U.S. Centers for Disease Control and Prevention, updated 3/31/20

Global Best Practices in Controlling the COVID-19 Pandemic
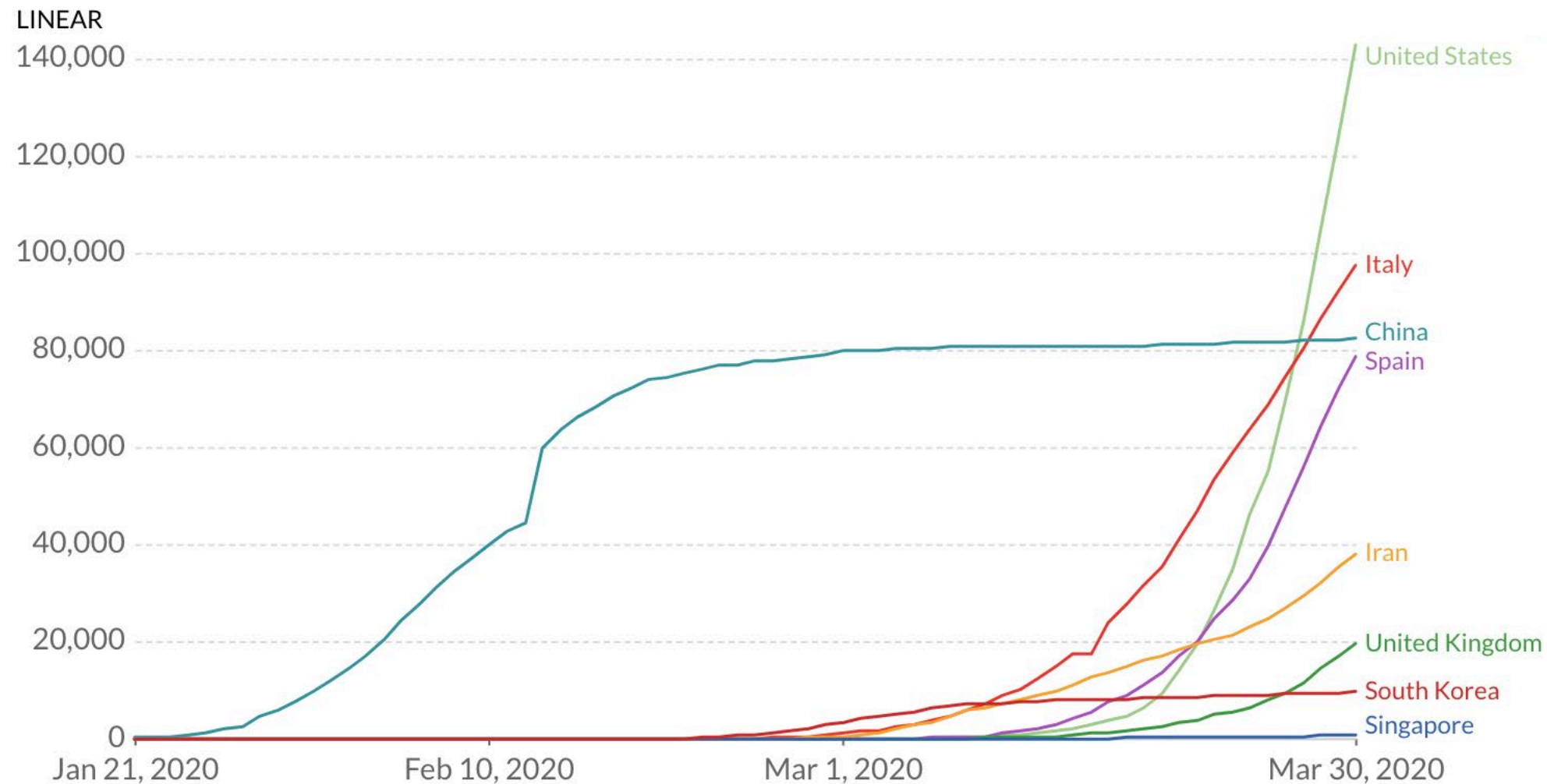
Michele Barry, MD, FACP, FASTMH

Drs. Ben and A. Jess Shenson Professor of Medicine and Tropical Diseases
Director of the Stanford Center for Innovation in Global Health
Senior Associate Dean for Global Health, Stanford University

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Total confirmed COVID-19 cases

Our World in Data

LINEAR

Source: European CDC – Latest Situation Update Worldwide – Last updated 12:45 London time (30th March)
Note: The large increase in the number of cases globally and in China on Feb 13 is the result of a change in reporting methodology.
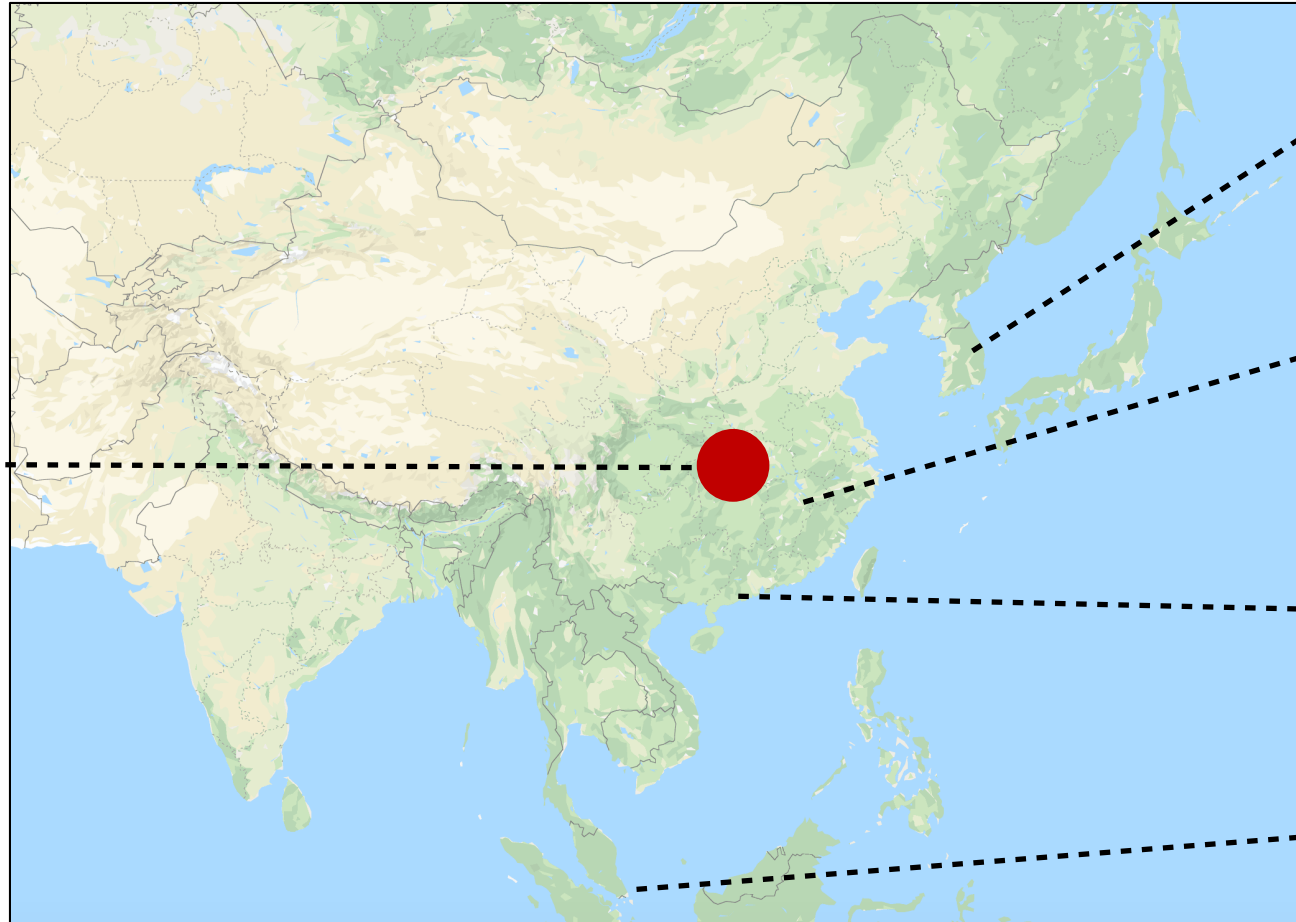
CC BY

Focus on Four Responses:

✈

~5 million people traveled from Wuhan before restrictions.

Hubei Province

South Korea

China

Hong Kong

Singapore

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Vulnerable due to proximity of initial outbreak in
Hubei Province

Singapore

| Confirmed Cases	926
Deaths	3
Recovered	240
Population	5.8M

Updated on 3/31/20

First country to have highest confirmed cases outside of China.

Singapore's Strategies: Containment

Travel Restrictions

- **Strict international travel restrictions** Returning citizens **stay at home order** for 14 days
- **Temperature screening** at borders, all buildings and airports

High Levels of Testing
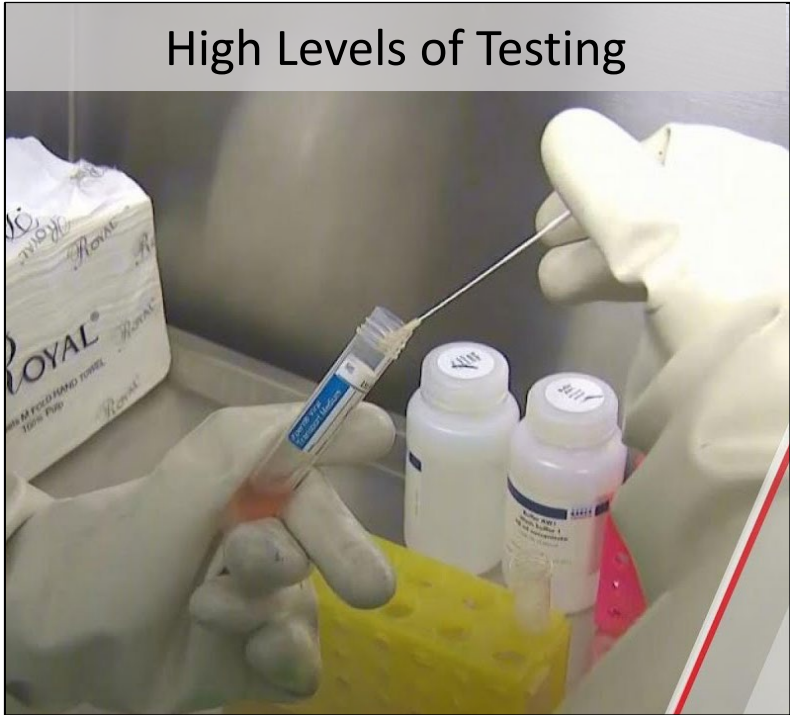
- Rapid **test development and lax testing requirements.**
- **Free testing** in public hospitals
- All symptomatic patients tested - at peak, over 2,000 tests /day

Singapore's Strategies: Strict quarantine measures & no lockdown

Temperature testing in public spaces

- **Stay at home notice** for contacts or travel/masks delivered.
- **Mandatory hospital or isolation facility stay** for individuals testing positive to COVID-19
- **Daily Economic assistance** for those quarantined: SGD $100 (USD $75)
- **All upper respiratory infections** quarantined even if COVID-19-negative
- **Strict social distancing measures in effect:** Lack of total lockdown

WHAT HAPPENS WHEN YOU GET A STAY-HOME NOTICE?

Each person who gets a Stay-Home Notice (SHN) must stay at home at all times for **14** days

If it applies to you, you will be issued an official hard-copy notice upon arrival at Singapore's checkpoints

How will authorities make sure you stick to this?

- Text messages will be sent to you at various times of the day
- You will have to give an update on your location with GPS on your mobile phone
- You might get random phone calls and house visits from authorities
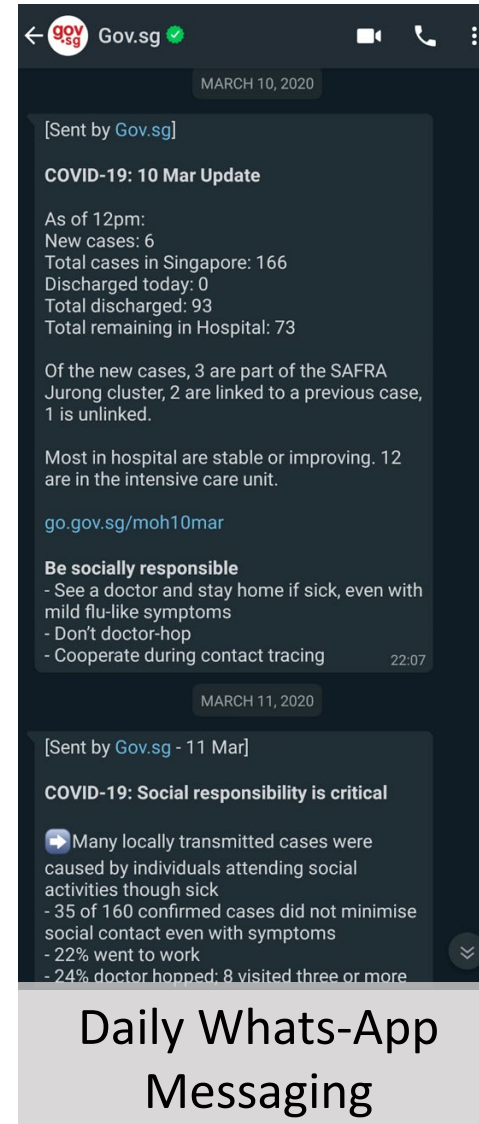- If you get a phone call, you must take photos of your surroundings to verify your whereabouts
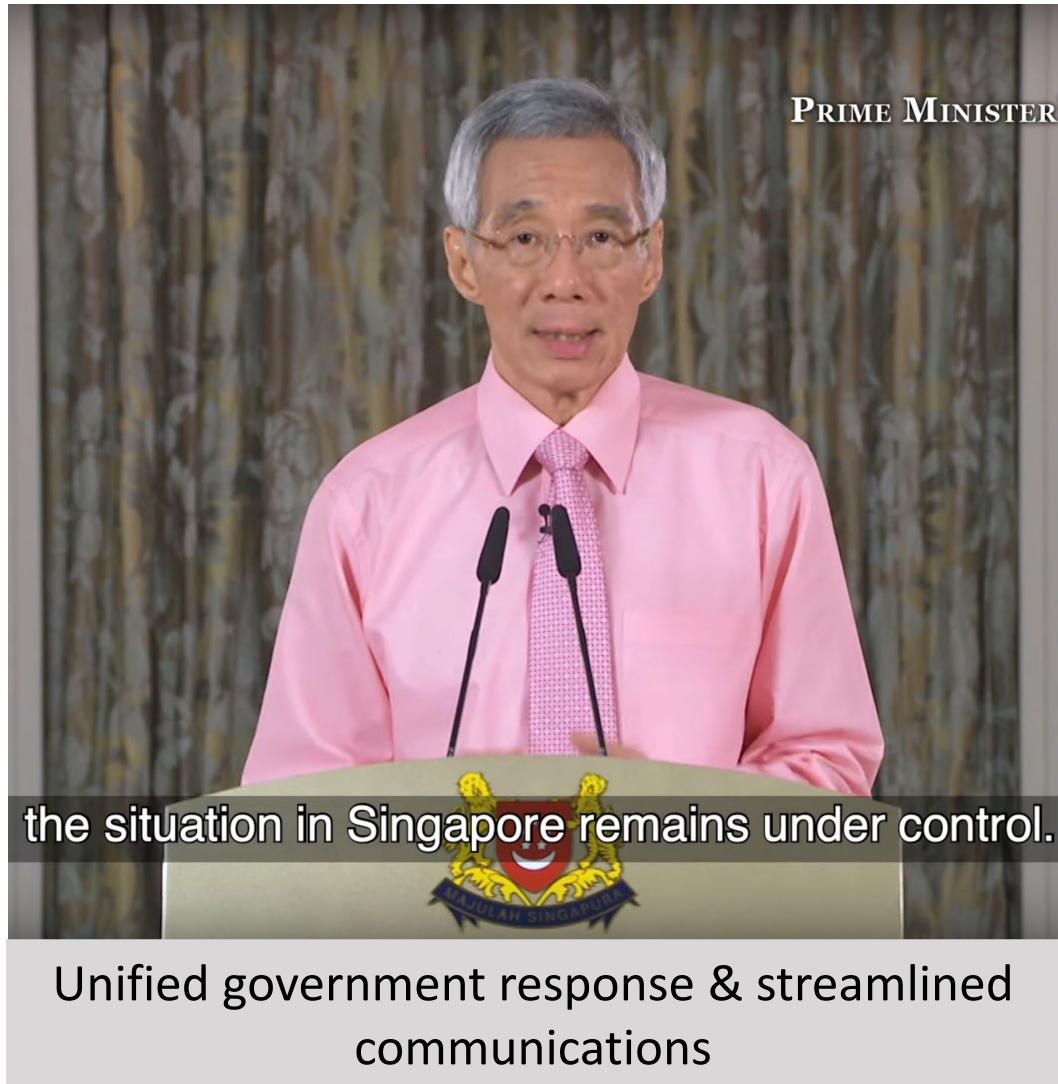
Source: Immigration and Checkpoints Authority
Infographic by Rafa Estrada
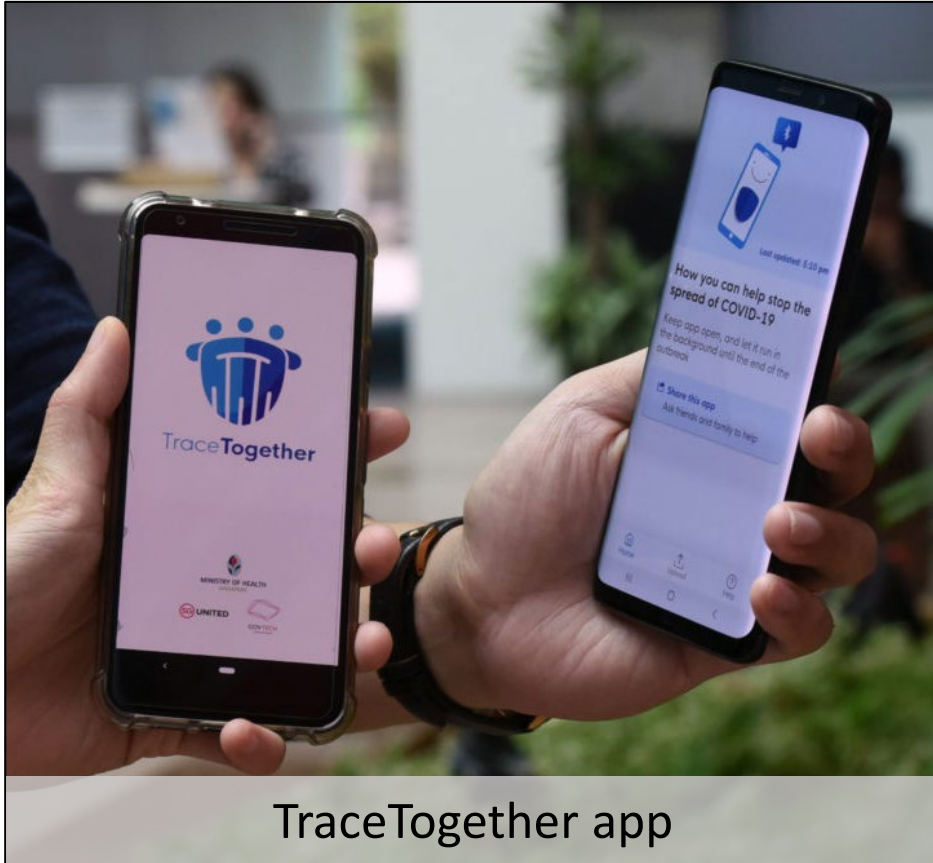
cna

GPS Quarantine Surveillance

MoH and police-enforced with fines

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Unified government response & streamlined communications

Daily Whats-App Messaging

"COVID-19 Chronicles"

Singapore's Strategies: Containment Solutions

TraceTogether app

- Cell phones with the app communicate via Bluetooth networks to enable **contact tracing for 21 days – calculate the distance between people.**

- Allows early notification of **exposure** to COVID-19 positive person.

- The app has been installed by **more than 620,000 people** and is now freely available to developers around the world.
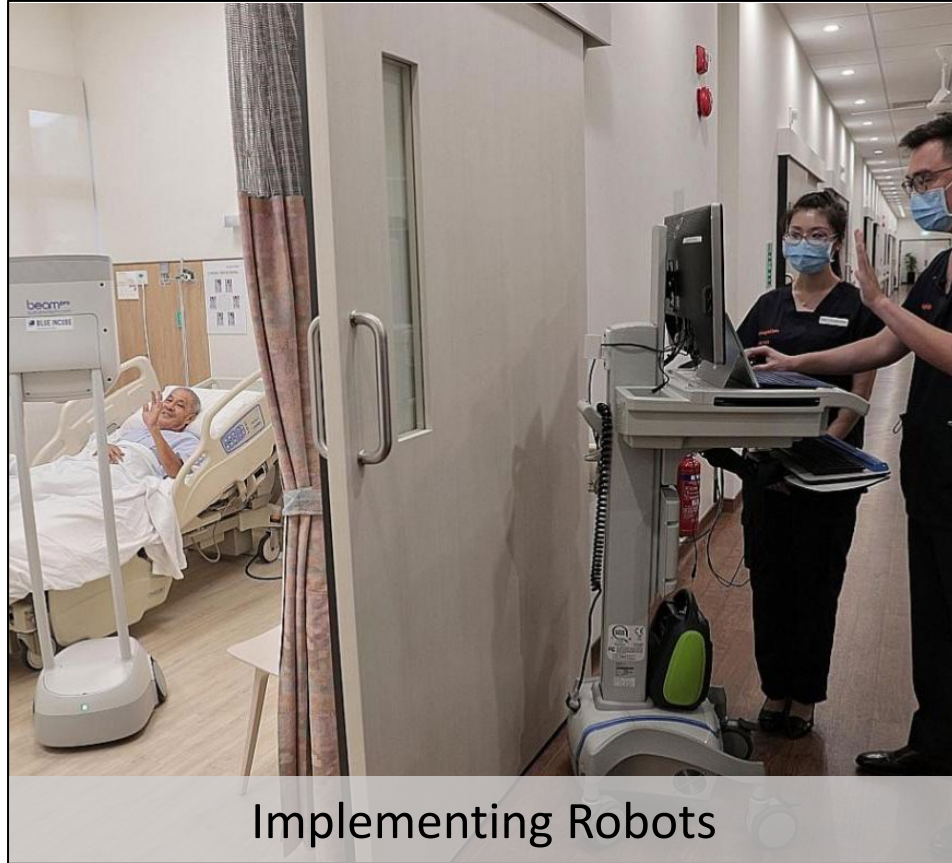
Benefit : MoH is better-informed about who needs quarantine.

Con: privacy

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Singapore's Strategies: High Tech- Solutions

Implementing Robots

- Robots, like the **BeamPro**, are used to deliver food, medicine and other supplies to patients in isolation.

- Cleaning robots used in hospitals help to maintain sanitation standards

Benefit: Use of robots reduced hospital transmission and lowered risk to HCW while conserving PPE

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South Korea

Confirmed Cases	9,786
Deaths	162
Recovered	5,408
Population	51.2M

Updated on 3/31/20

South Korea's Strategies: Rigorous Testing

A drive through testing station

A walk-in testing station outside a hospital

- Mobilized companies for rapid test development → **100,000 kits / day**
- **600 testing centers** across the country → **innovative testing strategies**
- Conducted **over 300,000 tests** (at peak ~15,000/day)
- **More testing per capita** than any other country → minimized community transmission
- **Government financed** testing and centers

South Korea's Strategies: High Tech- Surveillance, Quarantine, and Communication

- Advanced **contact tracing using Big Data** (security cameras, smart phone apps, & credit cards)
- **Data transparent** & **available to public** → accessible testing & hotspot avoidance
- **Regular text messages** to at risk communities near outbreaks
- Aggressive **thermal imaging checks** at all restaurants, hotels and large buildings
- **New laws** to prioritize community security over individual privacy during outbreaks.
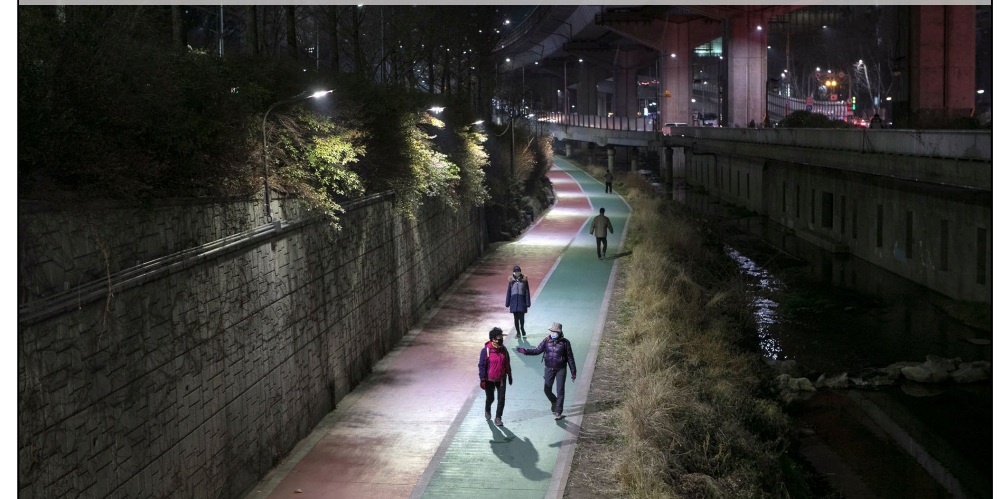
Lack of strict lockdown strategies & movement restriction

Airport temperature checks
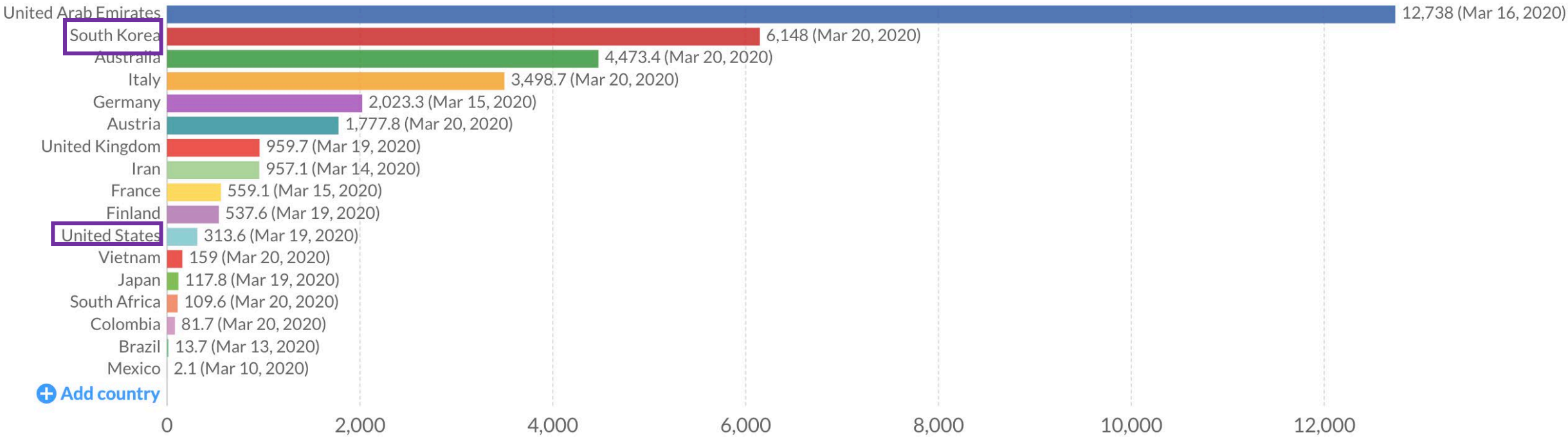

Residents living without strict lockdowns

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COVID-19 data as of 20 March: Total tests performed per million people

Data collected by Our World in Data from official country reports.
For some countries the number of tests corresponds to the number of individuals who have been tested, rather than the number of samples.

Country	Tests per million
United Arab Emirates	12,738 (Mar 16, 2020)
South Korea	6,148 (Mar 20, 2020)
Australia	4,473.4 (Mar 20, 2020)
Italy	3,498.7 (Mar 20, 2020)
Germany	2,023.3 (Mar 15, 2020)
Austria	1,777.8 (Mar 20, 2020)
United Kingdom	959.7 (Mar 19, 2020)
Iran	957.1 (Mar 14, 2020)
France	559.1 (Mar 15, 2020)
Finland	537.6 (Mar 19, 2020)
United States	313.6 (Mar 19, 2020)
Vietnam	159 (Mar 20, 2020)
Japan	117.8 (Mar 19, 2020)
South Africa	109.6 (Mar 20, 2020)
Colombia	81.7 (Mar 20, 2020)
Brazil	13.7 (Mar 13, 2020)
Mexico	2.1 (Mar 10, 2020)

Add country

Our World in Data

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China's Strategies

Confirmed Cases	81,518
Deaths	3,305
Recovered	76,057
Population	1433.8M

Updated on 3/31/20

A bold & aggressive approach that changed the course of the rapidly escalating pandemic

China's Strategies

Strict **control of movement** via quarantine & social distancing in Hubei province & major cities

Expanded **hospital infrastructure** (3 new hospitals; 16 temporary); Swift **testing development**

Rapid deployment of HCW (>40,000) and epidemiologists to Hubei province

China's Strategies: High Tech- Solutions

Drones for crowd & temperature monitoring

- China implemented an unprecedented **surveillance strategy**

- Included employing drones to **monitor movement** and **reduce social gatherings**

- Drones **sensed temperatures** and determined who in a crowd had a **fever** → automatically alerted officials

Benefit: With drones, police were able to enforce strict social distancing measures & monitor fevers

Hong Kong's Strategies
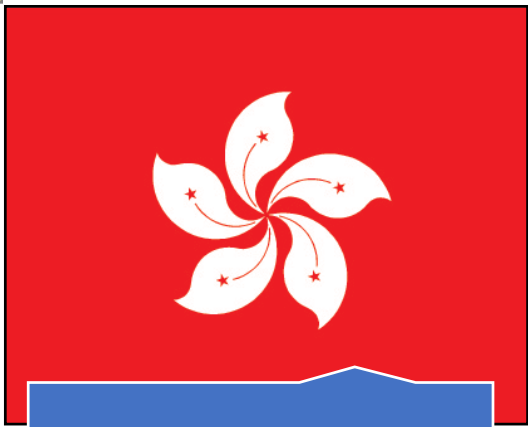
Hong Kong

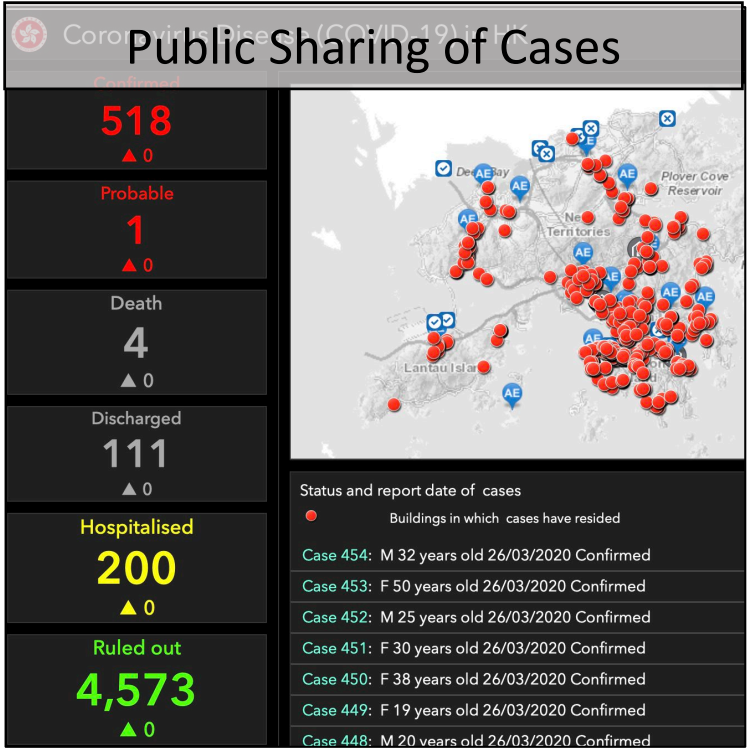| Confirmed Cases	715
Deaths	4
Recovered	128
Population	7.4M

Updated on 3/31/20

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Strict Social Distancing
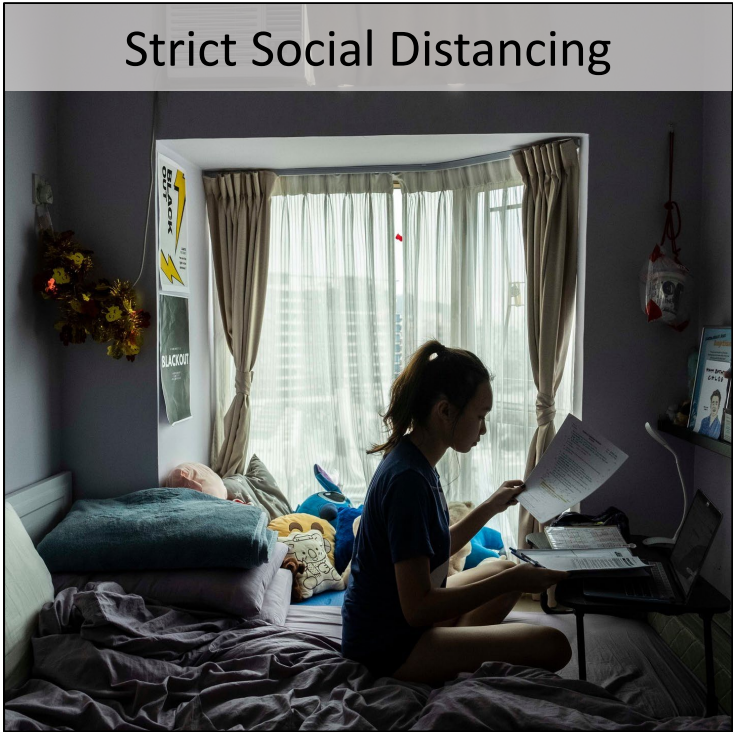
- Implemented early in the crisis
- **Closure** of schools, businesses, amusements parks and large gatherings
- **Wrist bands** for tracking those in Quarantine.

Public Sharing of Cases

Coronavirus Disease (COVID-19) in HK

Confirmed
518
▲ 0

Probable
1
▲ 0

Death
4
▲ 0

Discharged
111
▲ 0

Hospitalised
200
▲ 0

Ruled out
4,573
▲ 0

Status and report date of cases
● Buildings in which cases have resided

Case 454: M 32 years old 26/03/2020 Confirmed
Case 453: F 50 years old 26/03/2020 Confirmed
Case 452: M 25 years old 26/03/2020 Confirmed
Case 451: F 30 years old 26/03/2020 Confirmed
Case 450: F 38 years old 26/03/2020 Confirmed
Case 449: F 19 years old 26/03/2020 Confirmed
Case 448: M 20 years old 26/03/2020 Confirmed

- **Daily public press release** of COVID-19 positive cases.
- Information included: date of positivity, symptoms, street location, date of discharge from hospital.

Focus on Four Responses:
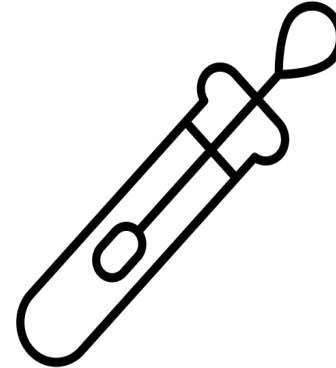
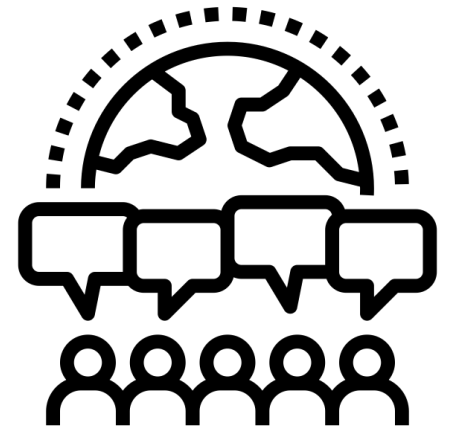| Singapore | Hong Kong | China | South Korea |

Commonalities

Extensive **preparation** post 2003 SARS-CoV epidemic

Swift & decisive **physical distancing**

Aggressive **testing & transparent case reporting**

Frequent, consistent and coordinated public health **communication**

Vò, Italy

- Population of **3,300**
- Location of Italy's first COVID-19 death

Public Health Experiment in **Vò,** Italy: Containment Possible

- Authorities closed the town's borders on February 23, 2020.

- Implemented **mass testing** of **all** residents in February.

- **No new cases** as of March 23, 2020.

Non-residents blocked from entry.

First testing (2/29):

3% of residents tested positive for COVID-19

Strict Quarantine & Isolation Measures

Second testing (3/8):

0.25% of residents tested positive for COVID-19

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Iran: Clash of Religion and Public Health

|	
Confirmed Cases	44,606
Deaths	2,898
Recovered	14,656
Population	82.9M

Updated on 3/31/20

Qom, Iran:
- City is the largest center for Shi'a Muslim scholarship in the world
- Significant **pilgrimage destination**
- First, officials refused advice to close holy sites → massive viral dissemination
- Sites have since been closed → angry crowds have broken barricades

Measures in Place:
- "Unnecessary travel" prohibited
- Traveler screenings (temperature)
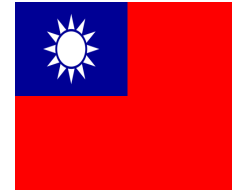- Punitive measures against those who violate quarantine

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Diverse Global Response to COVID-19:
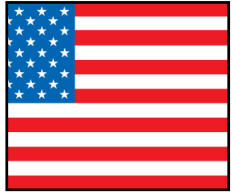
United States:
Surpassed China – State by state health policies.
Lack of testing.

India:
Has implemented lockdowns, forcing a massive migration or migrant workers back to rural villages.
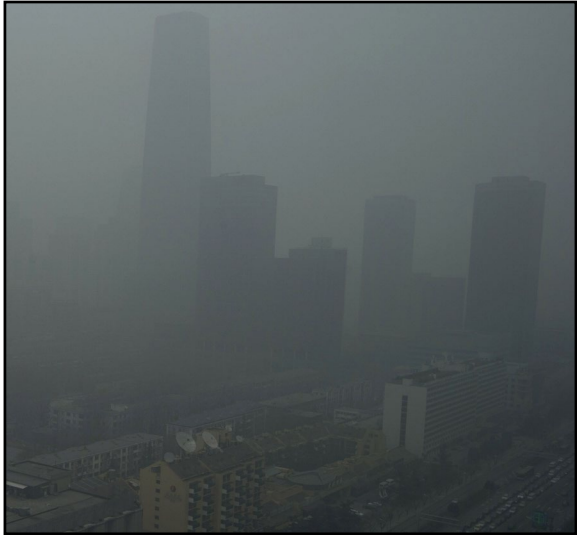
Taiwan:
Central coordination: Used big data analytics, new technologies, and proactive testing in COVID-19 response

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Interdependence Sovereignty

Relates to the ability of countries to control threats that transcend borders

Air pollution

Climate change

Pandemic infectious disease

Shared Global Governance

Frenk et al. *New Eng J Med* 2013; 368 (10), 936-942.

Best Practices & The Future:
Human and Planetary Health

- **Planetary Health -** impact of land use, deforestation, and climate change upon emerging infectious diseases

- **Surveillance** to detect emerging zoonotic diseases in animals and humans (IHR and One Health)

- **Evidence-based interventions** to build community resilience to prevent, adapt, and respond to pandemics

Environmental Health

Human Health

Animal Health

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