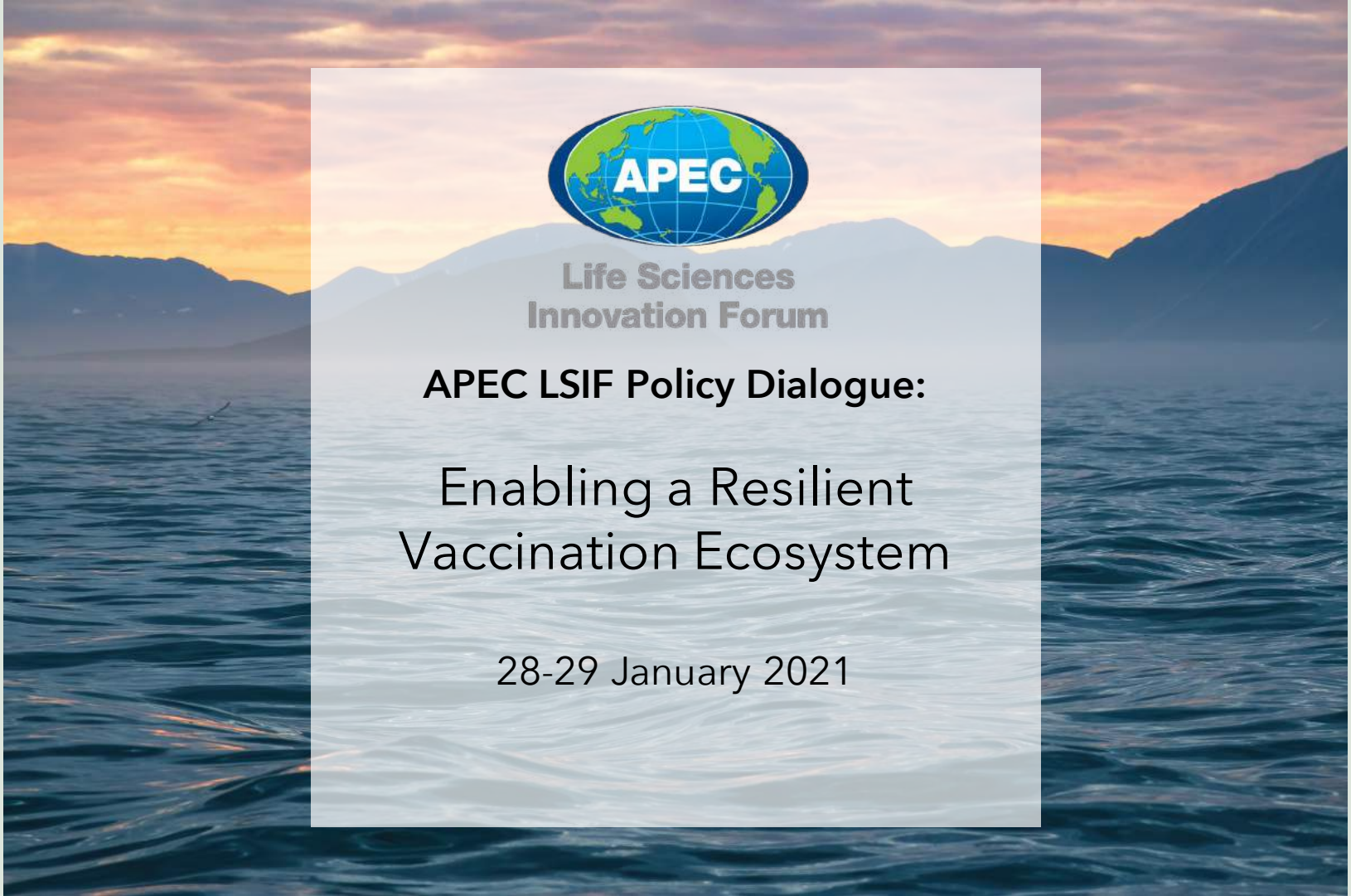
APEC
Life Sciences
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APEC LSIF Policy Dialogue:
Enabling a Resilient
Vaccination Ecosystem
28-29 January 2021


APEC
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KEYNOTE ADDRESS

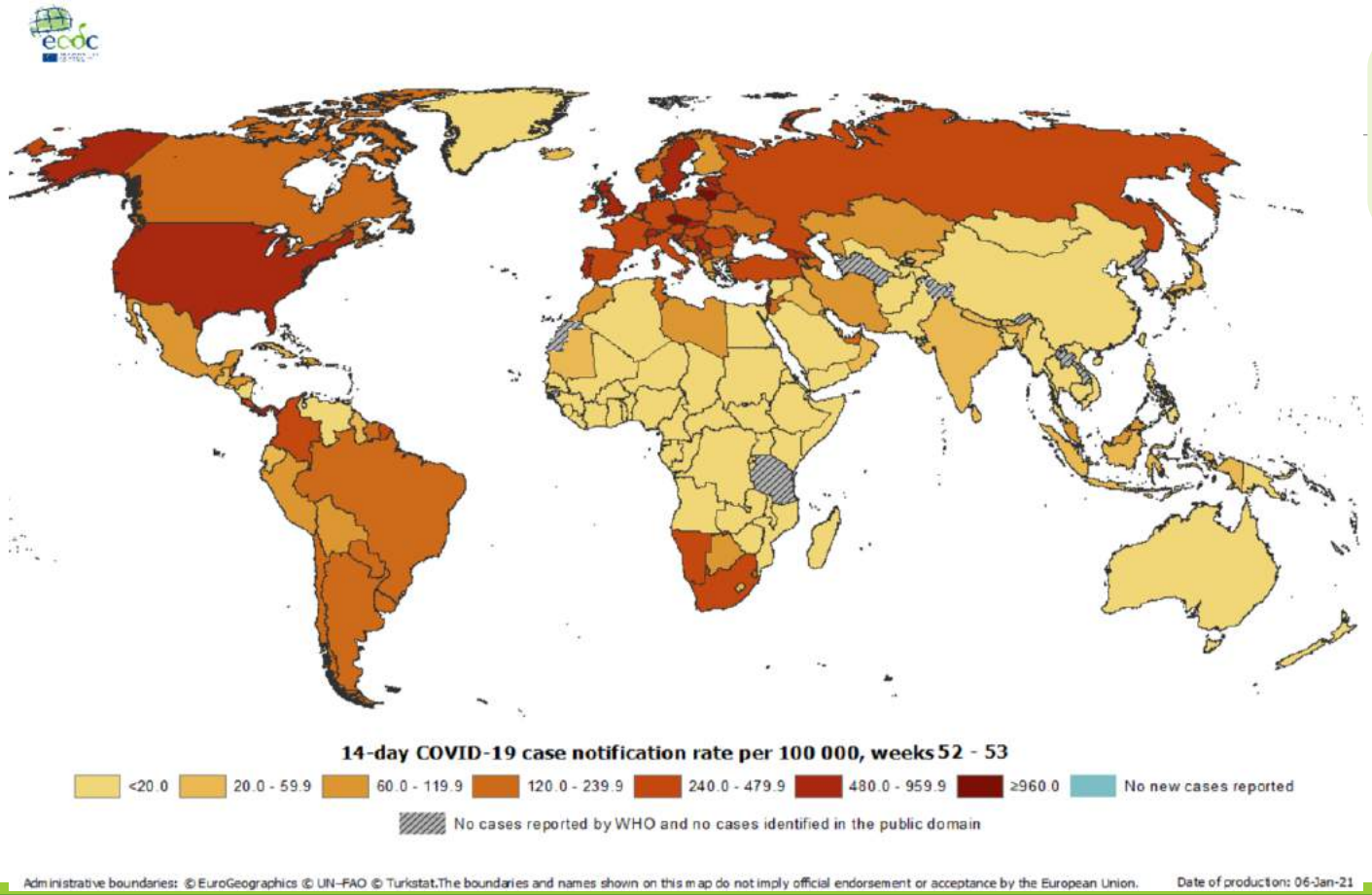
**Keynote Address**

**Dr. Philip Yi-Chun Lo, MD**
Deputy Director-General
Centers for Disease Control, Ministry of Health and Welfare
Chinese Taipei

# Chinese Taipei's COVID-19 Vaccination Strategies

Dr. Yi-Chun Lo
Deputy Director General
Centers for Disease Control,
Ministry of Health and Welfare, Chinese Taipei

# COVID-19 Overview Global epidemic situation




Global confirmed cases

**97,419,541**

Global deaths

**2,093,894**

Global fatality rate

**2.15%**

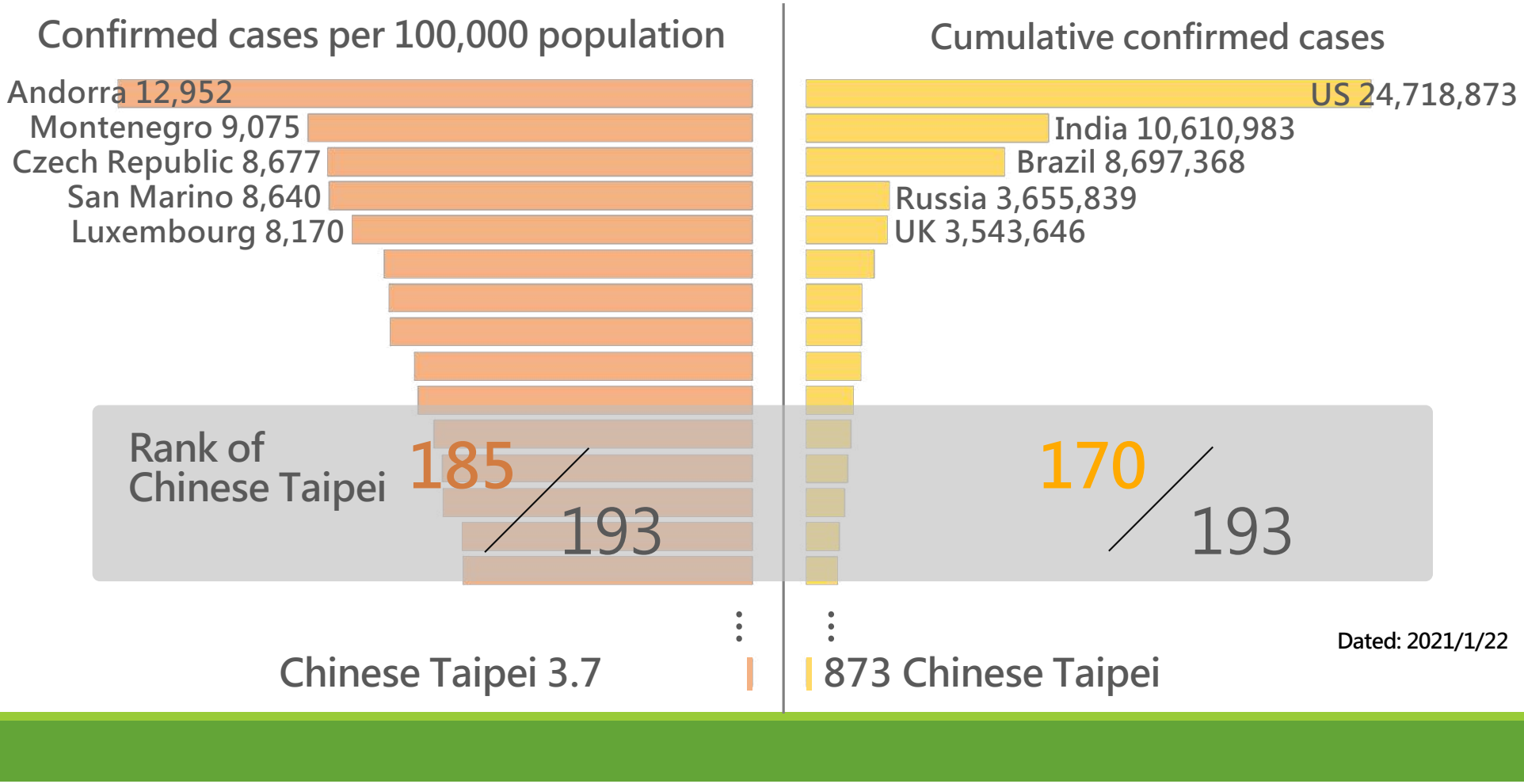
Number of region

**193**

Data source: ECDC **2021/1/22**

# COVID-19 Overview

## Effective COVID-19 control in Chinese Taipei



# Non-Pharmaceutical Interventions still Crucial

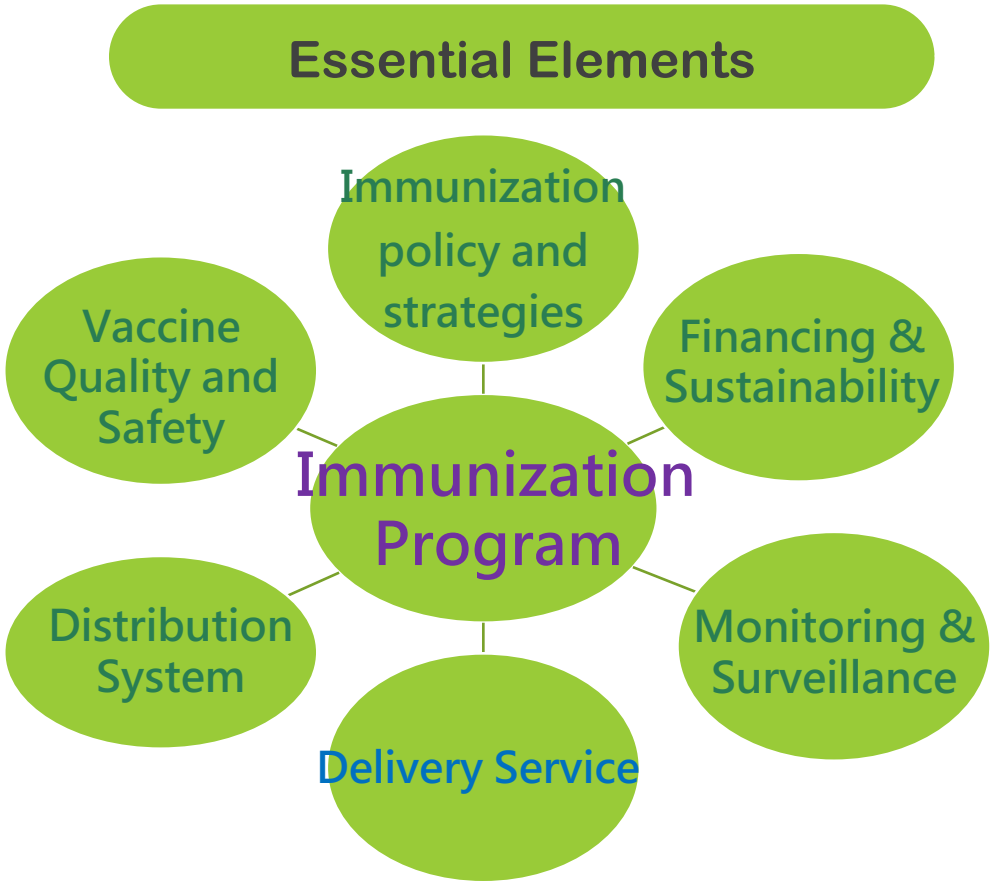
## Social Distancing

## Personal protective practices

- Entry temperature screening,
- Hand sanitizer and disinfectants widely placed in public spaces


- Contact Tracing
- Testing
- Quarantine
- Isolation

# COVID-19 Vaccination Program

## COVID-19 Vaccination Program

## Vaccine Coverage & Procurement

65% of population (about 15 million persons)

- COVAX
- Domestic production
- Bilateral agreement with overseas suppliers

# COVID-19 Vaccination Program | Prioritized groups for vaccination

## 9 groups of people are listed as the priority groups for COVID-19 vaccination

| Medical personnel | Disease Prevention staff | Essential Personnel Who Maintain Normal Functions Of society | Long-term care, Social welfare workers, caregivers | Soldiers | Elders aged≧65y | 19-64y High risk | Persons with major chronic conditions | Healthy adults 50-64y |
|---|---|---|---|---|---|---|---|---|
| 0.45 | 0.5 | 0.58 | 0.8 | 1 | 4.7 | 8.5 | 8.6 | 13.9 |

Cumulative number (million)

Stage I (2 million doses)

Stage II (2~10 million doses)

Stage III ( Supplies likely sufficient to meet demand)

## Vaccination Program Schedule

- ✓ The vaccine doses are expected to be delivered as early as March 2021
- ✓ The schedule will be made based on the time and quantity of vaccines that we can obtain

## Vaccination Strategy

- ✓Multidose vaccine : 5~10 doses/vial
  - ➢ Make an appointment
  - ➢ Get vaccinated collectively

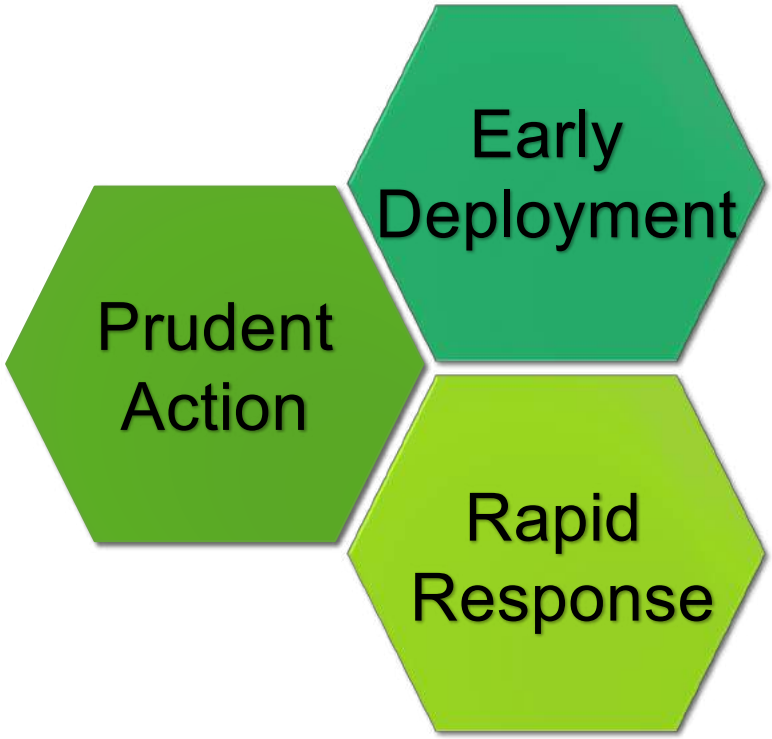
## Passive surveillance

- ✓ Reporting of suspected adverse reactions by healthcare providers

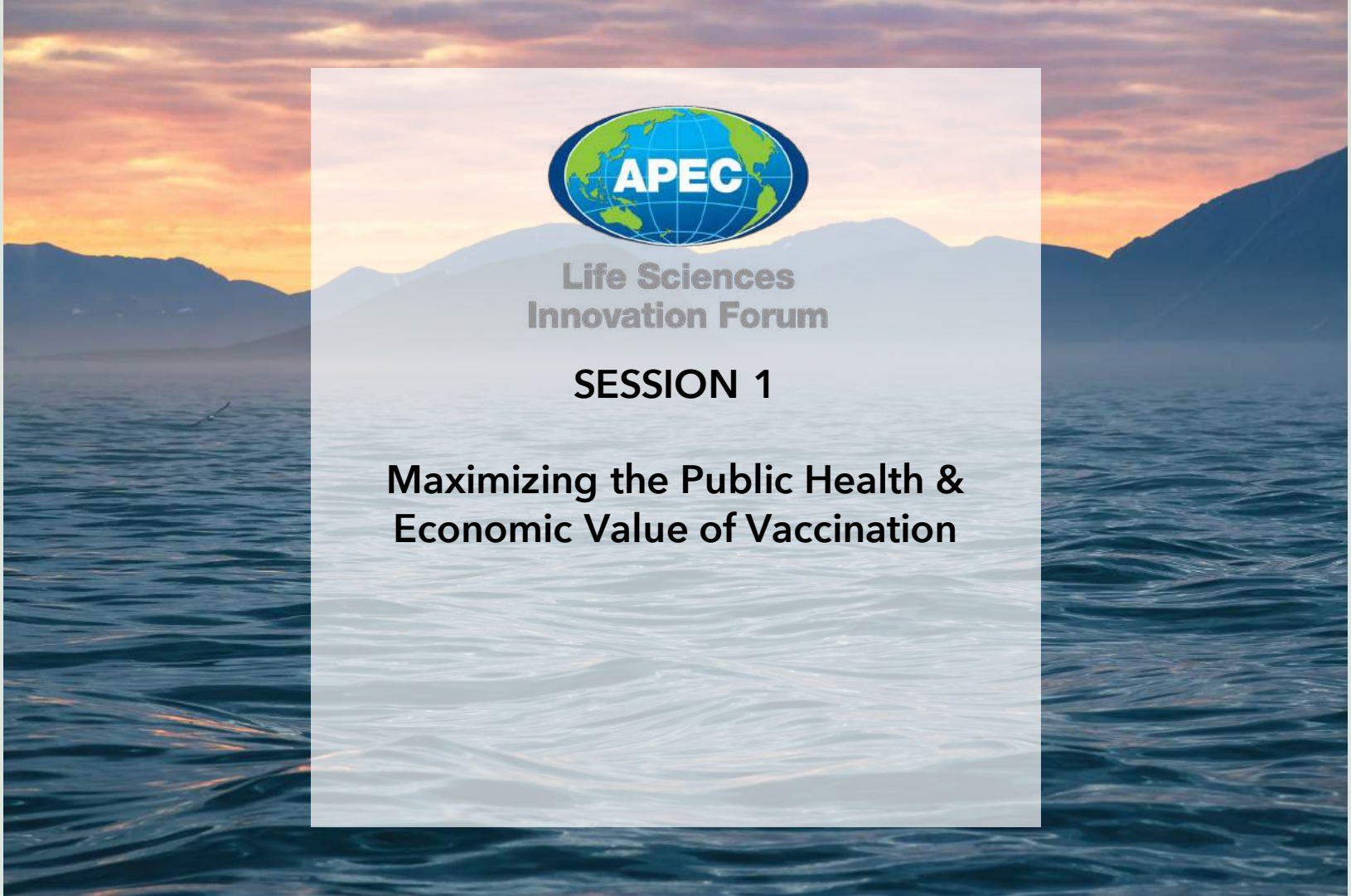
## Active surveillance

- ✓ Follow-up for recipients
- ✓ Smartphone-based two-way messaging

# Conclusion




# Thanks for your attention!


APEC
Life Sciences
Innovation Forum
SESSION 1
Maximizing the Public Health &
Economic Value of Vaccination

**Dr. Teiji Takei, MD, MBA, PhD**
Assistant Minister for Global Health and Welfare, Ministry of Health, Labour and Welfare (MHLW)
Japan

**Rachel Mitrovich, DrPh, MPH**
Director, Global Vaccines Public Policy
MSD

# Maximizing the Public Health & Economic Impact of Vaccination

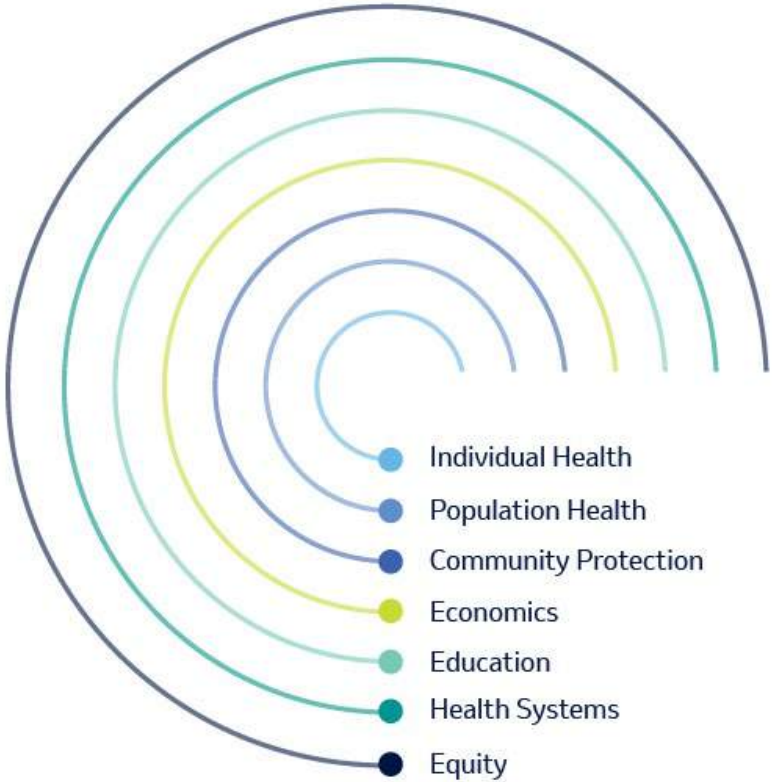
Rachel Mitrovich, DrPH, MPH
Director, Global Vaccines Public Policy
MSD


January 2021

# Value of vaccination: The ripple effect from individual to society

## Vaccines are one of the greatest public health success stories in history[1]

- With the exception of safe water, no other intervention has had a greater effect on overall mortality reduction and population health to date.[1]
- Vaccination helps to ensure health, education, and equity across all stages of life and allows important social and economic returns that go beyond the individual and family.[2]
- The ripple effects of vaccination accrue without regard to race, gender, age, or geography.[3]




1. Bustreo F, Kieny M-P. Vaccines: a global health success story that keeps us on our toes. https://www.who.int/mediacentre/commentaries/vaccines/en/. Published April 25, 2016. Accessed May 7, 2020.
2. Pollard AJ. Childhood immunization: what is the future? Arch Dis Child. 2007;92:426-433.
3. World Health Organization. How to present the societal benefits of immunization. WHO Regional office for Europe 2015. http://www.euro.who.int/__data/assets/pdf_file/0020/281522/How-present-wider-societal-benefits-immunization-.pdf?ua=1. Published 2015. Accessed May 7, 2020.

# Vaccines help protect against serious infectious diseases across all stages & various circumstances of life[1]

## Vaccines help save 2 to 3 million lives globally each year [2]

Vaccination in children and adolescents can help promote healthy growth and development.[3] Childhood vaccination impacts school readiness and performance.[4]

Vaccines administered to women during pregnancy can provide protection against serious infectious diseases for the mother, newborn, or both.[5]

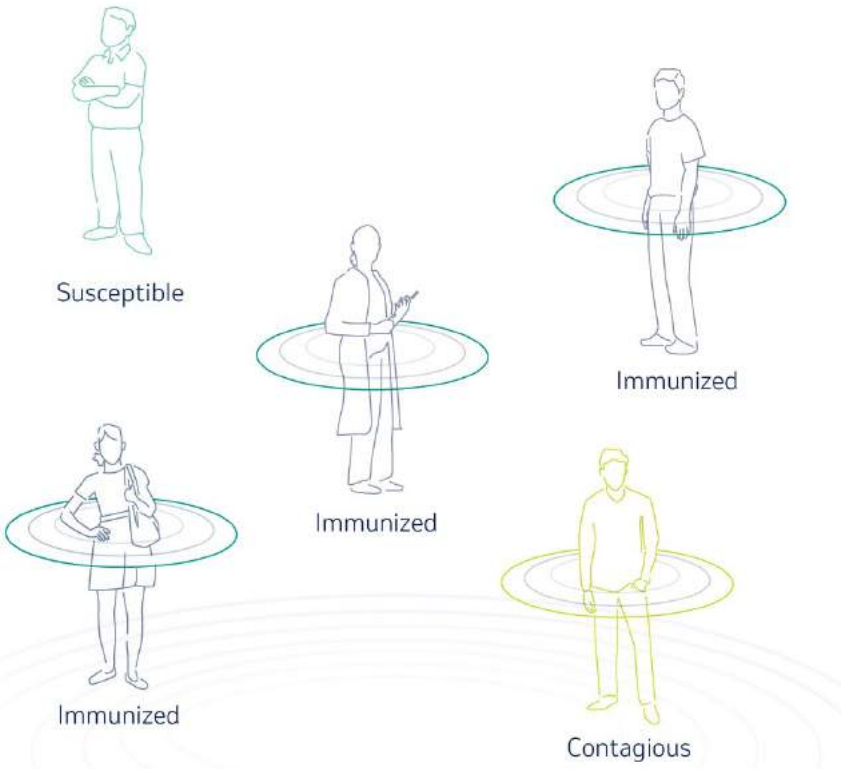
Vaccination may protect people affected by underlying chronic conditions, such as diabetes or kidney disease, by preventing infectious diseases and lowering the risk of related medical complications.[6,7]


1. United States Department of Health and Human Services. Vaccines: who and when. https://www.vaccines.gov/who_and_when. Reviewed March 2020. Accessed May 7, 2020.
2. World Health Organization. Immunization coverage. https://www.who.int/en/news-room/fact-sheets/detail/immunization-coverage. Updated December 6, 2019. Accessed May 7, 2020.
3. World Health Organization. Vaccines: the powerful innovations bringing WHO's mission to life every day. https://www.who.int/ news-room/commentaries/detail/vaccines-the-powerful-innovations-bringing-who-s-mission-to-life-every-day. Published April 24, 2018. Accessed May 7, 2020.
4. World Health Organization. How to present the societal benefits of immunization. WHO Regional office for Europe 2015.
5. The National Kidney Foundation. Chronic kidney disease and pneumococcal disease: do you know the facts? https://www.kidney.org/ atoz/chronic-kidney-disease-and-pneumococcal-disease-do-you-know-facts. Accessed May 7, 2020.
6. Goeijenbier M, Van Sloten TT, Slobbe L, et al. Benefits of flu vaccination for persons with diabetes mellitus: a review. *Vaccine*. 2017;35:5095-5101.

# Vaccination provides value to the broader community by limiting the spread of disease

## Herd immunity helps protect the unvaccinated by limiting the spread of disease in the community[1,2]

Vaccination provides the individual with boosted immunity against severe diseases and can provide indirect protection to unvaccinated individuals by reducing the spread of infection. [1,2]

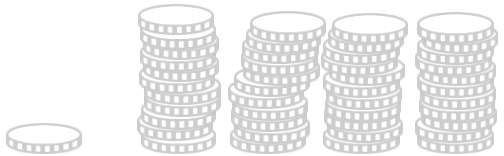



1. Vaccines Europe. Vaccines: a tool for spending SMART. http://www.vaccineseurope.eu/wp-content/uploads/2016/01/ VaccinesEurope-Infographic-Leaflet.pdf. Published January 16, 2016. Accessed May 7, 2020.
2. Vaccines Today. What is herd immunity? https://www.vaccinestoday.eu/stories/what-is-herd-immunity/. Published February 7, 2015. Accessed May 7, 2020.

# Vaccination is regarded as one of the most cost-effective public health interventions[1]

## $151 BILLION SAVED[2]

**Worldwide**
**$145 billion in productivity losses[3]**
**$6.2 billion in treatment costs[3]**



## $1 SPENT = $44 RETURN[4]

**For every dollar invested in childhood vaccination, the return is approximately $44[4]**

**1.** Remy V, Zollner, Heckmann U. Vaccination: the cornerstone of an efficient healthcare system. *J Mark Access Health Policy*. 2015;3(1).
**2.** Johns Hopkins Bloomberg School of Public Health. Vaccine expansion in 72 of the world's poorest countries could avert 6.4 million deaths. https://www.jhsph.edu/news/news-releases/2011/ivac-vaccine-studies.html. Published June 9, 2011. Accessed May 7, 2020.
**3.** Stack ML, Ozawa S, Bishai DM, et al. Estimated economic benefits during the "decade of vaccines" include treatment savings, and gains in labor productivity. *Health Aff*. 2011;30(6):1021-1028.
**4.** Ozawa S, Clark S, Portnoy A, et al. Return on investment from childhood immunization in low- and middle-income countries, 2011–20. *Health Aff*. 2016;35(2):199-207.

# High vaccine coverage rates are critical to preventing outbreaks and limiting their impact at the societal level

## Disruption of routine immunization services due to the COVID-19 pandemic creates a risk of resurgence of vaccine preventable diseases, such as polio and measles[1,2]

According to WHO, at least 26 measles vaccination campaigns were or are at risk of being cancelled and 46 economies put their polio campaigns on hold[1,2]

Maintaining routine vaccination during a pandemic:

- Reduces strain on already burdened healthcare systems
- Addresses health inequities
- Supports primary health care and Universal Health Coverage
- Contributes to global health security

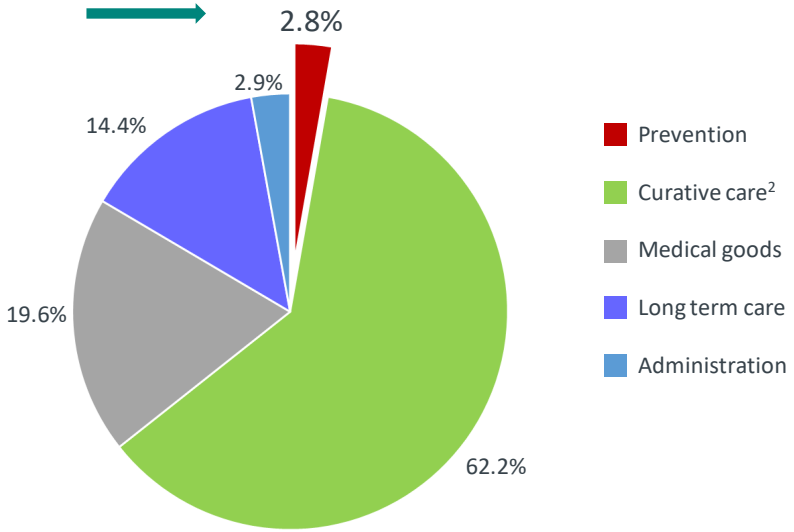

1. World Health Organization. Special feature: immunization and COVID-19. Accessed December 10, 2020
2. World Health Organization. Worldwide measles deaths climb 50% from 2016 to 2019 claiming over 207 500 lives in 2019. Published 2020. Accessed December 10, 2020

# The current value proposition for vaccination is limited, leaving value on the table

## Undervaluing vaccination leads to:

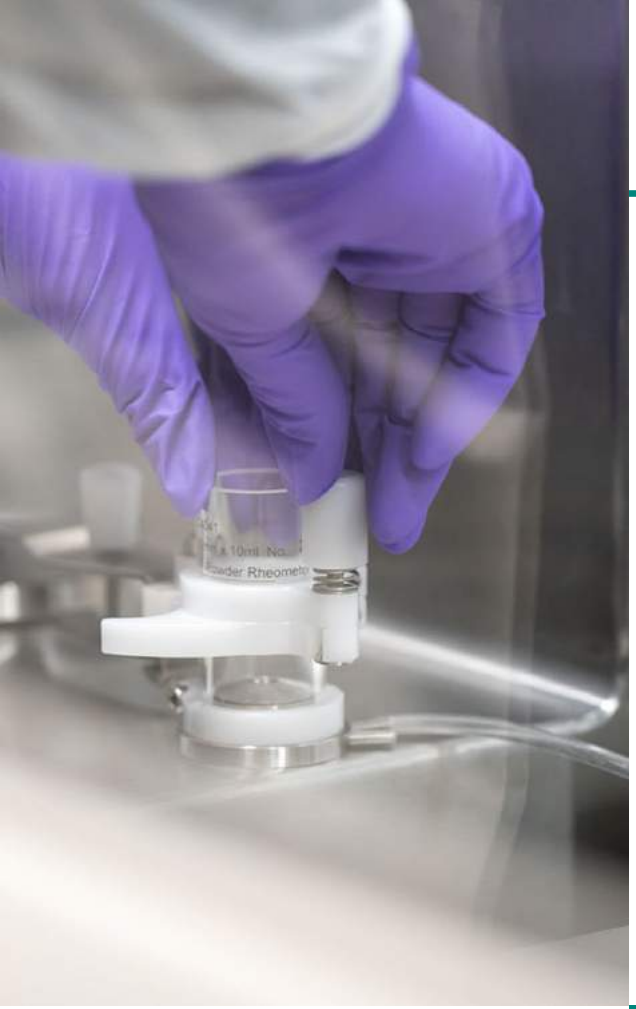
- Suboptimal use of existing vaccines
- Reduction in investment in breakthrough and incremental vaccine innovation
- Downstream effects not being recognized when setting policies / making decisions
- Lack of funding dedicated to prevention and vaccination

**Health expenditure by function of health care, OECD average, 2018[1]**




1. OECD health statistics, 2018. Https://stats.Oecd.Org/index.Aspx?Datasetcode=sha#.

2. Includes rehabilitative and ancillary services



# How to ensure vaccination reaches its full potential in APEC

01 Equip policymakers with a more comprehensive picture of the full value of vaccination across the life course, as well as the value of vaccine innovation.

02 Develop evidence-based approaches that enable the inclusion of the societal value perspective in technical decision-making and expand the evidence base that uses these processes.

03 Invest in real world data on the societal impact of vaccination, advance health economic models to assess the full societal value of vaccination, and strengthen NITAG's capability and adoption of advanced health economic models that assess value more broadly.

04 Ensure technical review processes are pulled through in procurement decision-making to support a healthy vaccines market that incentivizes and rewards innovation.



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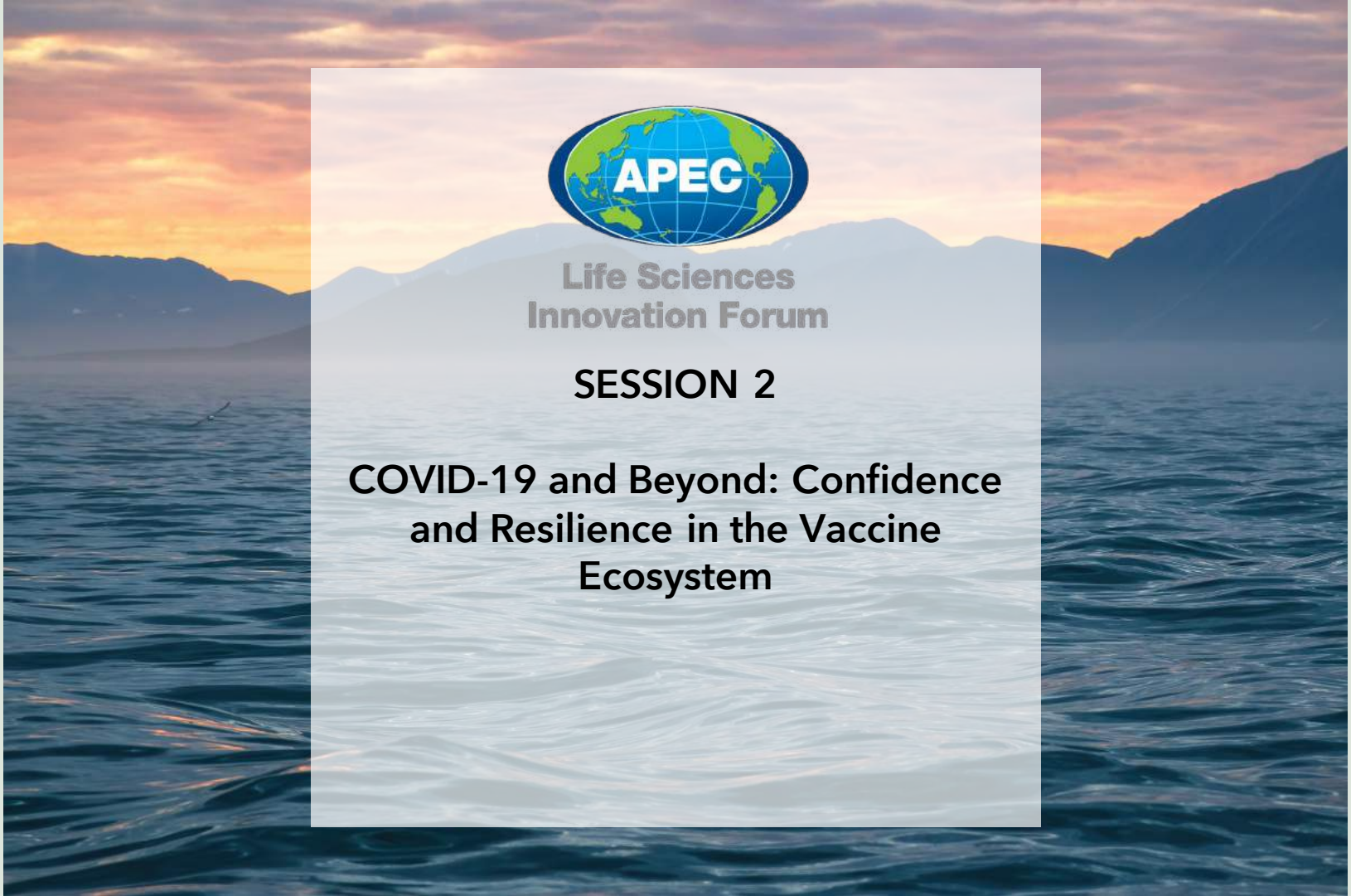
# Thank You




SESSION 2

# COVID-19 and Beyond: Confidence and Resilience in the Vaccine Ecosystem

**Dr. Charles Harvey, PhD**

Vaccine Public Policy Director, Japan, China and Asia-Pacific

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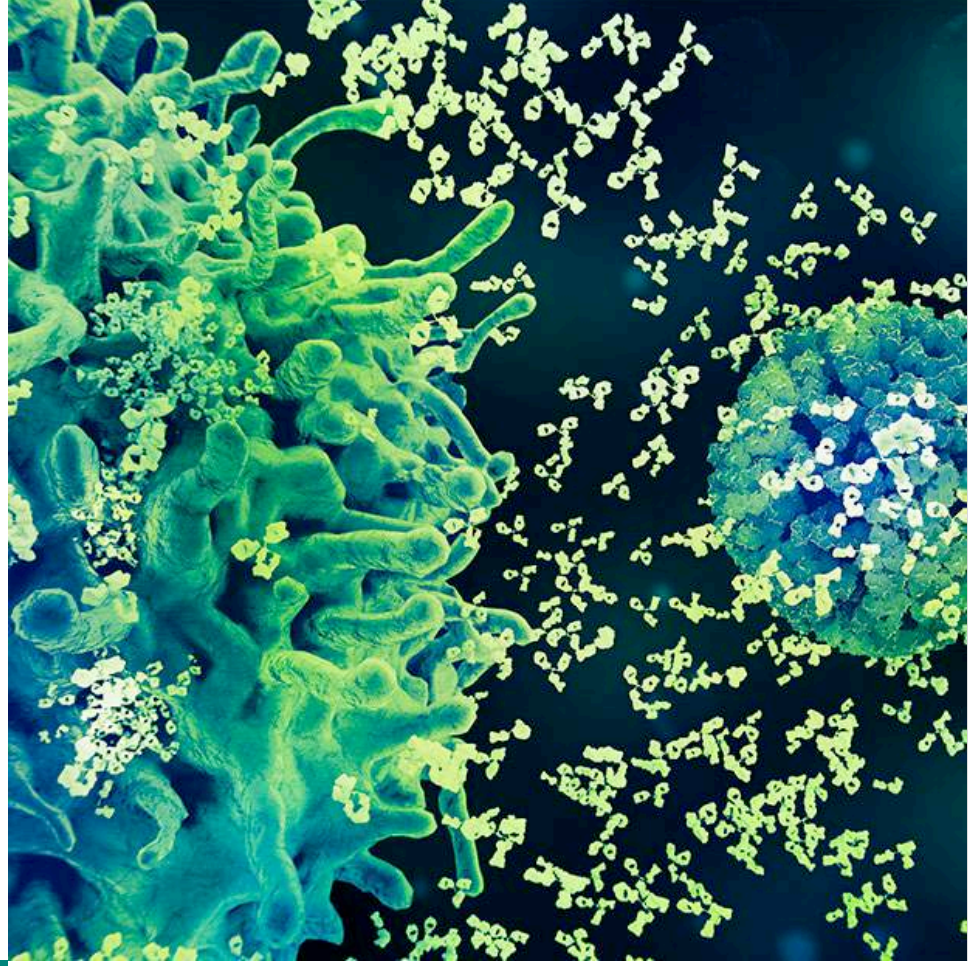
# Addressing vaccine hesitancy and building vaccine resilience

January 2021



# Vaccines

## One of the greatest public health success stories in history

Vaccines are vital in the global fight against disease, eradicating smallpox and nearly eliminating other diseases like polio worldwide.

Vaccines help prevent
**+30** infectious diseases worldwide

**2-3 million**
lives are saved worldwide each year through vaccination[1]

**$1=$44**
Every dollar spent on childhood immunization yields $44 in economic benefits[2,3]

"With the exception of safe water, no other modality, not even antibiotics, has had such a major effect on mortality reduction and population growth."

**Stanley A. Plotkin, MD**, Vaccine Developer, Emeritus Professor of Paediatrics, University of Pennsylvania & Emeritus Professor, Wistar Institute



**Source**:
**1.** World Health Organization. Immunization coverage. https://www.who.int/en/news-room/fact-sheets/detail/immunization-coverage. Updated December 6, 2019. Accessed May 7, 2020.
**2.** Ozawa S, et al. Health Affairs 2016; 35, No. 2 (2016): 199-207 **3.** Estimated figure for 2011-2020 **Image source**: Adplotkin98

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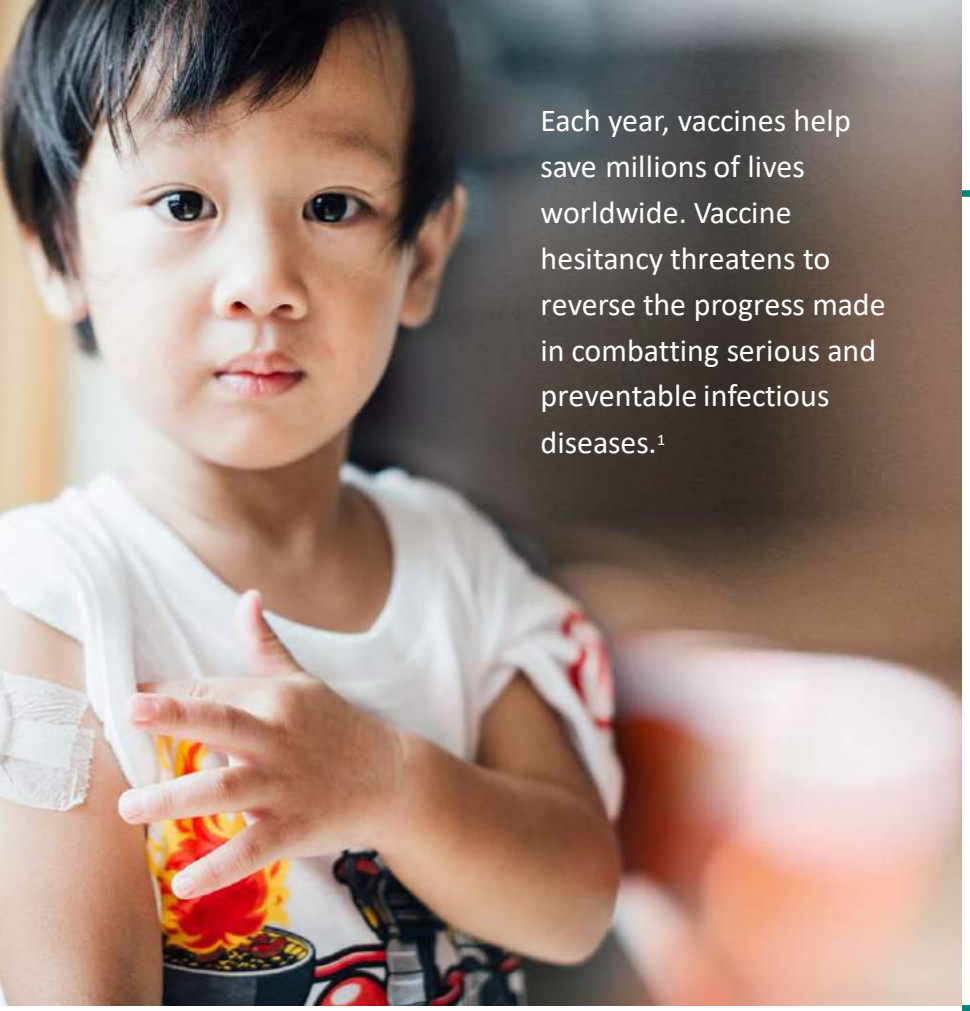

Each year, vaccines help save millions of lives worldwide. Vaccine hesitancy threatens to reverse the progress made in combatting serious and preventable infectious diseases.[1]

# The threat of vaccine hesitancy

## What is vaccine hesitancy?

Vaccine hesitancy is the reluctance or refusal to vaccinate despite the availability of vaccine services.[2]

## What causes vaccine hesitancy?

There are three main factors related to vaccine hesitancy[3]

### Complacency

The perception that vaccine-preventable diseases post a much smaller risk than they do.

### Convenience

How easy or difficult it is to receive vaccines, based on the systems that surround immunisation programmes, including accessibility, quality of care, and cost.

### Confidence

A lack of trust in the effectiveness and safety of vaccines and the systems that deliver them.

**1**: World Health Organization. Ten threats to global health in 2019. Available at: https://www.who.int/vietnam/news/feature-stories/detail/ten-threats-to-global-health-in-2019. Accessed October 19, 2020. **2**: European Centre and Disease Prevention, "Vaccine Hesitancy," 2019, 11–12. **3**: World Health Organization. SAGE Working Group Revised Report on Vaccine Hesitancy. Available at: https://www.who.int/immunization/sage/meetings/2014/october/SAGE_working_group_revised_report_vaccine_hesitancy.pdf?ua=1. Accessed on December 20, 2019.



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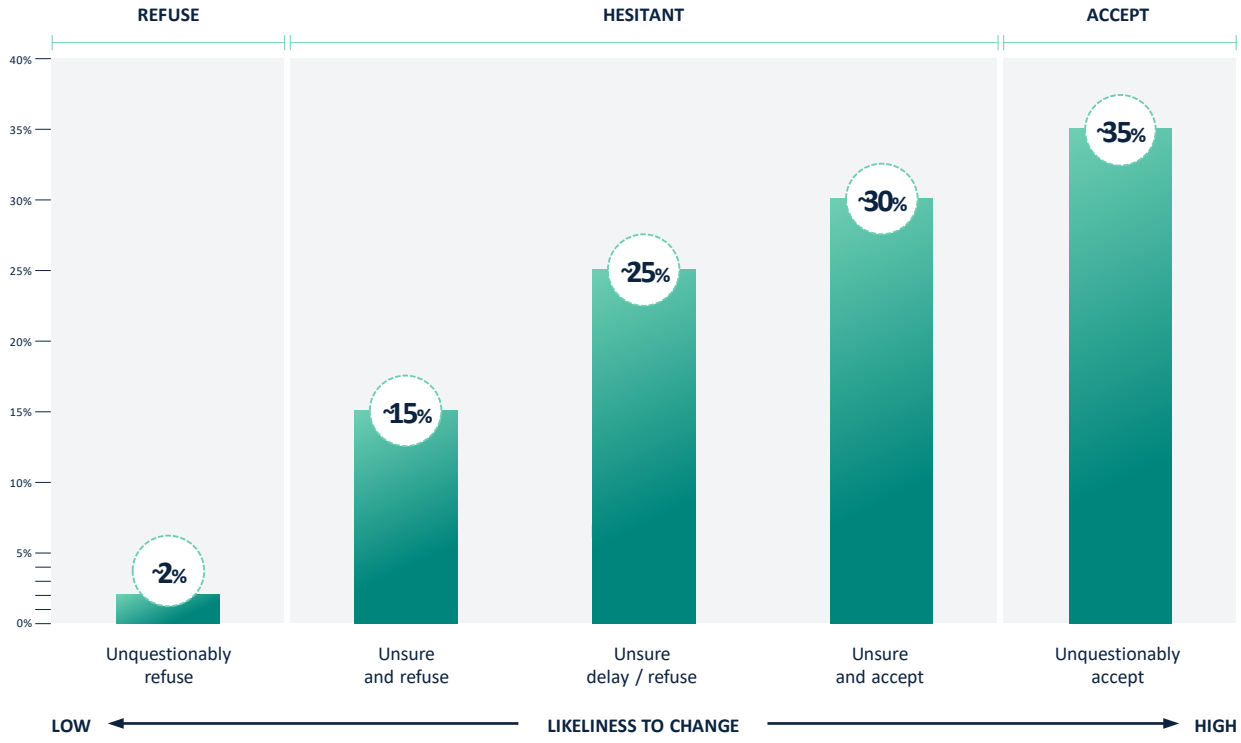
# The vaccine hesitancy continuum

Vaccine hesitancy is not just about the small but vocal minority of the population that refuses vaccination. Rather, hesitancy exists along a broad continuum of opinion that ranges from vaccination refusers at one end to vaccination acceptance at the other.[1,2,3]






**1**: MacDonald, N., Dube E. Vaccination resilience: Building and sustaining confidence in and demand for vaccination. Science Direct. 2017. www.sciencedirect.com/science/article/pii/S0264410X17307922?via%3Dihub. Accessed July 6, 2020.
**2**: World Health Organization (WHO). Report of the SAGE Working Group on vaccine hesitancy. www.who.int/immunization/sage/meetings/2014/october/1_Report_WORKING_GROUP_vaccine_hesitancy_final.pdf. Accessed December 12, 2018.
**3**: Leask J, Kinnersley P, Jackson C, et al. Communicating with parents about vaccination: a framework for health professionals. BMC Pediatrics. 2012;154(12):1-11. www.doi:10.1186/1471-2431-12-154. Accessed July 6, 2020.

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# Our approach to addressing vaccine hesitancy

At MSD, we are working with a variety of partners to help build confidence in vaccination. Our approach includes global, national, and local engagement. To us, protecting public health is more than a business decision – it is a shared mission.

## Globally

Developing high quality vaccines for use across the world.

**ASIA PACIFIC**: MSD has supported the formation of the Asia Pacific Immunisation Coalition (2020).

## Nationally

Build strong and resilient immunisations systems.

**INDONESIA**: In partnership with the Ministry of Health and the Indonesian Paediatric Association, we support the #LengkapiVaksinasiAnak campaign.

## Locally

Empowering communities with knowledge and capabilities.

**PHILIPPINES**: In collaboration with the Department of Health and the League of Cities, we have launched Bakuna Muna! (Vaccine First), an advocacy campaign.



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# Building more resilient vaccination programs within APEC

01 Engaging directly with communities, officials, and experts to understand hesitancy, its impact on vaccination and public health, and what can be done about it.

02 Investing in immunization system infrastructure to anticipate and manage issues related to vaccine hesitancy.

03 Activating a broad set of actors within and beyond the health system to reach communities and individuals more effectively and demonstrating broad support for vaccination.

04 Developing national strategies and strengthening capabilities of health care workers to increase confidence in vaccination.

05 Mobilizing private sector and other stakeholders involved in digital media to address misinformation and promote dissemination and availability of accurate information.

06 Developing and implementing policies that increase public confidence in vaccination.



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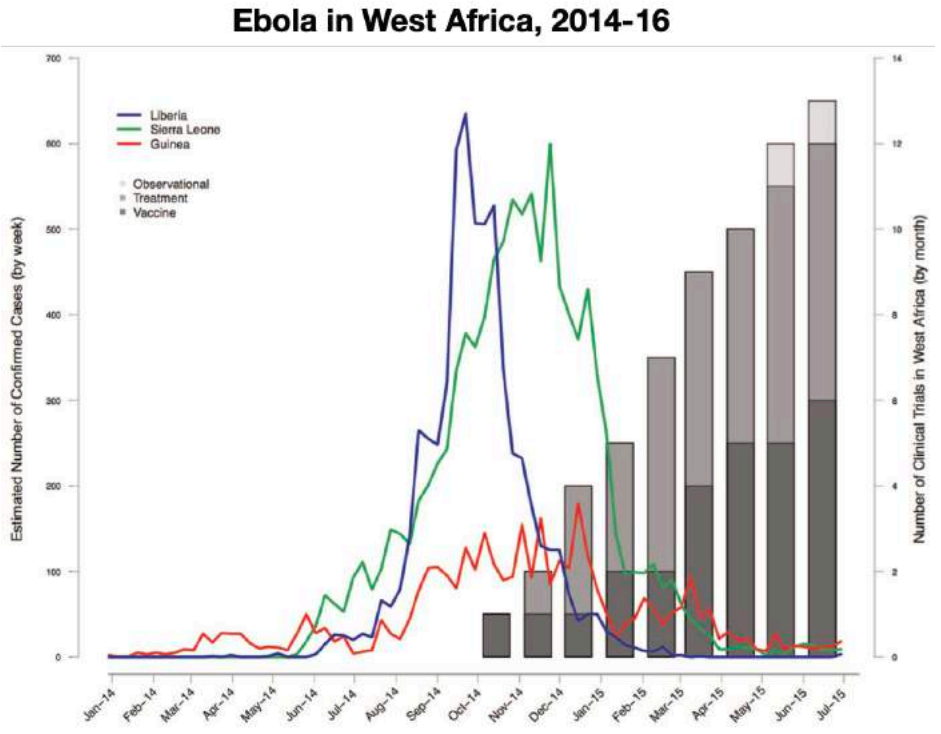
# Thank You

**Dr. Eng Eong Ooi, PhD**
Deputy Director
Emerging Infectious Diseases Program
Duke-National University of Singapore School of Medicine

# Vaccine development for outbreak response

Eng Eong Ooi BMBS PhD FRCPath
Professor
Programme in Emerging Infectious Diseases
Duke-NUS Medical School

## Dyssynchrony in drug and vaccine development for outbreak response


Thielman et al, Clinical Trials 2016

# Challenges in pre-pandemic vaccine development

Funding support?

Lack of clear regulatory pathway for licensing

- Difficulty in conducting clinical trials etc.
- Animal rule (but not every viral disease has a good animal model)

When and how much to manufacture?

Uncertain returns and recovery of development cost

Competition from other more profitable agenda

- Blockbuster drugs

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# New vaccines for a safer world


The Coalition for Epidemic Preparedness Innovations (CEPI) is a global partnership launched in 2017 to develop vaccines to stop future epidemics.

## $570bn

The estimated annual global cost of moderately severe to severe pandemics

## Eleven

The number of diseases WHO identified as public health risks due to epidemic potential and lack of biomedical countermeasures

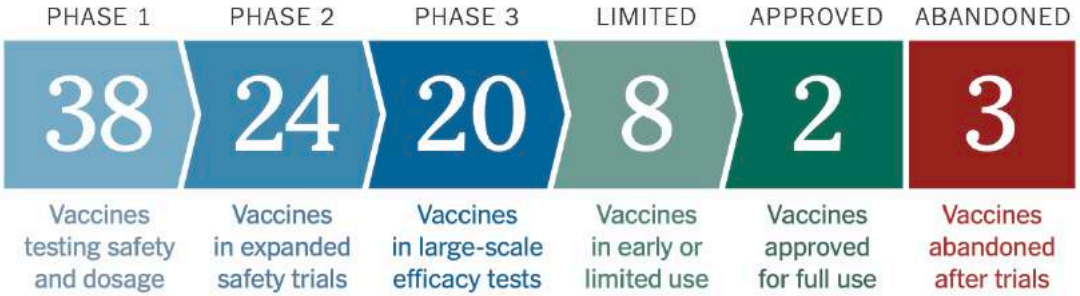
## $2.8bn

The minimum average cost for progressing one vaccine against each of WHO's 11 priority epidemic infectious diseases

The New York Times

# Coronavirus Vaccine Tracker

By Carl Zimmer, Jonathan Corum and Sui-Lee Wee Updated Jan. 26, 2021



The New York Times

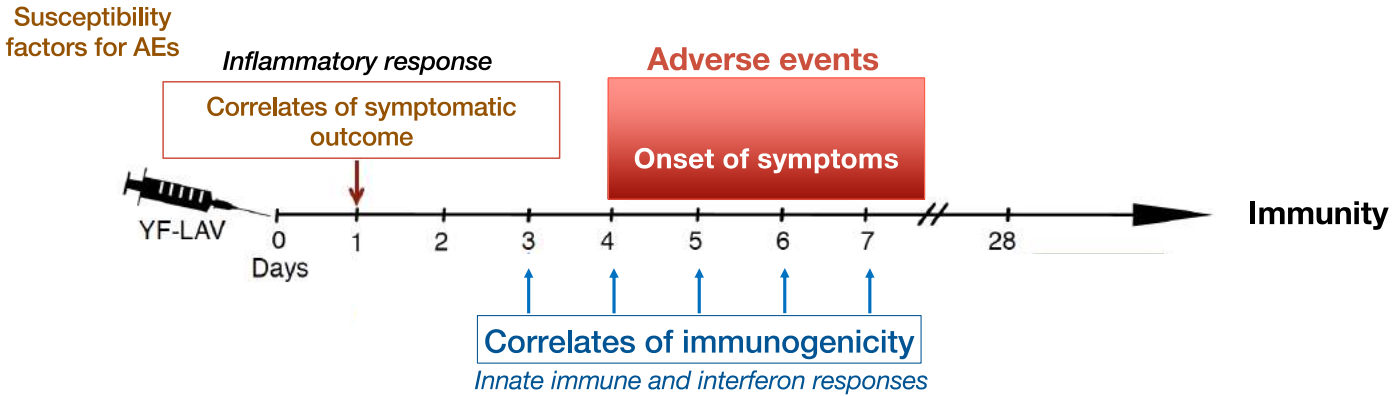
PHASE 2

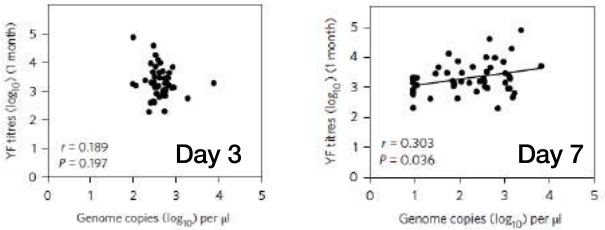



The California-based company **Arcturus Therapeutics** and **Duke-NUS Medical School** in Singapore have developed an mRNA vaccine. It has a "self-replicating" design that leads to a greater production of viral proteins. Tests on animals showed that it protected them against infection. In August, Arcturus launched a Phase 1/2 trial at Singapore General Hospital. On Nov. 9, the company announced that an interim analysis of the trial showed that the vaccine produced an immune response that's in the range of responses seen in people who recovered from Covid-19. On Jan. 6 Arcturus announced that they had permission to start the Phase 2 portion of the trial in both Singapore and the United States. Singapore reached an agreement with Arcturus to spend up to $175 million to acquire vaccines when they're ready.

Updated Jan. 12

# Insights from studying the live yellow fever vaccine




Chan KR et al, Nature Microbiology 2016
Chan C et al, JCI Insight 2017
Chan KR et al, Nature Medicine 2019
Low et al, NEJM 2020

The New York Times

PHASE 2



The California-based company **Arcturus Therapeutics** and **Duke-NUS Medical School** in Singapore have developed an mRNA vaccine. It has a "self-replicating" design that leads to a greater production of viral proteins. Tests on animals showed that it protected them against infection. In August, Arcturus launched a Phase 1/2 trial at Singapore General Hospital. On Nov. 9, the company announced that an interim

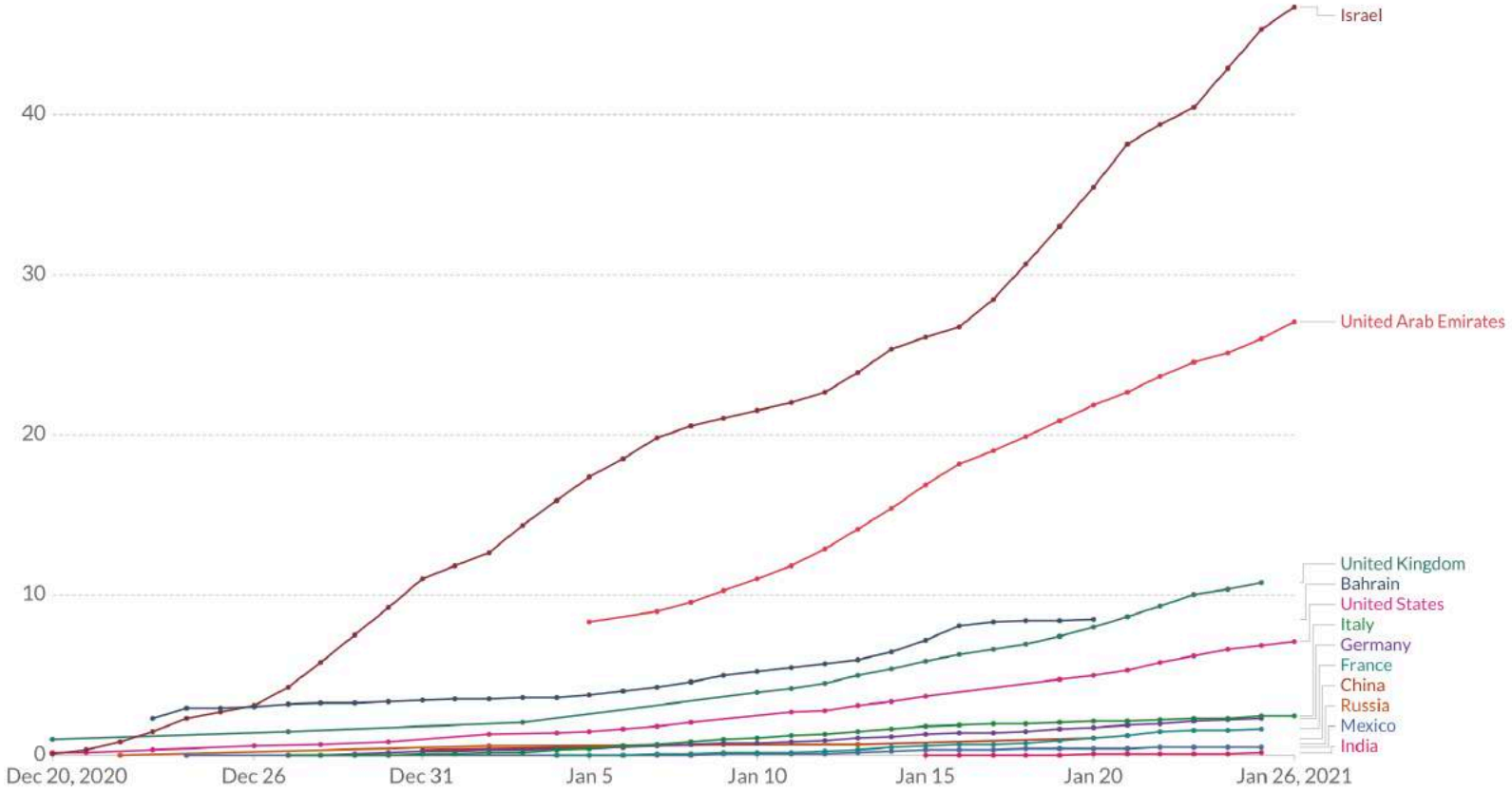
Vaccine construction → 4.5 months → Phase 1/2 clinical trial → 6 months → Multi-country phase 2 clinical trial

# Cumulative COVID-19 vaccination doses administered per 100 people

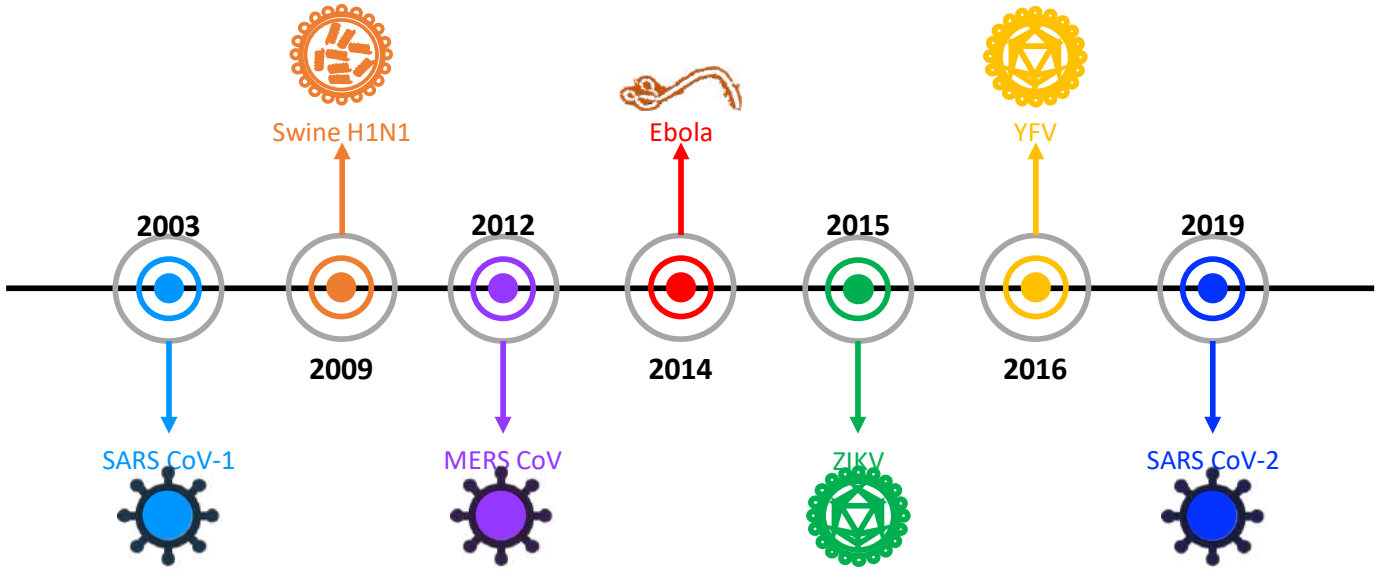
This is counted as a single dose, and may not equal the total number of people vaccinated, depending on the specific dose regime (e.g. people receive multiple doses).

Our World in Data

LINEAR LOG



# Viral outbreaks in the 21st century




***Not if.***
***What's next and when?***

Darren Mok

# How can we prepare for the next pandemic?

Develop ways to accelerate discovery, development, manufacturing and licensing of new vaccines and drugs safely and effectively?

- Investment in basic, translational and regulatory science
- Address issues of affordability and accessibility

Economic sustainability

These efforts will require active partnerships

- Academia
- Industry
  - Biotech
  - Big pharma
- Revised regulatory framework
- Government