

Translating Pandemic R&D Learnings into the Broader Global Health Agenda

Jerome H. Kim, MD

International Vaccine Institute

Global Vaccine and Immunization Research Forum

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**International
Vaccine
Institute**

Disclosures:

- **Dr. Kim has been a consultant for SK biosciences and Moderna**
- **IVI works on the Inovio, Genexine, ST Pharm, Sanofi, SK bioscience, Janssen, Sinopharm, and Clover COVID-19 vaccines in human clinical trials**

Once in a Century Pandemic Exposed the Two Worlds

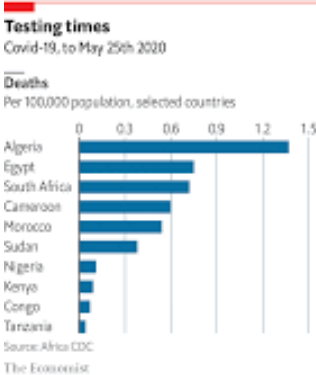
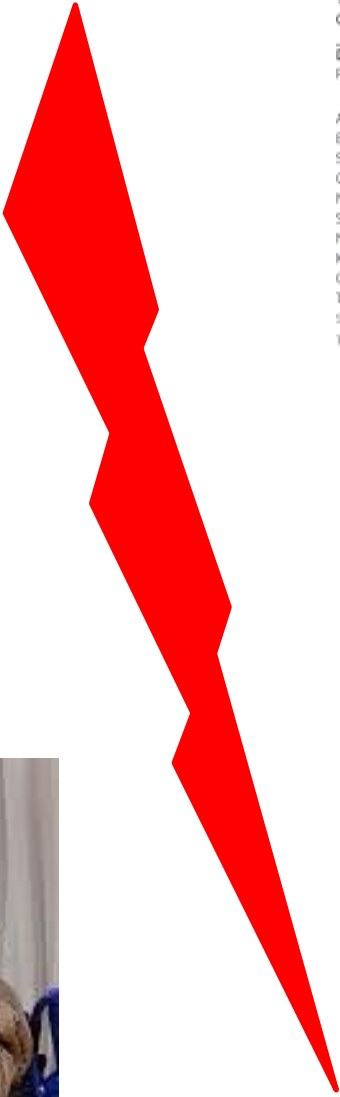
Tests



Treatment: MABs

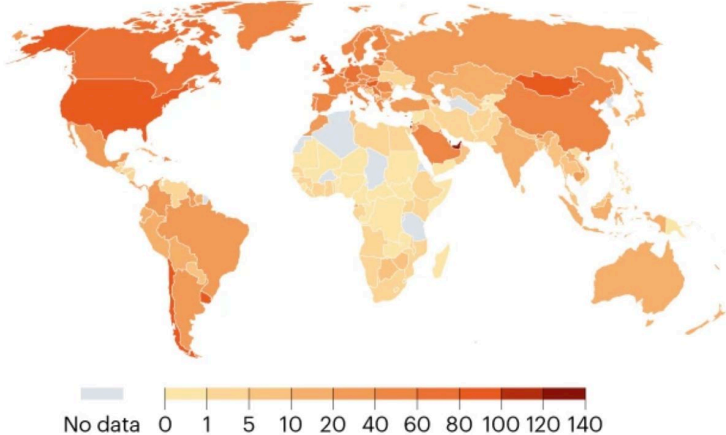


Vaccines



Little Testing

Limited treatment



No/low/slow vaccination

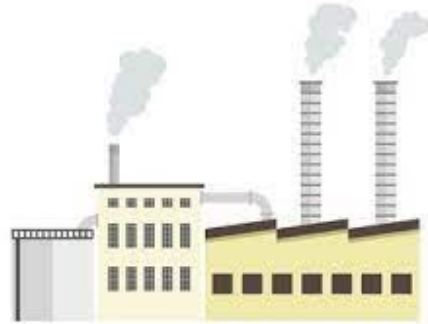


Four gaps to bridge for the next pandemic



**The
diagnostics
gap**

**No deaths?
No fear
No uptake
No impact**



**The
manufacturing
gap: where
and when**

**No vaccine?
No vaccination
No impact**



The equity gap

**No vaccine?
No vaccination
No impact**

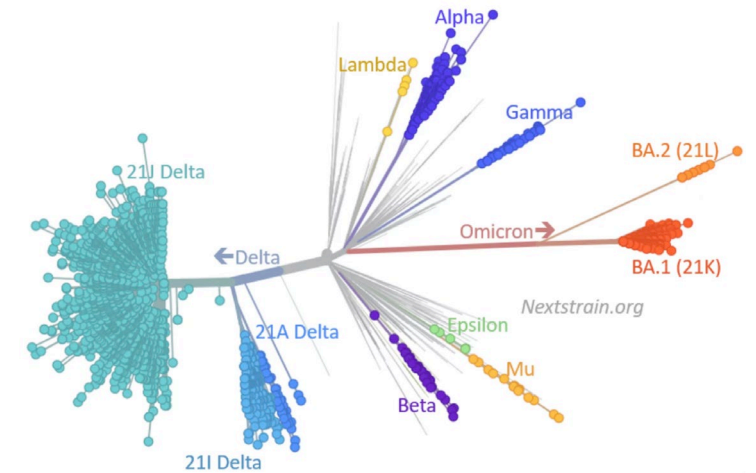
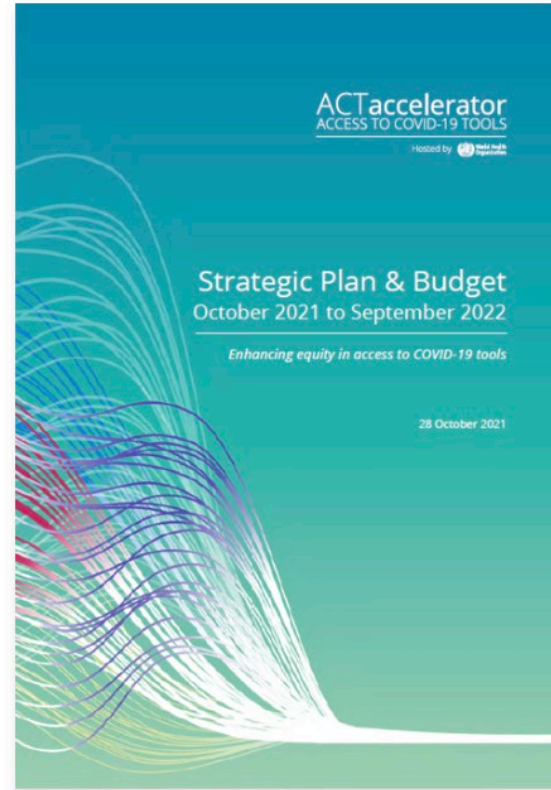
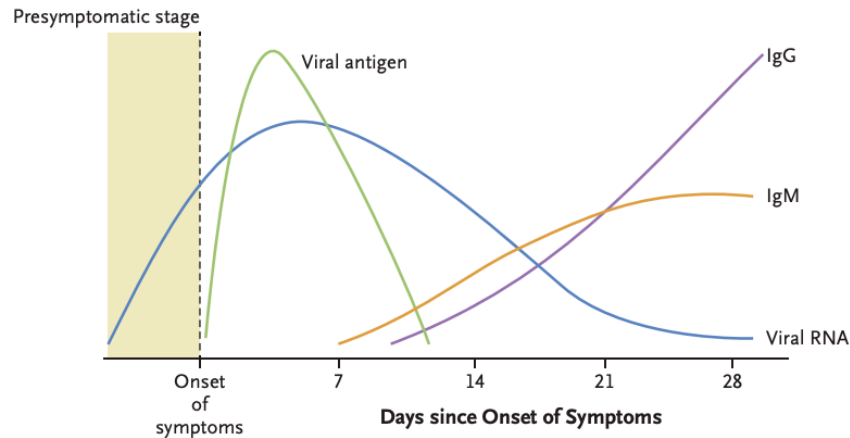


**The
leadership
gap**

**More deaths
More cost
More mutants**

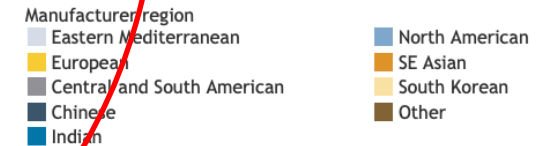
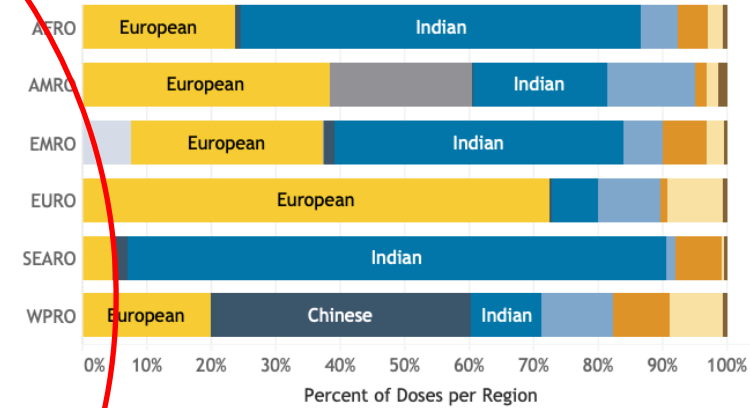
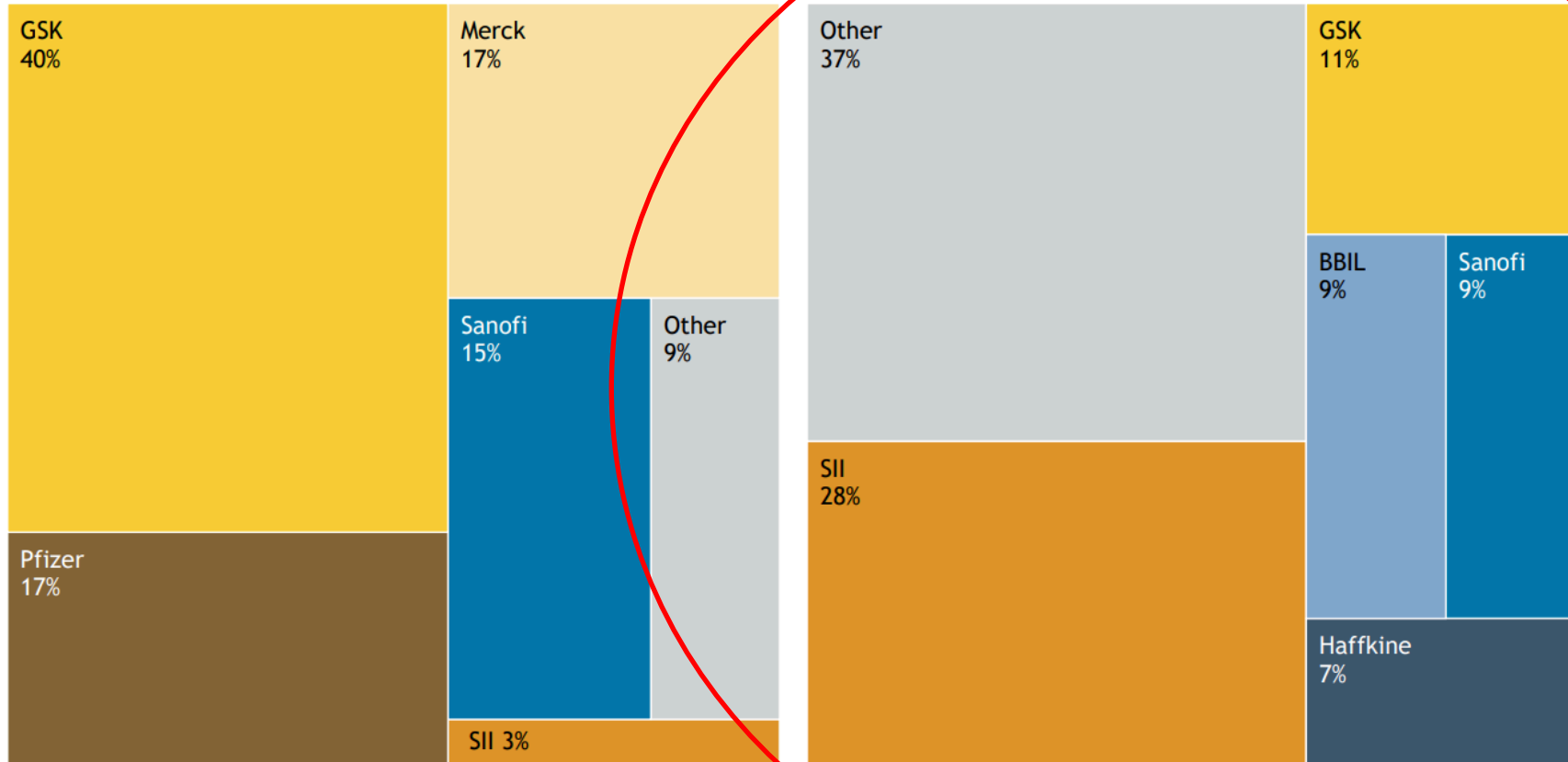
Data – the key to an effective pandemic response

The access to COVID-19 tools accelerator (ACT-A) estimates \$7 billion necessary for diagnostic capabilities in 2022.



You can't fight a pandemic you can't see or a variant that you don't know

Who makes the vaccines for Global Health?



Who doesn't?

Africa makes <1% of the vaccines it uses



Vaccines don't save lives, vaccination does (lesson from COVID)

Covid vaccine stockpiles: Could 241m doses go to waste?



21 September 2021

By Stephanie Hegarty
Population correspondent



Absorption Capacity: The issue is getting vaccines into arms

Tony Blair Institute for
Social Change August 2021



- 16 billion doses + 8B + 8B...
- Personnel: from extended program of immunization to a universal program of immunization?
- Logistics, cold chain, last mile
- Tracking/recording?
- Access – getting off work to vaccination sites?
- Trust/acceptance?

**Health Systems Strengthening!
Funding?**

Lesson 1:
Crisis
spurs
innovation

Lesson 2:
Funding
realizes
innovation

Lesson 3:
We can
scale to
billions of
doses

Lesson 4:
Access &
equity are
still a
problem

Lesson 5:
Impact is
about
delivery

The Pandemic leadership gap



Apologies to the Emerson Quartet



- **Do we need leadership in a pandemic crisis?**
- **Can we defeat a global pandemic without global responsibility, funding, accountability, and responsiveness?**
 - Multiple requests for funding
 - Multiple sources of loans
 - Uncoordinated disbursement of vaccines
 - Lack of end-to-end planning
- **Is it an organization, a council, a person, a treaty?**
- **Is there a plan?**
 - Who makes it?
 - Who endorses it?
 - Who funds it?
 - Who is responsible and accountable?



von Karajan, Berlin Philharmonic, 9th Symphony in D minor, Beethoven

Consequence 1: Deaths

Cumulative confirmed COVID-19 cases per million people, Feb 26, 2023

Due to limited testing, the number of confirmed cases is lower than the true number of infections.

Our World
in Data

World

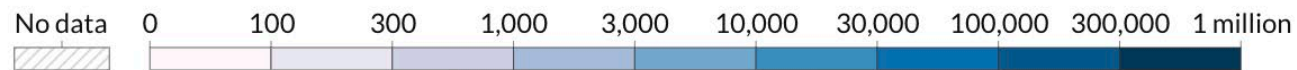
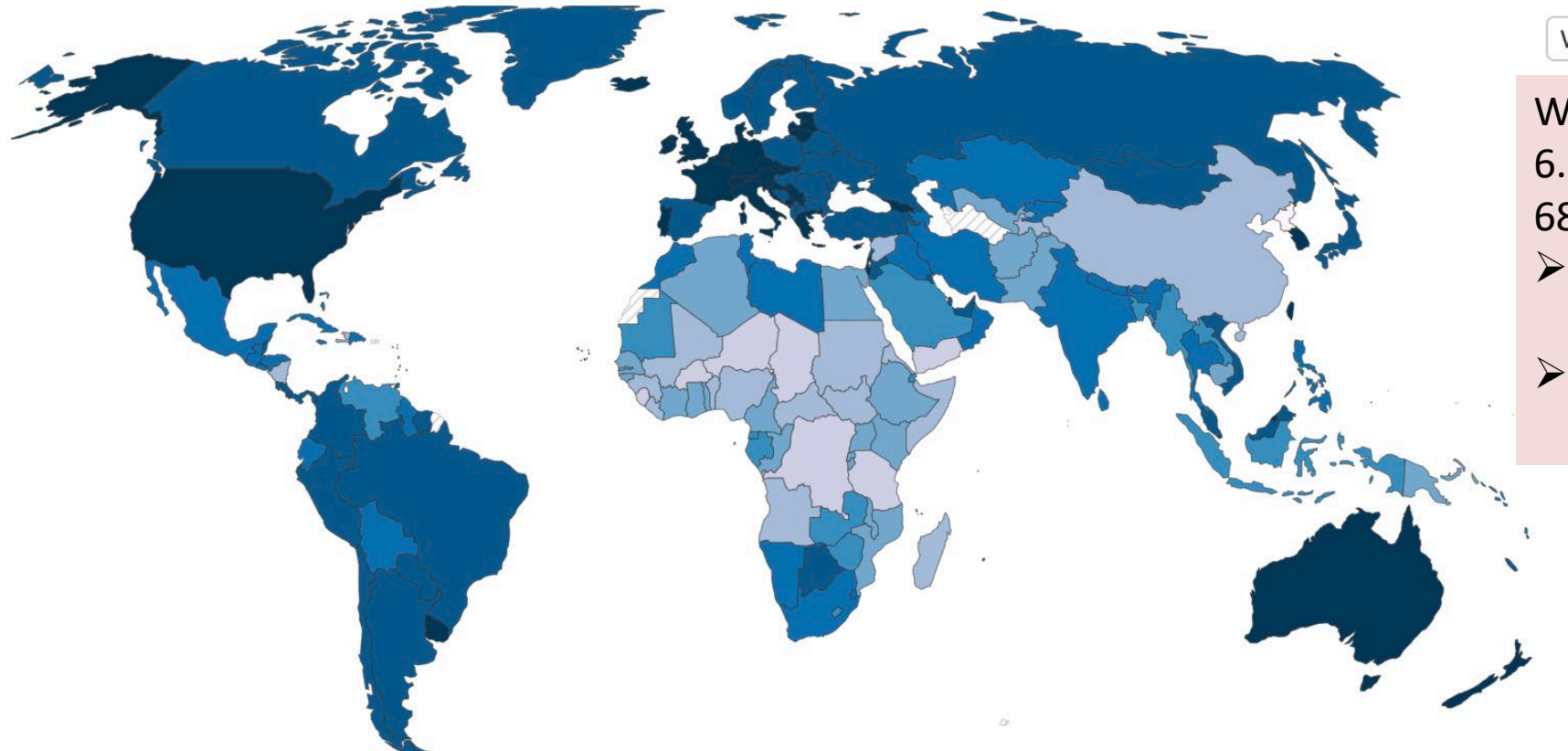
Worldometer (27 Feb 2023)

6.8 million deaths

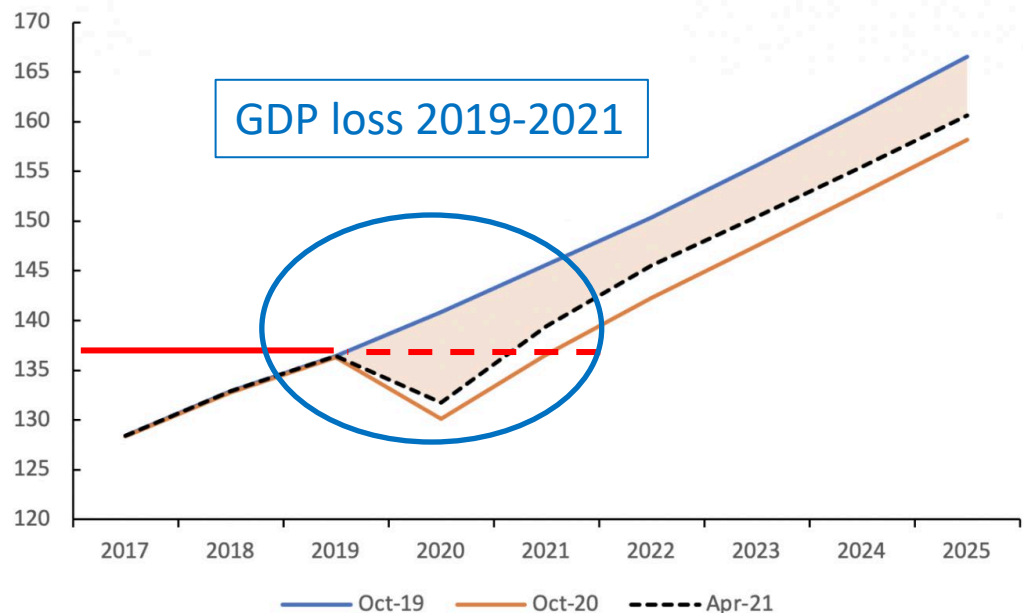
680 million cases

➤ WHO estimate: 14.91 million deaths (13.3-16.6 million)

➤ IHME estimate: 18.2 million deaths (17.1-19.6 million)



Consequence 2: cost



Global GDP projections 2019, 2020, 2021

- GDP loss
- Fiscal stimulus supplements
- Statistical value of lives lost
- Educational loss
- Inequity has a cost: 4-5T (ONI,NEBR)? \$23T (UNDP)?

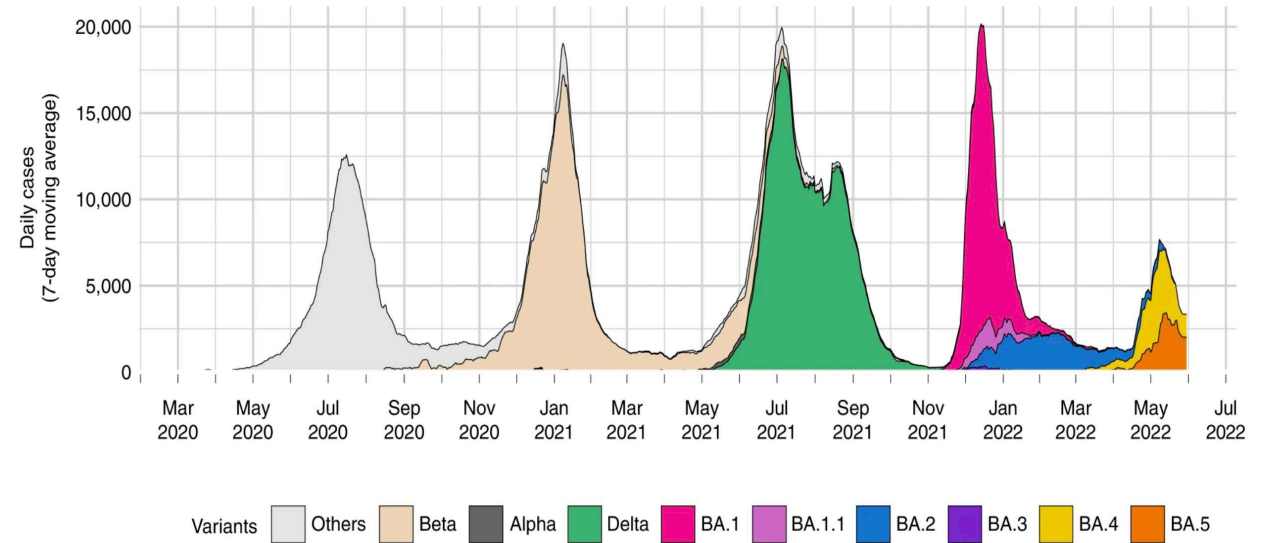
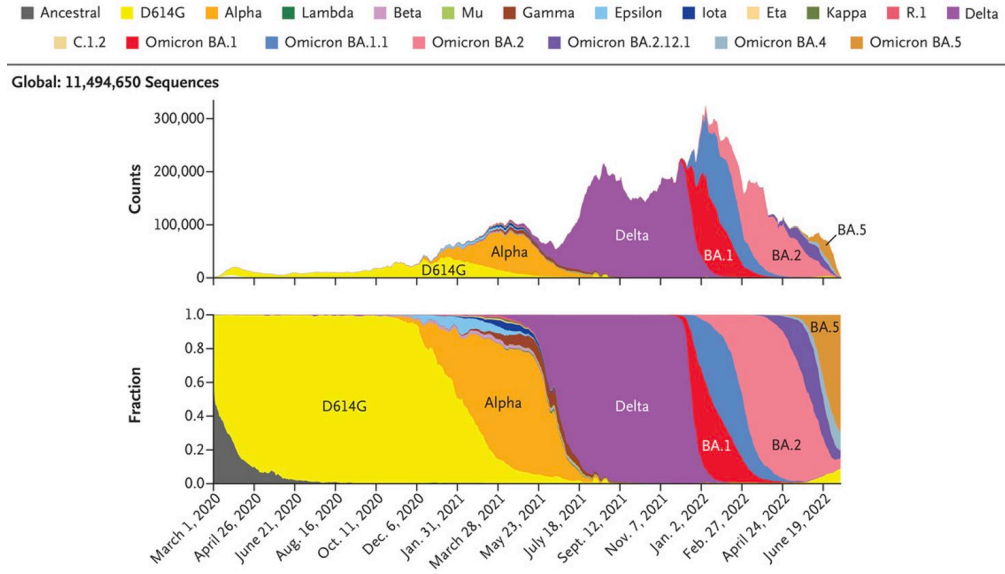
	World	AEs	EMEs	LIDCs	LatAm
Lost 2020 global GDP from Covid-19	6.7%	6.5%	7.0%	4.8%	8.5%
Lost 2021–30 global GDP from Covid-19 <i>discounted at 0%</i>	47.9%	13.8%	76.7%	87.6%	84.3%
GDP loss 2020-30 (discounted at 0%)	54.6%	20.3%	83.8%	92.4%	92.8%
Global fiscal impulse (IMF Fiscal Monitor Apr-2021)					
Above the line	9.2%	16.4%	4.0%	1.6%	5.3%
Below the line	6.1%	11.3%	2.5%	0.2%	4.1%
Fiscal impulse	15.3%	27.7%	6.5%	1.8%	9.4%
Output + fiscal	69.9%	48.1%	90.3%	94%	102.2%
Statistical value of deaths related to Covid-19					
Total deaths related to Covid-19	2,828,146	1,201,442	1,525,088	65,348	800,100
Deaths per million	363	1,148	299	41	1,235
Statistical value of a life (lower bound, in USDmm)	5.0				
Total value of deaths related to the pandemic	16.2%				
Education and human capital loss					
Average missed days of instruction in 2020	48	15	46	69	174
Lifetime loss in labour earnings for the affected cohort	12%	-	-	-	-
Broader economic cost	98.1%				

Cost of Pandemic as % of 2019
Global GDP (~\$137 trillion)



Consequence 3: mutants

Outbreaks make variants and
variants make outbreaks



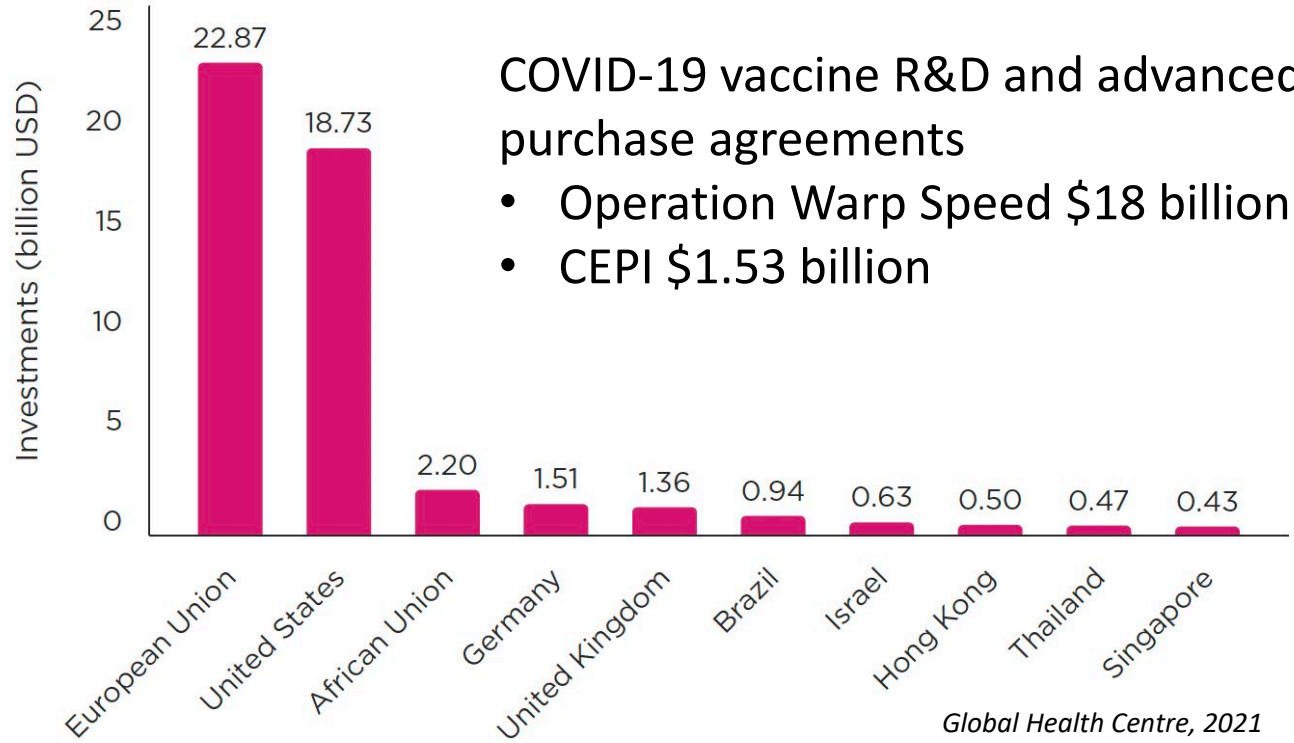
Summary of variants of concern since March 2020

Variants and waves in South Africa



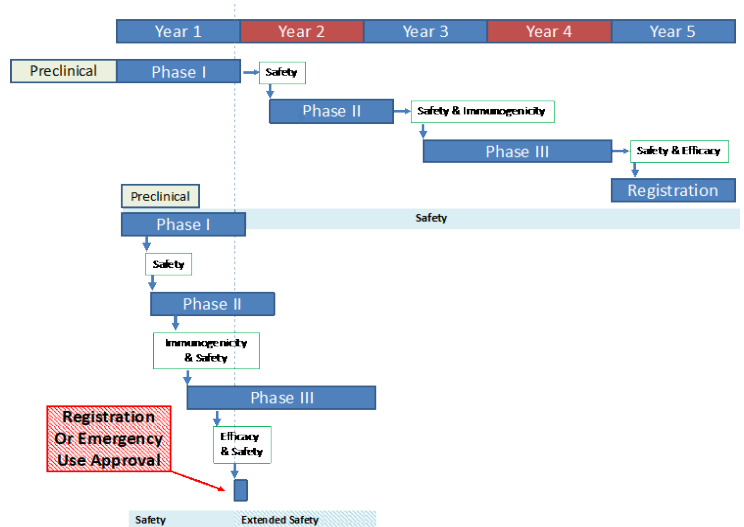
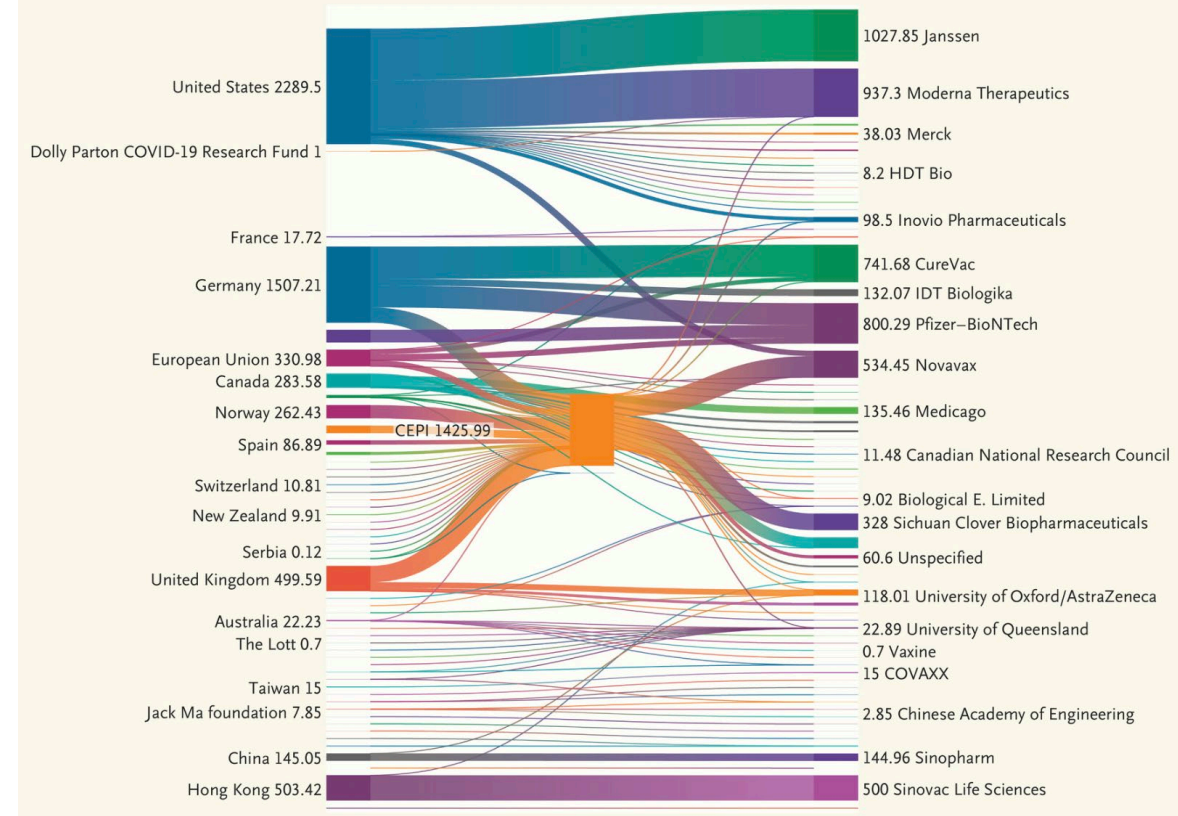
Successes

(Enough) Funding makes innovation real and fast



COVID-19 vaccine R&D and advanced purchase agreements

- Operation Warp Speed \$18 billion
- CEPI \$1.53 billion



Funding derisks development

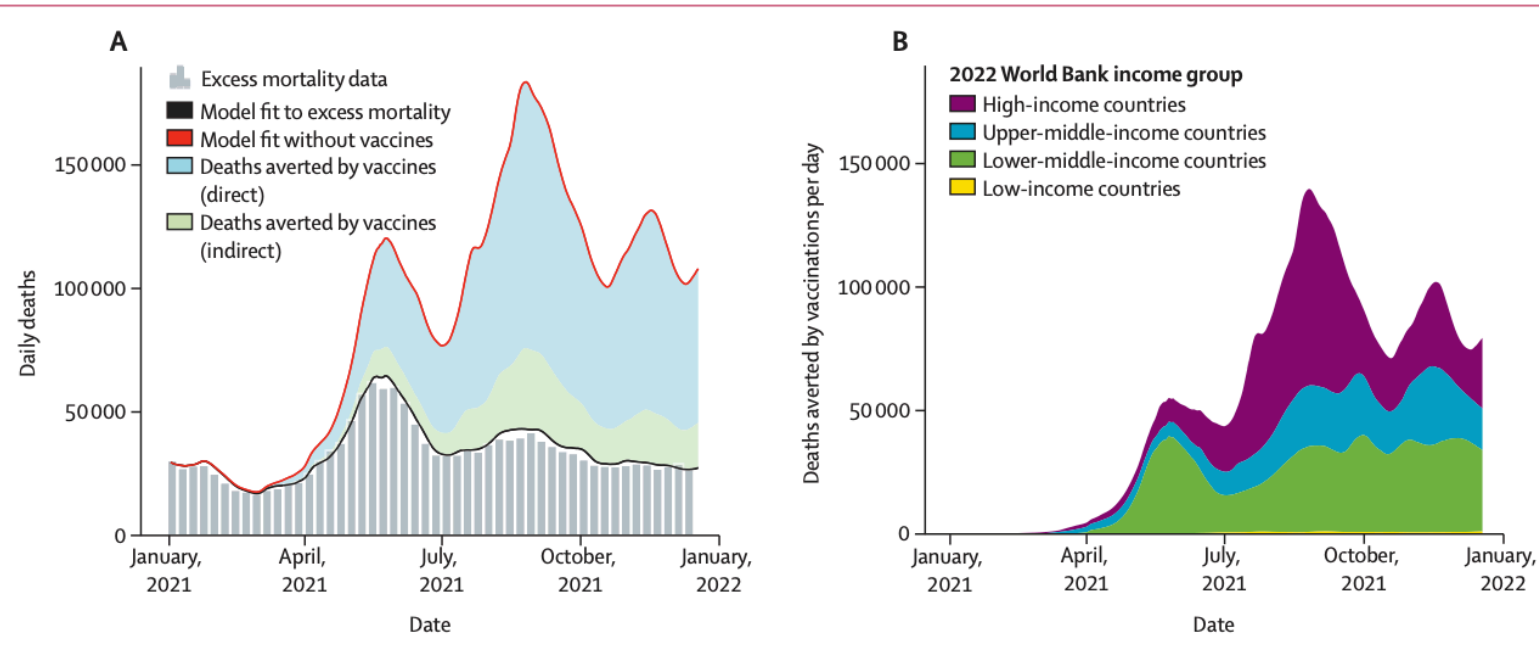


For COVID-19, vaccination saved 20,000,000 and could have saved more

COVID-19 vaccines saved 19.8 million
COVAX saved 7.4 million
COVAX could have saved 10.7 million

The human cost of inequity and missed targets (WHO: 40% vaccinated by Dec 21)?

8.2 million (preventable) deaths

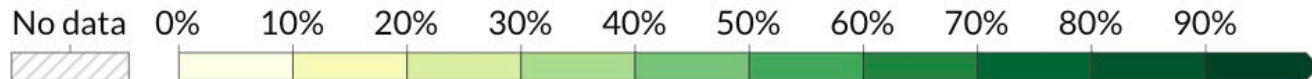
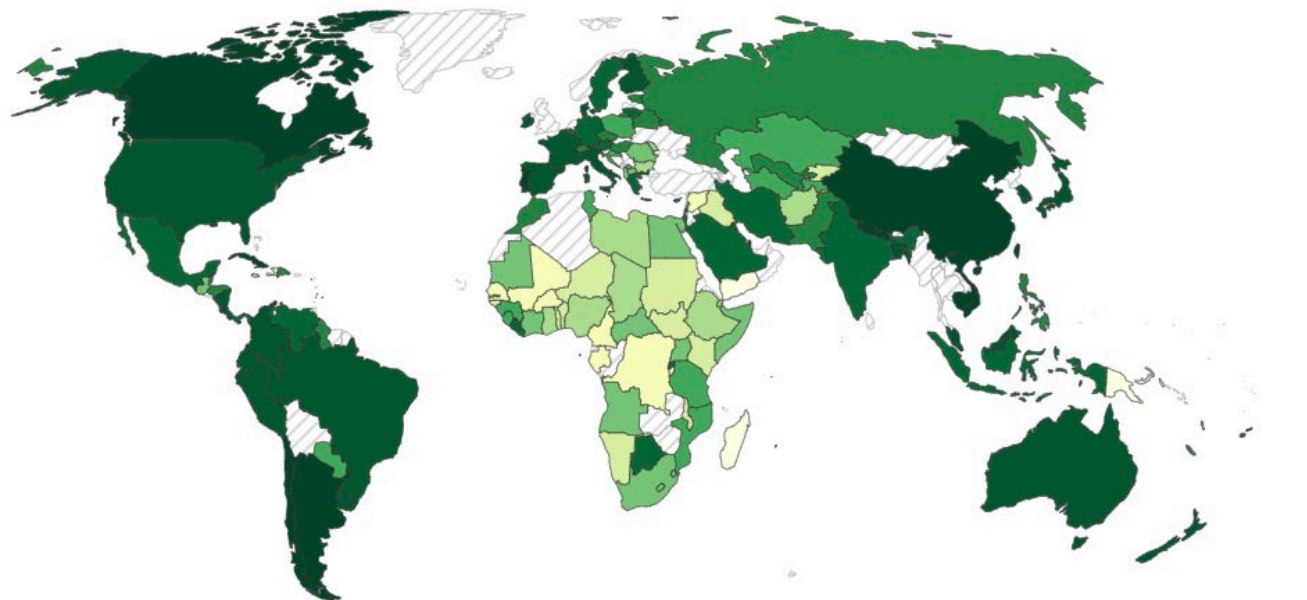


Watson et al, *Lancet Infect Dis*, 2022

- Based on official COVID-19 deaths, vaccination prevented **14.4 million** (95% CI 13.7–15.9) deaths thru Dec 2021.
- Lives saved increased to **19.8 million** (95% CI 19.1–20.4) using better estimate of excess mortality -- **a global reduction of 63%** in total deaths in 2021.
- In **COVAX** Advance Market Commitment countries, **~7.4 million deaths** (95% CI 6.8–7.7, 41% of excess mortality) averted.
- In LIC: **~3.3 million deaths** could have been averted if the COVAX 20% vaccination target was met
- **8.2 million** (111%) deaths could have been averted had the 40% WHO target been met by the end of 2021.

COVAX was a partial success, but not enough

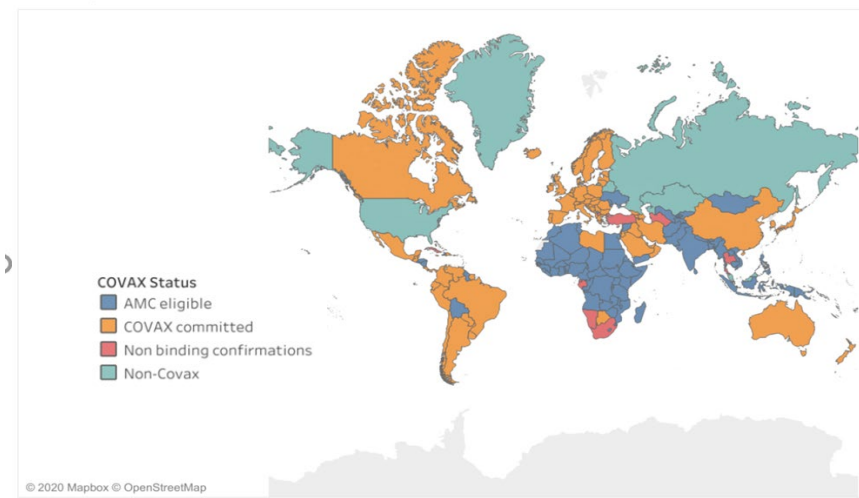
% of population receiving at least one dose of COVID-19 vaccine, Our World in Data, 26 Feb 23



Source: Official data collated by Our World in Data – Last updated 27 February 2023
OurWorldInData.org/coronavirus • CC BY

Equity was more challenging than supply

Our World in Data (25 Mar 2023)
13.3 billion doses given
69.8% received ≥ 1 dose
71.6% of people in LIC unvaccinated

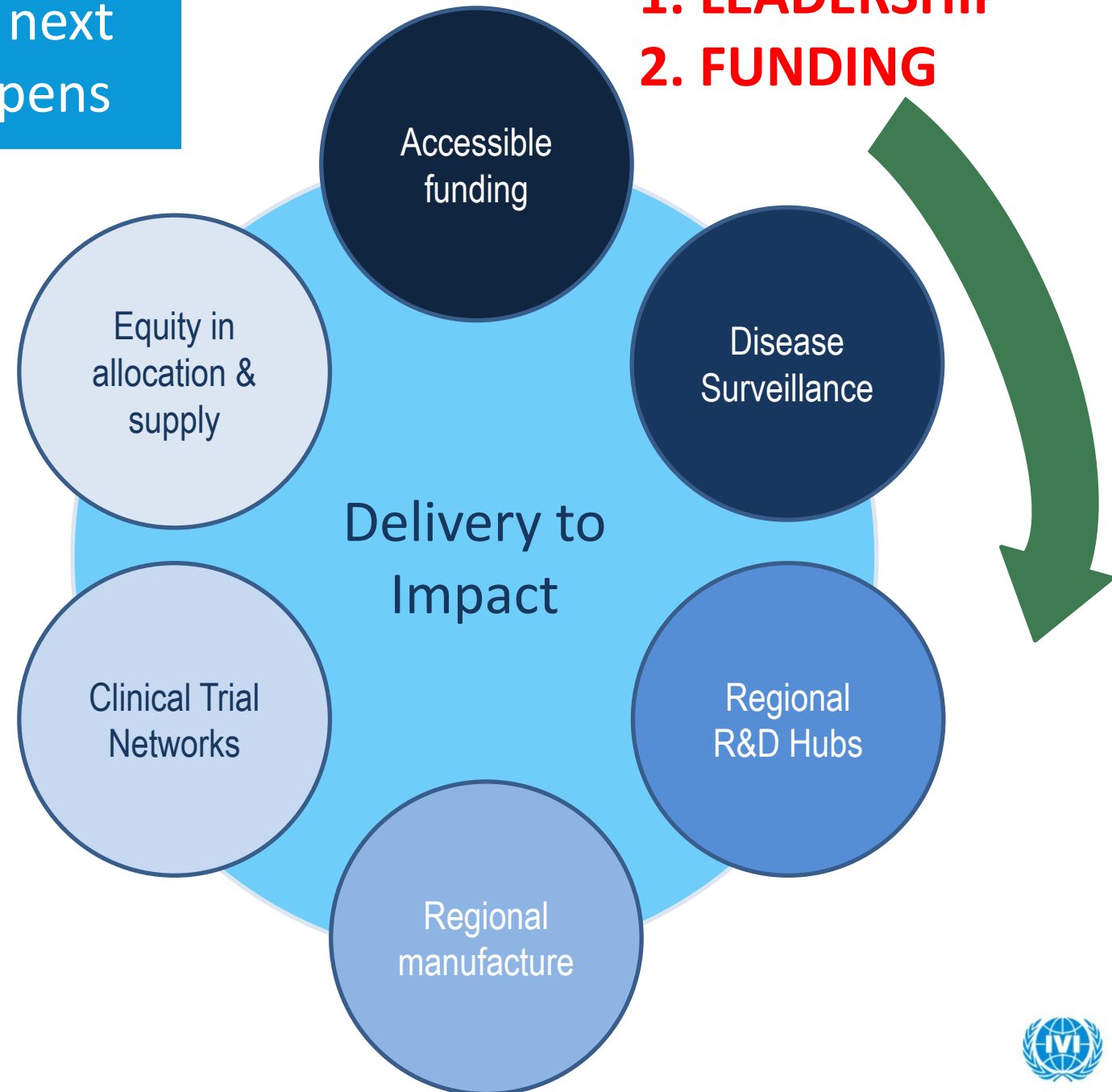


- COVAX was only a partial success
- It was 1 billion doses short by 6 Jan 22
- Countries either waited or acted on their own with what means they had

Recommendations for stopping the next epidemic(s) where and when it happens

- **Regional research and development** hubs built around ready-to-adapt technology platforms for “last-mile innovation”
- Pre-negotiated **financing and governance** for research, development, and manufacturing, including ownership rules over technologies and commitments for availability and access following a common good approach
- Ready-to-use **clinical trial networks**, conducting public health-focused trials
- Ready-to-activate **regional and subregional manufacturing capacity** linked to the selected technology platforms
- Continuous **assessment of health needs** to inform and guide the priority research and development agenda
- **Coordinated allocation** and supply management that ensures equity at regional and subregional levels

Torrele et al, Lancet 2023



Many manufacturing projects announced in the last 2 years

Countries where announcement have been made to develop new/additional Vx manufacturing capacity since Covid-19



Strong mobilisation, with major funding announced

Selection of recent funding announcements (not exhaustive)

\$1.5Bn

Saving Lives & Livelihoods initiative, to purchase Covid-19 Vx, enable Vx delivery, develop talent for Vx manufacturing and strengthen capacity of A-CDC

\$700Mn

Long-term joint financing package to increase manufacturing of vaccines, and other therapies for developing countries

\$220Mn

Funding to MADIBA project to build manufacturing capacity, R&D capacity and training capacity

More than \$5Bn of disclosed funding (focused on Vx manufacturing) – total funding (inc. undisclosed) is likely closer to \$10bn

Source: desktop research, interviews, press releases, BCG analysis

Turning funding into sustainable equity in pandemic preparedness and response must be a global priority

Final thoughts [1]: Global Health cannot be separated from humanity's other great challenges

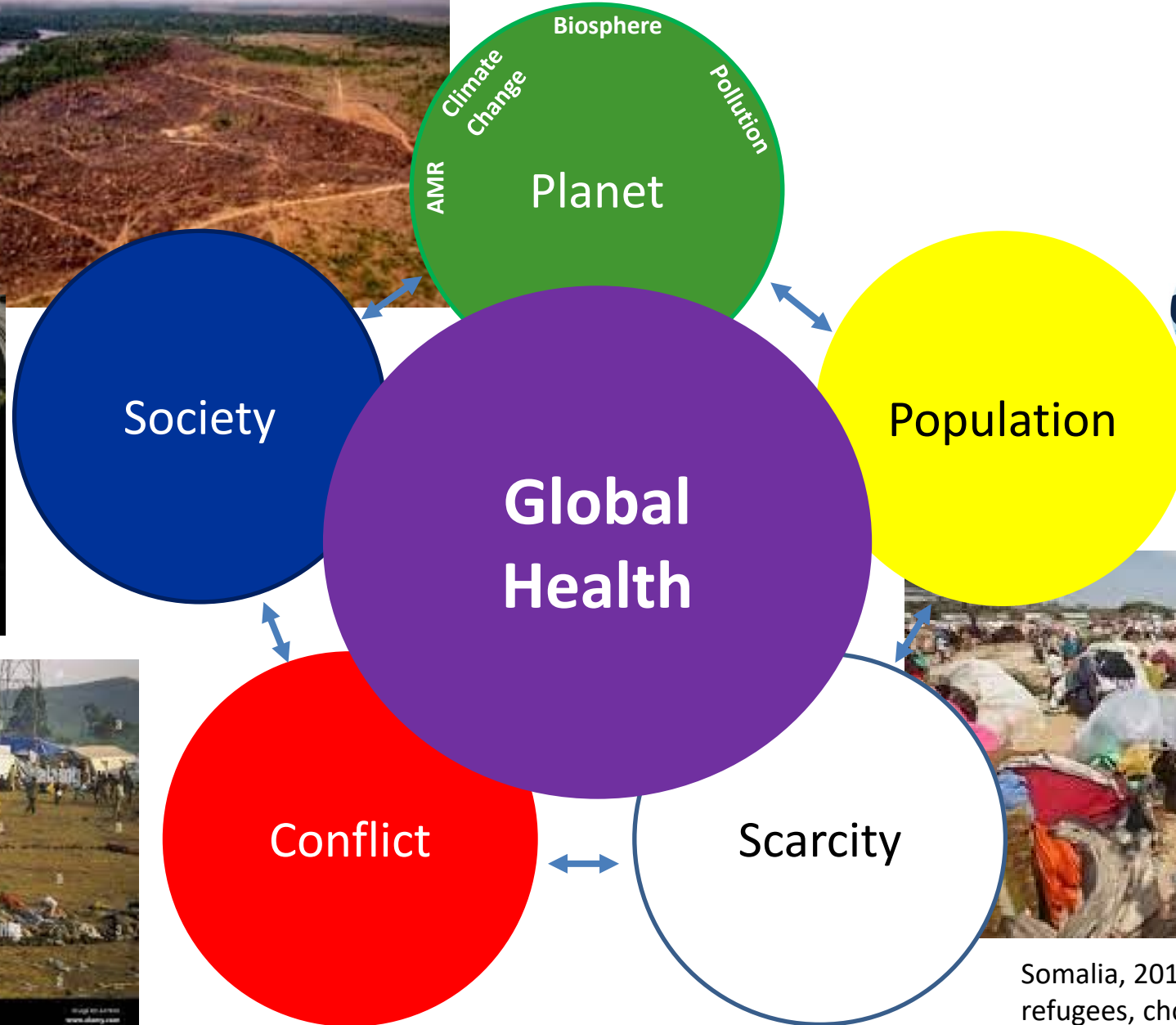
Brazil, 2021, Amazonia deforestation



Italy 2021



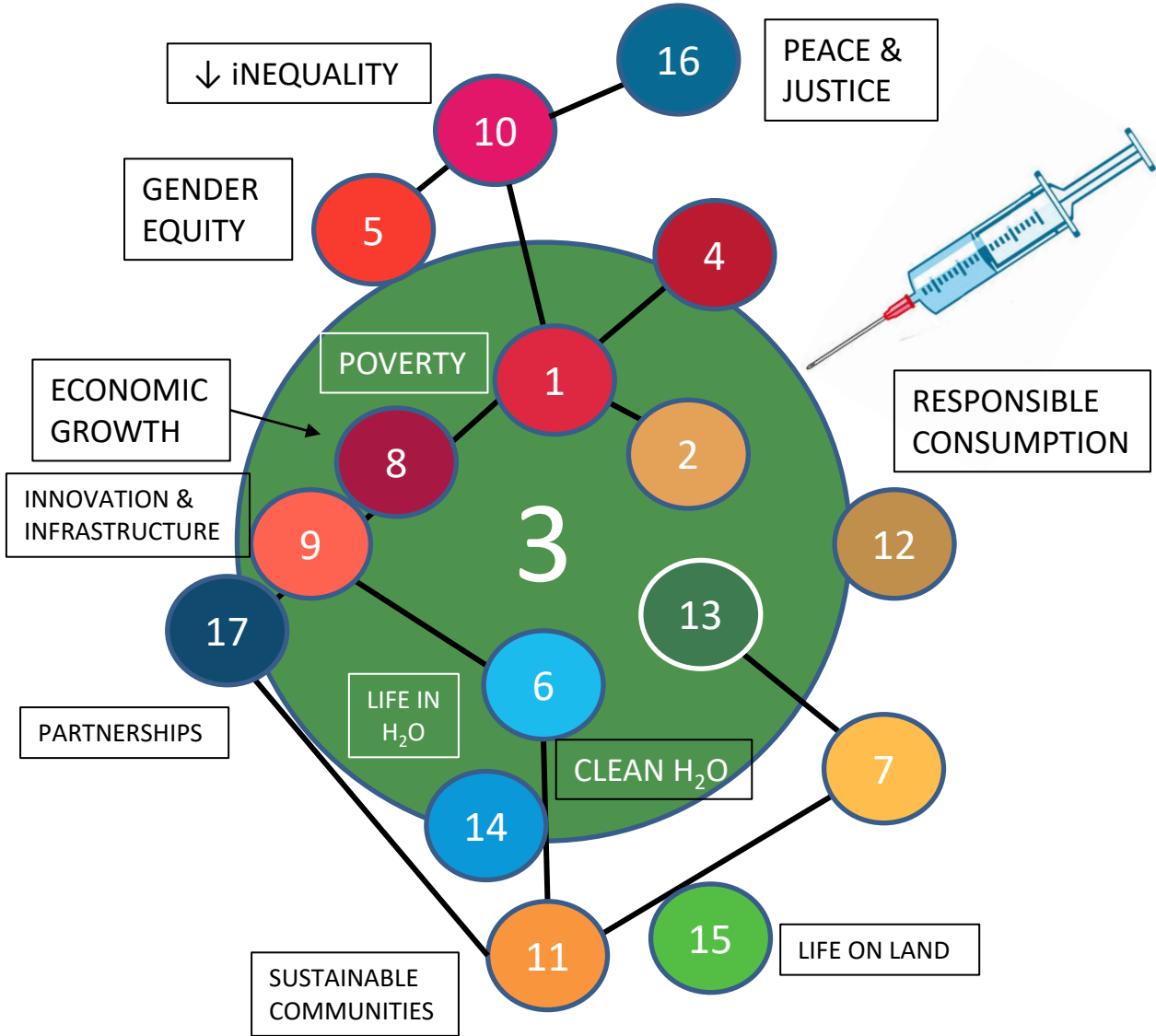
Goma 1994



Somalia, 2011: drought, famine, refugees, cholera, measles



Final thoughts [2]: Global Health intersects the other development goals



Courtesy of Prof. David Salisbury



IVI works to enable global partners in COVID-19 vaccine development

Thank you for your attention!

Pre-clinical and International Standard Serum & Assay Development

Clinical Development

- Laboratory: EIA, PRNT, PsVNa
- Phase I-III / effectiveness

Capacity Building

- Support for Epi. and Phase III site development



IVI is working with companies that have committed 1.2 billion (+) doses to COVAX