

# Covid-19 Lessons in the Singapore Experience

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**American Society for Microbiology lecture, 15 Feb 2021**

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MINISTRY OF HEALTH  
SINGAPORE

*Greetings from Singapore ☺*



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# Greetings from Singapore

## GEOGRAPHY



CITY-STATE  
ISLAND NATION  
SOUTHEAST ASIA  
NEAR TIP OF MALAYSIA  
2/3 SIZE OF NEW YORK CITY

## POPULATION & LANGUAGE

5.6 MILLION PEOPLE



4 OFFICIAL LANGUAGES  
ENGLISH    TAMIL  
MANDARIN    MALAY



## RELIGION



|                             |                 |
|-----------------------------|-----------------|
| BUDDHISM (33.9%)            | TAOISM (11.3%)  |
| CHRISTIANITY (18.1%)        | HINDUISM (5.2%) |
| ATHEIST/NO RELIGION (16.4%) | OTHER (0.7%)    |
| ISLAM (14.3%)               |                 |

## COST OF LIVING

THE MOST EXPENSIVE CITY IN THE WORLD (FORBES 2017)

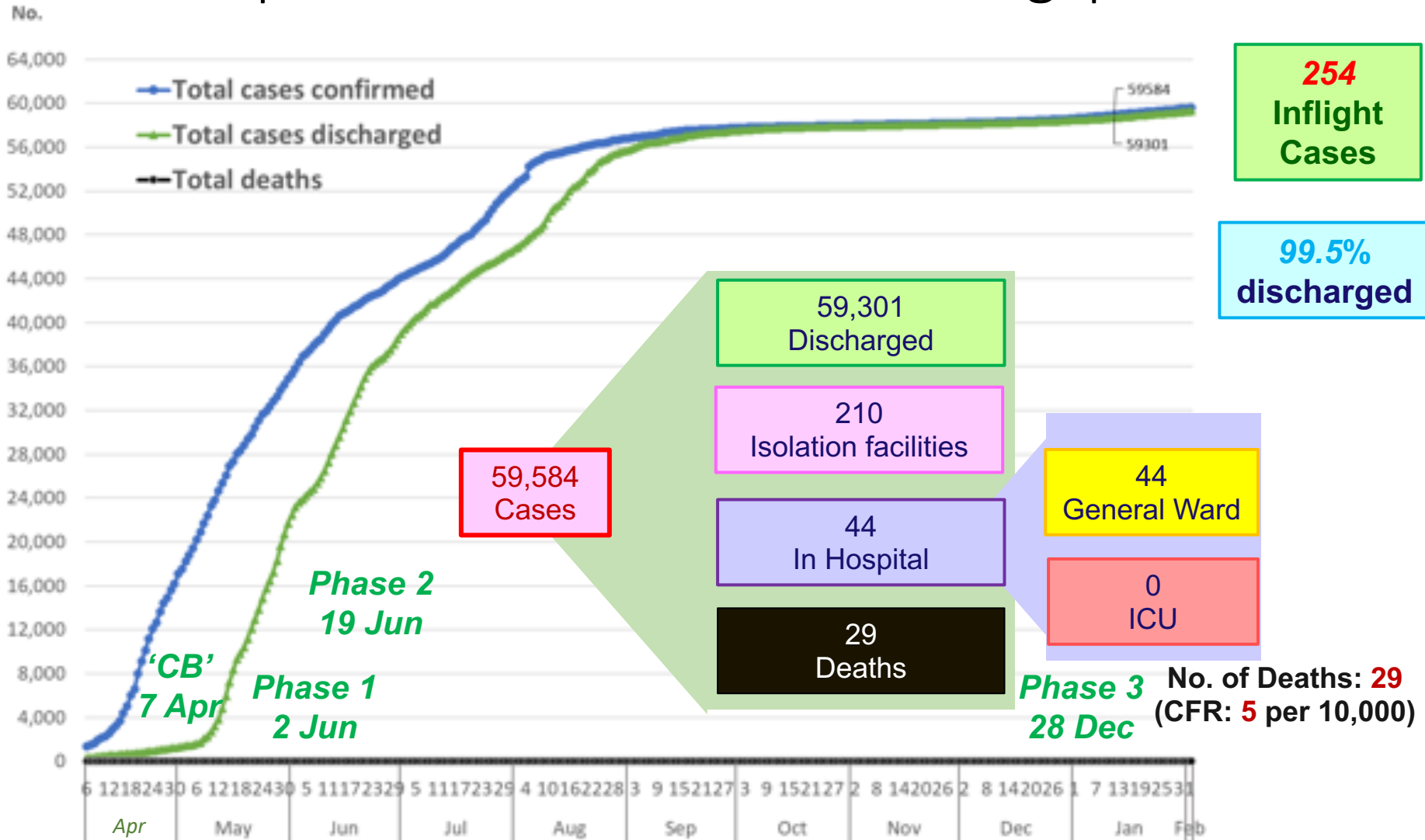
\$75/MONTH  
SUBWAY PASS

\$2,000.00/MONTH  
3 BEDROOM APARTMENT  
1300-1400 SQ. FT.

\$9.56  
1 GAL. MILK



# Reported COVID-19 cases in Singapore







*Contact tracers working  
everyday in urgent race  
against time...*

*Cluster is epidemiologically defined as cases that are grouped in time, geographic location and/or by common exposures*



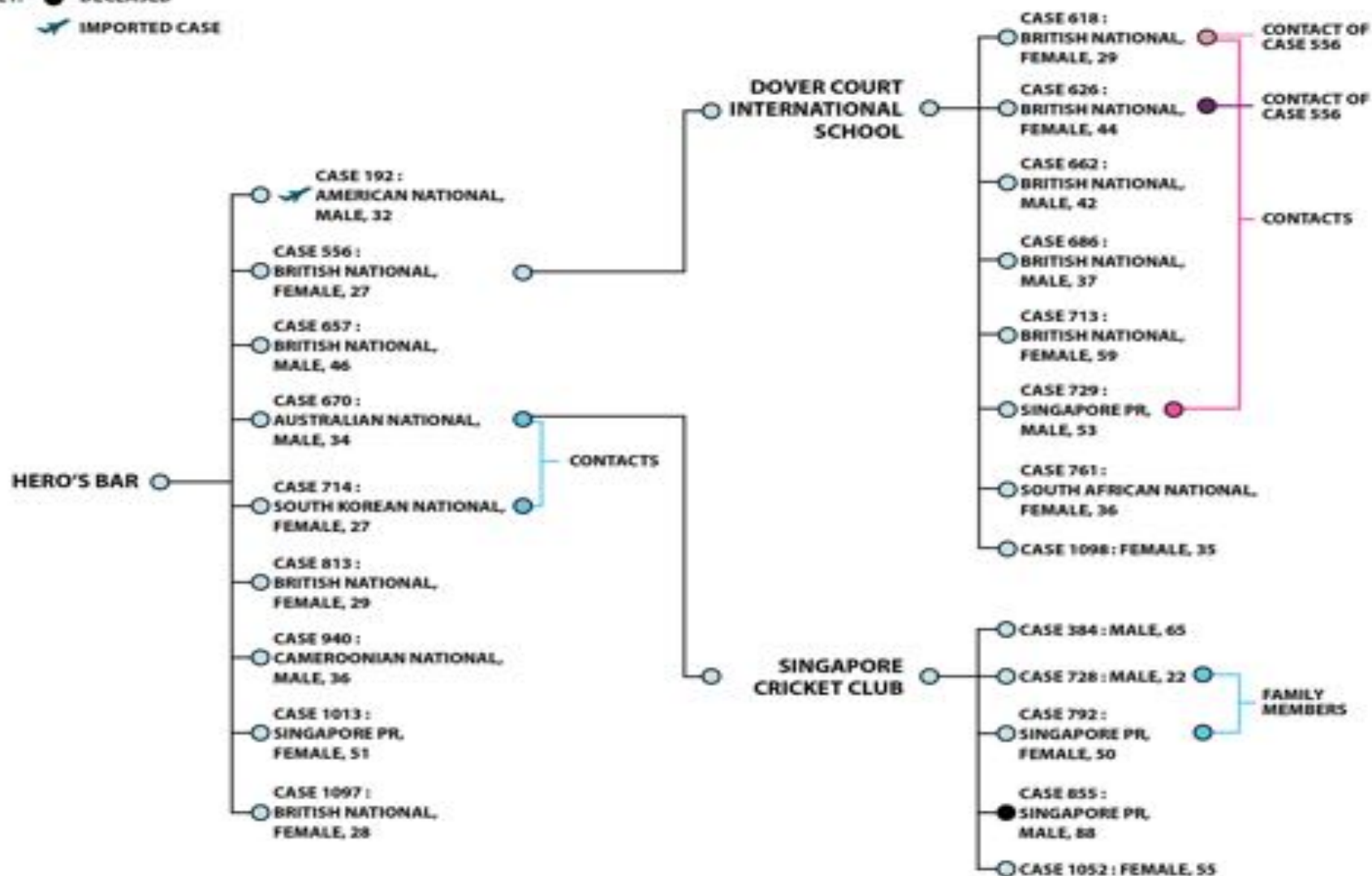
*Epidemiological investigation team  
studies the distribution and determinants of  
infection observed in an at-risk population and  
applies critical findings towards disease control*

| Cluster                               | No. of Cases                | Transmission Factors For Cluster  | Learning Points   |
|---------------------------------------|-----------------------------|---|---|
| <b>Hero's Bar</b><br>14 Mar-<br>3 Apr | <b>9</b><br><br>All patrons | <ul style="list-style-type: none"> <li>• This is a F&amp;B and entertainment venue with live singing.</li> <li>• The likely source is an imported case who had patronised the bar a day before onset of symptoms.</li> <li>• Patrons shared common spaces and were there for a prolonged period (&gt;30 min). No attempts made at social distancing.</li> </ul> | <ul style="list-style-type: none"> <li>• Travellers must stay home for 14 days to prevent introducing the infection to others</li> <li>• Masks should be worn in public, and good hand hygiene should be practiced.</li> <li>• Minimise large social events.</li> <li>• Safe distancing measures at social establishments and events (e.g. tables should be spaced at least one metre apart)</li> </ul> |



# LINKS BETWEEN THREE COVID-19 CLUSTERS IN SINGAPORE

KEY: ● DECEASED  
✈ IMPORTED CASE





| Cluster            | No. of Cases  | Transmission Factors For Cluster   | Learning Points   |
|--------------------|---|--|---|
| <b>Dover Court</b> | <b>11</b><br>9 staff<br>1 household contact<br>1 social contact | <ul style="list-style-type: none"> <li>• Going to work while sick.</li> <li>• Social gathering in common areas and at restaurants for meals and rest.</li> <li>• Social gathering with colleagues and friends outside of work while sick.</li> <li>• Prolonged contact with colleagues at workplace.</li> <li>• Share office and also attended meeting together in conference room.</li> <li>• Choir lessons in school for 30 to 40mins</li> <li>• No social distancing at work.</li> <li>• Potential transmission via fomites through common touchpoints and rest areas.</li> </ul> | <ul style="list-style-type: none"> <li>• Avoid socialising with colleagues/friends while sick.</li> <li>• <i>Stay home if sick (even if symptoms are mild).</i></li> <li>• Avoid prolonged time spent in confined areas.</li> <li>• Avoid going to work after symptoms onset even if symptoms are not severe</li> <li>• Ensure PPE are worn (properly) when there is possible interaction with non-household members</li> <li>• Ensure safe distancing between staff.</li> <li>• Avoid use of common areas at the same time.</li> <li>• Regular cleaning of common areas that are being shared.</li> <li>• Hand hygiene.</li> </ul> |

| Cluster                       | No. of Cases                            | Transmission Factors For Cluster   | Learning Points   |
|-------------------------------|---|--|---|
| <b>Singapore Cricket Club</b> | <b>6</b><br><br>2 visitors<br>4 patrons | <ul style="list-style-type: none"> <li>• Attending social events while sick.</li> <li>• Social gatherings &gt;10pax over meals and drinks for prolonged period of time in close proximity with friends from UK.</li> <li>• Larger social gathering to watch a cricket match.</li> <li>• Sharing of common areas e.g. toilets</li> <li>• Sanitisers not readily available to visitors, only for staff.</li> <li>• One patron was an elderly man undergoing cancer treatment who eventually died.</li> </ul> | <ul style="list-style-type: none"> <li>• Stay home if sick (even if symptoms are mild).</li> <li>• Social distancing during social gatherings of any size.</li> <li>• Social distancing measures for mass events e.g. sporting, concerts etc.</li> <li>• Regular cleaning of common areas that are being shared.</li> <li>• Hand hygiene.</li> <li>• <i>Elderly who are vulnerable should stay home and avoid large social gatherings in close proximity.</i></li> <li>• Provision of hand sanitisers for patrons.</li> </ul> |

**TODAY**

## LINKS BETWEEN CHURCH CLUSTERS AND WUHAN TRAVELLERS



Life church



CNY family  
gathering



Grace AGO  
staff



Grace AGO  
church members

**JAN 19**

### LIFE CHURCH & MISSIONS SERVICES

Two travellers from  
Wuhan arrived on  
January 19, 2020

Possible link

**JAN 25**

### MEI HWAN DRIVE

Cases 83 and 91 attended a  
Chinese New Year gathering  
at Mei Hwan drive

Case 86 is a staff worker at  
Grace Assembly of God and  
was also at the Chinese New Year  
gathering at Mei Hwan drive

**JAN 29 - FEB 9**

### GRACE ASSEMBLY OF GOD

| Cluster  | No. of Cases   | Transmission Factors For Cluster   | Learning Points  |
|--|--|--|--|
| <b>Grace of Assembly God Church</b><br>29 Jan-16 Feb     | <b>17</b><br><br>8 staff<br>9 church members<br><br>[Official count is 23 as it included members of Case 66's family who were not part of Grace AOG] | <ul style="list-style-type: none"> <li>Primary case was a staff member who went to work while sick and infected a few staff, who in turn infected others.</li> <li>Staff meetings consisted of about 70 persons. At one of these meetings, there was a buffet lunch and use of a common serving spoon.</li> <li>Staff and church members shared common spaces and were at church for a prolonged period (&gt;30 min).</li> <li>Although there was temperature screening at meetings for church members, cases can have mild symptoms and may not have a fever.</li> <li>Singing is a common practice at churches – this practice can generate as much droplets as coughing.</li> </ul> | <ul style="list-style-type: none"> <li>Stay home if sick (even if symptoms are mild).</li> <li><i>Singing, a common religious practice, should be avoided.</i></li> <li>Avoid large meetings for prolonged periods of time.</li> <li>If meals are provided, these should be individually packed/served. Avoid the use of common serving spoons – risk of fomite transmission.</li> <li>Safe distancing measures should be practiced at religious places and workplaces if these places are opened.</li> <li>Work from home should continue to be recommended as the default practice if this is feasible.</li> <li>Religious services to be conducted online as the default option if this is feasible.</li> </ul> |
| <b>Life Church and Missions Services</b><br>23 Jan-4 Feb | <b>8</b><br><br>2 visitors from Wuhan<br>4 church members  | <ul style="list-style-type: none"> <li>Although no known direct interactions between the visitors and church members, they all shared common spaces and were at church for a prolonged period (&gt;30 min).</li> <li>The visitors were also not symptomatic at the time (pre-symptomatic transmission).</li> <li>Singing is a common practice at churches – this practice can generate as much droplets as coughing.</li> </ul>  | <ul style="list-style-type: none"> <li><i>Religious services to be conducted online as the default option if this is feasible.</i></li> <li>Singing, a common religious practice, should be avoided.</li> <li>Safe distancing measures should be practiced at religious places if these places are opened.</li> </ul>  |

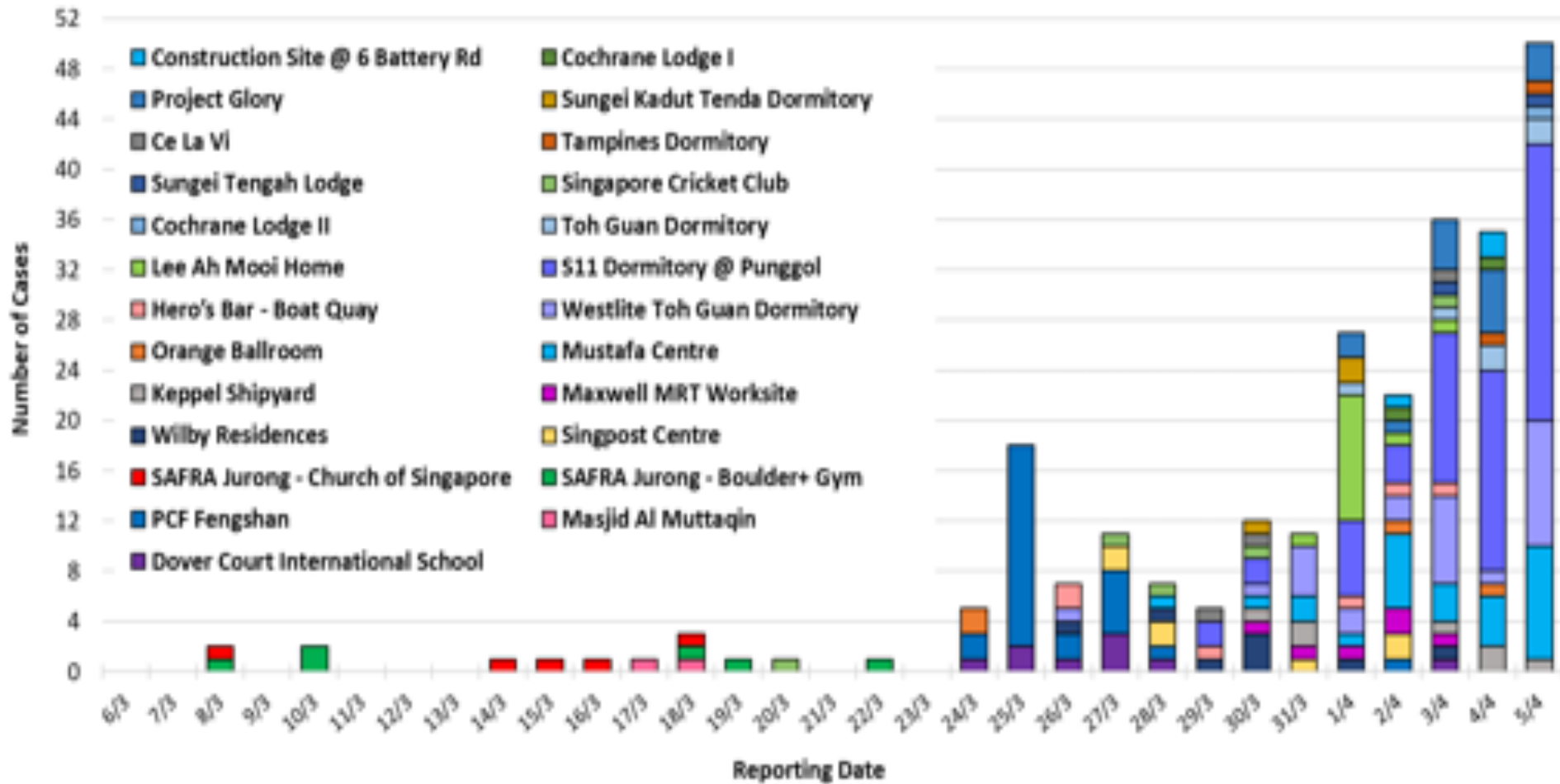


*Singapore,  
5 April  
2020...*



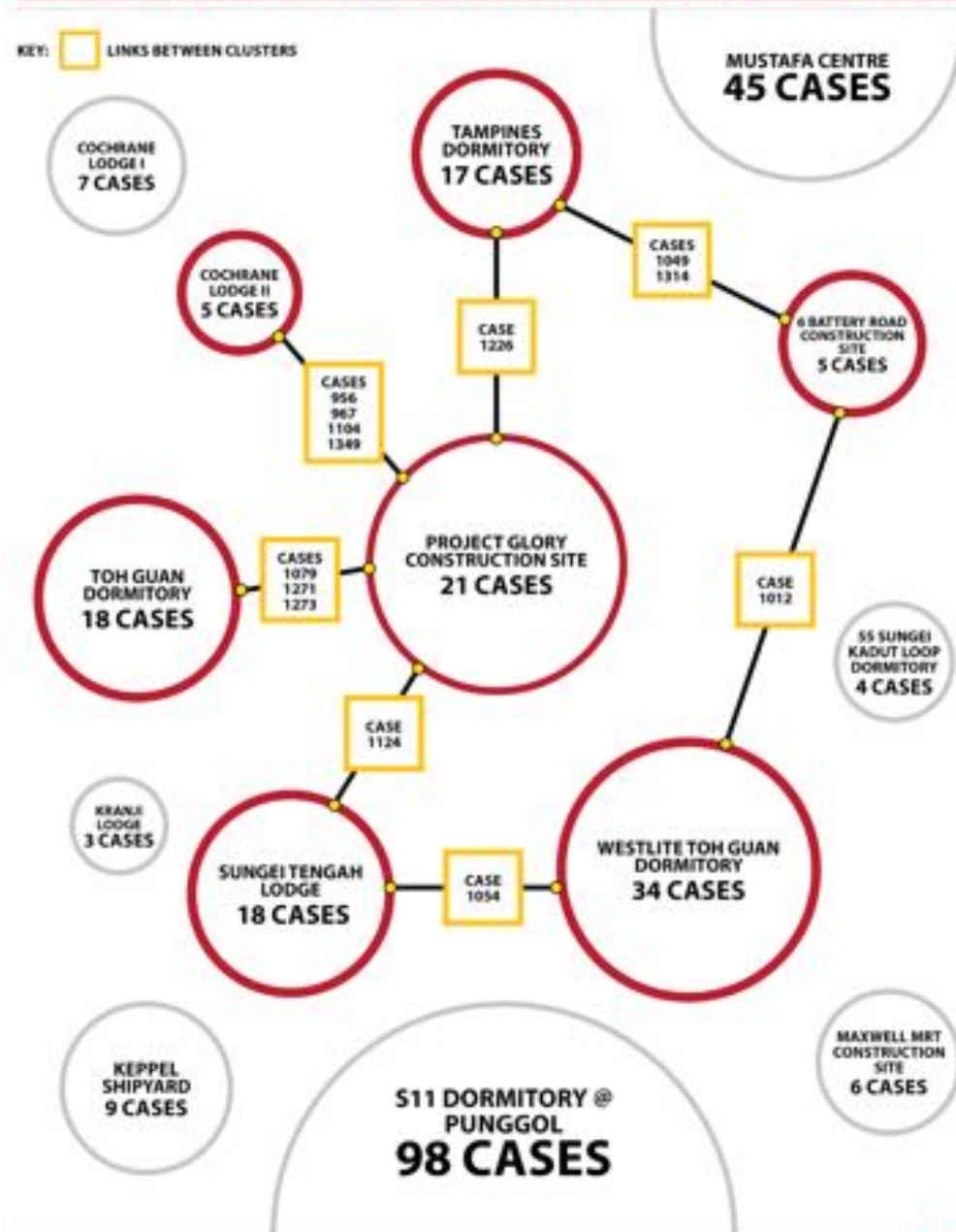
*Evolution of a  
Super  
Spreading  
Event\**

*\*At a time when already occupied with multiple active clusters...*



**NB** 260 cases, excludes imported cases who were linked to the locally acquired infections

- Network analysis found 13 cases with symptom onset between 14 and 25 Mar had visited Mustafa Centre during their infectious period, including four imported cases
- Employees were likely infected initially when they had contact with these visitors who were infectious
- Two employees who developed symptoms on 18 and 28 Mar continued work while symptomatic
- Infection spread through close contact during interactions at work or gatherings for meals and breaks at common rest areas.
- Visitors to Mustafa were likely infected from the staff when they visited Mustafa Centre.



## *More hard practical lessons in outbreak management...*

| Cluster                                    | No. of Cases  | Transmission Factors For Cluster  | Learning Points  |
|--|---|---|--|
| <b>Mustafa Centre</b><br>14 Mar-<br>26 Apr | <b>129</b><br><br>[Breakdown available for 99 cases below]<br>60 staff<br>18 household or social contacts of staff<br>21 visitors | <ul style="list-style-type: none"> <li>• This is a multi-source cluster, including 2 staff who are imported cases. One had continued to work while symptomatic, while the other developed symptoms at work. A few visitors had gone to Mustafa while symptomatic.</li> <li>• Transmission was propagated when staff had breaks at common rest areas. There was no attempt at social distancing.</li> <li>• Although there was temperature screening at the entrances, cases can have mild symptoms and may not have a fever.</li> <li>• Potential transmission via fomites through common touchpoints for customers. e.g. trolleys, baskets, ATM keypads</li> </ul> | <ul style="list-style-type: none"> <li>• Stay home if sick (even if symptoms are mild).</li> <li>• <b>Masks should be worn in public</b>, and good hand hygiene should be practiced.</li> <li>• Workplaces should implement safe distancing practices and should practice team segregation when feasible.</li> <li>• <b>Safe distancing measures should be implemented at shopping places.</b></li> <li>• Temperature screening is not a fail-safe measure. Cases can have mild symptoms and no fever.</li> <li>• All supermarkets and convenience stores should ensure <b>regular cleaning of common touch points</b> for customers, especially trolleys, baskets and ATM keypads.</li> </ul> |



*Dormitory clusters, three months later and still ongoing...*

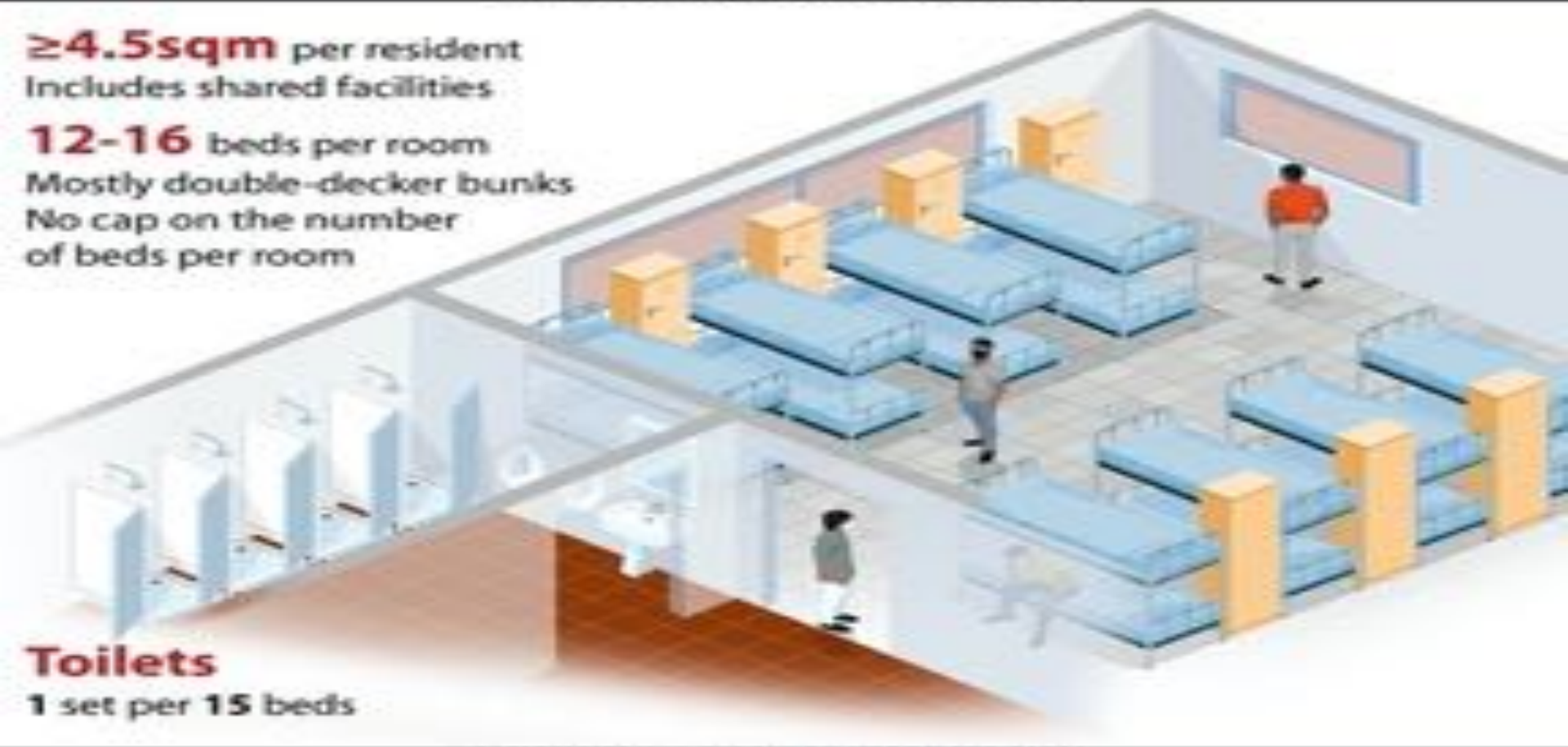
## NEW STANDARDS FOR SINGAPORE'S MIGRANT WORKER DORMITORIES

### Current dormitories

**≥4.5sqm** per resident  
Includes shared facilities

**12-16** beds per room  
Mostly double-decker bunks  
No cap on the number  
of beds per room

**Toilets**  
1 set per 15 beds



*Dormitory clusters, three months later and still ongoing...*

## Improved dormitories

**$\geq 6\text{sqm}$**  per resident  
Excludes shared facilities

**$\leq 10$**  beds per room  
Only single-deck beds to be used,  
with **1m** spacing  
between beds

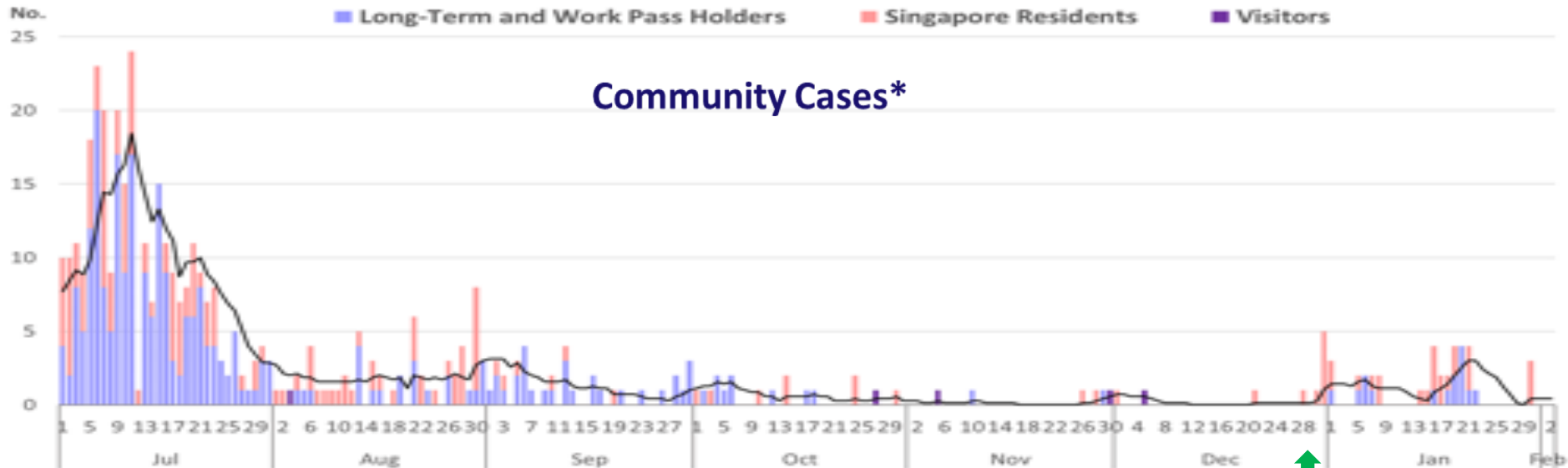


**Toilets**  
1 set per 5 beds

# Managing the Foreign Worker Mega Dorms

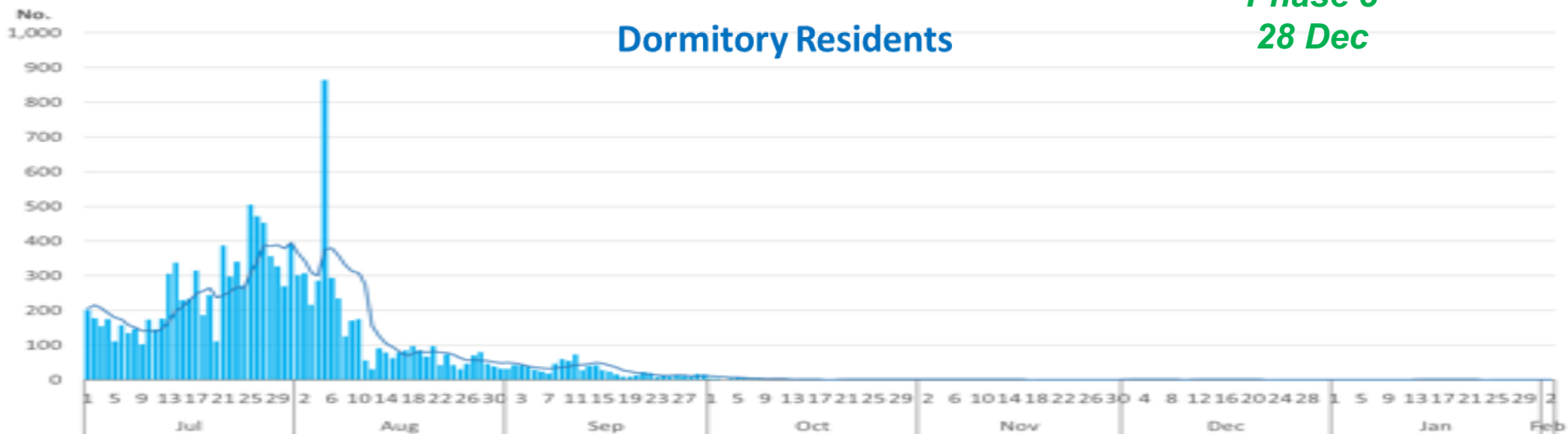
- Outbreak exposed structural problems in how FWs live, needing deployment onsite by forward assurance support teams involving MOM, SAF, SPF
- Govt had to work with dorm operators to enforce hygiene, safe distancing and effective management at all dorms
- Active screening and testing; onsite medical support; movements minimized to prevent further spread; provision of daily needs and salaries
- Community isolation facilities created, FWs who were well and in essential services moved out to reduce congestion in dorms
- *Society awakening to inequity issues and doing right by leading positive change*

# Locally Acquired Cases, Jul 2020-Jan 2021



\* All cases (including amongst work permit holders) who are detected outside of the dormitories

## Dormitory Residents



**Phase 3**  
**28 Dec**



# Phased re-opening

## Gradual resumption of activities over 3 phases:

Singapore is currently in Phase 3

Safe Management Measures in place to resume more activities without substantially increasing the risk



## S'pore's circuit breaker ends June 1

Singapore will enter 3 phases - safe reopening, safe transition and safe nation.

ST

### PHASE 1

From June 2, will take at least 4 weeks



- Some **businesses** will reopen with measures in place.
- Households** can have 2 visitors a day - must be children and/or grandchildren from the same household.
- Pri 6, Sec 4 and 5 students** to attend school daily. Other students alternate between home-based learning and school.
- Pre-schools** will reopen fully by June 10. Student care centres will also resume.
- Places of **worship** to reopen for private worship only.
- Marriage solemnisations** can take place in-person, with 10 people attending.

### PHASE 2

Over a few months



- F&B dine-in** will be allowed. **Retail outlets, gyms, fitness studios, tuition and enrichment centres** will reopen.
- All students** will return to school.
- Sports, recreation and outdoor facilities** will reopen, with safe management practices.

### PHASE 3

S'pore enters a 'new normal' until a vaccine is available



- Social, cultural, religious and business** gatherings or events would have resumed, with limited crowd sizes.

# Strategy to Manage COVID-19

***1. Minimise Importation***

***2. Early Detection***

***3. Containment***

# Strategy to Manage COVID-19: Minimise Importation

**Singapore is taking a risk-based approach to border reopening.**

- Assess risk of importation: through open source information and WHO IHR
- Mitigate risk of importation: implement different travel lanes with public health measures commensurate to the assessed risk

**Continue monitoring of global situation, other countries, and adjusting our border measures to manage risk of importation and spread to the community**

| Unilateral Opening<br>(All travelers, specific countries)  | Green Lanes<br>(Essential business travellers)  | Normal Entry / Return<br>(Returning residents)   |
|--|---|--|
| <ul style="list-style-type: none"><li>• On-arrival PCR test</li><li>• Self isolation until negative test</li><li>• Similar safe management measures as rest of the community</li></ul> | <ul style="list-style-type: none"><li>• On-arrival PCR test</li><li>• Self isolation until negative test</li><li>• Controlled itinerary and limited interactions with the community</li></ul> | <u>Countries with low risk of transmission</u> <ul style="list-style-type: none"><li>• 7-day Stay Home Notice (SHN)</li><li>• End of SHN PCR test</li></ul><br><u>Other Countries</u> <ul style="list-style-type: none"><li>• 14-day SHN</li><li>• End of SHN PCR test</li></ul> |

# Strategy to Manage COVID-19: Early Detection

## *(a) Enhanced surveillance*

### Case presentation

- Expanded version of WHO's suspect case definition
- Test all individuals with pneumonia and acute respiratory illness (ARI)

### Regular screening of target groups

- Testing of asymptomatic high-risk groups
- Fortnightly Rostered Routine Testing (RRT) of workers living in dormitories

### Nationwide network

- Health Promotion Board to support testing with regional screening centers set up
- Activation of Public Health Preparedness Clinics

*Based on the positive test rates from different surveillance methods, there is no evidence that suggests that the virus is circulating more widely than reported*

**ARI and ILI**

*7 positive out of 70,844  
(0.01% of persons tested)*

**RRT**

*58 positive out of 318,547  
(0.02% of persons tested)*



# Strategy to Manage COVID-19: Early Detection

## *(b) Active Case Finding*

### **Contact tracing**

- Cases and close contacts quickly identified and ring-fenced
- Test all close contacts of confirmed cases at the start and end of their quarantine period

### **Technological support**

- TraceTogether: Bluetooth “handshake” in close proximity
- SafeEntry: digital check-in/out

### **Epidemiological investigation**

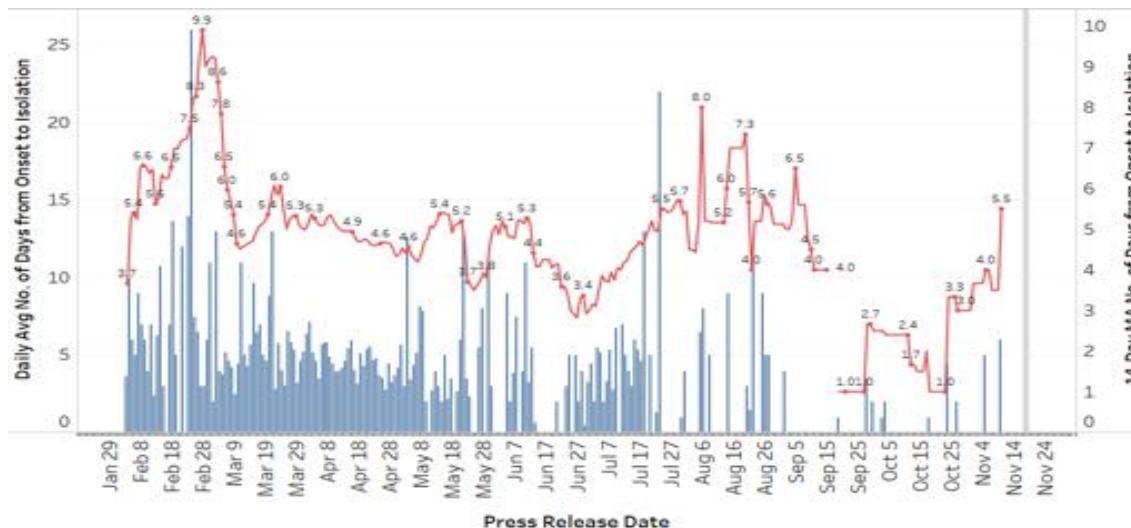
- Chain of infection established for every case



# Strategy to Manage COVID-19: Containment

## Rapid identification and isolation of confirmed cases

- ~5 days from onset of symptoms to isolation in hospital or community care facilities
- Quarantine order for close contacts of confirmed cases



Line represents the 14-day moving average; Bar represents the daily average

As of 20 Nov 2020, 1200hrs

# SINGAPORE MOVES TO PHASE 3 ON DEC 28

Social gatherings of up to 8 people will be allowed, up from the current 5



Current **5**



**8** **DECEMBER 28**



**Households** can receive up to **8** visitors

These events are allowed up to **250** people, in zones of up to **50** people each:



Congregational and worship services by religious organisations



Indoor and outdoor live performance pilots



# SINGAPORE APPROVES USE OF PFIZER-BIONTECH COVID-19 VACCINE

## Phased re-opening

### Gradual resumption of activities over 3 phases:

Based on the COVID-19 risk assessment, public health measures continue to ease gradually till we reach a new normal

Phase 3 still requires shared responsibility and consideration for one another



First shipment to arrive by **end-December**; other vaccines to arrive in coming months



COVID-19 vaccination will be **voluntary** and **free** for all Singaporeans and long-term residents



**Priority** given to healthcare and frontline workers, elderly and the vulnerable



**Rest of adult population** to be progressively vaccinated by end-2021

# Challenges Ahead

## **Sustainability is a key consideration**

- Fighting against “compliance fatigue” for COVID-19 control measures in the general population
- Ensuring sufficient healthcare capacity in order to meet healthcare needs beyond COVID-19
- Providing healthcare workers support and protection as they take on frontline battle
- Taking an evidence-based approach in management of COVID-19 and be prepared to adapt

**A whole-of-society approach needed to tackle the crisis.**

**Government and community must strengthen trust through relationships.**





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# Thank You

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National Centre for  
Infectious Diseases



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School of Public Health



MINISTRY OF HEALTH  
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