 3: Relax lockdowns gradually as the data show that the spread of the disease is being contained.
Easing of Restrictions 	Recommendation 1: Use data to guide decisions on when to open the different sectors of the economy and, ultimately, the economy as a whole.
	Recommendation 2: Reopen targeted parts of the education sector with adequate support and guidelines in place to facilitate safety.
Risk Communication and Community Engagement 	Recommendation 1: Run clear and simple campaigns with high communication frequency.
	Recommendation 2: Engage local communities in the communication process.
	Recommendation 3: Understand the channels through which the public gets their information.
	Recommendation 4: Address rumours and misinformation swiftly.

Table 1: Summary of recommendations

These interventions are strongest when they are combined. Their strategic sequencing matters as well. For example, digital contact tracing and testing interventions worked well where they were implemented concurrently and without compromise. Without access to testing facilities and medical support, potential carriers identified via contact tracing cannot be diagnosed accurately and rapidly. Given extensive and real-time availability of digital contact tracing, any individual identified as a potential carrier or contact needs prompt and easy access to immediate medical attention and treatment, regardless of their physical location. Hence, it is crucial that governments have adequate testing facilities, equipment, and standard operating procedures (SOPs) prior to deploying a digital contact tracing application (app). Lack of capacity to meet a surge in testing demand will cause panic and commotion – potentially exacerbating the spread of the virus.

Similarly, restricted movement practices and the easing of restrictions work hand in hand, with outcomes of the former dictating the terms and implementation approach of the latter. Some countries, such as Sweden and South Korea, have not imposed nationwide lockdowns. In these cases, the easing of restrictions will be less complicated. For countries that have imposed strict lockdowns and restricted movement orders, the easing of restrictions needs to be planned strategically and meticulously, to ensure the public trusts the health and safety guidelines and acts accordingly. The World Health Organisation (WHO) has established six conditions for countries to fulfil prior to lifting restrictions, including systems established for transmission control, detection, track and trace, outbreak minimisation, workplace preventive measures, export/import case risk management, and public awareness. Non-compliance with these conditions can result in dire consequences, such as a proliferation of cases leading to a second wave and a second lockdown phase.

Public engagement and communication throughout a pandemic are fundamental. The most effective governments have overseen these efforts through a central coordinating body. As governments take countries through the different phases of interventions and strategies, clear, concise and consistent communication can enable the public to understand both the rationale behind decisions and what they need to do. The more people choose to comply with advice or instructions, the less compulsion and enforcement are required. Citizens of different social and economic backgrounds need to adhere to the same intervention approaches. It is important that the communication strategy is integrated with the overall strategy to help citizens understand the bigger picture of why a decision was made and how it will contribute to the welfare and healthcare of the public.

Our research has found that people and their governments are, for the first time, equal players at the frontline. Unless responsible leadership is met with public responsibility, the success of any combination of interventions, in any selection of countries, would be unable to withstand the pandemic. This publication focuses on countries where strong leadership is met with a responsive public.

1. The world as we now know it: Current impact of COVID-19

1.1 Chronology of events

The global impact of the COVID-19 pandemic has been unprecedented – it has changed the global economy and society drastically within a short period of time. Governments and business leaders around the world have been forced to combat this highly infectious disease through strategies and initiatives which have required expertise, funding and resources, in many cases well beyond available means. The COVID-19 timeline below reveals a lack of preparedness and coordination in many countries.

Since the discovery of COVID-19 on 31 December 2019, more than fifteen million people have been infected,⁴ 637,221 deaths have been recorded, nearly half of the global workforce are at risk of losing their livelihoods⁵ and social, behavioural and religious norms have changed significantly. Various important and welcome initiatives to contain the virus and support the world economy have been advanced by global development financing institutions, philanthropists and individual governments. However, these initiatives have not prevented many countries from being overwhelmed by the pandemic.

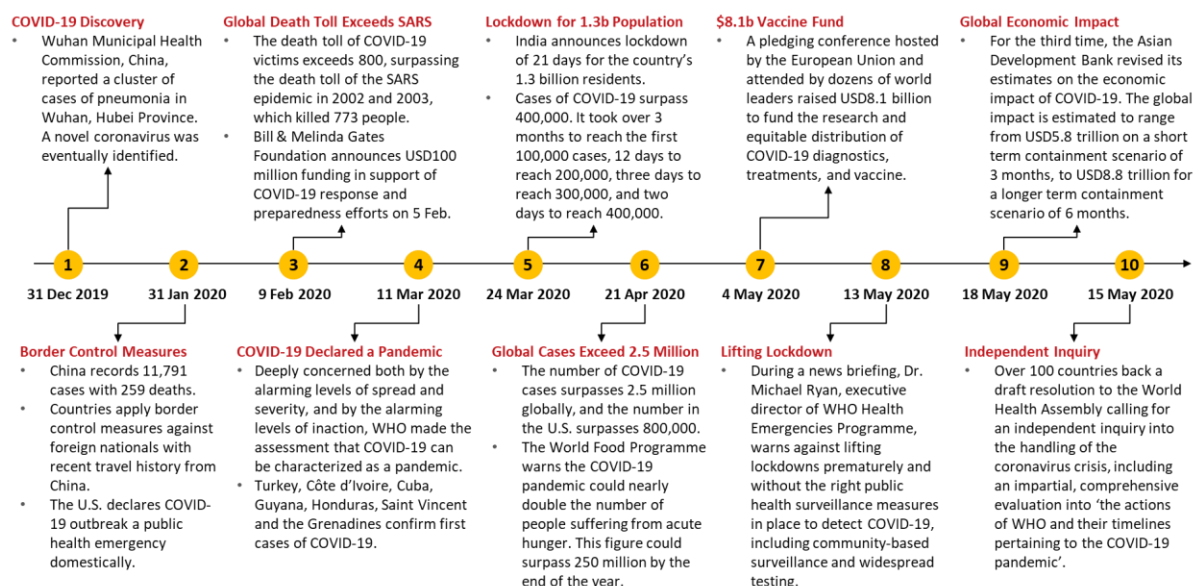


Figure 2: High-level COVID-19 early stage timeline⁶

The high-level timeline of events that took place in the earlier stages of the spread of the virus shows that it took the virus a little more than a month after its first discovery to record a higher death toll than Severe Acute Respiratory Syndrome (SARS). The severity of the issue prompted the Bill and Melinda Gates Foundation to donate USD 100 million to support COVID-19 response and preparedness, even before it had been declared a global pandemic by the WHO. By the end of

⁴ Our World in Data, 24th July 2020

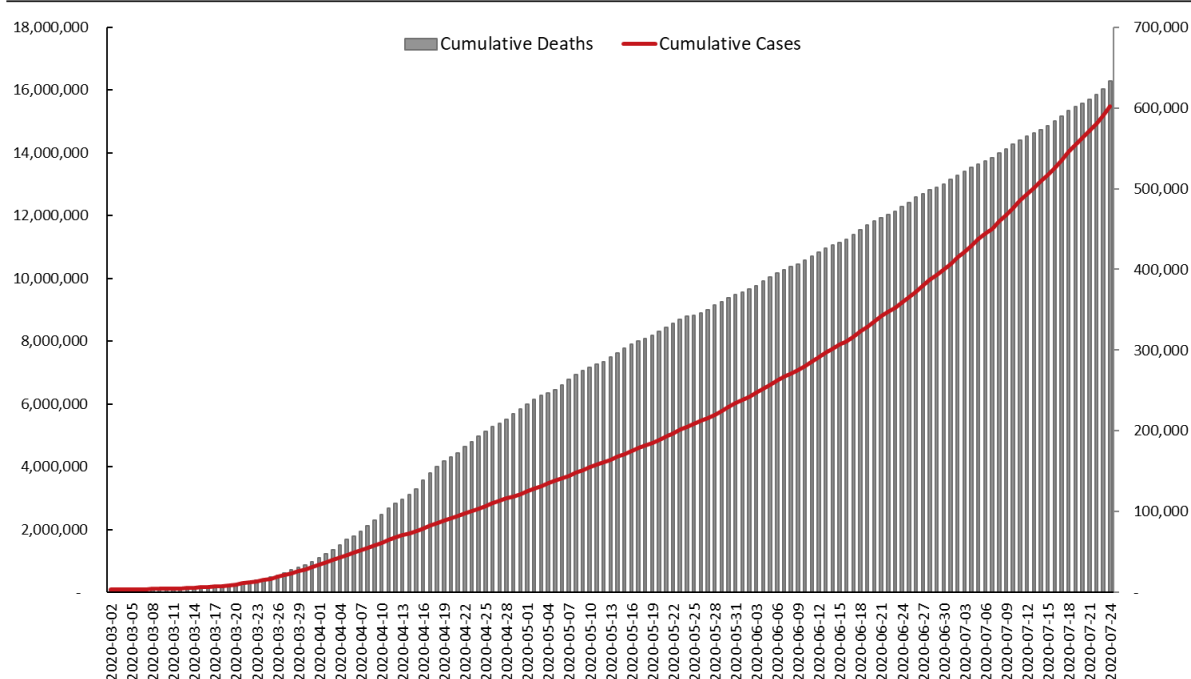
⁵ COVID-19: Stimulating the economy and employment, International Labour Organization (ILO), 29 April 2020

⁶ COVID-19 – a timeline of the Coronavirus outbreak, Devex.com

March, the continuous spread and severity of the disease led to the world's largest COVID-19 lockdown in India, a country with 1.3 billion people.

Today, efforts to develop a vaccine are continuing at pace; world leaders and private donors have pledged more than USD 8.1 billion to develop a COVID-19 vaccine, diagnostics and treatment. A number of expert groups are concurrently working on development of vaccines both in academia and among biotech and pharmaceutical companies. While a 12- to 18-month vaccine development timeline was initially estimated, these estimates are regarded as ambitious, given that a timeline of 24 to 36 months would still represent a record in vaccine development. The 12- to 18-month timeline assumes that a vaccine progresses through all stages of testing without encountering significant issues.

Total Global COVID-19 Cases and Deaths
Cumulative



Source: Our World In Data – Coronavirus (COVID-19) Cases

Figure 3: Total COVID-19 cases and deaths

At time of publication, the number of global cases and deaths are still on an upward trajectory, despite many countries recording improved recovery rates. However, many countries have been unable to flatten the curve as rapidly as other countries, despite implementing strict measures. The explanations for these variations in performance include factors such as a lack of public compliance or ineffective government coordination and implementation. In some cases, intentionally unconventional approaches, such as that of Sweden, which opted for a herd immunity approach, affected the outcomes. It is quite clear that countries need to learn rapidly and deeply from the experiences of others as they strive for more effective co-ordination and implementation. This, in turn, will enable greater public cooperation during the potentially lengthy period in which a vaccine is under development. Indeed, if it takes 24 to 36 months to complete the development of a vaccine, this will pose a significant challenge to governments as they seek to manage the pandemic effectively, generate renewed economic growth and ensure social stability.

1.2 Responding to COVID-19

Despite the magnitude of the challenge, the evidence is clear that a number of governments have implemented effective strategies that have enabled recovery at a pace significantly above other countries. These governments have demonstrated exemplary leadership in decision-making, communication and coordination. Data from the GCI Recovery Rating⁷ has helped to identify those countries. The effective practices they have applied fall within the categories of testing, contact tracing, movement restriction, easing restrictions and public engagement, among others.

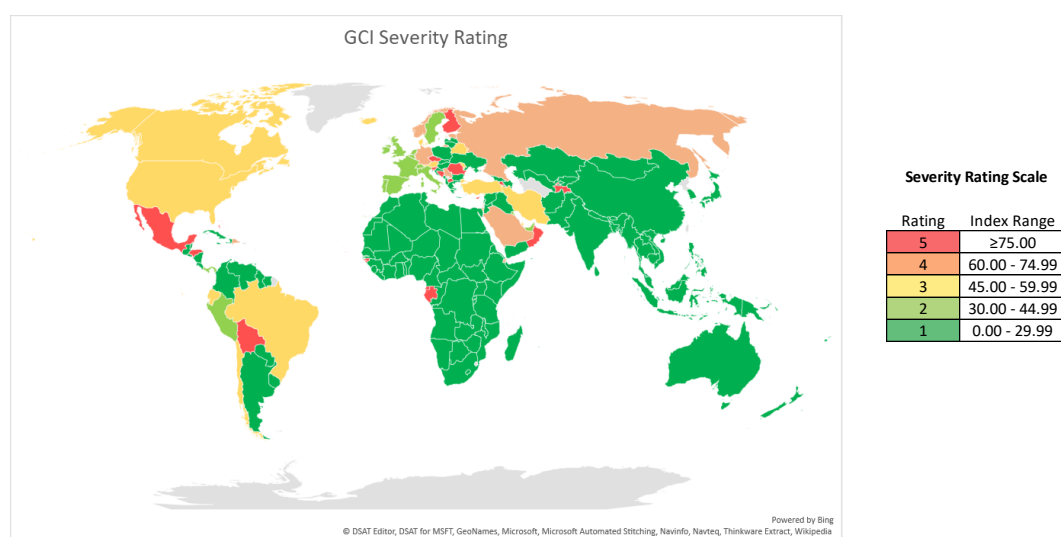


Figure 4: GCI Recovery Rating

Whilst the development of a vaccine is still underway, countries can learn from the emerging evidence what works in these key categories. Governments can assess the potential effects of the different interventions and prepare appropriate strategies and initiatives commensurate with the resources they have available. Although other social and economic factors contribute to the success and effectiveness of a country's response, the five effective practices can be regarded as the foundational measures to be adopted by countries to combat COVID-19.

1.3 The need for fast learning between countries: The Global Pathfinder Initiative

Given the urgency to act swiftly during this unprecedented time, governments would benefit from learning quickly from effective strategies that have been implemented by others. There is as yet no standard playbook to shape the fight against COVID-19. However, by sharing the experiences of countries that have demonstrated an effective response, we can ensure other countries learn fast and reduce the time taken to respond to emerging challenges presented by COVID-19.

The GPF initiative has pulled together effective practices from around the world to provide countries with solutions to manage this challenging situation. The GPF initiative taps a wealth of impactful interventions from countries on the path to recovery. Given the changing nature of the pandemic, the rapid sharing of effective practices will enable countries to make better decisions. Lessons learnt

⁷ Global COVID-19 Index (GCI) – more details in Appendix A

will facilitate cross-regional fast learning and serve to increase the chances of effective delivery in specific contexts. It will also enable countries to avoid errors that others have made. Whilst the adoption of interventions will rightly differ across countries and contexts, the lessons learnt will no doubt help to guide decision-making as governments consider their next steps.

The GPF initiative has analysed interventions in countries that have ranked highly in both the severity and the recovery Indices of the GCI. The high-performing countries selected for review and analysis consist of low-middle, middle- and high-income countries with a range of population sizes across the world. Sweden has also been included in the research due to its unique approach to managing the spread of the virus.

Country/ Region	GCI Recovery Ranking ¹	GCI Severity Ranking ¹	OxCGRT Stringency Rating ²	Income Group	Population Group	GCI Recovery Index
Australia	1	177	70	High	10-50m	<ul style="list-style-type: none"> Indicates how well a given country is handling the COVID-19 crisis from a health/safety perspective. Estimates when a country is on the road to recovery, allowing opportunity to lift restrictions.
Thailand	2	181	83	Upper Middle	50-100m	
Hong Kong, SAR, China	3	179	65	High	1-10m	
South Korea	4	175	39	High	50-100m	
New Zealand	5	173	35	High	1-10m	
Taiwan	6	182	22	High	10-50m	
Iceland	7	27	52	High	<1m	
Malaysia	8	164	74	Upper Middle	10-50m	GCI Severity Index <ul style="list-style-type: none"> Measures how severe a situation is in a country, given its healthcare system's ability to contain and cope with the COVID-19 outbreak. This index acts as an early warning sign.
Denmark	9	28	61	High	1-10m	
Latvia	10	131	NA	High	1-10m	
Switzerland	11	12	70	High	1-10m	
Lithuania	12	80	NA	High	1-10m	
Vietnam	13	176	61	Lower Middle	50-100m	
Macao, SAR, China	14	180	70	High	<1m	
Slovakia	15	168	NA	High	1-10m	OxCGRT Stringency Rating <ul style="list-style-type: none"> An aggregation of scores which measures the stringency of several different policy responses governments have taken to combat the COVID-19 outbreak.
Austria	16	33	48	High	1-10m	
Germany	17	36	78	High	50-100m	
Croatia	18	87	52	High	1-10m	
Finland	19	53	57	High	1-10m	
Luxembourg	20	6	48	High	<1m	
Sweden	155	17	39	High	1-10m	

Note: Ranking is accurate as of 17 May 2020. Changes in ranking are expected due to the dynamic nature of the data.

Figure 5: GCI Recovery Ranking – top 20 countries and Sweden

Sweden has been included in the list because it has consciously adopted an unconventional approach to addressing the COVID-19 pandemic. Whilst the majority of countries have imposed institutional lockdowns and movement control orders to prevent public spread of the infectious disease, Sweden has adopted a distinct and more relaxed approach, anchored in public cooperation and personal responsibility. To ensure minimal disruption to social norms and maintain economic activity, a herd immunity model has been adopted, enabling businesses and public services to resume operations. However, basic guidelines on social distancing and restrictions of gatherings of over 50 people have been imposed.

In comparison to other Scandinavian countries, Sweden has recorded the most cases and highest number of deaths. The country acknowledges that it has adopted a relaxed approach to build resistance and immunity in the long run, while its neighbours - such as Norway, Finland and Denmark - have imposed strict lockdowns and measures similar to other countries to contain the spread of the virus. Sweden has received praise for being able to preserve economic stability and

continuity, and for keeping its per capita death rate lower than those of Belgium, France, Italy, the Netherlands, Spain and the United Kingdom. Hence, the inclusion of Sweden in the analysis is important to provide insight and information that may contrast with the overall findings, but at the same time, highlight some effective practices.

2. Lessons learnt: Effective practices to manage the COVID-19 pandemic

Various interventions have been introduced by governments around the world to contain the spread of COVID-19, from mass testing and the imposition of restricted movement orders to the deployment of technology-driven track and trace initiatives. Each intervention has advantages and disadvantages, and each is applied and governed differently in different countries. In the countries which have been most effective in managing the spread of the virus so far, the application of a range of complementary strategies has been a common factor. Several common effective practices have been identified.

This first version of the GPF report focuses on interventions and practices designed to improve the health recovery of countries; it does not focus on understanding the impact of economic stimulus or on policies on economic recovery, which will take longer to become apparent. The next phase of research will focus on the economic impact of interventions.

The analysis of effective practices in successful countries reveals the impact of interventions in the areas of testing, contact tracing, movement restriction, easing of restrictions and public engagement. It identifies common successful practices. Countries that have excelled in COVID-19 health recovery have deployed all five health recovery-related interventions at a rapid pace.

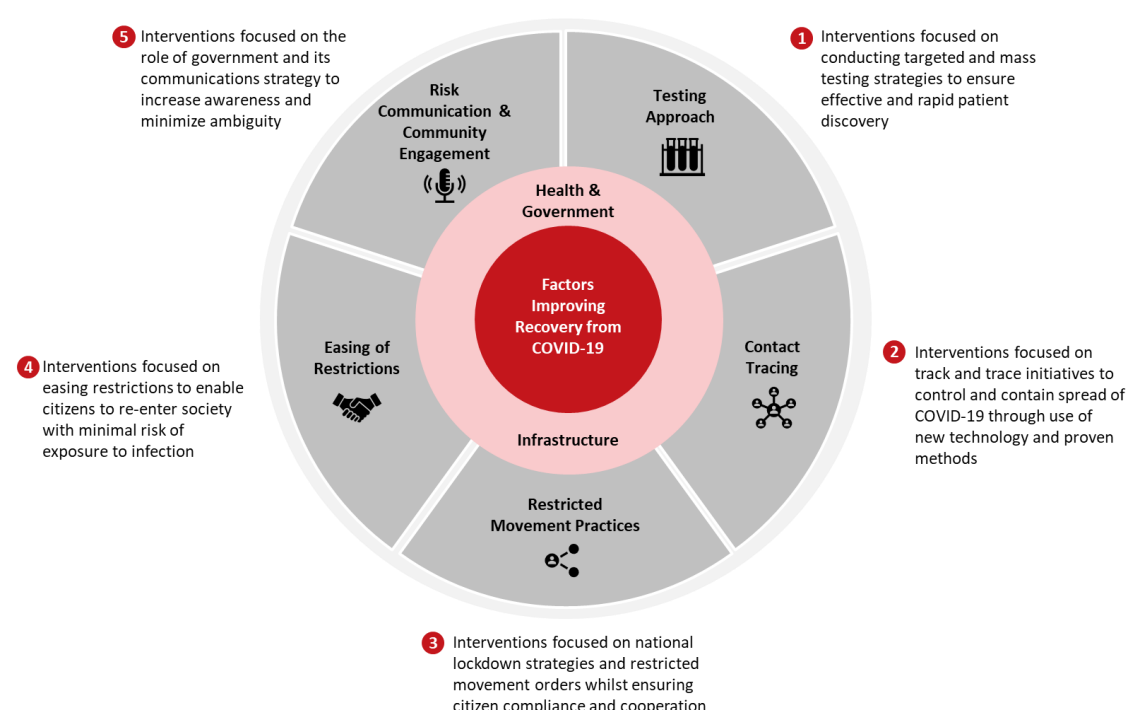


Figure 6: COVID-19 health recovery interventions

Not all countries ranked in the top 20 applied equal weight to each of the five intervention categories. However, all countries prioritised them and managed to deploy sufficient resources to ensure all five were addressed purposefully. At the time of writing, the top 20 countries (identified as of 17 May 2020 from the GCI) continue to record improvements in recovery with little indication of suffering from a second wave of infections. Although there were instances of countries and regions (such as South Korea) dealing with a spike of new infections as a result of easing restrictions, they were addressed rapidly with appropriate stringent measures and, to date, South Korea has managed to contain the spread of COVID-19 successfully.

The five intervention categories are not presented in priority order and are viewed as having equal importance in the fight against the COVID-19 pandemic. Through strategic and coordinated delivery across the five intervention categories, other countries can aspire to levels of effectiveness similar to these countries.

The importance of these interventions is summarised below.

1 Testing Approach

- A successful testing approach leads to rapid identification of cases, quick treatment of patients and immediate isolation to prevent mass spreading and/or the formulation of clusters in different areas.
- In the broader context of public health, it enables healthcare investigators to understand the prevalence and contagiousness of the disease and develop purposeful mitigation strategies as a result.

2 Contact Tracing

- Contact tracing is critical in the beginning and throughout the recovery phase of the pandemic to ensure any outbreak is contained.
- Contact tracing contributes to countries' efforts to 'flatten the curve' successfully by identifying and isolating infected individuals, and by reducing the risk of further transmissions from asymptomatic contacts.
- Contact tracing is the most effective measure to identify 'patient 0' in a new cluster, and makes it possible to anticipate and minimise the impact of further outbreaks.

3 Restricted Movement Order

- Restricted movement orders ('lockdowns') prevent local transmission through public and social gathering and restrict the spread of the disease.
- They slow down the spread of the pandemic and help reduce peak healthcare demand while simultaneously protecting those most at risk from infection.
- They are the easiest, fastest and most effective measure a government can put in place to ensure all citizens are safe from exposure.

4 Easing Restrictions

- After a period of lockdown, easing restrictions leads to responsible, controlled and gradual transition of individuals and businesses back into activity, without compromising safety.
- It prevents a second wave of infections through clear SOPs and regulations enforced by the government.
- It ensures citizens are protected from potential new infections on the basis of analysis of active cases, infection rates and other risks involved.

5 Risk Communication and Community Engagement

- The establishment of a single and trustworthy platform for government leadership to communicate its strategies and implementation plans is a vital component of any successful strategy to contain COVID-19.
- Consistent, regular, scheduled and transparent public communication enables the public to understand the severity of the existing situation and remain informed of measures being undertaken by the government to ensure cooperation and compliance.
- Effective communication and engagement minimises ambiguity, confusion and panic among citizens, which might otherwise lead to public unrest and non-compliance with critical advice.

2.1 The place of testing in the management of COVID-19

2.1.1 Setting the context

How can testing help reduce the spread of COVID-19?

An effective testing approach provides a crucial window into the pandemic and enables better understanding of how the virus spreads. Testing allows countries to identify infected individuals and guides the medical treatment that they receive. It enables the safe isolation of all people infected, and the subsequent tracing and quarantining of their contacts. It can also help allocate medical resources, equipment, funding and staff more efficiently.

In addition, testing for COVID-19 also deepens knowledge of the pandemic and the level of risk it poses within different populations. This is crucial to equip countries with knowledge to assess the interventions that need to be implemented, including comparatively costly interventions such as social distancing and the shutdown of entire regions and industries.

Testing coverage and the number of tests per confirmed case help countries understand the severity and spread of the coronavirus better. The number of tests per confirmed case is known to be the most helpful indicator in this regard, because it accounts for the fact that smaller outbreaks require less testing. Testing coverage depends on the strategy a country employs - mass testing or targeted testing. Which approach a country chooses is highly dependent on available capacity and resources.

Mass testing is generally offered to every individual in the country, regardless of level of risk, socio-economic background, immigration status or geographical location. Hence, mass testing is more widespread, and consequently, more expensive to the government. Targeted testing, by contrast, focuses on specific groups of individuals based on a set of criteria. For example, it might be offered to only those with symptoms, to overseas travellers entering the country or to individuals who have had contact with confirmed COVID-19 cases.

Several top recovering countries, including New Zealand, Iceland and Germany, are actively conducting mass testing as they move to more advanced stages of recovery. Other recovering countries, such as Singapore, Canada and Tunisia, are still pursuing targeted testing.

When COVID-19 diagnostic tests are available, people who test positive and have symptoms can receive earlier care. Contacts can be traced, and self-isolation or quarantine can commence sooner to help stop the spread of the virus.

- However, no COVID-19 test is 100 per cent accurate. It is possible to test negative yet be infected (a false-negative result). When accurate antibody tests become widely available, results will indicate how many people have had COVID-19 and recovered, including those who never had symptoms. This will make it possible to determine who is likely to have immunity.

Different types of tests for COVID-19

There are many different technologies for COVID-19 testing, some currently available and some still in development. Broadly, these different tests can be divided into 3 types:




 Diagnostic test	 Antibody test	 Antigen test
<ul style="list-style-type: none"> • This is a test to establish whether an individual is currently infected with COVID-19. • The most common way is with a polymerise chain reaction (PCR) test. • This test uses a sample of mucus typically taken from a person's nose or throat. It looks for the genetic material of the coronavirus. • PCR testing is currently the most reliable method for COVID-19 diagnosis. • Tests are generally sent to centralised labs for analysis, so it can take several days for results. 	<ul style="list-style-type: none"> • This is a test to identify people who have previously been infected with the coronavirus. • This is a blood test (based on a drop of blood taken from the finger). It looks for antibodies to the coronavirus. • Generally, the antibody test is not sufficiently reliable for doctors and researchers to act on the results. • However, it can still provide good information about rates of infection in a community. • These tests can produce results within minutes after testing. 	<ul style="list-style-type: none"> • This is a test to identify people who are currently infected with the coronavirus. It can be used as a test to quickly detect active infections. • Antigen tests can identify the virus in nose and throat secretions. It achieves this by searching for proteins from the virus (as opposed to the diagnostic test, which looks for genetic material). • It is not as accurate as the PCR diagnostic test. However, it is possible for antigen tests to be used to screen patients for infection.

Figure 7: Types of testing for COVID-19⁸

Analysis on COVID-19 testing statistics for select countries

Analysis on test data was conducted on a selection of countries which included high-income, upper middle-income, lower middle-income and low-income countries, as well as those with both high and low recovery rates.

A key question to ask is: How many tests should a country conduct to find one COVID-19 case? There is a significant difference across countries on testing coverage for each confirmed case.

⁸ Source: *How Reliable Are COVID-19 Tests? Depends Which One You Mean*, 1 May 2020, npr

- Some countries, such as New Zealand, Iceland, Australia and Taiwan do hundreds of tests for each case that they find.
- Others, such as Indonesia, Nigeria, and Peru only do a handful of tests – ten or fewer – for every confirmed case.

Number of COVID-19 tests per confirmed case for select countries under different income groups

Latest available data as of 17 May 2020

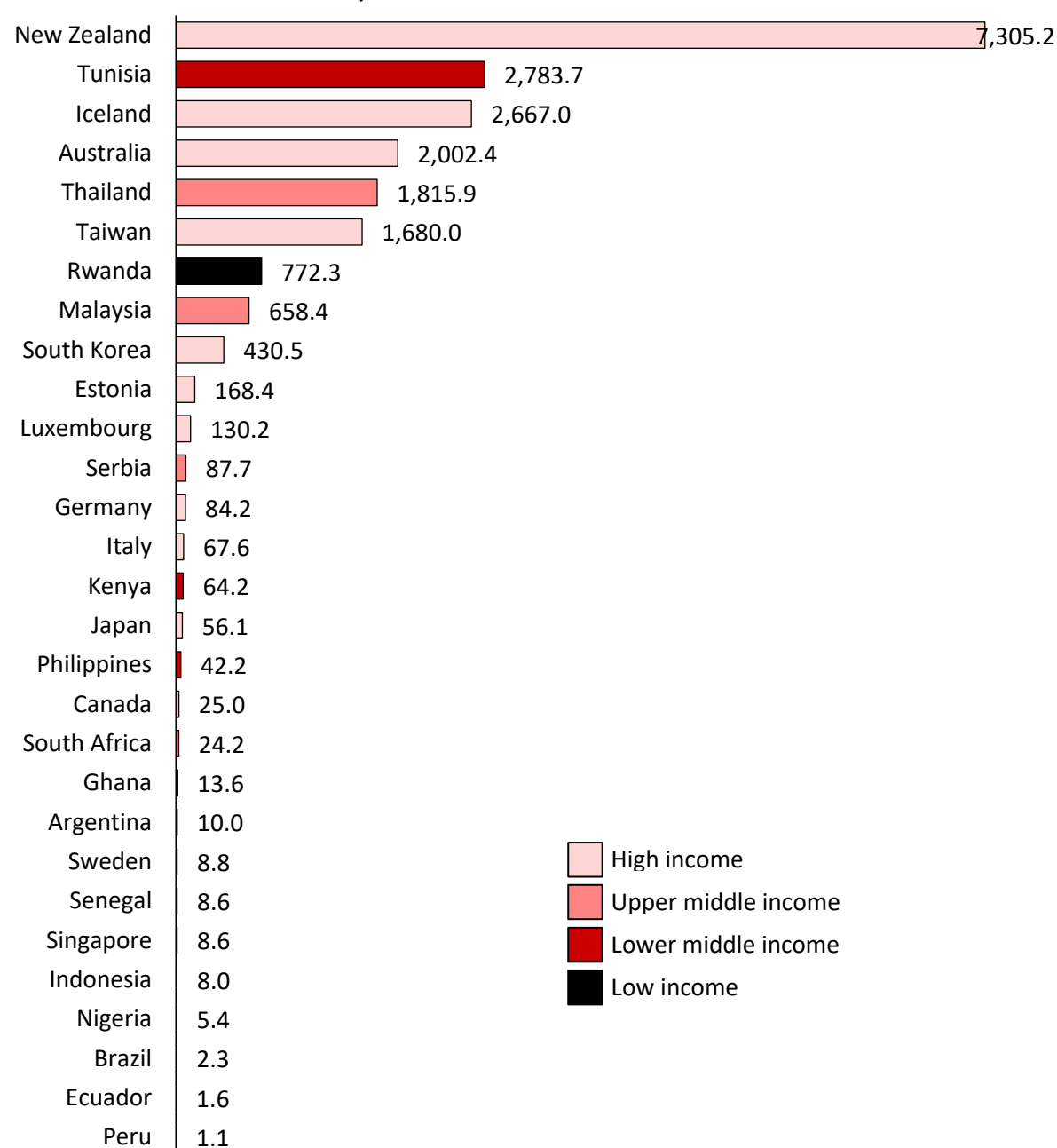


Figure 8: COVID-19 testing statistics for select countries

Source: Official sources collated by Our World in Data [1]

Note: Tests per confirmed case is defined as the number of tests conducted over the number of positive COVID-19 diagnoses. This measurement provides a good assessment of how widely countries are testing by comparing the number of tests performed to find a COVID-19 case.

Based on testing data as of 17 May 2020, New Zealand tops the list for number of COVID-19 tests per confirmed case, followed by Tunisia, Iceland, Australia, Thailand and Taiwan.

Number of COVID-19 tests per confirmed case for top 20 GCI countries and Sweden

Latest available data as of 17 May 2020

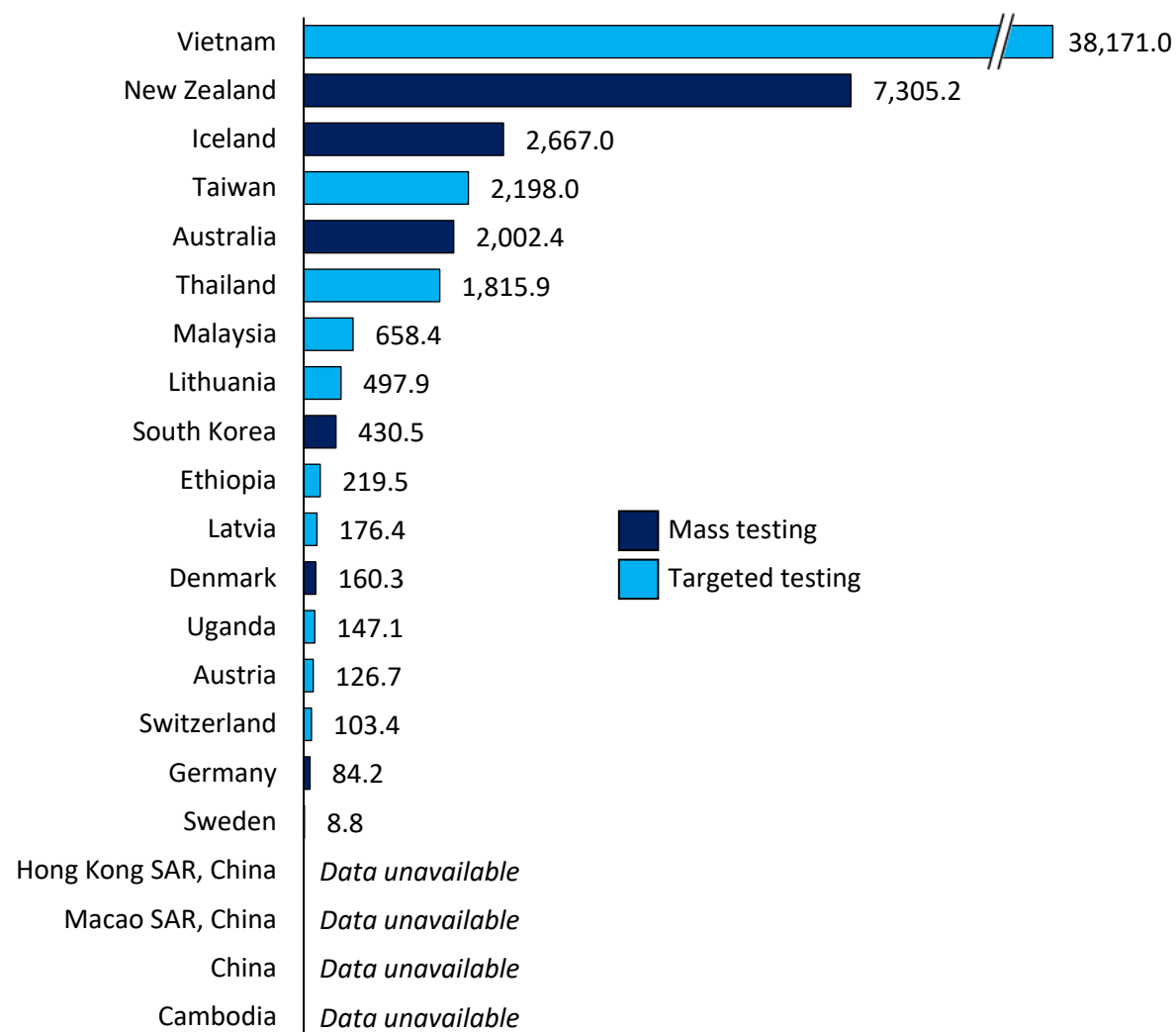


Figure 9: COVID-19 testing statistics for top 20 GCI countries and Sweden

Source: Official sources collated by Our World in Data [2]

2.1.2 Key findings from the analysis

Key finding 1: Strategic testing is key to understanding the spread of the infection.

- Testing strategies that focus on high-risk and susceptible individuals within the population in order to identify infection clusters, high-risk communities, and targeted areas for testing are important in enabling the government to take immediate action to break the transmission chain.
- Given the importance of rapid response at the beginning of the outbreak, the timing of testing is crucial; a high rate of testing will do more to slow the outbreak if conducted early on when there are fewer infections. Until an effective vaccine or treatment is available, strategic testing continues to be critical in managing public health recovery.

Countries can benefit by setting themselves up to commence testing activities early in the outbreak of a communicable disease. A rapid response through testing leads to quick identification of cases and prompt treatment for identified cases. Early testing also helps identify individuals who have been in contact with those infected; treatment or quarantine can then follow.

Since the beginning of the coronavirus pandemic, the WHO has emphasised the importance of testing, which needs to be complemented with an effective track and trace approach, in the fight to contain and reduce the impact of COVID-19.

In addition to early testing interventions, there are benefits in ensuring the proportion of the population tested is significant. Mass testing is a fundamental practice of typical pandemic response. Historically, it has been widely adopted as a mitigation model. Mass testing helps limit the spread of the virus and paves the way for a range of measures to flatten the curve of cases and deaths.

Countries that do very limited tests per confirmed case may not find and identify all cases. The WHO has suggested around 10 – 30 tests per confirmed case as a general benchmark of adequate testing.⁹

In the early stages of a pandemic, when clusters are typically few and far between, three interventions are crucial: identifying infected individuals; identifying their household cluster and tracing individuals they have been in contact with; and quarantining them until they no longer carry the risk of transmitting the infection.

Even at a later stage of the outbreak, building the capacity for mass testing and isolation can continue to separate infective and non-infective individuals and communities - allowing health and economic recovery to take place simultaneously. Individuals that test negative and have not been exposed, for instance, can continue to engage in economic activities as opposed to being in total lockdown.¹⁰ Although building capacity for mass testing is expensive, the longer-term economic benefits can be worth it.

Effective mass testing also helps protect health workers and enables officials to measure the progression of a pandemic. It can provide evidence about regional variation and how the virus affects people of different ages and genders. Virologists can use information about cases to monitor the nature of the virus and any mutations. This valuable testing data can show social and behavioural scientists whether other measures such as physical distancing are working.

⁹ Dr. Michael Ryan, WHO Media Briefing (30 March 2020)

¹⁰ Paul Romer's Case for Nation-wide Coronavirus Testing, The New Yorker, May 3, 2020

Testing processes also need to go hand in hand with aggressive contact tracing via effective track and trace mechanisms in order to keep the infection rate to a minimum. Individuals who may have been in contact with an infected patient are likely to have greater risk of COVID-19 infection. Hence, testing and isolating patients with COVID-19 symptoms (together with their identified contacts) helps reduce the risk of the virus spreading.

In cities with dense living conditions, which make social distancing measures harder to practice within the community, it makes sense for the testing strategy to be more aggressive and rigorous.

Effective Practice Case Study: New Zealand

Testing before confirming its first COVID-19 case enabled New Zealand to win in the fight against the pandemic

New Zealand's Ministry of Health reported that they started testing for the novel coronavirus on 22 January 2020, four weeks before the country's first confirmed case. As of 17 May 2020, New Zealand, which has a population of only five million, had tested 230,718 people with a positive rate of 0.7 per cent. As a result of this early intervention, New Zealand had the highest number of tests per confirmed case in the world at 5,950. Testing has been focused on people with symptoms, as well as on tracing both close and casual contacts.

Active Cases vs Cumulative Testing (New Zealand)

GCI Country Rank: 5th

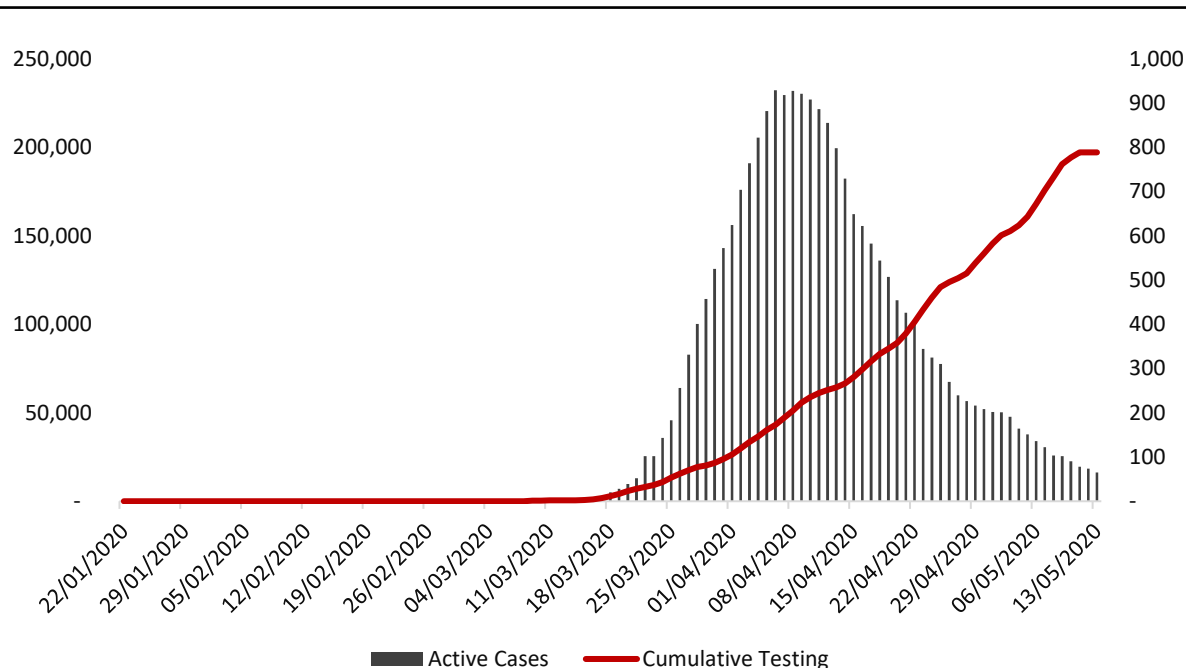


Figure 10: Active cases vs number of tests conducted - New Zealand

Highlights:

- In addition to being quick to enact lockdown measures, New Zealand worked hard to ramp up testing. At its peak, the country had the capacity to process up to 8,000 tests per day, resulting in New Zealand having one of highest testing rates per capita in the world at 1.06 tests per thousand people.¹¹

¹¹ New Zealand Ministry of Health

- Based on WHO's general benchmark of adequate testing (between 10 – 30 tests per confirmed case), New Zealand has performed remarkably well. As of 17 May 2020, it has conducted over 7,300 tests per confirmed case, which suggests that there is no undetected widespread community transmission in New Zealand.¹²
- New Zealand introduced more widespread testing as their response evolved. The Ministry of Health arranged testing for specific communities who are at higher risk of contracting the virus, such as those in aged residential care facilities and healthcare workers. At the time of writing, testing samples from sewerages was also being considered to monitor control and elimination.
- As New Zealand moves towards zero community transmission and eliminating the virus, caution needs to be noted over the drop in testing rates; as fewer people present with symptoms and as they resume normal activities (i.e. work and school), reduced community awareness of the need for testing may lead to lower rates of uptake.

Effective Practice Case Study: Malaysia

Early targeted testing led to the discovery of clusters in Malaysia

During Malaysia's early coronavirus infection wave in January and February 2020, Malaysia's Ministry of Health conducted random testing of people with flu symptoms and adopted extensive contact tracing to identify people who needed to be screened for COVID-19. This early strategy enabled the Ministry to identify clusters effectively, which were then prioritised for targeted mass testing. This provided the government a clear picture of community transmission and overall virus spread, while exerting effort to expand its nationwide testing capacity.

Since the end of March 2020, identified COVID-19 hotspots have been placed under strict quarantine measures via the enhanced movement control order (EMCO), and mobile testing deployed to test all residents regardless of symptoms. It has also enabled and encouraged undocumented immigrants to be tested and obtain healthcare services without recrimination.

As of May 2020, Malaysia had tested over 500,000 individuals for COVID-19, which translates to 16.65 tests per thousand people, with a positivity rate of 1.45 per cent.¹³

Highlights

- Malaysia's Ministry of Health has been using a targeted approach in deploying its COVID-19 testing due to the significant cost that would have been required to test everyone in the country.
- Through early detection and screening of high-risk target groups, Malaysia has been able to gradually reduce the number of active COVID-19 cases, as shown in Figure 11.
- The targeted approach to active case detection conducted by the Ministry has identified eight key groups effectively so far, namely:
 - Participants of a religious assembly and their close contacts
 - Students and staff of *madrasah and tahfiz*¹⁴ schools linked to the religious assembly
 - Malaysians returning from overseas and placed in quarantine centres
 - Healthcare staff
 - Residents within areas placed under the EMCO
 - Kuala Lumpur wholesale market and other linked wet markets

¹² How New Zealand eliminated Covid-19 after weeks of lockdown, CNN, 28 April 2020

¹³ Ministry of Health Malaysia

¹⁴ Madrasah and tahfiz schools are terms for religious-based schools for Islamic education in Malaysia

- Foreign workers on construction sites within red zones¹⁵
- Nursing homes for the elderly
- By prioritising specific target groups, Malaysia has also been able to expand its overall testing capacity via the optimisation of existing government-run testing facilities, establishing new testing facilities, and authorization of private laboratories to run diagnostic tests for paying and insured individuals.
- As of 1 June 2020, Malaysia's Ministry of Health's proactive effort in testing has successfully expanded daily testing capacity to 29,789 PCR tests. This capacity would be further supported by the employment of the Rapid Test Kit Antigen (RTK Antigen), which would be prioritised for cases that require fast turnaround time, such as for the transiting travellers at the airports.



Detection of largest COVID-19 cluster in Malaysia

- Malaysia's targeted screening approach in high-risk groups managed to identify its largest COVID-19 cluster on 11 March 2020, which was linked to a mass religious gathering in Sri Petaling mosque.
- The four-day gathering had approximately 16,000 attendees, including about 1,500 from outside Malaysia. Through detection from rigorous contact tracing and testing, the country saw massive spikes in local cases, and an exportation of cases to its neighbouring countries.
- This cluster accounted for 3,369 out of 7,629 confirmed cases in Malaysia, or about 44 per cent, as of 28 May 2020.
- Ministry of Health officials consider the targeted approach screening during the nationwide Movement Control Order (MCO) as a critical success factor in detecting and managing other subsequent clusters.

Photos courtesy of New Straits Times and Free Malaysia Today

¹⁵ Ministry of Health Malaysia defines three categories of Covid-19 zones: Red zones are defined as districts with at least 41 active Covid-19 cases, yellow zones with 1-40 cases, while green zones with zero active case.

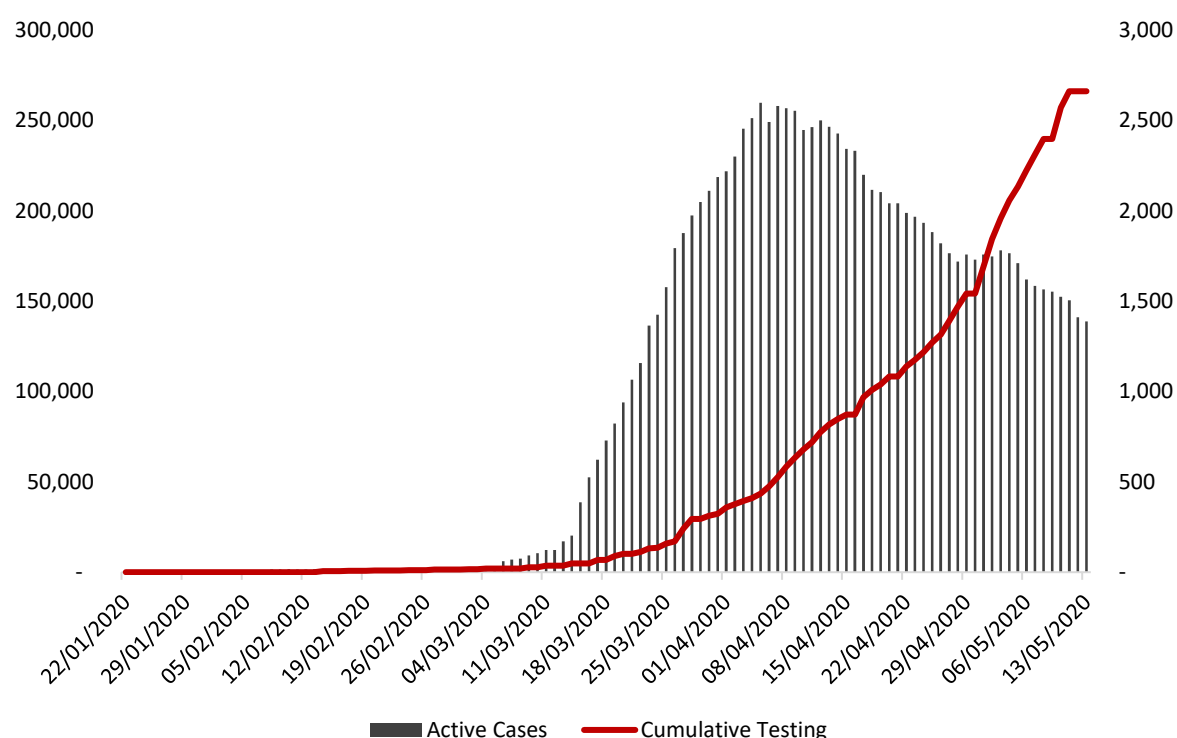


Figure 11: Active cases vs number of tests conducted - Malaysia

Case Study: Indonesia

Insufficient testing is a contributing factor to Indonesia's upward trend in active cases, which indicates there is an undetected chain of infection in the community

Government data as of 17 May 2020 indicates that Indonesia had conducted tests on 140,479 people, a rate of about 520 tests per one million people. This is in stark contrast with its neighbours; as we've seen, Malaysia has conducted more than 6,500 tests per one million people, while Singapore has conducted more than 24,000 tests per one million people. With a population of 270 million, Indonesia has one of the lowest testing rates in the world.

Highlights

- The Indonesian government is currently offering free testing at hospitals for people who have been in contact with positive cases or who have visited high-risk areas and present with COVID-19 symptoms. Individuals seeking treatment based on symptoms but without contact history are not eligible for free testing.
- Amid the urgent need for mass testing to contain the spread of COVID-19 in Indonesia, poor people in the fourth-most-populous country in the world have had challenges accessing COVID-19 tests.
- Rapid testing is available at private hospitals in Indonesia but is costly, ranging from USD 50 to USD 1,000 per test. Tests at private hospitals are unaffordable for millions of low-income Indonesians, leading to low rates of uptake.
- Unequal access to testing has led to late diagnosis and preventable deaths due to undetected COVID-19 among the poor.
- As of 17 May 2020, 17,514 people in Indonesia are reported to have been infected, with 1,148 reported deaths.

Despite President Joko Widodo asking for a 50 per cent increase in test rates (to 30,000 per day) in July, the number of active cases has continued an upward trend as shown in

- Figure 12, suggesting that the chain of infection is continuing in the community.

Active Cases vs Cumulative Testing (Indonesia)

GCI Country Rank: 71st

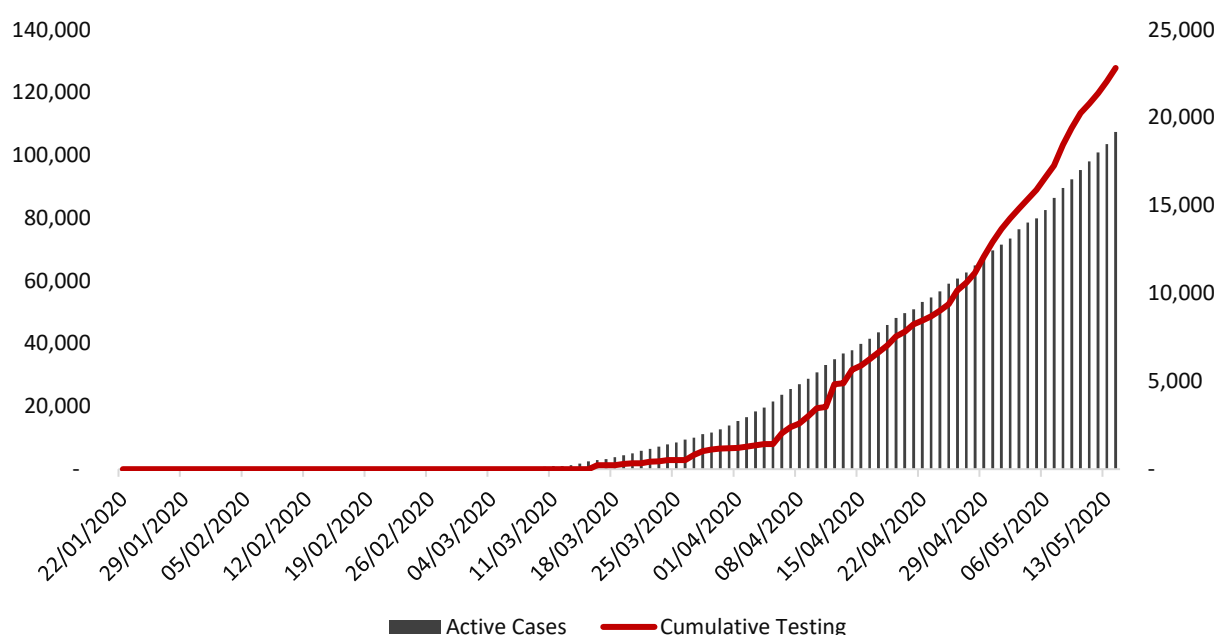


Figure 12: Active cases vs number of tests conducted - Indonesia

Key finding 2: Expansion of testing capacity can be achieved more expeditiously via active partnerships with private laboratories and healthcare providers.

- Unleashing the untapped potential of existing testing capacity at private laboratories, such as local healthcare companies or universities, allows for quicker expansion of testing volume than relying solely on government-owned facilities and services.
- Any limitation in terms of testing equipment, qualified manpower, testing consumables and overall funding can be addressed more efficiently when there is close collaboration between government agencies and the private sector.

With most countries' public health sectors being pushed to capacity in testing and treating COVID-19 cases, an effective method to expand testing capacity is to partner with private sector enterprises. A number of countries have increased daily testing capacity successfully via private laboratories. These countries include Iceland, Malaysia, Australia, Singapore and Denmark.

In Singapore, the biomedical research and laboratory community was mobilised to help ramp up its testing ability. The National Diagnostics Development Hub, established by the Singapore government, integrates researchers, technology transfer offices and industry. It successfully created a test kit for clinical service in February 2020. The test kit includes a pre-packed mix of reagents to test patient samples, which are then deposited into a machine that analyses the results. The procedure helps hospitals and laboratories save time by conducting their own tests. This allows for rapid scaling of testing across Singapore.

In Denmark, a public-private cooperation significantly increased COVID-19 testing capacity. As a result of this significant partnership, within one month the Danish healthcare system managed to almost double its COVID-19 testing capacity from approximately 6,000 COVID-19 tests per day to 11,000 tests per day. As an immediate response to the COVID-19 pandemic a close collaboration between Novo Nordisk, Pentabase and Rigshospitalet was established which led to the rapid development of a new technology that increased testing capacity significantly via faster sample analyses.

Effective Practice Case Study: Iceland

Public-private partnerships increased Iceland's testing capacity by over 130 per cent in less than a week

Iceland has undertaken comprehensive testing for COVID-19; at 17 May 2020, 15 per cent of Iceland's inhabitants had been tested, a higher percentage than in any other country in the world.¹⁶ This is attributed to the testing effort by Iceland Health Authorities and a private company, deCODE Genetics. deCODE Genetics offers free screening for general, non-quarantined members of the public, while more symptomatic individuals are screened at hospital testing facilities.¹⁷

Highlights

- As of 17 May 2020, Iceland has tested 56,834 people, or more than 15 per cent of its 365,000-member population. It has already established a healthcare system that offers publicly funded, universal healthcare and provides a strong base for mass testing to the public.
- However, Iceland's testing rate of over 166 tests per 1,000 people is also largely due to a public-private partnership, which involves a pharmaceutical company (deCODE Genetics) conducting tests on people both with and without COVID-19 symptoms.
- The initiative by deCODE Genetics to conduct large scale testing was intended to gather insight into the actual prevalence of the virus in the community, as most countries are testing symptomatic individuals exclusively.
- Iceland has also placed significant emphasis in conducting extensive contact tracing, leveraging available resources such as nurses and police officers to identify and notify people who had come into contact with others diagnosed with COVID-19. As a result, 57 per cent of all diagnosed cases were among the group already in quarantine.¹⁸
- While Iceland has now reopened to tourists, its targeted border testing has helped identify positive cases early (at least 12 out of 30,000 cases tested positive at the border) and isolate cases that could contribute to a rise in cases across the country.¹⁹

¹⁶ How Iceland Beat the Coronavirus, The New Yorker, 1 June 2020

¹⁷ Iceland's Aggressive COVID-19 Testing Helped Curb Outbreak, Genetic Engineering & Biotechnology News, 16 April 2020

¹⁸ Iceland's Aggressive COVID-19 Testing Helped Curb Outbreak, Genetic Engineering & Biotechnology News, 16 April 2020

¹⁹ DeCODE extends participation in COVID-19 border testing as tourist numbers strain capacity, Iceland Review, 13 July 2020

Active Cases vs Cumulative Testing (Iceland)

GCI Country Rank: 7th

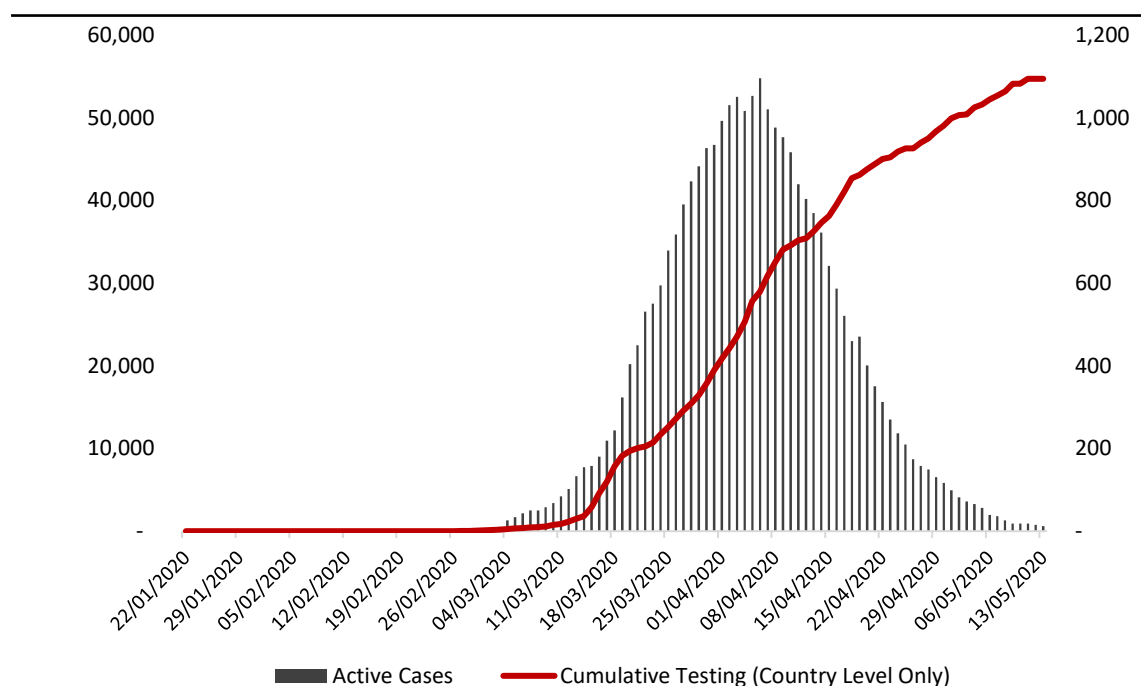


Figure 13: Active cases vs number of tests conducted - Iceland

Key finding 3: Implementation of innovative temporary solutions, e.g. mobile, drive-through and makeshift facilities, significantly increases testing capacity to drive large-scale testing.

- Mobile and drive-through testing facilities are effective in limiting exposure of medical staff and other patients against transmission risk.
- These innovative mobile testing facilities allow for sampling to be conducted on a larger group of individuals.
- This approach also frees up hospitals and healthcare facilities for more serious cases and other healthcare needs.

Many governments around the world have reported limitations in testing capacity. These have hampered efforts to ramp up testing activities. The challenges include the inaccessibility of healthcare facilities due to distance, limited capacity in existing facilities to manage large groups and still comply with social distancing measures, and the difficulty that high-risk, low-mobility groups face in accessing test locations. By establishing mobile and makeshift testing facilities and teams, authorities are able to make testing more easily accessible for the targeted population.

Effective Practice Case Study: Denmark

Mobile testing facilities increased testing capacity by over 100 per cent, to approximately 20,000 people per day

The Danish Ministry of Health is implementing mass COVID-19 testing for all adults in Denmark, effective from 25 May 2020. The initiative is part of Denmark's national testing strategy to prevent a second wave of the coronavirus.²⁰

²⁰ Denmark increases testing, contact tracing to prevent second coronavirus wave, The Straits Times, 12 May 2020

Highlights

- The tests are primarily for asymptomatic adults and are conducted in white tents that TestCenter Denmark has already set up in 16 cities across the country.
- The national testing strategy for Denmark aims to increase testing significantly within the population to break the chain of infection completely. Denmark's total testing capacity increased by over 100 per cent in April and May 2020, with COVID-19 tests offered in hospitals, tents and at mobile testing sites. It can now conduct approximately 20,000 tests per day.
- Until April 2020, Denmark had been testing only those with severe symptoms or related to at-risk people, due to a lack of equipment.

Active Cases vs Cumulative Testing (Denmark)

GCI Country Rank: 9th

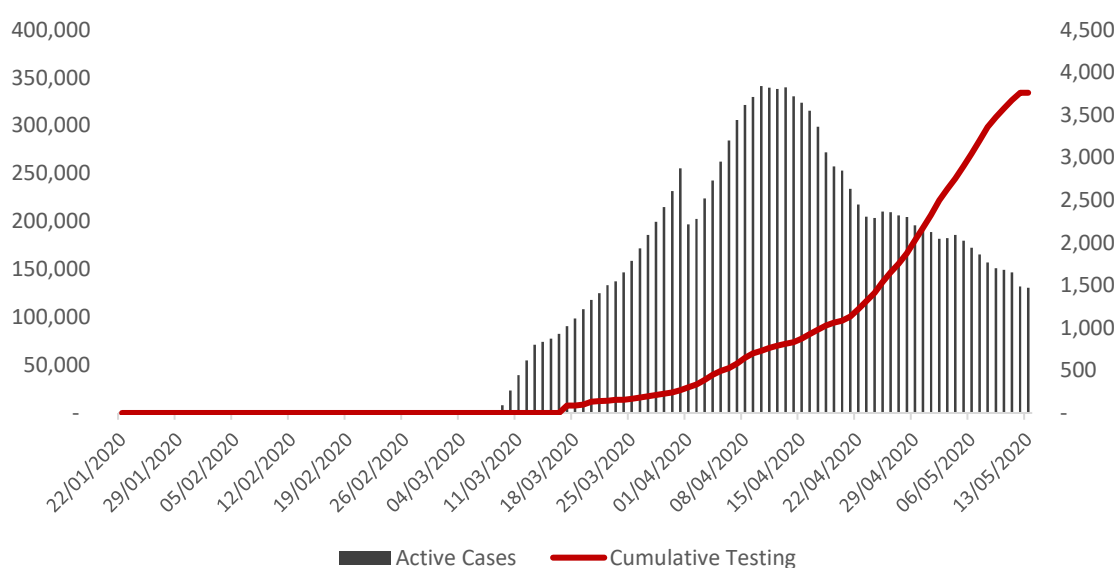


Figure 14: Active cases vs number of tests conducted - Denmark

- Denmark has set up large white tents in Copenhagen and other regions to help expand its capacity for comprehensive testing. They have also ramped up testing at international airports since reopening borders, with rapid tests and the ability for Danish residents to check their results online.

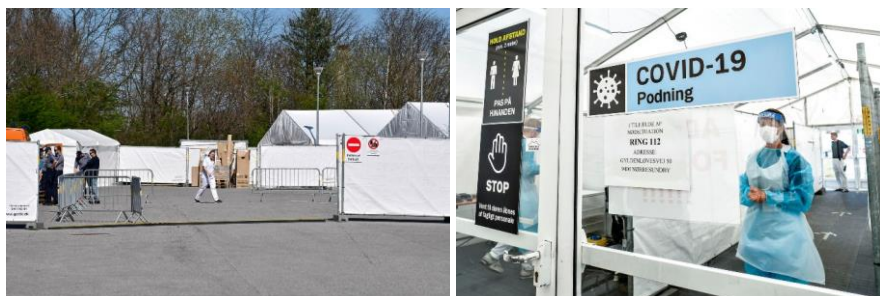


Figure 15: White tent facilities in Denmark for COVID-19 testing

Photos courtesy of The Local (Denmark News)

Effective Practice Case Study: South Korea

Early implementation of drive-through facilities enabled South Korea to achieve a high percentage of tests per population

Mass testing has been credited as a critical success factor for South Korea's containment of the spread of the virus, with the number of active cases declining and consistently suppressed, as shown in Figure 17. As of 17 May 2020, the country has administered 14.24 tests per one thousand people.²¹

Highlights

- South Korea was one of the first countries to implement drive-through testing facilities, which officials say was inspired by the drive-through counter of fast food restaurants.
- The facilities allow individuals to drive into makeshift stations set up in parking lots, where nurses in protective plastic suits, masks and face shields register the drivers, record their temperatures, and use swabs to retrieve samples from their nasal passages and throats.
- With the drive-through concept, passengers and drivers go through the entire testing process in a matter of minutes without getting out of their vehicles.
- This limits the exposure of frontline workers to the virus at the test site, and ensures patients do not contaminate public health facilities. Generally, it is safer and faster to test for the virus at drive-through sites than in a hospital or health clinic as there is less face-to-face contact.
- Test results are communicated to the respective individual via short message service (SMS) within three days.²²



Figure 16: Drive-through screening facility in South Korea

Photos courtesy of abcNEWS (Getty Images) and South China Morning Post (AFP)

²¹ Our World in Data: Total COVID-19 tests per 1,000 people, 17 May 2020

²² South Korea Pioneers Coronavirus Drive-Through Testing Station, CNN, 3 March 2020

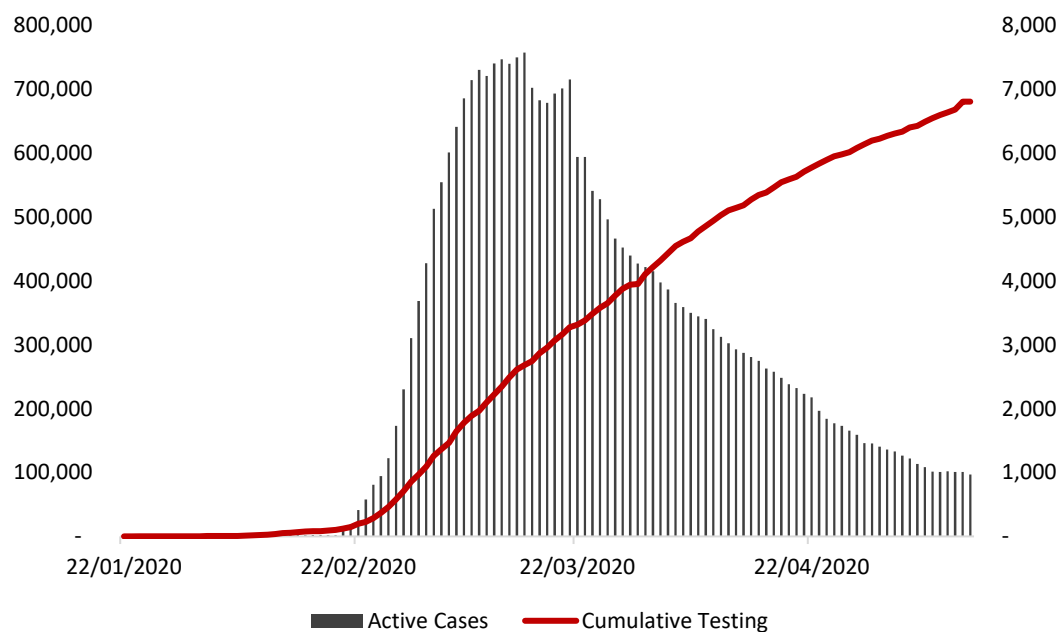


Figure 17: Active cases vs number of tests conducted - South Korea

Mobile/makeshift Testing Facilities in Other Countries



Figure 18: COVID-19 drive-through mobile test centres in Nigeria
Photos courtesy of CNN



Figure 19: Makeshift COVID-19 testing facility in Hanoi, Vietnam
Photos courtesy of VOA News and People's World

Effective Practice Case Study: New York City

Creative redeployment of resources can improve testing and tracing capacity

Despite relatively low levels of testing nationally in the USA,²³ New York City is on track to achieve 50,000 tests per day by 1 August by opening 12 new testing sites,²⁴ launching mobile testing trucks and recruiting over 2,500 contact tracers in early June. As of 20 July the state was carrying out 324 daily tests per 100,000 residents. Capacity for additional testing continues to increase for at-risk individuals, whether in hard-hit communities or those working with non-profits in vulnerable areas. Mayor Bill de Blasio hopes to test all those with symptoms, and high-risk individuals in adult-care facilities, nursing homes and shelters to improve their ability to track and trace and improve the overall health recovery.²⁵

Test and trace strategies at city and state levels have also improved these governments' ability to target high-risk populations. In New York City, a phased plan was developed to provide additional support to senior citizens and nursing home residents that included an initial two-week 'blitz' to provide 3,000 tests each day to nursing home residents and employees.²⁶

Key finding 4: A self-assessment tool that is accessible to the public helps with mass testing prioritisation and triage.

- A self-assessment tool is a cost-effective solution for the first phase triage in priority testing.
- A self-assessment tool is particularly beneficial for countries with significant limitations on funding for mass testing, healthcare system and manpower capacity, and test kit supply shortages.
- All top 20 GCI countries have implemented self-assessment tools that are available online, either provided by the government or private companies. However, there are exceptions for Cambodia, Uganda and Ethiopia where self-assessment tools could not be found online that are specific to those countries.

A self-assessment tool is provided virtually either via the internet, through mobile devices, or is based on a simple flow diagram (example shown in Figure 20) to help the public assess symptoms and determine the risk of infection and level of priority for COVID-19 testing. The tool generally offers guidance on when to seek medical care and what to do should symptoms persist.

Key benefits of implementing self-assessment tool:

- **Easily accessible to the wider population**
A self-assessment tool made available virtually, either online or via mobile technology, is a fast and efficient way to reach a large number of people, especially within a population that has a vast geographical reach with a variety of languages and dialects.
- **Cost effective**

²³ Only 35% of the tests needed to mitigate the spread of the virus are being carried out in the US: NYT, 20 July 2020

²⁴ Coronavirus pandemic in the US, CNN, 26 May 2020

²⁵ Coronavirus NYC Updates for May 2020, Eyewitness News, 9 June 2020

²⁶ Coronavirus News: Mayor de Blasio unveils 4-part plan to protect NYC nursing home residents, Eyewitness News, 21 May 2020

A self-assessment tool is beneficial for countries with significant limitations on funding for mass testing, healthcare system and manpower capacity, and test kit supply shortages. It is a cost-effective solution for first phase triage in priority testing.

Self-assessment tools work best when there are supporting processes that ensure effective application:

- **Established protocols for all levels of assessment outcomes**
The steps to take upon assessment completion can be set out in standard protocols. For example, in cases where a user is assessed as high-risk due to exposure to a confirmed patient, the established next steps should cover further testing, quarantine, treatment and contact tracing.
- **Preparedness of the healthcare infrastructure**
It is important to ensure that the infrastructure is ready to support the required processes upon completion of assessment, such as testing and quarantine/isolation.
- **Accurate and up-to-date information**
As understanding about the virus advances, there may be changes to the assessment parameters; real-time updates will be critical to keep advice and guidance current.

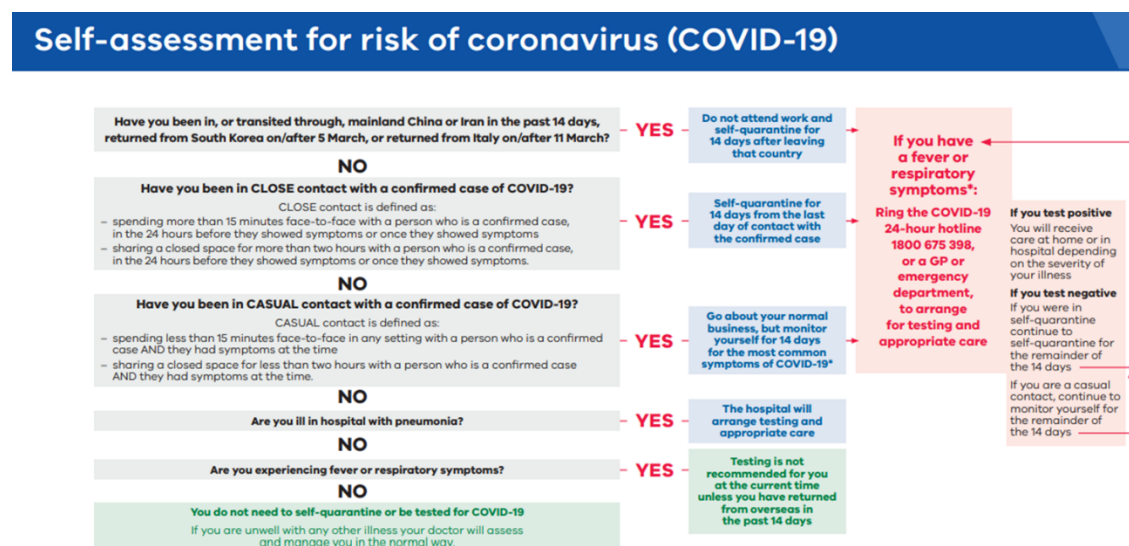


Figure 20: Example of flow diagram for self-assessment of COVID-19 risk by government of Australia

Effective Practice Case Studies in African countries

A number of countries in Africa have applied self-assessment tools

- **Nigeria:** A local private company called Wellvis created a COVID-19 Triage Tool, a free online tool accessible to all to help users self-assess their coronavirus risk based on symptoms and exposure history. Depending on their answers, users are offered remote medical advice or directed to a nearby healthcare facility. The online tool has helped reduce the number of unnecessary and trivial calls to designated disease control hotlines.
- **South Africa:** The South African government has focused its attention to utilising a WhatsApp chat service to run an interactive chatbot which can answer common queries about COVID-19 myths, symptoms and treatment. The chat service is

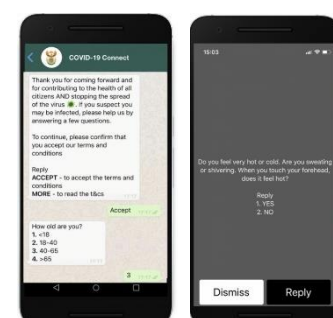


Figure 21: Interactive self-assessment chatbot implemented in South Africa
Photos courtesy of Bloomberg

also available for free on Unstructured Supplementary Service Data (USSD) for people without access to airtime or internet. It has now reached over 6.2 million users in five different languages since it was launched.

Effective Practice Case Study: Rwanda

Rwanda has repurposed HIV testing labs to increase testing for COVID-19

Rwanda provides nearly universal healthcare to its 13 million citizens. After the first positive case of COVID-19 was recorded on 8 March, the government immediately formed and implemented a nationwide response. The country's timely reaction has been aided by its previous success in preventing Ebola from crossing its borders in 2019.²⁷

Highlights

- Rwanda's mass testing approach is intentionally designed to fulfil the conditions set by the WHO for countries before lifting the COVID-19 lockdown. Since the beginning of April 2020, the Ministry of Health has carried out over 15,000 COVID-19 tests, which is 175.1 tests for every confirmed case – one of the highest rates in the world.²⁸ By 16 July over 194,000 tests had been carried out nationwide.²⁹
- Rwanda is increasing its coronavirus testing capacity and capability rapidly through periodic community testing, and sampling in hospitals and clinics across the country. In Kigali, the capital, a random street testing scheme has been introduced as well as a drive-in centre at the national stadium.
- Individuals targeted in this random mass testing exercise are patients who present with influenza-like illnesses and severe acute respiratory infections. The number of those tested is increasing every day. Rwanda is now expanding the target group with those who have been in contact with confirmed cases.
- Despite the proactive and robust government response, the government's capacity to test for COVID-19 is still dependent on the limited capacity of the National Reference Laboratory based in Kigali.³⁰
- The government is also utilising laboratories that normally test for HIV to test for COVID-19, which allows for higher daily testing capacity.³¹

²⁷ Rwanda's Successes and Challenges in Response to COVID-19, Atlantic Council, 24 March 2020

²⁸ Mass COVID-19 Tests Begin as Rwanda Readies for End of Lockdown, The EastAfrican, 25 April 2020

²⁹ Rwanda COVID-19: Places of worship reopen amid targeted lockdowns, Africa News, 16 July 2020

³⁰ Rwanda's Successes and Challenges in Response to COVID-19, Atlantic Council, 24 March 2020

³¹ Rwanda to Start Using HIV Testing Laboratories to Test COVID-19 Samples, RwandaTV, 6 May 2020

Active Cases vs Cumulative Testing (Rwanda)

GCI Country Rank: 22nd

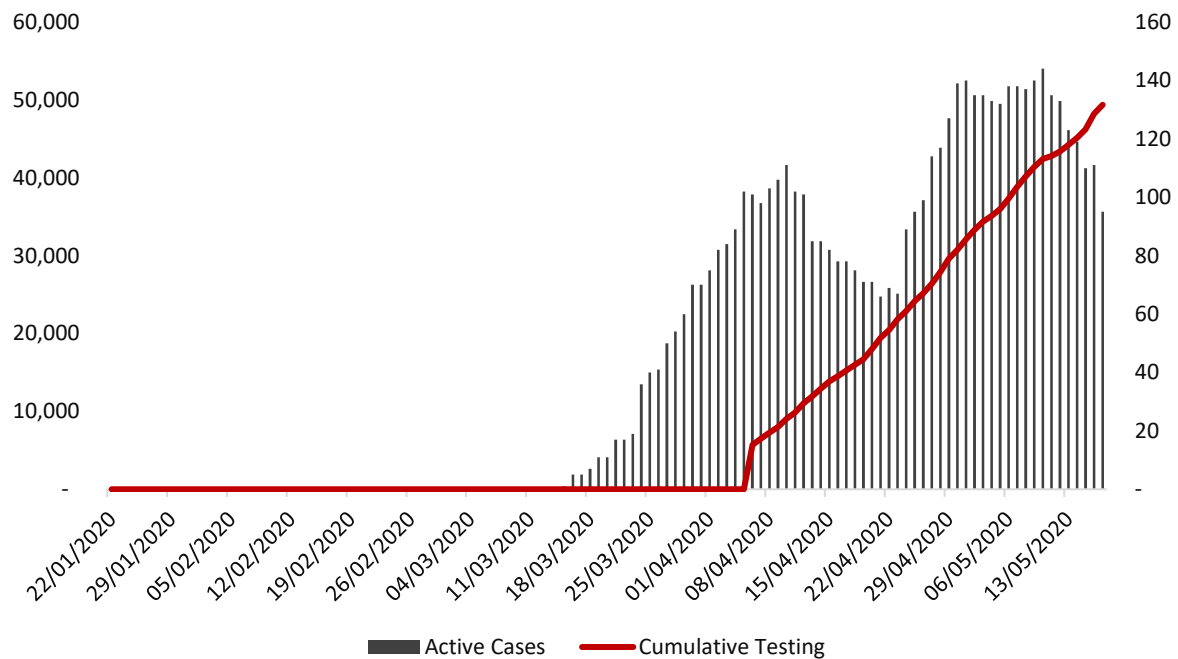


Figure 22: Active cases vs number of tests conducted - Rwanda

30-day Time Series Matrix of Severity Index vs Recovery Index for Good Practice Countries

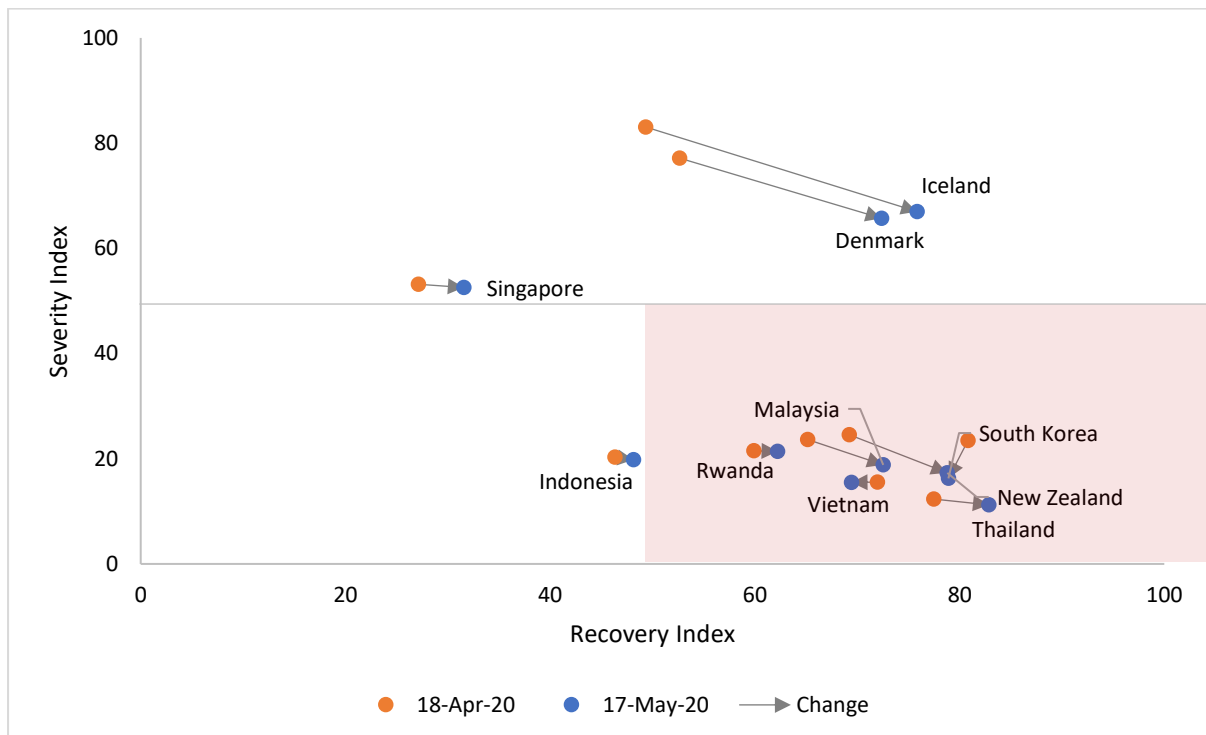


Figure 23: 2X2 matrix of Severity Index vs Recovery Index for good practice countries

Based on the 30-day time series comparison of countries, the top 20 countries that conduct higher testing, such as New Zealand, South Korea, Thailand and Malaysia, are progressing well in terms of increase in recovery index and reduction in severity index.

2.1.3 Recommendations: Interventions for countries to consider

Recommendation 1: Implement large-scale testing as soon as possible, with priority target groups identified and isolation/quarantine protocols established and enforced.

- Large-scale testing conducted early in the outbreak, coupled with centralised quarantine facilities, have been identified as the primary drivers for flattening the curve in South Korea, Canada and Singapore. Essentially, countries with financial and operational capacity to conduct large-scale testing can consider implementing mass testing early.
- Dedicating a budget for and enhancing capacity for large-scale testing at any point since the start of an outbreak can help manage the trade-off between health and economic recovery.
- For countries that have limited resources, targeted testing is advisable to contain the spread, especially when supplemented with robust track and trace processes, and enforcement of isolation/quarantine protocols to break the infection chain.
- Countries may want to prioritise access to testing to identify target groups. This is especially crucial for countries with limited visibility and understanding of how the virus is spreading within their boundaries.
- Countries with funding and healthcare capacity limitations may want to establish the criteria for priority testing for vulnerable groups. Examples of vulnerable groups include people with travel history to high-risk areas, susceptible individuals (the elderly and those with pre-existing conditions), front-line workforce and residents in dense living quarters.

Recommendation 2: Encourage community participation in mass testing.

- The effectiveness of mass testing in Singapore, South Korea and Australia has been underpinned by their resilient health systems and advanced surveillance technology. That may not be the case for many low- and middle-income countries. However, Rwanda has been conducting large-scale testing effectively by making use of existing laboratories that conduct HIV testing.
- On top of good infrastructure, the government's ability to persuade or compel people to test via clear communication, SOPs and processes is important.
- To be effective in reducing transmission from asymptomatic cases, testing should ultimately reach a large proportion of the population and especially those living in high-risk circumstances. All top 20 countries are conducting tests at a rate greater than WHO's general guideline of 10 to 30 tests for every confirmed case. Countries that conduct very few tests per confirmed case are unlikely to be testing widely enough to find all cases.
- Governments should reach out to vulnerable, marginalised and economically disadvantaged populations so they can make an informed decision about participating in mass testing. The virus does not discriminate between people on the basis of their socioeconomic status; therefore, testing should be equally accessible across the population.

Recommendation 3: Capitalise on public-private partnerships to optimise testing capacity and capability.

- Collaboration between private and public institutions can help with prohibitive overheads when it comes to growing testing capabilities. Private and non-government organisations can provide equipment, expertise, skilled manpower and funding support. Larger scale collaboration between organisations would enable larger scale testing.
- This can be especially important in countries with constrained public healthcare systems.

2.2 Utilising track and trace processes and technology to limit the spread of the virus

2.2.1 Setting the context

Why is contact tracing an important intervention to contain COVID-19?

Contact tracing has been a core disease-control measure employed by healthcare professionals around the world for decades. It is a fundamental approach to combat the spread of infectious diseases and is a key process for identifying clusters and preventing exposure in order to eliminate local transmission.

Contact tracing may reduce transmission at any stage of the COVID-19 epidemic, whether in countries or regions where the epidemic is emerging, at the peak of the epidemic or to support the safe transition out of a lockdown. However, contact tracing is most impactful during the early stages of the epidemic to control and contain the disease effectively.

In addition, effective contact tracing reduces the need for widespread and prolonged lockdowns, and thus helps to reduce the significant psychological, emotional and economic impact of restricted movement. Track and trace digital apps help to lighten the load on manual processes and can help slow the spread of infection until vaccines and treatments become widely available.

Some countries have experienced first-hand the trials and tribulations of employing contact tracing methods due to previous disease outbreaks such as SARS, Middle East Respiratory Syndrome (MERS), Ebola, tuberculosis and other infectious diseases. Hence, these countries/regions (examples include South Korea, Hong Kong, Australia and Singapore) are better equipped to coordinate and combat the spread of COVID-19 through effective contact tracing processes.

A summary of manual vs digital contact tracing

To date, there are two types of contact tracing approaches that can be deployed: manual contact tracing and digital contact tracing. The digital contact tracing approach is a mobile app that can be downloaded on a smartphone designed to identify and locate potential patients. This is an innovative strategy recently developed to combat the COVID-19 outbreak. The manual contact tracing approach relies on tried-and-tested methods of deploying healthcare professionals to screen and identify patients. Other professionals and civil servants such as immigration officers and police officers can also play an important role in manual contact tracing.

Manual contact tracing is a laborious activity which requires individuals with specialized skills. To be done effectively, it requires healthcare staff with the training, supervision, and access to social and medical support to handle patients and all contacts. Other professionals, such as immigration officers and police officers, need to be equipped with the right tools, knowledge and procedures to be able to identify and engage with potential patients and contacts without compromising their own safety and the safety of others.

In the case of manual contact tracing, patients diagnosed with COVID-19 are requested to provide a detailed history of contacts to prevent further transmission. However, those infected may struggle to recall all interactions within the minimum 14-day timeframe, leaving certain contacts undetected and untreated, thereby heightening the risk of transmission. However, such an approach ensures patient confidentiality, which is a major concern for most patients. In situations where there is an absence of a digital tool to track and trace the spread of the disease, the manual process can play a significant and complimentary role in reducing local transmission.

Digital contact tracing allows for swift distribution of information to alert individuals potentially exposed upon identification of a COVID-19-positive patient. Exposed individuals can act on real-time information and either self-isolate to prevent transmission or, if necessary, seek medical attention. The collation of real-time information also enables the government to conduct targeted testing to manage and further control the spread of the disease.

The scalability and speed of a digital approach, using apps embedded in smartphone devices, makes it a practical, cost-efficient solution. However, for such an approach to be effective, the disclosure of personal information is required, which inevitably limits mass user adoption.

Manual Contact Tracing	Digital Contact Tracing
<ol style="list-style-type: none"> Manual contact tracing is part of the public healthcare process of supporting patients with suspected or confirmed COVID-19 infection. Through manual contact tracing, public health staff work with patients to help them recall everyone with whom they have had close contact. Public health staff then warn these exposed individuals (contacts) of their potential exposure as rapidly and sensitively as possible. To protect patient privacy, contacts are only informed that they may have been exposed to a patient with the infection. They are not told the identity of the patient who may have exposed them. Contacts are provided with education, information and support to understand their risk, separate themselves from others who have not been exposed, monitor themselves for illness and prevent spread of infection even if they do not feel ill. Contacts are encouraged to stay home and maintain social distance from others (at least 6 feet) until 14 days after their last exposure, in case they also become ill. They are required to monitor themselves by checking their temperature twice daily and watching for cough or shortness of breath. Public health staff may check in with contacts to make sure they are self-monitoring and have not developed symptoms. 	<p>Digital contact tracing includes public participation to enhance the effectiveness of tracing through an app.</p> <p>Through a contact tracing app, history of contacts are logged automatically in an individual's phone, enabling healthcare staff to access the information and contact potentially exposed individuals immediately.</p> <p>Although apps do not collect a patient's name, other details such as age, sex and location may be captured and exposed to raise awareness. Each country implementing a contact tracing app will configure the app according to their privacy laws.</p> <p>Through immediate notification of potential exposure, contacts can self isolate for 14 days or seek treatment if symptoms manifest. Real-time information will enable contacts to take immediate precaution and prevent further spread to family and friends.</p>

Figure 24: Manual vs digital contact tracing

2.2.2 Key findings from the analysis

Key Finding 1: Relying on manual contact tracing alone is labour intensive, costly and time consuming in a pandemic of the scale of COVID-19.

- Manual contact tracing requires trained and skilled healthcare professionals with a firm understanding of principles of exposure, infections, symptoms of diseases and contact tracing, in addition to interpersonal and interviewing skills to manage patients.
- The lack of a large talent pool of trained healthcare professionals and total cost of hiring can stretch a country's financial resources, especially considering other competing priorities such as acquisition of medical equipment, the establishment of makeshift hospitals, and the need for additional drugs and medicine.
- Tracking contacts through interviews with confirmed patients can lead to uncertainties due to an over reliance on patient memory, in which the degree of accuracy in contact identification can be low. As such, contact tracing turnaround time will be slow, leaving room for the virus to transmit rapidly.

Manual contact tracing and its limitations

Traditional contact tracing processes have been honed and refined over decades in response to various infectious disease outbreaks such as SARS, MERS, and Ebola. Despite the introduction of contact tracing technology, trained contact tracers are still required to analyse data and information captured and subsequently, to engage with patients and their contacts. Timely communication with patients in times of crisis is key to prevent misinterpretation of information while patients are under emotional and mental stress. The following interventions typically take place via a manual approach:

- Officials can ask patients about their movements and recent contacts, and obtain a better understanding of the extent of the spread
- Officials can advise patients to get tested for the disease and make sure they are quarantined and adhere to the established SOPs
- Officials can offer direct advice on other related matters that may be of concern to the patient

Human interaction is considered important to establish the bond between two people. For healthcare professionals, the ability to engage with a patient and be able to answer their questions, address their needs and allay their concerns is seen as important in ensuring a productive contact tracing session. Additionally, building, earning and maintaining their trust and confidentiality is crucial in such times, and is a missing element in digital contact tracing. However, as we've seen, manual contact tracing can be time consuming and requires a large talent pool of skilled resources to manage patients.

Typically, competencies required by healthcare staff to implement manual contact tracing are as follows:

- A firm understanding of patient confidentiality, including the ability to conduct interviews without violating confidentiality
- Understanding of the medical terms, principles of exposure, risks of infection, incubation period, and symptoms of other underlying diseases that may be harmful
- Excellent and sensitive interpersonal skills, cultural sensitivity, and interviewing skills such that they can build and maintain trust with patients

- Basic skills of crisis counselling and the ability to refer patients and contacts for further care if needed
- Resourcefulness and proactivity in locating patients and contacts who may be difficult to reach, reluctant to engage due to privacy concerns, or unaware of reporting procedures

Considerations of manual contact tracing

A country or region needs a large number of trained contact tracers. These contact tracers need to locate contacts quickly, discuss what needs to be done and assist in arranging for patients to isolate themselves. They can also work with patients to identify people with whom they have been in close contact, so the contact tracer can locate them. The estimated number of medically trained staff needed is large and varies depending on a number of factors including but not limited to:

- The number of registered daily cases
- The number of contacts identified
- How quickly patients are isolated and advised to self-monitor and conduct standard tests and procedures
- How quickly contacts are informed to stay home, self-monitor and maintain social distance from others

Case Study: United States of America

The total cost of deploying a countrywide manual contact tracing programme for the US could reach USD 46.5 billion

New York City was one the hardest-hit regions in the world, and it showcases the difficulties that the US has had with building manual contact tracing capacity despite its capability and readiness to adopt digital contact tracing. New York City has a population exceeding 21 million people and has recorded over 32,000 COVID-19 deaths.³² As of 22 June 2020, they have hired over 3,000 contact tracers, but the programme is off to a slow start as they learn how to do this difficult and complex work.³³

Similar efforts are underway throughout states and cities in the US. Bloomberg Philanthropies has partnered with New York State to train up to 16,000 additional tracers, and has partnered with the Johns Hopkins School of Public Health to develop an online contact tracer training course that is free and accessible to all.^{34,35}

These efforts all run into the same challenge: Contact tracing armies are difficult to build overnight. And the cost of a full-scale manual contact tracing approach can be substantial, subject to the scale of the operation designed for a country. In the US, two former federal health officials, Scott Gottlieb

³² As of 24th July 2020 – CNN Health

³³ <https://www.nytimes.com/2020/06/21/nyregion/nyc-contact-tracing.html>

³⁴ <https://www.bloomberg.org/press/releases/johns-hopkins-and-bloomberg-philanthropies-with-new-york-state-launch-online-course-to-train-army-of-contact-tracers-to-slow-spread-of-covid-19/>

³⁵ <https://www.coursera.org/learn/covid-19-contact-tracing?edocomorp=covid-19-contact-tracing#reviews>

(former Food and Drug Administration chief for President Trump) and Andy Slavitt (former director of Medicare and Medicaid in the Obama administration), suggested the federal government create a massive manual contact tracing programme. The plan was co-signed by 14 other doctors, scholars, and policymakers.³⁶ The suggested plan would cost a total of USD 46.5 billion, which includes the following:

- USD 12 billion for a maximum of 180,000 contact tracers
- USD 4.5 billion to house infected patients and exposed contacts in vacant hotels
- USD 30 billion for a total of 18 months of income to support those voluntarily self-isolating

The lack of digital adoption by the US stems from data privacy issues and the strong opposition to any form of government surveillance. Despite Apple and Google co-developing specifications that would allow apps to be developed with smartphone-based exposure notifications and minimal risk to privacy,³⁷ most governments in the US have yet to warm to the idea of a digital approach, save for a few states such as North Dakota, South Dakota, Wyoming, Rhode Island and Utah, which have developed voluntary COVID-19 contact tracing apps.^{38,39}

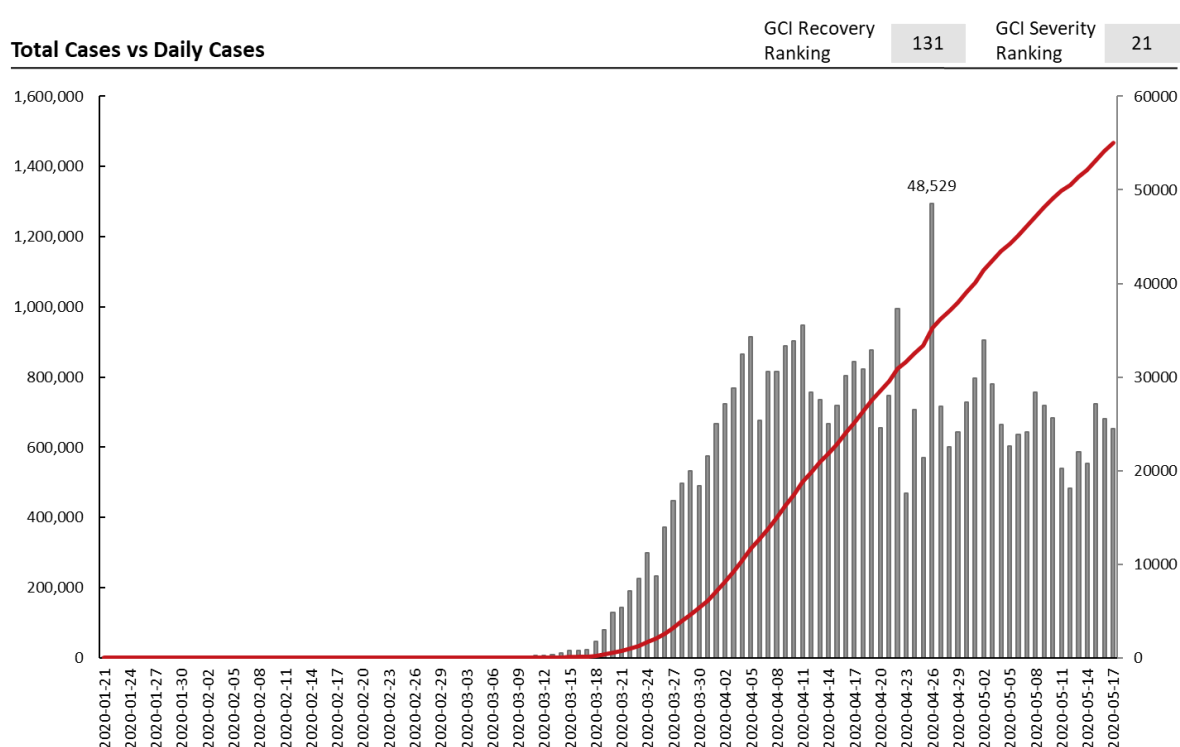


Figure 25: Total cases vs daily cases - United States of America

As of 24 July 2020, the US had recorded over 4.1 million COVID-19 cases. As a gauge, the country with the next highest number of cases is Brazil with over 2.3 million cases, almost one half of the US total. As a result, the US also suffers from the highest number of deaths at 147,672.⁴⁰

³⁶ Ex-Officials Call For \$46 Billion For Tracing, Isolating in Next Coronavirus Package, National Public Radio, 27 April 2020

³⁷ <https://www.apple.com/covid19/contacttracing>

³⁸ <https://www.govtech.com/civic/Whats-New-in-Civic-Tech-States-Build-COVID-19-Tracking-Apps.html>

³⁹ What ever happened to digital contact tracing? Lawfare Blog, 21st July, 2020

⁴⁰ World o Meters, 24th July 2020

Whilst various factors contribute to the impact of COVID-19 in the US, it is not possible to ignore the sheer scale and monumental effort required to conduct manual contact tracing where there are more than a million active cases. Manual contact tracing is still ramping up, the efforts are fragmented across cities and states, and digital options are not under serious consideration to fill the gap. Despite the understandable data privacy issues, the reluctance to augment manual efforts with digital solutions, despite the quality of the infrastructure and high mobile penetration rate, could be costly in the long run.

Highlights

- The US recorded its first case on 19 January 2020.
- The US government declared a public health emergency on 31 January, and on 2 February began to prevent the entry of most foreign nationals.
- The US is the only country so far to record more than four million COVID-19 cases.
- The US has not fully adopted a digital contact tracing approach, with individual states and communities implementing different approaches.
- Despite Apple and Google co-developing tools for developers to create contact tracing apps with strict privacy protocols, skepticism about digital surveillance remains a major obstacle to adoption.

Case Study: Sweden

Launch of digital contact tracing app without official government endorsement will limit user adoption

Sweden has not embarked on a government-driven-and-endorsed digital contact tracing initiative, given its unique approach in managing the COVID-19 pandemic to date. Instead, it still relies on a manual track and trace approach which is achieved through interview sessions to identify potentially exposed individuals.

Nonetheless, researchers at Sweden's Lund University have been proactive in developing a digital solution and launched a free contact tracing app on 29 April 2020 to help map the spread of infection in Sweden. It was designed by a group of experts consisting of scientists and doctors at King's College London, Guy's and St Thomas' Hospitals and Zoe Global Limited, a health technology company. Without official government endorsement, the app was only downloaded by 2,000 people during its first day of launch, despite the country recording almost 20,000 cases and 2,355 deaths on the same day.

However, to help collect meaningful and real-time data until the pandemic subsides, the researchers have encouraged local residents to use the app on a daily basis. Usage of the app takes one minute per day to answer simple questions about an individual's health. Such commitment from the public could help contribute to a reduction in the spread of COVID-19. The aim of the app is to obtain the following information:

- Which locations in Sweden may have a high risk of COVID-19 infection
- Which behavioural factors raise a person's susceptibility to infection
- How underlying health conditions affect risk
- How rapidly the virus is transmitting in different parts of Sweden

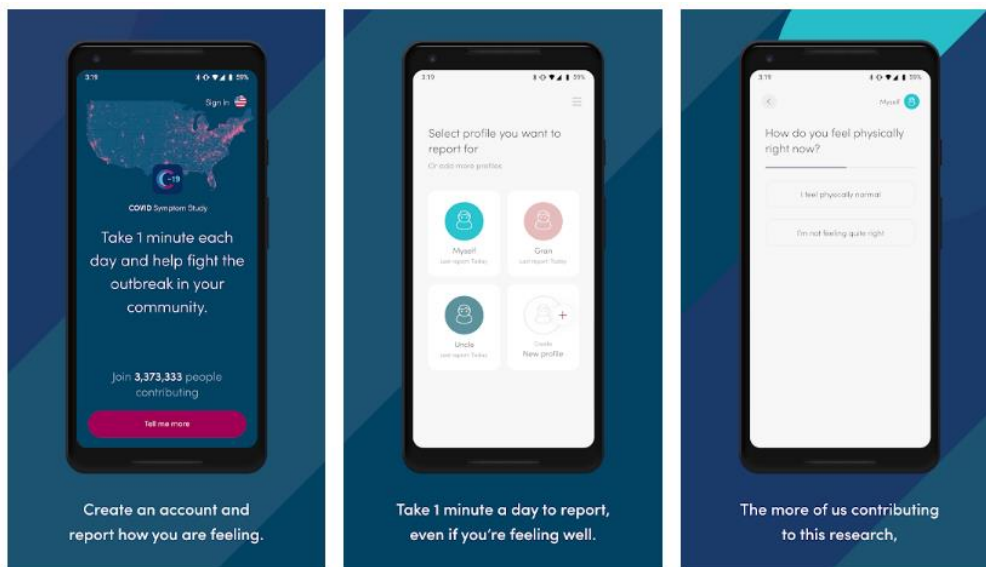


Figure 26: Sweden's COVID-19 Symptom Tracker app

The app is not designed as diagnostic tool, and it does not collect data such as names, identification numbers, addresses or telephone numbers. Participants only provide their e-mail address when they first create a user account – however, e-mail addresses are not included in the research database. Furthermore, the location feature only records the first two digits of the user's postal code for identity protection. No other geolocation features are collected to track a user's movement.

All information is handled in accordance with the General Data Protection Regulation (GDPR), a regulation in EU law on data protection and privacy in the EU and the European Economic Area (EEA). Additionally, all information will only be used for research and not for commercial purposes. In line with opt-in configuration, the use of the app is strictly voluntary with users knowing that all information is purely for research purposes.

The app designed by the researchers from Lund University has been approved by the Swedish Ethical Review Authority under Sweden's Public Health Agency, which is the body responsible for managing Sweden's coronavirus response. However, there has been scepticism over how useful the app would be since the authority has already retrieved its own data via manual contact tracing.

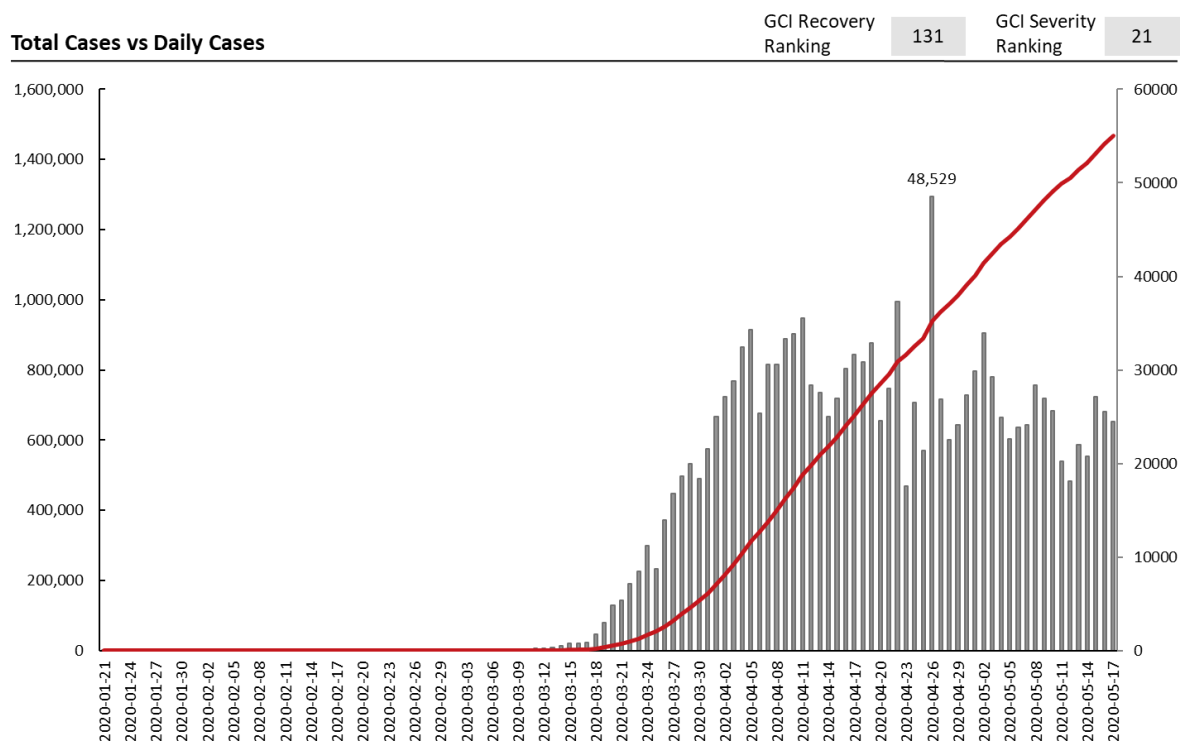


Figure 27: Total cases vs daily cases - Sweden

Highlights

- Sweden recorded its first COVID-19 case on 1 February 2020 and recorded its highest single-day tally on 25 April 2020 when 812 new cases were recorded.
- Sweden has adopted a unique approach of fighting COVID-19 through herd immunity.
- Sweden's government has closed public institutions and banned large public gatherings, but it has not mandated its citizens to remain indoors or wear protective gear. The government has offered sound medical advice but has not imposed a nation-wide lockdown.
- According to Sweden's state epidemiologist, since the virus can be transmitted easily by people who show no symptoms of illness, it can't be contained by lockdowns and contact tracing.
- Sweden has recorded higher cases than other Scandinavian countries, many of which have or are planning to, deploy a government-endorsed digital contact tracing app.

Key Finding 2: Government assurances on personal data protection are critical to user adoption of digital contact tracing apps.

- Without clear governance and guidelines on data protection, there is a serious risk that user adoption will be low. Countries such as Australia have introduced new data privacy laws in parliament specifically to govern data managed by contact tracing apps, with commitment to cease data collection for contact tracing initiatives once the pandemic is over.
- Design and configuration of apps should be user friendly and non-intrusive, with only necessary information captured (i.e. phone number, name and age). Apps should be equipped with security features and data should be encrypted to maintain confidentiality and prevent data breaches.
- Governments should ensure that only select personnel have access to data, and that all information will be deleted once it is no longer needed for public health purposes.
- Countries that have developed strong personal data protection measures for their contact tracing apps include Australia, Israel, Italy and Iceland.

Digital contact tracing

As of 17 May 2020, at least 16 of the top 20 countries have already adopted, or are in the midst of adopting a digital contact tracing approach, particularly those with ready infrastructure and high mobile penetration rates. However, challenges remain with regards to privacy laws and voluntary user adoption, both of which impact effectiveness and efficacy of the app. Digital contact tracing apps have been developed to achieve the following:



- Enhance traceability of infections through availability of real time data
- Identify infected individuals and subsequently trace and monitor the contacts of the infected individual for containment purposes
- Help ensure the safe, sustainable and effective quarantine of exposed individuals to prevent local transmission
- Increase awareness and notify the public of risk of exposure within a given area or concentration
- Improve the efficiency and accuracy of data management and automating tasks for public healthcare
- Reduce the burden of data collection on public health staff by allowing electronic self-reporting by infected individuals and contacts
- Enhance quality of data for analysis, reporting and formulation of solutions and policies
- Help communities and individuals re-enter society safely when the number of cases declines.

Figure 28: Example of digital contact tracing app

To address the COVID-19 pandemic swiftly, Apple and Google collaborated and co-developed a digital contact tracing framework that allows public health authorities around the world to create tailored mobile apps that notify the public when they have been exposed to the coronavirus.

The app is referred to as an 'exposure notification' tool and uses Bluetooth technology within smartphones. Apple and Google are providing the Application Programming Interface (API), but public health authorities will have to develop their own contact tracing apps based on their required configuration, guided by local privacy laws. In order to promote mass adoption and reduce fragmentation of a digital contact tracing approach, use of the API will be restricted to one app per country.

Apple and Google have confirmed that some states in the US (i.e. North Dakota, South Dakota and Utah) and 22 countries⁴¹ will be using the software.

How many contact tracing apps are available and how are they configured to ensure data privacy?

According to the Massachusetts Institute of Technology (MIT) COVID Tracing Tracker, more than 26 countries (and counting) have already deployed or are in the midst of developing a digital contract tracing app.⁴² In line with this digital approach, various countries are cautious in their app design and deployment, as they do so by adhering to various types of configurations, data privacy settings and governance in accordance to their data privacy laws. Additionally, some apps are produced locally by small groups of coders, while others are vast global operations. Some countries have adopted the Apple and Google co-developed app, which mobilises a large team to build their systems.

⁴¹ Apple and Google launch coronavirus exposure software, The Washington Post, 21 May 2020

⁴² COVID Tracing Tracker MIT Technology Review, 7 May 2020

Countries/ Regions with active contact tracing app or in the process of developing	Name of contact tracing app used by the country for official purposes	Can a person choose not to use the app with no ill effects and does the app require explicit permission from a user?	Are there strong and clear functionality limitations against using data for purposes other than public health?	Do the technology and policies ensure data is deleted when it's no longer needed for public health purposes?	Are policies in place to ensure only necessary information is collected? Is data sharing with outside entities prohibited?	Are the government and technology transparent about what data is acquired, from where, how it's used, and who has access to it?	Centralised: data is consolidated into one repository; Decentralised: data stays on personal device
Country/ Region	Application Name	Voluntary Download	Limited Data Use	Data Destruction	Minimized Data Sharing	Transparent	Centralized/ Decentralized
Australia	COVIDSafe	✓	✓	✓	✓	✗	Centralised
Austria	Stopp Corona	✓	✓	✓	✓	✓	Decentralised
Bulgaria	Virusafe	✓	TBD	TBD	TBD	TBD	Centralised
China	Chinese Health Code System	✗	✗	✗	✗	✗	Centralised
Cyprus	CovTracer	✓	TBD	✓	✓	✓	TBD
Czech	eRouska	✓	✓	✓	✓	✓	TBD
Estonia	Estonia's App*	✓	TBD	TBD	✓	TBD	Decentralised
Finland	Ketju*	✓	TBD	TBD	✓	✓	Decentralised
France	StopCovid*	✓	TBD	TBD	TBD	TBD	Centralised
Germany	Corona App	✓	TBD	TBD	✓	✗	Decentralised
Ghana	GH Covid-19 Tracker	✓	TBD	TBD	TBD	✗	TBD
Iceland	Rakning C-19	✓	✓	✓	✓	✓	TBD
India	Aarogya Setu	✗	✗	✓	✓	✗	Centralised
Iran	Mask.ir	✓	TBD	TBD	TBD	✗	TBD
Ireland	HSE Covid-19 App*	✓	TBD	TBD	TBD	TBD	Decentralised
Israel	HaMagen	✓	✓	✓	✓	✓	Decentralised
Italy	Immuni*	✓	✓	✓	✓	✓	Decentralised
Malaysia	MyTrace	✓	TBD	TBD	TBD	TBD	Decentralised
Mexico	CovidRadar	✓	TBD	✗	✗	✗	Centralised
N. Macedonia	Stop Korona	✓	✓	✓	TBD	✓	Decentralised
Norway	SmitteStopp	✓	✓	✓	✗	✗	Centralised
Poland	ProteGo*	✓	TBD	✓	✓	✓	Decentralised
Singapore	TraceTogether	✓	✓	✓	✓	✓	Centralised
Switzerland	Swiss Contact Tracing App*	✓	✓	✓	✓	TBD	Decentralised
Turkey	Hayat Eve Sıgar	✗	✗	✗	✓	✗	Centralised
UK	NHS COVID-19 App*	✓	✗	TBD	✓	✓	Centralised

*Note: Not yet deployed, last updated 17 May 2020

Figure 29: MIT COVID Tracing Tracker

Despite the myriad of services available, deployment of most apps is still relatively new and there is little information and direct evidence of their efficacy and their broader social implications. There are also numerous configurations across the different contact tracing apps that may impact user adoption. Additionally, not all countries have been completely transparent with the operations, management and policies that govern the apps, which raises questions for people and may affect uptake.

Typically, there are six distinct parameters that determines whether a digital contact tracing app fulfils its intended objective whilst maintaining data privacy and freedom of choice.

Voluntary Download: Can a person choose not to use the app with no ill effects and does the app require explicit permission from a user?

Limited Data Use: Are there strong and clear functionality limitations against using data for purposes other than public health?

Data Destruction: Do the technology and associated policies ensure data is deleted when it is no longer needed for public health purposes?

Minimised Data Sharing: Are policies in place to ensure only necessary info is collected? Is data sharing with outside entities prohibited?

Transparent: Are the government and the technology transparent about what data is acquired and from where, how the data is used and who has access to it?

Centralised/Decentralised: Is the data managed through a centralised or decentralised system? Centralised data is consolidated into one repository; Decentralised data stays on personal device.

Based on information available on the MIT COVID Tracing Tracker (17 May 2020), only three countries (i.e. Austria, Israel and Italy) have developed a contact tracing app that fulfils all six distinct parameters concerning data privacy and freedom of choice, including a decentralised model which ensures data remains with the user. However, this does not mean that these apps will be the most effective in combating the spread of COVID-19, neither does it mean user adoption will be highest compared to other apps.

Nonetheless, the development of a digital contact tracing app is still viewed as a viable option for most countries since cost of development is dramatically less than the cost of manual contact tracing. Subject to the levels of configurations, an app commissioned by a government for the purpose of contact tracing may cost anywhere between USD 100,000 to USD 500,000. Meanwhile, the cost to the economy of continuous lockdown has already reached billions of dollars. It is no surprise then that, despite the lack of evidence so far on the effectiveness of digital contract tracing, governments are willing to invest in digital contact tracing apps to support other initiatives.

Clear guidelines lead to effective implementation of a contact tracing digital app

In implementing a digital contact tracing app, the Centre for American Progress (CAP), one of the leading think tanks in Washington, DC, released a list of recommendations for countries and states who wish to adopt digital contact tracing. Their approach seeks to maximise privacy protection while encouraging the most effective and prudent use of digital contact tracing apps.⁴³

- 1 Governments should consider adopting a decentralised approach. Data can be stored locally on people's phones and anonymised for government storage.
- 2 A digital contact tracing system is best designed for voluntary subscription. Earned trust is more valuable than compulsion, especially given the legitimate and heightened concerns about government surveillance.

⁴³ What good digital contact tracing might look like, Vox, 22 April 2020

- 3 To encourage trust, governments can put in place limits on how long data will be stored, both locally and in anonymised databases. If Bluetooth is sufficient for contact tracing, there is no need to collect GPS or Wi-Fi information for geolocation features to track people's movements.
- 4 Governments may want to establish legally binding guidelines about what information will be collected and how it will be used. Only healthcare workers (not local and federal law enforcement agencies) involved in contact tracing initiatives require access to the information.
- 5 To encourage transparency, governments can place the app software in the public domain or operate under an open source license. This can enable the public to understand how the app operates. Additionally, this can make it easier to build apps faster and coordinate across other local governments and states. Public health agencies can also commission and contract trustworthy and reputable companies with clean records.
- 6 Any government-approved contact tracing app can be developed with patients and public health workers, with syndications with the general public prior to its deployment. This can enable transparency, ownership and buy-in from end-users, and eventually increase user adoption.
- 7 Governments can set up independent advisory boards focused on privacy and civil rights; those panels can be empowered to hold hearings and collect information from documents and witnesses to provide this oversight.

It must be re-emphasised that digital contact tracing is still a novel approach and was only introduced during the start of the pandemic. Its effectiveness has yet to be proven as there is limited and inconsistent evidence to suggest that digital contact tracing alone can be a one-size-fits-all solution to future contact tracing efforts. Early results have varied in different countries, and best practice in terms of deployment approach, user experience and adoption, and implementation is still emerging.

Key Finding 3: Usage of Bluetooth technology can uphold data privacy whilst ensuring relevant contact data and information are sufficiently captured for tracing purposes.

- The introduction of Bluetooth technology in contact tracing apps has eliminated the need to use intrusive geolocation features such as GPS.
- All smartphones have Bluetooth-enabled connectivity. Information exchanged between devices using Bluetooth can be encrypted, increasing security measures and privacy.
- The current Bluetooth technology employed by most apps can be prone to false positives and false negatives due to its inability to detect whether contacts are taking precautions against the virus and whether barriers exist between contacts.
- Without appropriate measures to address the false signals, individuals who are not likely to be infected may be required to quarantine several times, impacting daily activities and employment.

Effective Practice Case Study: Australia – COVIDSafe App

The introduction of the COVIDSafe app is accompanied by new legislations that will uphold user data and privacy

The Australian government launched the COVIDSafe app on 26 April 2020 to enhance track and trace capabilities to contain COVID-19. The app was modelled after Singapore's TraceTogether app, which records the Bluetooth connections a phone makes with a contact nearby, a central design feature of the app. The app was launched as part of Australia's strategy to reopen the economy, based on the

declining number of cases. The app would help enable the government to control and contain new cases.

The government target for uptake of the app is 40 per cent of Australian smartphone users - approximately 6 million users. As of 8 May 2020, uptake of the app has been positive with more than 5.3 million Australians downloading COVIDSafe since its launch on 26 April 2020.⁴⁴

Usage of the app is voluntary to acknowledge concerns about data privacy and government surveillance. The app only records a user's name (or pseudonym), age range, postcode and phone number. The app does not perform location tracking, which has been a contentious feature of similar apps deployed in other countries. The Google version of the app, however, does request user permission for location information due to requirements permission needed for Bluetooth utilisation. The app can also be deleted at any time at the discretion of the user.

Using Bluetooth, the app records other individuals with the same app within close proximity (approximately 1.5 metres for 15 minutes or longer). The two apps then exchange anonymised IDs, which change every two hours and are stored and encrypted on the phones and deleted after 21 days. If a potential COVID-19 patient is identified, a designated health official will send a unique code via SMS for the infected person to key into the app for consent to upload the list of anonymised IDs which have had contact with the patient over the past 21 days. Upon consent, the data will be uploaded from the app at the time of positive testing and will be held by the federal government on an Amazon Web Services server in Australia. The system and analysis will then use signal strength and other information to identify who needs to be contacted.

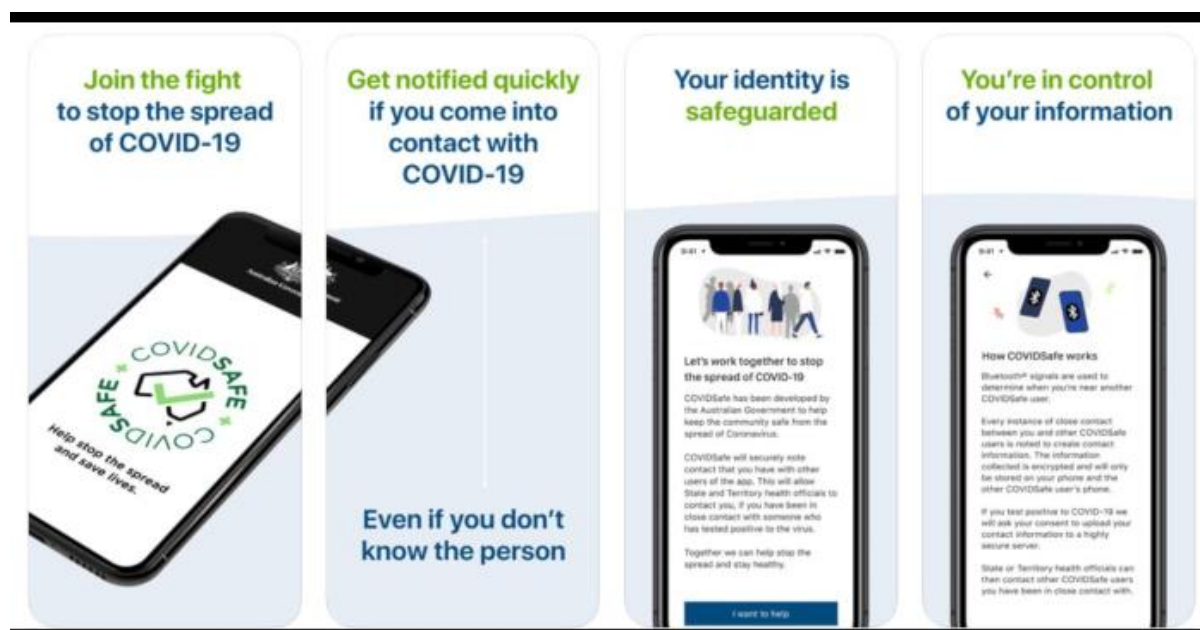


Figure 30: Australia's COVIDSafe app

With regards to data governance and storage, all information is stored and encrypted on a government server, and then passed on to state and territory health authorities where an individual's contact has tested positive. During the launch, Greg Hunt, Australia's Health Minister,

⁴⁴ Readers respond to the COVIDSafe app's launch, The Sunday Morning Herald, 8 May 2020

announced a written directive that mandates only health authorities or those maintaining the app can access the information. Subsequently, on 14 May 2020, parliament passed the Privacy Amendment (Public Health Contact Information) Act to support the COVIDSafe app and ensure users' privacy is protected. Furthermore, the COVIDSafe legislation provides additional protections under the Privacy Act 1995 including the following:

- The Office of the Australian Information Commissioner will have oversight over the collection and use of data by the COVIDSafe app.
- The operation of the Notifiable Data Breach Scheme is extended to include the protection of data collected by the apps at risk from eligible data breach.
- In addition to criminal sanctions (including imprisonment of up to five years), the COVIDSafe legislation sets penalties for any unauthorised disclosure of data to also include penalties imposed under the Privacy Act.⁴⁵

Such clarity and transparency in the configuration of the app and its servers, reinforced with specific legislation designed to protect user data and information, has enabled the Australian government to earn the trust of its citizens and to successfully deploy the COVIDSafe app.

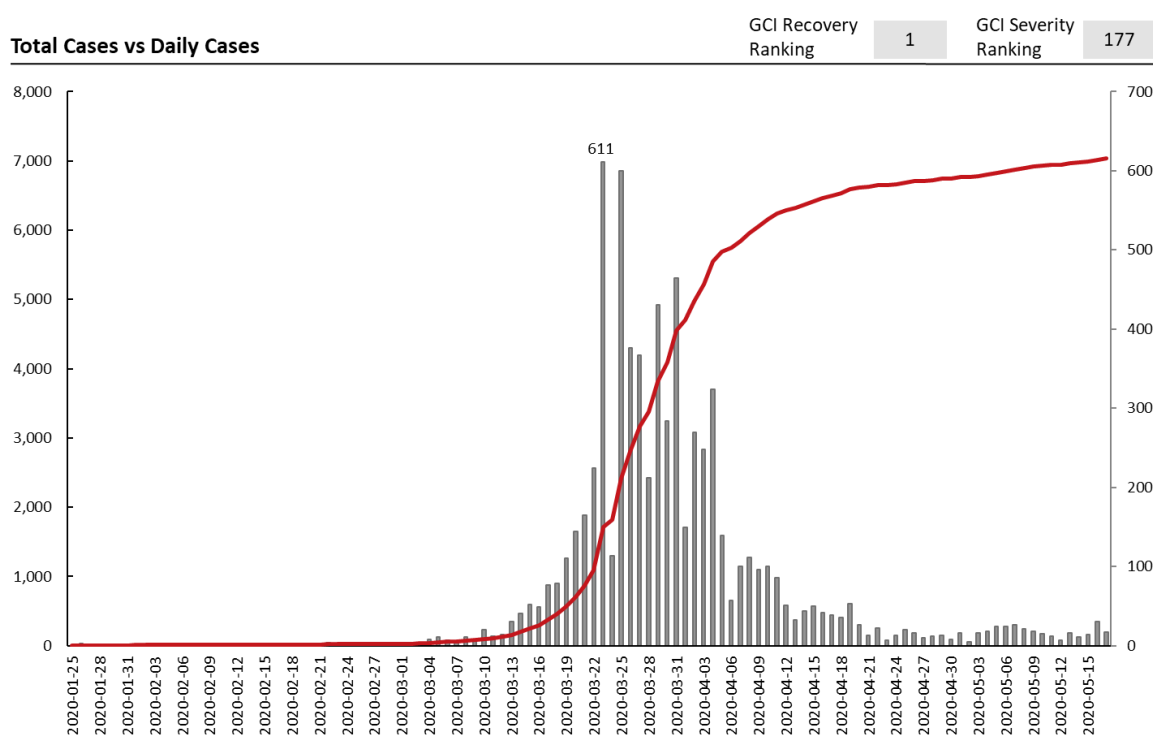


Figure 31: Total cases vs daily cases – Australia

However, despite the ongoing efforts of the government to ensure high utilisation, the app has yet to provide much meaningful assistance to local health authorities. This is in part due to the low levels of community transmissions recorded in Australia since its launch, hence the app's capability

⁴⁵ <https://www.mondaq.com/australia/operational-impacts-and-strategy/935542/covidsafe-app-part-two-legislation-passed-to-address-privacy-concerns--what-it-means-for-you>

has not been fully tested. As of 29 June 2020, the COVIDSafe app has yet to identify any new cases that were not already identified through manual contact tracing.⁴⁶

Nevertheless, health authorities still encourage Australians to download the app, as an unexpected spike in cases can occur, particularly due to the relaxing of lockdown measures which will result in social get-togethers, sporting events, and in certain cases, organised demonstrations (e.g. recent Black Lives Matter protests). In such circumstances, should a spike occur, the availability of such an app can greatly assist public health authorities to contain the virus quickly.

It is still unclear how successful the COVIDSafe app will be to Australia's contact tracing approach, given that there are few public benchmarks available to measure against at the moment. It is still premature to judge the usefulness and effectiveness of the app given the current circumstances. In its efforts to cover all bases to combat COVID-19, the Australian government has taken a prudent approach to include contact tracing technology in its arsenal to protect Australian citizens and its economy from an unpredictable and highly infectious disease threat.

Highlights

- Australia recorded its first case on 25 January 2020 in Melbourne.
- Australian borders were closed to all non-residents on 20 March 2020 after a series of increased daily cases, and social distancing rules were imposed on 21 March 2020.
- Australia implemented nation-wide lockdown on 23 March 2020, after a spike of 611 cases the day before. This was also Australia's highest number of cases per day.
- Australia's COVIDSafe app was launched on 26 April 2020, to help ease reopening of the economy after a continuous and significant decline in active cases.

Key Finding: Centrally managed and mandatory track and trace initiatives can be highly effective measures to contain COVID-19 transmission.

- Governments which have deployed mandatory track and trace initiatives such as South Korea and Hong Kong have been able to flatten the curve of transmission rapidly during peak periods through central management of data and coordinated efforts.
- Publicly available data can be utilized by third-party companies to develop user-friendly, enhanced features for effective warning systems, tracking and tracing.
- South Korea has legislation in place that explicitly allows authorities to publish personal information for the purpose of tracking and tracing infectious diseases.

Effective Practice Case Study: South Korea – Corona 100m app and Corona Map app authentic and real-time data will enable app reliability and increase user adoption

South Korea was one of the first countries to be affected severely by COVID-19. To combat the spread, health authorities created a public database of COVID-19 cases for contact tracing that provides detailed information about every infected individual, including their age, sex, nationality

⁴⁶ <https://www.abc.net.au/news/science/2020-06-17/covidsafe-contact-tracing-app-test-documents-rated-poor-iphone/12359250>; <https://www.telegraph.co.uk/news/2020/06/29/surge-cases-australia-government-admits-tracing-app-has-not/>

and exact movements around the country. However, names are not made publicly available. Unlike most countries, GPS data is also used in contact tracing by health authorities. All data is stored in a government database. Through the database, text alerts are sent out at the discretion of regional governments and specifically target people in those areas, giving them an opportunity to avoid locations where active cases have been found. For individuals who test positive for COVID-19, investigators from the Korea Centre for Disease Control and Prevention (KCDC) interview patients first, then verify their whereabouts by checking closed-circuit television (CCTV) camera footage, credit card transaction records and GPS data from mobile phones.

South Korea operates a system to support epidemiological investigation of people infected with COVID-19 by utilising various cutting-edge technologies via a smart city technology system. The new system, co-developed by the Ministry of Science and ICT, the Ministry of Land, Infrastructure and Transport, and the KCDC, allows various data about confirmed COVID-19 patients to be immediately analysed and submitted to health investigators. The system is based on the country's 'smart city data hub programme'. Prior to the emergence of infectious disease threats, KCDC investigators had to formally request crucial contact tracing data such as CCTV footage and credit card transactions of confirmed patients from police investigators, resulting in protracted delays in epidemiological investigation.⁴⁷ The contact tracing approach adopted by the South Korean government can be perceived as intrusive; however, its successful implementation hinges on the social and political culture of the country, and most importantly on citizen buy-in. It has not been adopted by any other country, apart from China. However, through this approach, South Korea has been able to manage the spread without imposing major lockdowns on its citizens and businesses

Following the serious MERS outbreak in 2015, which reportedly infected 186 people in South Korea and killed 36, the South Korean Parliament passed legislation that explicitly allows authorities to publish such personal information for the purpose of tracking and tracing infectious diseases.



Figure 32: South Korea's Corona 100m app

South Korea's Corona 100m app was launched on 11 February 2020 by a private developer and was downloaded over one million times in 10 days.⁴⁸ Using publicly available COVID-19 health-related

⁴⁷ S. Korea to run system to better detect virus patients' routes, The Korea Herald, 11 March 2020

⁴⁸ Mobile apps, websites offer real-time data on COVID-19 outbreak, KOREA.net, 10 March 2020

data as its main source, the app signals to users when they come within a 100-metre radius of a spot previously visited by an infected person. The Corona Map, which utilises the same publicly available data allows users to view where infected people are located using its real-time updated map. It also offers information about the dates the cases were confirmed, and the names of the hospitals and places that a person visited before testing positive.

With the support of legislation to minimise data privacy for the purpose of combating infectious diseases, South Korea was able to make vigorous use of the convergence of data and technology to rapidly improve the effectiveness of digital contact tracing. Despite being one of the first countries to experience the COVID-19 outbreak, past experiences from MERS coupled with the access to data, has enabled the country to manage the rate of transmission effectively. Data privacy concerns, however, have deterred many countries from adopting digital contact tracing at this level.

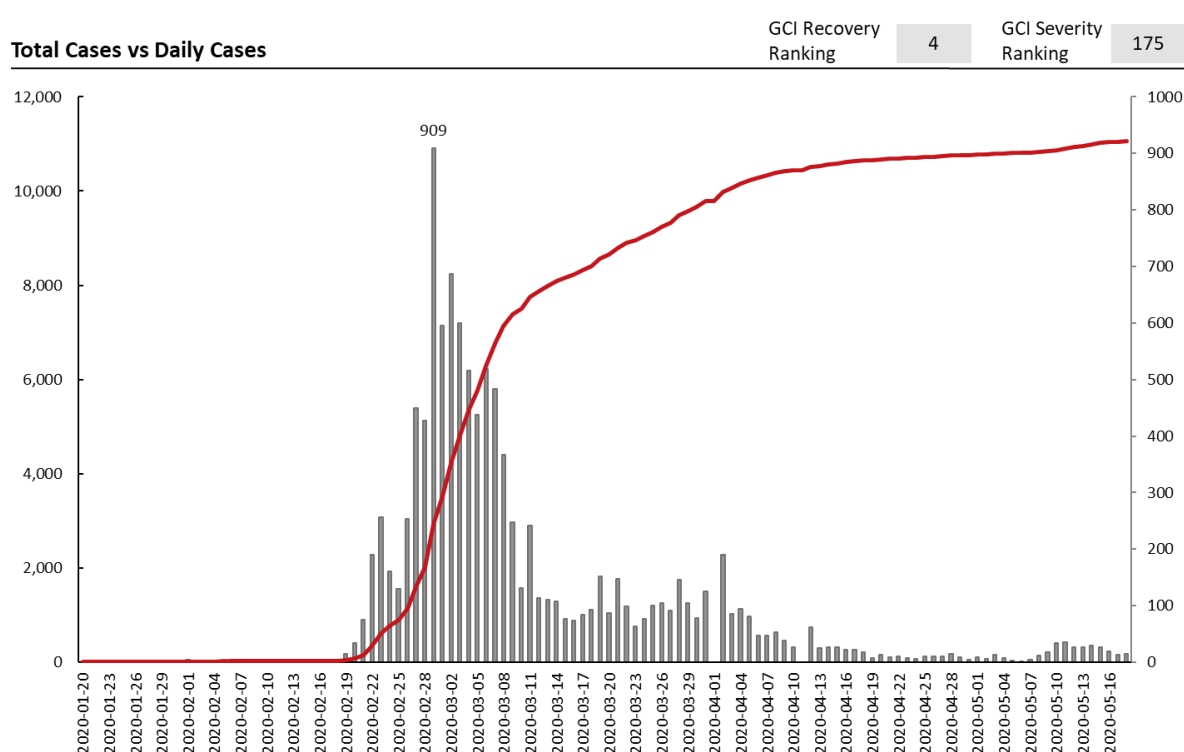


Figure 33: Total cases vs daily cases – South Korea

Highlights

- South Korea recorded its first case on 20 January 2020. It reached peak cases on 3 February after recording 851 cases in a day.
- South Korea tightened its border checks on 19 March amidst lowering local transmissions.
- South Korea did not impose a major lockdown, but instead focused on diagnostic testing, isolation of contacts and social distancing.
- The Corona 100m app and Corona Map app were effective due to public availability of detailed health data for analysis.

Key Finding 5: Contact tracing applications are effective in identifying contacts and containing transmission when user adoption is high.

- A research team from the University of Oxford claims that around half of the population of a country needs to use a contact tracing app for it to be effective.
- Countries which lack communications infrastructure and have a low smartphone penetration rate will not be able to benefit from such an app.
- High-risk groups such as the aging population and low-income groups often do not have access to smartphones and internet connection, rendering them more susceptible to infections.
- Despite infrastructure readiness and a high mobile penetration rate, Singapore's TraceTogether app has not achieved the desired level of user adoption.

Case Study: Singapore – TraceTogether app

Contact tracing apps are only as reliable as the number of users that willingly utilise them

On 20 March 2020, Singapore's in-house IT agency, Technology Agency of Singapore (GovTech, in collaboration with the Ministry of Health, announced the launch of the TraceTogether app. The initiative was developed to help support contact tracing efforts in the nation-state to reduce the spread of COVID-19.

Singapore was the first country to deploy a digital contact tracing app. In order to help the international community address the escalating coronavirus situation, the government made the TraceTogether software freely available to developers around the world. Australia's COVIDSafe app was modeled after the TraceTogether app, with slightly different configurations to suit local requirements.

Similar to most countries, the Singapore government has made the app a voluntary option for its citizens to download, and it can be deleted at any time. Once TraceTogether is uninstalled or the app's functionality is disabled, all connection data collected on the phone will be lost. The user can also request for the mobile number and user ID to be removed from the centralised server by sending an email to support@tracetgether.gov.sg.

Additionally, data privacy is a priority. The only data that is collected by the government through the app is the user's mobile number, which is logged and remains encrypted in the mobile device. Personal mobile numbers are not disclosed to other TraceTogether users. Only temporary IDs, which are generated by encrypting the user ID, are exchanged between phones. For additional security, the temporary IDs are designed to be refreshed regularly. The app does not collect or use location data or contacts, only who users might have been close to.

In terms of tracing technology, the app uses Bluetooth technology to exchange connections with nearby devices (within approximately two metres for 30 minutes or longer) that have the app. The app's functionality is limited to present connections between devices, and not their locations. Data is stored in the phone for only 21 days and will not be accessed unless the individual is identified as a close contact. Only those who test positive for COVID-19 will be asked by the Ministry of Health to share the data logged to speed up contact tracing.

Within the first three days of the launch of the TraceTogether app, there were over 620,000 downloads. However, the hype around the launch quickly withered due to the resurgence of COVID-19 cases in Singapore in late March. Due to the loss of momentum in public engagement, only 32 per

cent of the Singapore population downloaded the app since its launch on 20 March^{49,50}, minimizing its overall effectiveness. In addition, the value and impact of any digital contact tracing app is limited in situations where maintaining robust social distancing is not followed.

The government also declared that should users be contacted by the Ministry of Health for contact tracing, they must submit and allow the authorities access to their stored data or be prosecuted under the Infectious Diseases Act. However, the law (passed in 1976 and revised in 2003) is vague and subject to interpretation. It suggests that users of the app are subject by law to submit data to the government and do not have full authority over the data stored on their mobile devices.⁵¹

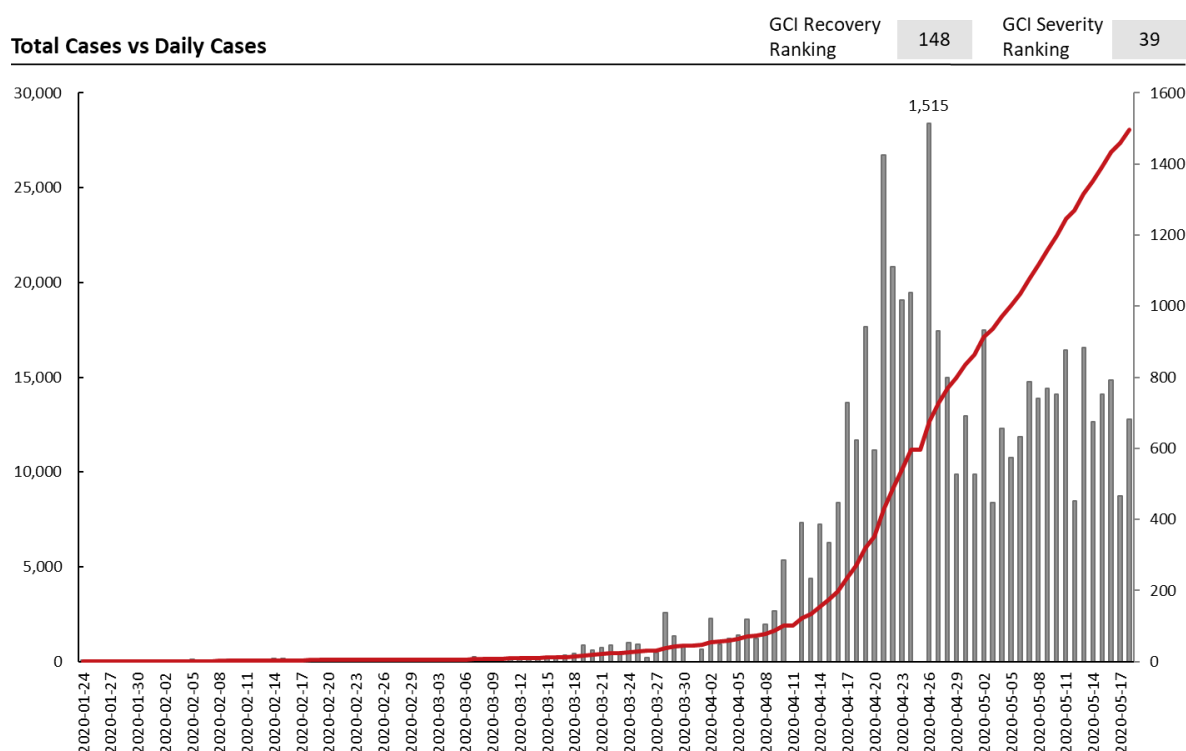


Figure 34: Total cases vs daily cases – Singapore

Highlights

- Singapore recorded its first case on 23 January 2020.
- Singapore's TraceTogether app was launched on 20 March 2020, the first digital contact tracing app introduced.
- Singaporean borders were closed to all tourists and short-term visitors on 25 March after two confirmed COVID-19-related deaths.
- Singapore implemented nation-wide lockdowns known as 'circuit breakers' on 3 April 2020.
- On 20 April, daily cases peaked at 1,426, primarily due to spread among migrant workers in dormitories.

⁴⁹ Given low adoption rate of TraceTogether, experts suggest merging with SafeEntry or other apps, Today, 8 May 2020

⁵⁰ Singapore to launch Trace Together Token device for COVID-19 contact tracing, Mobi Health News, 10 June 2020

⁵¹ Tracing the problems with Singapore's COVID-19 app, East Asia Forum, 9 May 2020

Challenges with implementing digital contact tracing

- Encouraging citizens to voluntarily partake in an initiative is always a challenge, particularly if it involves opting into a system that has the potential for leakages and breaches in personal data.
- The use of Bluetooth technology is not foolproof, as it is still susceptible to register false positives and false negatives. Individuals may be falsely tagged as having contacted one another despite very low possibility of transmission – such as when the individuals are on the opposite sides of porous walls that a Bluetooth signal can penetrate. Additionally, the technology does not take into account when individuals take precautions, such as the use of personal protective equipment (PPE) in their interactions with others.
- Brief interactions, such as crossing paths in common public areas such as malls, cafes and parks will be substantially more common and less likely to cause transmission. If the apps detect these lower risk encounters as well, they will cast a wide net when reporting exposure. If most exposures detected by the apps would not lead to infection, many users will be instructed to self-quarantine even when they have not been infected. Individuals may tolerate a false positive once or twice, but after a few false alarms and the ensuing inconvenience of protracted self-isolation, many will start to disregard the warnings.
- The people in the highest risk groups, such as the aging or under-resourced individuals, are least likely to download the app while needing safety most. Other members of the public may download the app but be reluctant to report a positive status out of fear of being ostracised or stigmatised, or to prevent being quarantined and prevented from working.
- Hence, contact tracing apps cannot be the only tool to rely upon when assessing safety of community health. Ultimately, contact tracing is a public health intervention, not an individual health intervention. It can help prevent the public spread of the coronavirus, but it does not confer direct protection on any individual. As such, this creates incentive problems that require careful thought. Policy makers need to understand and devise initiatives that will naturally compel users of contact tracing apps to comply with instructions voluntarily, even without immediate benefit to them.

Country adoption of digital contact tracing apps

Country/ Region	Recovery Index (18 April 2020)	Recovery Index (17 May 2020)	Recovery Index Improvement	Government- Endorsed Digital Contact Tracing App
Australia	79.25	85.09	+5.84	Y
Thailand	77.47	82.87	+5.4	Y
Hong Kong	73.63	81.81	+8.18	Y
South Korea	80.84	78.91	-1.93	Y
New Zealand	69.22	78.81	+9.59	Y
Taiwan	68.94	77.73	+8.79	Y
Iceland	49.33	75.86	+26.53	Y
Malaysia	65.14	72.54	+7.4	Y
Denmark	52.66	72.39	+19.73	Y
Latvia	52.25	70.48	+18.23	Y
United States	33.71	36.30	+2.59	N
Sweden	25.73	28.80	+3.07	N

Table 2: Recovery Index of top 10 countries + US and Sweden

All countries in the top 10 recovery rankings have deployed a government-endorsed digital contact tracing app. Whilst their recovery successes have been anchored on a combination of strategic interventions, each country has decided to adopt a new and innovative approach toward contact tracing. This is particularly so as countries begin to ease lockdowns and prepare to subdue any potential of a second wave of infections. South Korea is the only country that saw a dip in its recovery index, despite being one of the earliest adopters of a digital contact tracing app. However, this was due to the easing of restrictions on public movements.

Other countries such as the US and Sweden, which have not developed government-endorsed digital contact tracing apps, are struggling with recovery efforts. Both countries are committed to manual contact tracing despite the challenges on capital outlay and resources required. Other considerations such as data privacy have weighed in heavily in considering a digital approach, even though both countries have excellent infrastructure and mobile penetration which could support digital contact tracing.

Moving forward

As countries begin to ease institutional lockdowns and movement restriction orders, all governments are actively considering proactive measures to prevent a second wave of COVID-19. Whilst the tried-and-trusted manual contact tracing approach can be a crucial strategy moving forward, it would make sense to combine it with digital contact tracing efforts in order to enhance detection coverage and increase public awareness. The emergence of technology in public healthcare is worth leveraging, given its scalability and cost effectiveness in combatting such a pandemic – especially when resources are inevitably stretched.

As governments develop bespoke contact tracing strategies, they are paying attention to the public's concerns about data and information privacy. Particularly in an age where security breaches and leakages of private information are not uncommon, providing the highest level of assurance to the public on privacy is vitally important. This could be in the form of independent oversight of the data collected by the app, frequent audit exercises, and security clearance to access data, all enshrined in legislation. The careful development and successful implementation of digital contact tracing apps could be a game changer in combatting future infectious diseases and is worth exploring for inclusion as part of the wider healthcare infrastructure.

2.2.3 Recommendations: Interventions for countries to consider

Recommendation 1: Deploy digital contact tracing apps alongside clear and implementable data privacy laws to encourage high user adoption.

- In a world governed by information and data, citizen privacy is bound to be a major concern for any government-commissioned app designed to track and trace the health status and location of an individual. Governments would benefit from providing the highest level of assurance on data privacy and governance to encourage user adoption.
- Countries such as Australia have done well to earn the trust of its citizens in deploying a voluntary contract tracing app. The introduction and tabling of the Privacy Amendment (Public Health Contact Information) Bill 2020 in parliament to address data privacy concerns on its COVIDSafe app seems to have quelled public concerns. The government will also legislate to prevent data from the app being moved offshore.
- In introducing such an app, government leadership need to engage in an open and transparent dialogue to ensure all privacy- and data-related concerns are publicly addressed with clear solutions and mitigations.

Recommendation 2: Combine manual and digital contact tracing to address gaps and limitations in both approaches.

- In a pandemic of the scale of COVID-19, it is not possible to contain the spread of the virus with manual contact tracing alone. The thoughtful use of digital technology can enhance efficiency and coverage.
- Contact tracing technology is still limited in its functionality and strict data privacy laws are necessary to gain public consent. The risk of false positives and false negatives with digital options could result in confusion and the misallocation of healthcare and financial resources. Furthermore, frequent false alarms will undermine the technology's credibility.
- It therefore makes sense for governments to consider developing and deploying a holistic contact tracing approach involving both manual and digital contact tracing. Manual tracing is still required to ensure that the data and information collected are analysed correctly by trained healthcare staff and that patients and contacts can obtain the required medical advice. At the same time, digital contact tracing can be utilised as a first responder to isolate potentially exposed individuals before they obtain medical advice from healthcare professionals and/or immediate treatment.

Recommendation 3: Governments should ensure adequate access to testing facilities and clear advice on self-isolation at the time of the launch of a digital contact tracing app.

- Substantial reductions in the number of COVID-19 cases through contact tracing requires both easy access to proper testing and medical facilities, and clear isolation guidelines.
- Increasing capacity of medical infrastructure and health personnel would help address the substantial increase in the number of patients and contacts identified through the contact tracing app.
- Enforcement of targeted measures and clear SOPs to ensure effective quarantining efforts would increase the benefit of a contact tracing app.

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2.3 Slowing the spread through restricted movement measures

2.3.1 Setting the context

Most countries across the world have imposed restricted movement measures in response to the COVID-19 pandemic, recognizing that the fast-spreading virus does not observe national borders, let alone provincial or local boundaries. While some countries have completely closed borders to non-citizens and non-residents, others have kept borders partially open for some categories of travellers. Regardless of who can enter or leave a country, 91 per cent of the global population is currently living with some form of travel restriction.⁵² Where economies can afford it, the situation inside countries is no different; movement has been severely curtailed.

According to the WHO, travel restrictions implemented early on can delay the onset of COVID-19 cases by providing countries with essential time to prepare to manage the pandemic.⁵³ Travel restrictions can delay the spread of the virus by as much as a few weeks and can be effective when supplemented with stringent lockdown measures.⁵⁴

This section is divided into two key topics:

- The impact of border closures on the spread of COVID-19
- The relationship between the stringency of lockdown measures and a country's ability to recover from COVID-19

2.3.2 Key findings from the analysis

Can closing international borders reduce new COVID-19 cases significantly?

Travel advisories have evolved since the first known COVID-19 case in Wuhan, China in December 2019. Countries have calibrated their approach to restricted movement according to fast-changing scenarios locally and internationally. Based on the interval between the date of the first reported COVID-19 case in a country and the date of international border closures, timing can be divided into three categories: early, on-time, and late.

According to the WHO, countries that close borders right at the start of a pandemic have seen the highest impact on reducing the spread of COVID-19. How do countries fare that close borders as cases rise or much after the peak has passed?

This section includes a historic capture of how countries performed in relation to the closure of international borders during the early stages of the pandemic. Since the publication date, many countries have reopened borders and we continue to see varying results in response.

Key Finding 1: The impact of border closures on new cases is not immediate. Regardless of when countries close borders, it takes time for new cases to start declining as a result of fewer imported cases. Closing borders is an effective strategy to buy time while governments implement in-country measures to prevent community transmission.

⁵² More than nine-in-ten people worldwide live in countries with travel restrictions amid COVID-19, PEW Research Center, 1 April 2020

⁵³ Updated WHO Recommendations for International Traffic in Relation to COVID-19 Outbreak, World Health Organisation, 29 February 2020

⁵⁴ Travel Restrictions and the Spread of COVID-19 – What Does the Research Say? CATO Institute, 23 March 2020

The literature suggests that the effect of travel restrictions is complex to assess because restrictions are usually imposed alongside other countermeasures. Recent research by Kucharski et al (2020) and Chinazzi M, Davis JT, Ajelli M, et al (2020)⁵⁵ has concluded that travel restrictions delayed the overall epidemic progression by a few days/weeks at a national level, with greater impact at the international level due to the reduction of 'import cases'. To illustrate, the travel restrictions to and from Wuhan delayed the overall contamination by three to five days in Mainland China but had greater effect at an international level where case importations were reduced by nearly 80 per cent in the period up to mid-February 2020. This is supported by related research on influenza (Kucharski et al 2020), which concluded that travel restrictions delay (e.g. by three to four weeks when 90 per cent of air travel is restricted in affected countries, or by two months if even more restrictive measures are introduced) but do not prevent pandemics. As described by the WHO previously, strict travel restrictions (that could interfere with traffic of essential professionals and goods) may be justified only at the beginning of an outbreak, as they will enable countries sufficient time (even if only a few days) to rapidly implement effective preparedness measures.⁵⁶

We considered three countries, Uganda, Germany and Vietnam, each of which has either closed borders completely or partially. The interval between the first reported case and the date of the border closure among the top 20 countries in the GCI can help categorise country response to border closures in three key groups:

- **Early:** If the country closed borders before the onset of COVID-19 cases or within 29 days of the first reported case
- **On-time:** If the country closed borders between 29 and 58 days after the first reported case
- **Late:** If the country closed borders between 58 and 87 days after the first reported case

All three saw a dip in new cases within a few days or weeks of enforcement of border controls, but we wanted to evaluate the comparative impact of the timing of these border closures on the trend of cases.

In **Uganda**, international borders closed early – even before the emergence of the first reported COVID-19 case in the country (see Figure 35). On 18 March, Uganda started by restricting non-essential travel from 16 countries, including the UK and the US, and requiring a 14-day self-quarantine for people coming from such countries. However, after the first case of coronavirus was confirmed on 23 March, the government of Uganda decided to close all borders while cargo- and humanitarian-related services remained open. Such a fast reaction might have allowed Uganda to reduce imported cases and to delay the virus outbreak for some days - five days with zero reported cases - but did not eliminate cases altogether. Once the first case was reported, new cases increased every few days, but then dropped to zero in April (twice) and May (four times). The first drop to zero cases happened 10 days after international borders closed.

⁵⁵ Kucharski, A. et al. (2020), "Early dynamics of transmission and control of COVID-19: a mathematical modelling study", *The Lancet Infectious Diseases*, Vol. 0/0. Chinazzi M, Davis JT, Ajelli M, et al. The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak. *Science*. 2020

⁵⁶ Updated WHO Recommendations for International Traffic in Relation to COVID-19 Outbreak, World Health Organisation, 29 February 2020

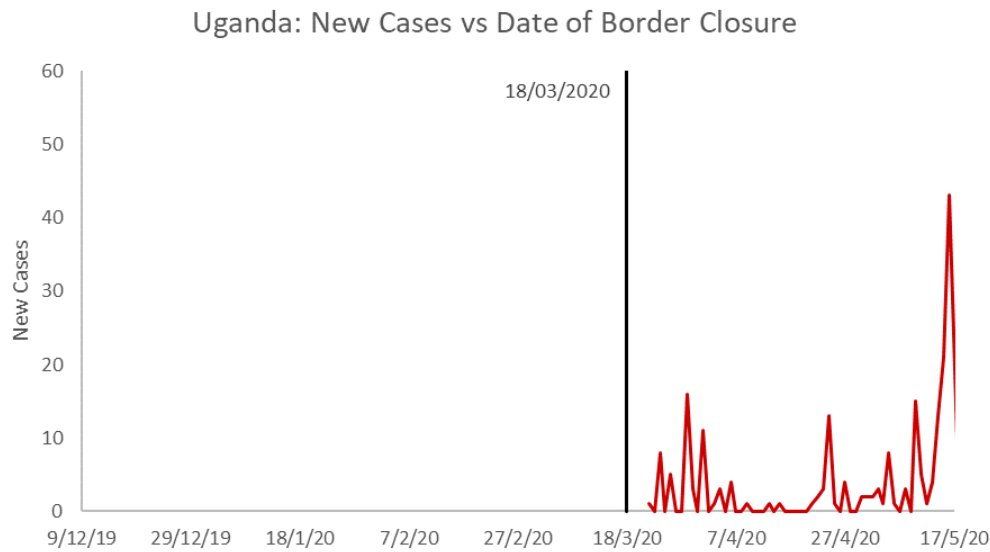


Figure 35: Trend of new cases in Uganda after border closures

In **Germany**, the government decided to close the borders on 16 March with a more flexible approach for flights coming from EU member states. International borders were closed for all entries from outside the Schengen area. For flights coming from the Schengen area, several exceptions applied:

- Citizens from EU member states and countries associated with Schengen and their family members who enter Germany in order to travel to their country of origin or residence
- Third country nationals with a long-term residence in an EU Member State
- Third country nationals with essential functions or needs (i.e. healthcare workers, transport personnel employed in the movement of goods and other essential sectors, diplomats, etc)

With the above measures in place, Germany (which closed borders 'on time') achieved zero new cases by 1 May, which was around six weeks after international border closure (see Figure 36). However, cases started dipping significantly four days after closure.

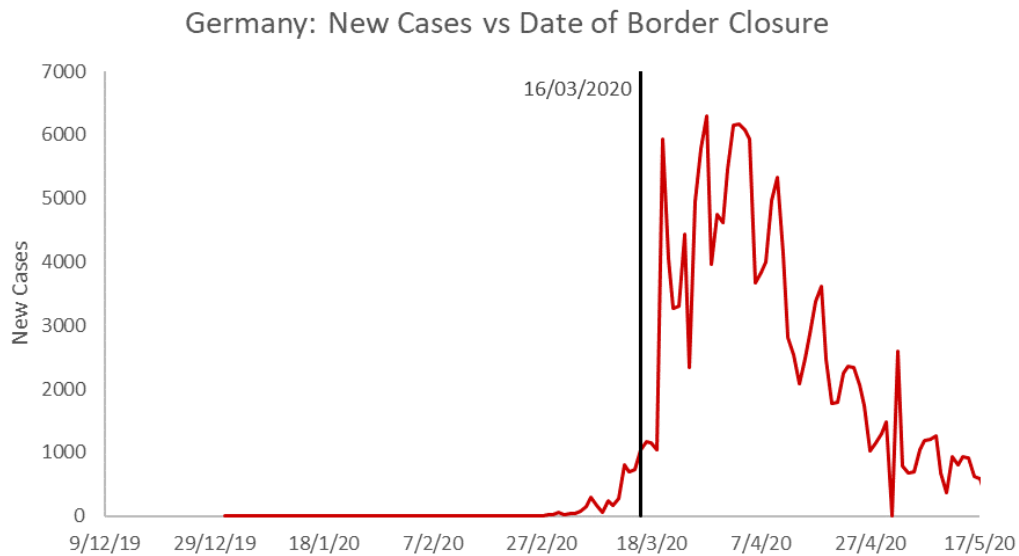


Figure 36: Trend of new cases in Germany after border closures

Vietnam adopted a longer process, gradually restricting international travel throughout March 2020. The government began by imposing entry restrictions on travellers from Iran and Italy and then suspending new visas for nationals from the Schengen area and UK during the first and second weeks of March. A week later, the government suspended visa issuance for all foreigners over COVID-19 concerns, leading to the complete closure of all international borders on 21 March. Although Vietnam deployed early actions to restrict visa issuance, borders were effectively closed 'late'. Zero new cases were achieved by 8 May, which was around 2.5 weeks after international borders closed (see Figure 37). The number of cases started dipping significantly two days after border closure, perhaps caused by a reduction in imported cases.

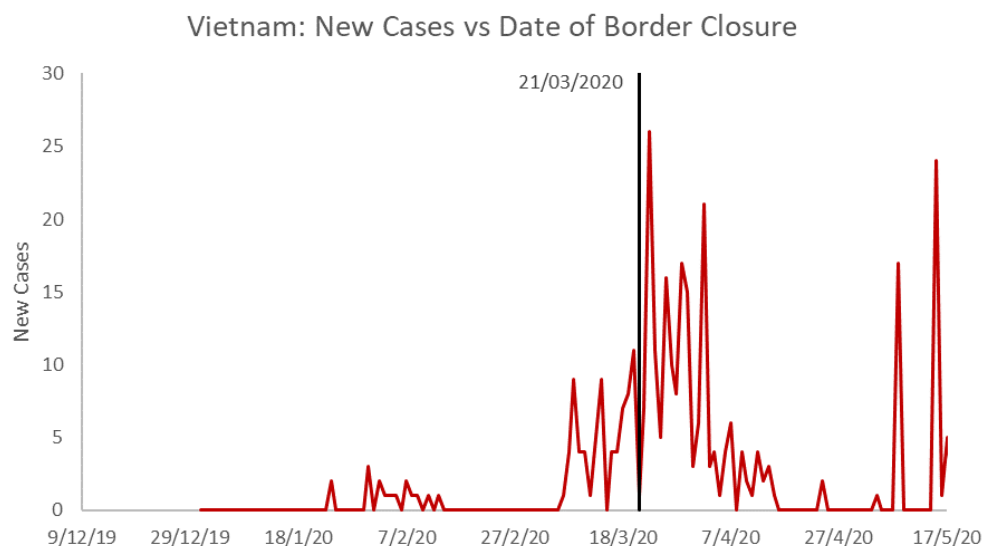


Figure 37: Trend in new cases in Vietnam after border closures

Countries in each category ended up with significantly fewer new cases over time, but closing borders as early as possible may provide more time for governments to adopt measures which prevent community transmission. A reduction in imported cases will slow down the number of new daily cases. As shown above, regardless of timing for imposing international travel restrictions, all countries eventually experienced a downturn in new cases, with occasional drops to zero new cases within a month and a half of restricting international non-essential travel.

Key Finding 2: Even if countries close borders late, it may help to flatten the curve alongside other curtailment measures.

China is an example of a country that imposed international travel restrictions (in March 2020) long after the first cases had appeared in December 2019. In late January 2020, China began with in-country mobility restrictions in Wuhan, the epicentre of the COVID-19 transmission then, and the neighbouring cities of Huanggang and Ezhou. Eventually all the remaining cities in the province of Hubei were added. These restrictions involved suspension of all public transportation including buses, railways, flights and ferry services. Moreover, the residents of Wuhan were not allowed to leave the city without permission from the authorities. Severe lockdown measures were implemented allowing families to send one person for grocery shopping every two days. In Wuhan and other 'high-risk areas', people were permanently housebound.

Effective lockdown measures were possible thanks to strict regulation and enforcement, community efforts and monitoring technology. Lockdown relied upon individual communities to self-enforce social distancing and travel bans. Entrances to communities were shut down, leaving only one entry point for residents with valid IDs and face masks. The introduction of mobile apps, ID readers, and temperature checks enhanced with digitally enabled detection and prevention systems, all contributed to the monitoring of community mobility and the close monitoring of quarantined and treated patients.

Based on these measures, China created an environment designed to fight community transmission from imported cases at a time when other countries in Europe were already presenting high numbers of confirmed cases.

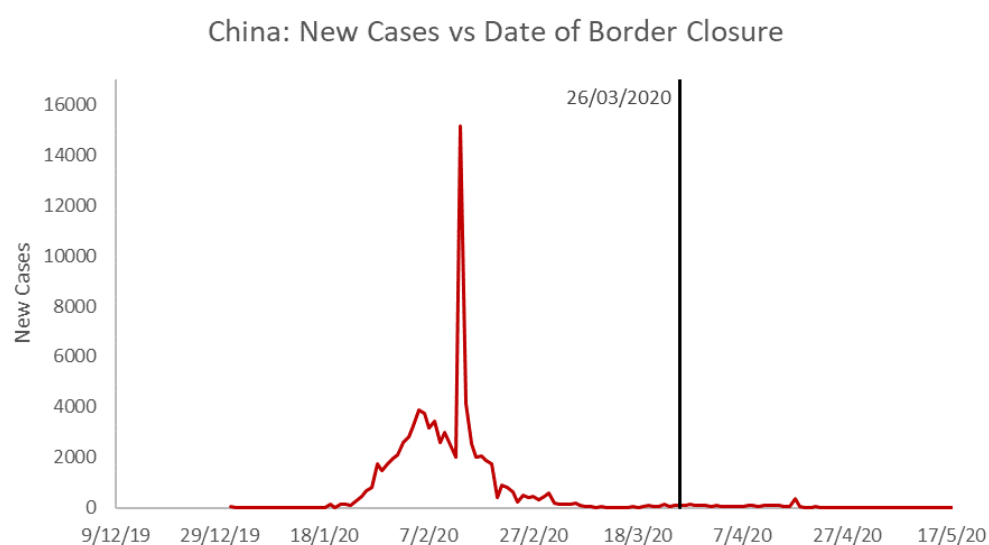


Figure 38: Trend of new cases after border closure in China

As with many peer countries, **Cambodia's** core response was based on case detection, isolation and contact tracing. Schools were closed in mid-March and large entertainment and religious gatherings were prohibited starting from early March. The Prime Minister cancelled the Khmer New Year holiday scheduled for mid-April - one of the largest celebrations of the year amongst Khmer people.

Cambodia imposed travel restrictions on 30 March with 107 accumulated cases, almost two months after the first case in late January 2020. These measures included suspending the visa exemption policy and the issuance of tourist visas, e-visas and visas on arrival for all foreigners for one month. Moreover, any foreign individual faced a 14-day mandatory quarantine. This condition was then changed to require an updated medical certificate demonstrating that the individual was not infected and proof that the individual held at least USD 50 thousand for medical coverage. Strict quarantine measures were put in place after imported cases from foreign cruises and tourist groups boosted daily cases in March 2020. Quarantine was also applied for national garment workers or any company employees taking leave during Khmer New Year. According to the Phnom Penh Capital City Hall, an estimated 15,726 garment workers employed in 672 factories returned to Phnom Penh from the provinces. Although Cambodia closed borders when daily cases were already at their peak, the country did manage to reduce the spread of imported cases through strict mobility measures and quarantine for all international and domestic travelers.

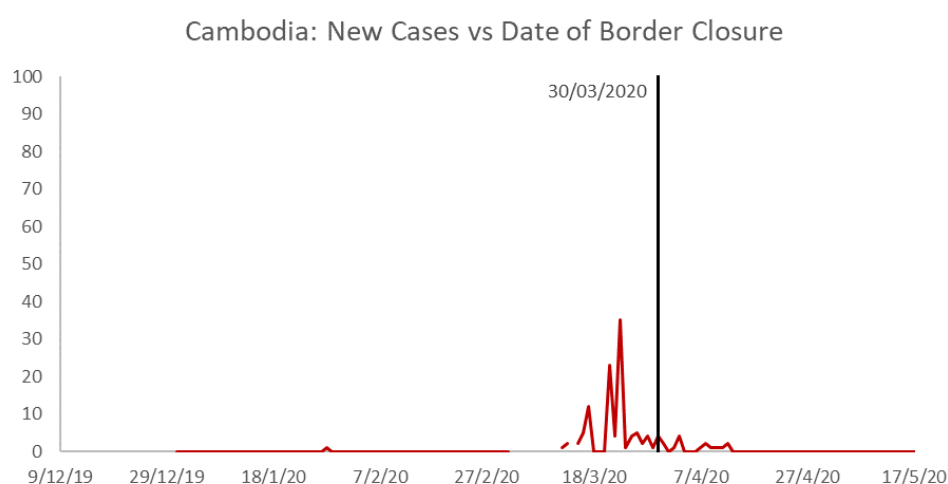


Figure 39: Trend of new cases after border closure in Cambodia

Cambodia and China have managed improvement from their peak number of cases as of 17 May. Although critical, closing international borders is unlikely to be the main driving force in reducing COVID-19 cases. Other protective and precautionary measures restricting in-country mobility at the community level are vital too.

Can lockdown measures help countries recover quickly from COVID-19?

Some countries have developed and enforced strict lockdown measures, while others have been more relaxed. The strictness of lockdown measures may be linked to countries' income levels. Depending on where a country stands on the income spectrum, the stringency of lockdowns might have a different impact on the ability to recover from COVID-19.

Key Finding 3: Lockdowns are consistently associated with improvements in recovery of COVID-19 cases.

Countries have adopted various types of social mobility restrictions with diverse levels of stringency. Evidence suggests that the number of new cases has dropped regardless of level of lockdown stringency. The stringency of lockdowns can be measured by various indices, of which the Oxford Stringency Index is the most comprehensive. Based on this index, countries can be divided into four categories: very strict, strict, moderate, and relaxed. Among the top 20 countries in the GCI, all countries fall in the first three categories.

A comparison of countries in the ‘very strict’ and ‘moderate’ categories shows how both approaches can be linked to either sustaining a positive or improving the recovery path. Denmark was the first country in Europe to implement lockdown measures. New Zealand and Greece also fall under the ‘very strict’ category and have shown remarkable recovery. Both Denmark and New Zealand requested all public servants to stay at home as well as private sector employees unless working on essential services. Education services for primary, secondary and university students were cancelled and transitioned to virtual schooling. All places for social/religious gatherings were closed. Assemblies of more than 10 people became illegal with associated fines of DKK 150 in Denmark. Greece adopted similar restrictions with additional measures to limit mobility, only allowing its citizens to leave home for seven specific reasons such as going to a pharmacy, food store or bank, exercising outdoors briefly and walking pets. The recovery index in Denmark, as shown in Figure 40, jumped 27.2 points from its lowest point since the onset of COVID-19, followed by New Zealand (25.8 points) and Greece (18.4 points). Recent international literature also supports the positive impact of large-scale lockdown measures and school closures in decreasing COVID-19 cases and has arguably prevented 3.1 million deaths in Europe.⁵⁷

Although recovery index performance in South Korea and Taiwan is much more modest, with a jump of 10.5 points in Taiwan and zero points in South Korea, this might imply that even ‘moderate’ lockdowns seem to support recovery paths over time if they are coupled with other strategies to prevent contagion. Both countries have been widely known for implementing mass contact tracing and testing policies enabled by technological solutions which potentially offset the need for strict lockdown measures.

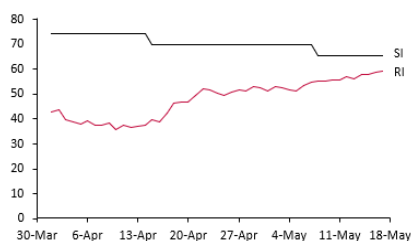


Figure 40: Denmark

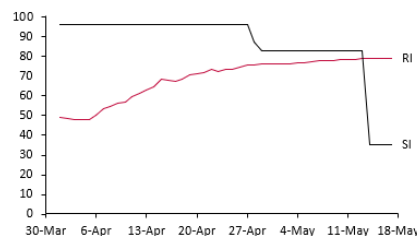


Figure 41: New Zealand

⁵⁷ Flaxman, S., Mishra, S., Gandy, A. et al. Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe. Nature (2020). <https://doi.org/10.1038/s41586-020-2405-7>

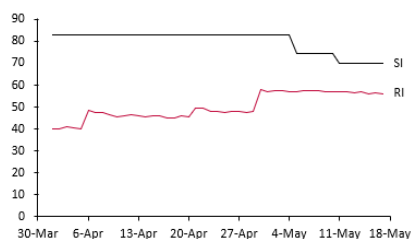


Figure 42: Greece

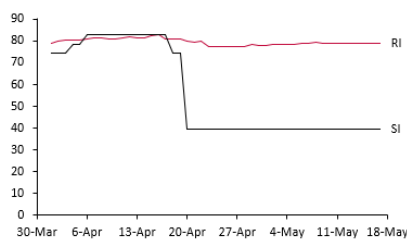


Figure 43: South Korea

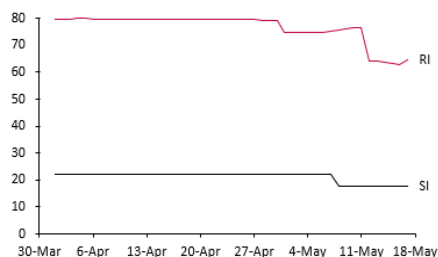


Figure 44: Taiwan

Key Finding 4: Countries with large-scale efficient contact tracing, testing and isolation measures can potentially afford less strict mobility restriction measures while controlling health risks.

The government of South Korea decided early on not to impose draconian quarantine and lockdown measures. It focused instead on mass testing and contact tracing. South Korea is a compelling case for using technology-based solutions for contact tracing, testing and isolation measures. South Korea used cell phones, closed-circuit television (CCTV) and bank transactions to collect data on the movements of COVID-19-infected people and shared information via text message with people living nearby. Moreover, it put in place widespread drive-through testing facilities where examination and temperature checks were done with drivers able to remain inside the car.

Quarantine and isolation measures were put in place for infected people in government shelters. High-risk patients with underlying illnesses were prioritised for hospitalization while others with moderate symptoms were placed in repurposed corporate training facilities and public spaces to receive medical support. Recovered patients and those with minimal symptoms were sent home and requested to self-quarantine for two weeks, receiving twice-daily calls from monitoring teams to check on compliance and review symptoms. All individuals under self-quarantine were required to download an app that alerts authorities about non-compliance, leading to a fine of up to USD 2,500.

In April 2020, after the number of daily confirmed cases fell into single digits, the government decided to relax some mobility restrictions in stores, restaurants, gyms, schools, bars, religious services and national parks. Such intervention did not lead to an increase in the number of daily cases (there were under fifty new daily cases in April, and under forty in May); but it did enable the reactivation of economic and social activity. South Korea leveraged the use of big data to reduce the cost of contact tracing. However, questions around information privacy and episodes of data leaks have created controversy and fears of social stigma.

Like South Korea, Taiwan adopted an alternative approach deploying a policy of maximum health information transparency and supervised self-discipline without resorting to strict lockdown measures. The government of Taiwan established a centralised epidemic command centre (CECC) to provide information and perform detailed surveillance of the movements of infected people. All confirmed cases with COVID-19 symptoms reported to public and private hospitals and were immediately reported to the CECC. The CECC traced patients' recent movements and identified their footprint in public spaces such as supermarkets and restaurants. Text messages were sent to warn other people who might have been near the patients and encourage compliance with social distancing rules. The government also established an 'electronic fence' system, allowing them to monitor any infected person leaving their designated quarantine area.

Key Finding 5: Gradual relaxation in lockdown measures helps sustain recovery paths.

Countries that have eased the strictness of lockdown step by step and gradually have observed sustained improvement in the recovery index (see Figures 45 and 46 below).

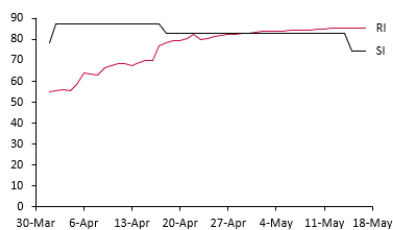


Figure 45: Australia

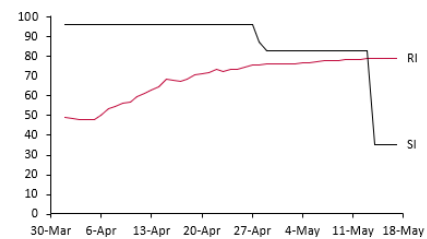


Figure 46: New Zealand

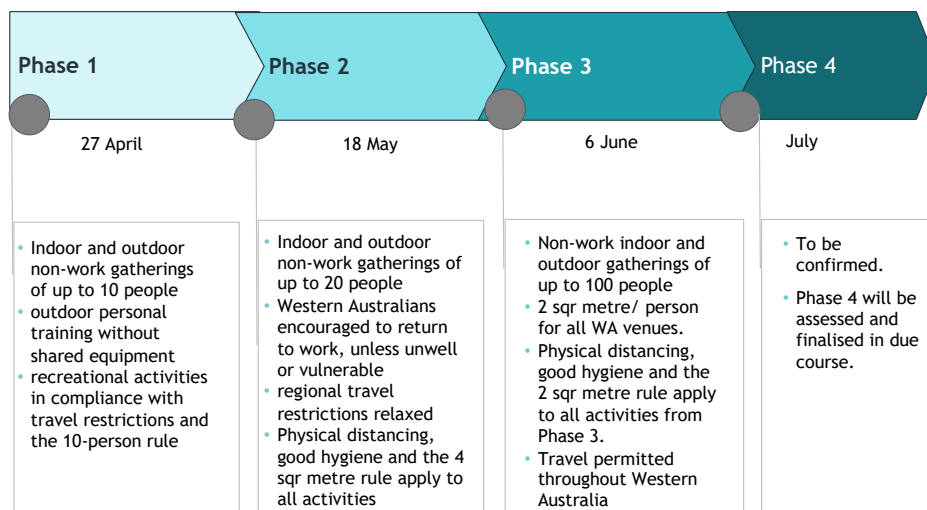
Effective Practice Case Study: Australia's four phase roadmap Lockdown measures and gradual reopening of society and economy

The lockdown measures: Like many other countries, Australia gradually adopted strict lockdown measures to reduce the risk of community contamination. In early March, government started imposing self-isolation for all international travellers for 14 days and restricting social gatherings larger than 100 people. The government then closed international borders for all non-essential travel both for non-citizens and residents. It imposed a major round of closures of non-essential services including all pubs, clubs, cafes, restaurants and gyms nationwide, excluding only takeaway services. By late March, travel restrictions were in place for international and domestic flights, gatherings were limited to two people, people over age 70 were advised to self-isolate and government advised all people to stay at home.

The results: After imposing strict travel and quarantine restrictions throughout March and reaching the highest number of daily cases (497) on 28 March, daily cases began to drop drastically. In April, the average number of new daily cases was 25 (with the highest point being 64 new cases on 14 April). In May, the average number of new daily cases was 15 to 17, with a peak on 14 May with 30 cases.

The reopening plan: As the number of new cases decreased in April, a four-phase roadmap to gradually ease the lockdown measures and resume economic and social activities was put in place. Each phase is separated by three to four weeks and gradually provides greater flexibility regarding social distancing, gatherings and reopening economic activities and travel. This plan has been constantly revised and updated by the authorities to enable preventive action if the rate of new cases increases.

Australia four-phase roadmap to ease COVID-19 restrictions



Note: As of 21 July, Australia has witnessed several new outbreaks including a return to lockdown across the Melbourne Metropolitan area in the state of Victoria where over 370 new cases were recorded in one day. This highlights the changing nature of the pandemic and how much we need to continue learning the effect of gradual easing measures taken by different countries.

Source: Website, Department of the Premier and the Cabinet – Government of Western Australia

2.3.3 Recommendations: Interventions for countries to consider during the early stages of an outbreak

Recommendation 1: Close international borders to prevent import of new foreign cases and buy time for adoption of preventive and protective measures.

- Travel restrictions are feasible with a careful risk assessment that takes account of the public health risks and immediate economic impacts. As the situation evolves, room to reconsider such restrictions is recommended.
- A plan for closing international borders can make exceptions to allow essential travel for national citizens and residents and mobility of essential workers and goods.
- For essential travellers, provide clear recommendations and establish protocols for testing, tracking and self-quarantine measures.
- Closing international borders is not enough. International mobility measures work best when combined with in-country measures.

Recommendation 2: Implement and enforce lockdowns; adjust stringency based on capacity to test and isolate.

- Lockdown measures are a highly contextualised policy with no one-size-fits-all recommendation. Countries may want to analyse lockdown policy in light of government's capacity to effectively test, track, trace and isolate infected cases and prevent the spread through physical interaction. The lower a country's surveillance and case management capacity, the more stringent its social mobility restrictions must be.
- If required, define a lockdown plan starting with high-risk areas for contagion (places for social or religious gatherings), reinforcing work-from-home policies for non-essential workers and social distancing measures in places allowed to operate. Communicate widely to encourage universal hygiene actions to prevent infection (e.g. washing hands, wearing masks and constant disinfecting).
- Before, during, and after lockdown, governments can take rapid action to increase capacity for contact tracing and isolation through digital apps, widespread mobile use, and technological infrastructure. Nation-wide strict lockdown measures are not sustainable for long periods of time. Governments can develop alternative approaches that enable more targeted actions.

Recommendation 3: Relax lockdowns gradually as the data show that the spread of the disease has been controlled.

- The relaxation of lockdown measures can be based on an analysis of both the health risks and the economic risks of prolonged lockdowns. Lifting a lockdown too early might bring a second wave of infections; lifting it too late will involve larger economic loss.
- Define a clear roadmap that specifies stages, dates and actions to gradually resume social and economic activities. Ensure the roadmap provides clear metrics regarding social distancing, size of gatherings and type of activities allowed to reopen, allowing citizens and business owners to take immediate action.
- Closely monitor the impact of lockdown relaxation on viral spread at the community level. Update the plan and specific actions accordingly.

2.4 Reopen the economy when the time is right based on data

2.4.1 Setting the context

Some countries have begun to reverse the upward trend of COVID-19 cases, while others remain on an upward trajectory despite their best efforts. However, countries in both categories have started reopening their economies. With markets, industries and educational institutions closed for weeks or months, governments are faced with deciding how long they are willing to sustain the negative social and economic impact of restricted movement. It is too early to tell how reopening the economy will impact the long-term health recovery trajectory. What we attempt in this section is to briefly highlight some of the emerging trends we are seeing and to identify the role that some of these sector decisions might play in the health recovery of countries as they respond to the pandemic. These insights can inform a broader narrative that can inform effective practice moving forward.

This section therefore focuses on two key areas:

- Effective use of data and relevant information to drive decision-making
- Effective practice in balancing the recovery in health with reopening of the education sector (as an illustration of resuming a critical area of public life)

2.4.2 Key findings from the analysis

How have countries used data effectively to inform their decisions on easing of restrictions, and what can this tell us about trends in recovery?

Key Finding 1: Countries that have begun to reopen sectors on the basis of improvements in COVID-19 data seem to be able to continue progress on their health recovery.

It is too early to make firmly evidence-based assumptions on what is or is not working when it comes to balancing economic reopening measures with maintaining health outcomes. Many factors feed into the GCI recovery index, and the impact will vary over time as different stages of easing measures come into play. But as the situation evolves rapidly, clear trends in best practice are beginning to emerge. These include:

- **Use of big data to track real-time rise in infections and respond rapidly.**⁵⁸ Often this coincides with countries that have compact demographics and can deploy mobile communication technology for rapid contact tracing, and targeted responses to minimise resurgences. Whilst this raises an important debate around use of data and privacy concerns, where advanced mobile apps with geolocation data are combined with human contact tracers, such as Singapore, Taiwan and South Korea, cases have continued to decrease rapidly even after key sectors such as education and public transport are reopened. **Smart technology** has played an outsized (and sometimes controversial) role here. As China began reopening its public transport system, QR codes were placed on

⁵⁸ Reopening the Economy, Moving Forward This Week: The Coronavirus Workplace Series, Michael Bernick, Forbes, 20 April 2020

Beijing's subway trains and on buses in Shanghai to encourage passengers to register contact information to improve track and trace efforts.

- **Adapting the model of reopening to disease progression data.** Many countries are planning a graduated model of reopening, easing restrictions in stages based on data that informs decision makers on the progression of the disease, the capacity of the health system to respond and the preparedness of the general public to adhere to measures.⁵⁹ Many countries are adopting traffic light systems to communicate their deliberate and phased roadmaps, from Australia's 'levels', to New Zealand's 'alert system' – both countries in the top 10 rankings of the GCI recovery index.
- **Phasing reopening by sector.** Effective countries have prioritised the sectors to be released from lockdown based on analysis of four key considerations: (1) sectors less suitable for remote operations; (2) sectors that contribute larger percentage of gross domestic product (GDP) to the national economy; (3) value add per worker (releasing fewer workers, but releasing those with more productive contributions); and (4) business viability and the impact that state support can have on stimulating the economy.⁶⁰ It is important to consider combining this approach with real-time tracking of virus progression so that corrections can be made where the number of cases spikes. An MIT Digital Economy initiative, for example, developed a framework that ranks the viability of reopening specific industries based on the trade-off between risk of infection and importance to the economy. Work like this could provide a useful baseline to help countries think through the impact of opening specific businesses to the long-term health recovery.⁶¹

Phasing reopening by sector: [Harvard analysis](#) on two case studies: Switzerland and Spain

- **Switzerland** – By constructing key measures of analysis (e.g. an indicator of 'value loss in lockdown' which combined ease of switching to remote operations and relative weight of contribution of the sector to the economy) and comparing this with an evaluation of the risk of contamination (e.g. density of the workplace amongst other factors) – the team concluded that employees in the health, construction and manufacturing sectors should be targeted for release in the first wave of easing measures. They could then identify which sectors to target in a second stage of release, and finally, once there were zero new cases – a third stage – a strategy could be developed that would progressively reopen businesses without risking overwhelming the public health system.
- **Spain** – Similar analysis for Spain would see manufacturing, construction and health services released in stage one of reopening, with retail and real estate restarting operations in stage two. All other sectors (mainly tourism, financial and administrative services) could reopen in the final stage of reopening.
- **There is no one answer here.** However, if governments use data continuously to adapt their phased reopening strategies, it could give them the space needed to continue learning about the changing dynamics of the pandemic to inform their ongoing strategy.

⁵⁹ Beyond the Curve: How to Restart in the Wake of COVID-19, Amanda Brimmer, Vincent Chin et al., BCG, 16 April 2020

⁶⁰ The Case for Reopening Economies by Sector, Jean-Philippe Bonardi, Arturo Bris et al., Harvard Business Review, 19 May 2020

⁶¹ What should reopen first? Data shows the way, Sara Brown, MIT Management Sloan School, 18 May 2020

- **Maintaining snap-back mechanisms.** On initially easing restrictions, Germany witnessed an increase in the COVID-19 reproduction number (going above one again in early May from a drop to 0.65 before reopening). Yet the government agreed to monitor the data and snap back into targeted lockdown measures if any county exceeds 50 new coronavirus cases per 100,000 residents.⁶² This type of coherent national framework, combined with cooperative local implementation to improve adherence, will require strategies to rebuild public trust and manage uncertainty. Yet early indications are that these reopening strategies can pay off, with Germany maintaining good health recovery outcomes on the GCI.
- **Using data to manage and monitor recovery.** This is increasingly important as restrictions are eased, with health dashboards helping governments manage the impact of reopening on resurgence in cases, business activity and the trade-off between the two. In the US, for example, a new '[Management Metrics for Cities](#)' tool released by Bloomberg Philanthropies, Johns Hopkins University and Delivery Associates, provides one set of expert-vetted benchmarks to help local leaders use the best data to manage through the recovery period.⁶³

Case Study: New Zealand

The full reboot model

- The government in New Zealand waited until new COVID-19 cases effectively reached zero before restarting full economic and social activity. This required a set of conditions very specific to New Zealand as a remote group of islands, including tight border controls, high levels of test, track and trace, and the ability to get high levels of adherence to an early, strongly enforced and lengthy lockdown.⁶⁴
- Whilst New Zealand has since recorded new confirmed cases of COVID-19, it is clear that keeping its borders closed appears to be key to New Zealand's broadly successful strategy to protect its elimination of community spread, with 'travel bubbles' being designed to stimulate economic progress in a measured way. This could first include travel between Australia and New Zealand but could be extended to COVID-free South Pacific island nations in July.⁶⁵ This approach might be unique to its context, essentially providing laboratory conditions under closed-border restrictions.
- Contact tracing is another foundational element of the strategy, learning from Singapore's model of a mobile-based app and continuing its globally high levels of testing.
- The data roadmap released by the New Zealand government highlights some of the unique characteristics that enable New Zealand to be data-driven in its policymaking. Amongst these, the fact that 90 per cent of residents have access to the internet, the growing data economy which is projected to contribute over NZD 4.5 billion this year, and its dedication to an open data environment (ranking fifth on the Global Data Barometer) all enable data to play a unique role in government decision-making and the pandemic has been no different.⁶⁶

⁶² Renewed outbreaks in South Korea, Germany and China show continued risk as more countries seek to reopen, James Griffiths, CNN, 11 May 2020

⁶³ Management Metrics for Cities in the COVID-19 Crisis, Johns Hopkins University and Medicine

⁶⁴ Beyond the Curve: How to Restart in the Wake of COVID-19, Amanda Brimmer, Vincent Chin et al., BCG, 16th April 2020

⁶⁵ Australia and New Zealand reopen after coronavirus cases plummet, Rebecca Falconer, AXIOS, 12th May 2020

⁶⁶ Data strategy and roadmap for New Zealand, data.govt.nz, 2020

Case Study: China

The graduated reopening approach

- 'First in, first out' is not just a handy catchphrase for China's experience of COVID-19, but highlights the importance of learning lessons from its experience, both in terms of what to adopt and what to adapt or change.
- China was one of the first countries to adopt a graduated approach to lifting restrictions and reopening the economy. The government developed a national framework to guide decisions, but decentralised decisions on implementation to the local level. The framework graded businesses according to their transmission risk, and then phased low-to-medium risk businesses such as construction and manufacturing first, with high-transmission risk industries such as hospitality and education reopening more than a month later. This localised approach has clear benefits in terms of targeting efficiencies. However, it also poses logistical challenges for supply chains of the many businesses that operate across provinces with different rules.
- Equally controversial is the government-endorsed health code system,⁶⁷ which gauges a person's infection risk and colour codes them accordingly. This information is centralised on a data platform using QR codes to crowd-source information, which raises important questions on privacy and civil liberties while simultaneously enabling more rapid targeted isolation of outbreaks.

Key Finding 2: Some countries have experienced a decline in recovery after reopening, raising questions on the impact of reopening too much, too fast.

On the flip side, early evidence suggests that countries that haven't invested in data-informed strategies have seen a negative impact on their health recovery. Doing this well isn't easy. There are many statistical challenges with the data being used to inform these strategies, including limited access to the tools and data needed under lockdown conditions, inconsistent approaches to recording data (leading to complications in the assessment of impact and implications), and lower frequency in data reporting, meaning policymakers are making decisions based on infrequent and/or out-of-date information.⁶⁸

One of the key challenges seen is limited track and trace programmes. Many countries have been unable to identify **real transmission rates** at a local level so far, reducing their ability to target response measures effectively. When a cluster of new cases was identified in Seoul, South Korea on 10 May, questions were raised on whether the government had reopened too much too soon. Yet with the capacity to test, trace and isolate individual cases in real-time, the government is arguably getting health recovery back on track without having to reinstitute lockdown for entire sections of the economy.⁶⁹ This is not the case everywhere:

⁶⁷ China's Coronavirus Back-to-Work Lessons: Masks and Vigilance, Alexandra Stevenson & Cao Li, The New York Times, 12th May 2020

⁶⁸ Keeping Economic Data Flowing During COVID-19, IMFBlog, 26 May 2020

⁶⁹ Renewed outbreaks in South Korea, Germany and China show continued risk as more countries seek to reopen, James Griffiths, CNN, 11 May 2020

Case Study: Israel

Surge in cases after measures deployed to reopen the economy

- **Israel** had to 'put the brakes on' the reopening of its economy after reports of steep increases in infection rates at the start of June. When schools, shopping malls and restaurants reopened at the end of May, the country saw five times as many new infections each day (100 daily new infections up from 20 the week before reopening).⁷⁰
- Initially, Israel had been seen as a relative success case, with the National Security Council concluding that the infection rate had only increased by 0.1 per cent within 10 days of reopening schools and the retail economy. Yet as the planned measures to reopen aspects of the economy are put on hold, questions are being raised over the evidence that informed decisions over which aspects to reopen (e.g. shopping malls before public rail) and whether too much was reopened too soon.
- Since then, Israel has had to close many areas of its economy again in an attempt to control further outbreaks. Schools, for example, that were reopened on 3 May had to close a month later after over 2,000 students, teachers and staff tested positive for COVID-19.⁷¹

The calculation is not a simple one, especially for populous, developing economies. The debate is ongoing on the cost of social distancing measures to contain the virus given the significant impact on economies with large informal sectors. What is becoming clear is the need for global partnerships, data exchange and advanced analytics to help governments make effective and evidence-informed decisions that work for them. Sometimes the best health interests will conflict with the best interests of economies, requiring political leaders to exercise judgment in difficult circumstances.

Case Study: Pakistan

The political challenge in targeting the right response

- Prime Minister Imran Khan of **Pakistan** made the decision to lift lockdown measures despite data showing 20,000 new COVID-19 cases in the previous three weeks. That number more than doubled in the three weeks after measures were eased.⁷² Whilst testing is increasing, adding complication to any assumptions being drawn on number of cases alone, the data suggests that community transmission is probably still widespread, leading local health experts to urge the government to reinstate some lockdown measures.
- The graph below plots the ratio of total deaths to total cases through 27 April. Once broken down by demographics (for example age and gender of the deceased), critical policy implications become clear in terms of segments of the population that could remain on lockdown in order to stimulate the economy through safer demographics. Yet decisions in the country appear to not have prioritised the data, with mosques remaining open despite the clear risk to the most vulnerable age groups.

⁷⁰ Israel hits "emergency brake" on reopening as coronavirus cases rise, Kisa Archeta, 8 June 2020

⁷¹ <https://time.com/5868098/schools-reopening-coronavirus-denmark-south-korea-israel/>

⁷² Coronavirus cases surge in Pakistan after PM gambles on reopening the economy, Charlotte Greenfield & Umar Farooq, Reuters, 5 June 2020

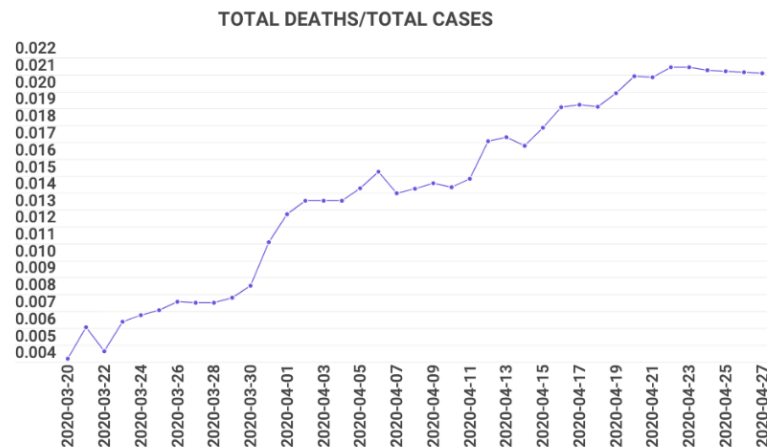


Figure 47: Total deaths/total cases

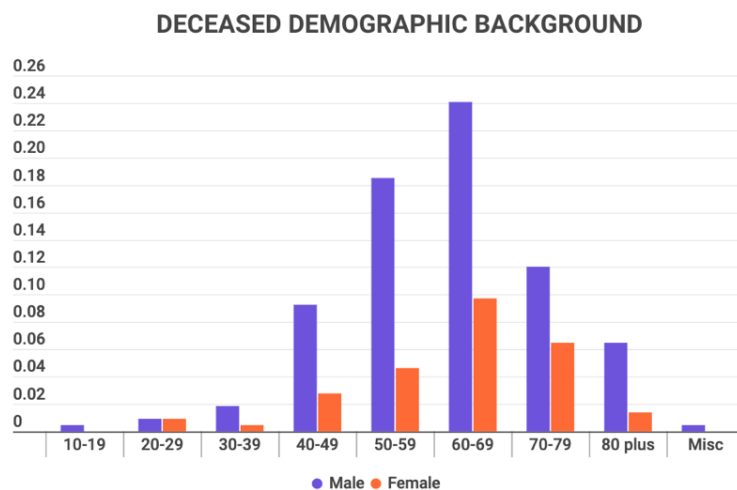


Figure 48: Pakistan's deceased demographic background
Source: Reuters

- Reopening came with recommendations to follow social distancing rules, with face masks being made compulsory in public. Many still fear this won't be enough to stop the continued rise in cases as shopping malls and markets have reopened through a Supreme Court ruling. Education is the only major sector that remained closed as of the end of May. Even with the government's emphasis on citizen responsibility, official data suggests the infection rate has started increasing again, doubling every nine to eleven days since 1 April.⁷³
- Pakistan has a poor GCI recovery rating of just 2 as of 17 May, placing it 136th out of 184 countries analysed.

It remains too early to be definitive about the best model for reopening, with the graduated approach appearing to minimise the risk of increased viral reproduction rates, but arguably compounding the impact to the economy without a full sharp reboot.⁷⁴ However, with real-time data available, countries such as New Zealand, Austria, China and Switzerland have been able to

⁷³ Lockdown over, Pakistan's COVID-19 deaths, infections tick higher, Reuters, 21 May 2020

⁷⁴ Beyond the Curve: How to Restart in the Wake of COVID-19, Amanda Brimmer, Vincent Chin et al., BCG, 16 April 2020

develop economic roadmaps that are targeted and phased, but also flexible enough to adapt to the rapidly changing dynamics of the pandemic.

Key Finding 3: Key trends are emerging in countries that have reopened parts of their education sector and maintained a recovery in health metrics.

As of June 2020, most countries had not yet reopened schools, and many still plan to end their academic year online. Schools in Israel, Norway, Japan, Denmark, China and Taiwan were among the first to reopen, with teachers, parents and students alike being forced to adjust to a new reality. By mid-May, an estimated 22 countries in Europe alone had reopened schools for certain grades, with education ministers insisting this has not led to a significant increase in infections amongst children, parents or school staff.⁷⁵ The graphs below speak to this trend, with minimal impact to progress on health recovery rates (based on the GCI). The lessons we can learn from these countries, however, can only provide initial indications. It is too early to extrapolate from these individual experiences to broader effective practice beyond what the current data can tell us.

⁷⁵ Schools reopening has not triggered rise in COVID-19 cases, EU Ministers told, Guardian, 18 May 2020

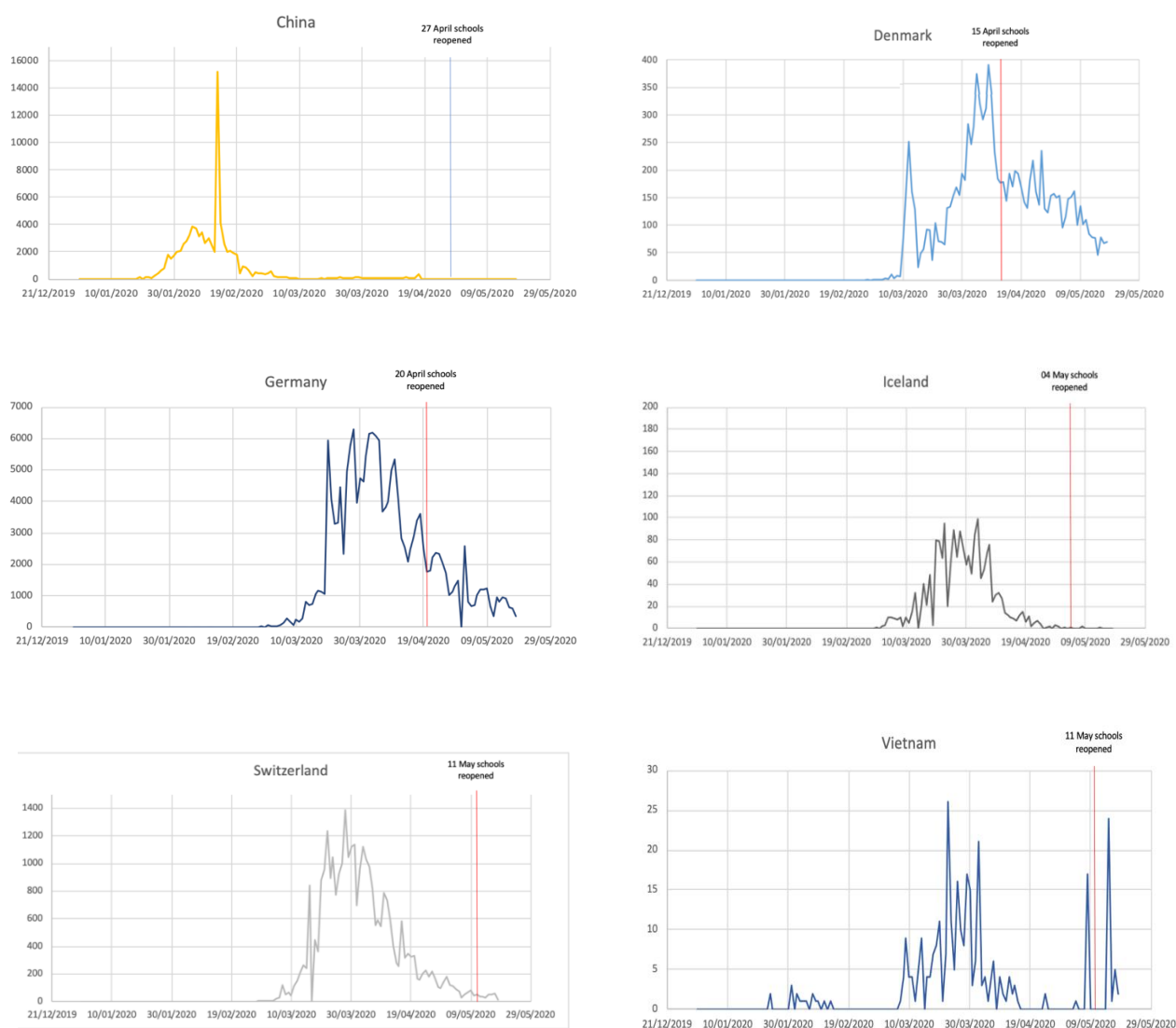


Figure 49: Reopening of economies Source: GCI

These early trends highlight some key considerations for governments reopening their education sector, through a narrow lens of the role these decisions have played in the health recovery.

- **Social distancing** both inside and outside of the classroom is a key tactic in Denmark's reopening strategy. The first country in Europe to restart classes on 15 April, much of the learning in Denmark's schools has moved to outdoor public parks and spaces. Class 'pods' (groups of students) have gradually increased from groups of four to groups of 28 students in line with weekly updates to government guidelines in line with the data.⁷⁶
- **Testing and screening measures** have played a key role in China's partial school reopening. Despite provincial variation in return dates and regulations, the Ministry of Education is requiring all students to have their temperature checked at school entrances, displaying a green sticker to align with the national smartphone health code programme.⁷⁷ Similar to

⁷⁶ How Denmark sent children safely back to school, ITV, 20 May 2020

⁷⁷ COVID-19: Countries around the world are reopening their schools. This is what it looks like, WEF, 2 May 2020

Denmark, the latest data on the recovery index suggests a continued reduction in COVID-19 cases despite the partial reopening of the education sector in China.

- New Zealand opted for **staged returns** to on-site schooling to allow time to monitor the data and evaluate the effects of the increased movement of people and community transmission. The government laid out a detailed set of guidelines for each of the four levels of ‘alert’ in response to COVID-19, which saw all educational facilities closed at level four, through to current level two status in which all education facilities, including schools, early learning centres and tertiary institutions are open with distance learning options for those unable to attend school. In Europe, 17 of the 22 countries that had begun reopening by mid-May were only allowing kindergarten, primary and final year secondary students back to school, to prioritise return-to-work policies and final examinations for secondary leavers.⁷⁸ This **contextualisation** to allow for adapting response strategies to local recovery conditions appears to be key in early strategies to reopen education to stimulate economic recovery whilst maintaining a strong GCI recovery index.

Case Study: Denmark

Success in reopening schools without impacting recovery

- The Danish government worked closely with school community representatives (e.g. Danish Union of Teachers) to ensure buy-in for guidelines on school reopening across the ecosystem. This led to transparent publication of information on decision-making, informed by the Statens Serum Institut (SSI), the governmental public health and research institute. The SSI’s scientific modelling showed the infection rate was at 0.6 (R number) with just 433 active COVID cases in Danish hospitals at the time of reopening on 15 April. Reopening was phased to allow social distancing between students. Classes were split in



Figure 50: Danish Prime Minister Mette Frederiksen speaks with students as she participates in the reopening of a school in Valby, Copenhagen on 15 April 2020



Figure 51: A Danish teacher speaks with her pupils outside a primary school in Copenhagen, Denmark on 29 April 2020

Source: [The Local](#) c/o Reuters

two, with learning ‘pods’ initially restricted to four students. With weekly updates to the guidelines from government, this has increased to class ‘pods’ of 28 students, complimented by strong hygiene practices including near-hourly handwashing in every classroom. Social distancing guidelines have been reduced from two metres to one, meaning most schools can now accommodate all pupils in one session. The government has not made guidelines definitive leading to schools interpreting them in different ways, with many still offering blended options of split days of on-site learning with online teaching to avoid overcrowding at schools.

⁷⁸ Schools reopening has not triggered rise in COVID-19 cases, EU Ministers told, Guardian, 18 May 2020

- Timetables were adapted to enable smaller class sizes and shift learning to outside spaces wherever possible, informed by SSI modelling that showed children had a low susceptibility rate to the coronavirus (including as carriers) and that infection spread was reduced significantly outside vs inside the classroom.
- Initial fear of the virus led to just 50.7 per cent of pupils returning to primary school within the first three days, but by the third week of reopening, that number had jumped to 90.1 per cent of registered pupils.¹ The R number reportedly rose from 0.7 to 0.9 within two weeks of reopening schools to students up to age 11, but quickly decreased again. Six weeks on from the first reopening of schools, it has remained at 0.7, in line with reductions in infections and deaths from coronavirus countrywide. The SSI reported as few as 112 COVID-19 patients in Danish hospitals at the end of May (a drop from 380 when primary schools reopened) leading epidemiologists to suggest the process has proven to be safe.

2.4.3 Recommendations: Interventions for countries to consider

Recommendation 1: Use data to guide decisions on when to open the different sectors of the economy and, ultimately, the economy as a whole.

- With the impact of COVID-19 ongoing and a vaccine still months or years away, the transition period will last for some time to come. Strategies therefore need to be flexible and adapt to data-informed trends.
- Ensuring critical data is collected and used sector by sector and region by region is clearly important to manage the consequences of reopening the economy. In the short-term, when good real-time data may not yet be available, using the best that can be found makes sense. This might mean using temporary estimations, imputing data from alternative sources, or enhancing the transparency of data sharing to encourage quality controls in real-time.
- [Open Data Watch](#) consolidated a set of resources that can help strategists in effective use of open data in responses and recovery plans from COVID-19.

It is important to bring **equity** to the forefront here. Even where data use has been effective in informing reopening strategies, most countries still have gaps in their levels of disaggregated data leading to large equity concerns across the world. The pandemic has proven to impact some groups disproportionately according to gender, race and ethnicity. Yet even where this disturbing fact has been recognised, such as the UK where Public Health England recently published a report on minority ethnic groups and the effects of COVID-19, the lack of disaggregated data makes it hard to make significant recommendations on how to address the problem.⁷⁹ This and other equity concerns should be at the heart of any data-driven approach.

Recommendation 2: Reopen targeted parts of the public sector (such as education or transport) with adequate support and guidelines in place to facilitate safety.

- Deploy a contextually relevant range of testing and screening measures from self-administered health screening to thermal digital technologies to identify and isolate individual clusters and avoid reclosing whole sectors.
- Establish a staged roadmap for reopening, analyse lead indicators and adjust the strategy in real-time as necessary.
- Devolve some decisions to the local level to enable local contextual factors to be taken into account.

⁷⁹ Data in the time of COVID-19, Open Data Watch

2.5 Risk communication and community engagement to manage public sentiment and response across stakeholder groups

2.5.1 Setting the context

Why is effective public engagement crucial during a pandemic?

Risk Communication and Community Engagement⁸⁰ (RCCE) is integral to the success of responses to health emergencies.⁸¹ When done well, it has been observed to be a vital means of informing and guiding the public during the COVID-19 pandemic.

RCCE supports national governments, national health authorities, regional and local governments and community engagement staff to develop, consistently implement and effectively monitor the impact of a communications plan. It is vital to effective communication with the public and successful engagement of local communities and other stakeholders in order to protect public health during the pandemic.⁸²

COVID-19 and previous health emergencies such as SARS, MERS and Ebola have placed the public within situations of great uncertainty. RCCE addresses this uncertainty by rectifying the knowledge gap between the originators of information and the public. An effective RCCE response facilitates the conversations between government agencies and the public to reduce anxiety, increase trust and guide recipients of information to make better decisions.

RCCE has the highest impact in the early stage of a pandemic when uncertainty is rife and the demand for information is at its highest, but it is a critical tool throughout recovery and rebuilding as well. The RCCE ensures that all members of the public are made aware of the risks surrounding the epidemic and understand their role and responsibility in slowing the spread of the virus until a vaccine or treatments become readily available.

A well-executed RCCE plan:

- **Demystifies the fear surrounding the epidemic:** Through proactively updating the general public with timely, accurate information with the objective of saving lives and minimising adverse consequences.
- **Prevents the spread of misinformation, builds trust in the response and increases the probability that health advice is followed:** Through minimising and managing false rumours and misunderstanding, which undermine responses and may lead to further spread of the virus.
- **Ensures the protection of all segments of society:** Through frequent communication and engagement with the public and at-risk populations to alleviate confusion and misunderstanding.
- **Synchronises community engagement staff, authorities and official spokespersons with accurate information at all levels:** Through transforming and delivering complex scientific knowledge in a form which is understood by, accessible to, and trusted by the public.

⁸⁰ Risk Communication and Community Engagement (RCCE) Guidelines, World Health Organisation

⁸¹ World Health Organisation, January 2020

⁸² Coronavirus Disease (COVID-19) Technical Guide: Risk Communication and Community Engagement, World Health Organisation (WHO)

- **Actively involves communities in slowing the spread of the virus:** Through communicating individual and group protective measures.
- **Enables all the other COVID-19 interventions:** Through RCCE, which is essential for surveillance, lockdown co-operation and enforcement, case reporting, contact tracing, caring for the at-risk, and gathering local support for any logistical or operational needs of the response.

2.5.2 Key findings from the analysis

Providing prompt, accurate and coordinated information that is tailored to the local context of the epidemic is essential

Key Finding 1: Centrally coordinating RCCE efforts ensures higher compliance with government COVID-19 interventions and lowers infection rates.

- Countries without a coordinated RCCE strategy erode the public's trust toward relevant institutions and risk lower compliance rates to COVID-19 interventions.
- 'Infodemics' (misinformation about the pandemic) are harder to manage without a coordinated RCCE plan.
- Countries with coordinated RCCE plans can engage minority communities more efficiently, thus communicating COVID-19 interventions to a larger portion of the public.
- Countries such as Malaysia and Australia have benefitted greatly from having coordinated RCCE plans.
- Communication needs to be tailored to the local context based on the stage of the epidemic in specific locations within a country.

COVID-19 has placed the global community in an environment with high levels of uncertainty. Thus, it is imperative for governments to demonstrate a coordinated and unified front during the pandemic. To the public, this is evidenced through unified messaging from the government to its citizens.

According to Scott Green, a political scientist from the University of Michigan who studied the response to the 2014 Ebola epidemic, the most effective practice for communications during pandemics is the existence of a central message behind every RCCE plan.⁸³

A centralised and coordinated response is enabled by the fulfilment of the following RCCE guidelines:⁸⁴

1. Establishing a Risk Communication System

- Ensuring that the highest levels of government agree to include the RCCE in preparedness and response activities.
- Ensuring that highest levels of government are participating in the information communication exercise.
- Agreeing on procedures for the timely release of information such as clearance procedures for messages across platforms.

⁸³ Sciencemag.org

⁸⁴ Risk Communication and Community Engagement Readiness and Initial Response for novel coronaviruses (nCoV), Interim Guidance v1, World Health Organisation, January 2020

- Setting up a centralised RCCE team with defined roles and responsibilities.

2. Internal and Partner Coordination

- Identifying partners within relevant agencies, organisations, community planners and other stakeholders.
- Assessment of the communication capacity for all relevant partners through identification of typical target audiences and channels of communications.
- Setting communication roles and responsibilities through SOPs (e.g. assigning agencies to specific issues, assigning specific topics and audiences to a partner and coordinating the alignment of messaging).

3. Public Communication

- Reviewing and selecting the roster of spokespeople at all levels and, if necessary, training selected representatives in public communication.
- Identification of media partners, communication channels and influencers to assess their potential reach for the target audiences (i.e. ideally only trusted and regularly-consulted channels and influencers can be considered).
- Identification of key media, creating an updated list of journalists and media relations.
- Identification of the specific messaging in communication campaigns and deciding the frequency of communication to the public.

4. Communication engagement with affected communities

- Establishing methods for understanding the concerns, attitudes and beliefs of key audiences.
- Identification of target audiences and gathering information on their knowledge and behaviours (e.g. likely channels of information, concerns relevant to the community, etc.).
- Identify existing influencers within the community capable of bridging cultural and linguistic barriers (e.g. community leaders, religious leaders, health workers) and networks (e.g. women's groups, community health volunteers, unions, etc.).

5. Addressing uncertainty, perceptions and misinformation management

- Establishing a system for monitoring and responding to rumours, misinformation and frequently asked questions.

6. Capacity Building

- If required, train the RCCE engagement staff on key information regarding COVID-19 and current plans and procedures for the RCCE plan.

An effective RCCE plan requires two broad categories of centralisation: First, the centralisation of information which entails storing all the latest COVID-19 information on a single platform and/or identifying the parties in possession of all relevant COVID-19 information and updates. The second is the centralisation of alignment on key messages.

The centralisation of information allows for community engagement staff at all levels to access the latest COVID-19 information, thus ensuring the accuracy of data communicated to their respective stakeholders. Centralising information also eases the establishment of an information repository available to the public. This empowers the public to fact-check information independently, a key method of battling misinformation. Australia is among the notable countries to have utilised the centralisation of information in their COVID-19 communication interventions.

The centralisation of key messaging ensures that the instructions for and perceived severity of COVID-19 in each country are communicated effectively to the public. Malaysia has made notable strides in ensuring the uniformity of its key messaging in COVID-19 communications across all parties, which has enabled the high compliance rates to COVID-19 interventions in the country, such as the Movement Control Order (MCO), a 49-day lockdown imposed on its citizens.

Effective Practice Case Study: Australia

Centralising information and coordinating communication for the wide dissemination of COVID-19 interventions to the public

Australia was highly successful in ‘flattening the curve’ in the first wave of the pandemic. The country ranked first in terms of recovery in the GCI as of 17 May 2020. Whilst recent outbreaks have caused concerns around the country’s response, there is much we can learn from their successful communication strategy in the early stages of the recovery.

In Australia, state and territory governments are mainly responsible for health matters. When major health issues such as the COVID-19 pandemic affects the country, these governments work together with the Australian government to share information and ensure that the response is consistent and integrated across the country.

The response for the country is coordinated by the Australian Health Protection Principal Committee (AHPPC) which is made up of chief health officers from each state and territory, the chief medical officer and representatives from key departments.⁸⁵

In terms of centralising information and coordinating communication, the Australian government takes the stance that **the government itself should always be the authoritative source of truth during a national emergency**. If the information is fragmented or not easily discoverable, then the government will struggle to control the national narrative.

Coordinating communication is enabled by **centralising information**. The current practice in Australia is to create a single source of genuine data and information on one site. In facing the COVID-19 crisis, the existing Australian government portal (Australia.gov.au), which is a pre-existing static site which guides users to navigate across all government portfolios, has been transformed for this purpose.

The Australian government portal has been completely revamped and rebranded as the central portal to bring together federal government agency measures and information. The portal is the central repository for all information including health and safety updates, income support and business safety measures.⁸⁶

To guide the public into viewing the portal as the single source of accurate COVID-19 information, all television, radio, print and

Country Context

Australia is a democracy which is home to 24.99 million people (as of 2018).

Australia is also home to the world’s eighth-largest immigrant population, with immigrants accounting for over 30 per cent of the population. Communication efforts in the country would have to account for the variety of languages spoken in the country.

Geographically, it is one of the most sparsely populated countries in the world with an average population density of 3.3 persons per square kilometre of total land area.

The country is divided into six states and two major mainland territories. Under the Australian constitution, states have the power to legislate on any subject.

⁸⁵ Government Response to the COVID-19 Outbreak, Health.gov.au

⁸⁶ Australia.gov.au becomes Central Portal for all Coronavirus Info, The Financial Review, 22 March 2020

digital marketing news on COVID-19 now sends users to the portal. The portal springboards into multiple links and sites which encompass the broad sweep of measures and announcements across the 14 portfolios within the Australian government.

The government has also utilised Google and its official Facebook, Instagram and Twitter pages to direct the public towards the Australian government portal as the official sovereign website.

Australia's communication to the public consists of the following information points:

- What the government knows about the disease and the outbreak
- The risk that COVID-19 represents
- Actions taken by the Australian government's health sectors in response to the pandemic
- How the public can contribute to 'flatten the curve'
- How the public can manage their own risk and the risk to their family and communities (in English and 69 other languages spoken by minority communities)

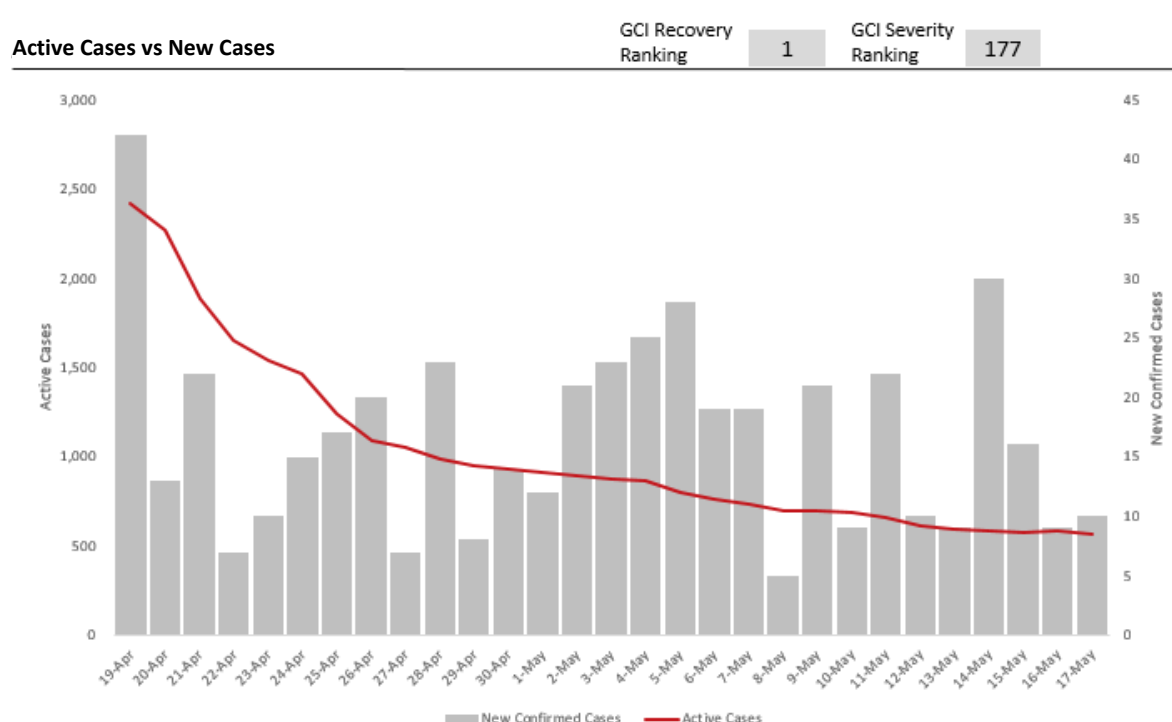


Figure 52: Active cases vs new cases - Australia

Highlights

- As of 24 July 2020, Australia has recorded 13,595 cases and 139 deaths.
- Australia has made a concerted effort to centralise its information repositories. COVID-19 statistics and responses across all Australian states and territories can be found on the portal.
- Key responses are formulated upon the feedback from individual states and territories. Despite case numbers varying across regions, the response adopted by Australians was kept uniform across the locations.
- While coordinated information gathering, centralisation and communication cannot be attributed as the sole reason behind Australia's quick 'flattening of the curve', the coordination has allowed for the collective response (including interventions and key messaging adopted in

campaigns) taken by the Australian government to address the concerns and needs of its citizens in real time.

Key Finding 2: Centrally coordinating information and key narratives provides cohesion to the overall response of a nation. This allows the key messages communicated to the public to be tailored according to the severity of the outbreaks.

- Effective communication is tailored to the local context and to the stage of the epidemic in specific locations within a country.
- Without a coordinated message in response to COVID-19, differing responses across states and territories may lead to confusion and distrust among the public.

As the pandemic evolves through the stages of the ‘curve’, the messaging communicated by governments and public health officials must evolve with it. A staged communication approach helps provide individuals, families and communities with clear messages and instructions on how to minimise the risks and support family and community members.

Anchored on the key message identified by the government and guided by accurate COVID-19 data and information, the messages can be phased over the course of the pandemic,⁸⁷ depending on the situation.

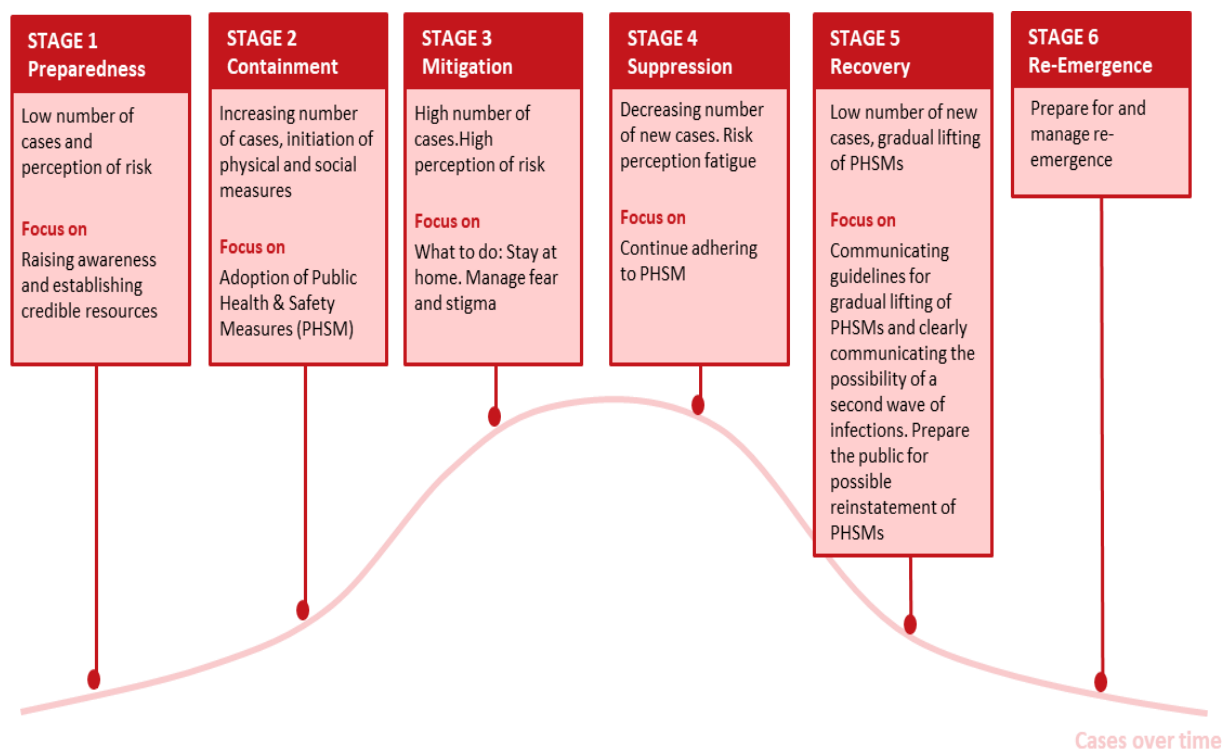


Figure 53: Phases of communication according to the number of cases over time

⁸⁷ Effective Risk Communication to Save Lives, Vital Strategies, May 2020

Stage 1 – Preparedness: Stage one is deployed when there are no or low numbers of COVID-19 cases in a country. The key objectives of this stage are to:

- Raise awareness about COVID-19.
- Communicate the status of cases in the country and what is known and unknown about the nature of the virus.
- Educate the public about steps which can be taken to protect themselves, their families and their communities to slow the spread of the virus.
- Inform people about the preparedness of the country to face the pandemic and acknowledge challenges.
- Establish a source of reliable, trusted and timely information.
- Express empathy in order to build public trust.

Stage 2 – Containment: While facing an increasing number of cases, the objectives of this stage are to:

- Introduce social distancing and explain what it is (including specificity in terms of the distance required between individuals) and why it is important.
- Motivate the public to stay home. Clarify early that they will be allowed to go out for essential tasks to avoid panic buying.
- Build acceptance of measures including the closure of entertainment facilities, places of worship, workplaces, etc.
- Educate the public about symptoms, and the procedures involved if someone is suspected of having COVID-19.
- Inform the public of screening procedures which will be in place at health facilities.
- De-stigmatise the perception of COVID-19 patients by establishing their humanity and emphasising a sense of community in order to encourage people to get tested.
- Build a sense of community and solidarity to deepen public commitment to staying at home.

Stage 3 – Mitigation During the Crisis: At the peak of the pandemic ‘curve’:

- Educate and inform the public on the government’s response and explain the need for the interventions that have been adopted.
- Develop methods for communities to provide feedback to the government.
- Provide timelines for decision-making wherever possible.
- Manage fear and stigma through reminding the public of public health and social measures which, if adopted, will minimise risk.
- Reinforce the need for social cohesion and unity in dealing with the pandemic and remind the public that the measures instituted are for the protection of public health during the crisis.
- Acknowledge the community’s efforts to prevent the spread of the virus, including healthcare workers and other essential workers.
- Balance the news of increase in cases with positive stories of successful recoveries. Messages which focus exclusively on the negative may disempower communities.

Stage 4 – Suppression:

- Communicate the importance of continued adherence to public health and social measures. As the number of cases decreases, people may stop following public health and social measures. Reminders of the measures are required.
- Explain that some measures may be in place until effective treatments are found and tested.

Stage 5 – Recovery:

- Communicate to the public that the crisis point has passed, and the country may be allowed to reopen gradually.
- Explain the phased concept of reopening the economy.
- Explain government decisions to prioritise the reopening of critical entities based on societal benefit such as childcare or certain religious sites under strict safety measures.
- Explain that measures may need to be re-imposed if the number of cases begins to rise again.

Stage 6 – Prepare for and manage re-emergence:

- Educate the public of the possibility of re-emergence of the pandemic in the country.
- Support the re-implementation of public health and social measures if required.



Country Context

Malaysia is a democratic, middle-income country, with a population of 31 million people. The states and federal territories of Malaysia are the principal administrative divisions in the country. The country comprises 13 states and 3 federal territories.

The governance of the states is divided between the federal government of Malaysia and the state governments. In Malaysia, state governments cannot refuse to abide laws set by the federal government. Thus, any instructions regarding Malaysia's COVID-19 response from the federal government will be uniformly applied in all states, regardless of the political party governing each state.

Effective Practice Case Study: Malaysia

Evolving the key messaging used in campaigns according to the number of cases over time helped manage COVID-19 anxiety and increase compliance rates

The key messaging for COVID-19 campaigns is centralised by the government of Malaysia under the advice and instruction of the Malaysian Ministry of Health.

Stage 1

Communications regarding COVID-19 cases began on 25 January, as the country recorded its first case of the virus. While reported cases remained relatively low and confined to imported cases, the Director-General of Health in the Malaysian Ministry of Health began communicating facts and updates about the COVID-19 disease via press releases and the Ministry's official Twitter and Facebook pages.

In response to the increasing trend of COVID-19 cases in Malaysia and the sharp spike in cases from 42 on 15 March 2020 to 186 cases on 16 March 2020, the Malaysian Prime Minister made an official speech through live national broadcast to announce the country's MCO on 18 March 2020.

Stage 2

In the Prime Minister's speech, the key message was that the government of Malaysia was genuinely concerned about the nature of COVID-19 and the risk it posed to its people, and thus the country would be deploying 'drastic' measures to break the chain of infections and flatten the curve.

Key Points in the Prime Minister's Speech:⁸⁸

⁸⁸ Prime Minister's Special Message on COVID-19, Prime Minister's Office of Malaysia, 16 March 2020

- COVID-19 had spread to a total of 135 at the date of the speech, and had cost the lives of 6,443 people worldwide.
- Malaysia's cases had been increasing, at that time, 511 people being treated for the virus in the country.
- The leadership was also concerned about a possible second wave of infections, and, to stem the spread of the virus, decided to enforce the 'drastic' measure of the MCO which encompassed 6 key actions:
 - (1) The prohibition of mass gatherings including religious gatherings
 - (2) The closure of borders and cancellation of all outgoing flights and requirement for a 14-day self-quarantine for those who have just returned to the country
 - (3) The prohibition of all incoming flights and non-citizens entering the country
 - (4) The closure of all pre-school, primary, and secondary day and boarding schools
 - (5) The closure of all private and public tertiary institutions
 - (6) The closure of all private and government office buildings except for essential services
- While the government was sympathetic to the lives which would be disrupted, speed was seen as essential in ensuring lives were not lost to the virus. Other countries such as China had adopted MCOs with success in breaking the chain of infections.
- The relevant ministries such as the Ministry of Domestic Trade and Consumer Affairs would monitor the supply of goods, and the National Security Council chaired by the Prime Minister would meet every day in order to monitor and control the COVID-19 situation.
- The Prime Minister announced a national operations hotline for all MCO inquiries.

The Malaysian federal government set the key message for the nation: **COVID-19 is a serious threat to our health and security and should be taken seriously**. This message was received as an order by all state governments, and private and public sector organisations. This led to the general Malaysian public understanding the severity of the situation and abiding by the MCO.

The speech was also used as a foundation for the Malaysian National Fatwa Council to announce the adjournment of all religious activities in mosques, including Friday prayers. This was a large step considering 61.3 per cent of all Malaysians are Muslim. In countries with a similarly large group of adherents to any religion which requires mass prayer sessions, controlling mass gatherings has proven to be a challenge without the support of religious institutions.

Stage 3

At the peak of the pandemic, the Director-General of Health continued to deliver addresses in order to remind the public of the importance of their adherence to the public health and social measures.⁸⁹ Changes to the interventions, such as extension to the MCO or tightening of restrictions were announced bi-weekly. The date for the next public address would be communicated at the end of the current address. As of 4 April 2020, after the second extension to the MCO, compliance rates were at 99 per cent.⁹⁰

The centralisation of key messaging in Malaysia also streamlined the communication efforts deployed by the federal government and its communication partners at various levels. COVID-19 updates and key information were disseminated to the general public through the following process:

⁸⁹ Health DG: Play your part, Malaysians, New Strait Times, 31 March 2020

⁹⁰ MCO Compliance Rate Now at 99 pc says IGP, Malay Mail, 4 April 2020

- Malaysians received **daily COVID-19 statistics** from the **Ministry of Health**, delivered by the Director-General of Health on the nation's cumulative number of COVID-19 cases and deaths, number of recoveries, number of new infections and deaths, information on 'red zones' within the country and reminders to practice COVID-19 safety precautions.
- All information regarding current or additional COVID-19 **safety information** such as the closing of state borders, curfews, and SOPs for travel would be delivered after the speech from the Ministry of Health by the **Malaysian Minister of Defence**.
- Key points from both speeches were published on the **Ministry of Health's official Twitter and Facebook pages** (the two most-subscribed-to social media platforms in Malaysia).⁹¹
- **Daily text message** blasts are sent out to all Malaysians owning a mobile phone to communicate key points from the Minister of Defence's speech.
- General COVID-19 information was also published on the Malaysian government's COVID-19 microsite.⁹² The microsite directs users to the official **Ministry of Health Portal** which contains daily COVID-19 statistics and the official Facebook page for the Ministry of Health's Crisis Preparedness and Response Centre (CPRC).
- This information is picked up by national newspapers and published in print and digitally for public consumption.
- Media partners such as telecommunications (e.g. Celcom) and major private sector partners (e.g. Grab) also disseminate information through their mobile apps.

Campaigns which called for support for frontline workers were also launched to encourage a sense of community and protection over essential workers. Medical health professionals in Malaysia made viral their 'I stay at work for you, you stay home for us'⁹³ message and the civil society created the '#KitaJagaKita' or 'we look after each other' campaign as a 'one-stop shop' that mobilised community COVID-19 efforts and also generated a sense of solidarity and camaraderie among the people. The latter has since garnered 1.2 million mentions on Instagram as of 1 June 2020.

Stage 4

Centralisation of key messaging allowed for Malaysia's COVID-19 spread to remain relatively stable after its 49-day MCO was eased to the Conditional Movement Control Order (CMCO).

Any divergence from the CMCO instructions were from state governments, which added additional safety and precautionary conditions according to the severity of infection rates in the states. Ultimately, the various levels of leadership were guided by a central body.

The communication adopted in the states with higher infection rates involved warning the residents in the area of the impact of being too relaxed.⁹⁴ As several major 'hotspots' were also home to the Bottom 40 per cent (B40) communities in the country, the government deployed communications

⁹¹ Social Media Stats Malaysia, Global Stats, April 2020

⁹² Malaysia.gov.my/portal/content/30936

⁹³ 'I stay at work for you, you stay at home for us', The Star, 18 March 2020

⁹⁴ Stay Home Even if MCO Lifted, says MOH, Code Blue, 20 April 2020

which sympathised with their situation, and reminded them that the measures in place would ensure the restarting of the economy and their livelihoods without seeing a resurgence in cases.

Stage 5

As Malaysians adapt to the 'new normal' business conditions under the CMCO, public health officials have reminded the public that while it is considered safe to conduct business under the 'new normal', reopening the economy too quickly risks a resurgence in cases.⁹⁵

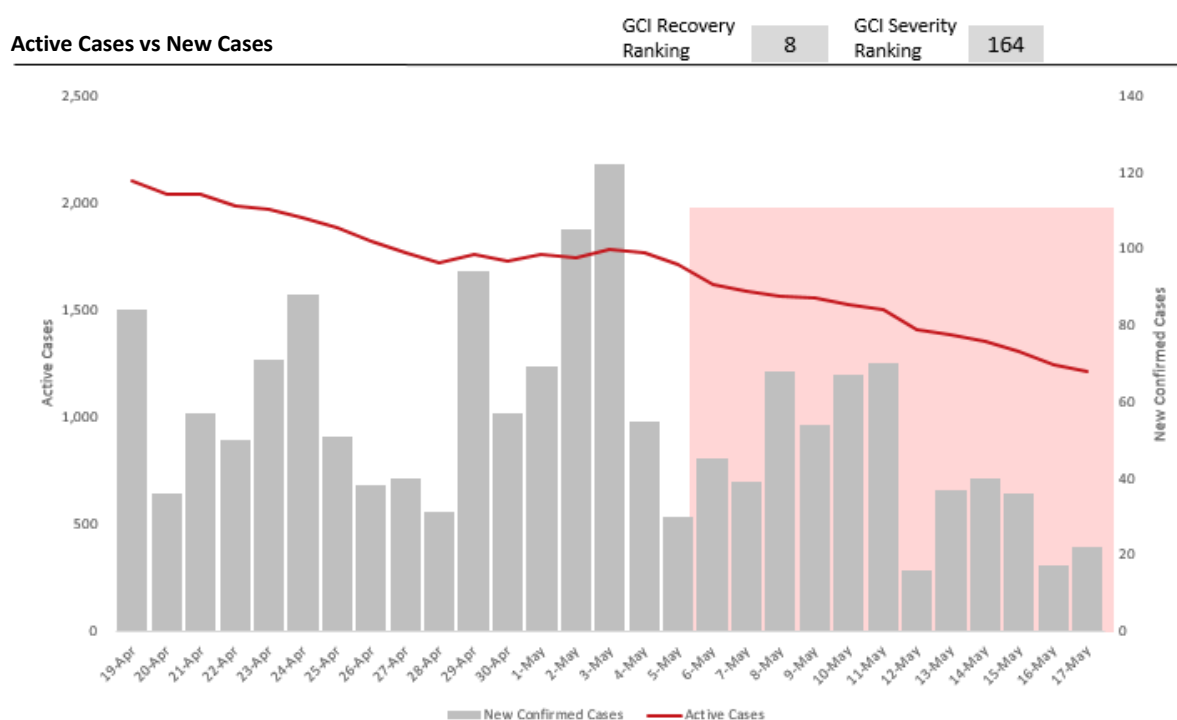


Figure 54: Active cases vs new cases - Malaysia

Highlights

- Malaysia's centralisation of its key messaging made the government's stance against COVID-19 clear.
- The central coordination of its communication efforts made it clear that its Ministry of Health prioritises the health of the public, and the federal government and Ministry of Defence worked with the Ministry of Health to flatten the curve. This led to higher understanding and acceptance rates of the MCO and other safety interventions in Malaysia.
- Malaysia's communication efforts included: explaining its rationale for interventions, communicating basic health and safety practices (e.g. social distancing by ensuring 1 metre between individuals and the importance of washing hands), sending clear and consistent (daily) messages to the public and engaging the community through its #JustStayHome campaign.
- The central coordination of information has distinguished the Ministry of Health as the sole source of current and accurate information on the state of COVID-19 in the country. The federal government microsite, which directed users towards the Ministry of Health portal, further solidified this.

⁹⁵ MHC: Reopening of Economy must be done Gradually, New Straits Times, 10 May 2020

- The streamlining of communication efforts and information has empowered the Ministry of Health and multiple parties to disseminate information through traditional media (television, radio, print) and digital campaigns (government portals, social media, text messages).
- The central coordination of updates and information has allowed for the public to understand the possible legal and health repercussions of non-compliance with government instructions.

Case Study: The United States of America

If RCCE communications and narratives are uncoordinated, the conflict in messaging and instructions undermines trust and reduces adherence to COVID-19 interventions

According to the WHO, good communication helps manage individuals' expectations and fears⁹⁶, thus increasing compliance to COVID-19 health and safety interventions. If communications during pandemics are managed poorly, the result is an erosion of trust within the public, which in turn impacts its compliance to COVID-19 interventions.

In the US, communications during the pandemic response have been fragmented.

Unlike the federal government of Australia, which has provided an overarching view of the COVID-19 situation and response across states, the US has yet to establish a similar mechanism. Conflicting views have been expressed at federal and state levels.

As the US federal government has attempted to coordinate the response of COVID-19 by releasing a set of guidelines⁹⁷ of effective practices, there appears to be an absence of a mechanism to achieve the following:

- Compile and organise COVID-19 facts based on sound science
- Align differing viewpoints
- Appoint appropriate spokespeople to address updates, risks and address community concerns across various levels of the public
- Ensure all recommendations and directives are based on the latest statistics and scientific suggestions

The four points above are the key steps to establish an RCCE plan according to the RCCE Guidelines released by the WHO.⁹⁸

According to its former director, Tom Frieden, the US Centers for Disease Control and Prevention (CDC) has taken the central role in every public health emergency since its inception 75 years ago in 1945. However, they are not playing that role in this pandemic. While the CDC was represented on

Country Context

The United States of America consists of 332 million people living in 50 states and thousands of municipalities. Many day-to-day governing decisions are made locally rather than at the federal level.

⁹⁶ Risk Communication and Community Engagement Readiness and Response to COVID-19: Interim Guidance, 19 March 2020

⁹⁷ Sciencemag.org

⁹⁸ Risk Communication and Community Engagement Readiness and Initial Response for novel coronaviruses (nCoV), Interim Guidance v1, World Health Organisation, January 2020

the White House's coronavirus task force⁹⁹ various other members of the task force took on the role of informing the public – and the task force has since discontinued this role.¹⁰⁰

The federal government uses its centralised website (<https://www.usa.gov/coronavirus>) to direct citizens to different agencies and their individual responses. The absence of a central body to coordinate communication and information has left local mayors and politicians to lead communication efforts in their respective constituencies. As a result, the President of the US, various state and local officials and public health authorities have delivered conflicting messages.¹⁰¹ The differences in their key messaging ranges from indifference to alarm, which impacts the policy decisions adopted in their constituencies during the crisis.

'My mother is not expendable': As Trump itches to get U.S. back to work, experts warn of deaths, economic calamity

Figure 55: Excerpt from NBC news on conflicting views from the US President and public health officials



Figure 56: Excerpt from NBC News on impact of conflicting instructions at various levels of communication

While public health officials and the CDC field detailed questions about what is scientifically known and what is not, political conflict over the degree of threat and the appropriate response have caused confusion.

⁹⁹ Statement from the Press Secretary Regarding the President's Coronavirus Task Force, Press Release, White House, January 29, 2020

¹⁰⁰ <https://www.bloomberg.com/news/articles/2020-06-19/white-house-s-virus-task-force-will-no-longer-brief-public>

¹⁰¹ Young People Didn't Social Distance because the Government Kept Telling them to Not Worry, NBC News, 22 March 2020

For instance, on 25 March 2020, the White House indicated that the public might return to work as early as Easter of the same year.¹⁰² This statement was directly in contrast to the science-based outlook communicated by federal public health authorities who had stated that social distancing might need to last for several months in order to halt the spread of the disease and protect human life.

Amongst politicians, differing attitudes towards COVID-19 are partly a result of the varying severity of case levels in each state. Additionally, in the absence of federal-level mandatory instruction, some governors who typically hold powers to shut businesses and enforce curfews are reluctant to invoke their powers without clear national direction.¹⁰³

New York, which was the first epicentre of COVID-19 cases in the US has seen its governor take a stricter stance against COVID-19, reflected in his frequent communications on the state of COVID-19 in New York:

- At the peak of infections in New York, the governor warned his constituents that 80 per cent of his state could contract COVID-19 unless actions were taken.
- The governor has declared that while stakes are high in New York, expert scientific opinion is more valuable than political opinion and employed two international experts in epidemiology on New York's progress and metrics in the face of COVID-19.
- The governor provided daily COVID-19 updates to the citizens of New York for 111 straight days, reducing the frequency only after the epidemic came under control.¹⁰⁴

By contrast, the governor from the State of Florida delayed ordering a state-wide ban of beaches and public facilities, and reopened his state earlier than most others. He was quoted to be unwilling to cross the tourism industry players in the state. Other state and local leaders have faced similar pressures. The result is that the pandemic has taken different courses in different parts of the country, with outbreaks peaking at different times in different places.¹⁰⁵

The multiplicity in narratives against COVID-19 and the lack of centralised information on the current situation also led to difficulties in engaging the minority communities in the US. Translating COVID-19 resources has been challenging as instructions are frequently changed and often conflicting. This has contributed to the rise of infection rates within these communities.¹⁰⁶

As a result of the conflicting messaging, polls¹⁰⁷ in the US have shown that Americans trust the measured, fact-based communications of public health institutions for their information more than they do the federal government. A CBS¹⁰⁸ poll from 24 March 2020 also found that respondents

¹⁰² 'My Mother is not expendable': As Trump itches to get U.S back to work, experts warn of deaths, economic calamity', NBC News, 25 March 2020

¹⁰³ Pandemic Politics: Timing State-Level Social Distancing Responses to COVID-19, University of Washington, 28 March 2020

¹⁰⁴ <https://abc7ny.com/cuomo-final-presser-briefing-coronavirus-in-new-york/6256097/>

¹⁰⁵ <https://www.theatlantic.com/health/archive/2020/05/patchwork-pandemic-states-reopening-inequalities/611866/>

¹⁰⁶ Race to Translate COVID-19 Information as some U.S Communities Left Out, Al Jazeera, 1 April 2020

¹⁰⁷ SurveyMonkey and Axios poll of 7,925 adults in the U.S in response to the question 'How much do You Trust Each of the Following to Protect Americans from a Major Outbreak of Coronavirus, March 9-13, 2020

¹⁰⁸ Most Americans don't trust President Trump for Accurate COVID-19 information says CBS/YouGov poll, YouGov, 24 March 2020

trusted health authorities (doctors and nurses - 88 per cent; the CDC - 82 per cent) more than the president (44 per cent) to deliver accurate COVID-19 information.

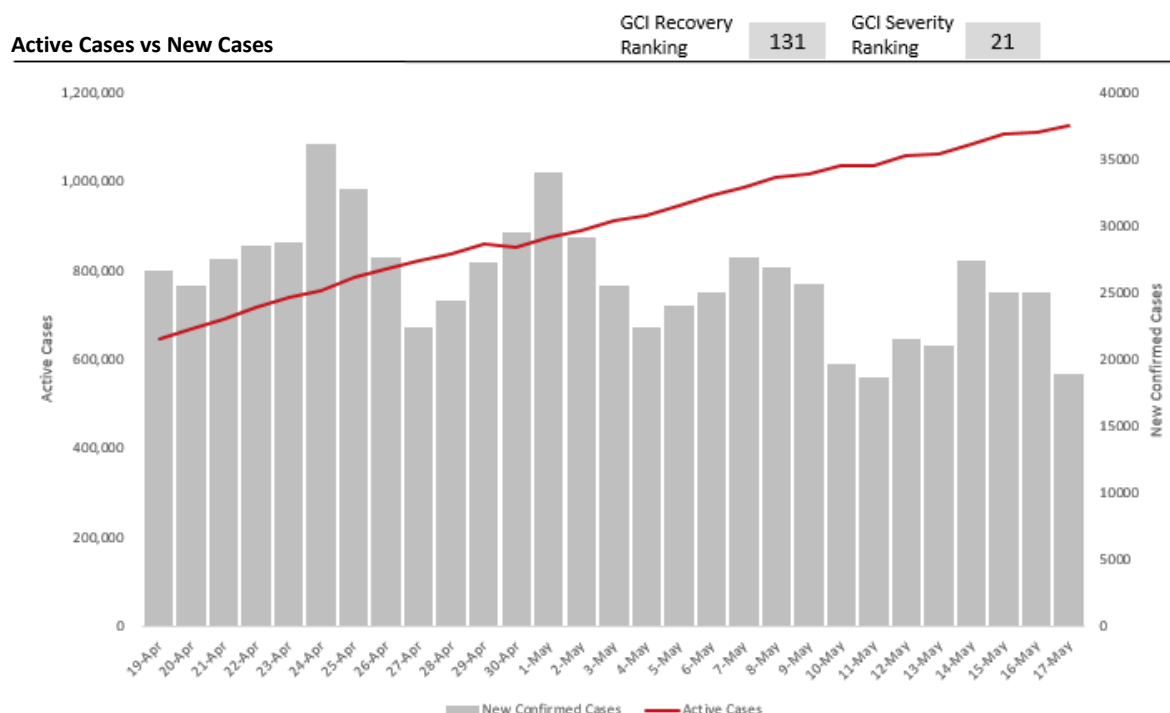


Figure 57: Active cases vs new cases - United States of America

Highlights

- The US recorded its first case on 19 January 2020. The US registered its highest number of daily cases on 24 April, recording 48,529 cases, and is the only country so far to record more than two million COVID-19 cases.
- The need for a centralised information repository where all citizens can receive an overarching view of countrywide statistics and measures is essential to allay misinformation.
- The need for a centralised communication plan and messaging is required to avoid conflicting messages and eroding public trust.
- Directives should be science-based. When the answer is uncertain, it is better for spokespeople to admit to uncertainty, allowing people to take precautions and prepare for possible outcomes.
- Politicians can be excellent spokespeople. However, the messages and instructions they deliver should be guided by public health experts and coordinated across multiple levels of government.
- Spokespeople need to offer clarity of message, transparency and honesty.

Understanding how the public consumes information dictates the type of communication campaigns deployed and helps to manage misinformation and rumours

Key Finding 3: The medium of communication matters as much as the content communicated in ensuring awareness and compliance to COVID-19 health and safety measures

- During crises, the need for information increases rapidly. Tools used to communicate to the public should be those with high reach and rapid news cycles in the country (e.g. television, radio or social media).
- The frequency of press briefings needs to be daily in order to deliver latest COVID-19 statistics and responses to address community concerns, and dispel misinformation.
- The information sources in each country (federal government, Ministry of Health, public health experts) play an important role in supporting news sources with accurate information in order to avoid extensive misinformation.

Traditional media campaigns have been deployed over decades in response to various health emergencies. With increasing internet connectivity around the world, information which was previously only accessible through traditional media and official press conferences from the government is now readily available online.

Having awareness and recognising the various modes of communication utilised by the public is a key factor in developing a RCCE plan. While some countries with low mobile penetration and basic communications infrastructure may rely on traditional media channels, digital campaigns may prove worthwhile for countries with connected users and high mobile penetration rates. The adoption of digital campaigns in the former enables the government to reach a wider public population not covered by traditional media campaigns.

Traditional media campaigns encompass the following mediums:

- **Television broadcast:** Enables rapid news cycles
- **Radio broadcast:** Enables rapid news cycles
- **Newspaper and print advertisements:** Utilised for general COVID-19 awareness, precautions and reminders
- **Posters and billboards:** Utilised for general COVID-19 awareness, precautions and reminders

Countries embracing digital communication campaigns have also utilised the following methods and mediums:

- Existing government portals
- Newly established COVID-19 portals or microsites
- Countrywide text alerts
- E-mail updates and alerts
- Social media platforms such as Facebook, Twitter and Instagram
- Social influencers

All forms of digital communication mediums are capable of rapid news updates. However, the reach of the platforms matters as much as frequency of news updates when determining efficacy. Consistency is essential.

Considerations for Digital Campaigns

Whilst digital campaigns may require less budget to execute depending on communication channels used, they require just as much planning and effort as conventional media campaigns. Consistency across the different channels of communication is fundamental.

Another consideration is that some countries lack the financial and human resource capabilities to efficiently develop digital tools that can support people during a crisis. To circumvent this, some countries have begun building partnerships with private and international technology companies to meet the needs of people and soften the impact of the COVID-19 epidemic on their lives.

For instance, the US government issued a Call to Action (CTA) to key industry stakeholders and artificial intelligence experts to develop new text on data mining techniques that can help the scientific community answer high-priority questions related to COVID-19.¹⁰⁹

Effective Practice Case Study: Vietnam

Developing a COVID-19 digital communication campaign to ensure higher compliance rates to health and safety interventions



Country Context

Vietnam is a lower middle-income country with a population of 97 million people. It is a one-party Communist State and has one of Southeast Asia's fastest growing economies. Under highly successful economic and political reforms, Vietnam's GDP per capita has increased by 2.7 times between 2002 and 2018, reaching over USD 2,700. Poverty rates have also declined sharply from over 70 per cent to below 6 per cent over the same period.¹

Vietnam has one of the most successful COVID-19 responses in Southeast Asia so far. Unlike its Association of Southeast Asian Nations (ASEAN) counterpart South Korea, which has spent a considerable amount on testing, or Singapore, which has established strong epidemiological surveillance, Vietnam has followed an economical approach which, when combined with a strong communication campaign, has been effective in maintaining a strong recovery to COVID-19.

In line with its developing economy, Vietnam's ICT infrastructure has also grown. In 2019, Vietnam saw both of its fixed-line and mobile broadband services penetration grow, together with smartphone penetration. Even though Vietnam is one of the last of Southeast Asia's larger economies to roll out 4G, its Ministry of Information and Communications has prioritised and encouraged the development of broadband infrastructure, which includes the fast completion of 4G network coverage and the early rollout of 5G.

Due to its increased connectivity, 65 per cent of Vietnam's population are online.¹¹⁰ Despite its growing economy and digital population, the Communist Party retains a strong hold on the media and the state controls all print and broadcast outlets. Though there are myriads of newspapers and magazines, the Communist Party, government bodies and the military own or control almost all of them.¹¹¹

Bloggers and citizen journalists are the only sources of independent news. However, material deemed to threaten Communist rule, including political

¹⁰⁹ UN Policy Brief: Embracing Digital Government During the Pandemic and Beyond

¹¹⁰ Internet user penetration in Vietnam from 2017 to 2023, accessed 21 May 2020, Statista

¹¹¹ Vietnam 2020 World Press Freedom Index, accessed 21 May 2020, RSF.org

dissent, is blocked. In Vietnam, official news outlets and social media channels have been communicating information about COVID-19 consistently.

To get ahead of potential misinformation regarding COVID-19, Vietnam has harnessed the power of volume and frequency. Between 9 January 2020 and 15 March 2020, an average of 127 articles on COVID-19 were published daily on 13 of the most popular online news outlets in Vietnam, leaving little room for rumours and misinformation to spread.

Additionally, Vietnam has utilised its government portals to provide up-to-date information on the outbreak and tips for disease prevention. The use of government domains and social media accounts have helped to prevent misinformation quickly, collect information from the public systematically and identify case clusters as early as possible.

Social media has also been used as a tool to create viral content for increased public awareness on COVID-19 health and safety measures. The most notable of which is the song 'Ghen Cô Vy' which helped build public awareness of the new virus and the importance of handwashing in the country. The video, released in March 2020, has garnered over 47 million views on YouTube.¹¹²

On social media, individual updates and reviews about the availability and quality of government-mandated quarantines have attracted thousands of views on Facebook. The updates speak about the food served during quarantines, the health check-ups which are available and COVID-19 testing carried out during quarantine. These reviews have circulated so widely that the two-week isolation period is favourably perceived, which has increased compliance with the government's quarantine intervention.

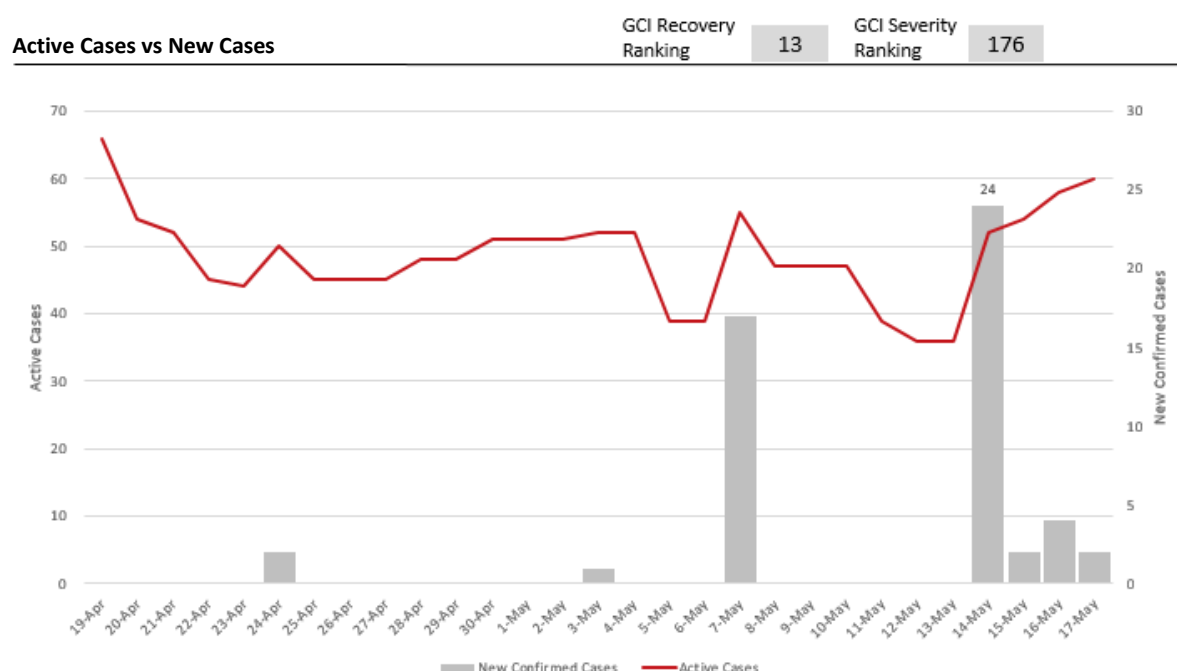


Figure 58: Active cases vs new cases - Vietnam

¹¹² Youtube views as of 21 May 2020

As of 23 June 2020, Vietnam had recorded 349 COVID-19 cases and zero deaths, among the lowest numbers among Southeast Asian countries.¹¹³ Vietnam's experience demonstrates that effective communication paired with government-citizen cooperation can be effective in managing COVID-19 RCCE.

However, it is worth noting that in a Communist Party-led country where expression is heavily monitored, occurrences of public dissent and non-compliance may be lower than in democratic countries.

Highlights

- Vietnam tightened border controls and set hospitals and local health departments on high alerts for new pneumonia cases on 3 January 2020, before the first fatality in China and only three days after confirmation of the outbreak there.
- Vietnam's RCCE efforts began on 9 January in order to inform the public and have them be on alert for COVID-19.
- Vietnam's first cases were recorded on 23 January 2020. The situation was under control until an additional wave of cases was triggered by foreign tourists and returning travellers and students on 6 March 2020.¹¹⁴
- Vietnam's success in controlling the media's narratives and controlling the misinformation online is possible due to the country's close media monitoring and laws which allow the government to remove news which may affect public order.
- In countries with higher levels of democracy, Vietnam's daily COVID-19 news updates on its government platforms, online news outlets and social media pages (Facebook being the platform of choice for the Vietnamese public) could be emulated in order to ensure a steady stream of reliable information for the public.



Country Context

Finland is a high-income, democratic country with a small population of 5.5 million. Unlike Vietnam, the country's press is one of the world's freest.¹ Finnish people are also known to have high levels of trust in the media.¹

The country's decision to enlist social influencers has been a part of Finland's Emergency Contingency Plans since 2018. Finland's Emergency Contingency Plans are under the purview of the National Emergency Supply Agency (NESA). NESA is an organisation under Finland's Ministry of Economic Affairs and Employment. It is the organisation responsible for securing Finland's key functions during a national emergency.

Together with other government authorities and the business community, NESA is charged with ensuring the continuity of national critical infrastructure and services under all circumstances. NESA's responsibilities include planning and financing various redundancy and auxiliary arrangements for information systems, data communications and mass communication.¹

Finland's social influencer approach is a collaboration between the Finnish government, NESA and PING Helsinki, a social media influencer consultancy. Social media influencers were added to the pool of essential workers a year and a half ago.¹

Effective Practice Case Study: Finland

Harnessing the power of social influencers for COVID-19 communication

Finland helps demonstrate the value of harnessing the power of social influencers in its digital campaigns. As of June 2020, the country had supplied COVID-19 advice and precautions to its network of 1,500 social influencers consisting of bloggers, writers and songwriters in order to communicate information to those not reached by traditional media campaigns.

The aim of the cooperation between Finland's mainstream

media and social media is to provide better access to information for those who are difficult to reach through traditional channels. The COVID-19 pandemic has demonstrated how panic can spread on social media, and the difficulty involved in curbing the panic if the authorities' messages do not reach the demographic on the platforms.

PING Helsinki, the Finnish government's social media partner for this intervention edits the government's messages into bite-sized information in a social media format.

This information is then sent to its network of influencers who are free to use the message as they wish. Platforms utilised by influencers are Instagram and Facebook. The Finnish government is also exploring other social media platforms such as Tik Tok. Influencers involved in the intervention participate voluntarily and do not get paid.

Despite the country's relative advancement in embracing social media trends, Finland is not immune to fragmented news landscapes. Tero Koskinen, the Head of Preparedness for the media section of the Finnish National Emergency Supply Agency stated that a portion of Finland's population trust social media influencers more than the media. The collaboration between the government and social influencers is to instil a procedure that would help social media influencers to communicate fact-based information.

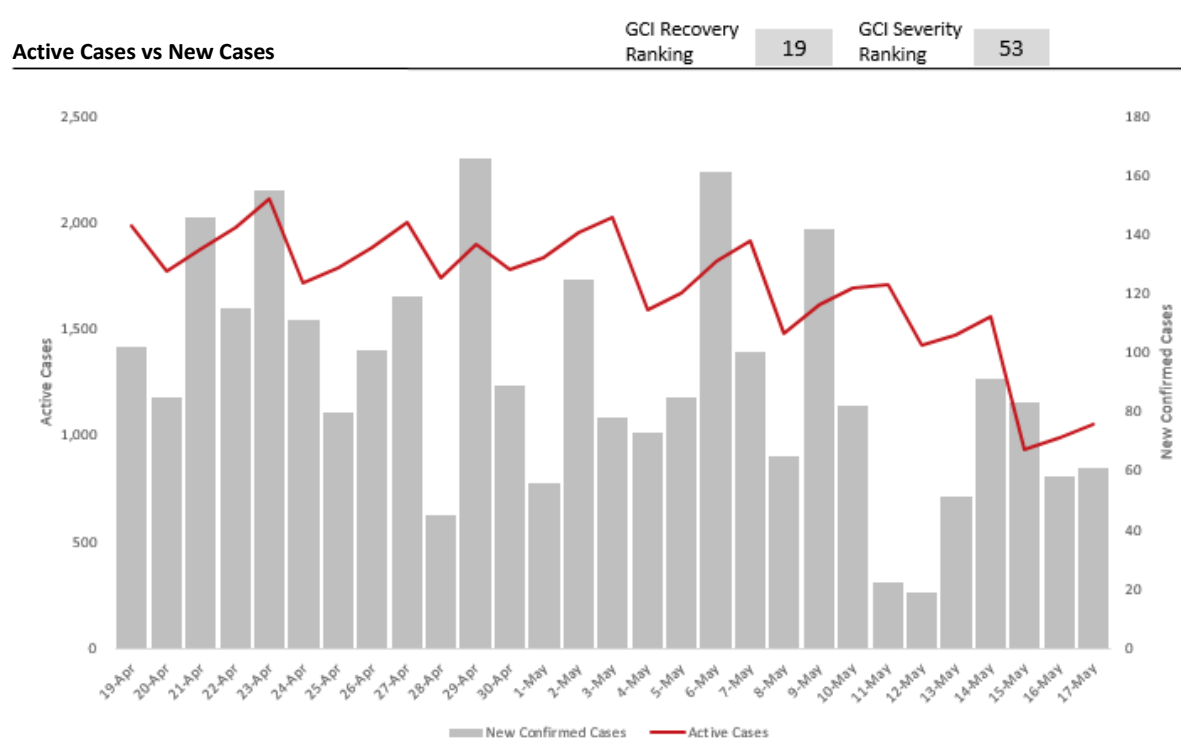


Figure 59: Active cases vs new cases - Finland

Highlights

- As of 21 July 2020, Finland has recorded 7,347 COVID-19 cases and 328 deaths.
- Globally, reports show that screen time has increased by 76 per cent since the COVID-19 pandemic began. Finland used this opportunity to deploy its communication plan and reach a captive audience.

- Finland has been planning and working towards establishing its social influencers as a credible source of information over the past two years. In the absence of such efforts, countries with a larger population and increased bureaucracy could consider setting up official social media accounts for their relevant agencies in order to achieve the same outcome as Finland.

Effective Practice Case Study: Uganda

Retaining traditional media campaigns for greater reach

Uganda's experience in managing public health emergencies has led to its preparedness in responding to the COVID-19 outbreak. In March 2020, prior to the country recording its first COVID-19 case, the government launched its eight-pillar response plan, among which was the Risk Communication, Social Mobilisation and Community Engagement pillar (RCSM-CE).

UNICEF, which co-chairs Uganda's RCSM-CE sub-committee, led the resource mobilisation efforts and initiated the mass printing of nine 'Information, Education and Communication' materials on COVID-19. These materials have since been translated into 30 languages, including eight spoken by refugees and distributed to 135 districts.¹¹⁵ All collaterals were produced with the aim of promoting preventive behavioural practices.

Historically, physical interaction was a key part of social mobilisation. Under the lockdown, Uganda has taken to the following information dissemination methods¹¹⁶ to spread awareness and health and safety precautions across the country:

- **Radio Transmission:** This is one of the main channels of communication used in Uganda.
- **Audio-mobile vans:** The vans are utilised to drive through different villages broadcasting messages, distributing flyers and responding to queries.
- **Television programmes and talk shows.**
- **Posters and flyers:** These are placed in public places to display COVID-19 information.
- **Fact Sheets and Talking Points:** Guidelines and talking points have been designed to involve various leaders across the board, including local councils and village teams, in conducting awareness campaigns at district and village levels.



Country Context

Uganda is a democratic developing country in East Africa with 42 million citizens.

In terms of receiving information, radio listenership is high in Uganda. In 2018, 78 per cent of individuals said they listened to the radio, according to the Ugandan National Information Technology Survey. A further breakdown shows that 80 per cent of those living in urban areas listened to radio and 76 per cent of people in rural areas listened to radio.

In recent years, internet penetration has increased to encompass 45.9 per cent of its population (2018), while 0.1 per cent of its population has fixed broadband subscriptions and 7.6 per cent of its population has wireless broadband subscription.

¹¹⁵ At the front-line in the fight against COVID-19 in Uganda, 8 May 2020, UNICEF Uganda

¹¹⁶ Engaging from a distance during COVID-19, 11 May 2020, UNICEF Uganda

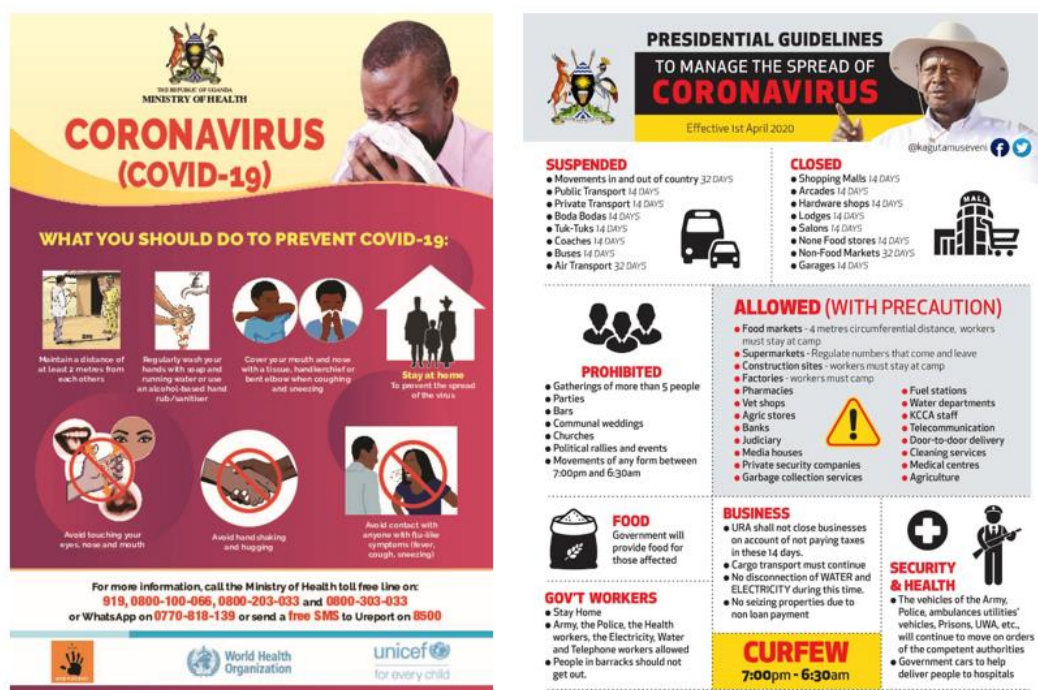


Figure 60: Examples of COVID-19 information posters and flyers in Uganda

Community Help

The RSCM-CE sub-committee was also aided by community volunteers, who offered a range of services from illustrating key messages, producing short plays on prevention and developing a mass social media campaign dubbed 'Tonsemerera, Luganda' for 'keep your distance'. The campaign, which encouraged social distancing and other precautionary measures recommended by the national task force, has been adopted by the sub-committee and is the official national campaign for Uganda's COVID-19 response.¹¹⁷

As a result of Uganda's communication efforts, a Ministry of Health online survey in April 2020 revealed that 98 per cent of over 12,000 social media users are significantly aware of COVID-19 and 100 per cent perceived the severity of the outbreak. In the last week of April, a total of 7,979 calls were received at Ministry of Health call centres inquiring about the disease or reporting suspected cases.¹¹⁸

Responses from station managers in Uganda have noted that the messages have helped dispel rumours and promote self- and community-policing. Its wide use of radio broadcasts has also empowered feedback and community response through phone calls and short messages/SMS to radio stations.

¹¹⁷ Tonsemerera – Ministry of Health | Government of Uganda

¹¹⁸ Engaging from a distance during COVID-19, 11 May 2020, UNICEF Uganda

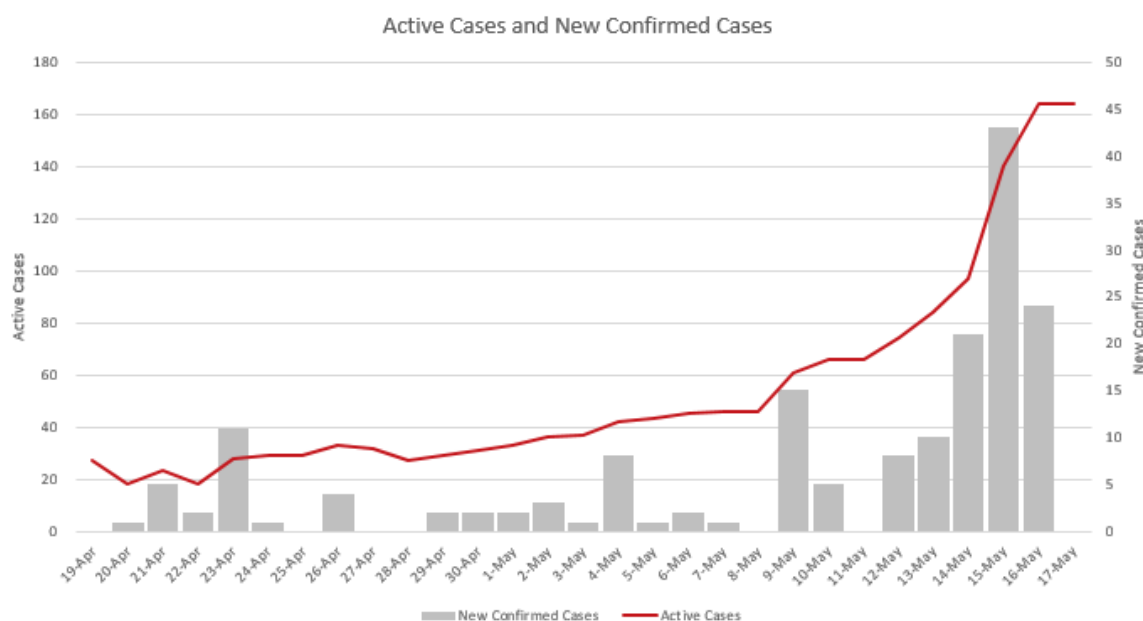


Figure 61: Active cases vs new cases – Uganda

Highlights

- Uganda's measures to curb the virus included a mass shutdown and a five-week extended lockdown.¹¹⁹ Its parliament has also passed a supplementary budget of approximately USD 82 million to fight COVID-19.¹²⁰
- Uganda's understanding of the channels through which its public obtains information was crucial in its COVID-19 communication plan. Although social media and digital means such as its Ministry of Health's webpage were utilised, Uganda also ensured its use of traditional modes of communication such as radio broadcasting and television talk shows to establish two-way communication between public officials, health experts and its people.
- Establishing two-way communication is essential in Uganda. Previously, risk communication and public engagement efforts have involved face-to-face engagement to address community concerns and questions to establish compliance with public health emergency responses. Two-way communication through radio talk-shows (where citizens call in) has allowed for the government to emulate a communication approach which is well received in Uganda without potentially risking Ugandans through face-to-face engagement efforts.
- To ensure further penetration of COVID-19 information and PHSM information, Uganda has also taken to using mobile vans with loudhailers, information posters, flyers and infographics to reach an even wider segment of the population.
- Political leaders have also recorded messages in local languages to sensitise communities, as the country is also home to large refugee and migrant communities.

¹¹⁹ Uganda Extends Coronavirus Lockdown for Three More Weeks, Reuters, 14 April 2020

¹²⁰ Uganda's Musicians are Fighting COVID-19 – Why Government Should Work with Them, 8 May 2020

Challenges to be addressed during RCCE

- The longer the time lapse between reports of the first suspected case of COVID-19 and the first confirmed case, the more speculation will occur in the media. Thus, the faster official news is published, the higher the likelihood of the leadership being able to retain control of the narrative.
- COVID-19 and similar public healthcare emergencies will lead to massive demand for information from the public. Health authorities, media partners and other regulatory entities need to collaborate in order to meet this demand. Failure to fulfil the demand may lead to the community turning to less credible sources of information.
- Misinformation and rumours are likely to fill gaps in communication by health authorities. Governments need to be proactive in ensuring updates provided by their health authorities take place daily.
- In countries with high numbers of online users, social media activity may increase the pressure and demand for information exponentially. Public education needs to be rolled out to educate the public in differentiating misinformation from valid news.

Matrix of Severity Index vs Recovery Index for good practice countries

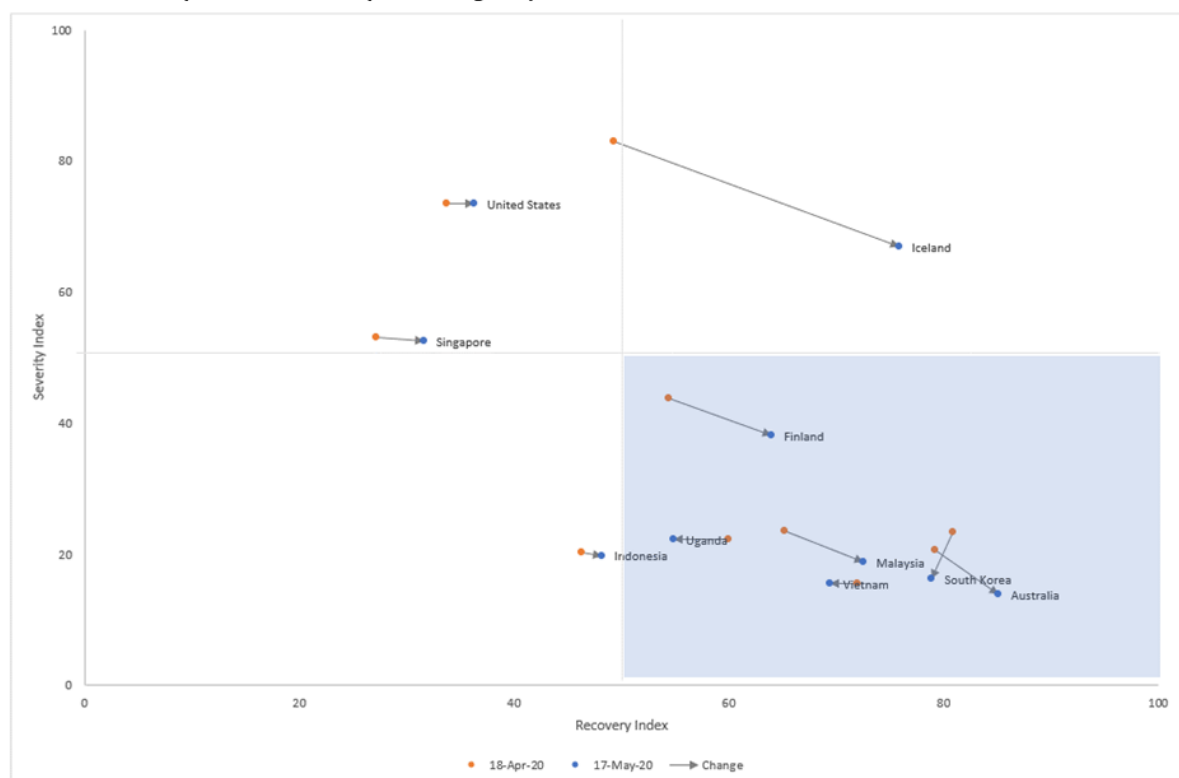


Figure 62: 2X2 matrix of Severity Index vs Recovery Index for good practice countries

Between 16 April 2020 and 17 May 2020, each country under the Global Pathfinder 2x2 Severity-Recovery trend has shown improvement in their recovery rankings from the COVID-19 pandemic, with the exception of Vietnam and Uganda, who have both recorded slight increases in the number of COVID-19 cases. In the US, which has suffered from a lack of coordination in its communications, the country showed only a marginal improvement in its recovery index over the same time period.

While communication is not the key reason behind the reduction of cases in these countries, if trusted, it is the most effective method of ensuring compliance to government-sanctioned COVID-19 interventions. Other methods such as enforcement and control over the media would be more controversial in democratic countries and have the potential to be abused in countries with less democratic freedom.

2.5.3 Recommendations: Interventions for countries to consider

Recommendation 1: Run clear and simple campaigns with high communication frequencies.

- Messages delivered to the public need to be factual and cohesive.
- Facts and statistics can be broken down into easy-to-understand forms in order to be accessible to those with little or no education. Visual aids such as graphics, diagrams and videos help.
- Key messages can be adapted to different cultures and language groups while keeping the key themes consistent.
- In delivering news within the campaign, balance the negative updates with positive news (e.g. the number of people who have recovered) in order to delay risk perception fatigue from setting in.
- Instructions in messaging need to be clear and specific, for instance: 'stay six feet away from each other at all times' is more effective than 'practice social distancing'; 'stay home to help save lives and ease the burden on hospitals' carries more meaning than 'flatten the curve'.

Recommendation 2: Engage local communities in the communication process.

- Identify the people within communities who the public trust and use them as spokespeople for COVID-19 updates and statistics.
- Engage with community members, including religious leaders or community leaders, early in the response.
- Influencers such as social influencers, musicians or athletes can be partners to disseminate information.
- Identify key informants in each community for real-time feedback on the COVID-19 response in their area.

Recommendation 3: Understand the channels through which the public obtains their information.

- Prioritise media which has high reach and rapid news cycles so updates can be communicated quickly.
- Provide daily press briefings to keep the public informed on the latest COVID-19 statistics and responses.

Recommendation 4: Address rumours and misinformation swiftly.

- Establish two-way communication such as hotlines or call-in radio programmes where the public can interact with public health officials or representatives capable of fielding their questions.
- Establish dialogues with key informants in the community such as leaders and health care workers to get real-time feedback about the response operations.
- To minimise the spread of misinformation, provide essential information to the public as soon as it becomes available.
- Utilise social media monitoring to identify concerns and guide responses.

3 Healthcare infrastructure as a fundamental basis from which all other interventions are built

3.1 Setting the context: The GHS (Global Health Security) Index as a measurement of country readiness to manage in a pandemic

The GHS Index was established as a joint project under the Nuclear Threat Initiative (NTI) and the Johns Hopkins Center for Health Security (JHU) and was developed together with The Economist Intelligence Unit (EIU). It is the first comprehensive assessment on benchmarking of health security and related capabilities across 195 countries.

The GHS Index was developed to understand and measure improvement in global capability to prevent, detect and respond to infectious disease threats, whilst highlighting capacity gaps in healthcare readiness to encourage political will and funding.

The GHS Index is organised into six categories based on 140 questions. The categories are:

- Prevention
- Detection and Reporting
- Rapid Response
- Health System
- Compliance with International Norms
- Risk Environment

The GHS Index prioritises not only countries' capacities, but also the availability of functional, tested and proven capabilities for stopping outbreaks at the source. All this is captured via the 140 questions. Additionally, several questions in the GHS Index are designed to determine not only whether capacity exists, but also whether that capacity is regularly tested and shown to be functional in exercises or real-world events.

The GHS Index is also designed as an indicator of a country's capacity and capability to reduce Global Catastrophic Biological Risks (GCBRs), which are biological risks of unprecedented scale that could cause severe damage to human civilisation at a global level, potentially undermining civilisation's long-term potential. These are events that could easily reduce all the progress made in sustainable development and global health because of their potential to cause national and regional instability, global economic consequences and widespread morbidity and mortality, which is similar to the threat posed by COVID-19.

The GHS Index relies entirely on open-source information: data that a country has published on its own or has reported to or been reported by an international entity.¹²¹

For more information on the 2019 GHS Index, please visit www.ghsindex.org/.

¹²¹ Global Health Security Index, 2019

3.2 Key findings from the analysis: Correlations between country readiness and their recovery rate

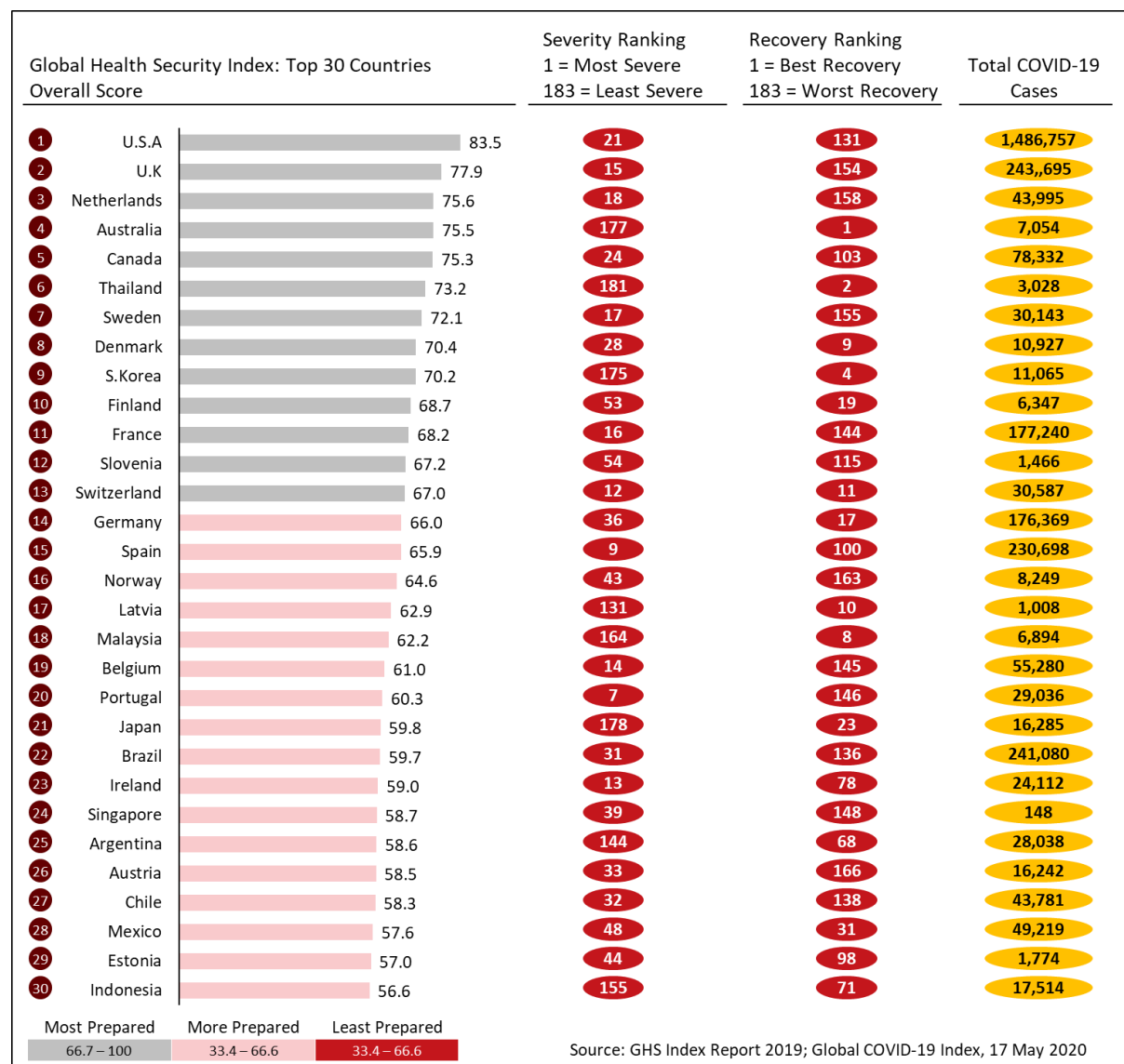


Figure 63: GHS Index 2019: Top 30 countries

Based on the initial findings, it is evident that a country's healthcare readiness according to the GHS Index may not necessarily translate to a successful campaign in combatting COVID-19. Despite recording favourable scores across the six categories which measure improvement in global capability to prevent, detect and respond to infectious disease threats, a country's actual implementation approach in practice during a pandemic may not prove as effective as its capability and capacity readiness suggests.

For example, the US is ranked number one in the overall GHS Index. However, it has been well documented that the country has been struggling to combat the spread of COVID-19. Other countries which have ranked highly in the GHS Index such as the UK, Sweden and France, have also fared relatively poorly in the management of COVID-19 as well, despite access to modern infrastructure, qualified healthcare professionals, and ample resources. Therefore, healthcare security and preparedness alone clearly do not guarantee a country's ability to manage a pandemic.

Instead, it can be accompanied by a measure of its ability in practice to respond, coordinate, communicate and rapidly mobilise the country into action.

However, there are also other countries high on the GHS Index that have done well to contain the spread of the pandemic, such as Australia, Thailand and South Korea. In general, it can be concluded that the common denominator across the successful countries is the anticipation, speed and coordination of deploying the highlighted intervention categories. The implementation model of these countries has been decisive and clear, based on lessons learnt from past pandemic experiences and trends from countries that were impacted during the early stages of the spread. Most countries that rank highly in the GHS Index and performed well in curbing the pandemic were early adopters and implementers of the intervention categories.

3.3 Recommendations: Ensuring minimum healthcare infrastructure is in place to manage a pandemic.

- In an age where there is constant threat of a global pandemic, it is crucial for countries to invest and develop adequate healthcare infrastructure, talent and procedures to be able to respond effectively. The recent virus outbreaks of SARS, MERS, Ebola and COVID-19 have taught us that no country can be fully immune to a pandemic, and that the spread can be rapid and deadly. Having access to basic healthcare infrastructure assists with early detection and classification of a potential disease and is vital to efforts to contain the spread.
- Equally important is the establishment of a rapid response system and a robust implementation plan to mobilise resources, coordinate initiatives and communicate with the masses. As the GHS Index shows, having healthcare infrastructure is only one part of the equation. The execution of national-level plans, effective implementation and monitoring are also essential.

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4 Conclusion

To confront this pandemic effectively, governments need to act boldly to implement measures based on demonstrably effective practices. During these unprecedented times, governments around the world have had to make tough and sometimes unpopular decisions for the benefit of a more stable future. Whilst development of a vaccine is ongoing, the most prudent approach in the meantime is to minimise transmission through coordinated and holistic strategies and a clear, sustained and rigorous approach to implementation. An advanced healthcare infrastructure alone is insufficient.

The key findings from this report demonstrate how the five key interventions work individually, and in relation to each other, to aid governments in achieving public health recovery. Whether we look at New Zealand or Australia, Malaysia or South Korea, strong leadership and public compliance emerge as critical enabling factors for COVID-19 containment. When leaders provide the right advice and the public complies, recovery is measured and orderly. Even in Sweden, where the public complied with relatively relaxed government orders, the risks were calculated and therefore manageable. Leading countries have implemented the five key interventions discussed in this report and upheld the conditions for recovery to some degree. However, it must be acknowledged that each country experienced different levels of severity. That may be a result of variation in the effectiveness of implementation or perhaps other factors which have not yet been documented.

As countries begin to ease lockdown measures and restricted movement orders, the next focus of governments will inevitably be the revitalisation of the economy. Whilst various stimulus packages were introduced to protect the economy and welfare of citizens in the recovery phase, the next phase will require further radical thinking to revive and reinvigorate businesses and overall economic activity.

Over the past few months, the pandemic has significantly impacted large and small businesses, causing significant layoffs, and reducing productivity and economic output. International border closures, lockdowns and the deferral of daily business activities to curb the spread of COVID-19 have forced many organisations to close and file for bankruptcy. With reduced household income and escalating debts, both the economy and the welfare of citizens are likely to be fragile for some time to come. Without expert advice to guide economic recovery interventions, countries that were on a growth trajectory prior to COVID-19 could lag behind in the short to medium term, losing a competitive advantage with regional and global peers.

Across the global economy there may also be significant opportunities to rebuild better – and differently. Sustainable energy generation, reduced need for travel by car or mass transit in cities, greatly improved use of digital communication, transformed models of teaching and learning in higher education, and many other aspects of the economy have the potential to be both different and better as we recover from the pandemic.

As the world gradually progresses through the COVID-19 pandemic, there will be a need to examine the effective practices adopted by leading countries on economic recovery. There will also be lessons to learn from strategies that were designed to address the prevailing economic challenges but did not produce desirable results. As countries grapple with the COVID-19 pandemic amidst other domestic and global challenges such as political instability, fluctuating oil prices and climate change, sound and holistic economic strategies will be essential to ensure national and global economic resilience and growth, and provide a prosperous, sustainable future for us all.

APPENDICES

Appendix A: The Global COVID-19 Index (GCI)

What is the GCI?

GCI is the world's first holistic and comprehensive index on COVID-19. It rates and ranks countries based on how well they are coping with the COVID-19 pandemic. It is a fully data-driven and objective approach designed to assist decision-makers with critical decisions in the fight against COVID-19.

There are other trackers and indexes out there; what makes the GCI unique?

The index is set apart through its comprehensive assessment of the true severity and recovery progress of these countries; it considers relevant metrics such as socio-economic factors and the strength of their healthcare systems, and normalises for differing population sizes.

Its proprietary algorithm processes approximately 3,000 data points daily, pulling together metrics from well-recognised and validated open-source databases on governance and public healthcare.

The GCI is poised to be a singular holistic source of data that can facilitate informed decision-making for governments in the fight against COVID-19. The GCI stands apart from other indexes because:

- a. The GCI is the most comprehensive and holistic index on COVID-19; apart from its own proprietary elements, it pulls together acknowledged elements from other available indices globally.
- b. The GCI has global coverage; it rates and ranks 184 countries.
- c. The GCI is based on data and updated daily to reflect any changes in the global landscape.
- d. The GCI can be instructive to governments, helping them make decisions on when or how they can lift restrictions.
- e. The GCI can also be helpful to the private sector, serving as an indicator as to when regular operations might resume, or when they should prepare a mitigation plan.

What does the GCI measure?

The GCI comprises two different indexes:

The GCI Severity Index measures how severe the situation is in a country, given its healthcare system's ability to contain and cope with the COVID-19 outbreak. It considers several parameters:

The following key dynamic parameters contribute 70 per cent of the GCI Severity Index:

- Number of confirmed cases per population
- Number of proportionate deaths as a result of COVID-19 over crude deaths

The remaining 30 per cent consist of static scores derived from the Global Health Security (GHS) Index:

- GHS Category 1 (Preventing the emergence or release of pathogens)
- GHS Sub-category 6.5 (Public health vulnerabilities)

The GCI Recovery Index measures a country's current progress in handling the pandemic and indicates how well it is doing from a health and safety perspective. It considers eight parameters:

The following key dynamic parameters contribute 70 per cent of the GCI Recovery Index:

- Number of recoveries per confirmed cases
- Number of active cases per population
- Number of tests per confirmed cases
- Number of tests per population

The remaining 30 per cent consist of static scores derived from the GHS Index:

- GHS Category 2 (Early detection & reporting of epidemics)
- GHS Category 3 (Rapid response to mitigate the spread of an epidemic)
- GHS Category 4 (Health infrastructure and system to treat the sick and protect health workers)

From the above, only the GHS Index categories are static indicators. The dynamic algorithm processes the live data for 70 per cent of the final calculations, allowing the GCI to employ continuously evolving metrics.

Which are the most important factors used to gauge severity/recovery?

In order to see how severe the situation is in a given country, we have found that the key is tracking the number of proportionate deaths attributed to COVID-19. This gives a clear idea of how many additional fatalities the country must contend with in comparison to their normal mortality rates, the latter of which already take into consideration the population as well as the healthcare system's ability to cope with the outbreak.

To gauge recovery, we have found that focusing on the number of active cases per population is a crucial factor in estimating if a country is recovering well or not. The number of recoveries a day is a good measure, but knowing how many more patients are still in treatment can give a better estimate on when a country has truly flattened the curve.

A country's willingness and ongoing efforts to invest in large scale testing is also factored into the GCI Recovery Index and gives a strong indicator of the preparedness of the country to handle any possible recurrence of the pandemic.

How is the GCI useful to governments?

The GCI is designed to assist countries in managing the COVID-19 pandemic - mitigating its severity and planning for their recovery from the crisis. It can help governments answer the key questions of when and how they should impose or relax their lockdowns with minimal guessing. It can also indicate when heavier measures may be needed to reinforce their healthcare system's capacity. With its global rating system, it can help answer the key question of what measures appear to be working or not working for countries around the world. From there, best practices can be derived and considered for countries with similar demographic, healthcare and socio-economic parameters.

Aside from that, the index can help governments:

- Improve border controls by highlighting countries who may be farther along the road to recovery or, conversely, those who are getting worse
- Identify countries who are ready to lift restrictions and resume normal trading arrangements
- Set up an early warning system for targeted intervention support to help countries who are at higher risk of being overwhelmed (based on a steadily increasing severity score)

- Estimate the timelines to lockdowns realistically, enabling a timely management of the economy

How is the GCI useful to the private sector?

Businesses would benefit from knowing where their base country is on the severity-recovery scale. For countries who are on the road to recovery, knowing this can help business owners prepare to resume operations. For countries who are still far from recovery or may be struggling, the index can help businesses prepare their mitigation plan over an expected timeline.

In addition, a country's performance on the index serves as a good indicator of how well they can manage such crises. Their stability is a factor for businesses deciding whether to enter into the market.

What are the datasets used in developing the GCI?

The GCI currently processes approximately 3,000 data points daily, leveraging upon recognised open sources from independent institutions in the space of governance and public healthcare analysis. It is also based on published government data that has been made publicly available and is updated regularly. We review the methodology of each data source in detail to ensure that the data generated is accurate and reflective of the current situation.

Sources include:

- Center for Systems Science and Engineering (CSSE) at Johns Hopkins University
- The Global Health Security Index 2019
- Our World in Data
- The Oxford Coronavirus Government Response Tracker, Blavatnik School of Government, University of Oxford
- The United States Census Bureau
- United Nations, Department of Economic and Social Affairs
- World Bank
- World Health Organisation

The GCI is a composite of relevant metrics on COVID-19 from healthcare to socio-economic factors, making it a holistic indicator of the true severity and recovery status of a country. It can also indicate when countries can lift restrictions or implement heavier measures against the pandemic. Compared to other individual data trackers, the GCI encapsulates numerous data points into a single figure, making it useful for high-level assessment.

To date, the GCI has been enhanced with selected components of University of Oxford's Coronavirus Government Response Tracker to provide an indicative recommendation for each country based on the WHO's defined criteria for lifting lockdowns.

Aside from country ranking, what are the other features of the GCI?

The GCI Stringency Score is applied based on selected Oxford Containment and Closure Policy Indicators. It provides a breakdown of detailed measures for Containment and Closure Policies and Health System Policies.

The World Health Organisation's Six Criteria Checks on Lifting Restrictions assess a country's ability to adhere to the main guidelines of lifting lockdowns. The GCI has built-in analytical and logical checks to determine if a country has satisfied one or more of the six criteria. The data is derived from a combination of GCI analysis and Oxford Stringency Sub-Indicators. Specifically, these six main criteria for lifting lockdowns by the WHO are:

- I. Transmission Control
- II. Detection, Track and Trace
- III. Outbreak Minimisation
- IV. Workplace Preventive Measures
- V. Export/Import Case Risk Management
- VI. Public Awareness

The Country of Interest Detector enables policy makers to observe trends in active cases, the GCI Recovery Index and the GCI Severity Index. This index shows the 30-day movements in these variables for all countries and can highlight potential countries of interest, be it for best practices or for potential outbreak monitoring.

Visual Interactive Maps available on the GCI Microsite Recovery and Severity Index Maps enable users to visually track countries and regions that are recovering or significantly affected based on population size and efforts undertaken to manage COVID-19.

Lockdown and Indicative Recommendations on Relaxing Restrictions Maps gives a quick glance into the strictness of containment and closure methods currently employed by various countries. It enables a visual tracking of countries that maintain closed borders regardless of the recovery progress made. It also shows which countries are recommended to relax stringent measures based on the guidelines set by the WHO.

The Global Infection Trend tracks the global progress made in flattening the COVID-19 curve. Country Comparison Matrix visualisation allows countries to compare themselves against others experiencing a similar severity level, but who are at a different point of recovery. It also enables countries to see if they are making daily progress towards positive recovery.

Ranking of Countries by Recovery Index is a daily ranking of countries from the perspective of recovery. It allows individual countries to be quickly searched to see their relative rankings.

The GCI Open Data contains data which has been analysed by the GCI following consultations with recognised academics, medical professionals and epidemiologists who have provided constructive feedback into the GCI. It allows users to compare ranking of parameters not commonly aggregated for 184 countries and possibilities to determine correlation and regression analyses.

The Country Dashboard is generated by a GCI-developed tool to match countries based on similar characteristics such as population, population density, income and climate.

GLOSSARY

Table 3: Abbreviations used in this report

Acronym	Definition
AI	Artificial Intelligence
B40	Bottom 40 per cent
CCTV	Closed Circuit Television
CDC	US Centers for Disease Control and Prevention
CECC	Centralised Epidemic Command Centre
CMCO	Conditional Movement Control Order
COVID-19	Coronavirus Disease 2019
EIU	Economist Intelligence Unit
EMCO	Enhanced Movement Control Order
EU	European Union
GCBRs	Global Catastrophic Biological Risks
GCI	Global COVID-19 Index
GDPR	General Data Protection Regulation
GHS	Global Health Security
GPF	Global Pathfinder
GPS	Global Positioning System
HIV	Human Immunodeficiency Virus
ICT	Information and Communications Technology
ID	Identification
JHU	Johns Hopkins Center for Health Security
KCDC	Korea Centres for Disease Control and Prevention
MCO	Movement Control Order
MERS	Middle East Respiratory Syndrome
MIT	Massachusetts Institute of Technology
NESA	National Emergency Supply Agency
NTI	Nuclear Threat Initiative
NYU	New York University
PCR	Polymerase Chain Reaction
RCCE	Risk Communication and Community Engagement
RCSM-CE	Risk Communication, Social Mobilisation and Community Engagement
SARS	Severe Acute Respiratory Syndrome
SMS	Short Message Service
SOP	Standard Operating Procedure
TUMI	Transformative Urban Mobility Unit
UK	United Kingdom
US/USA	United States of America
USD	United States Dollar
vs	Versus
WHO	World Health Organisation

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