



**Singapore
Special Case Study
Covid-19 Safety Assessment**

Singapore: #4 Region by COVID-19 Safety Ranking

COVID-19 Quarantine Efficiency

Weight 2.2 Category Score 63.79

<input type="checkbox"/> Scale of Quarantine	13.65
<input type="checkbox"/> Quarantine Timeline	10.63
<input type="checkbox"/> Criminal Penalties for Violating Quarantine	9.20
<input type="checkbox"/> Economic Support for Quarantined Citizens	9.04
<input type="checkbox"/> Economic and Supply Chain Freezing	15.50
<input type="checkbox"/> Travel Restrictions	5.78

140
POINTS

COVID-19 Healthcare Readiness

Weight 1.3 Category Score 66.00

<input type="checkbox"/> COVID-19 Equipment Availability	14.40
<input type="checkbox"/> Mobilization of New Healthcare Resources	17.50
<input type="checkbox"/> Quantity and Quality of Medical Staff	10.99
<input type="checkbox"/> Level of Healthcare Progressiveness	6.91
<input type="checkbox"/> Level of Technological Advancement	6.52
<input type="checkbox"/> Epidemiology System Level of Development	9.69

86
POINTS

COVID-19 Government Efficiency of Risk Management

Weight 2.2 Category Score 80.14

<input type="checkbox"/> Level of Security and Defense Advancement	8.50
<input type="checkbox"/> Rapid Emergency Mobilization	16.00
<input type="checkbox"/> Efficiency of Government Structure	15.33
<input type="checkbox"/> Economic Sustainability	11.02
<input type="checkbox"/> Legislative Efficiency	16.00
<input type="checkbox"/> Political Stability	13.29

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POINTS

COVID-19 Regional Resiliency

Weight 1.3 Category Score 78.21

<input type="checkbox"/> Infection Spread Risk	11.13
<input type="checkbox"/> Culture Specifics and Societal Discipline	16.23
<input type="checkbox"/> Level of Modern Sanitization Methods	15.00
<input type="checkbox"/> Demography	9.76
<input type="checkbox"/> Chronic Diseases	13.49
<input type="checkbox"/> Societal Risks	12.60

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POINTS



COVID-19 Monitoring and Detection

Weight 1.5 Category Score 96.41

<input type="checkbox"/> Monitoring Systems and Disaster Management	18.00
<input type="checkbox"/> Scope of Diagnostic Methods	15.00
<input type="checkbox"/> Testing Efficiency	16.45
<input type="checkbox"/> AI for Diagnostics and Prognostics	15.00
<input type="checkbox"/> Government Surveillance Technology for Monitoring	14.96
<input type="checkbox"/> Reliability and Transparency of Data	17.00

145
POINTS

COVID-19 Emergency Preparedness

Weight 1.5 Category Score 60.58

<input type="checkbox"/> Societal Emergency Resilience	20.25
<input type="checkbox"/> Emergency Military Mobilization Experience	15.33
<input type="checkbox"/> Surveillance Capabilities (Scale, Scope and Technological Sophistication)	13.50
<input type="checkbox"/> Previous National Emergency Experience	11.50

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POINTS

COVID-19: SWOT Analysis of Singapore

STRENGTHS

- High degree of healthcare modernization and technological sophistication.
- Meritocratic, city-state government capable of rapidly implementing very wide-spread social policy mandates and emergency mobilization of resources.
- Strong monitoring and detection efforts, both in terms of testing as well as in real-time monitoring of infection spread.

WEAKNESSES

- Singapore's economy highly depends on foreign workforce and supply chains.
- The region has a large aging population, which is the most at-risk demographic for infection, mortality and negative long-term health outcomes as a result of COVID-19.
- Singapore currently has the highest number of confirmed COVID-19 cases in Southeast Asia.

OPPORTUNITIES

- Singapore has in recent years been investing heavily into AI, digitalization and technological innovation, both generally and as it applies to healthcare. The region is in a position to optimize their testing and treatment capacities by creating specific mechanisms and incentives for technology transfer to utilize these innovations for COVID-19 treatment.
- Singapore's strengths in AI can also be utilized to further strengthen their monitoring and detection capacities.

THREATS

- Economy highly depends on foreign workforce and supply chains. As a result of lockdowns and border-closings, Singapore is at risk for economic decline as a result of the pandemic.
- Singapore's large aging population puts the region at risk for large infection resurgences and future healthcare resource incapacitation due to the rapid rate of transmission in elderly care facilities and nursing homes.

Singapore: COVID-19 Quarantine Efficiency

Singapore implemented a nation-wide mandatory lockdown in early April, which requires home isolation except for accessing essential goods and services, social distancing when in public, and mandatory wearing of masks. These measures were recently extended to June 1, 2020.

Singapore is also enforcing some of the most strongest criminal penalties for violating lockdown and social distancing mandates, ranging from monetary fines to incarceration. For now, preliminary results indicate that Singapore's quarantine efforts appear to be working, with the quantity of new cases steadily declining (from an average of 30 new daily cases in mid-April to roughly 8 daily new cases in early May).

Additionally, these efforts appear to be helping to stabilize one of their greatest previous risk factors as well, i.e., the high number of cases among migrant workers (due in part to the close living conditions of migrant worker dormitories). Since imposing their quarantine efforts, new cases among such workers has declined from an average of 1000 per day in mid-April to 700 per day in early May).

The situation in the migrant worker dormitories is also stabilising, from a high point of an average of more than 1,000 new cases per day in late April, to an average of about 700 cases per day in the last week.

Indicators	Points
Scale of Quarantine	13.65
Quarantine Timeline	10.63
Criminal Penalties for Violating Quarantine	9.20
Economic Support for Quarantined Citizens	9.04
Economic and Supply Chain Freezing	15.50
Travel Restrictions	5.78
Final Score	63.79
Weight	2.2
Final Points	140

Singapore: COVID-19 Government Risk Management Efficiency

Singapore will spend 12% of GDP to ensure the impact on the economy is softened and to help the economy recover back to the original state. The region's high dependency on foreign workers puts it particularly at risk for economic shortfalls as a result of closing its borders. Data released by the Ministry of Manpower found that the region lost 22,200 foreign workers from December 2019 - March 2020.

Singapore's Legislative Efficiency is also very high, and the region is capable of rapidly implementing very comprehensive, coordinated and widespread social policy measures in an efficient way, which in large part stems from its meritocratic governmental structure. As a city-state, Singapore is much more adept at efficiently and effectively implementing sweeping industry development and progressive social policy initiatives and reforms.

Furthermore, the Singapore Armed Forces are arguably among the most technologically advanced in Southeast Asia, which comes into play during the present pandemic in its capacity to utilize its armed forces to help with testing, monitoring and detection, and to enforce government-mandated lockdown and social distancing measures (and, indeed, the region utilized the combined resources of its Police Force, Armed Forces and Ministry of Health to conduct aggressive contact tracing).

Indicators	Points
Level of Security and Defense Advancement	8.50
Rapid Emergency Mobilization	16.00
Efficiency of Government Structure	15.33
Economic Sustainability	11.02
Legislative Efficiency	16.00
Political Stability	13.29
Final Score	80.14
Weight	2.2
Final Points	176

Singapore: COVID-19 Monitoring and Detection

Singapore scores well in the Monitoring and Detection category of the index. This in part is a result of its meritocratic government structure; as a city-state, the region is able to rapidly mobilize resources and impose widespread social policy mandates.

Similar to the cases of Israel and China, Singapore is using a diverse range of technologies for COVID-19 infection spread monitoring and detection, including location data, video camera footage and credit card information. The Singaporean government also launched a specific app, *TraceTogether*, that uses encrypted Bluetooth signals between cellphones to see if potential carriers of the coronavirus have been in close contact with other people.

The scope and breadth of the region's testing facilities is also highly optimal. In order to increase the number of available testing sites, the SARS-CoV-2 Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) laboratory test was expanded from the National Public Health Laboratory (NPHL) to all public hospitals in Singapore, which enabled an average of 2200 tests to be performed daily. The region also conducts detailed interviews with confirmed COVID-19 cases to conduct activity mapping and guide contact tracing and cluster investigations. Identified close contacts are placed in quarantine, and casual contacts are placed on phone surveillance.

Indicators	Points
Monitoring Systems & Disaster Management	18.00
Scope of Diagnostic Methods	15.00
Testing Efficiency	16.45
AI for Diagnostics and Prognostics	15.00
Government Surveillance Technology for Monitoring	14.96
Reliability and Transparency of Data	17.00
Final Score	96.41
Weight	1.5
Final Points	145

Singapore: COVID-19 Healthcare Readiness

The Singaporean government has made great strides in ensuring the sustainability of its healthcare resources during the current pandemic. As of January 2020, the region was requiring twice-daily temperature monitoring for all front-line healthcare workers, and encourages all such workers to report any symptoms of respiratory infection to their superiors.

In late April 2019, Singaporean healthcare authorities indicated that, while the region's healthcare resources were being stretched, they were not over-capacity. The region's government made rapid preventative and preparatory measures to scale up their available healthcare resources in the event of significant surges of new infection.

In early April Singapore's health ministry requested that retired nurses, doctors and other health care professionals to rejoin the workforce during the pandemic, and 1,100 signed up in a single day. The government has also enabled free transportation for front-line healthcare workers.

However, limiting outbreaks in elderly care and nursing homes must remain a vigilant priority, as this represents one of the main risks of future surges large enough to strain the region's healthcare capacity due to the high rates of infection

Indicators	Points
COVID 19 Equipment Availability	14.40
Mobilization of New Healthcare Resources	17.50
Quantity and Quality of Medical Staff	10.99
Level of Healthcare Progressiveness	6.91
Level of Technological Advancement	6.52
Epidemiology System Level of Development	9.69
Final Score	66.00
Weight	1.3
Final Points	86

Singapore: COVID-19 Region Resiliency

Singapore scores moderately well in the “Region Resiliency” category. The region has a high level of political stability, and the region has extended its support to several of its neighbors.

Political acceptance rates and stability is high within the region, although elections are approaching.

In terms of demography, a clear threat is the large size of Singapore’s elderly population. This puts the region at risk for sudden jumps in the rates of infection, especially in the context of elderly care facilities.

The prevalence of chronic disease is also on the rise among the region’s aging population, with the number of older adults with three or more chronic diseases having doubled between 2009 and 2017, and 25% of Singaporeans over the age of 40 have at least one chronic disease (diabetes, high blood pressure, high blood cholesterol or stroke). This puts the region at greater risk of growing mortality rates as the number of infected continue to rise.

Furthermore, the region has a fairly optimal score in terms of cultural specifics and societal discipline, and this, in combination with the very strict penalties put in place for violating quarantine and social distancing mandates, has helped to reduce overall infection spread risk.

Indicators	Points
Infection Spread Risk	11.13
Culture Specifics and Societal Discipline	16.23
Level of Modern Sanitization Methods	15.00
Demography	9.76
Chronic Diseases	13.49
Societal Risks	12.60
Final Score	78.21
Weight	1.3
Final Points	102

Singapore: COVID-19 Emergency Preparedness

- The region does not have a high degree of existing geopolitical tensions or military threats, which puts the region in an excellent position for positive geopolitical prospects in the post-pandemic era.
- However, this situation also means that their baseline preparedness for emergency situations is less than some of the regions included in the present analysis where national emergencies are expected and prepared for from a policy, infrastructure and technological point of view.
- Nonetheless, the region has one of the most technologically sophisticated militaries in Southeast Asia.
- Singapore also has strong surveillance capabilities in terms of both scale, scope, as well as technological sophistication and diversity, due in part to the emphasis on investments and developments in AI, digitization and technological innovation made in recent years. The region has utilized location data, video camera footage and credit card information for COVID-19 infection monitoring and detection.
- Furthermore, while their practical experience in emergency military mobilization (and the rapid mobilization of emergencies to manage nationwide crises in general) is comparatively lower than other regions, many of these factors are offset by their overall government efficiency and capacity to coordinate and integrate the activities of multiple governmental departments in a rapid manner.

Indicators	Points
Societal Emergency Resilience	20.25
Surveillance Capabilities (Scale, Scope and Technological Sophistication)	15.33
Emergency Military Mobilization Experience	13.50
Previous National Emergency Experience	11.50
Final Score	60.58
Weight	1.5
Final Points	91

Singapore: COVID-19 Recommendations

- Singapore has a marked ageing population, and the elderly are the most at-risk group for COVID-19 infection and mortality. Thus, moving forward Singapore should heavily prioritize investing into elderly-specific treatment regimes to improve patient outcomes in its elderly population, and consider broader testing (e.g. of asymptomatic elderly individuals).
- Singapore is currently employing a fairly broad scope of testing, but currently the region only tests individuals who present with pneumonia or influenza-like symptoms. The region should consider expanding it to include testing of asymptomatic individuals.
- The Singaporean economy is heavily dependent on foreign workers, and moving forward, in order to reduce economic risks resulting from future pandemics, the region should decrease its reliance on foreign workers and seek to reorient economic growth and sustainability toward innovation, digitalisation, and continuous investment in the skillsets of its domestic population.
- In recent years Singapore has been investing heavily in AI, digitization and technological innovation. The region should consider implementing specific mechanisms and incentives allowing for technology transfer and the repurposing of AI and digital technologies to improve testing, monitoring and detection and COVID-19 treatment.

Index Categories: All Scores	Points
Quarantine Efficiency	140
Government Efficiency of Risk Management	176
Monitoring and Detection	145
Healthcare Readiness	86
Regional Resiliency	102
Emergency Preparedness	91
Cumulative Score	740

Singapore: COVID-19 Conclusions

- A unique characteristic of Singapore that helps to boost its scores on almost all of the six component categories within Deep Knowledge group's Regional Safety Assessment Index is the region's overall government efficiency, which in large part is a result of its meritocratic, city-state nature.
- Singapore is also a fairly small country, and is fairly geographically isolated. This, in combination with fairly early shutdowns of international flights and non-essential border crossings, helps to neutralize community-based viral transmission, and serves as a strong advantage over other regions.
- Singapore is utilizing state of the art technologies for monitoring and detection, owing in part to the investments that the country has made in AI, digitalization and general technological innovation and international competitiveness in recent years.
- The government has also imposed some of the strictest monetary and criminal penalties (including fines and incarceration) for violating mandatory quarantine, self-isolation and social distancing mandates, which helps to significantly reduce the risk of infection spread.
- The country also has a generally optimal state of healthcare readiness, which in part owed to the fact that the country has been steadily increasing its per capita quantity of doctors and healthcare professionals. The Singapore Healthcare 2020 Master Plan (released in 2012) details its ongoing efforts in this regard, including the addition of 500 new doctors on average per year, as well as measures to attract medically trained Singaporeans overseas to return.
- As a result, despite having the highest number of confirmed COVID-19 cases in all Southeast Asia, the country has not witnessed critical medical equipment shortages, and its healthcare system is not in immediate risk of being over-capacitated.

Singapore: COVID-19 Conclusions

- In terms of emergency preparedness, despite having less practical experience with armed conflict, geopolitical tensions, or nation-wide emergencies requiring the rapid coordination of crisis-mitigation resources than other regions included in the analysis, Singapore has shown a great deal of government efficiency in terms of the rapid mobilization of resources across government departments in order to flatten the curve, and particular efficiency in coordinating its armed forces and police forces to assist its ministry of health with testing, monitoring and detection.
- One of Singapore's most critical threats is its aging population. Outbreaks among elderly populations, especially in elderly care facilities, can serve to increase rates of infection and mortality significantly in very short periods of time. Furthermore, the high transmissibility among the elderly, the high prevalence of age-related co-morbidities, and the overall high rate of COVID-19 pathology and necessity for critical care, means that such future outbreaks could place a sudden, unexpected and substantial burden on Singapore's healthcare resources.
- Very strict measures should be employed to avoid this from occurring, including heightened social distancing and quarantine measures for the elderly, broader-scale testing for the elderly (e.g. among asymptomatic individuals, for example), and prioritizing elderly-focused treatment regimes.
- While the number of new daily infections among migrant workers continues to decline, it remains the fastest-growing demographic, and heightened measures to prevent further transmission among foreign workers should be prioritized, including wider-scale testing and testing of asymptomatic individuals.
- Over the longer term, in order to prepare for both future pandemics, future resurgences of COVID-19 or the possibility of needing to maintain extended border closures, Singapore should also attempt to decrease its economic dependence on foreign workers and supply-chains by continuing to support the development of key skill sets within its domestic population, and to continue investing in automation, digitalization and technological innovation.

DISCLAIMER



Deep Knowledge Group is using its best efforts to continuously update its COVID-19 analytics based on dynamic, publicly available metrics deemed reliable, such as World Health Organization, Worldometers, CDC, Johns Hopkins University, and other publicly available sources.

Certain metrics used for advanced and qualitative assessment were formulated by Deep Knowledge Group analysts in coordination with specific experts and consultants using proprietary sources and techniques. Therefore, such rankings may be adjusted over time depending on the corresponding underlying information and in coordination with ongoing enhancements to our underlying analytical methodologies.

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