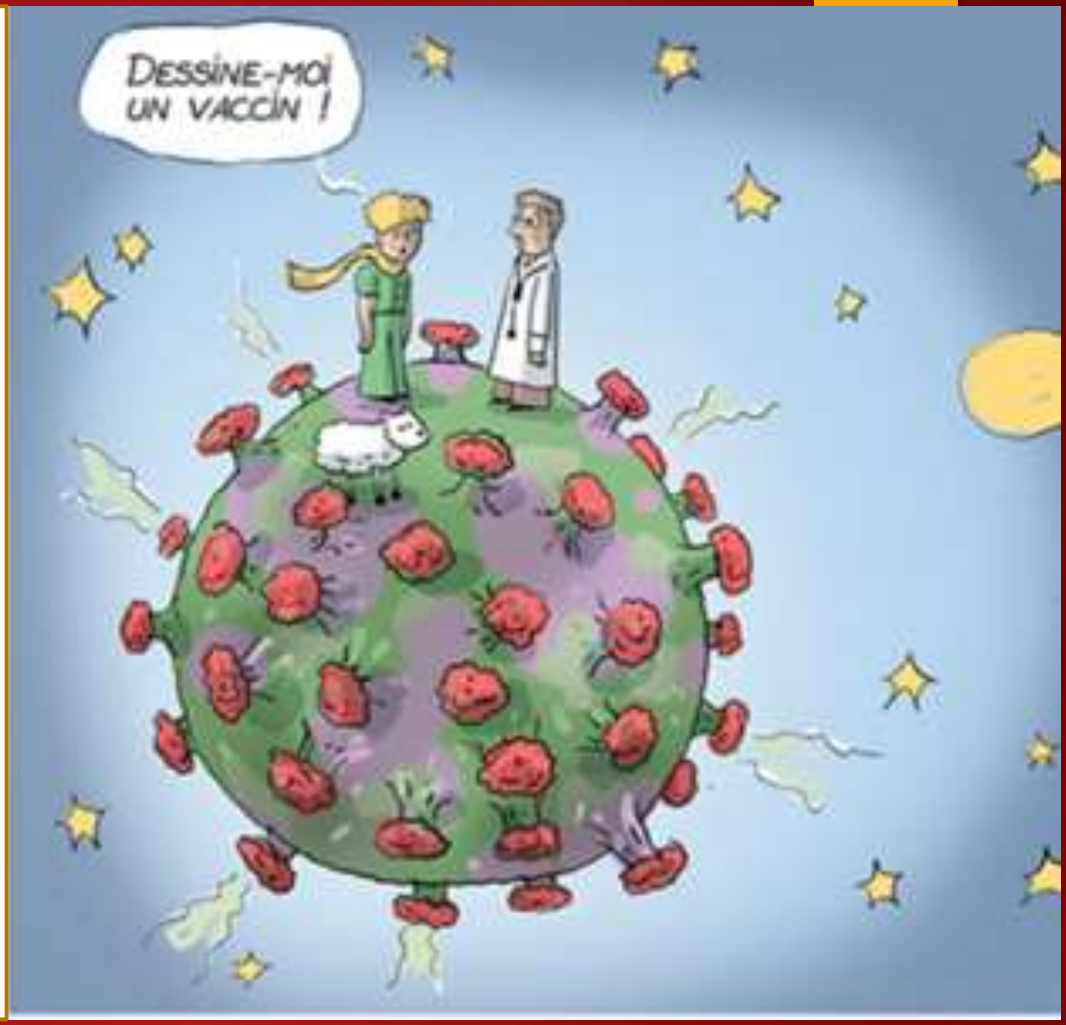
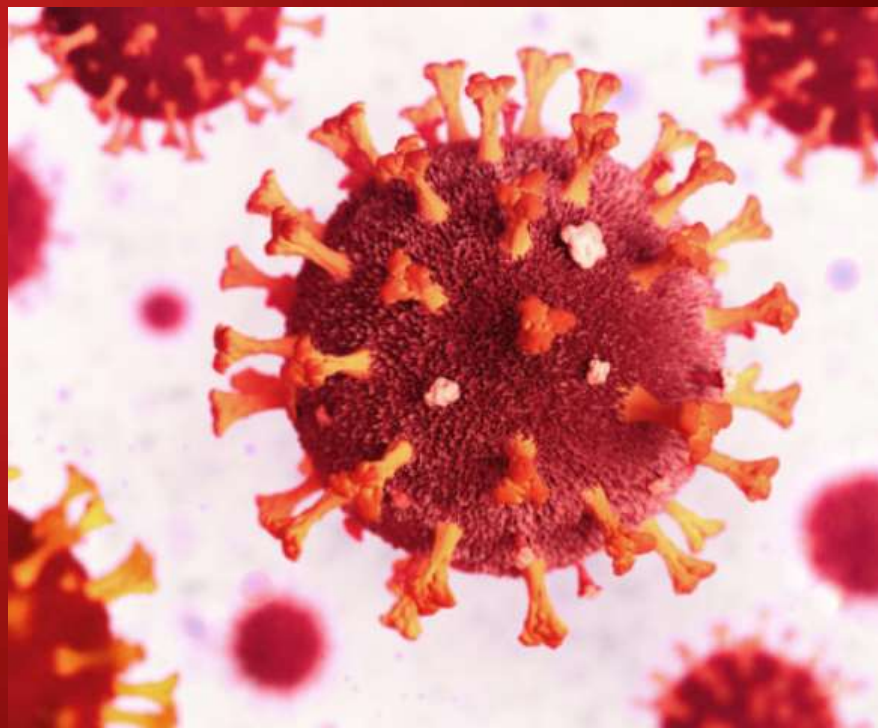
COVID19 Vaccines Literacy Workshop

Dr Isabella Panunzi
MSF-Belgium
January 26th 2021



Outline

- The role of vaccination
- COVID 19 candidates' vaccines
- Objective of COVID19 vaccination programs
- Groups targeted by COVID19 vaccination
- Access to COVID19 vaccines candidates in South Africa



DID YOU KNOW

Vaccines save FIVE lives every minute

The eradication of smallpox through vaccination saves an estimated 5 million lives every year

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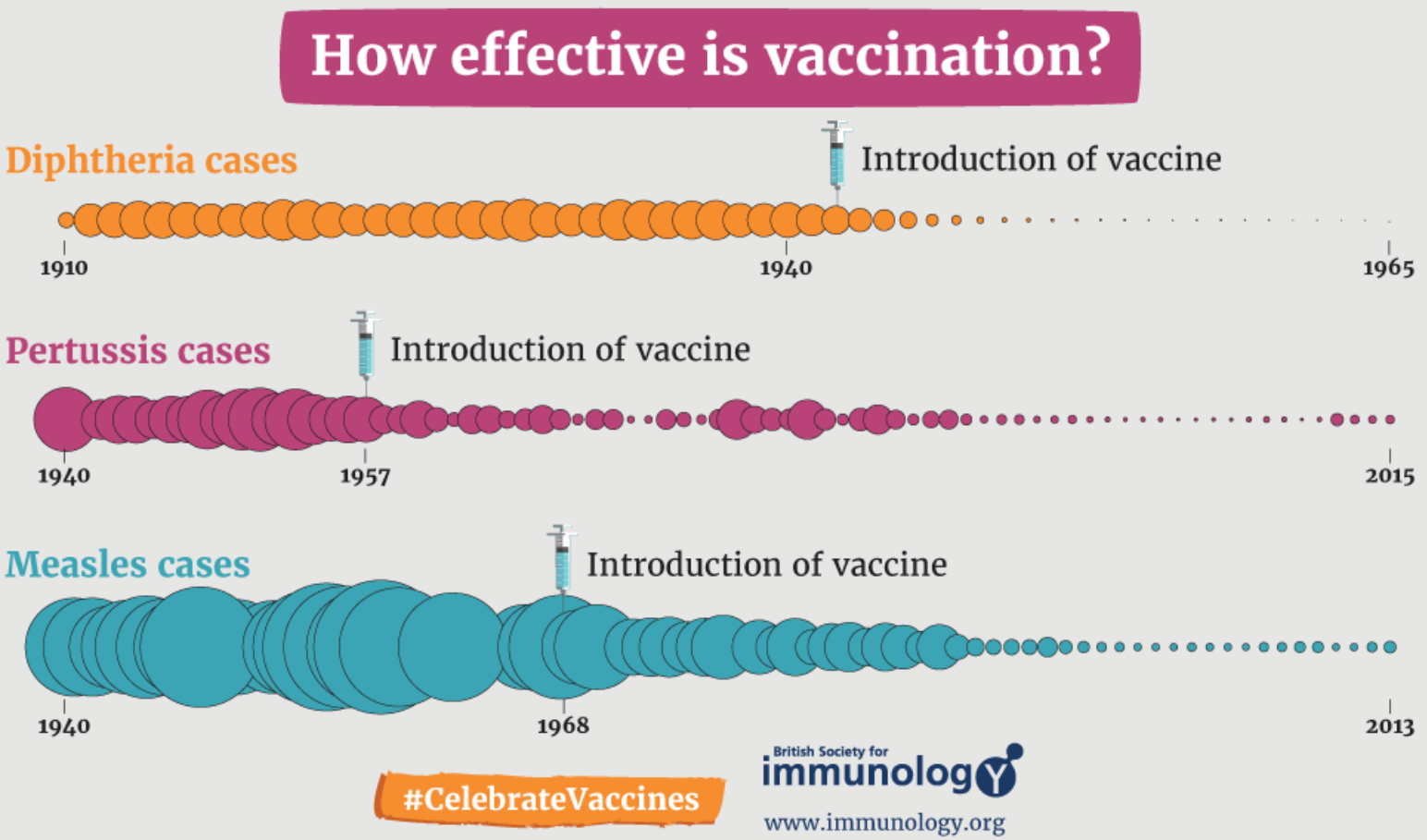
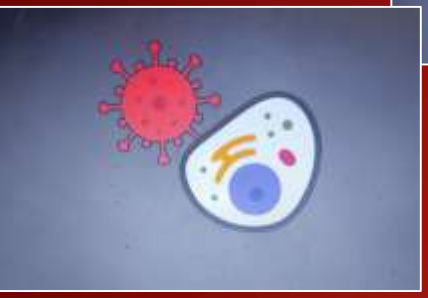
If a vaccine had not eradicated smallpox, someone would now die from the disease every 6 seconds of every day.

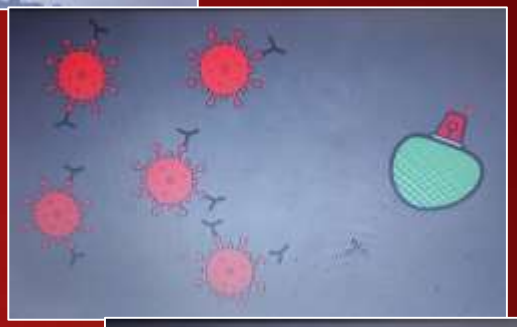
health
Department:
Health
REPUBLIC OF SOUTH AFRICA

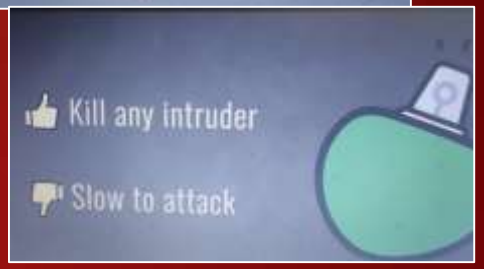


The early 1960s, about one third of African children did not reach the age of 5. Vaccine preventable diseases, particularly measles, accounted for a substantial share of these early deaths.

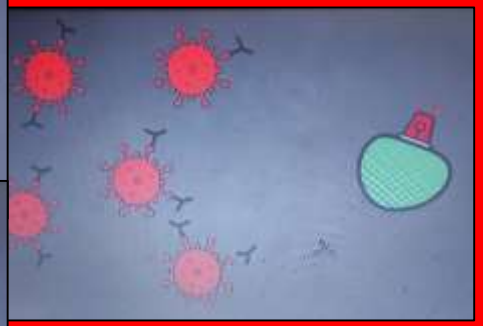
How the immune system works







How vaccines work



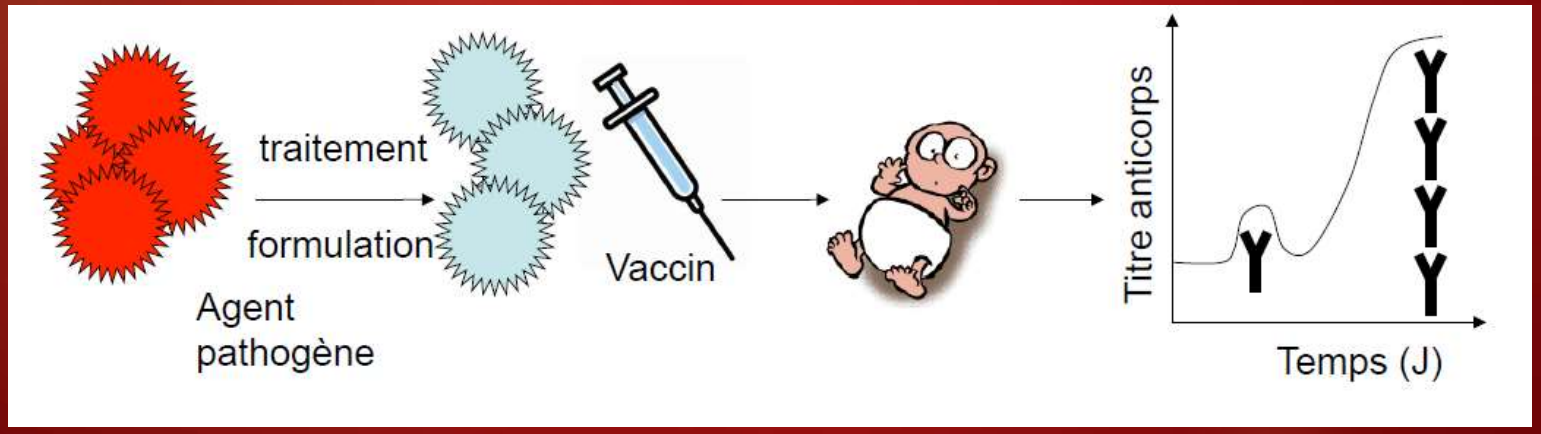
https://www.youtube.com/watch?v=WOvvyqJ-vwo

WHAT is immunization?

Immunization is a method used to prevent people getting sick from vaccine-preventable diseases

What is a vaccine?

➔ Preparation based on the agent causing the disease (e.g. measles virus) designed to **induce or increase immunity against a pathogen (Bacteria/virus)**



http://ed.ted.com/lessons/how-do-vaccines-work-kelwalin-dhanasarnsombut

Value of vaccination

➔ **Protects individuals** against the disease and consequences

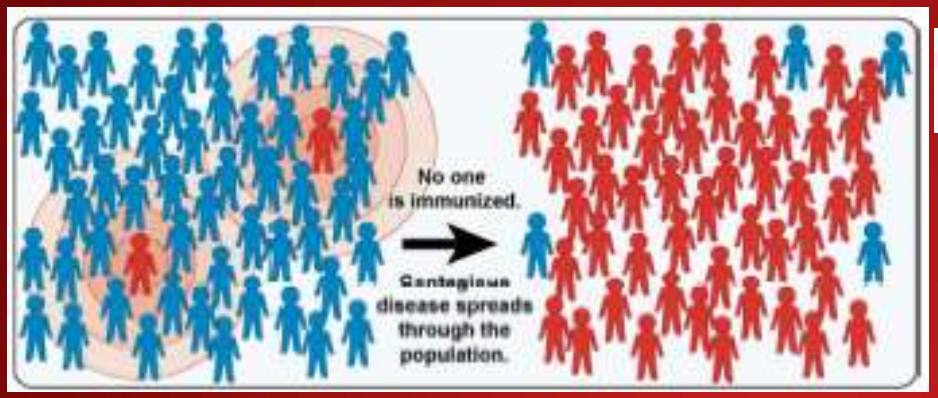
! Vaccine effectiveness <100% !

➔ **Reduces severity** of disease

➔ Reduces the probability that an unprotected person (susceptible) encounters an infectious person

= **Herd immunity**

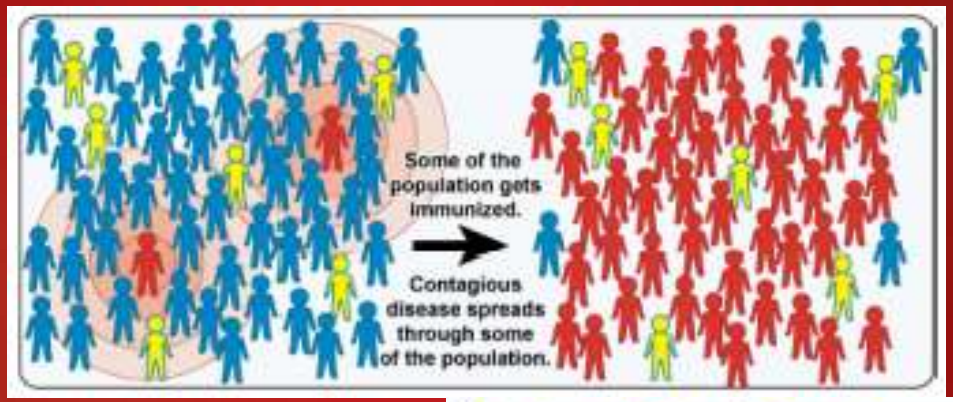
Herd immunity



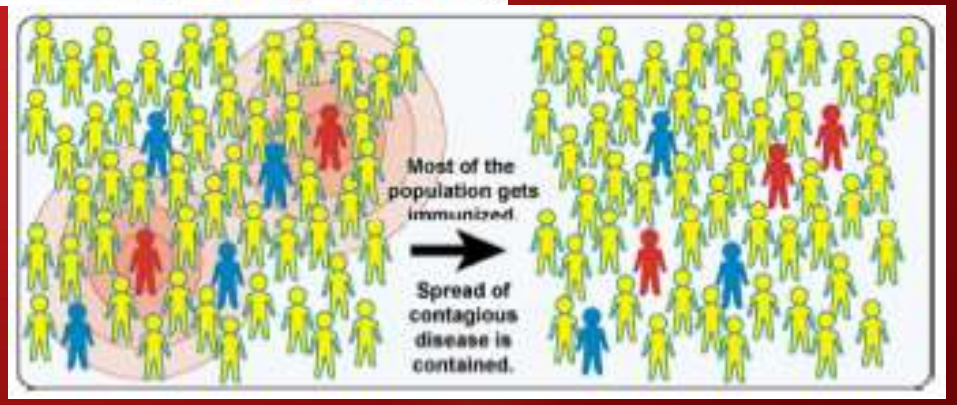
Not immunized but still healthy

Not immunized, sick and contagious

Immunized and healthy

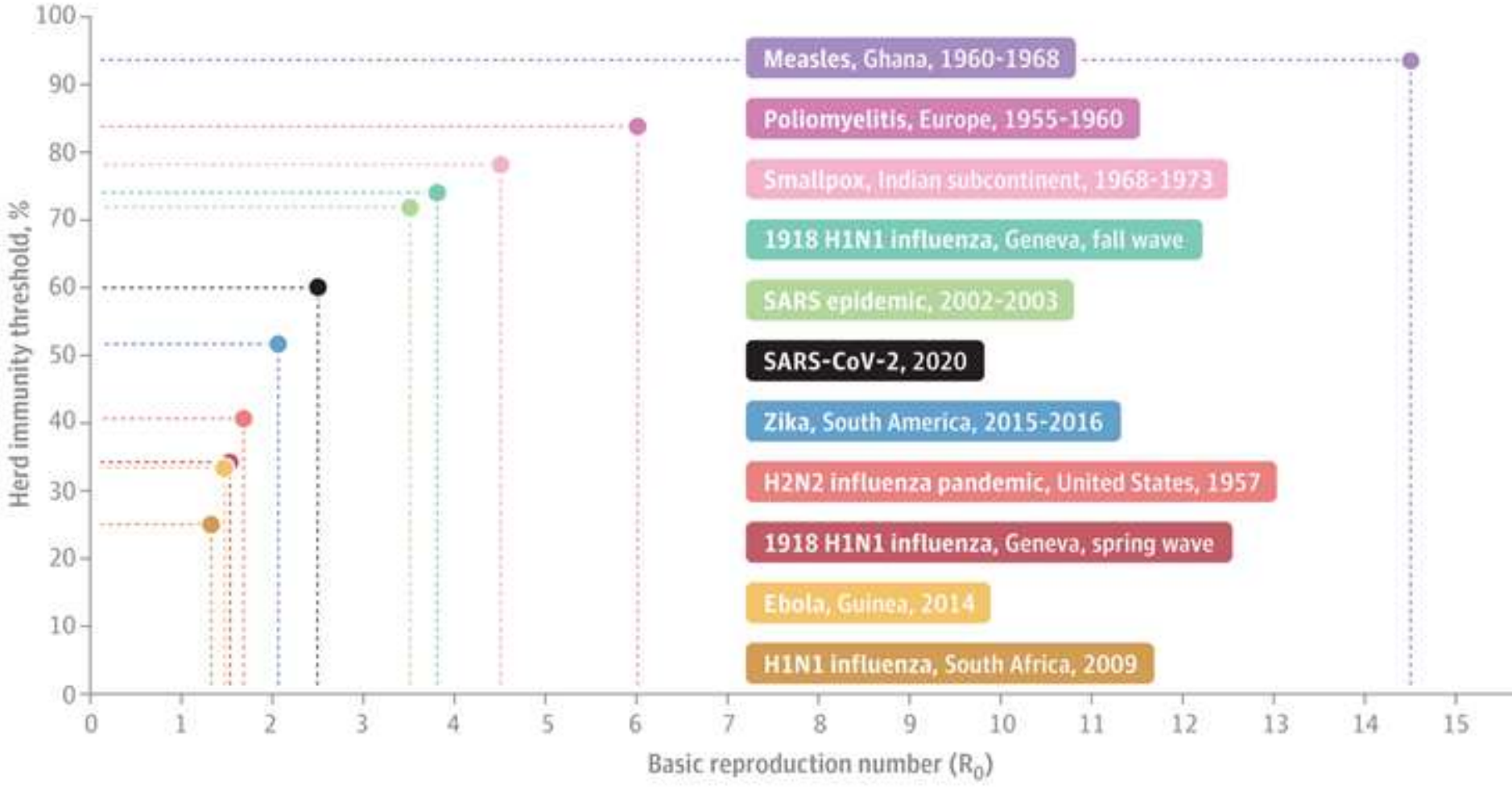


Each member is protected by the immune status of the "herd", irrespective of their own immune status



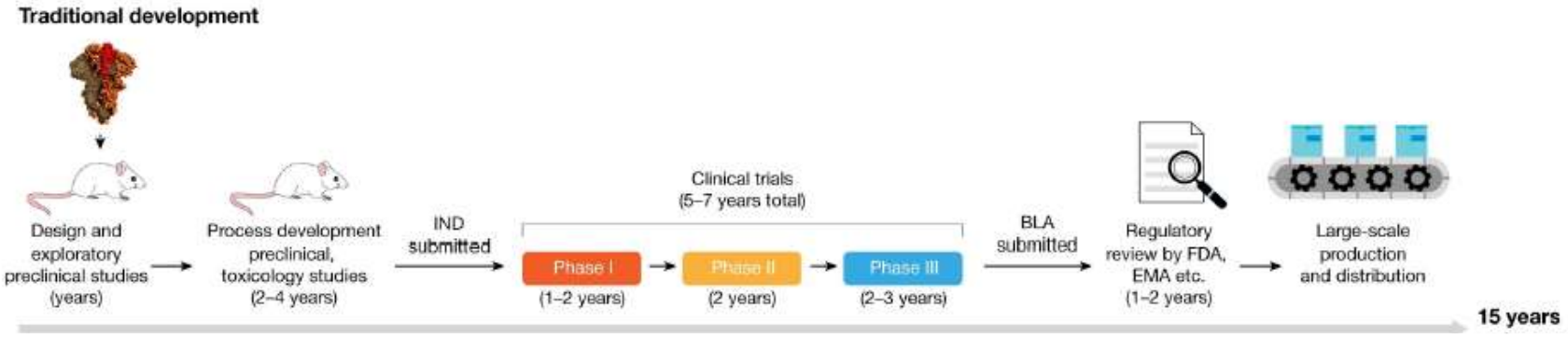
Source: NIAID

Herd Immunity

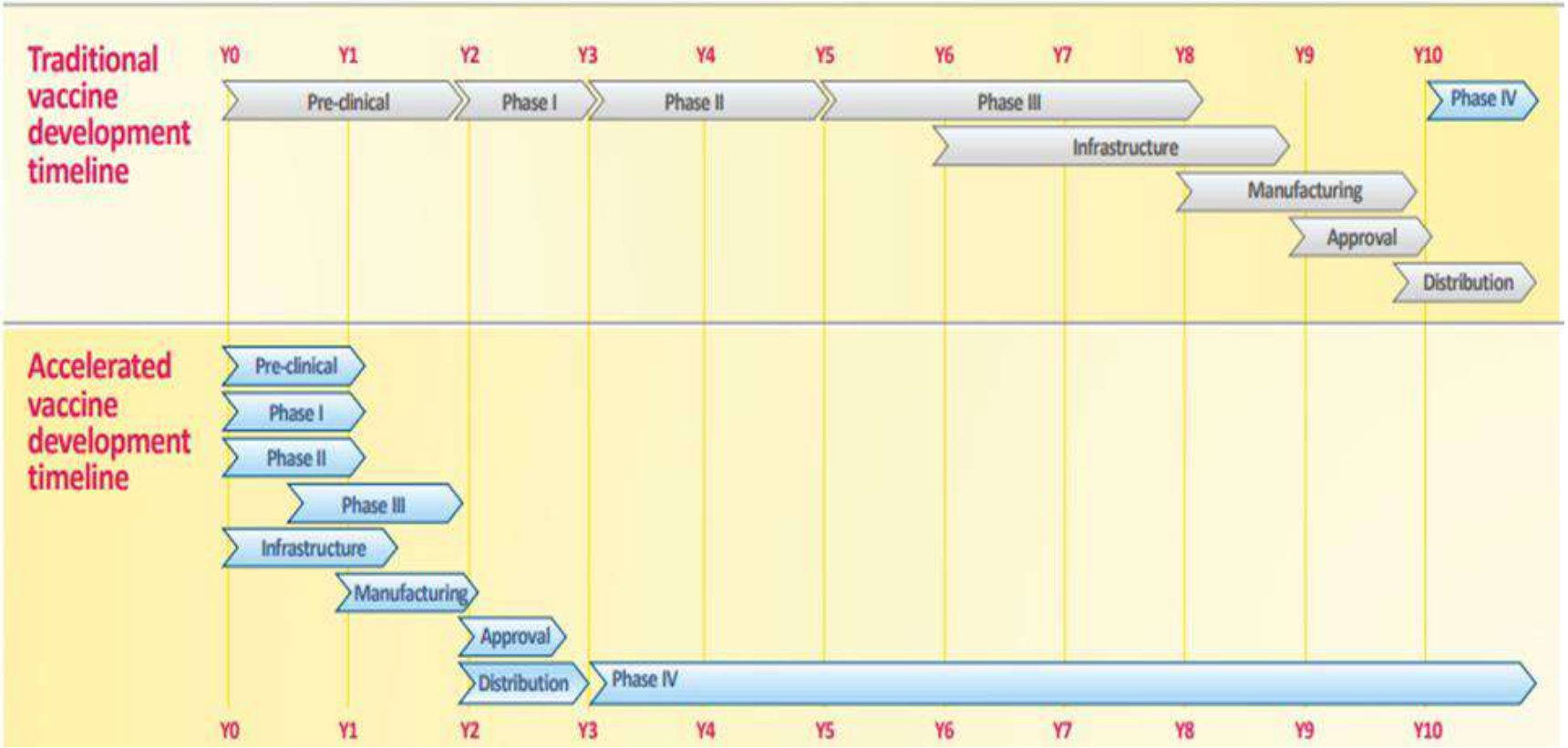


Omer SB, Yildirim I, Forman HP. Herd Immunity and Implications for SARS-CoV-2 Control. *JAMA*. Published online October 19, 2020. doi:10.1001/jama.2020.20892

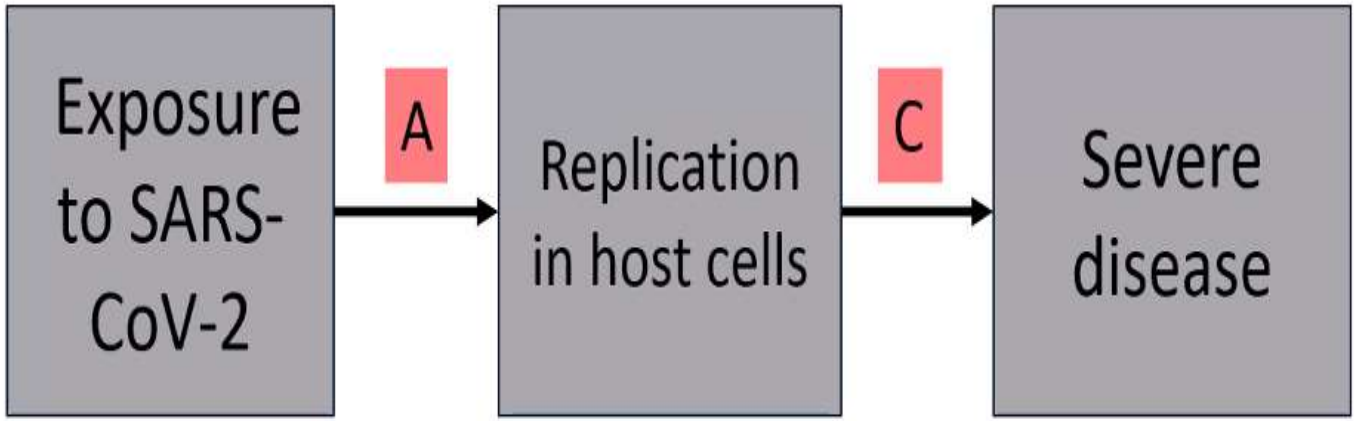
From: SARS-CoV-2 vaccines in development



https://www.nature.com/articles/s41586-020-2798-3/figures/1


Traditional vaccine development timeline
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Y8
Y9
Y10
Pre-clinical
Phase I
Phase II
Phase III
Phase IV
Infrastructure
Manufacturing
Approval
Distribution
Accelerated vaccine development timeline
Pre-clinical
Phase I
Phase II
Phase III
Infrastructure
Manufacturing
Approval
Distribution
Phase IV
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
Y8
Y9
Y10

Covid-19 vaccines expectations



Different mechanisms of vaccine impact

A. Prevents / reduces infection
B. Prevents /reduces infectiousness
C. Prevents / reduces degree of severity of disease

Many unknowns

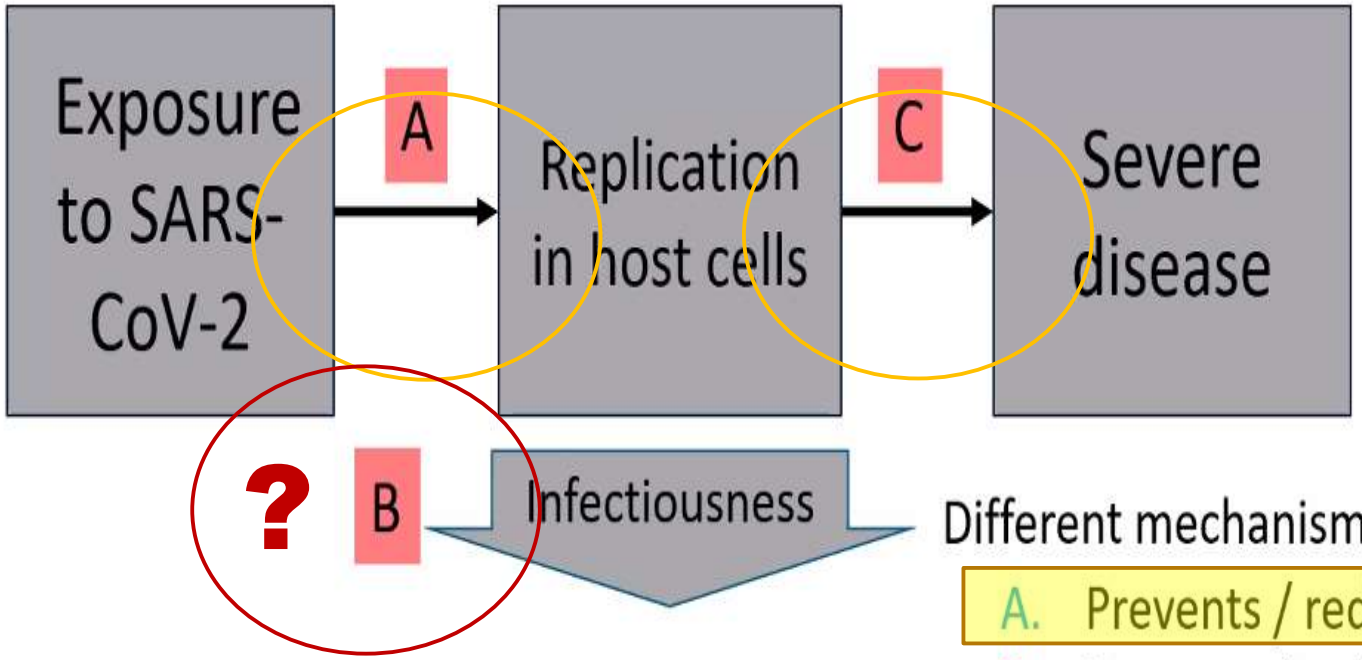
All-or-nothing vs. leaky vaccine

Age dependent VE

Underlying conditions dependent VE

+ Long lasting protection

Covid-19 vaccines expectations



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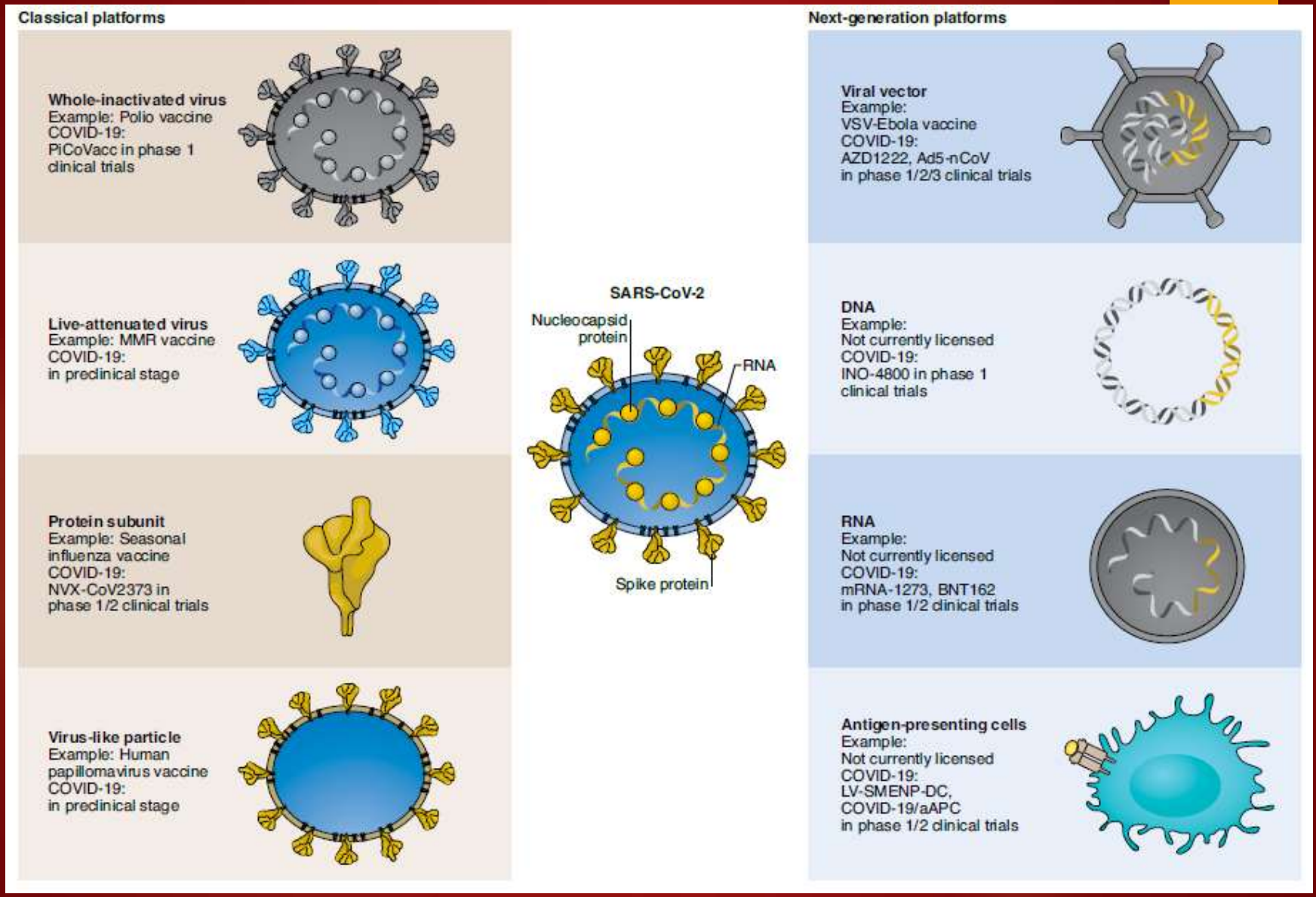
Age dependent VE

Underlying conditions dependent VE

+ Long lasting protection ???

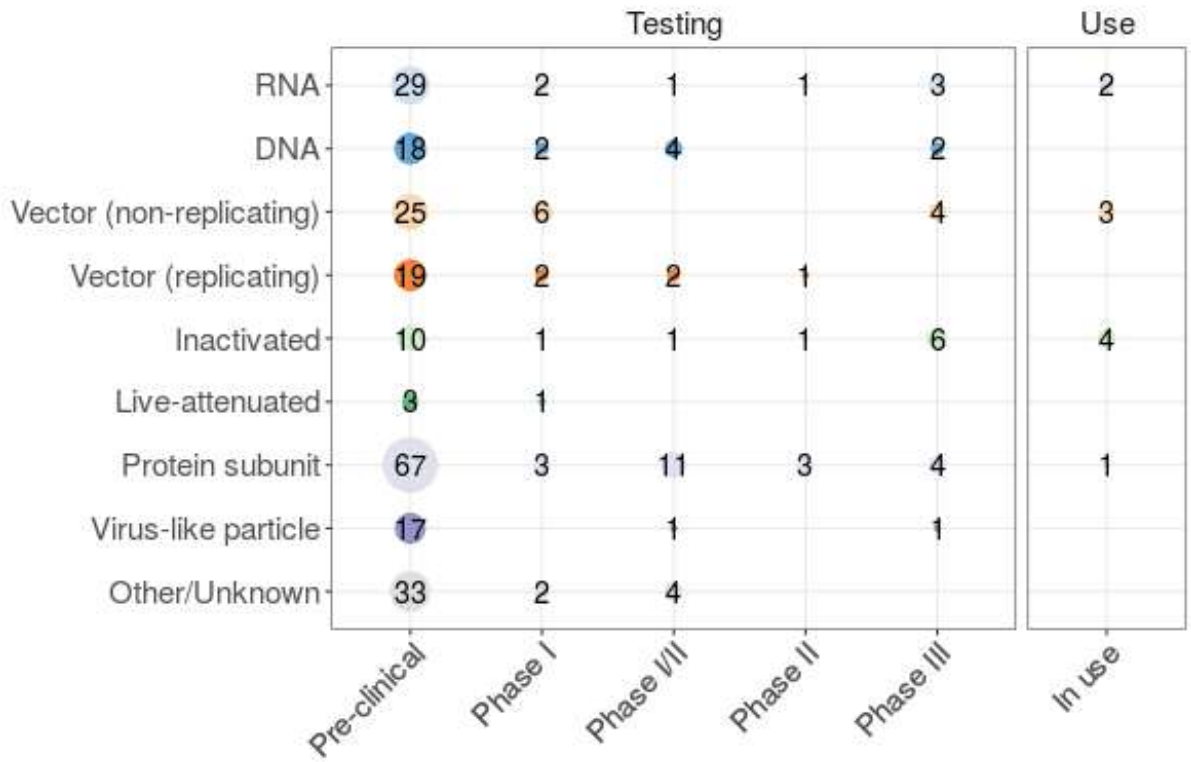
Classical and new platforms



https://www.nature.com/articles/s41563-020-0746-0/figures/1

Where are we today?

- 284 candidate vaccines in preclinical evaluation
- 49 vaccines in clinical evaluation and 20 in phase III
- 3 vaccines registered by a Stringent Regulatory Authority (SRA) and other by state mechanisms



https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines

Most advanced vaccines

BioNTech/Pfizer	Moderna	Oxford/AstraZeneca	Sputnik V	Coronavac
mRNA	**mRNA**	**Adenovirus**	**Adenovirus**	**Whole virus-inactivated**
95% efficacy @ 7d post second dose, 21d apart	**94.5% efficacy** 14d apart	**62%-90% efficacy** 14d apart	**91% efficacy** 7d apart **95%+** efficacy 21d apart	**50% efficacy 14 days after second dose**
Efficacy in >55y: 94%	15 cases in older adults,	Correlates of protection	No info in elderly	No info in elderly
Grade 3 events in > 2%	Grade 3 events in > 2%	"no serious safety events"	"no unexpected events"	"no serious safety events"
-70°C for 6 months **5-25°C for 5 days** Thermostable version mid-late 2021	**6 months @ -20°C** **30 days @ 2-8°C** Room temperature for 12h	**6 months @ 2-8°C**	Lyophilized form stored at **2-8°C**	**6 months @ 2-8°C**
US: $19.50 / dose EU: €15.50 / dose	$25-$37 / dose	EU: $3-4 / dose India: $3-4 (gov) $5-6 / dose	<$10 / dose	$30 / dose

Focus: Leading Vaccines

- **Pfizer/BioNTech**
  - BNT162b2
  - mRNA
  - 2 doses (21 days interval)
  - Results published in the NEJM the 10 December: 95% efficacy (7 days after the 2nd injection, duration at least 2 months).
  - Cold Chain of -70°C (5 days at 2-8°C)
  - Production capacity: 50M end 2020, 1.3B by end of 2021
  - Price: $15-20 per dose
  - Authorized for *limited emergency use by the* FDA & WHO, Conditional authorization by the EMA, registered in several countries.

Table 1: Adverse reactions from Comirnaty clinical trials

System Organ Class	Very common (≥ 1/10)	Common (≥ 1/100 to < 1/10)	Uncommon (≥ 1/1,000 to < 1/100)	Rare (≥ 1/10,000 to < 1/1,000)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy		
Immune system disorders					Anaphylaxis; hypersensitivity
Psychiatric disorders			Insomnia		
Nervous system disorders	Headache			Acute peripheral facial paralysis†	
Gastrointestinal disorders		Nausea			
Musculoskeletal and connective tissue disorders	Arthralgia; myalgia		Pain in extremity		
General disorders and administration site conditions	Injection site pain; fatigue; chills; pyrexia*; injection site swelling	Injection site redness	Malaise; injection site pruritus		

*A higher frequency of pyrexia was observed after the 2nd dose.

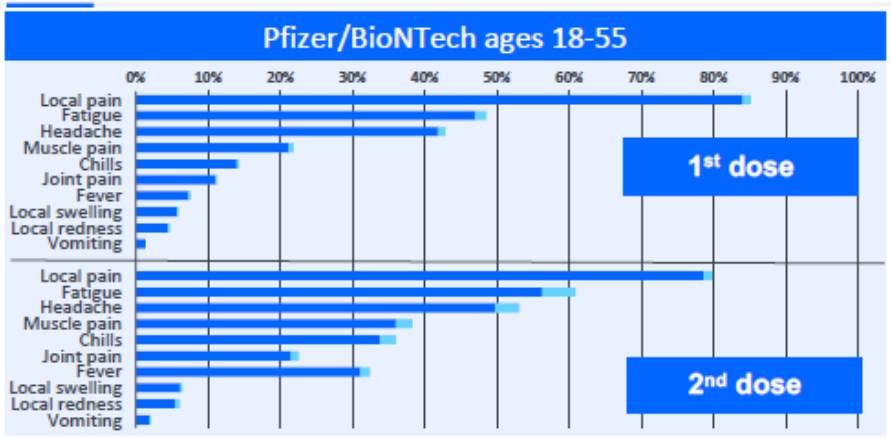
† Throughout the safety follow-up period to date, acute peripheral facial paralysis (or palsy) was reported by four participants in the COVID-19 mRNA Vaccine group. Onset was Day 37 after Dose 1 (participant did not receive Dose 2) and Days 3, 9, and 48 after Dose 2. No cases of acute peripheral facial paralysis (or palsy) were reported in the placebo group.

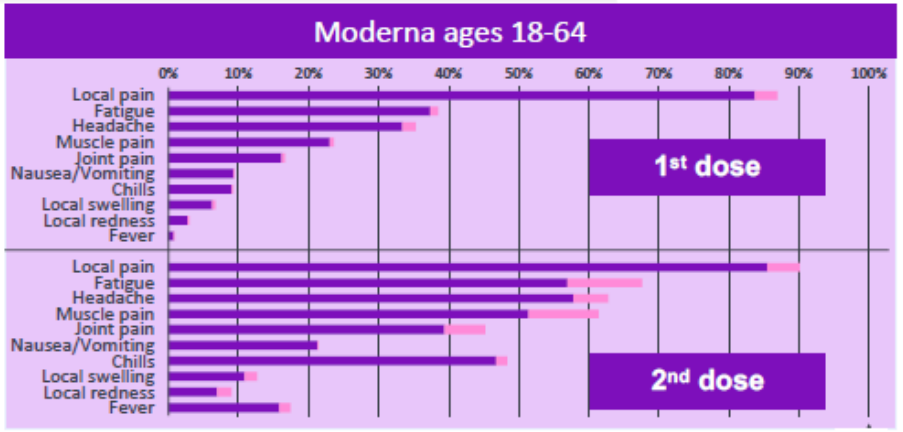
file:///C:/Users/ISP/Desktop/ComirnatySmPC_V2.pdf

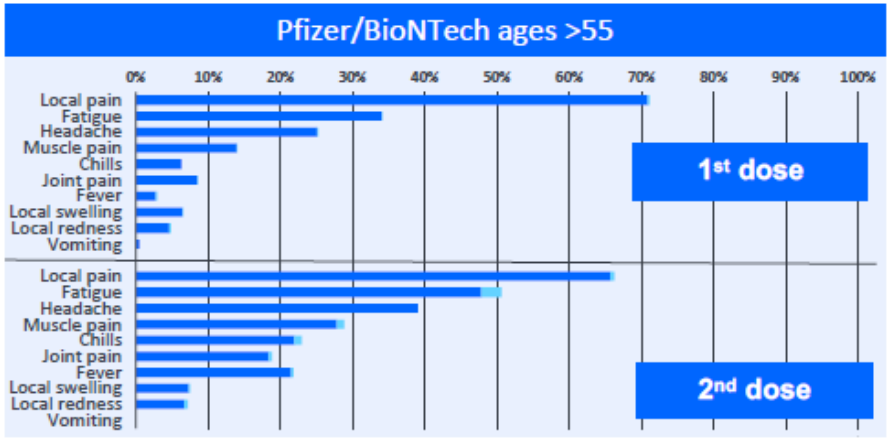
mRNA Side effects more frequent and severe after 2nd doses

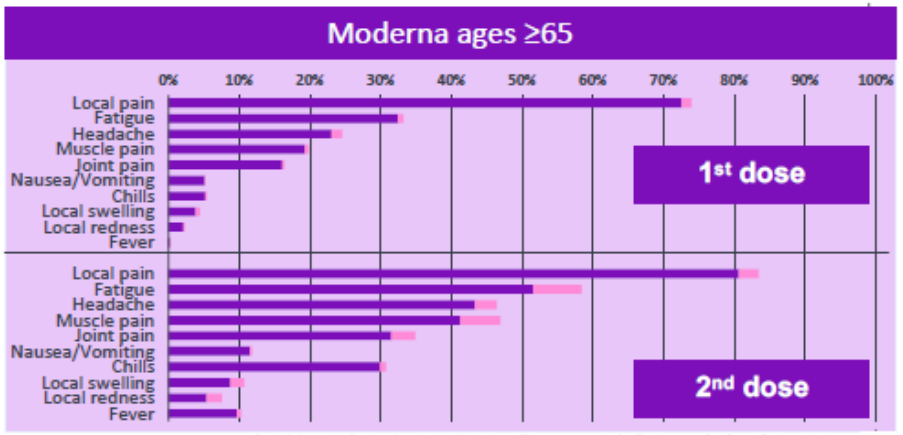
Summary of symptom prevalence FDA data for Pfizer/BioNTech and Moderna's mRNA vaccines

airfinity
HOME OF NEW SCIENCE









Mild/Moderate Servere

https://www.fda.gov/media/144245/download
https://www.fda.gov/media/144434/download

Mild/ derate Seve

Focus: Leading Vaccines

- **Astra-Zeneca**
  - AZD1222
  - Replication deficient simian adenovirus
  - 2 doses, 28 days interval
  - Preliminary results : (up to) 90% efficacy after 2 doses
  - Cold chain: 6 months at 2-8°C
  - Production capacity: 2.9B doses by end of 2021
    - Tech transfer with Serum Institute of India – have already been manufacturing doses (500M in 2020)
  - Price: <$5 par dose

  - Authorized for limited emergency use in the U.K., India, Argentina

Side effects that occurred during clinical trials with COVID-19 Vaccine AstraZeneca were as follows:

Very Common (may affect more than 1 in 10 people)

- tenderness, pain, warmth, redness, itching, swelling or bruising where the injection is given
- generally feeling unwell
- feeling tired (fatigue)
- chills or feeling feverish
- headache
- feeling sick (nausea)
- joint pain or muscle ache

Common (may affect up to 1 in 10 people)

- a lump at the injection site
- fever
- being sick (vomiting)
- flu-like symptoms, such as high temperature, sore throat, runny nose, cough and chills

Uncommon (may affect up to 1 in 100 people)

- feeling dizzy
- decreased appetite
- abdominal pain
- enlarged lymph nodes
- excessive sweating, itchy skin or rash

https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2021/01/Information_for_UK_recipients_COVID-19_Vaccine_AstraZeneca.pdf

Objectives of Covid-19 vaccination programs

To vaccinate a large proportion of the population with a vaccine which is highly **effective at preventing infection** (transmission)

- good evidence on the **effects** of vaccination **on transmission is not available**
- vaccine **availability** is **limited**

In the initial phase of the program, the objective is to prevent morbidity and mortality in the group(s) most at risk of severe disease and death

➔ Other preventive measures will need to remain in place until vaccination coverage is high enough !

Table 1. Summary of the SARS-CoV-2 seroprevalence study sample sources (15 July–7 August 2020), demographic information of individuals and SARS-CoV-2 antibody (Ab) prevalence, Cape Town Metro, South Africa.

	n	SARS-CoV-2 Ab positive	SARS-CoV-2 Ab negative	% positive (95% CI)
All Metro clinics	2791	1123	1668	40.2 (38.4-42.1)
Sex				
Male	518	170	348	32.8 (28.8-36.9)
female	2240	944	1296	42.1 (40.1-44.2)
Source population				
Tygerberg	161	54	107	33.5 (26.2-40.9)
Eastern	213	70	143	32.9 (26.5-39.2)
Southern	271	83	188	30.6 (25.1-36.2)
Age group				
<20 years	151	54	97	35.8 (28-43.5)
20-50 years	2349	966	1383	41.1 (39.1-43.1)
>50 years	291	103	188	35.4 (29.9-40.9)

NEWS

Check for updates

The BMJ

Cite this as: *BMJ* 2021;372:n124
http://dx.doi.org/10.1136/bmj.n124
Published: 14 January 2021

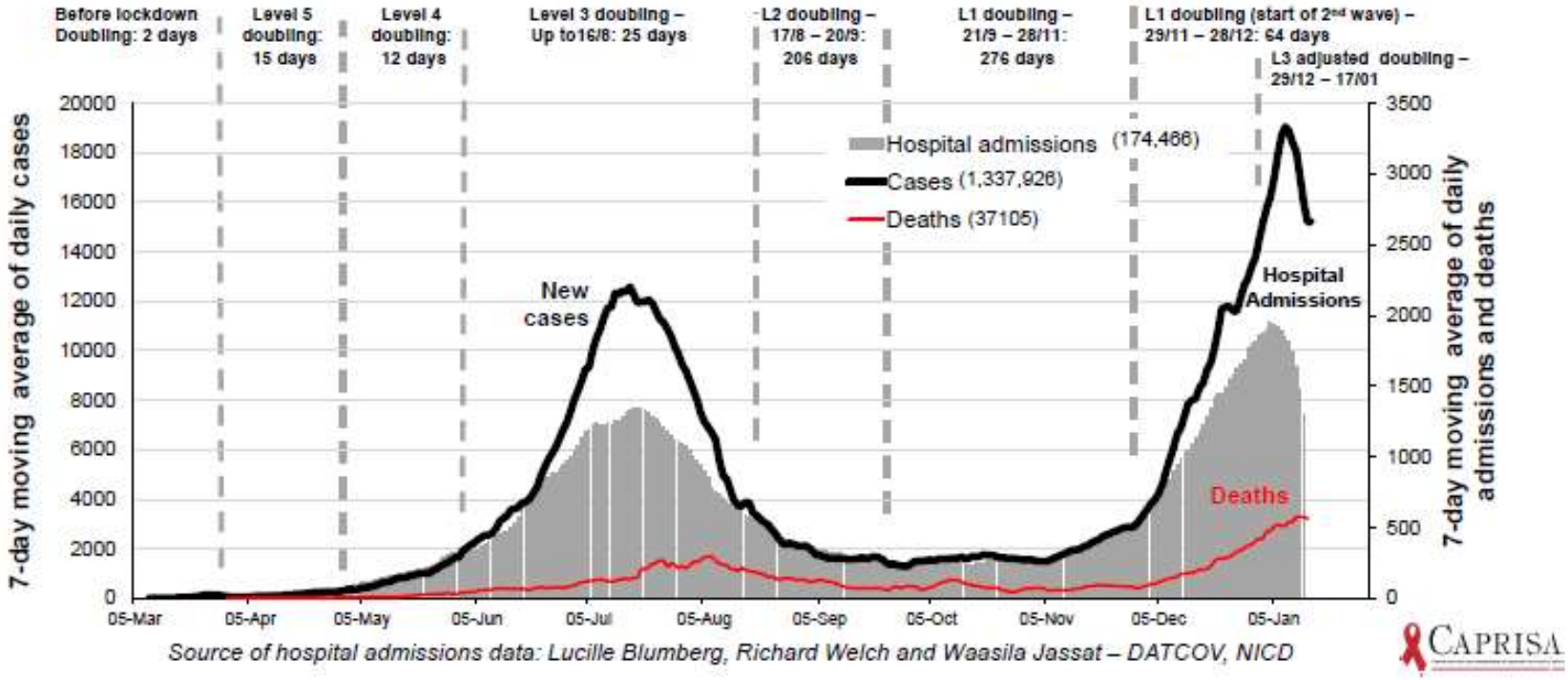
Covid-19: Past infection provides 83% protection for five months but may not stop transmission, study finds

Elisabeth Mahase

https://www.nicd.ac.za/wp-content/uploads/2020/09/COVID-19-Special-Public-Health-Surveillance-Bulletin_Issue-5.pdf

Covid-19 in South Africa

7-day moving average of new cases, sentinel hospital admissions and Covid-19 deaths – to 17 Jan 2021



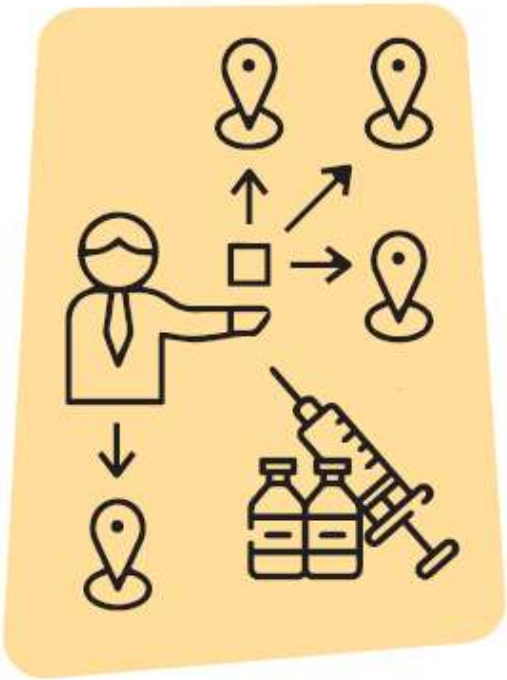
Source of hospital admissions data: Lucille Blumberg, Richard Welch and Waasila Jassat – DATCOV, NICD

CAPRISA

How will the vaccine be distributed?

Our rollout of the vaccine will take a three-phase approach that begins with the most vulnerable in our population. Our target is to vaccinate 67% of the population by the end of 2021, which will allow us to achieve herd immunity.

Phase 1 will focus on frontline healthcare workers
Phase 2 will vaccinate essential workers, persons in congre gate settings, persons over 60 years and persons over 18 years with co-morbidities.
Phase 3 will focus on persons older than 18 years, targeting 22,500,000 of the population.



https://sacoronavirus.co.za/wp-content/uploads/2021/01/CORONAVIRUS-AND-VACCINE-BOOKLET-.pdf

Risk according to age

	Hospitalization[1]	Death[2]
0-4 years	4x lower	9x lower
5-17 years	9x lower	16x lower
18-29 years	Comparison Group	Comparison Group
30-39 years	2x higher	4x higher
40-49 years	3x higher	10x higher
50-64 years	4x higher	30x higher
65-74 years	5x higher	90x higher
75-84 years	8x higher	220x higher
85+ years	13x higher	630x higher

Co-morbidities at risk

- Chronic kidney disease
- Chronic lung disease (asthma and heavy smokers included)
- Chronic cardiovascular disease (hypertension included)
- Immunocompromised state (*cancer treatment, bone marrow or organ transplantation, immune deficiencies, poorly controlled HIV or AIDS, prolonged use of corticosteroids and other immune weakening medications)*
- Obesity and Severe Obesity (BMI ≥ 40 kg/m^2)
- Sickle cell disease
- Diabetes
- Smoking

>>>>>Pregnancy (but no included in clinical trials)

People with HIV should be considered a high-risk group for COVID-19 management.

https://www.medrxiv.org/content/10.1101/2020.07.02.20145185v2

Contraindications vs lack of data

Contra-indication to vaccination:

history of severe allergic reaction to any component of the vaccine.

Precautions:

A history of any immediate allergic reaction to any other vaccine or injectable therapy (i.e. intramuscular, intravenous, or subcutaneous vaccines or therapies)

Treatment with anticoagulants

>>>>Food, contact, or seasonal allergies are not considered a precaution.

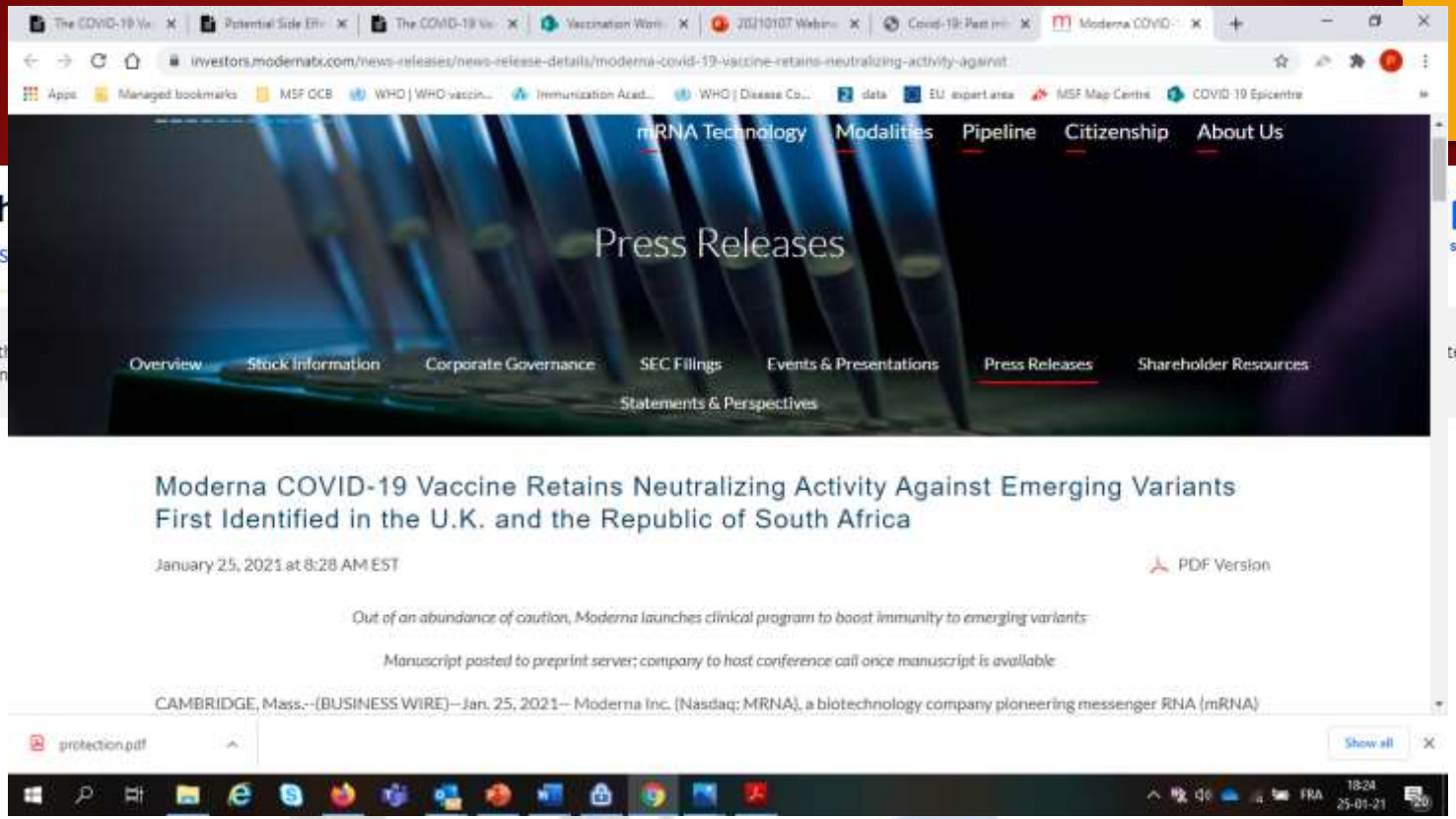
Contraindications vs lack of data

Lack of data:

- pregnancy and lactating women
- children <16/18 years
- Immunocompromised
-Unstable HIV and/or HCV+HBV

Not contra-indication to vaccination:

- previous infection with Covid-19 (avoid vaccination in the acute phase of the disease)
- stable comorbidities: including diabetes, cancer, hepatitis B, hepatitis C and well-managed HIV.

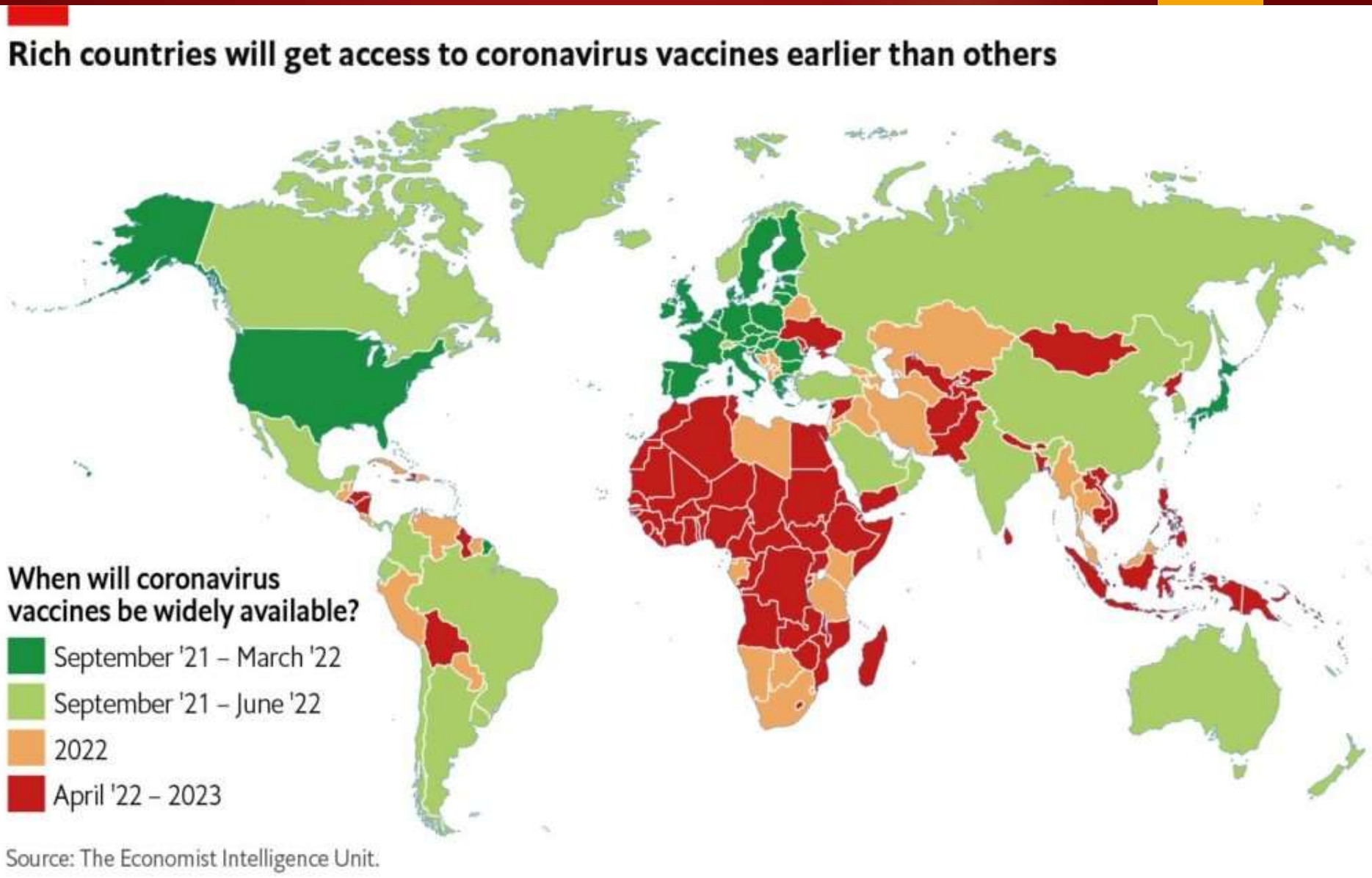


Transmissibility appears to be higher and impact on vaccine effectiveness is likely to be low.

Distribution mechanisms

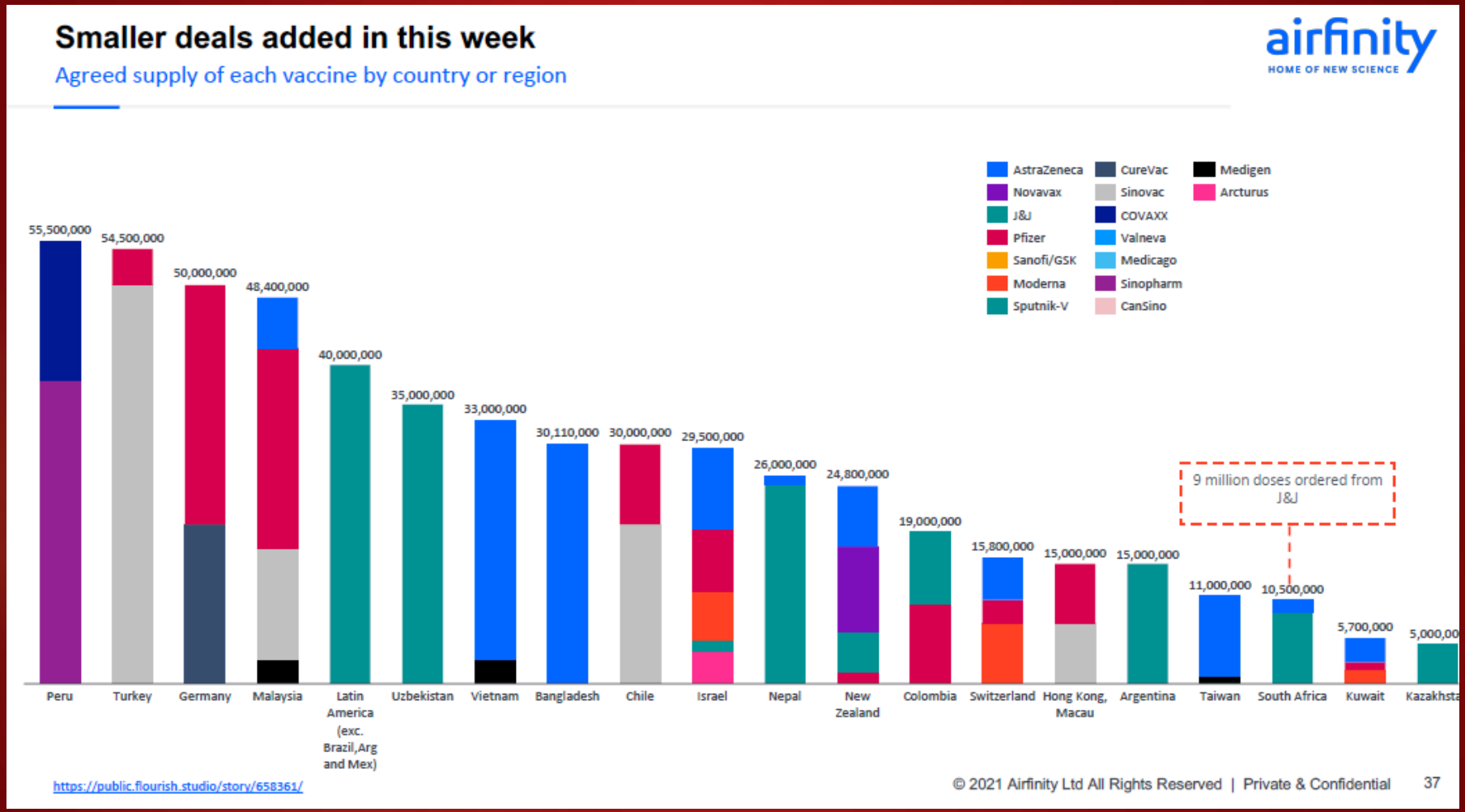
- **APA** (advanced purchase agreement)
  (50% of doses of advanced stage vaccines already promised by manufacturers to countries)
- **COVAX** (CEPI, GAVI, OMS)
  - GAVI COVAX Advanced Market Commitment signed by 92 LMIC
  - Financing gap of **7,5 billion** (11b total)
  - 2nd wave after manufacturers have delivered on APA

African Vaccination Acquisition Task Team (AVATT) has secured 270 Mil doses for African Countries (50 Mil from April to June 2021), Pfizer, AZ and J&J.



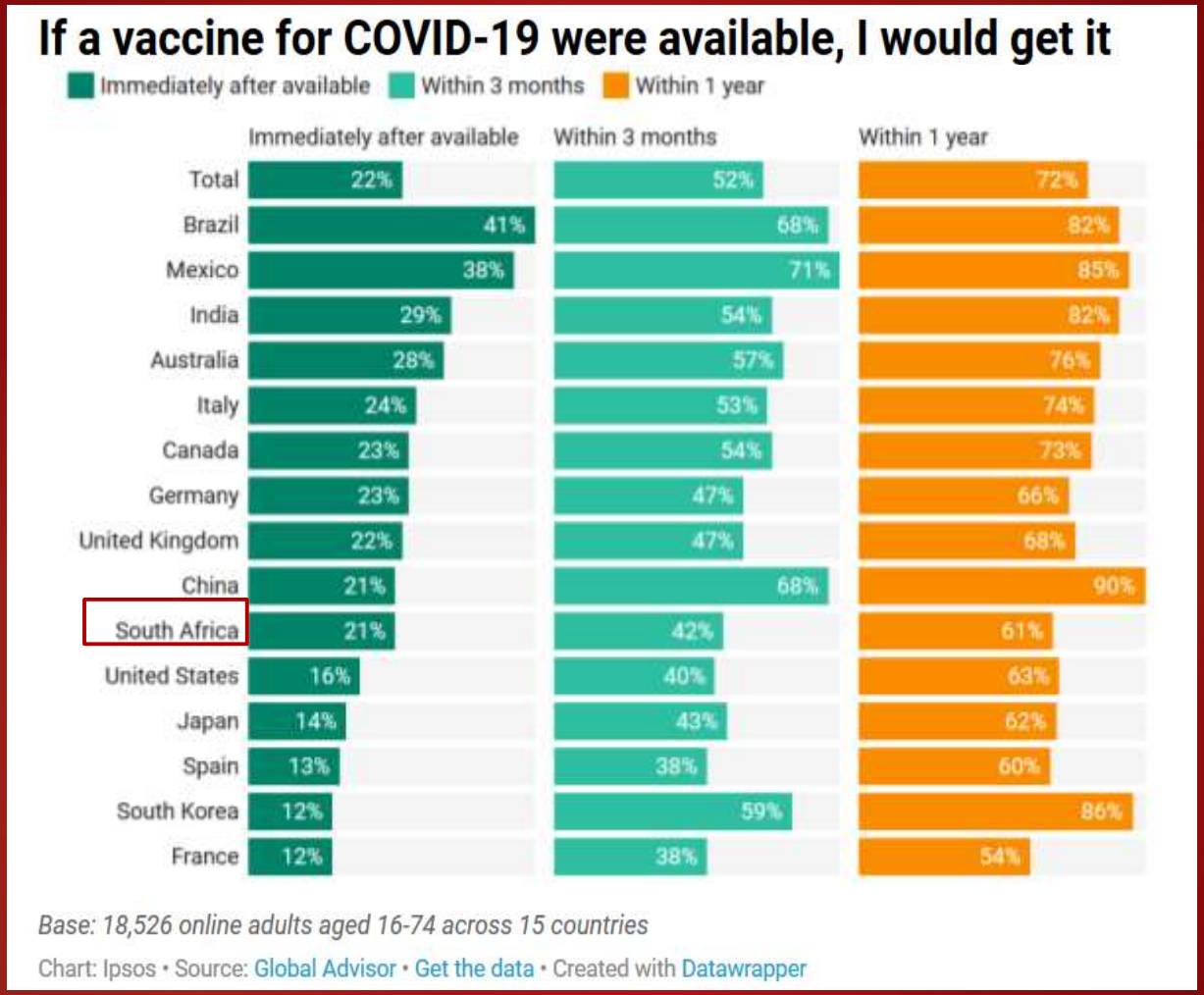
https://www.eiu.com/n/rich-countries-will-get-access-to-coronavirus-vaccines-earlier-than-others/

Covid vaccines bilateral/multilateral agreements



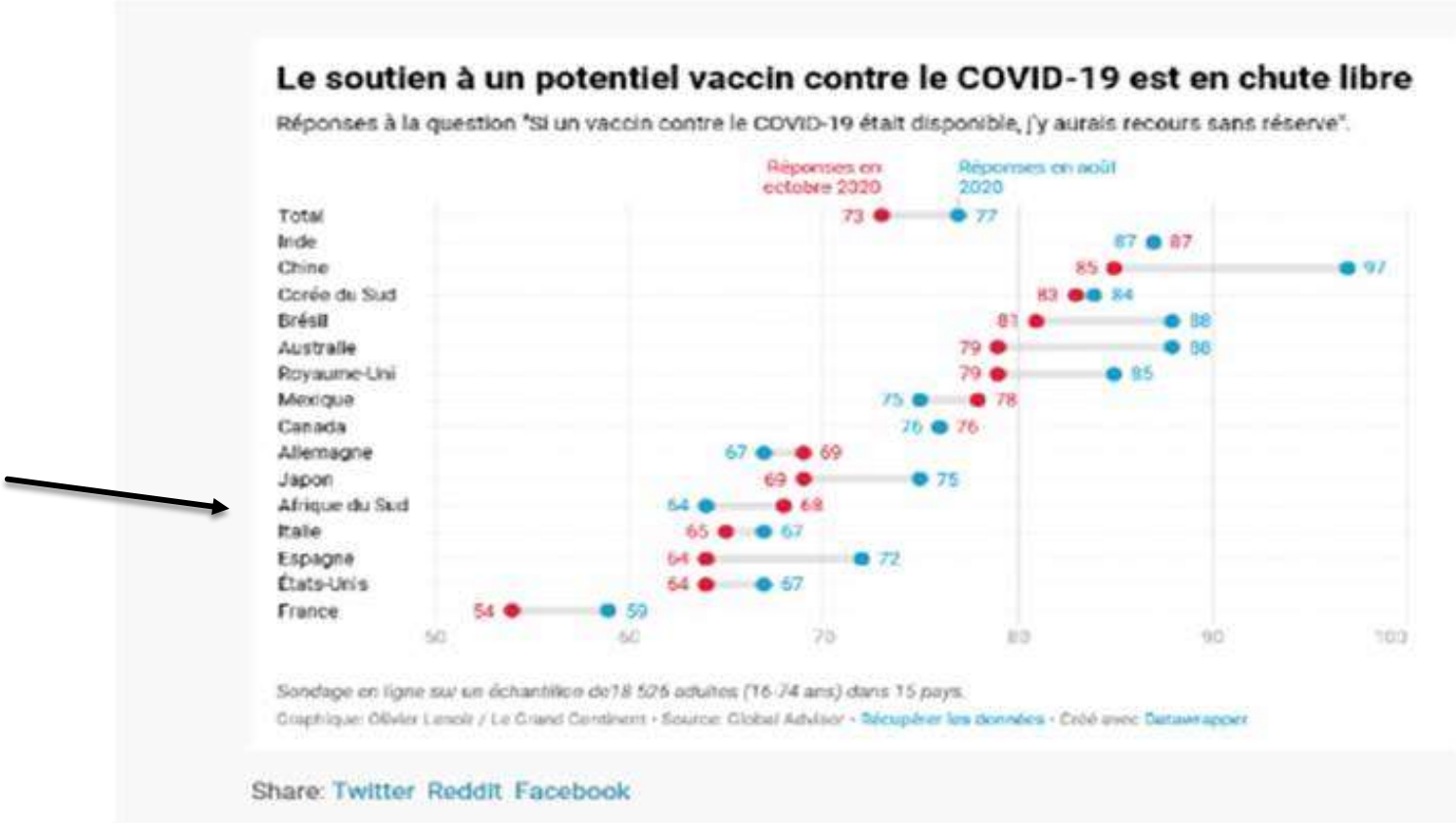
https://www.unicef.org/supply/covid-19-vaccine-market-dashboard

Vaccination hesitancy

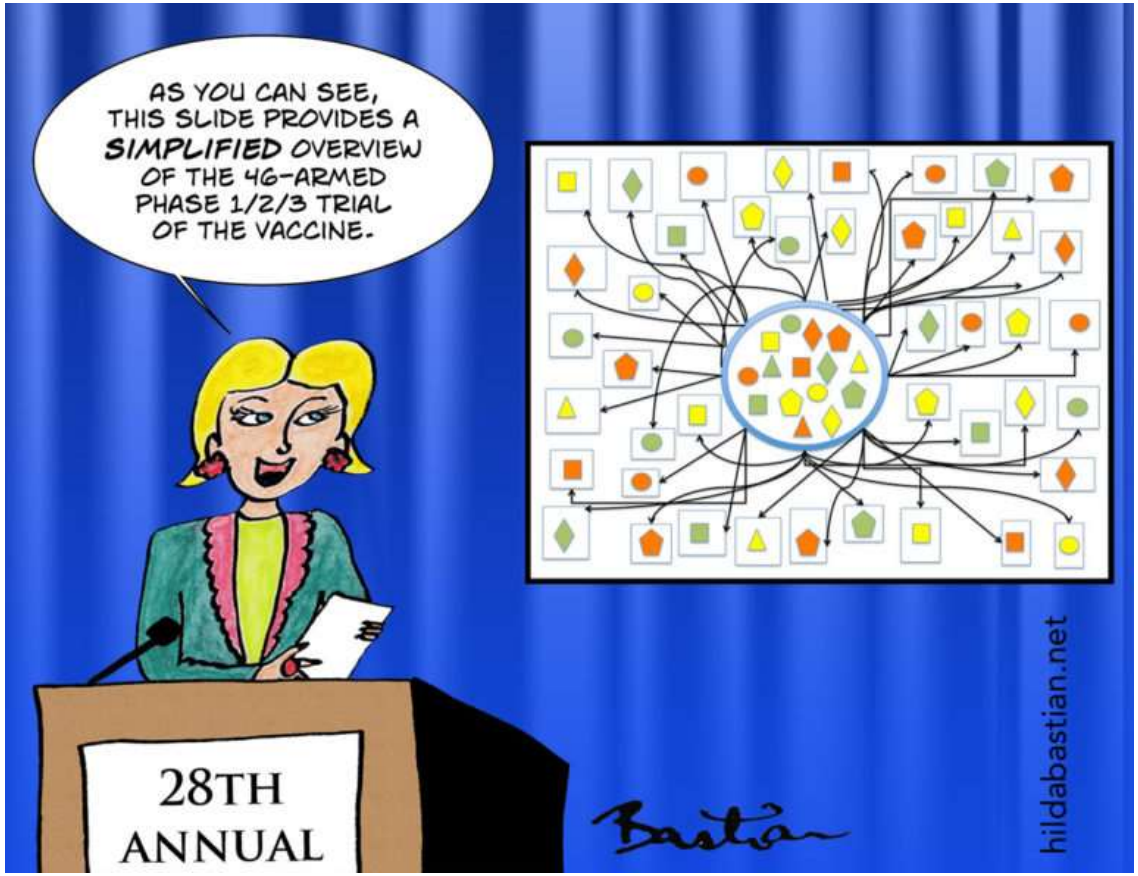


https://www.ipsos.com/en/global-attitudes-covid-19-vaccine-october-2020

Acceptabilité des vaccins COVID 19 au monde, Afrique : En baisse



THANKS!!



Time for questions

Reliable sources of information

- **WHO**, **CDC**, **ECDC** websites
- The **advisors** from the medical department
- Vaccine **technical sheets**
- **Questions & Answers**
- Good visuals and clear explanations: https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html

Specific to South Africa
https://sacoronavirus.co.za/2021/01/12/vaccine-rollout-infographics/

On pourrait presque dire qu'on a plus de risques de se faire renverser en allant se faire vacciner que d'avoir un effet secondaire du vaccin !

SAGE eccomendations

Interchangeability with other vaccines

No data are available on the interchangeability between different COVID-19 vaccine platforms. It is currently recommended that the same product should be used for all doses..

Co-administration with other vaccines

There should be a minimum interval of **14 days between administration** of COVID19 vaccine and any other vaccine against other conditions, until data on co-administration with other vaccines become available.

Summary of functional impact of key mutations

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Mutation	Key variants with mutation	Functional impact			
		Transmissibility	Therapeutic monoclonal escape	Polyclonal Escape	Impact on vaccine efficacy*
N501Y	B.1.1.7 (UK), 501Y.V2 (SA), P.1 (BRA)				BNT162b2 (Pfizer/BioNTech)** mRNA-1273 (Moderna)
E484K	501Y.V2 (SA), P.1 (BRA), P.2 (BRA)		LY-CoV555 REGN10933 (part of REGN-CoV2)		BNT162B2 (Pfizer/BioNTech) mRNA-1273 (Moderna)
ΔH69/V70	B.1.1.7 (UK)				
K417N	B.1.351 (SA)			Any potential impact appears likely to be mild	BNT162B2 (Pfizer/BioNTech) mRNA-1273 (Moderna)
P681H	B.1.1.7 (UK)				
D614G	All variants originating from the B.1 lineage				

*Based of impact on sera from vaccinated individuals
** Conflicting reports

No impact
Potentially no impact
Potential impact
Confirmed mild impact
No/insufficient/conflicting data
Confirmed impact