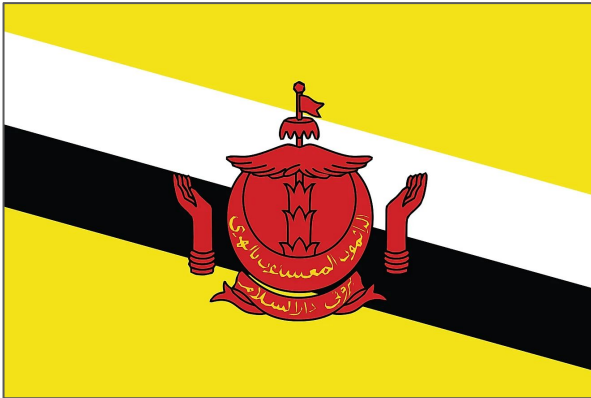
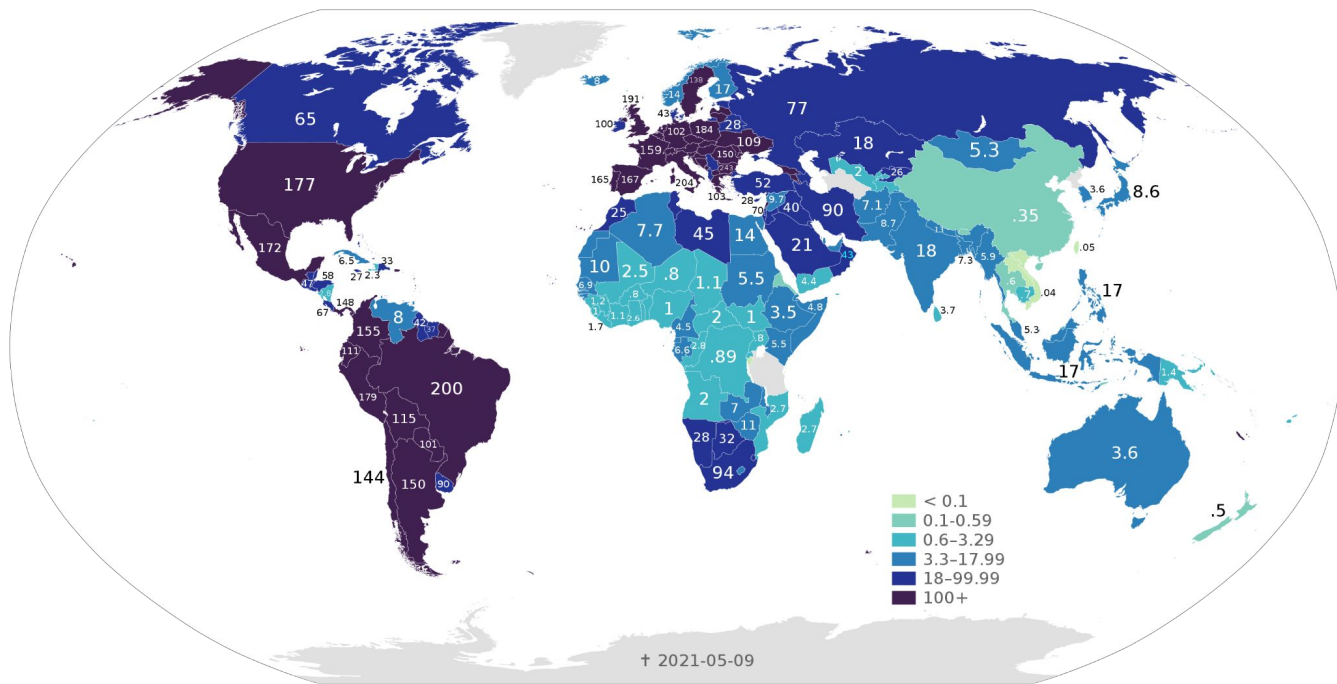


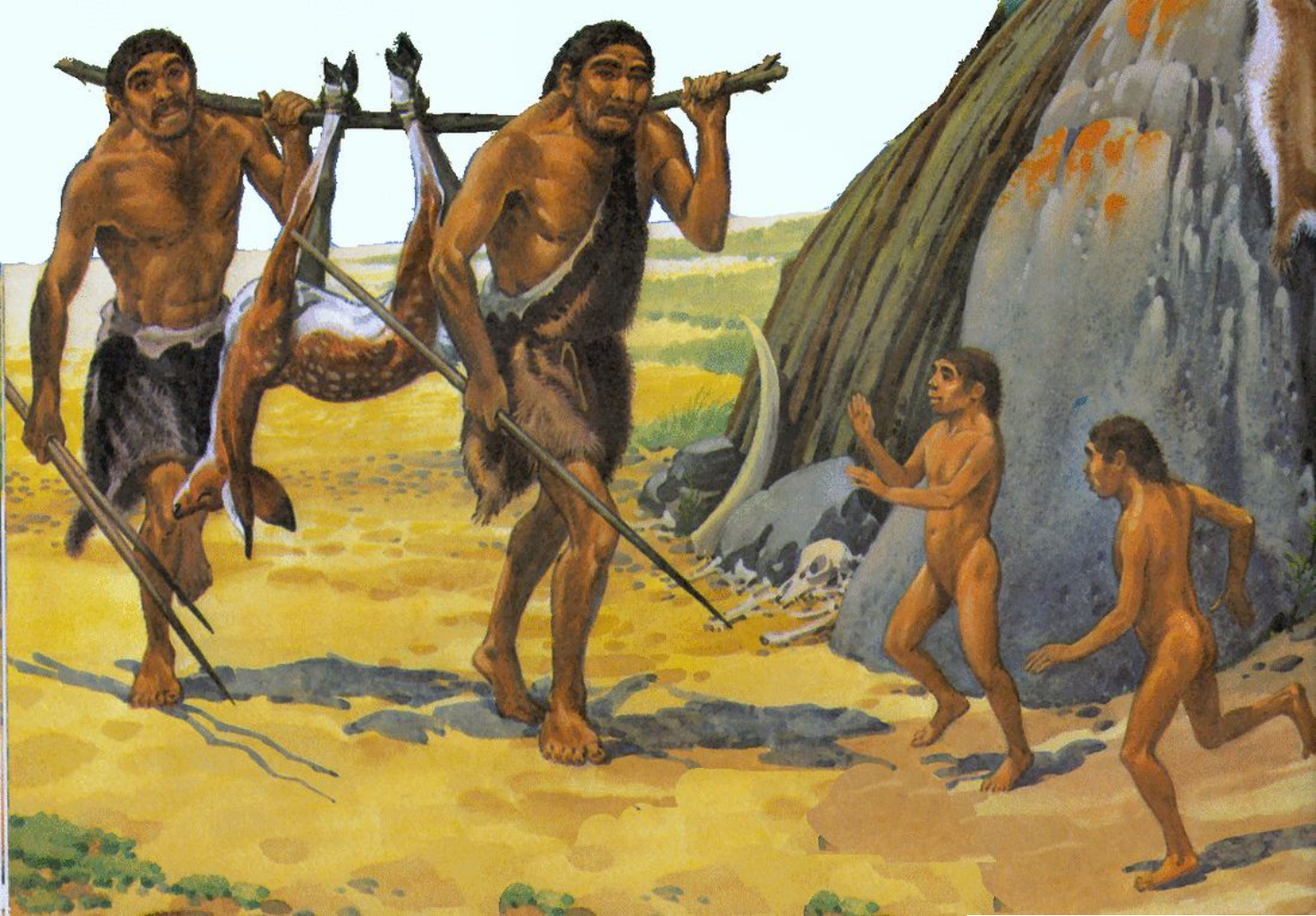
# ADDRESSING PANDEMICS THROUGH POPULATION-HEALTH BASED APPROACHES

COLONEL DR LO HONG YEE

CHIEF OF MEDICAL CORPS, SINGAPORE ARMED FORCES









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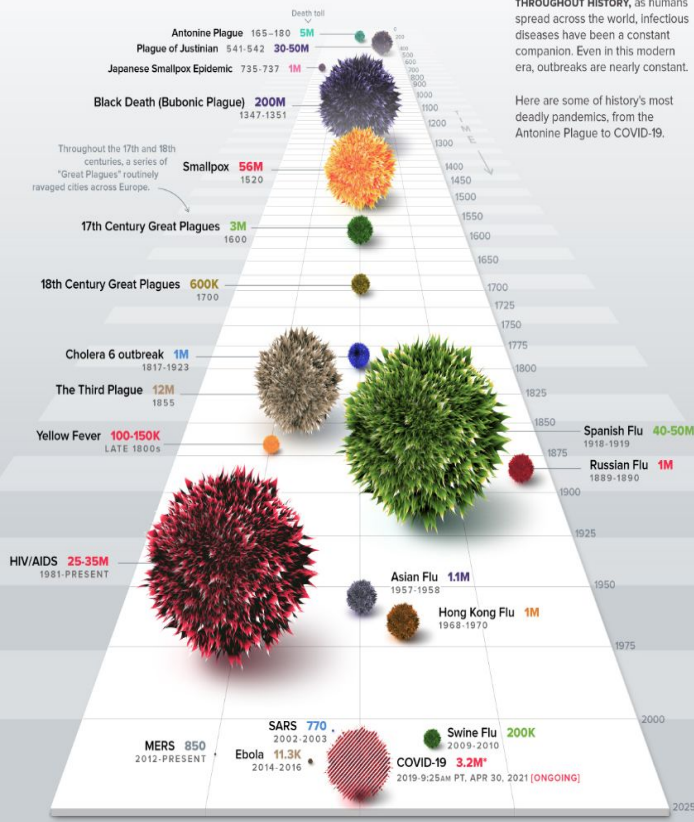


# HISTORY OF PANDEMICS

PAN-DEM-IC (of a disease) prevalent over a whole country or the world.

THROUGHOUT HISTORY, as humans spread across the world, infectious diseases have been a constant companion. Even in this modern era, outbreaks are nearly constant.

Here are some of history's most deadly pandemics, from the Antonine Plague to COVID-19.



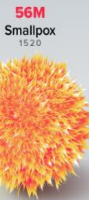
## DEATH TOLL [HIGHEST TO LOWEST]

### 200M Black Death (Bubonic Plague) 1347-1351



The plague originated in rats and spread to humans via infected fleas.

The outbreak wiped out 30-50% of Europe's population. It took more than 200 years for the continent's population to recover.



### 56M Smallpox 1520



### 40-50M Spanish Flu 1918-1919



### 30-50M Plague of Justinian 541-542

Smallpox killed an estimated 90% of Native Americans. In Europe during the 1800s, an estimated 400,000 people were being killed by smallpox annually. The first ever vaccine was created to ward off smallpox.

The death toll of this plague is still under debate as new evidence is uncovered, but many think it may have helped hasten the fall of the Roman Empire.



### 25-35M HIV/AIDS 1981-PRESENT



### 12M The Third Plague 1855



### 5M Antonine Plague 165-180



### 3.2M\* COVID-19 2019-9:25am PT, APR 30, 2021 [ONGOING]



### 3M 17th Century Great Plagues 1600



### 1.1M Asian Flu 1957-1958



### 1M Russian Flu 1889-1890



### 1M Hong Kong Flu 1968-1970



### 1M Cholera 6 outbreak 1817-1923



### 1M Japanese Smallpox Epidemic 735-737



### 600K 18th Century Great Plagues 1700



### 200K Swine Flu 2009-2010



### 100-150K Yellow Fever LATE 1800s



### 11.3K Ebola 2014-2016



### 850 MERS 2012-PRESENT



### 770 SARS 2002-2003

\*Johns Hopkins University estimates



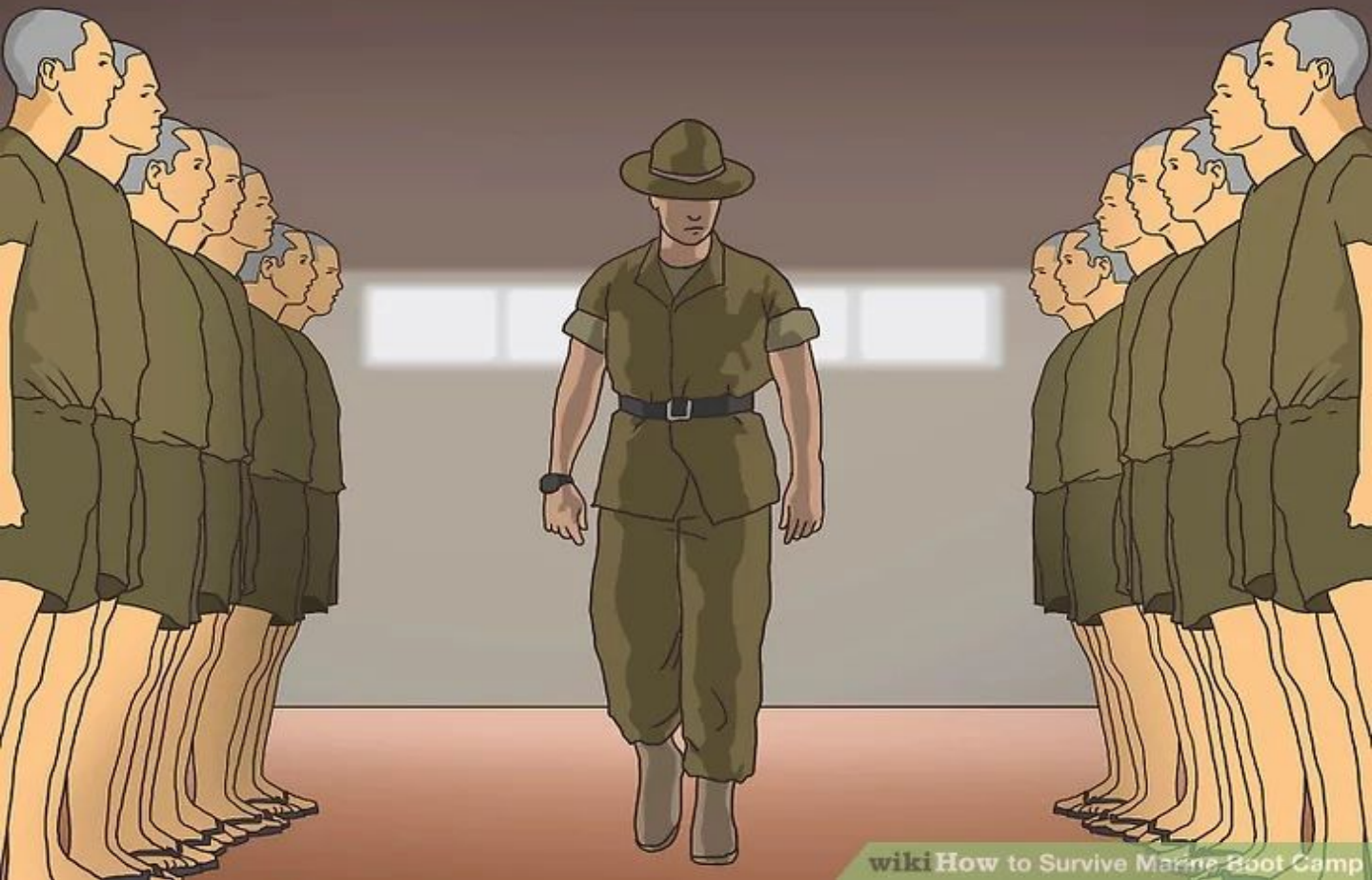
Sources: CDC, WHO, BBC, Wikipedia, Historical records, Encyclopedia Britannica, Johns Hopkins University

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Visual Capitalist





wikiHow to Survive Marine Boot Camp



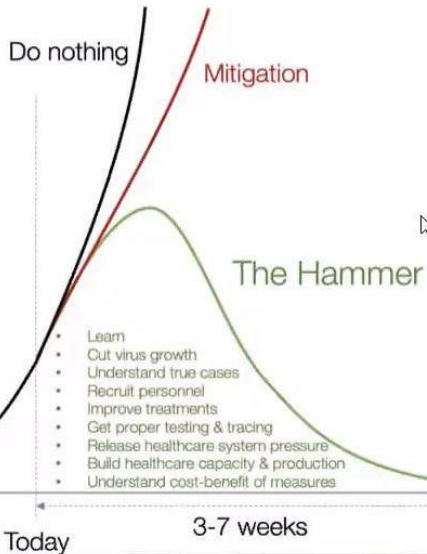




# COVID-19 in Singapore

## Epidemic Curve





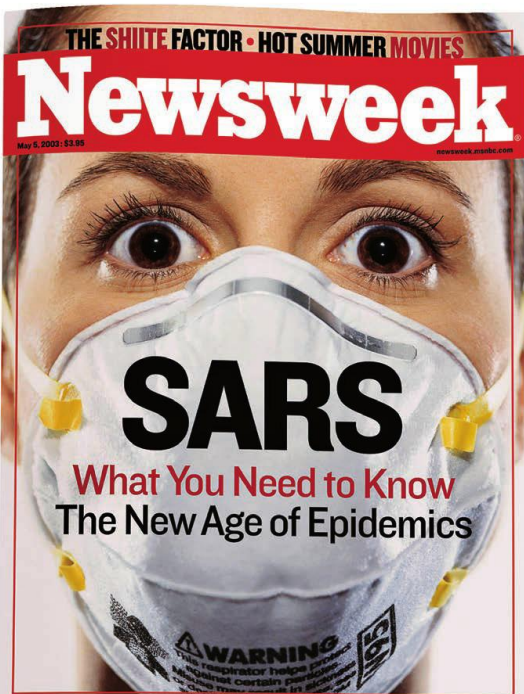
### Objectives

- **Suppress transmission**
- **Adequate healthcare capacity**
- **Reduce mortality, morbidity**
- **Wait out for vaccine**

### The Dance

- Keep R below 1
- Proper testing, contact tracing, quarantining, isolating
- Public education on hygiene and social distancing
- Ban large gatherings
- Most restrictions removed
- Tighten up when needed
- Apply highest cost-benefit social distancing measures

Source: Tomas Pueyo



# Multiple Determinants of Health



Dahlgren, G and Whitehead, M. 1991. Policies and Strategies to Promote Social Equity in Health. *Stockholm Sweden: Institute for Future Studies.*

# Multiple Determinants to Address



Multi-Ministry Taskforce on Wuhan Coronavirus  
Terms of Reference (TORs) and Composition

The Taskforce will:

- Direct the national whole-of-government response to the novel coronavirus outbreak;
- Coordinate the community response to protect Singaporeans and stay vigilant against the spread of the disease; and
- Work with the international community to respond to the outbreak.

- Multi-Ministry Task Force
  - Multiple Stakeholders (Various Ministries, public and private sectors, community-at-large)
  - Coordinated response



# 7 Feb 2020: Panic Buying and Empty Shelves

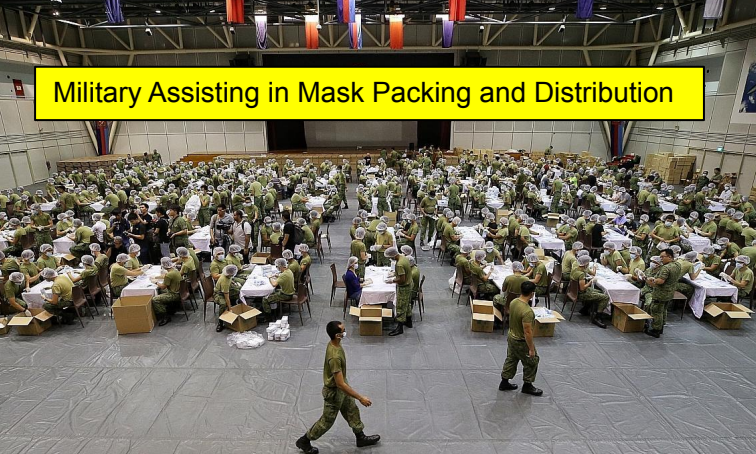


## 8 Feb: Restocked





Military Assisting in Mask Packing and Distribution



Packs of 4 Surgical Masks



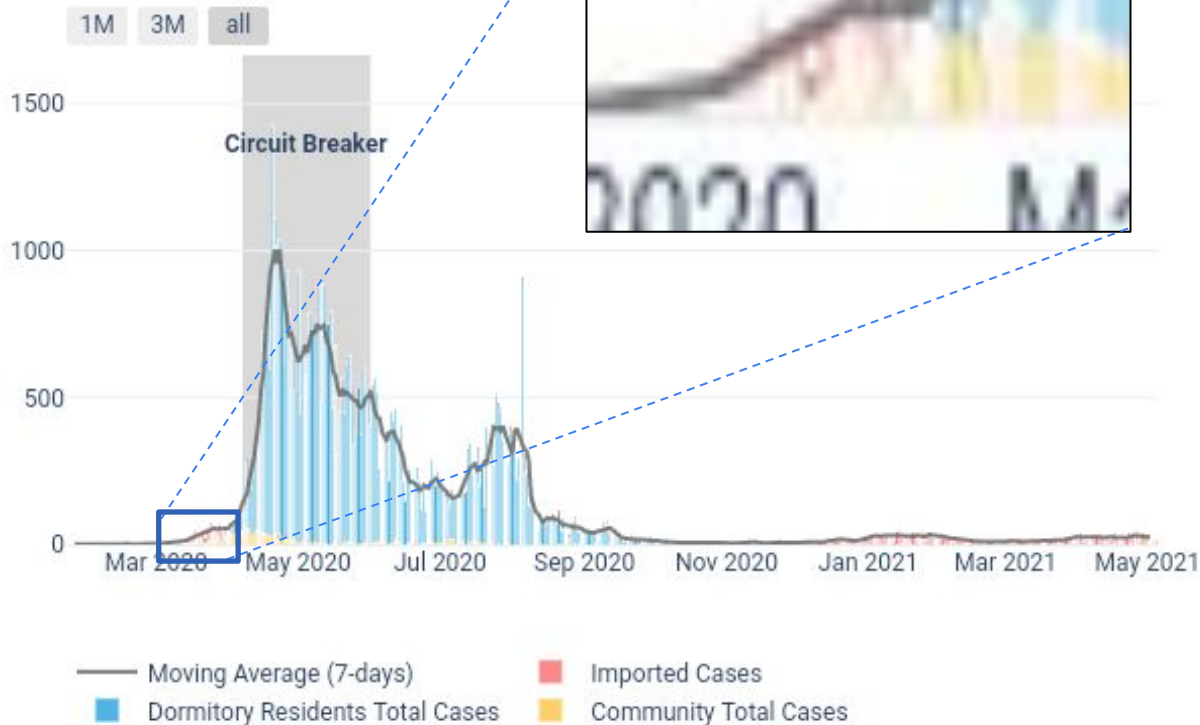
Mask Vending Machines



One of Reusable Masks Distributed



## Epidemic Curve





Singapore

## Two weeks and a 70-fold increase: A look into the COVID-19 outbreak in Singapore's foreign worker dormitories



Workers queue for food at S11 Dormitory @ Punggol on Apr 6, 2020. (Photo: Reuters / Edgar Su)



# 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

## Improved dormitories

**≥6sqm** per resident

Excludes shared facilities

**≤10** beds per room

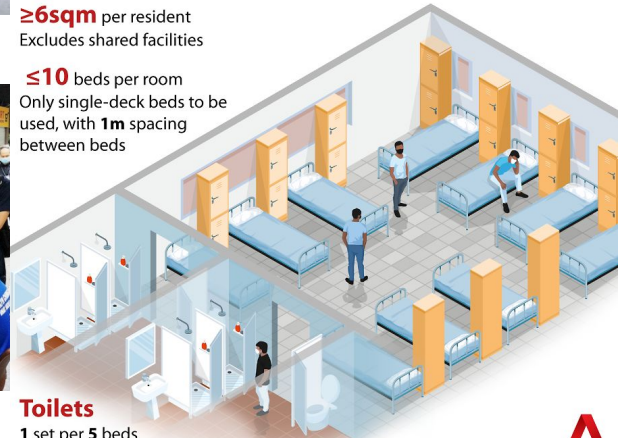
Only single-deck beds to be used, with **1m** spacing between beds

## Toilets

1 set per 5 beds



Seatown, 1 May 2020



Role of the Military

**UNIQUE  
POSITION**



## Multiple Determinants of Health



## Military Staff System

1. Manpower
2. Intelligence
3. Operations
4. Logistics
5. Plans
6. Signals
7. Training
8. Finance
9. Civil-Military Co-Operation

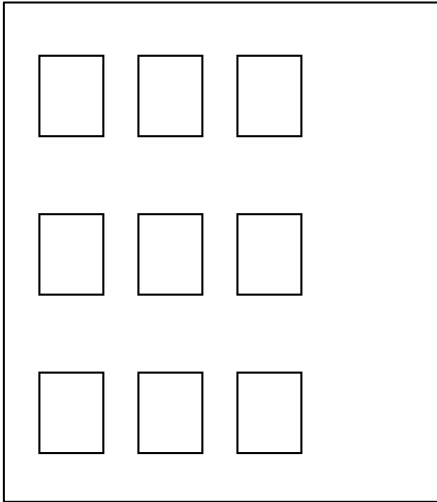
\*Source: Wikipedia – Continental Staff System



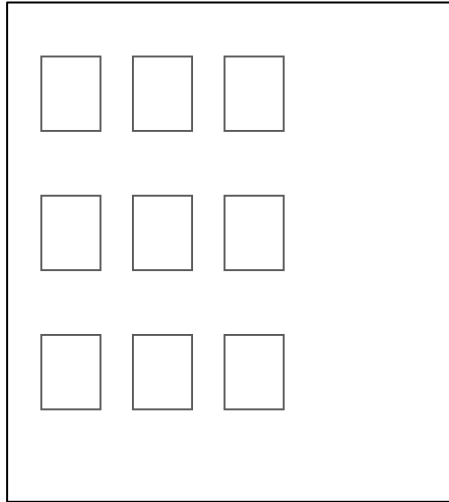
# Stockpiling



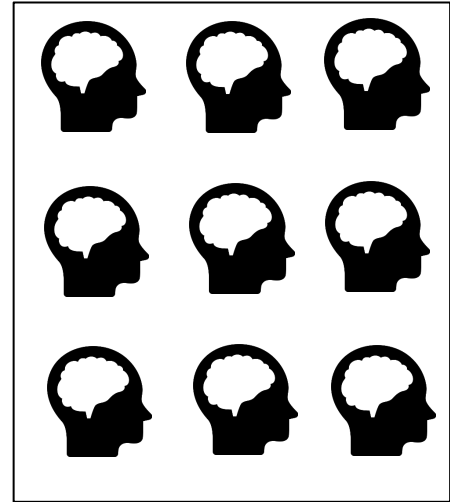
# Stockpiling



Physical Equipment



Manpower



Planning & Operations  
Capacity

Coronavirus: 'Fast' teams in place at all 43 dormitories to tackle situation



Police officers at the \$11 Dormitory @ Punggol on Monday. Each forward assurance support team, or "Fast" team, comprises officers from the Singapore Armed Forces, police and Ministry of Manpower. ST PHOTO: KEVIN LIM

🕒 PUBLISHED APRIL 10, 2020 5:00 AM

Each team will have officers from SAF, police and MOM; medical posts set up in the dorms

## 3,000 Covid-19 patients housed at six community recovery facilities in SAF camps



Patients are able to move about freely within the community recovery facilities. PHOTO: MINDEF

🕒 PUBLISHED MAY 06, 2020 7:10 PM

100 soldiers from SAF Medical Corps deployed to care for Covid-19 patients at Singapore Expo



(From left) Pte Terrenjit Gill, SLTC Daryl Tam and LTC (NS)(Dr) Gabriel Cheong at Singapore Expo on April 30, 2020. ST PHOTO: LIM YAOHUI

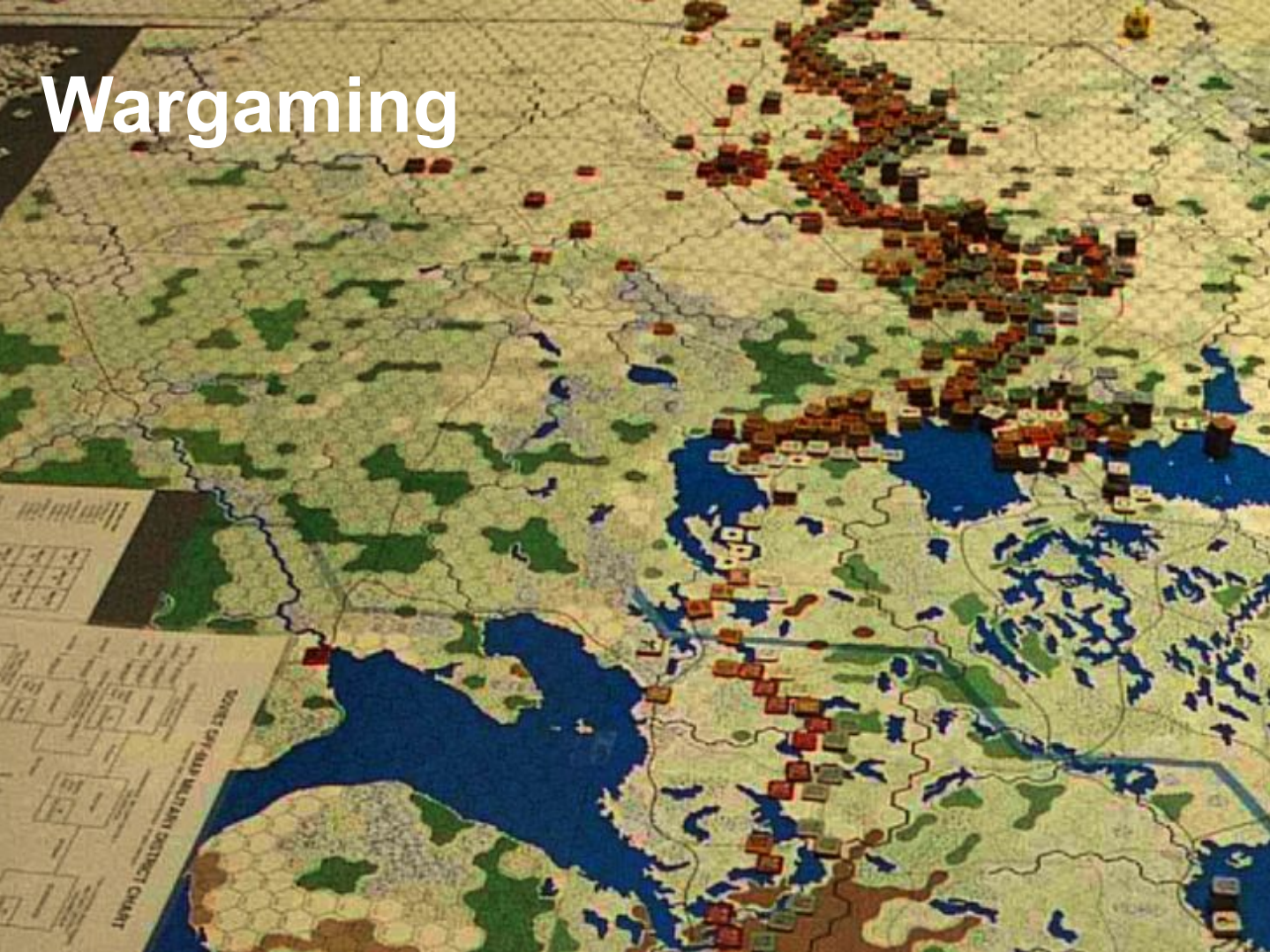
🕒 PUBLISHED APRIL 30, 2020 4:16 PM

# Crystal Ball Gazing, or...





# Wargaming

A detailed photograph of a large-scale wargaming setup. The main feature is a large, colorful map of Europe, likely from a historical wargame, showing terrain, rivers, and coastlines. Numerous miniature units, including tanks, infantry, and artillery, are placed across the map, particularly concentrated in Germany and Poland. In the bottom left corner, a portion of a command chart or rulebook is visible, featuring a grid and text. The word "Wargaming" is overlaid in large white letters at the top left.

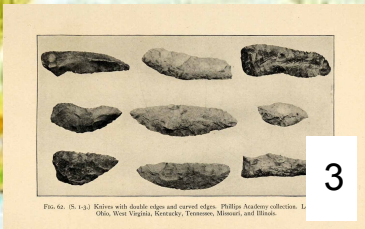
# Conclusion

- Health is not just healthcare. The “Population Health-Based Approach” is required for pandemics because it exposes every possible weakness in the population.
- Militaries are particularly relevant in response to pandemics because of our habits, discipline, stockpiling efforts and our systematic approach to missions.





2



3

FIG. 62. (5-13) Knives with double edges and curved edges. Phillips Academy collection. L. Allen, New Virginia, Kentucky, Tennessee, Missouri, and Illinois.



1







# THANK YOU

