SARS-COV-2(COVID-19) ,Vaccination & Health tips

Dr. Visula Abeysuriya

(MBBS,MPH,MPhil,FRSPH)

2021

Content

- Brief introduction of SARS-COV-2 and its variants
- Morbidity and mortality patterns (Global and Local)
- Excess mortality
- Brief history of vaccine development
- Approved vaccines for SARS-COV-2
- Mix and Match
- Trends in vaccination programme (Global and Local)
- Hesitancy and myths
- Recommended preventive health care practices
- Available curative care
- Post SARS-CoV-2 complications (Long COVID)

Brief introduction of SARS-COV-2

- On 31 December 2019, WHO was informed of cases of pneumonia of unknown cause in Wuhan City, China.
- A novel coronavirus was identified as the cause by Chinese authorities on 7 January 2020 and was temporarily named “2019-nCoV.
- The official names COVID-19 and SARS-CoV-2 were issued by the WHO on 11 February 2020.
- COVID-19 is a disease caused by a new strain of coronavirus.

'CO' stands for corona,

'VI' for virus,

'D' for disease.

COVID-19 and SARS-CoV-2

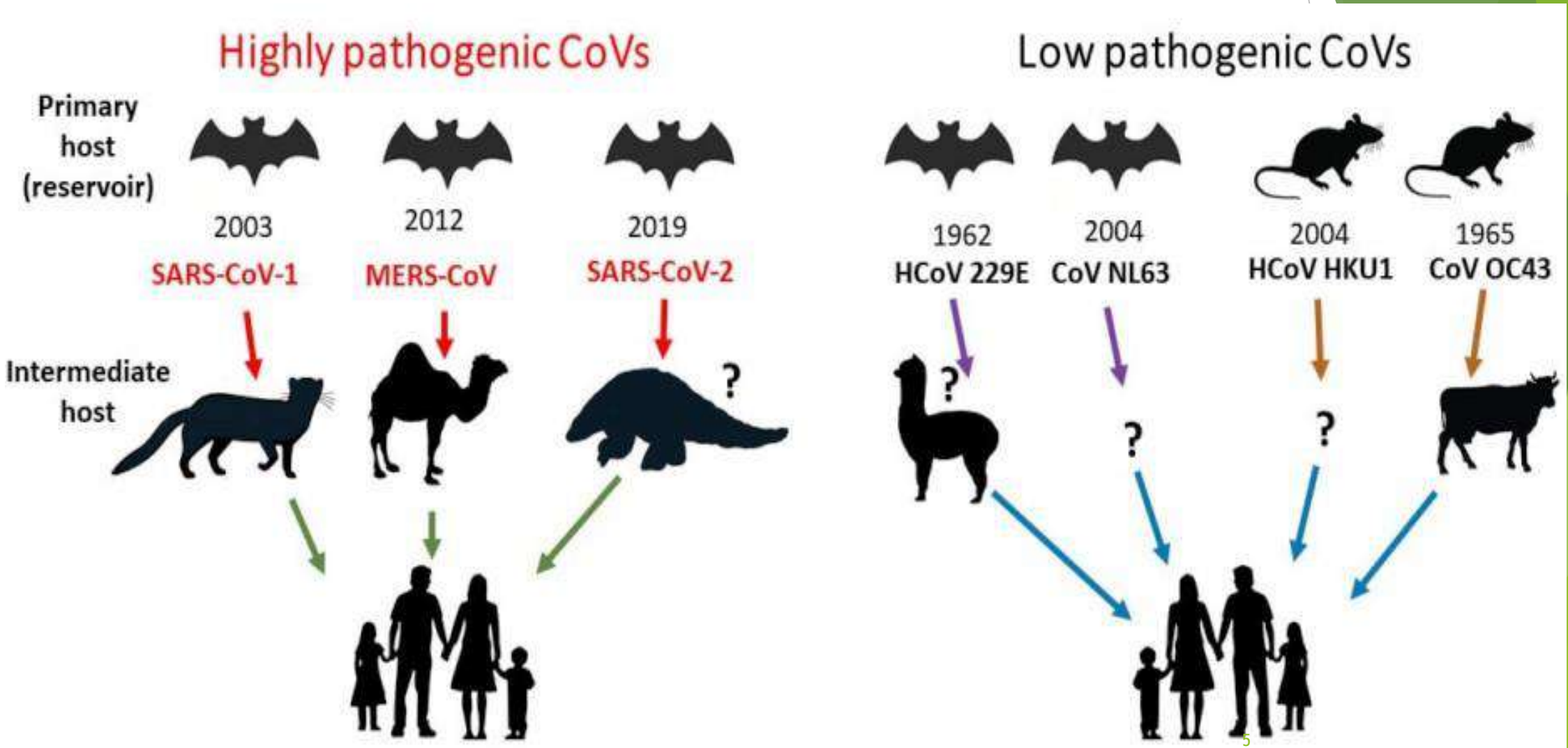
Disease

- Coronavirus disease
  - (COVID-19)

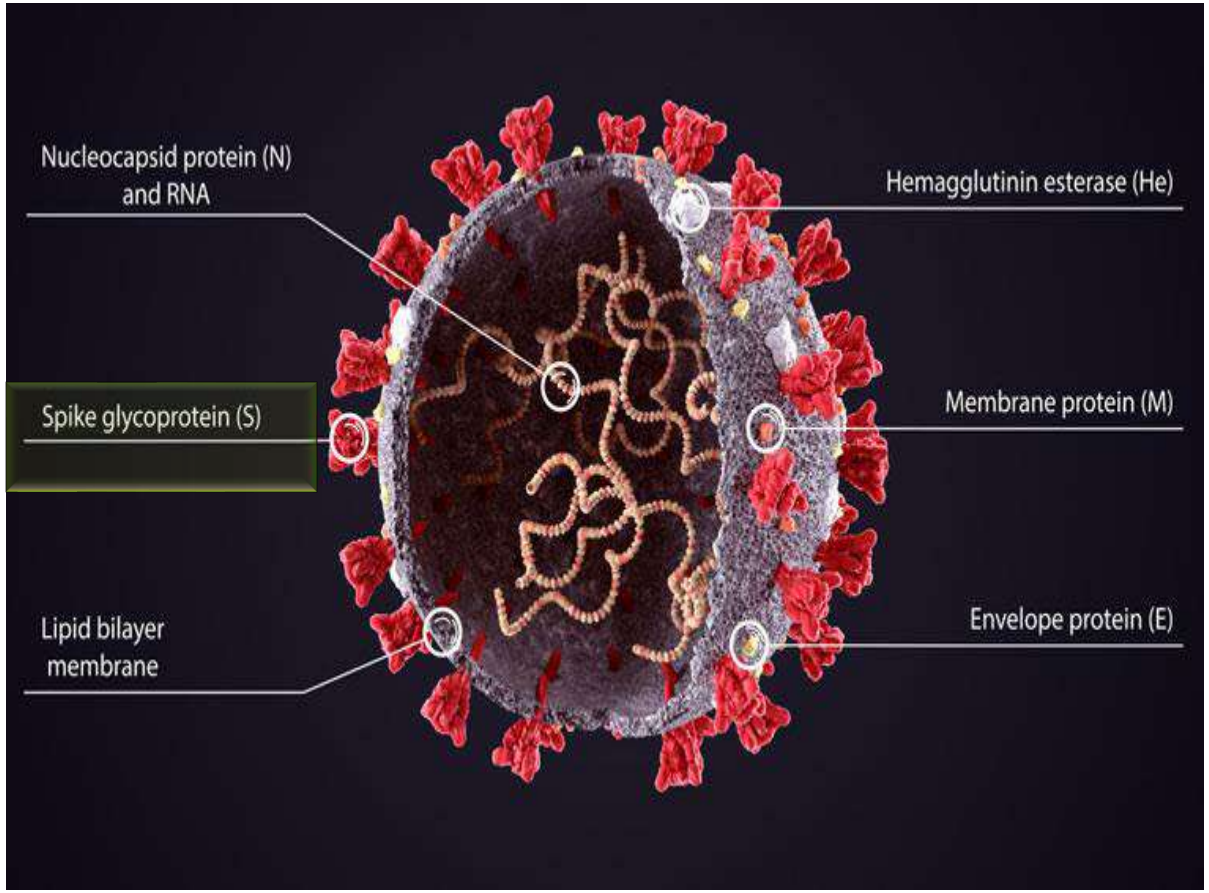
Virus

- Severe acute respiratory syndrome coronavirus 2
  - (SARS-CoV-2)

Types of Corona viruses(source :Googal website)



Structure of the SARS-CoV-2(source :Googal website)



Structure of virus

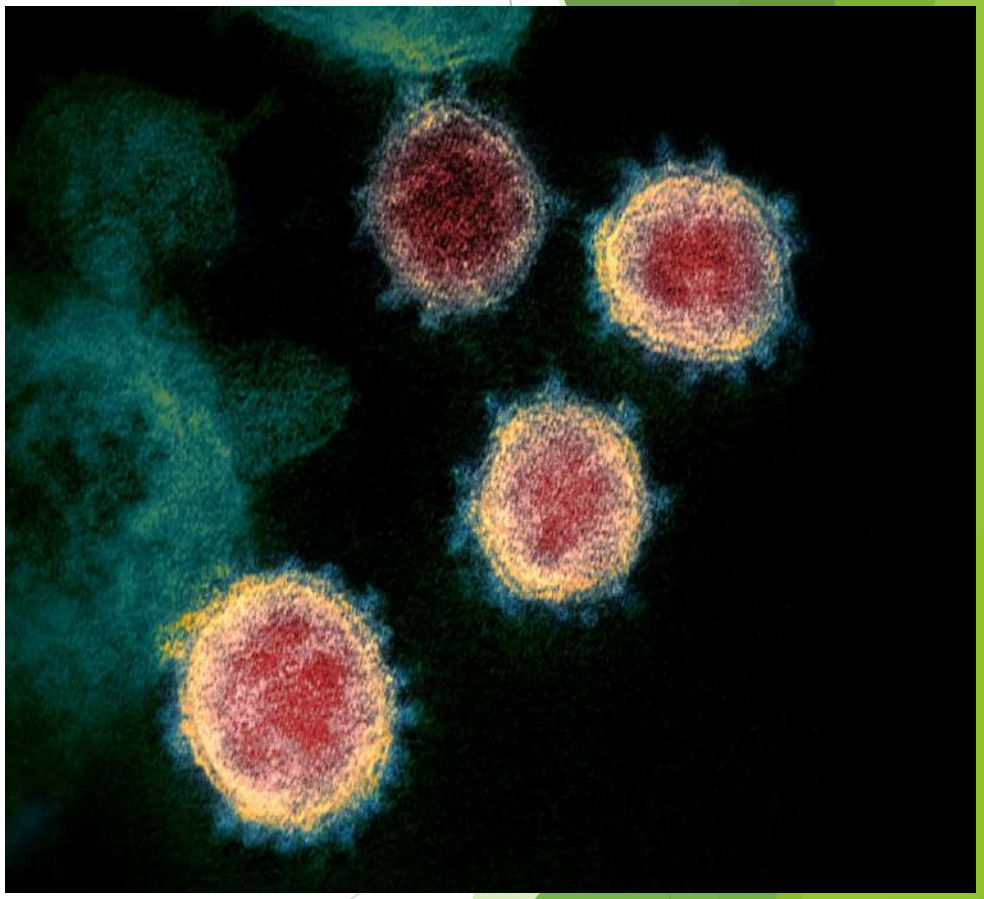
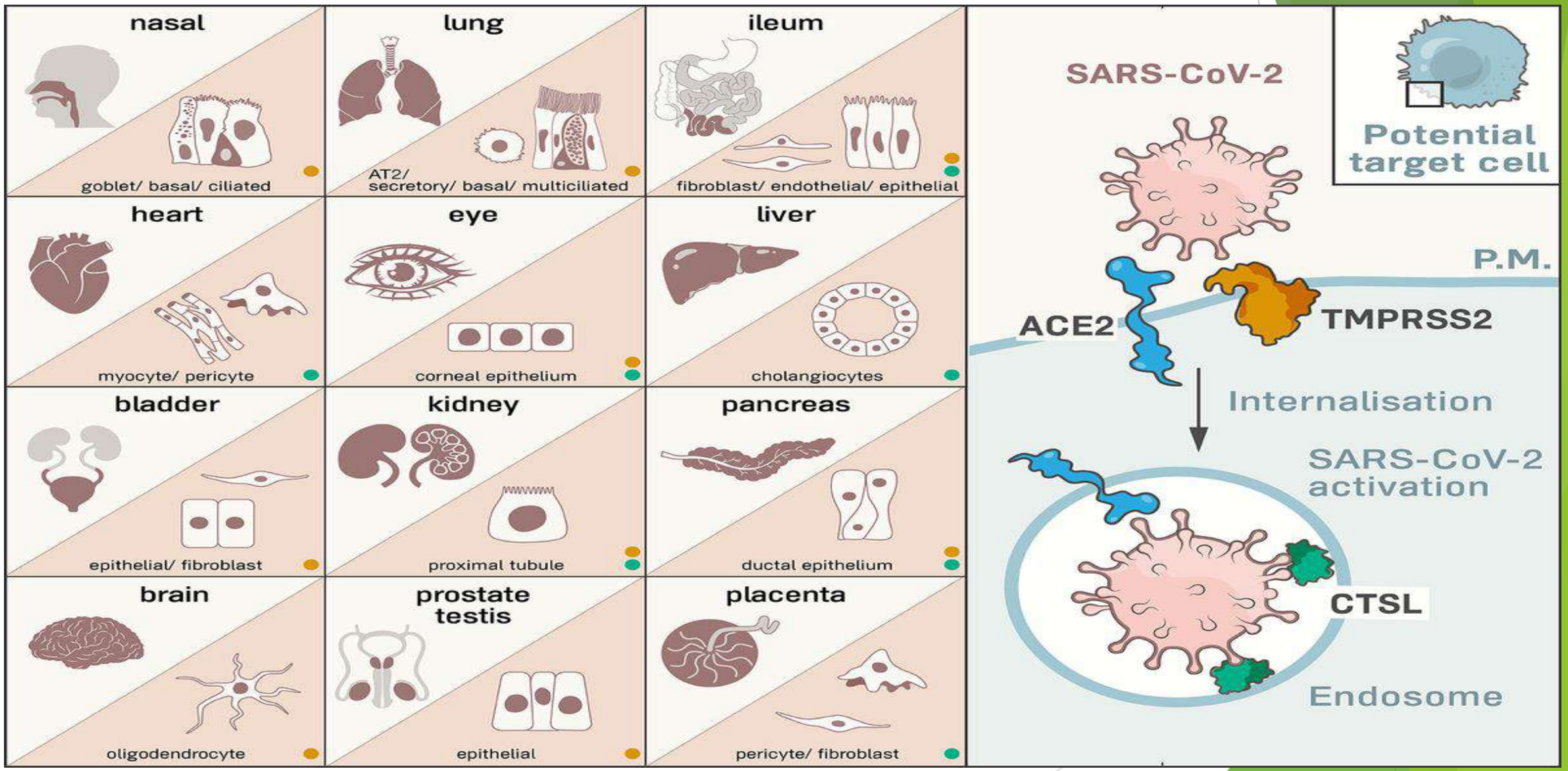
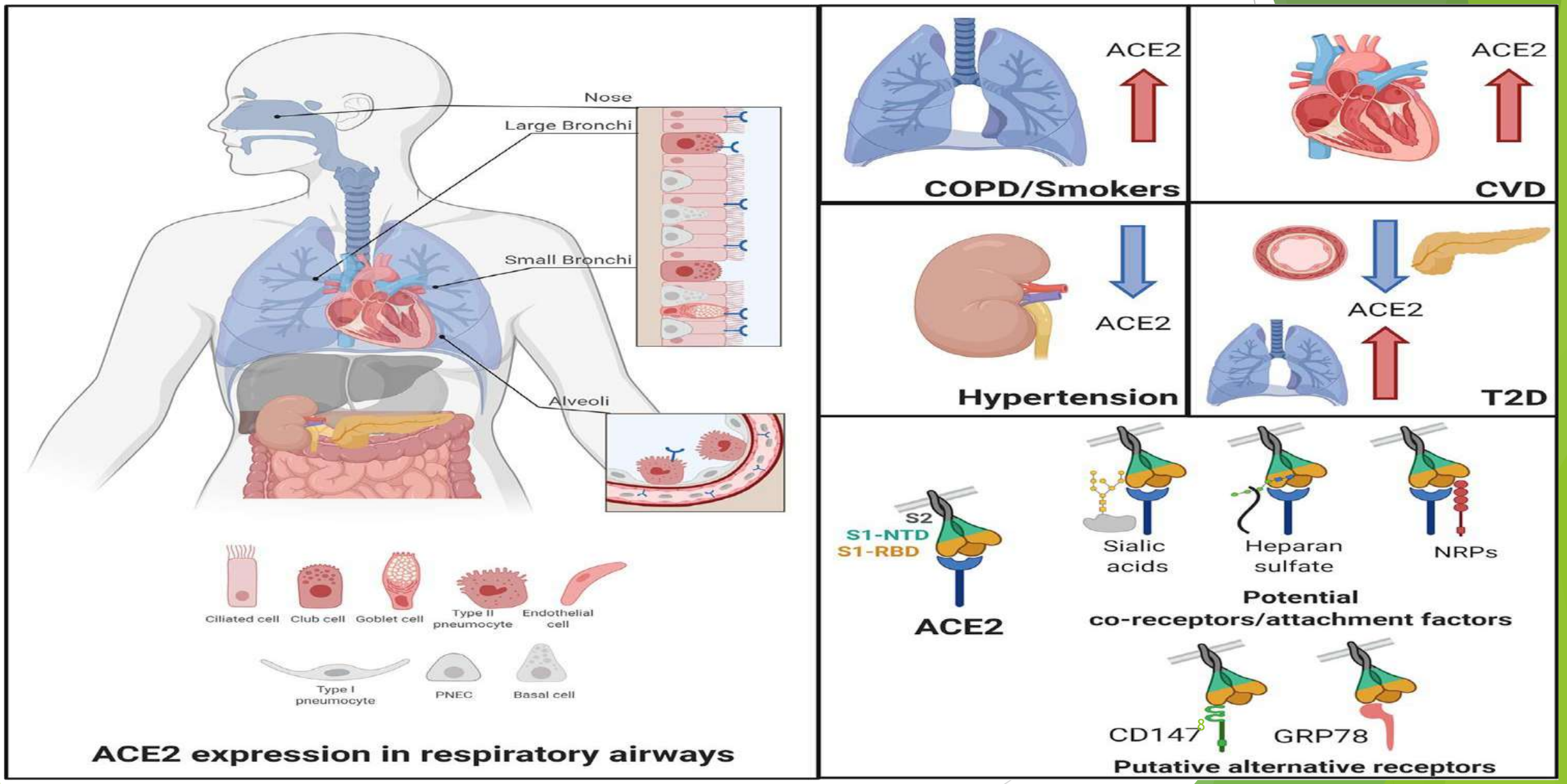


Image of electron microscope

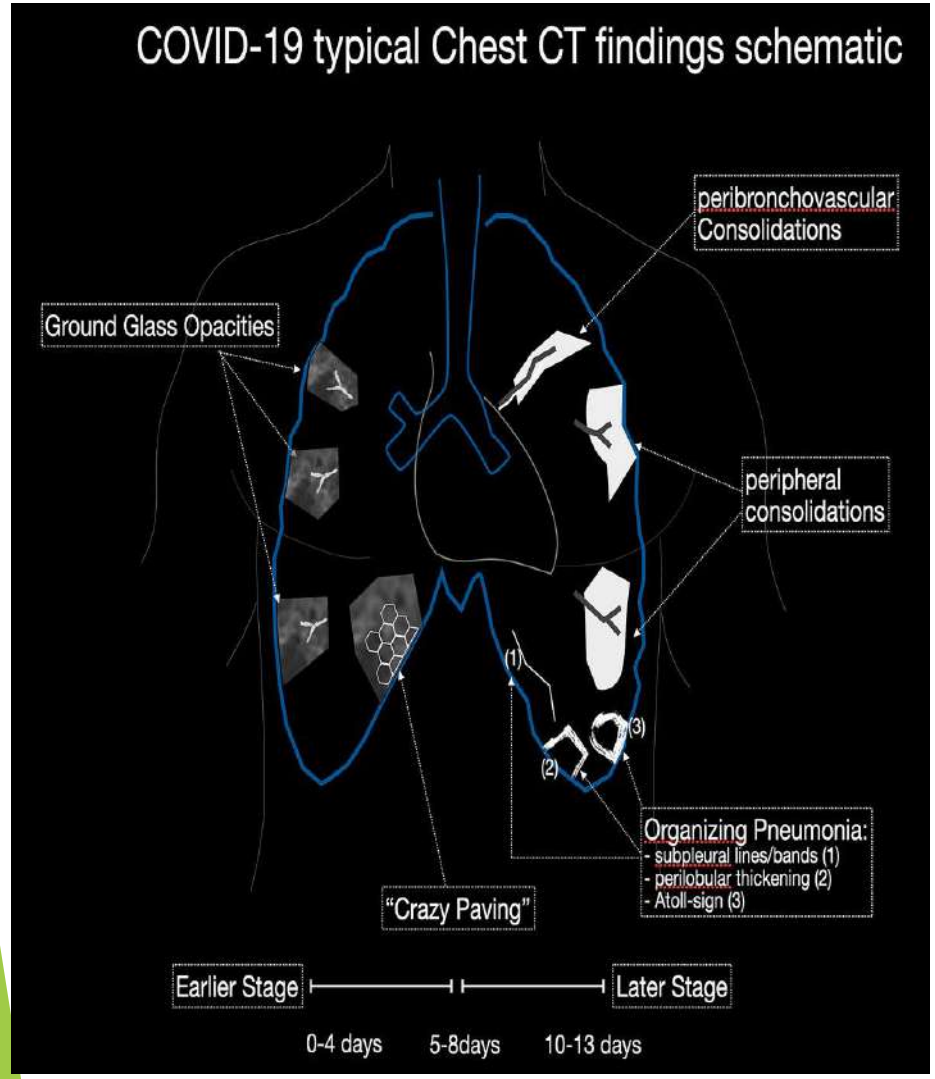
Virus activation(source :Googal website)

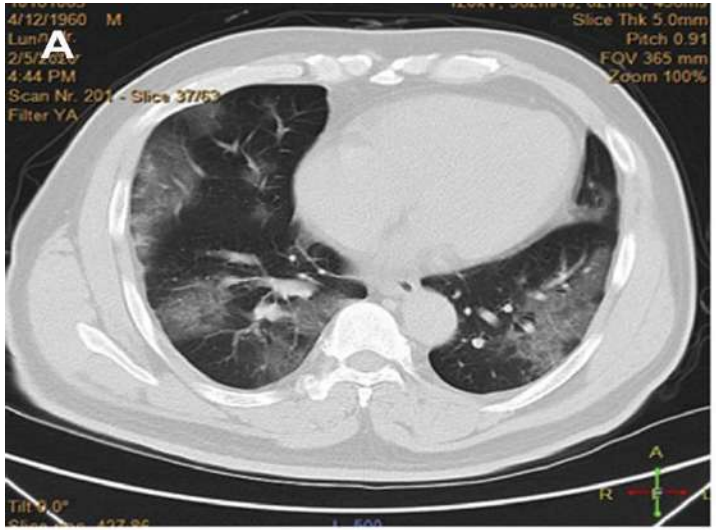


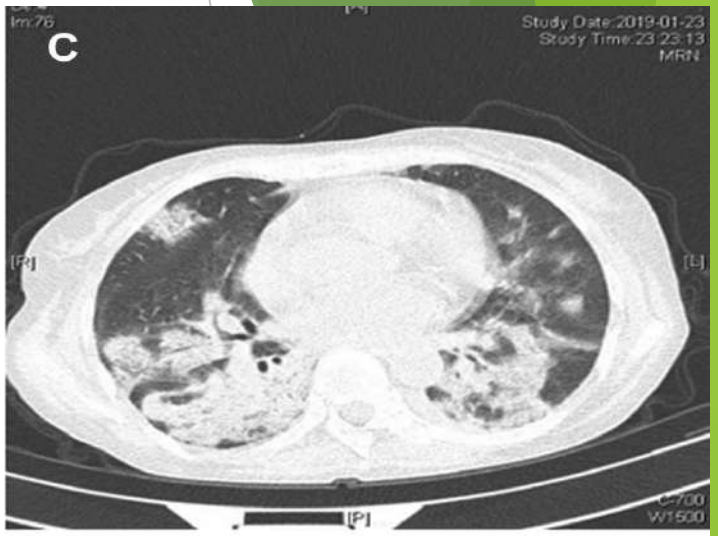
Differences of ACE II receptors(source :Googal website)



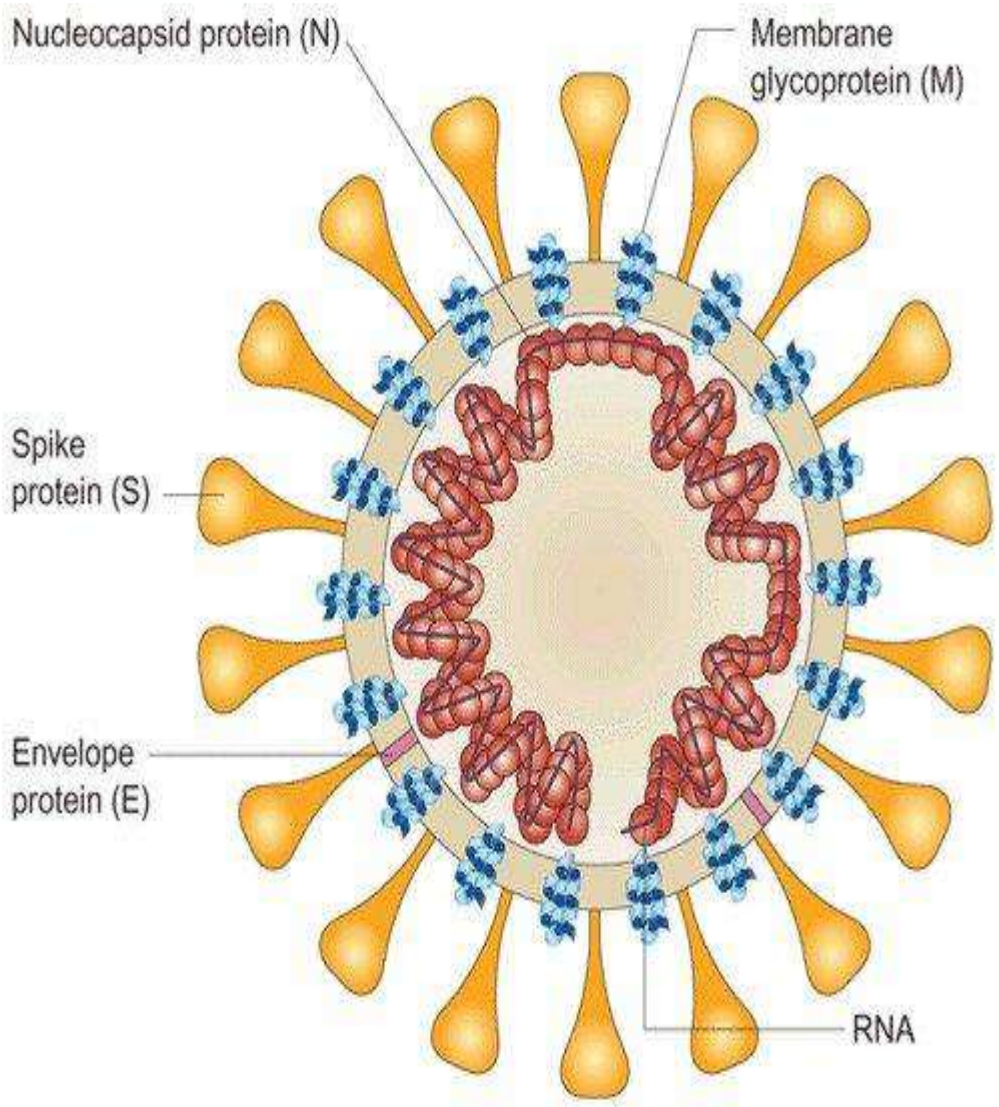
Most affected organ : Lung(Source: Google website)

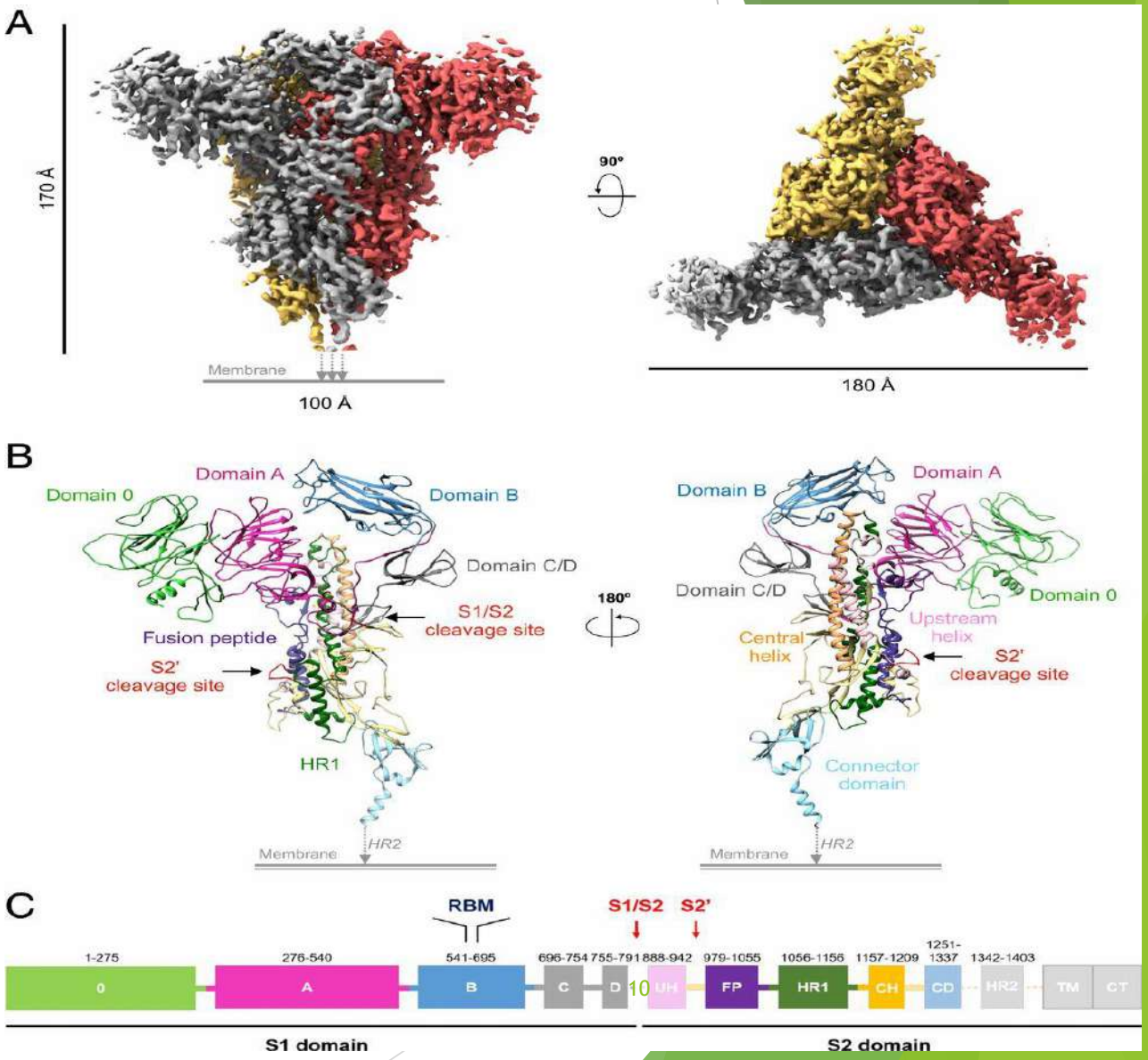






Spike protein(source :Googal website)





SARS-CoV-2 variants(source :Googal website)

Country/region	Scientific name	WHO name
 Kent, UK	B.1.1.7	Alpha
 South Africa	B.1.351	Beta
 Brazil	P.1	Gamma
 India	B.1.617.2	Delta

Source: WHO

BBC

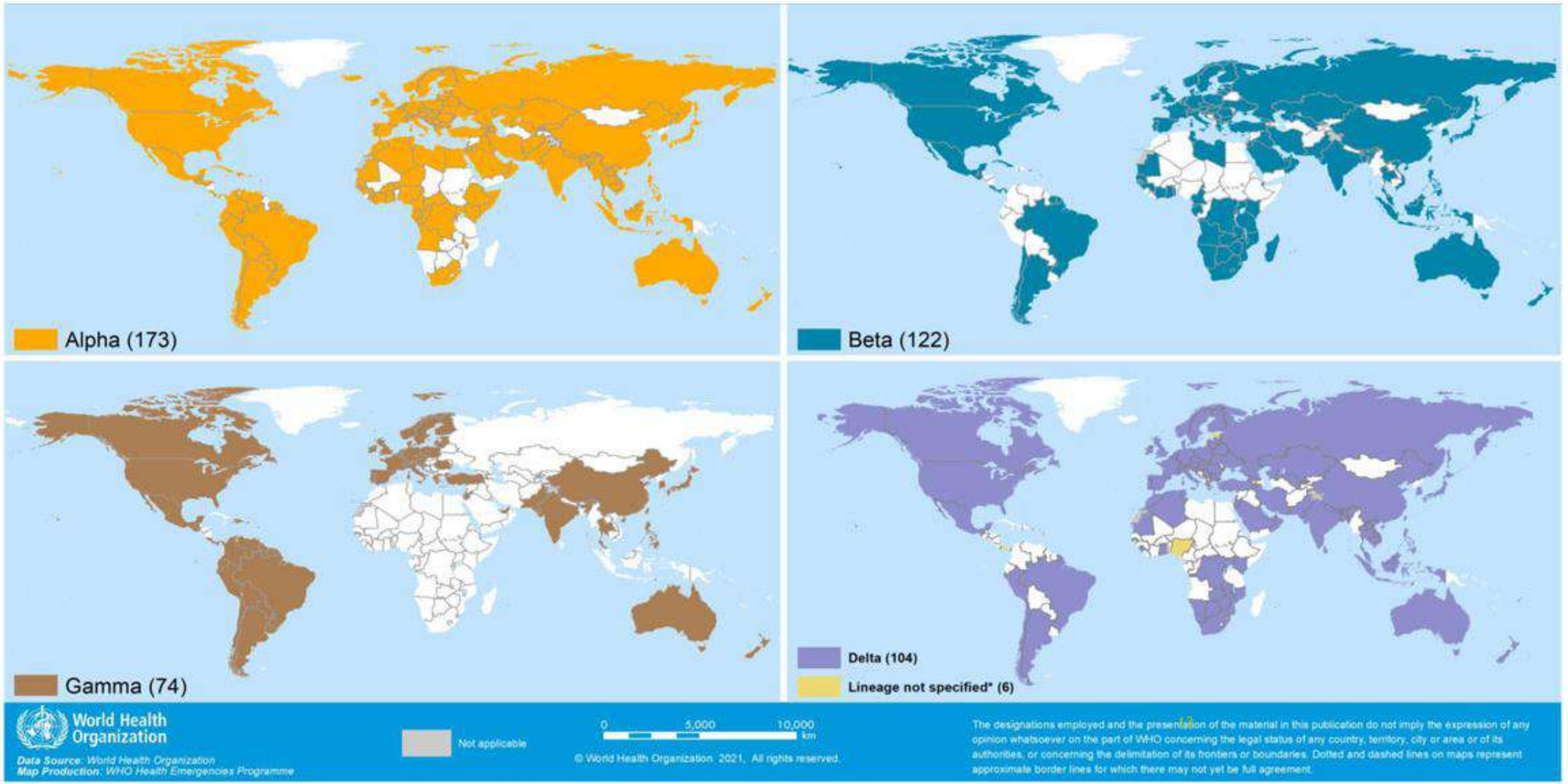
Variants of interest

WHO label	Scientific Name	Earliest documented samples
Epsilon	B.1.427/B.1.429	United States of America, Mar-2020
Zeta	P.2	Brazil, Apr-2020
Eta	B.1.525	Multiple countries, Dec-2020
Theta	P.3	Philippines, Jan-2021
Iota	B.1.526	United States of America, Nov-2020
Kappa	B.1.617.1	India, Oct-2020

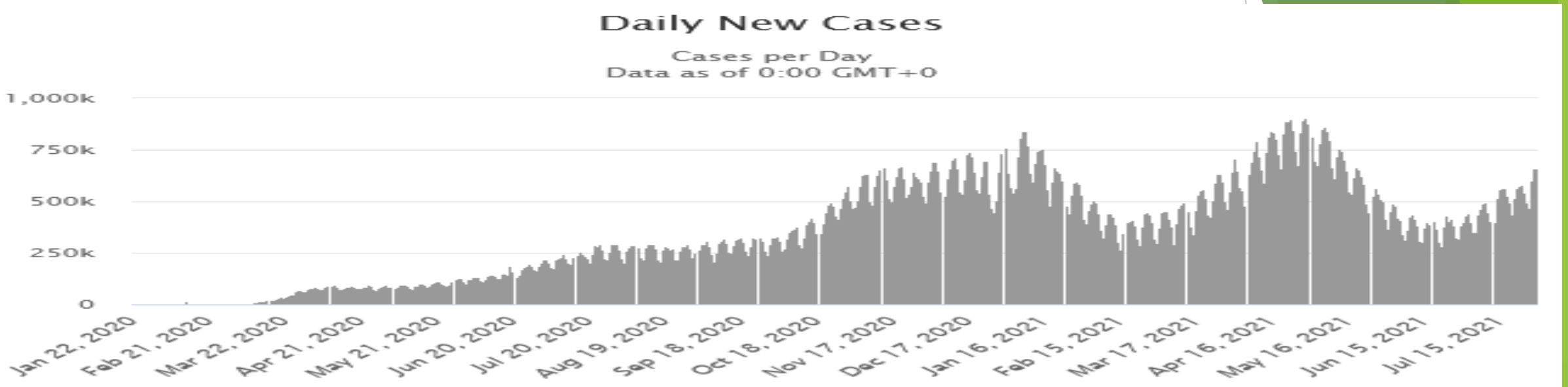
SOURCE: World Health Organization

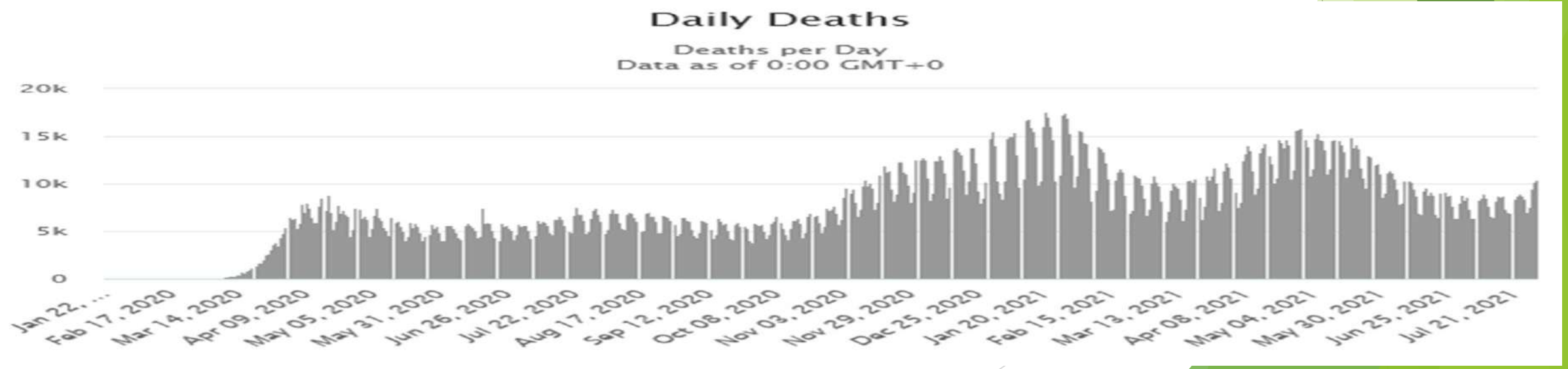
abc NEWS

Global spread of SARS-CoV-2 variants



Morbidity and Mortality pattern –Global (Source : WorldoMeter website)

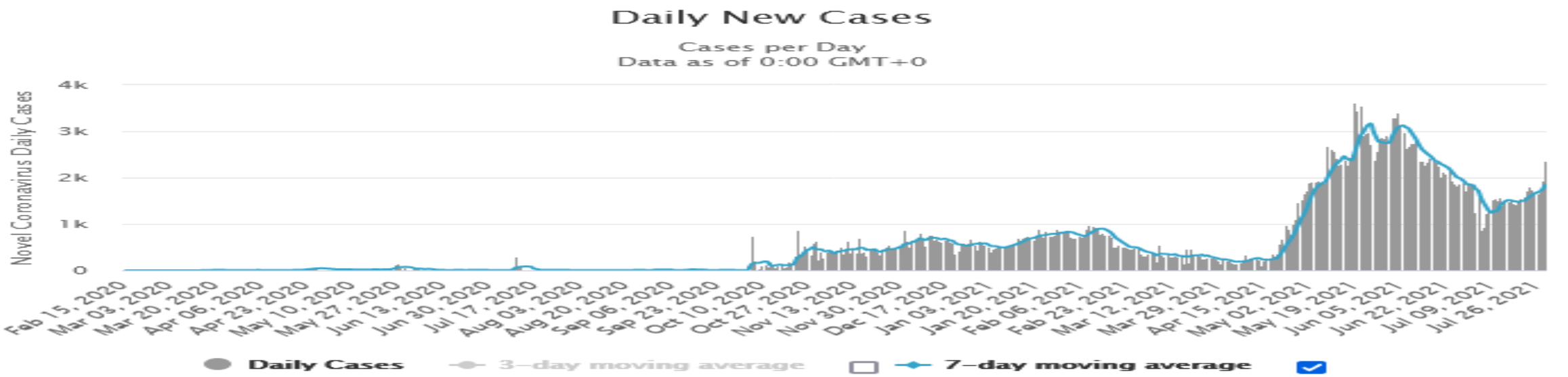


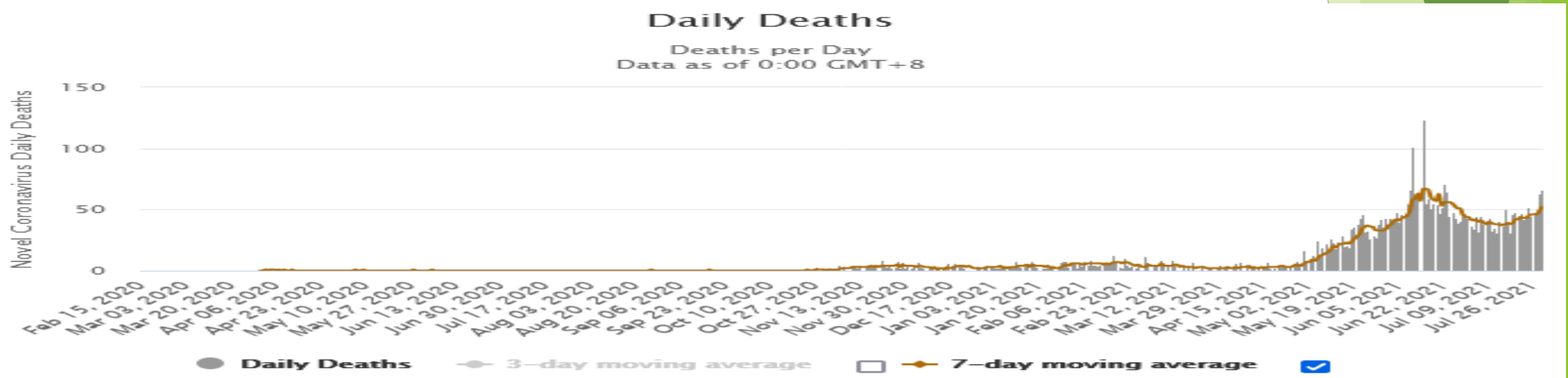


COVID-19 excess mortality estimates and reported deaths by WHO region, 2020

Source: WHO website

Morbidity and mortality in Sri Lanka (REF:Worldometer website)



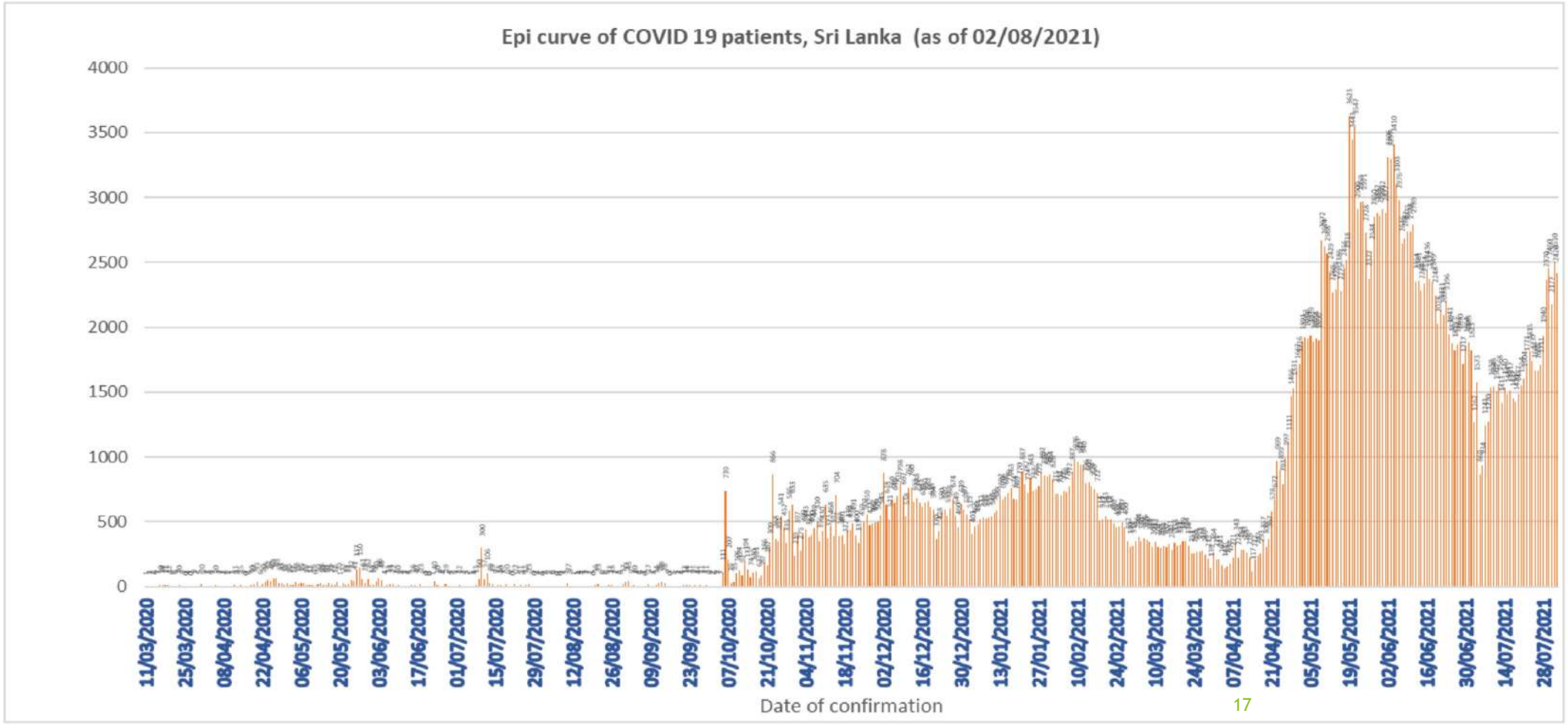


Epidemiology Unit, Ministry of Health

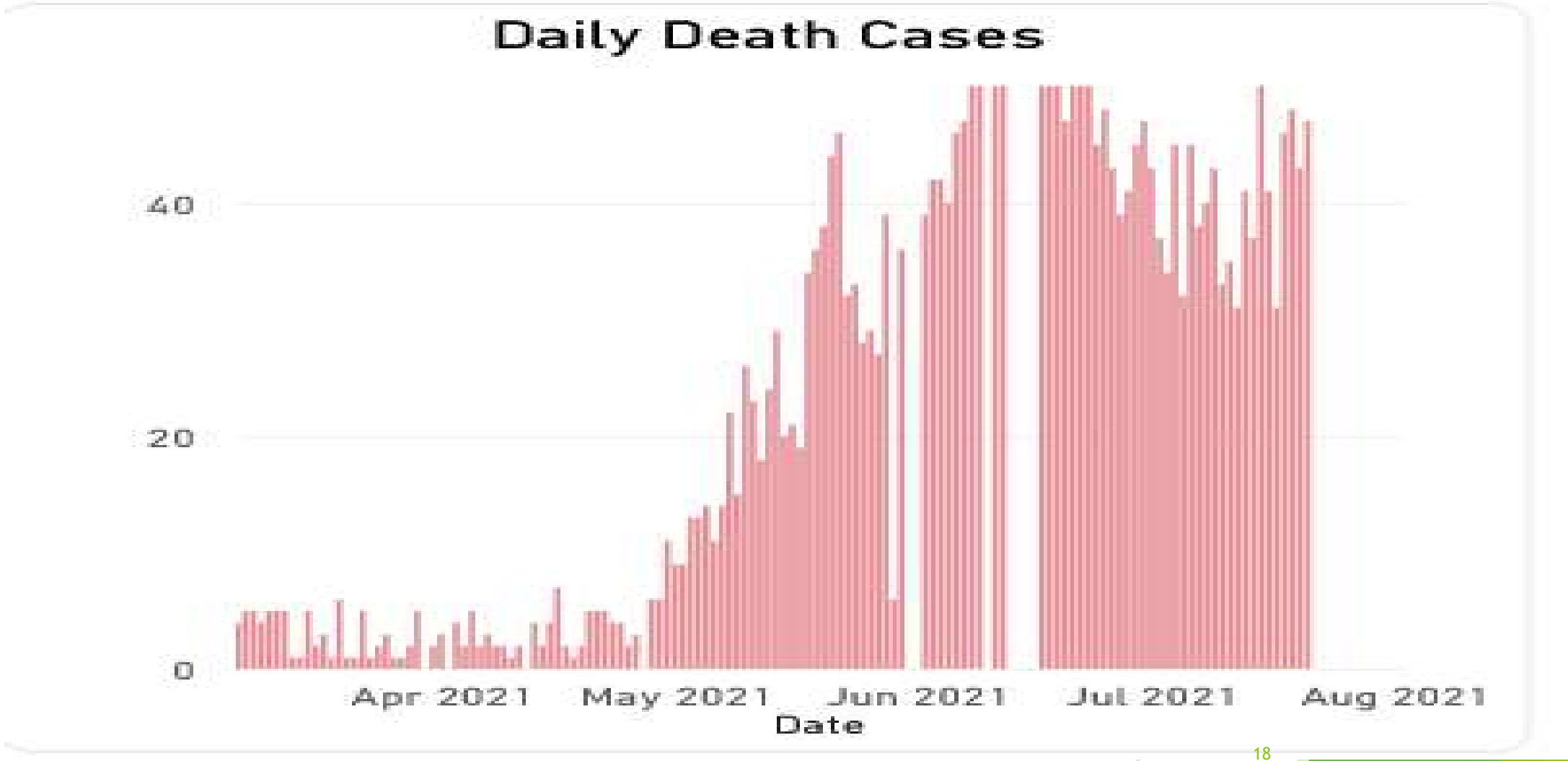
231, De Saram Place, Colombo 01000, Sri Lanka

Tele: (+94 11) 2695112, 4740490, 4740491, 4740492 2681548 Fax: (+94 11) 2696583

email: chepid@sltnet.lk, epidunit@sltnet.lk Web: www.epid.gov.lk



Daily deaths (Source: Presidential Secretariat Sri Lanka)



Death by districts (Source: Presidential Secretariat Sri Lanka)

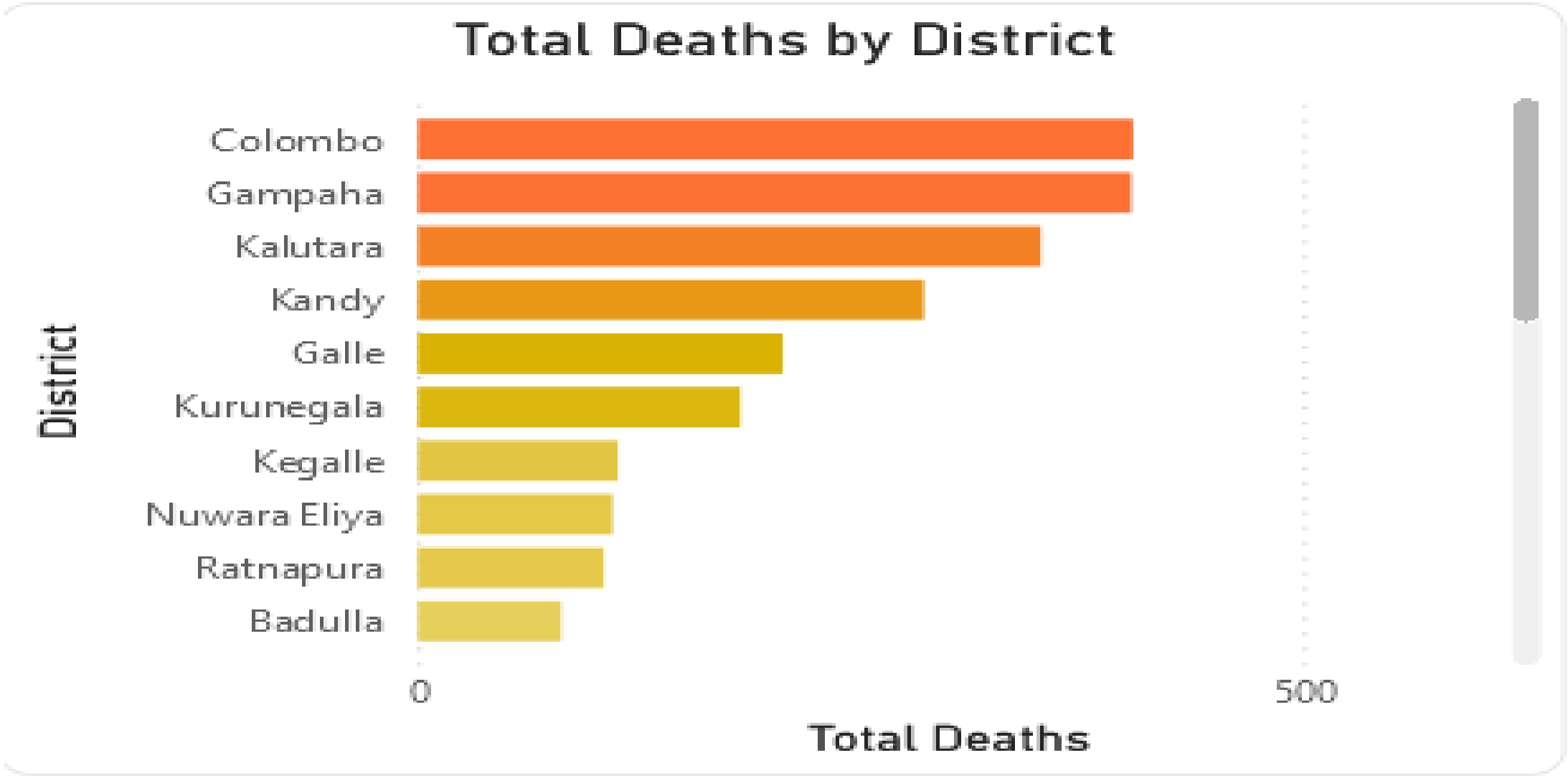
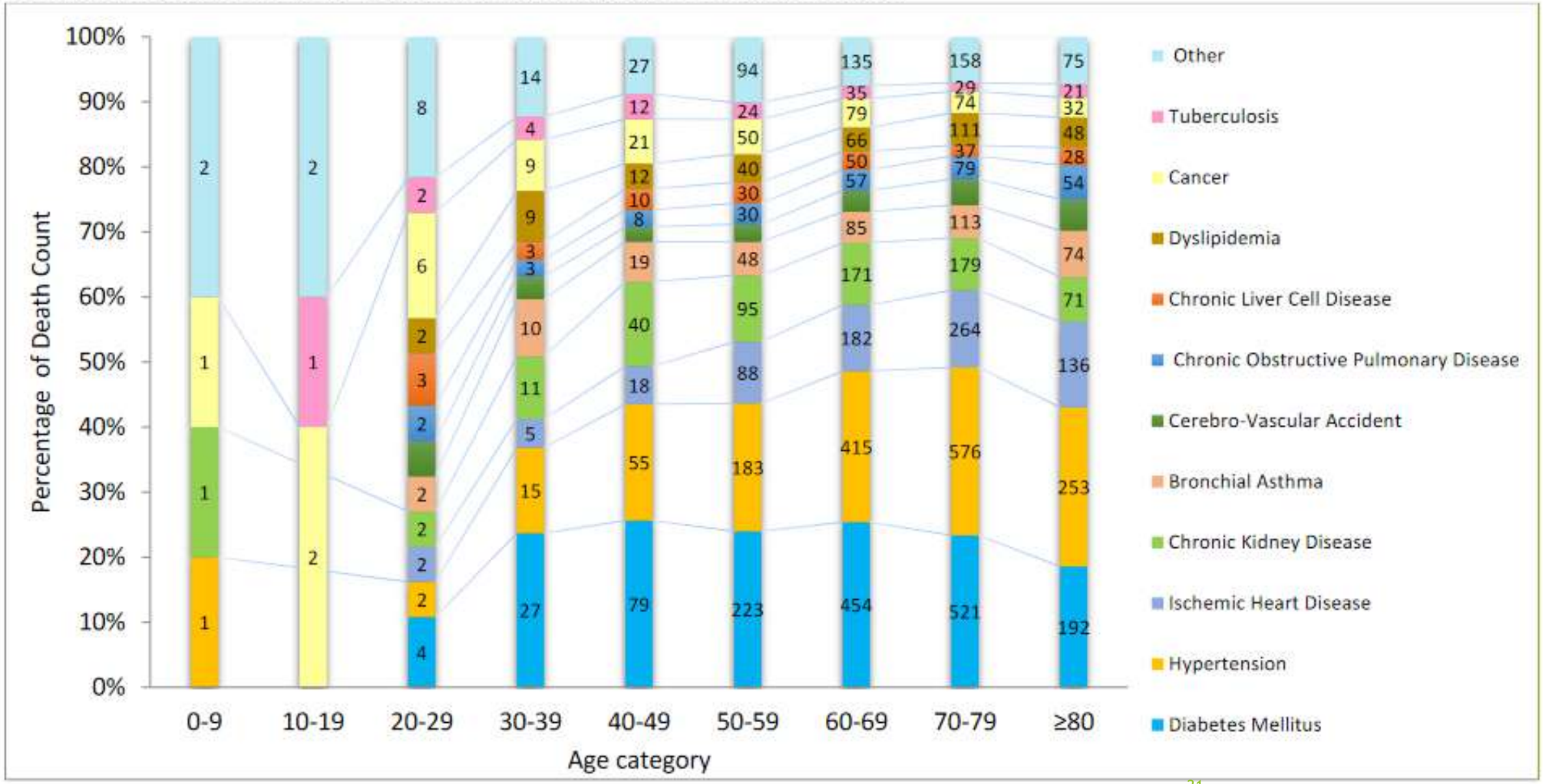


TABLE 2: DISTRIBUTION OF CONFIRMED DEATHS BY SEX AND AGE (BROAD CATEGORIES)

Age Category (Years)	Sex									
	Analysis up to 16.07.2021				Current Week				Total	
	Female	Male	Total	%	Female	Male	Total	%	Total	%
Below 30	20	26	46	1%	2	1	3	1%	49	1.2%
30-59	304	507	811	22%	24	46	70	23%	881	22.0%
60 & above	1224	1621	2845	77%	97	130	227	76%	3072	76.8%
Total	**1548**	**2154**	**3702**	**93%**	**123**	**177**	**300**	**7%**	**4002**	**100%**

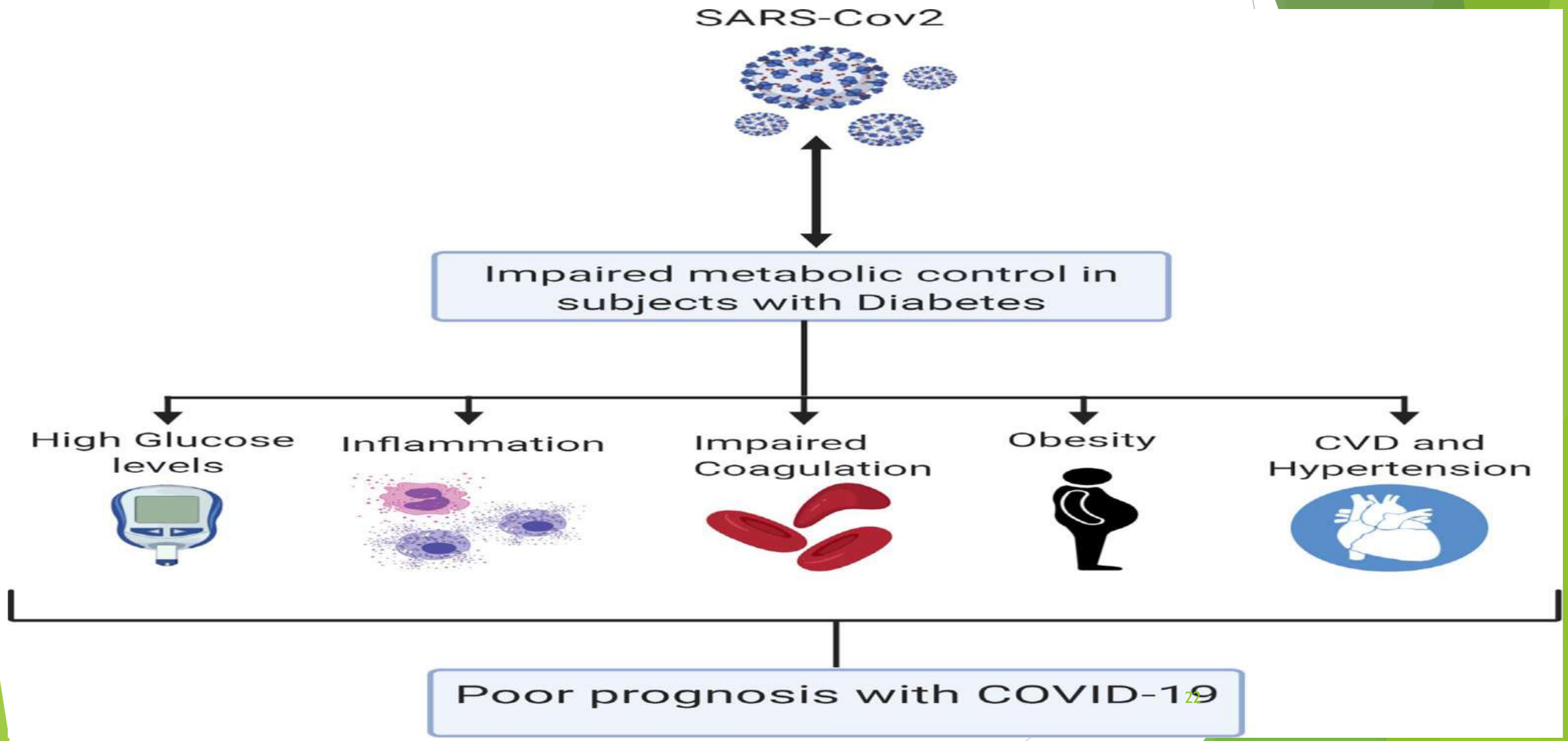
Source: Epidemiology unite of Sri Lanka

FIGURE 8: DISTRIBUTION OF CO-MORBIDITIES AMONG AGE CATEGORIES



Source : Epidemiology unit of Sri lanka

Diabetic and COVID-19 (source: Google website)



History of vaccine development(Source: Google website)

- Vaccine development started more than two centuries ago when English doctor Edward Jenner treated a young boy by injecting him with pus from cowpox blisters found on a milkmaid's hands.

Gloucestershire town of Berkeley


The Temple of
Vaccinia

Important dates in the history of vaccination
1700–Present

Variolation introduced in England
Lady Mary Wortley Montagu returned to England from Turkey and had her child inoculated to protect her from smallpox.

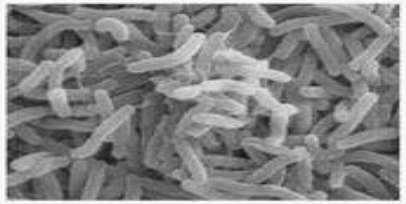
1721

The first vaccination
Edward Jenner inoculated a boy with cowpox and later challenged him with smallpox. The boy remained healthy.

1796

Variolation banned in Britain
An act of parliament outlawed variolation and provided free smallpox vaccine to the poor.

1840



Germ theory of disease
Louis Pasteur demonstrated the existence of airborne germs in his famous swan-neck flask experiment.

1859

Rubella vaccine approved
A rubella vaccine developed in fetal lung cells was approved in Europe. U.S. approval occurred in 1979.

1970

Oral polio vaccine
Albert Sabin's trivalent OPV, seen being dropped on sugar cubes, was approved and replaced inactivated polio vaccine.

1963

Yellow fever vaccine
Max Theiler grew yellow fever virus in mouse embryo cultures and in chick eggs. The vaccine is still used today.

1938

BCG tuberculosis vaccine
French scientists Calmette and Guérin used attenuated bovine tuberculosis bacteria as the basis for their vaccine.

1921

First lab vaccine created
Almost 100 years passed between the use of the first vaccine and the second, Pasteur's vaccine for chicken cholera.

1879

Recombinant hepatitis B vaccine
Replacing a vaccine made from blood of HBV-infected people, the recombinant vaccine was approved in 1986.

1986

First HIV vaccine trial
A vaccine based on vaccinia vector carrying a gene encoding HIV's envelope protein was evaluated in a Phase I trial.

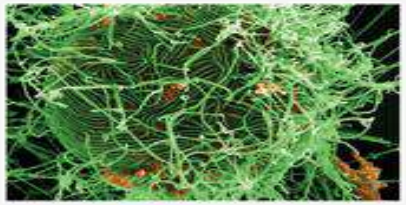
1987

Thai RV144 trial begins
The prime-boost HIV vaccine regimen in this clinical trial would eventually be shown to have 31% efficacy.

2003

HVTN 702 trial begins
The vaccine evaluated in the RV144 trial was modified in an attempt to boost efficacy. A new trial began in 2016.

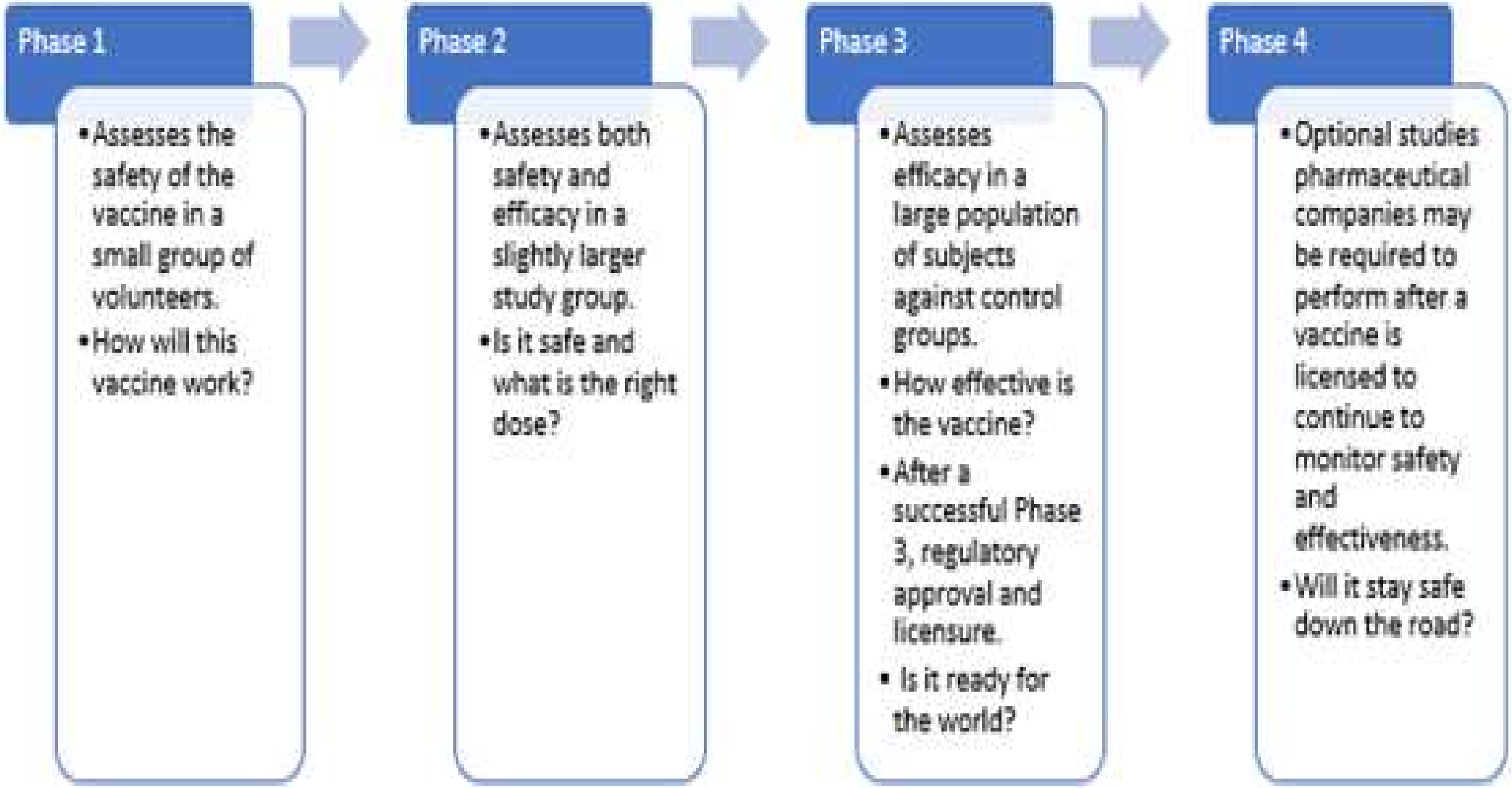
2016



Ebola vaccine approved
Innovative science and clinical trials led to the approval of a highly effective VSV-vectored Ebola vaccine.

2019

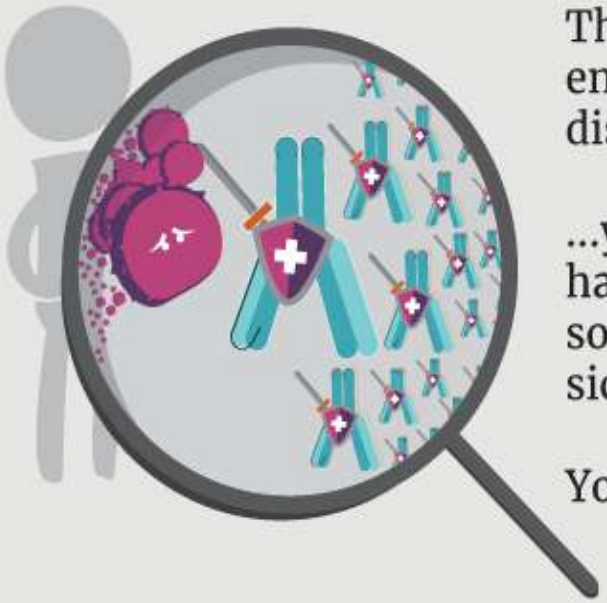
Vaccine development process



How do vaccines work?

You are given a small amount of a harmless form of a disease...

...Then your body makes antibodies to fight it off



Then if you encounter the disease again...

...your body already has the antibodies, so you don't get sick.

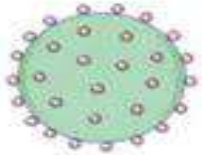
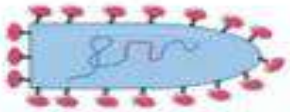
You are immune.

#CelebrateVaccines

British Society for immunology

www.immunology.org

Types of vaccines

Platforms		Examples of approved vaccines
Inactivated vaccine		• Flu vaccine • Polio vaccine • Rabies vaccine
Subunit vaccine		• Hepatitis B vaccine • Shingles vaccine (*Shingrix*^{MD})
Virus-like particles vaccine		• Human Papillomavirus vaccine (*Gardasil*^{MD})
Viral vector vaccine		• Ebola vaccine
DNA or RNA vaccine		

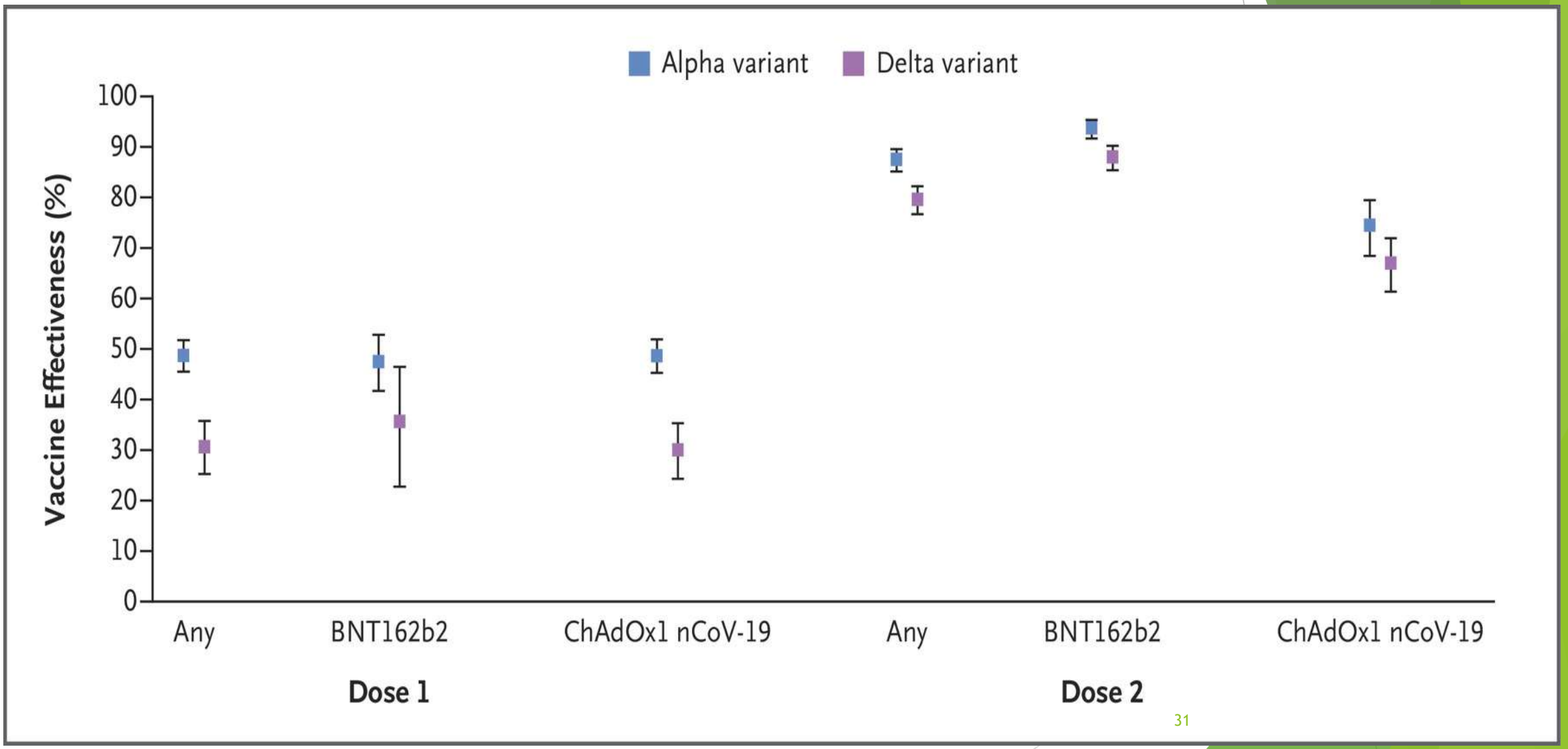
WHY VACCINATE?

- Protects oneself from getting specific diseases
- Protects others from contracting specific diseases
- Prevents epidemics
- Eliminates diseases

Approved vaccines for SARS-COV-2

Organisation	Name of vaccine	Type of vaccine	No of doses (IM)	Storage temperature (°C)	Efficacy (%)	Approx cost per dose ($)
Pfizer-BioNTech	BNT162b2	RNA	2	-70	95	20
Moderna	mRNA-1273	RNA	2	-20	95	37
AstraZeneca-Oxford	AZD1222	Viral vector	2	2 – 8	62-90	3
Gamaleya	Sputnik V	Viral vector	2	2 - 8	92	10
J and J	Janssen	Viral vector	1	2 - 8	66 - 74	10
Sinopharm	BBIBP-CorV	Inactivated	2	2 - 8	78 – 86	10 - 60
Novavax	NVX-CoV2373	Protein subunit	2	2 - 8	89.3	16

Vaccines and variants (Source:DOI: 10.1056/NEJMoa2108891)



Mix and Match

MIXING COVID VACCINES

Com-COV1 study – Immune findings

Vaccine combinations (given four weeks apart)

Oxford-AZ : Oxford-AZ

Oxford-AZ : Pfizer

Pfizer : Oxford-AZ

Pfizer : Pfizer

Liu, 2021 (Lancet pre-print)

Findings

Pfizer : Pfizer – produced the highest antibody levels

Oxford-AZ (first) and Pfizer (second) - antibody levels nine times higher than Oxford-AZ : Oxford-AZ

Pfizer (first) and Oxford-AZ (second) - antibody levels five times higher than Oxford-AZ : Oxford-AZ

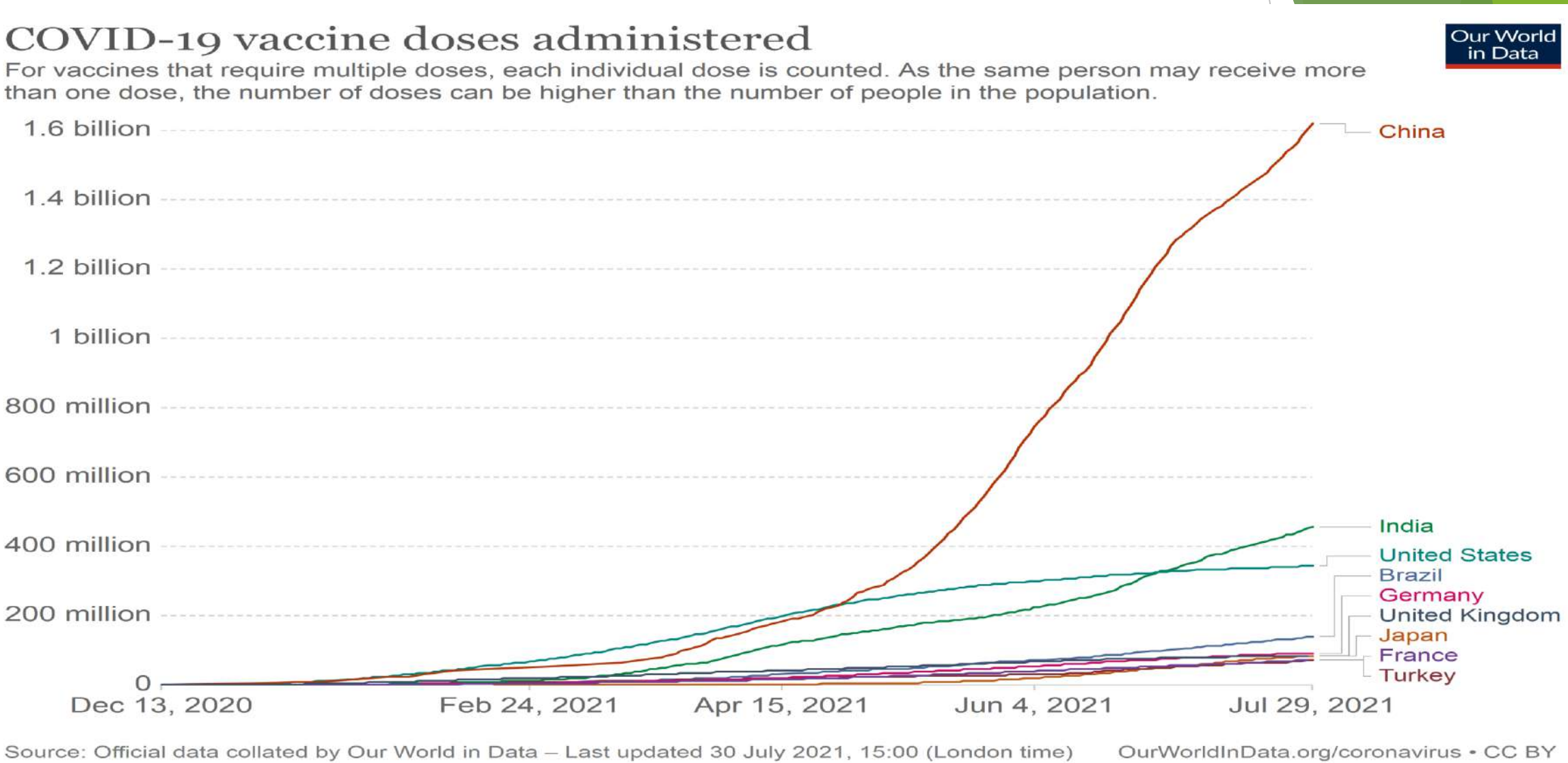
T-cell response was higher in people receiving the combination of vaccines

Conclusion: Mixed vaccine schedules of Pfizer and Oxford-AZ generates strong immune responses against the SARS-CoV2 spike protein

Trends in vaccination programme (Global)(source: Our world in data)

- 28% of the world population has received at least one dose of a COVID-19 vaccine, and 14.4% is fully vaccinated.
- 4.07 billion doses have been administered globally, and **37.26 million are now administered each day.**
- **Only 1.1% of people in low-income countries have received at least one dose.**

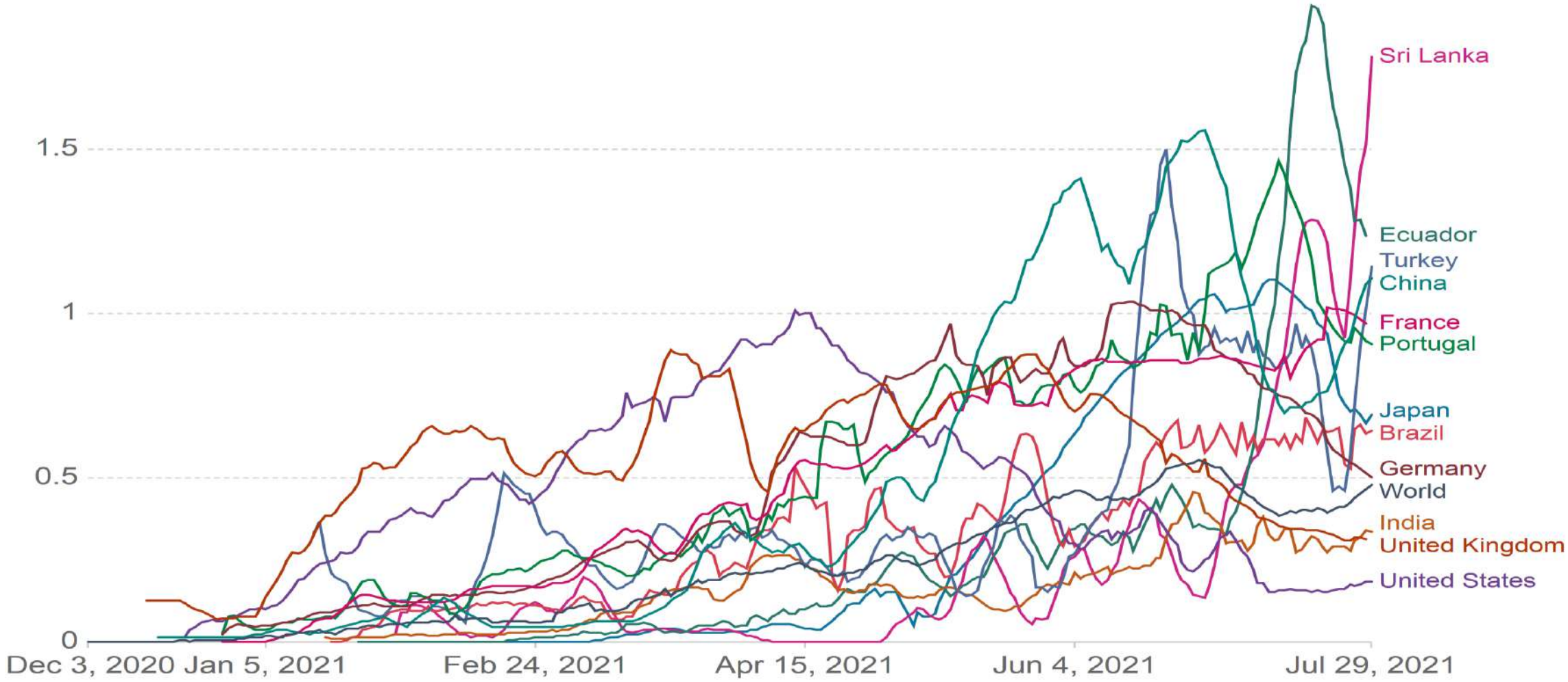
Trends in vaccination programme (Global)



Daily COVID-19 vaccine doses administered per 100 people

Shown is the rolling 7-day average per 100 people in the total population. For vaccines that require multiple doses, each individual dose is counted.

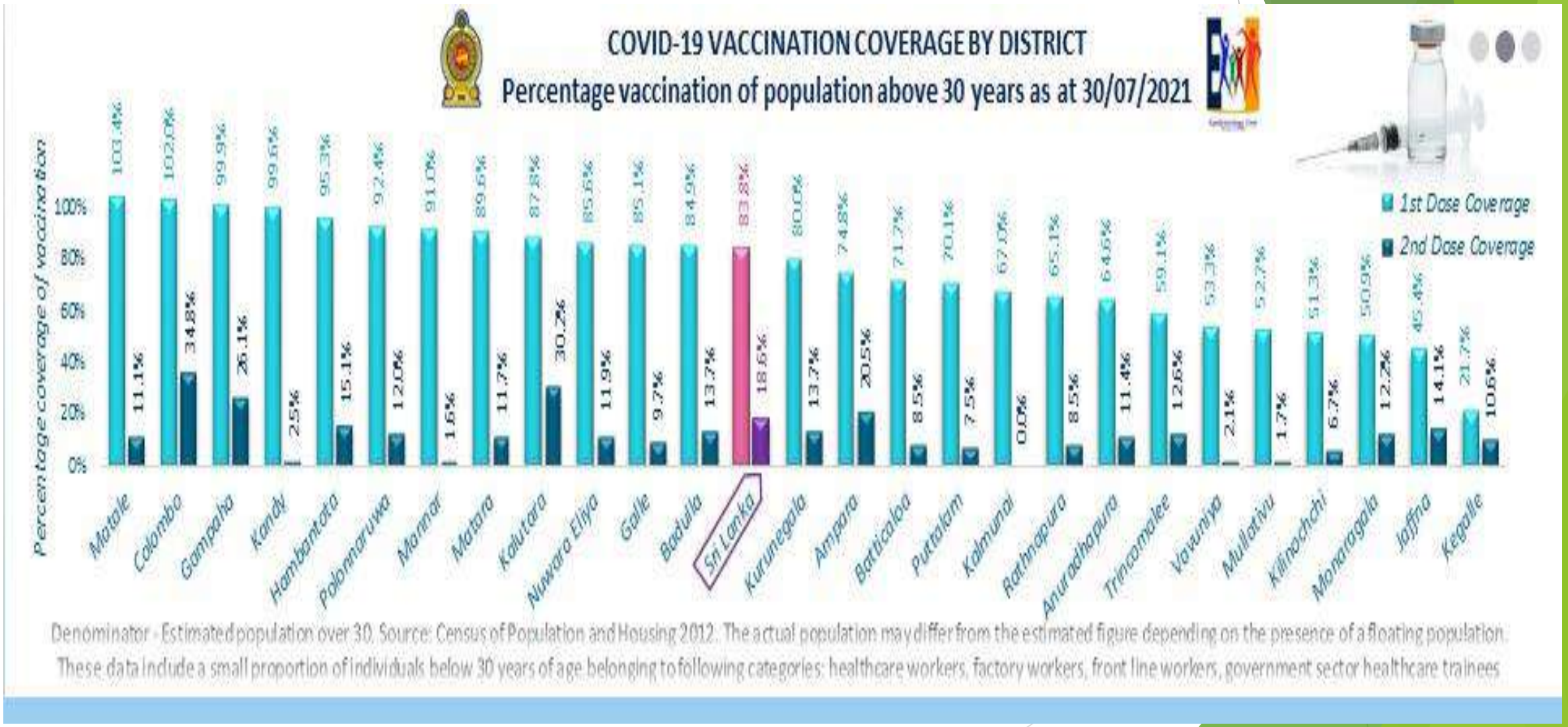
Our World in Data



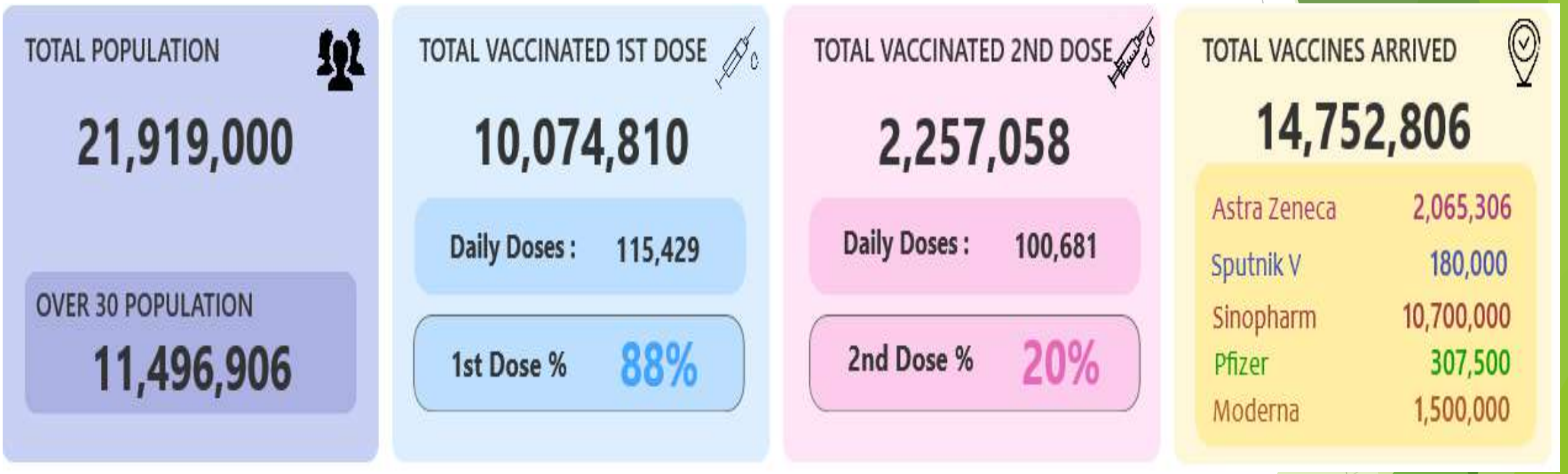
Source: Official data collated by Our World in Data – Last updated 30 July 2021, 15:00 (London time)

OurWorldInData.org/coronavirus • CC BY

Vaccination coverage of Sri Lanka

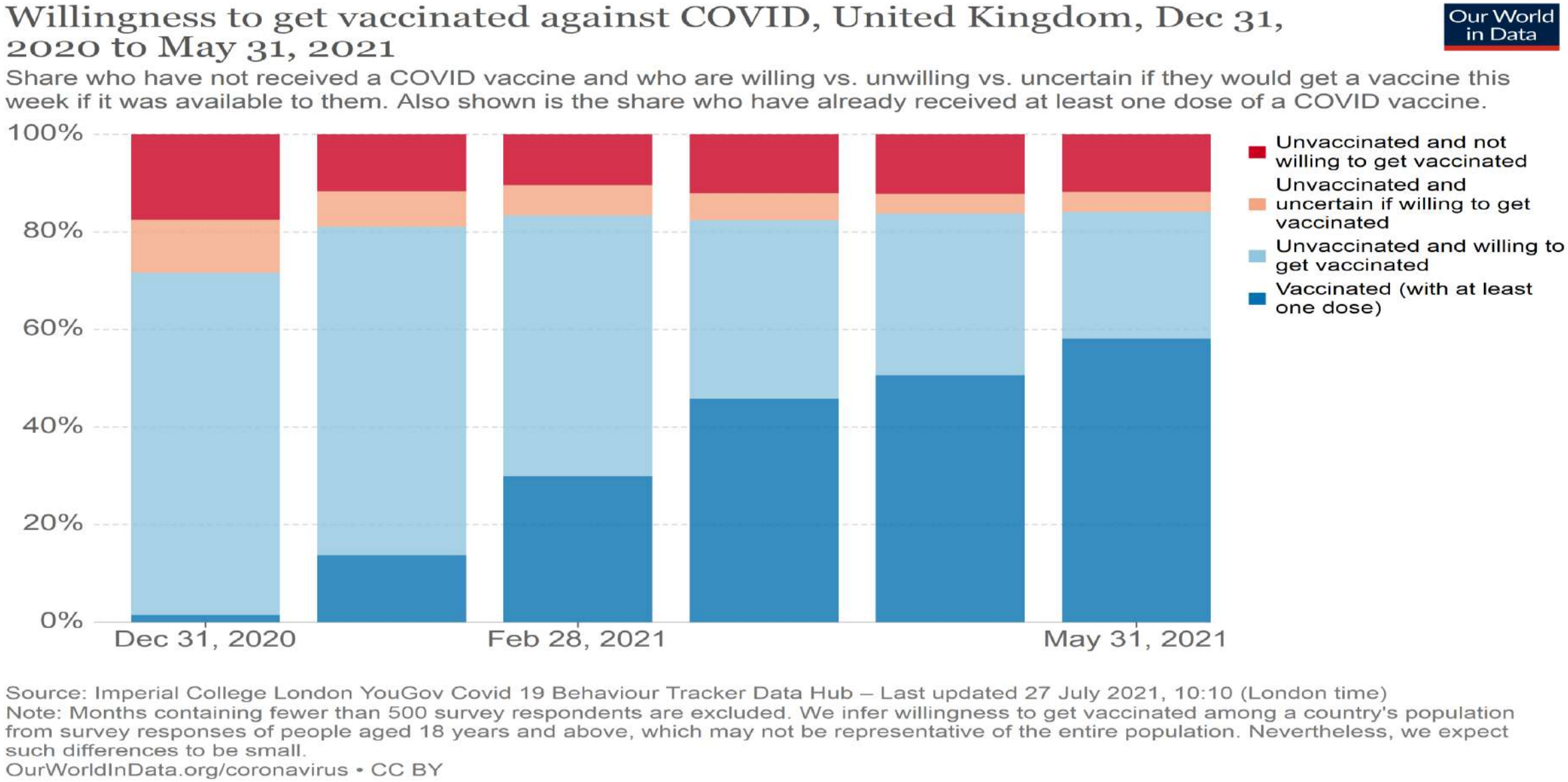


Current vaccination programme in SL



(Source: Presidential Secretariat Sri Lanka)

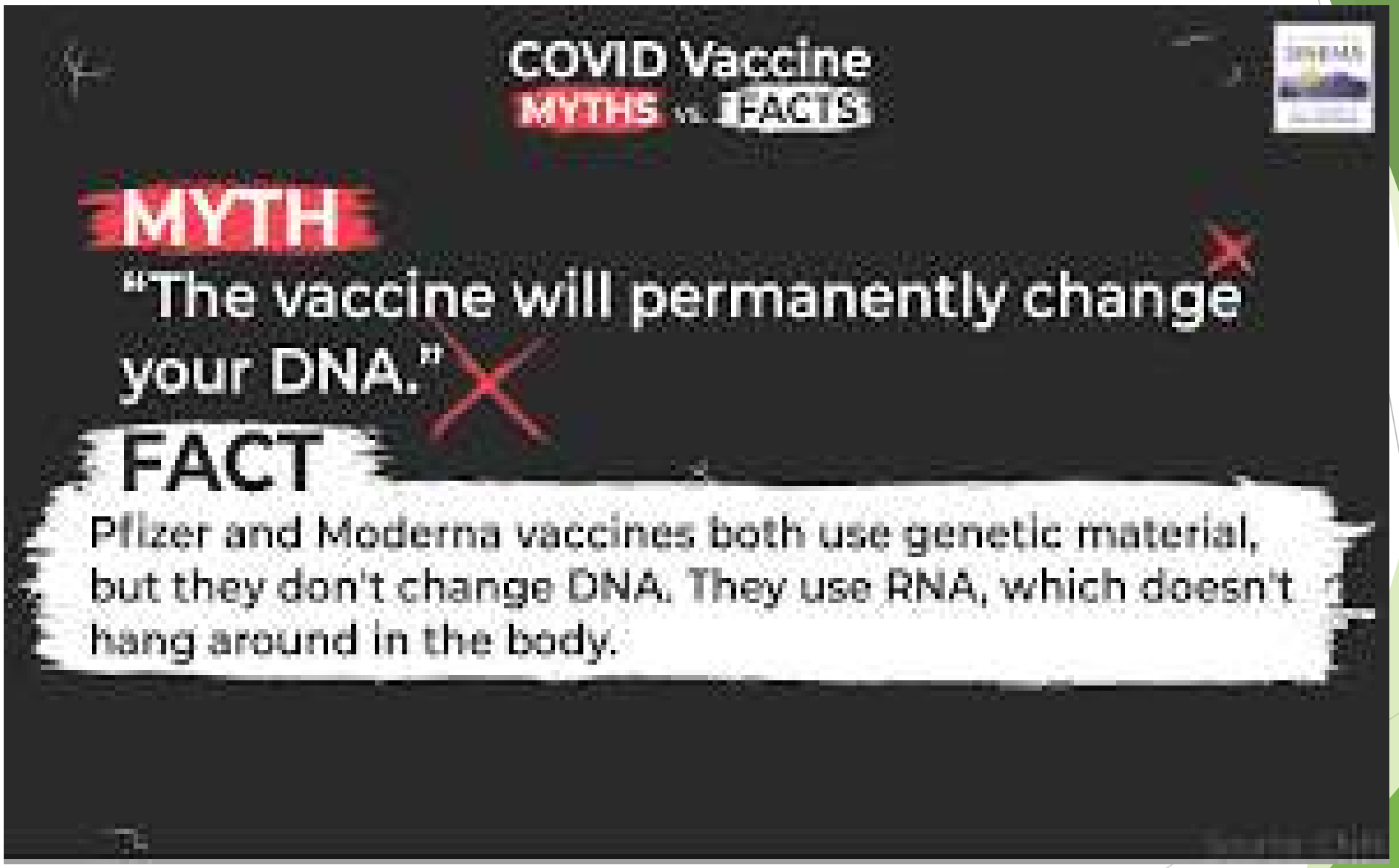
Hesitancy


Willingness to get vaccinated against COVID, United Kingdom, Dec 31, 2020 to May 31, 2021
Our World in Data
Share who have not received a COVID vaccine and who are willing vs. unwilling vs. uncertain if they would get a vaccine this week if it was available to them. Also shown is the share who have already received at least one dose of a COVID vaccine.
100%
80%
60%
40%
20%
0%
Dec 31, 2020
Feb 28, 2021
May 31, 2021
Unvaccinated and not willing to get vaccinated
Unvaccinated and uncertain if willing to get vaccinated
Unvaccinated and willing to get vaccinated
Vaccinated (with at least one dose)
Source: Imperial College London YouGov Covid 19 Behaviour Tracker Data Hub – Last updated 27 July 2021, 10:10 (London time)
Note: Months containing fewer than 500 survey respondents are excluded. We infer willingness to get vaccinated among a country's population from survey responses of people aged 18 years and above, which may not be representative of the entire population. Nevertheless, we expect such differences to be small.
OurWorldInData.org/coronavirus • CC BY

Myths

COVID-19 VACCINE

MYTH	FACT
THEY AREN'T SAFE BECAUSE OF HOW FAST THEY WERE CREATED.	NON-CLINICAL, CLINICAL, AND MANUFACTURING INFORMATION FOR BOTH VACCINES WAS REVIEWED BY A DATA SAFETY MONITORING BOARD BEFORE EMERGENCY APPROVAL.
THEY CAN CAUSE PEOPLE TO HAVE SERIOUS SIDE EFFECTS LIKE BELL'S PALSY.	SERIOUS SIDE EFFECTS FROM BOTH THE PFIZER AND MODERNA VACCINES WERE RARE IN CLINICAL TRIALS.
THEY WILL MAKE PEOPLE SICK.	THE MOST REPORTED SIDE EFFECT FOR EITHER VACCINE WAS INJECTION SITE REACTION/INJECTION SITE PAIN. VACCINES ALSO DO NOT CONTAIN A LIVE VIRUS.


COVID Vaccine
MYTHS vs. FACTS
MYTH
"The vaccine will permanently change your DNA."
FACT
Pfizer and Moderna vaccines both use genetic material, but they don't change DNA. They use RNA, which doesn't hang around in the body.

? Need of booster

COVID-19 booster vaccines

Joint Committee on Vaccination and Immunisation (JCVI) - UK

Provided interim advice on any potential COVID-19 vaccine booster programme earlier today (30 Jun 2021)

Should be offered in 2 stages

Stage 1 – to start in September 2021 and be given with the flu vaccine

- adults aged 16 years and over who are immunosuppressed
- those living in residential care homes for older adults
- all adults aged 70 years or over
- adults aged 16 years and over who are considered clinically extremely vulnerable
- frontline health and social care workers

Stage 2 – as soon as practicable after Stage 1

- all adults aged 50 years and over
- all adults aged 16 to 49 years who are in an influenza or COVID-19 at-risk group
- adult household contacts of immunosuppressed individuals

Alternative view: Is this fair
many regions of the world do not have sufficient vaccines to give even one dose to their adult population

THIRD DOSE OF A COVID-19 VACCINE

Scientific data coming out in the next few months are to be assessed

(including data from studies on duration of immunity from the current vaccines, the Com-COV, ComFluCov and CoV-Boost studies)

Final decision to be made at the end of August 2021

Prof. Suranjith L Seneviratne

Recommended preventive health care practices

Recommended preventive health care practices(WHO)

Staying physically active

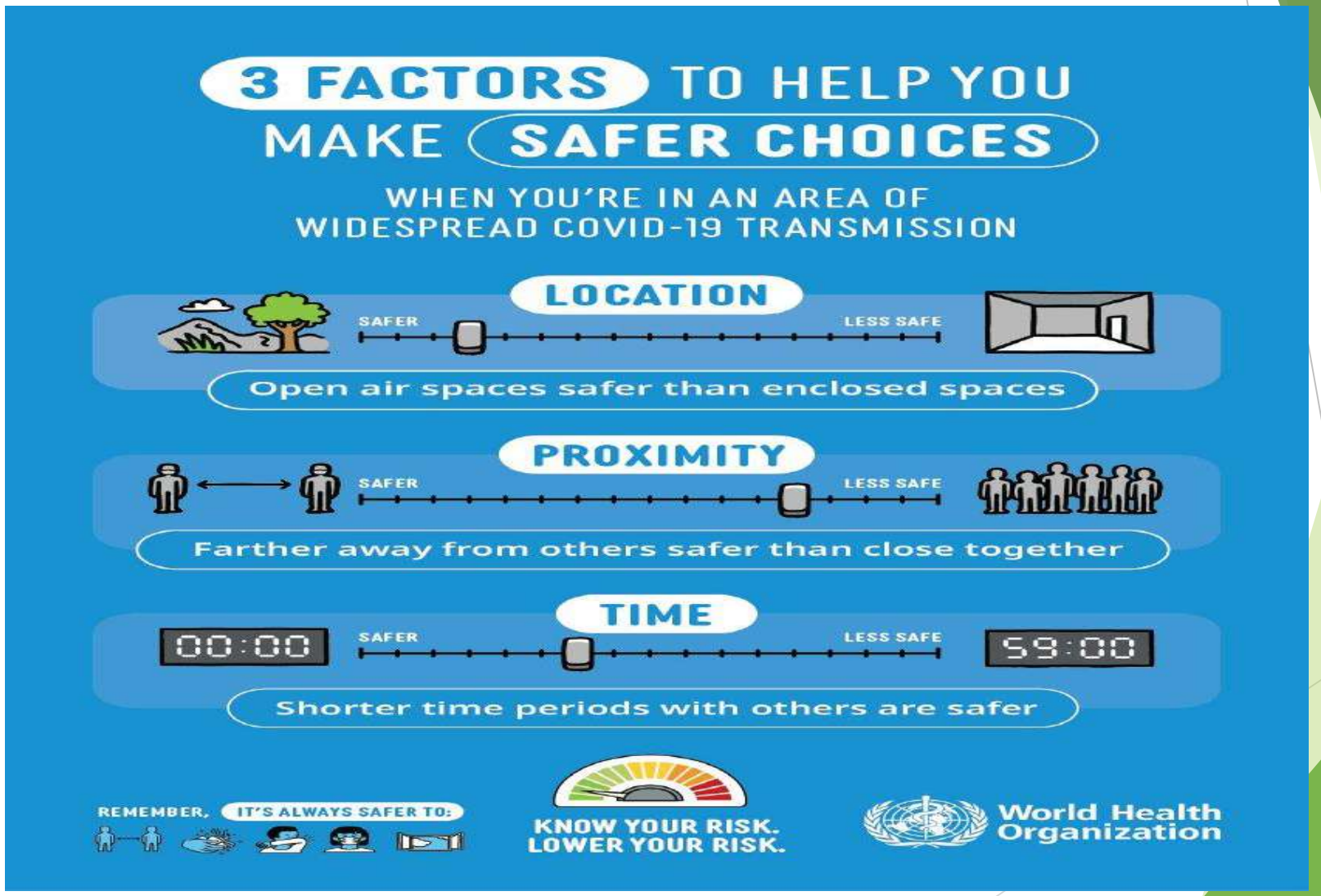
Healthy diet

Healthy parenting

Quitting tobacco

Mental health

Recommended preventive care



WHAT TO DO IF SOMEONE IS SICK IN YOUR HOUSEHOLD

Life has to continue even where COVID-19 is spreading.

Here's how to stay safe.

1 ISOLATE THE SICK PERSON

Prepare a separate room or isolated space, and keep distance from others.

Keep the room well ventilated and open windows frequently.

2 REDUCE CONTACT WITH THE VIRUS

Identify one household member to be the contact person who is not at high risk and has the fewest contacts with people outside.

Wear a medical mask if in the same room as the sick person.

Use separate dishes, cups, eating utensils and bedding from the sick person.

Clean and disinfect frequently touched surfaces.

3 TAKE CARE OF THE SICK PERSON

Monitor the sick person's symptoms regularly.

Pay special attention if the person is at high risk for serious illness.

Ensure the sick person rests and stays hydrated.

Call your healthcare provider immediately if you see any of these danger signs:

- Difficulty breathing
- Loss of speech or mobility
- Confusion
- Chest pain

4 DANGER SIGNS

REMEMBER, IT'S ALWAYS SAFER TO

KNOW YOUR RISK. LOWER YOUR RISK.

World Health Organization

World Health Organization

If you have been diagnosed with **COVID-19**:

- **stay in a separate room** and **away from others**
- **open windows** frequently

Know your risk,
lower your risk

SHOPPING FOR GROCERIES

Life has to continue even where COVID-19 is spreading. If online shopping is not an option, **here's how to stay safe.**

REDUCE YOUR RISK

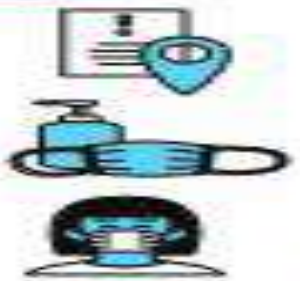
Go outside peak hours.

BEFORE YOU GO OUT

Always check on local regulations.

Bring sanitizer and wear your mask.

If you are in a high-risk group, wear a medical mask.



WHEN INSIDE STORES

Keep your shopping time short and make a list.

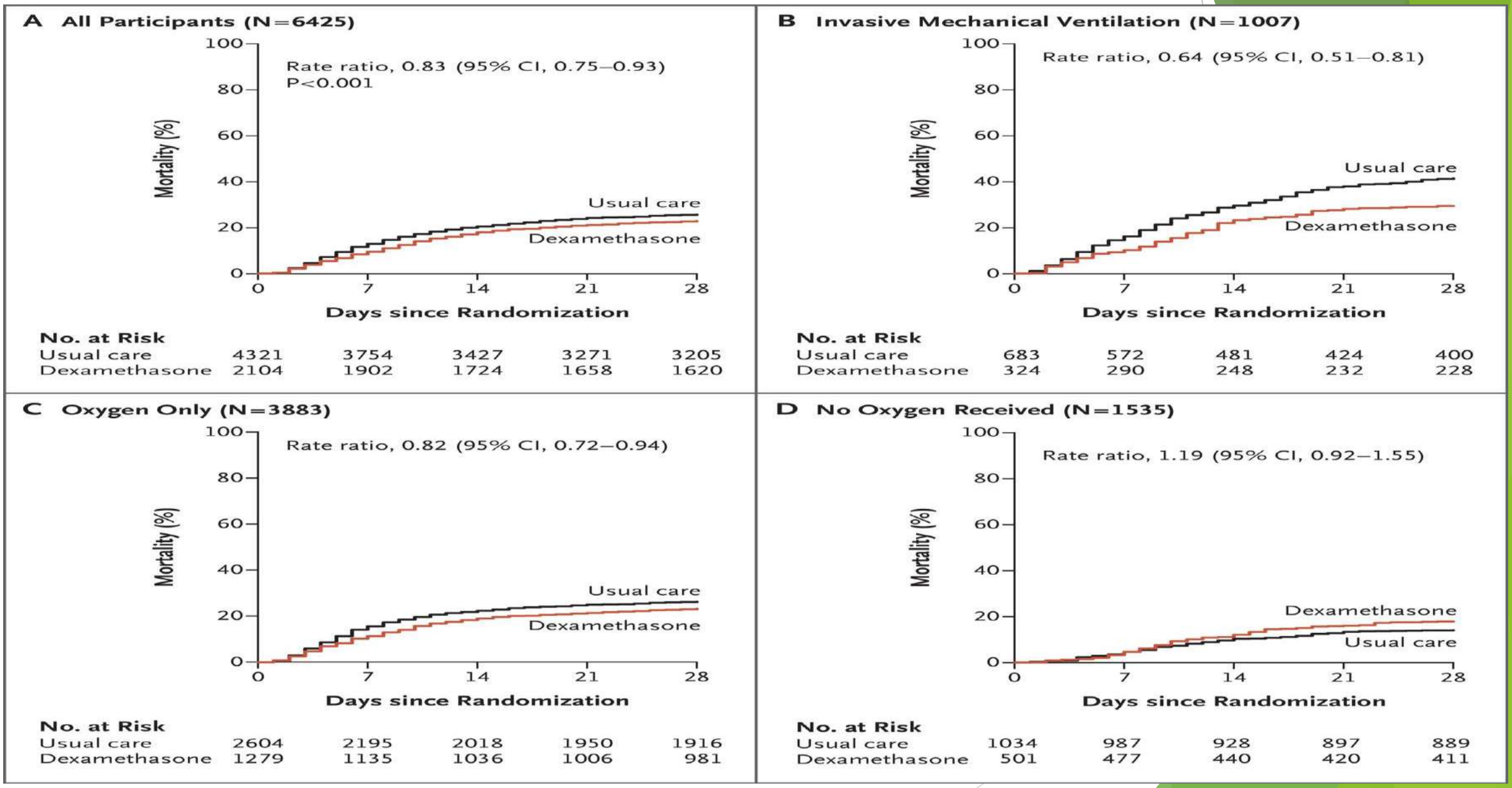
Keep at least 1 metre distance from others.

REMEMBER, IT'S ALWAYS SAFER TO

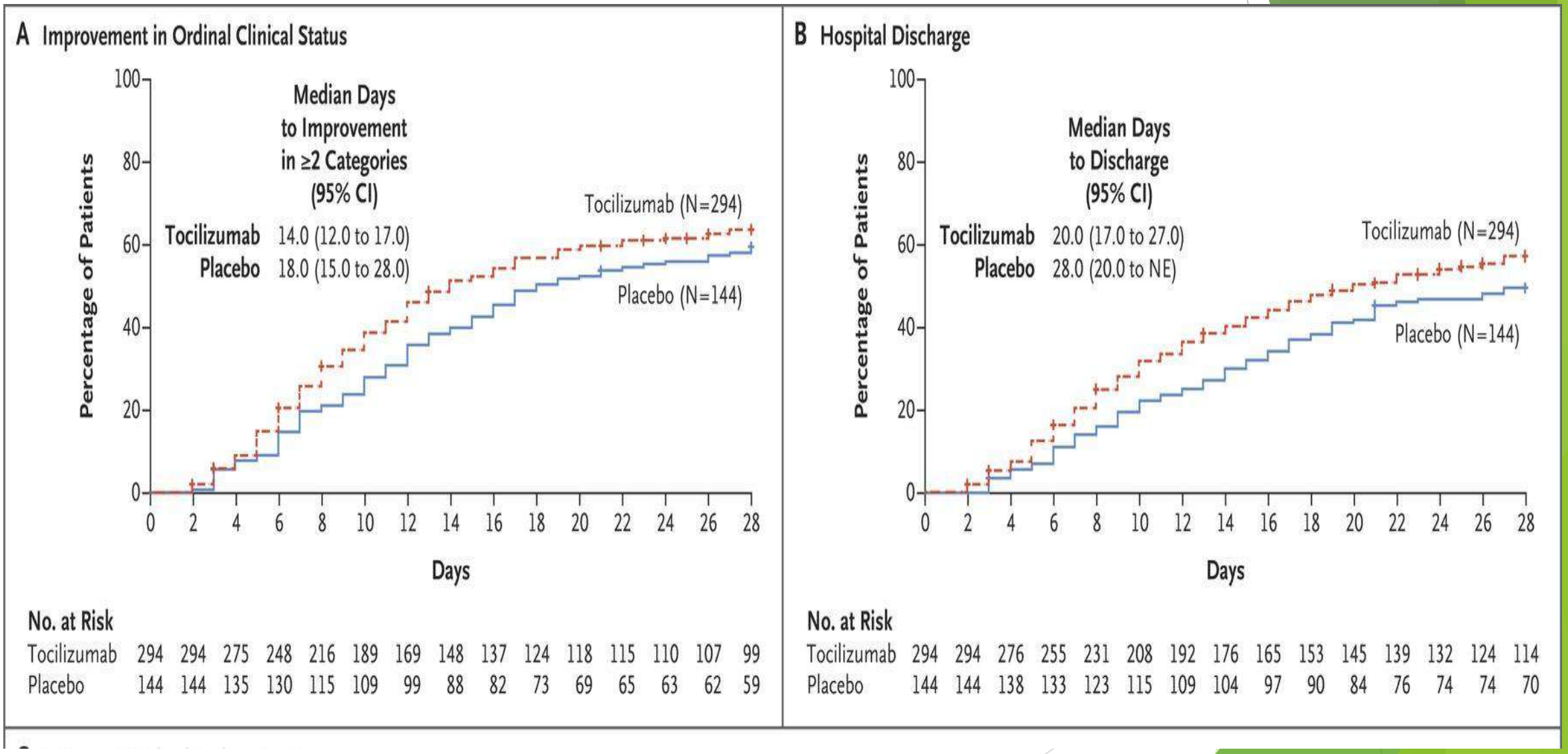
KNOW YOUR RISK. LOWER YOUR RISK.

World Health Organization

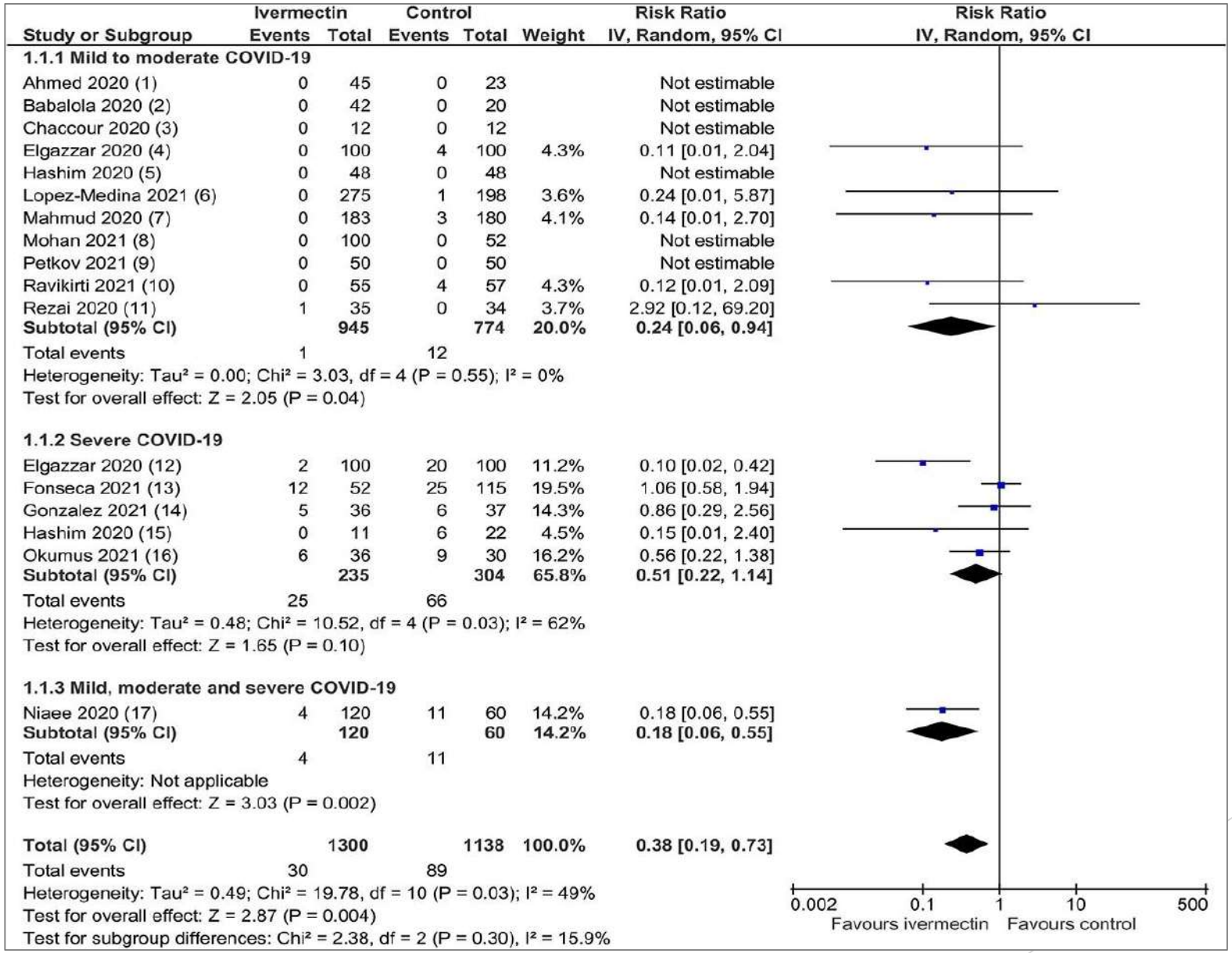
Curative care : Dexamethasone (Source: N Engl J Med 2021; 384:693-704)



Curative care : Tocilizumab (Source: N Engl J Med 2021; 384:1503-1516)



Curative care: Ivermectin (Source:American Journal of Therapeutics: July/August 2021)



Study or Subgroup	Ivermectin Events	Ivermectin Total	Control Events	Control Total	Weight	Risk Ratio IV, Random, 95% CI
1.1.1 Mild to moderate COVID-19						
Ahmed 2020 (1)	0	45	0	23		Not estimable
Babalola 2020 (2)	0	42	0	20		Not estimable
Chaccour 2020 (3)	0	12	0	12		Not estimable
Elgazzar 2020 (4)	0	100	4	100	4.3%	0.11 [0.01, 2.04]
Hashim 2020 (5)	0	48	0	48		Not estimable
Lopez-Medina 2021 (6)	0	275	1	198	3.6%	0.24 [0.01, 5.87]
Mahmud 2020 (7)	0	183	3	180	4.1%	0.14 [0.01, 2.70]
Mohan 2021 (8)	0	100	0	52		Not estimable
Petkov 2021 (9)	0	50	0	50		Not estimable
Ravikirti 2021 (10)	0	55	4	57	4.3%	0.12 [0.01, 2.09]
Rezai 2020 (11)	1	35	0	34	3.7%	2.92 [0.12, 69.20]
Subtotal (95% CI)		**945**		**774**	**20.0%**	**0.24 [0.06, 0.94]**
Total events	1		12			
Heterogeneity: Tau² = 0.00; Chi² = 3.03, df = 4 (P = 0.55); I² = 0%						
Test for overall effect: Z = 2.05 (P = 0.04)						
1.1.2 Severe COVID-19						
Elgazzar 2020 (12)	2	100	20	100	11.2%	0.10 [0.02, 0.42]
Fonseca 2021 (13)	12	52	25	115	19.5%	1.06 [0.58, 1.94]
Gonzalez 2021 (14)	5	36	6	37	14.3%	0.86 [0.29, 2.56]
Hashim 2020 (15)	0	11	6	22	4.5%	0.15 [0.01, 2.40]
Okumus 2021 (16)	6	36	9	30	16.2%	0.56 [0.22, 1.38]
Subtotal (95% CI)		**235**		**304**	**65.8%**	**0.51 [0.22, 1.14]**
Total events	25		66			
Heterogeneity: Tau² = 0.48; Chi² = 10.52, df = 4 (P = 0.03); I² = 62%						
Test for overall effect: Z = 1.65 (P = 0.10)						
1.1.3 Mild, moderate and severe COVID-19						
Niaee 2020 (17)	4	120	11	60	14.2%	0.18 [0.06, 0.55]
Subtotal (95% CI)		**120**		**60**	**14.2%**	**0.18 [0.06, 0.55]**
Total events	4		11			
Heterogeneity: Not applicable						
Test for overall effect: Z = 3.03 (P = 0.002)						
Total (95% CI)		**1300**		**1138**	**100.0%**	**0.38 [0.19, 0.73]**
Total events	30		89			
Heterogeneity: Tau² = 0.49; Chi² = 19.78, df = 10 (P = 0.03); I² = 49%						
Test for overall effect: Z = 2.87 (P = 0.004)						
Test for subgroup differences: Chi² = 2.38, df = 2 (P = 0.30), I² = 15.9%						

Post SARS-CoV-2 complications (Long COVID)

- Difficulty breathing or shortness of breath
- Tiredness or fatigue
- Symptoms that get worse after physical or mental activities
- Difficulty thinking or concentrating (sometimes referred to as “brain fog”)
- Cough
- Chest or stomach pain
- Headache
- Fast-beating or pounding heart (also known as heart palpitations)
- Joint or muscle pain
- Pins-and-needles feeling
- Diarrhea
- Sleep problems
- Fever
- Dizziness on standing (light headedness)
- Rash
- Mood changes
- Change in smell or taste
- Changes in period cycles

WHEN IT'S YOUR TURN, TAKE YOUR VACCINE

All approved COVID-19 vaccines have been thoroughly tested, and all provide a high degree of protection against getting seriously ill and dying from the disease.

It is important to be vaccinated as soon as possible and not wait. This way, we build immunity in our communities faster and can get back to our normal lives.

Thank you