

VACCINATION & PUBLIC HEALTH

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*Vaccination is a duty as well as a right. It should be known that the only gain of community immunity is not breaking the chain of infection. Community immunity is also a **solidarity** that ensures the protection of the most vulnerable segments of society.*

*Phase 1 lecture, 2024 - 2025
academic year, spring semester
8th October 2024, Ankara - TURKIYE*

www.ahmetsaltik.net

Polio Epidemics



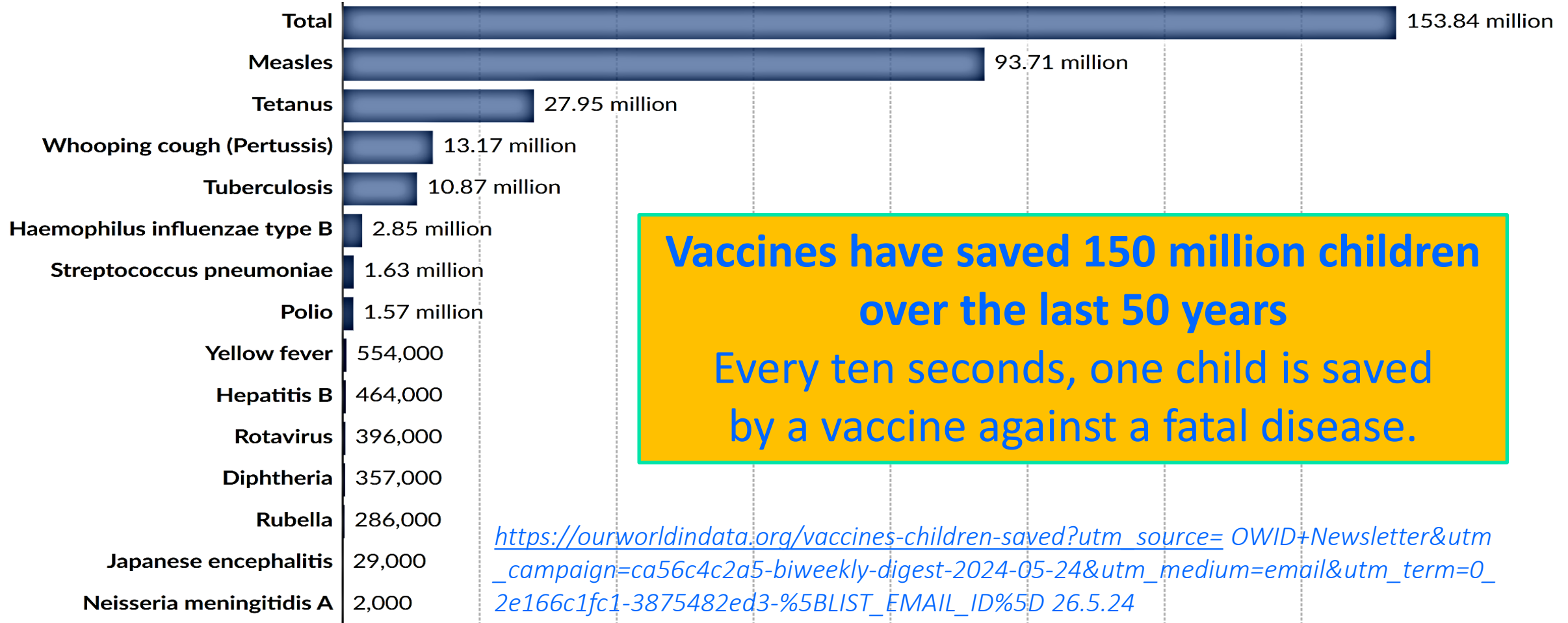
Dr. Jonas SALK (1914-1995) : *Developped polio vaccine*



Number of lives saved by vaccinations from 1974 to 2024, World

Table Chart

Change country or region



Vaccines have saved 150 million children over the last 50 years
Every ten seconds, one child is saved by a vaccine against a fatal disease.

https://ourworldindata.org/vaccines-children-saved?utm_source=OWID+Newsletter&utm_campaign=ca56c4c2a5-biweekly-digest-2024-05-24&utm_medium=email&utm_term=0_2e166c1fc1-3875482ed3-%5BLIST_EMAIL_ID%5D 26.5.24

Data source: Shattock et al. (2024). Contribution of vaccination to improved child survival: modelling 50 years of the Expanded Programme on Immunization. - [Learn more about this data](#)

OurWorldInData.org/vaccination | CC BY



Learning objectives....

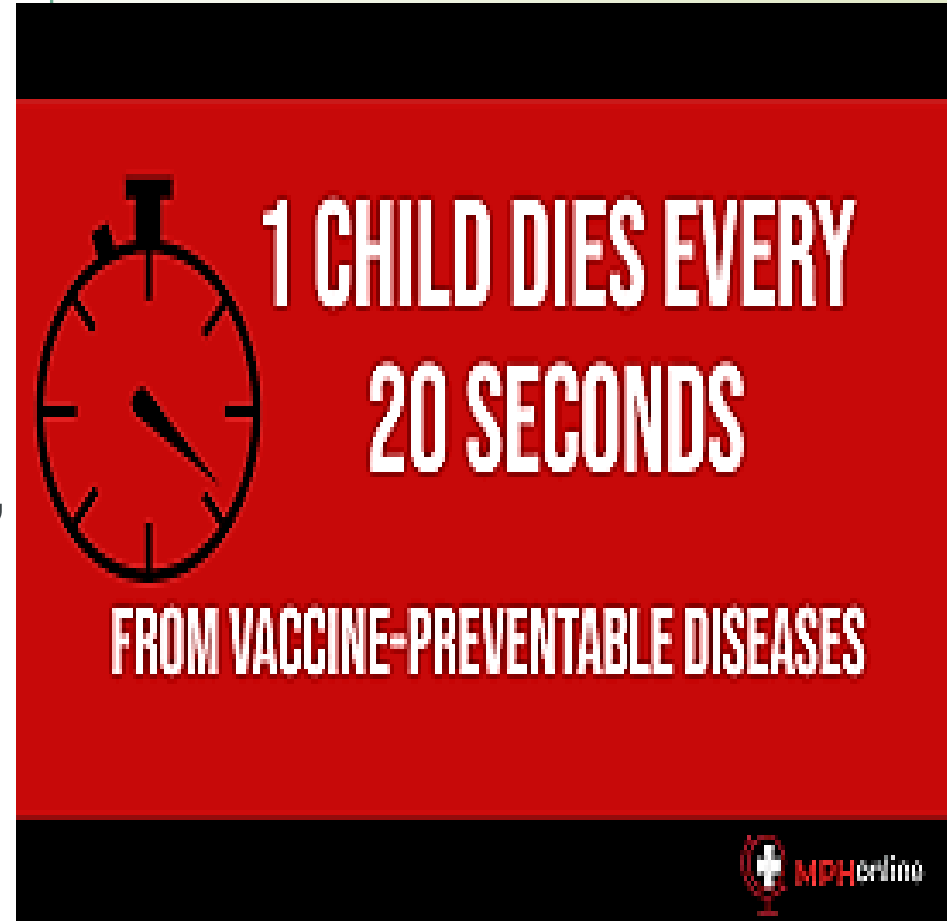
At the end of this lecture, students are expected to :

- have basic knowledge on vaccination from Public Health point of view
- define **Vaccination & Immunisation** and differences in between
- understand the rational of community (herd) and individual immunity
- learn the vaccine preventabl major diseases and vaccination schedule
- describe the medical and legal norms of vaccination at national & international level
- interface with the essential role of vaccination in fighting against infectious diseases
- introduce the principles of Vaccination in different age groups and conditions
- explain the basis of **vaccine hesitancy and refusal**
- conceive that the Vaccination is on of the **most cost-effective tool** in protecting the people before and during epidemics of certain contagious diseases
- realise vaccine coverage an eliminating – eradicating of infectious disease by mass roll up



IMMUNIZATION & PUBLIC HEALTH

- ✓ **Vaccination** is one of the best ways to prevent «*vaccine preventabl diseases*».
- ✓ *In total, vaccines are estimated to save between 2 - 3 million lives every year.*
- ✓ Together with governments, vaccine manufacturers, scientists and medical experts, WHO's **vaccine safety** programme is constantly helping monitor safety of vaccines.
- ✓ *This helps ensure that vaccines are **safe for you** and your family.*



What is Vaccination?

- **Vaccination** is a simple, safe, and effective way of protecting people against *harmful diseases*, before they come into contact with them. It uses your body's natural defenses to build resistance to specific infections and makes your **immune system** stronger.
- *Vaccines train your immune system to create antibodies, just as it does when it's exposed to a disease.*
- However, because vaccines contain only killed or weakened forms of germs like viruses or bacteria or produced by **recombinant DNA** they do not cause the disease or put people at risk of its complications.
- *Most vaccines are given by an injection, but some Polio vaccine is given orally (by mouth) or sprayed into the nose (Covid-19).*

Why is Vaccination important?

- ❖ **Vaccination** is a «*safe and effective*» way to prevent disease and **save lives** now more than ever.
- ❖ Today there are vaccines available to protect against almost **40 diseases** such as diphtheria, tetanus, pertussis (whooping cough), polio, measles, HPV, hepatitis B, chickenpox, rota virus, yellow fever, cholera, zona, BCG, rabies, dengue, malaria, Hib, varicella, Japanese encephalitis, meningococcal, coronavirus, yellow fever... etc.
- ❖ Together, these vaccines save lives of up to **3 million** people every year.
- ❖ When we get vaccinated, we aren't just protecting ourselves, also those around us.
- ❖ Some people, like those who are seriously ill, are advised not to get certain vaccines so they depend on the rest of us to **get vaccinated and help reduce the spread of disease** : This is an **inevitable humanitarian solidarity&responsibility!**

<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination> 06.12.20

Why is vaccination important?

- During the **COVID-19 pandemic**, **vaccination** became critically important.
- *The pandemic has caused a decline in the number of children receiving routine immunizations, which could lead to an increase in illness and death from preventable diseases.*
- WHO has urged countries to ensure that **essential immunization** and health services continue, despite the challenges posed by COVID-19.
- *More information about the importance of vaccines is available [here](#).*



<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination> 06.12.20

How does a vaccine work?

- ✓ Vaccines reduce risks of getting a disease by working with your body's natural defenses to build protection.
- ✓ *When you get a vaccine, your **immune system** responds;*
 - Recognizes the invading germ, such as the virus or bacteria.
 - *Produces antibodies. **Antibodies** are proteins produced naturally by the immune system to fight disease.*
- ✓ Remembers the disease and how to fight it.
- ✓ *If you are then exposed to the germ in the future, your immune system can quickly destroy it before you become unwell.*



A crisis of vaccine **inequity!**

- *The longer **vaccine inequity** persists, the more the virus will keep circulating and changing, the longer the social and economic disruption will continue, and the higher the chances that more **variants** will emerge that render vaccines less effective.”*
- Health leaders have called for urgent **global cooperation** on COVID-19 vaccine supply and access, particularly in Africa where only 2% of total doses worldwide have been administered.

Dr. Tedros Adhanom Ghebreyesus, Director-General, WHO

[Booster shots for COVID-19 - profsaltik@gmail.com - Gmail \(google.com\)](mailto:profsaltik@gmail.com) 17.9.21

How does a vaccine work?

- ❖ The **vaccine** is therefore a safe and clever / smart way to produce an *immune response* in the body, without causing illness.
- ❖ *Our immune systems are designed to remember.*
- ❖ Once exposed to one or more doses of a vaccine, we typically remain protected against a disease for years, decades or even a ***lifetime***.
- ❖ *This is what makes **vaccines so effective**.*
- ❖ Rather than treating a disease after it occurs, vaccines prevent us in the first instance from getting sick.



<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination>, 06.12.20

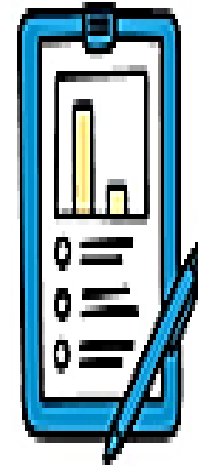
How do vaccines protect individuals and communities?

- ❑ Vaccines work by training and preparing the body's natural defenses –*the immune system*– to recognize and fight off viruses and bacteria.
- ❑ *If the body is exposed to those disease-causing pathogens later, it will be ready to destroy them quickly – which prevents illness.*
- ❑ When a person gets vaccinated against a disease, their risk of infection is also reduced so they're also far less likely to transmit the disease to others.

<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination>, 06.12.20

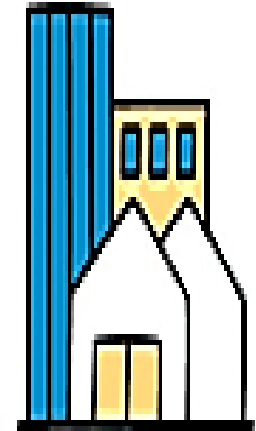
How do vaccines protect individuals and communities?

- ❑ *As more people in a community get vaccinated, fewer people remain vulnerable, and there is less possibility for passing the pathogen on from person to person.*
- ❑ Lowering the possibility for a pathogen to circulate in the community protects those who cannot be vaccinated due to other serious health conditions from the disease targeted by the vaccine :
- ❑ This is called “**community (herd) immunity.**”



Vaccine efficacy

refers to how the vaccine performs in ideal conditions
- controlled clinical trials.



Vaccine effectiveness

refers to how the vaccine performs in the wider populations.

<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination> 06.12.20

Vaccine efficacy and effectiveness are both measures of how well a vaccine works in preventing disease, but they are used in different contexts:

- Vaccine efficacy is measured in controlled clinical trials.
- Vaccine effectiveness is measured in real-world scenarios after the vaccine has been distributed to the public.

Vaccine Efficacy

The formula for calculating vaccine efficacy in a clinical trial is:

$$\text{Vaccine Efficacy (VE)} = \left(\frac{AR_U - AR_V}{AR_U} \right) \times 100$$

Where:

- AR_U = Attack rate in the unvaccinated group
- AR_V = Attack rate in the vaccinated group

Ref. World Health Organization. (2021). *Vaccine efficacy, effectiveness, and protection*. [WHO website](#)

The attack rate (AR) is the number of disease cases divided by the total number of individuals in the group.

If a vaccine has an efficacy of 80 percent:



It does not mean that the vaccine will only work 80% of the time.

It does mean that in a vaccinated population, 80% fewer people will contract the disease when they come in contact with the virus.



$$\text{Vaccine Effectiveness} = \left(\frac{AR_U - AR_V}{AR_U} \right) \times 100$$

Example:

Let's say a population is observed after the vaccine has been distributed, and we gather this data:

- **Unvaccinated group:** 200 cases in 2000 people
- **Vaccinated group:** 50 cases in 2500 people

First, calculate the attack rates:

- $AR_U = \frac{200}{2000} = 0.1$ (or 10%)
- $AR_V = \frac{50}{2500} = 0.02$ (or 2%)

Now, calculate the vaccine effectiveness:

$$\text{Vaccine Effectiveness} = \left(\frac{0.1 - 0.02}{0.1} \right) \times 100 = 80\%$$

This means the vaccine is 80% effective in the real-world population, similar to the trial scenario.

*The difference between **efficacy** and **effectiveness** often arises from real-world factors like different population behaviors, healthcare access, and the emergence of new virus variants that may affect vaccine performance.*

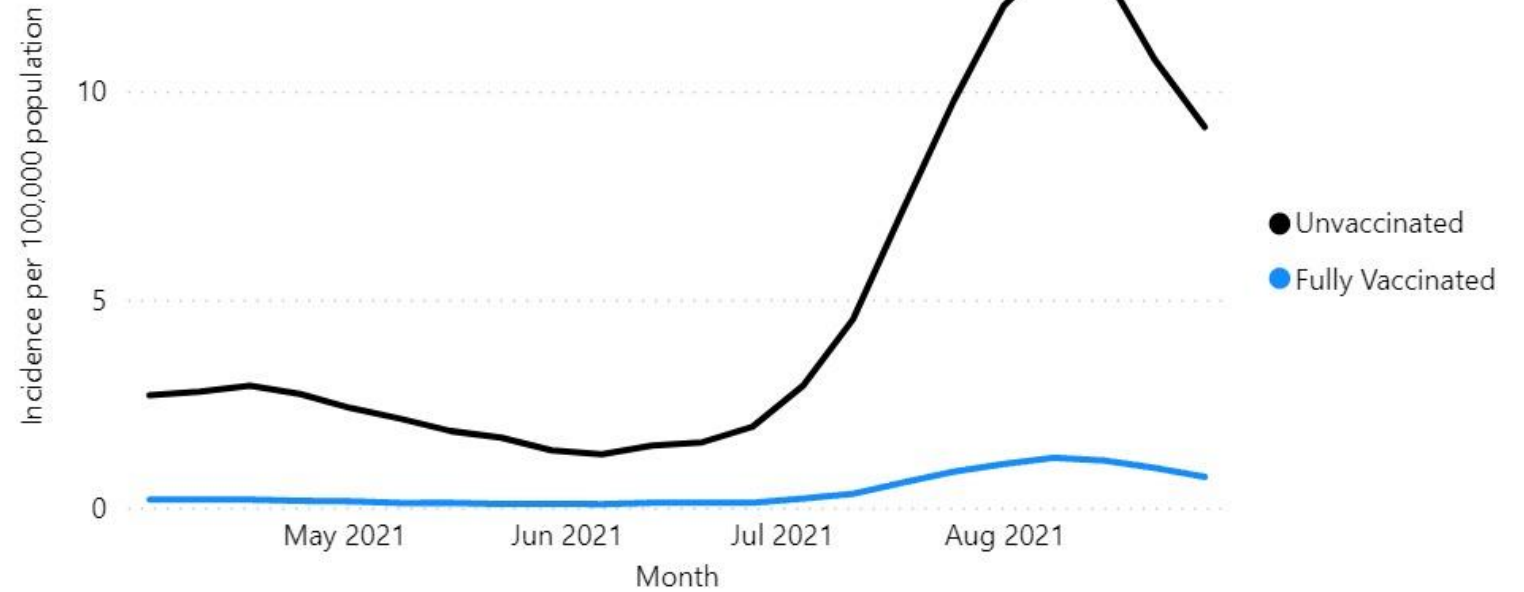
Rates of COVID-19 Cases or Deaths by Vaccination Status

April 04 - September 04, 2021 (16 U.S. jurisdictions)

Outcome

□ Cases

■ Deaths



In August, unvaccinated persons had:

6.1X

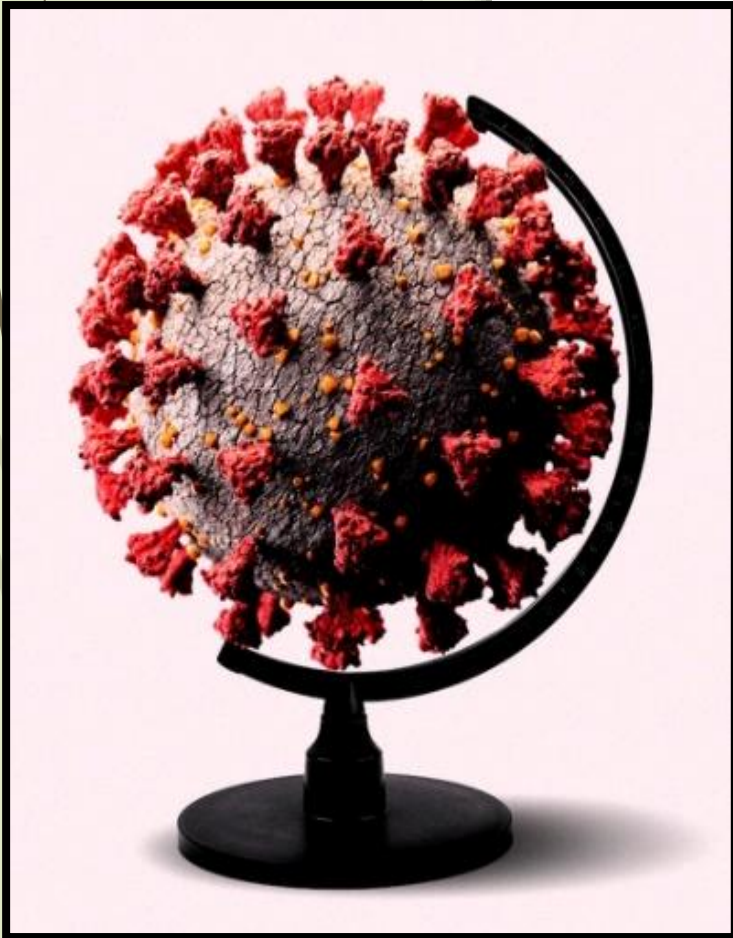
Greater Risk of Testing Positive for COVID-19

AND

11.3X

Greater Risk of Dying from COVID-19

compared to fully vaccinated persons



How do vaccines protect individuals and communities?

- “**Community (Herd) immunity**” exists when a high percentage of the population is vaccinated, making it difficult for infectious diseases to spread, because there are not many people who can be infected.
- *But **community (herd) immunity** works if most people are vaccinated.*
- At the same time, **community (herd) immunity** does not protect against all vaccine-preventable diseases.
- *For example, tetanus is caught from bacteria in the environment, not from other people, so those who are unimmunized are not protected from the disease even if most of the rest of the community is vaccinated.*

<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination> 06.12.20

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- ❖ Immunization is a global health and development success story, saving millions of lives every year.
- ❖ *Vaccines reduce risks of getting a disease by working with your body's natural defense to build protection. When you get a vaccine, your immune system responds.*
- ❖ We now have vaccines to prevent more than 20 **life-threatening diseases**, helping people of all ages live longer, healthier lives.
- ❖ *Immunization currently prevents 2-3 million deaths every year from diseases like diphtheria, tetanus, pertussis (whooping cough), influenza and measles.*
- ❖ Immunization is a key component of primary health care and an indisputable human right.
- ❖ *It's also one of the best health investments money can buy.*

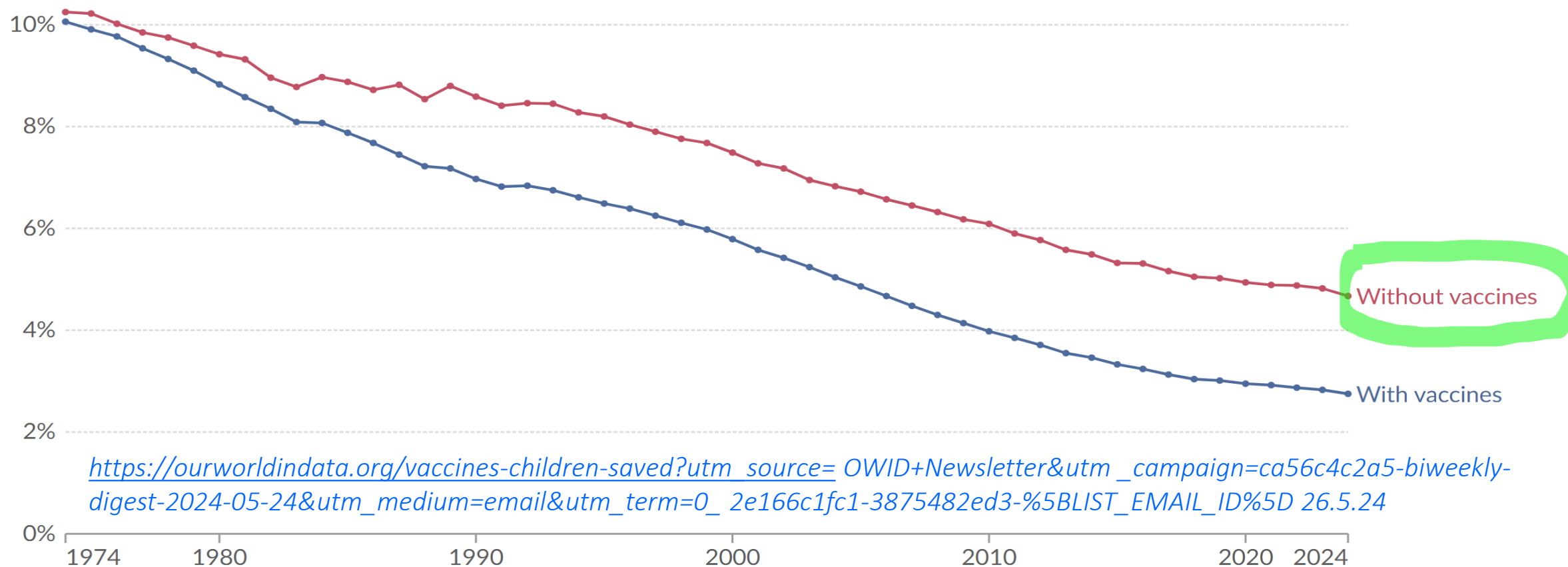
https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1 6.11.10

Global infant mortality rate with and without vaccines, 1974 to 2024

Infant mortality rates measure the share of newborns who die before reaching their first birthday. They are shown here as the actual observed change in the global rate (in blue), and a hypothetical scenario if vaccinations hadn't been rolled out (in red). Vaccination is estimated to account for 40% of the decline in infant mortality rates since 1974.

Table Chart

Settings



https://ourworldindata.org/vaccines-children-saved?utm_source=OWID+Newsletter&utm_campaign=ca56c4c2a5-biweekly-digest-2024-05-24&utm_medium=email&utm_term=0_2e166c1fc1-3875482ed3-%5BLIST_EMAIL_ID%5D_26.5.24



IMMUNIZATION & PUBLIC HEALTH

- **Vaccines** are also critical to the prevention and control of infectious-disease **outbreaks**.
- They underpin global health security and will be a vital tool in the battle against **AMR (anti-microbial resistance)**.
- Yet despite tremendous progress, far too many people around the world including nearly 20 million infants each year have **insufficient access to vaccines**.
- *In some countries, progress has stalled or even reversed, and there is a real **risk** that **complacency** will undermine past achievements.*
- **Global vaccination coverage**, the proportion of the world's children who receive recommended vaccines has remained the same over the past few years.

https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1 6.11.10



Preventing epidemics and pandemics

- ❑ The number of **high-threat infectious** hazards continues to rise; some of these are **re-emerging** and others are new (**emerging**).
- ❑ While **outbreaks of vaccine-preventable infectious diseases**, such as meningococcal disease, yellow fever and cholera, can have **disastrous effects** in areas with limited health infrastructure and resources, and where timely detection and response is difficult.
- ❑ **WHO** develops global strategies for the prevention and control of epidemic-prone diseases such as **yellow fever, cholera and influenza**.

*With partners from a wide range of technical, scientific and social fields, WHO brings together all globally available resources to counter these **high-threat infectious** hazards and scale these strategies to regional and country levels.*

https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1 6.11.10

Preventing epidemics and pandemics

✓ Flagship global strategies include:

- *The Eliminate Yellow Fever Epidemics strategy 2017- 2026;*
- **Ending Cholera: a Global Roadmap to 2030;**
- *the Pandemic Influenza Preparedness (PIP) Framework; and*
- **the Global Strategy for Influenza 2018-2030.**

✓ WHO is also the secretariat for the governance of global emergency stockpiles, including the *International Coordinating Group on Vaccine Provision*, which manages and coordinates the provision of emergency vaccine supplies and antibiotics to countries during major outbreaks.

https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1 6.11.10

COVAX

CEPI



- Immunization currently prevents 2-3 million deaths every year from diseases like *diphtheria, tetanus, pertussis, influenza and measles..*
- There are now vaccines to prevent more than 20 ***life-threatening diseases***, and work is ongoing at *unprecedented speed* to also make COVID-19 a vaccine-preventable disease. It was reached in a record short time!

When a safe and effective vaccine is found, **COVAX** (led by **WHO**, **GAVI** & **CEPI**) will facilitate the equitable access and distribution of these vaccines to protect people in all countries.
People most at risk will be prioritized.

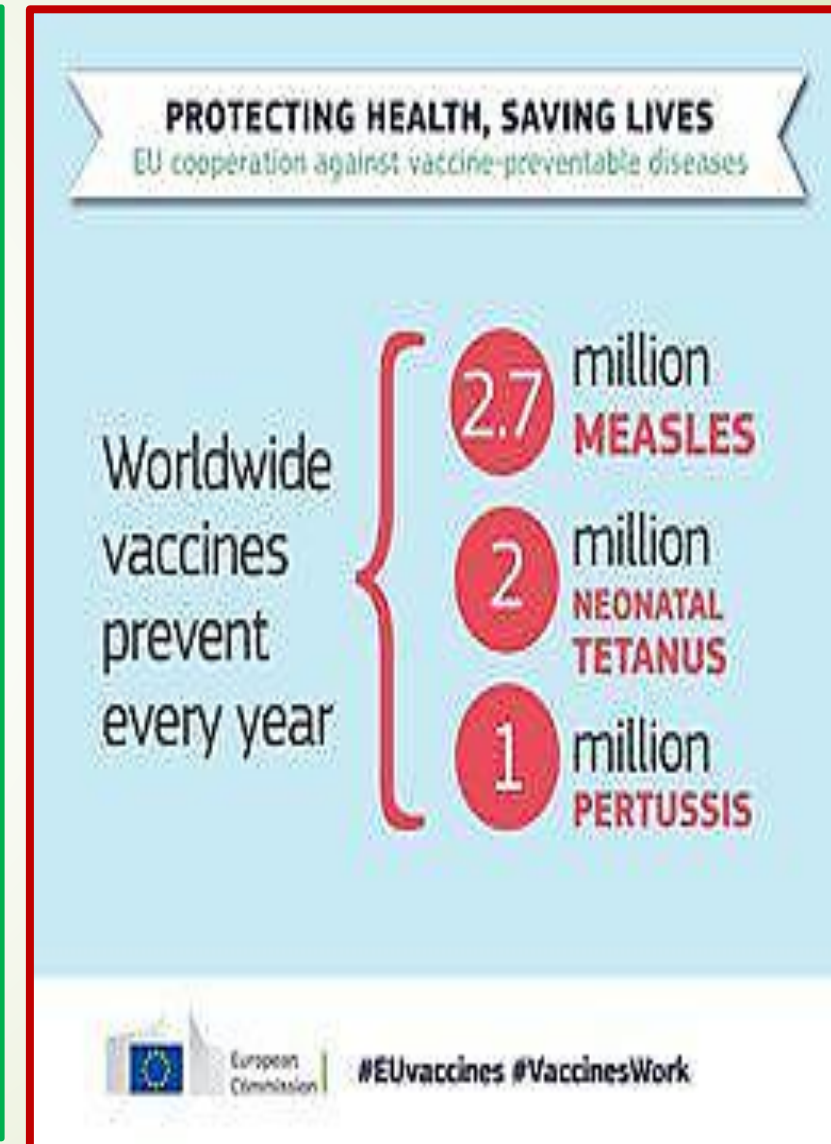


- Vaccines save millions of lives each year.
- Vaccines work by training and preparing the body's natural defenses -***the immune system***- to recognize and fight off the viruses and bacteria they target.
- *If the body is exposed to those disease-causing germs later, the body is immediately ready to remember and destroy them, preventing illness.*



What is «Vaccination Coverage» and Why is it important?

- ❑ **Vaccination coverage** is the estimated percentage of people who have received specific vaccines. Health departments all over the US monitor vaccination coverage to understand how well communities are protected from vaccine-preventable diseases.
- ❑ Vaccination coverage information is used to identify areas and groups with lower vaccination coverage so public health departments, health care partners, and schools can take action to help improve vaccination coverage and **protect everyone from vaccine-preventable diseases**.



In the early 1900s, **Polio** was a worldwide disease, paralysing hundreds of thousands of people every year.

By 1950, two effective vaccines against the disease had been developed.

But vaccination in some parts of the world was still not common enough to stop the spread of polio, particularly in Africa.

In the 1980s, a united worldwide effort to eradicate **polio** from the planet was begun.

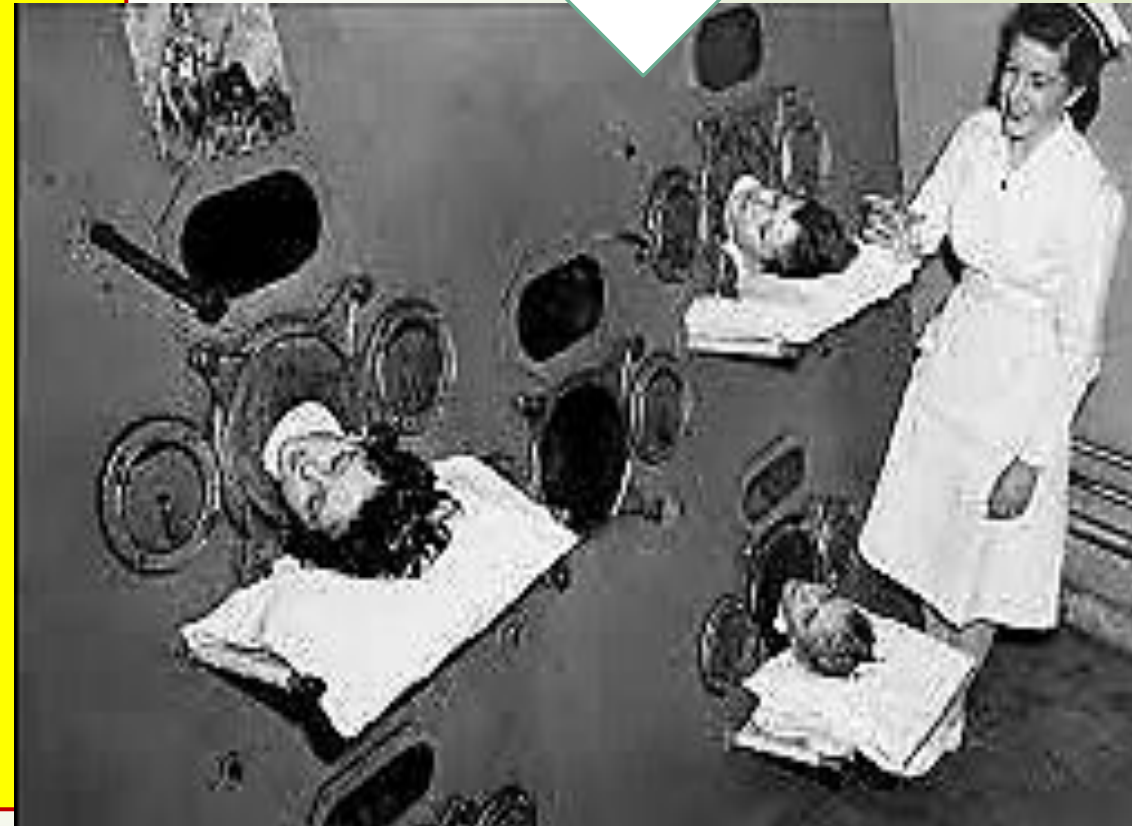
Global Polio Eradication Initiative



Over many years and several decades, ***polio vaccination***, using routine immunization visits and ***mass vaccination*** campaigns, has taken place in all continents.

*Millions of people, mostly children, have been vaccinated and in August 2020, the African continent was certified **polio free**, joining all other parts of the world except Pakistan and Afghanistan, where polio has not yet been eradicated.*

**Mechanical respiratory support for polio cases :
Iron lung or *negative pressure ventilator*.**

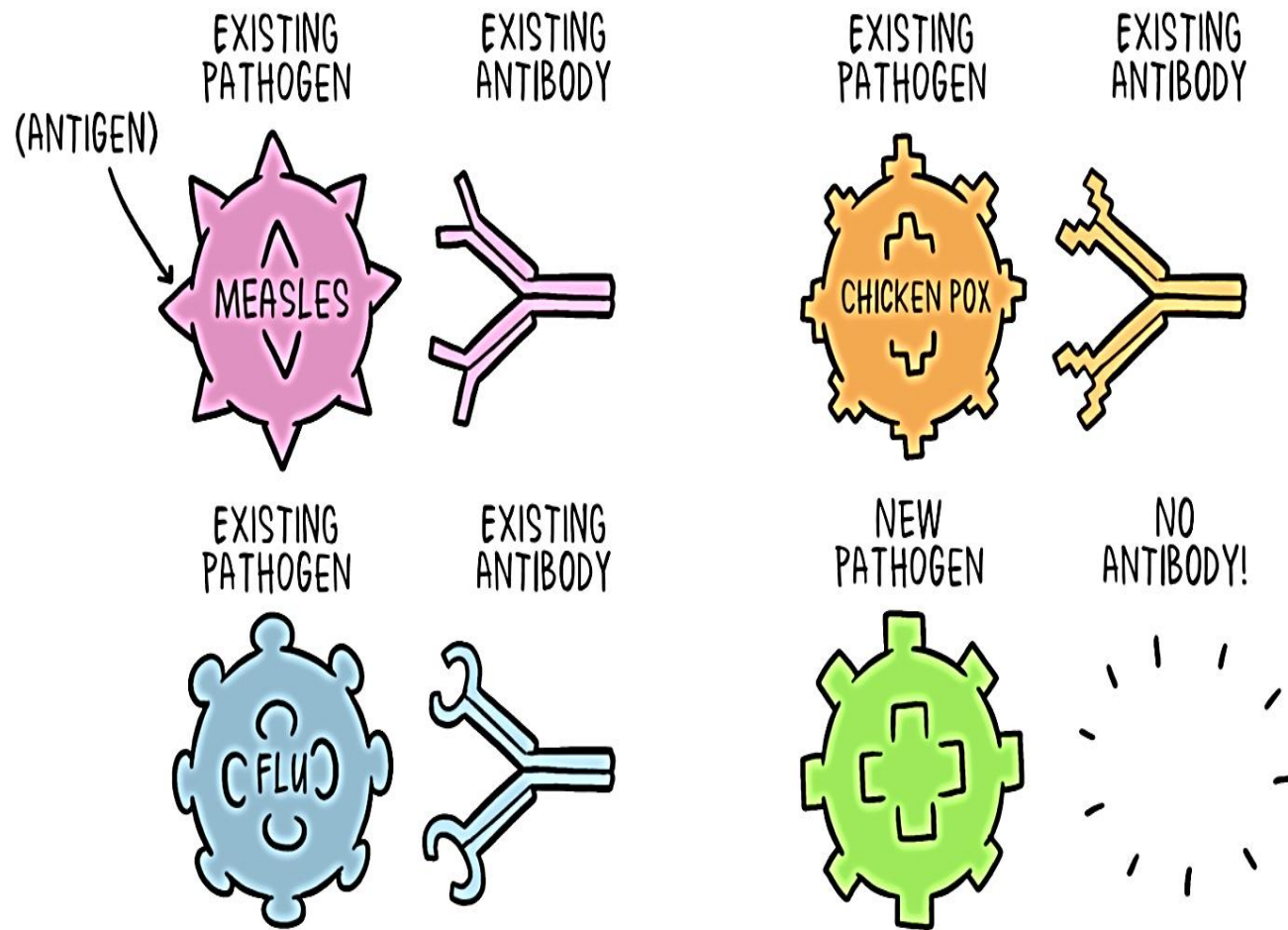




Paralytic polio, due to viral harm in the anterior horn motor neuron cells of the medulla spinalis.
Preventable by only 2 drops of vaccine!

Once the antigen-specific antibodies are produced, they work with the rest of the immune system to destroy the pathogen and stop the disease. *Antibodies to one pathogen generally don't protect against another pathogen except when two pathogens are very similar to each other, like cousins.* Once the body produces antibodies in its *primary response* to an antigen, it also creates **antibody-producing memory cells (B cells)**, which remain alive even after the pathogen is defeated by the antibodies.

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines/how-do-vaccines-work> 06.11.2020



How do vaccines work?

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines/how-do-vaccines-work> <https://twitter.com/i/status/1459419711544909826>

Germs are all around us, both in our environment and in our bodies. When a person is susceptible and they encounter a harmful organism, it can lead to disease and **death**.

The body has many ways of defending itself against pathogens (disease-causing organisms). Skin, mucus, and cilia (microscopic hairs that move debris away from the lungs) all work as physical barriers to prevent pathogens from entering the body in the first place.

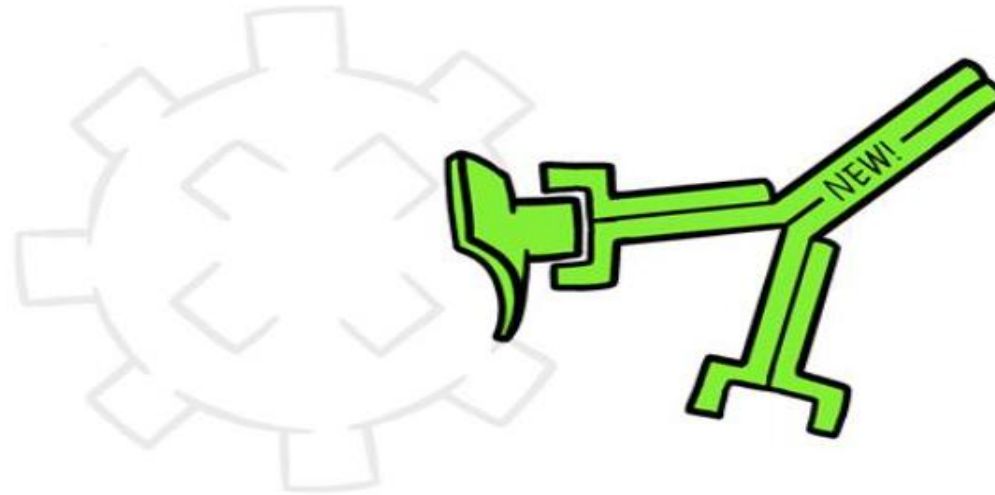
When a pathogen does infect the body, our body's defenses, called the **immune system**, are triggered and the pathogen is attacked and destroyed or overcome.

How vaccines help

Vaccines contain weakened or inactive parts of a particular organism (antigen) that triggers an immune response within the body. Newer vaccines contain the blueprint for producing antigens rather than the antigen itself. Regardless of whether the vaccine is made up of the antigen itself or the blueprint so that the body will produce the antigen, this weakened version will not cause the disease in the person receiving the vaccine, but it will prompt their immune system to respond much as it would have on its first reaction to the actual pathogen.

VACCINE

NEW ANTIBODY



A VACCINE is a tiny weakened non-dangerous fragment of the organism and includes parts of the antigen. It's enough that our body can learn to build the specific antibody. Then if the body encounters the real antigen later, as part of the real organism, it already knows how to defeat it.

*Some vaccines require multiple doses, given weeks or months apart. This is sometimes needed to allow for the production of long-lived **antibodies** and development of **memory cells**. In this way, the body is trained to fight the specific disease-causing organism, building up **memory** of the pathogen so as to rapidly fight it if and when exposed in the future.*

Communal (*Herd*) immunity

When someone is vaccinated, they are very likely to be protected against the targeted disease. But not everyone can be vaccinated.

People with underlying health conditions that weaken their immune systems (such as cancer or HIV) or who have severe allergies to some vaccine components may not be able to get vaccinated with certain vaccines.

These people can still be protected if they live in and amongst others who are vaccinated.

When a lot of people in a community are vaccinated the pathogen has a hard time circulating because most of the people it encounters are immune.

Communal (*Herd*) immunity

So the more that others are vaccinated, the less likely people who are unable to be protected by vaccines are at risk of even being exposed to the harmful pathogens. This is called **communal (*herd*) immunity**.

This is especially important for those people who not only can't be vaccinated but may be more susceptible to the diseases we vaccinate against.

No single vaccine provides 100% protection, and communal (*herd*) immunity does not provide full protection to those who cannot safely be vaccinated.

But with communal (*herd*) immunity, these people will have substantial protection, thanks to those around them being vaccinated.

❖ **Vaccinating not only protects yourself, but also protects those in the community who are unable to be vaccinated. If you are able to, get vaccinated.**

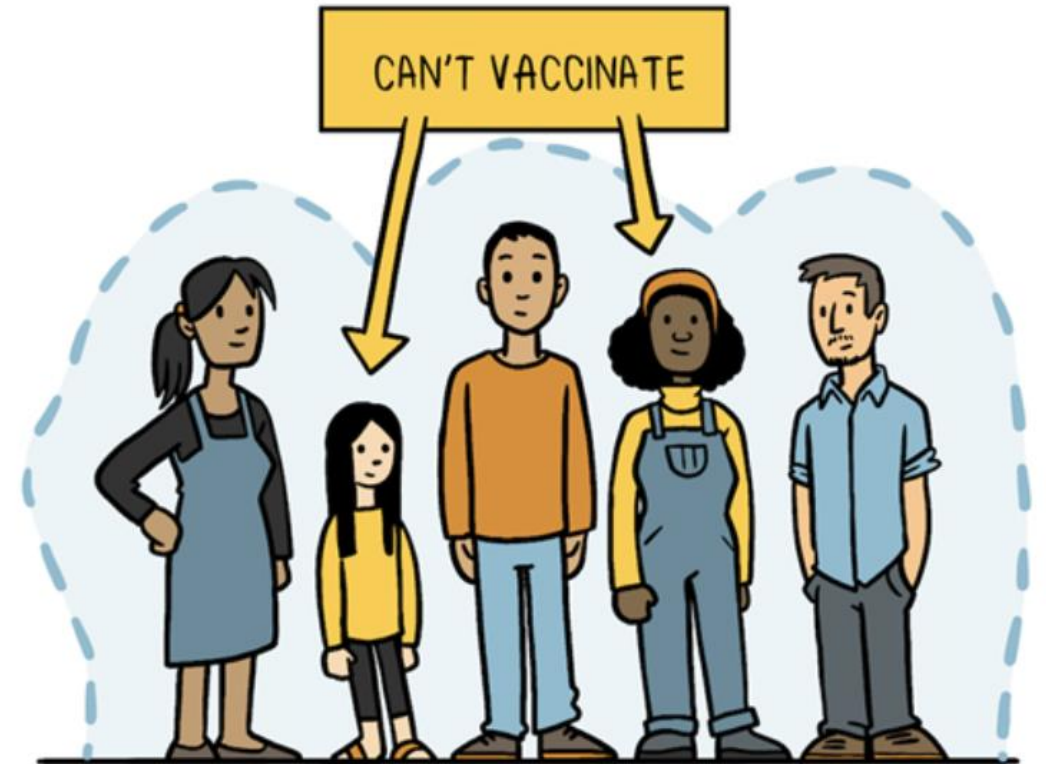
<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines/how-do-vaccines-work> 06.11.2020



A vaccine protects an individual...

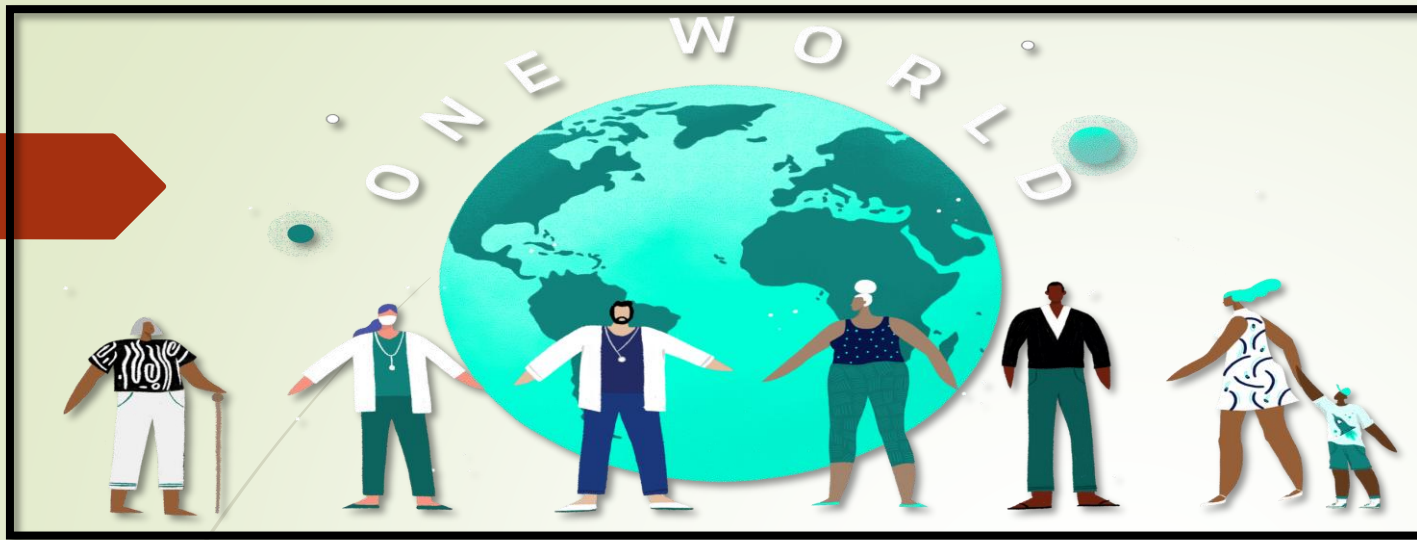
Throughout history, humans have successfully developed vaccines for a number of **life-threatening diseases**, including meningitis, tetanus, measles and polio.

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines/how-do-vaccines-work> 06.11.2020

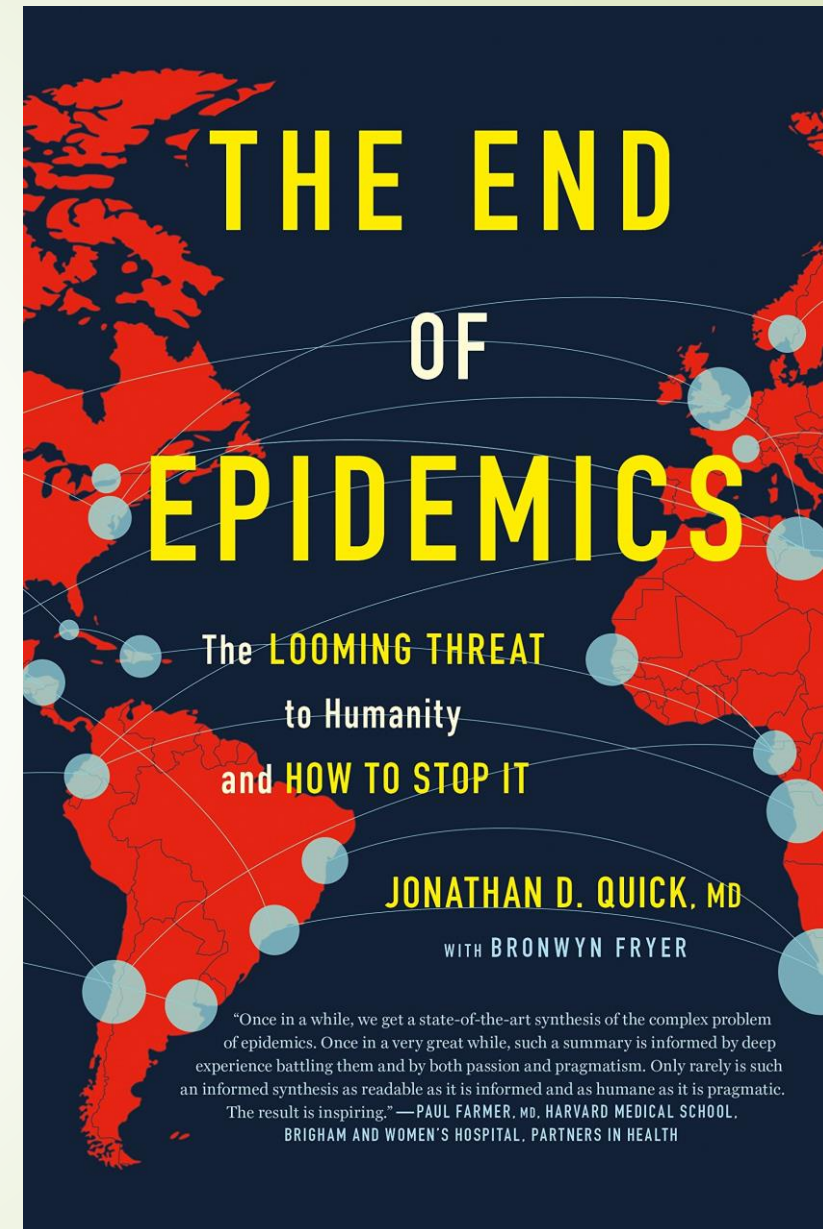


When a community is vaccinated, everyone is protected, even those who can't be vaccinated due to underlying health conditions.

<https://youtu.be/SkSdFzjNPs?t=4>



- ❖ The fastest way to end the pandemic is to ensure that people in all countries have **access to safe and effective vaccines** as soon as they are available.
- ❖ *Ensuring global access to a vaccine is the only way to tame the pandemic, says Seth Berkley, chief executive, **GAVI: Global Alliance for Vaccine Initiative***



How are vaccines tested?

Once a promising vaccine is identified, it will firstly undergo scrupulous lab. testing.

This includes careful examination and testing of the vaccine and its ingredients.

These tests evaluate the safety of the vaccine, and how well it prevents a disease.

If positive results are achieved in the lab, a manufacturer can then apply to do clinical trials.

These trials typically involve several thousand healthy volunteers participants on a voluntary basis, whose safety is ensured by national regulatory authorities, and last for many years. The trials are bound by strict regulations and take place across three main phases:

- During **Phase I**, small groups (approximately 20-50 people) receive the vaccine.

This phase will assess the safety, side effects, appropriate dosage, method of administration and composition of the vaccine.

How are vaccines tested?

- If it is successful, it will proceed to **Phase II**. At this stage, the vaccine is usually given to several hundred people. This group will have the same characteristics (e.g. age, sex) as the people for whom the vaccine is intended to be given.
- *In **Phase III**, the vaccine is usually given to thousands of people to help ensure it is safe and effective for broader use.*
- The results of all these studies will be assessed when regulators decide whether to approve a vaccine.
- *Studies may also take place after a vaccine is introduced. They enable scientists to monitor **efficacy and safety** among an even larger number of people, over a longer timeframe.*



Universal Health Coverage



How do we know that a vaccine is safe?

The most commonly used vaccines we have today have been in use for decades, with millions of people receiving them safely every year.

In addition, there are several new vaccines under development.

If approved, these will help prevent more life-threatening diseases such as COVID-19, Zika or Nipah viruses or improve the effectiveness of existing vaccines.


As with all medicines, every vaccine needs to go through extensive and rigorous testing before it can be introduced in a country.

Once they are in use, they must be continuously monitored to make sure they are safe for the people who receive them.

<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-vaccine-safety> 06.12.20

What happens if a problem is suspected with a vaccine?

- If a potential problem is reported following vaccination, a thorough investigation will take place.
- Investigations involve a thorough examination of the case in question, including medical assessment.*
- If necessary, detailed studies are conducted.
- During these investigations, it is **extremely rare** that health problems are found to be caused by the vaccine itself.*
- Health events are most often found to be *co-incidental*, i.e. entirely unrelated to vaccination.



"When health is at risk,
everything is at risk"

<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-vaccine-safety> 06.12.20

What happens if a problem is suspected with a vaccine?

- ❖ Sometimes, they are related to how the vaccine has been stored, transported or administered (*for instance, where errors are made in preparing the vaccine; cold chain injection technique; IM, IC/ID, intra-fat..*).
- ❖ *Such errors can be prevented by training health workers and, strengthening vaccination programmes.*
- ❖ In the rare cases where a genuine **adverse reaction** is suspected, the vaccine may be suspended from use.
- ❖ *Further investigations will take place to determine what exactly caused the event, and corrective measures put in place.*



<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-vaccine-safety> 06.12.20

Are there side effects from vaccines?

Vaccines are very safe even more than drugs...

- As with all medicines, side effects can occur after getting a vaccine. However, these are usually *very minor and of short duration*, such as a sore arm or a mild fever. More serious side effects are possible, but extremely rare.
- A person is far more likely to be seriously harmed by a disease than by a vaccine.*
- Vaccine-preventable diseases like measles, meningitis or polio can be deadly, or cause severe illness and disability.*
- Possible complications of these **diseases** can include:

- | | | | |
|---|--|---|--|
| <input type="checkbox"/> Blindness | <input type="checkbox"/> Deafness | <input type="checkbox"/> Paralysis | <input type="checkbox"/> Brain damage |
| <input type="checkbox"/> Infertility | <input type="checkbox"/> Cancer | <input type="checkbox"/> Birth defects | <input type="checkbox"/> Death... |

<https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-vaccine-safety> 06.12.20

~~DIS~~ABILITY



**Polio crippled children
due to non-vaccination
Just 2 drops!!**



SMALLPOX! Two Boys — One Vaccinated, One Not..





The World Immunization Week is celebrated yearly in the last week of April. This year, it will be celebrated from **April 24 to April 30**. It is worth noting that this year, the World Immunization Week celebration will mark the **50th anniversary of the Expanded Program on Immunization (EPI)**. **The Expanded Programme on Immunization (EPI)**, an initiative launched by the WHO in 1974, stands as *a global endeavor* to ensure **equitable access to life-saving vaccines for every child**, regardless of their geographic location or socioeconomic status. Over the past five decades, EPI has evolved and achieved remarkable milestones that reshaped the global health landscape.

Dr. Jonas Salk, who owned the patent to the **polio vaccine**? Dr. Salk replied :

❖ *“Well, the people. There is no patent. Could you patent the sun?”*



Dr. Albert Sabin

- Remembering **Dr. Albert Sabin** and the vaccine that changed the world. During his life, **Sabin** became a household name, famous the world over for his development of the **oral polio vaccine**. He was also a role model for many clinicians and researchers because **he refused to patent the vaccine**.
- Dr. Sabin examines a bottle containing pure strains of **polio** virus that proved best for **oral** consumption on Oct. 7, 1956, in OHIO/Cincinnati.

Immunization

- **Influenza and pneumonia** are among the top 10 causes of **death** for older adults.
- *Emphasis on Influenza vaccination for seniors has helped.*
- **Pneumonia** remains one of the most serious infections, especially among women and the very old.



SHAPING OUR FUTURE TOGETHER





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**World Health
Organization**



8.10.2024

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To bring *COVID-19 pandemic* to an end...

- ✓ To bring **COVID-19 pandemic** to an end, a large share of the World needs to be immune to the virus.
The safest way to achieve this is with a vaccine.
- ✓ *Vaccines are a technology that humanity has often relied on in the past to bring down the death toll of infectious diseases.*
- ✓ Within less than 12 months after the beginning of the COVID-19 pandemic, several research teams rose to the challenge and developed vaccines that protect from SARS-CoV-2, the virus that causes COVID-19.

<https://ourworldindata.org/covid-vaccinations> 16.5.21

To bring *COVID-19* pandemic to an end...

- ✓ *Now the challenge is to make these vaccines available to people around the world.*
- ✓ It will be key that people in all countries -*not just in rich countries*- receive the required protection.
- ✓ *To track this effort we at Our World in Data are building the international COVID-19 vaccination dataset that we make available on this page.*
- ✓ It is updated each morning, with the most recent official numbers up to the previous day.

<https://ourworldindata.org/covid-vaccinations> 16.5.21



Who will be offered a 3rd vaccine?

- ❖ People whose earlier vaccine protection may have worn off are likely to be prioritised. Currently, ***it's not certain how long COVID-19 vaccine protection lasts***, though studies suggest at least six months.
- ❖ However, ***vaccine protection varies*** by individual and *naturally wanes* over time. For some people, this waning happens more rapidly, for reasons such as old age, the effect of some chronic illness, or taking treatments that may suppress the immune system.
- ❖ Consequently, a **booster dose** is likely to be needed for people in these **high-risk groups** to make sure good **immune protection** is maintained. Indeed, the *UK's Department of Health and Social Care* has said that **boosters** will be distributed based on clinical need.

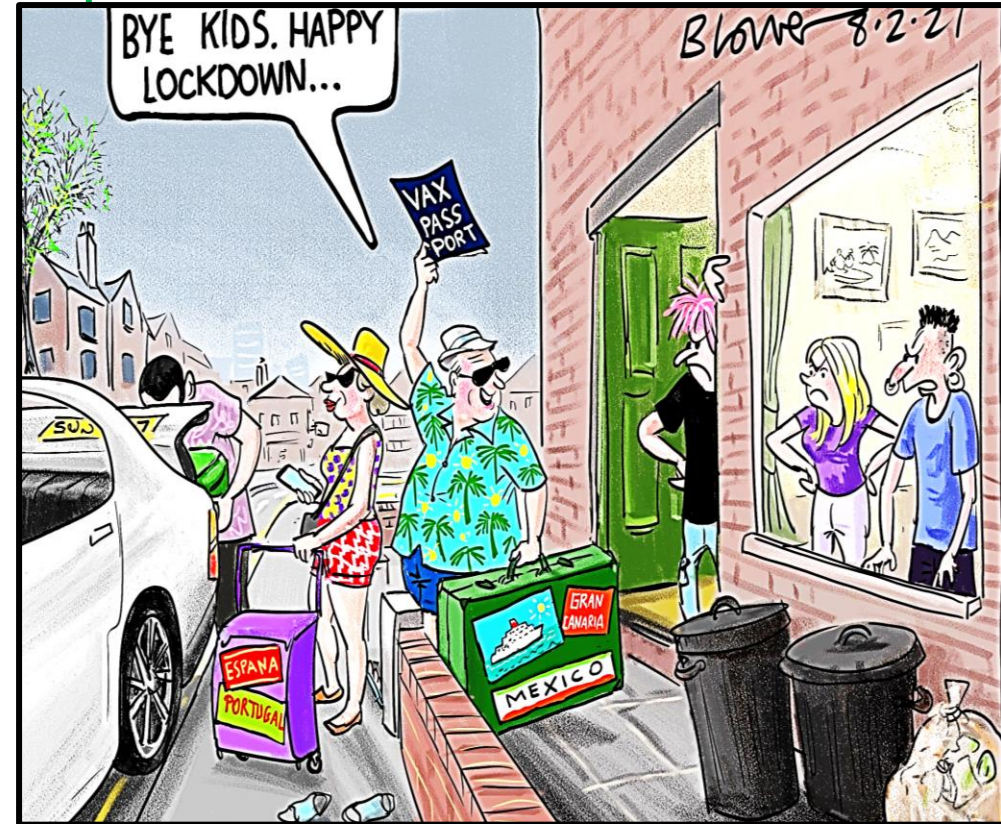
UK vaccine booster Q&A: what will be given and when, explained by public health expert 19.05.2021

Will the booster be an updated formula?

- ❑ However, a major concern is that a new ***variant emerges*** that can evade the immunity provided by existing vaccines what's known as "***vaccine escape***".
- ❑ *Should an escape variant emerge, one strategy may be to boost people with the existing vaccine that has the best efficacy against it.*
- ❑ For example, the B1351 variant identified in South Africa appears to have some escape potential, as the Oxford / AstraZeneca vaccine is less effective at preventing mild to moderate **COVID-19** when facing it.

Will the booster be an updated formula?

- ❑ However, early research some of which still needs to be reviewed by other scientists suggests the **Pfizer/BioNTech vaccine** isn't so severely affected.
- ❑ If none of the existing vaccines are sufficiently effective, then **updated vaccines** may be needed. However, they will take time to alter and mass produce.
- ❑ In the meantime, we **need to closely monitor** and study both the **emergence of new variants as well as the effectiveness of existing vaccines** against them.



UK vaccine booster Q&A: what will be given and when, explained by public health expert 19.05.2021

Immunity or Protection From COVID-19, Including After Vaccination

- ❑ **The FDA** is reminding the public of the limitations of COVID-19 antibody, or serology, testing and providing additional recommendations about the use of antibody tests in people who received a COVID-19 vaccination.
- ❑ *Antibody tests can play an important role in identifying individuals who may have been exposed to the SARS-CoV-2 virus and may have developed an adaptive **immune response**. However, antibody tests should not be used at this time to determine immunity or protection against COVID-19 at any time, and especially after a person has received a **COVID-19 vaccination**.*
- ❑ **The FDA** will continue to monitor the use of authorized SARS-CoV-2 antibody tests for purposes other than identifying people with an adaptive **immune response** to SARS-CoV-2 from a recent or prior infection.”

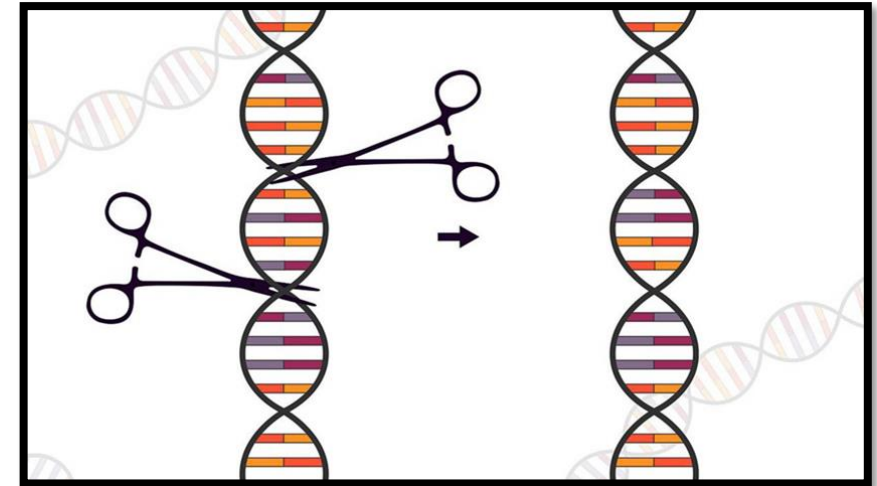
FDA In Brief: FDA Advises Against Use of SARS-CoV-2 Antibody Test Results to Evaluate Immunity or Protection From COVID-19, Including After Vaccination | FDA 23.05.2021

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World Medical Journal

- ❑ In August 2020, the **WHO** adopted the *Immunisation Agenda 2030* at the World Health Assembly, as an ambitious strategy to sustain political commitment to **universal health coverage-UHC**, including **vaccination coverage**.
- ❑ Building upon the **Global Vaccine Action Plan** (2011- 2020) and **eradication efforts** related WMA Members Contribute Insight on Global Vaccination Efforts WMA Members Contribute Insight on **Global Vaccination Efforts** to **polio and measles**, this strategy promises to uphold objectives to expand vaccination coverage through four elements
 - *operational planning,*
 - *ownership and accountability design,*
 - *monitoring and evaluation approach, and*
 - *communications and advocacy strategy.*
- ❑ In short, **WHO** leaders have expressed their goal:
 - ❑ **"A world where everyone, everywhere, at every age, fully benefits from vaccines for good health and well-being".**



- ❑ Furthermore, ***immunisations and optimal health outcomes*** are directly and indirectly linked to at least 14 of the 17 Sustainable Development Goals (SDGs) of the 2030 UN Agenda for Sustainable Development.
- ❑ *For example, vaccines can help improve work productivity and economic sustainability, which can support economic growth (SDG 8) and reduce poverty (SDG 1).*
- ❑ They can protect against pathogens and other enteric diseases, which can ensure clean water and sanitation (SDG 6) and reduce hunger (SDG 2).
- ❑ By conserving ***microbial diversity*** and **reducing the use of antimicrobial agents**, they can protect the marine and terrestrial ecosystems (SDG 14 and SDG 15) and the planet (SDG 13).
- ❑ In turn, ***equitable access to vaccines can reduce inequalities*** (SDG 10), promote quality education (SDG 4), and support **gender equality** (SDG 5), collective action and partnerships (SDG 17), ***peace and justice*** (SDG 16), and sustainable urban and rural communities (SDG 11) [2,8].

- ❑ These connections showcase the importance of the **One Health approach** (*humananimal-environmental nexus*) to better understand these direct and indirect connections between one public health approach (vaccines and immunisations) and the desired outcome (*optimal population health*).
- ❑ Notably, 2024 marks the 50th anniversary of the **Expanded Programme on Immunisation (EPI)**, which was launched by the WHO in 1974, to promote the coverage of childhood immunisations.
- ❑ The list initiated with six vaccines (*BCG-Bacillus Calmette-Guérin, diphtheria, pertussis, tetanus, polio, measles*), and today includes seven additional vaccines (*Haemophilus influenzae type B-HIB, Hepatitis B, rubella, pneumococcal disease, rotavirus, HPV, COVID-19 for adults*), for a total of 13 vaccines.



- ❑ Key milestones include the **eradication of smallpox in 1980**, as well as the elimination of polio by 99%, due to key partnerships with the **WHO, US-CDC, UNICEF**, Rotary International, Bill and Melinda Gates Foundation, and **Gavi the Vaccine Alliance**.
- ❑ *As the rapid spread of misinformation and disinformation was acutely observed during the **COVID-19 pandemic (infodemic!)**, global leaders should prepare comprehensive communication strategies for future public health initiatives.*
- ❑ **World Immunisation Week**, which is held annually from April 24-30 (<https://www.who.int/campaigns/world-immunization-week/2024>), provides an opportunity to promote joint public action to safeguard the population (including children) from **vaccine-preventable diseases**.

- ❑ Global health leaders recognise that the **One Health-One Medicine approach** offers a **holistic view** that can foster robust collaborations between scientific disciplines and sectors, which can support **infection control** practices and anti-microbial stewardship across human, animal, and agricultural sectors as well as **equitable vaccine delivery** and coverage across communities.
- ❑ Turkish leaders recognise that the **irregular migratory** routes from some countries, like Afghanistan, have most likely contributed to the **ongoing measles epidemic** in the nation (with 4,547 reported cases, as of October 2023) since December 2022 (<https://data.euro.who.int/CISID/>).
- ❑ Although the **WHO** has set the target of 90% coverage of **HPV vaccinations** to support efforts to **eliminate cervical cancer** by 2030, the Turkish Ministry of Health - MoH has not yet included this vaccine in its National Vaccination Schedule (NVS).



- ❑ The **World Immunisation Week** 2024 presents a global platform to recognise ongoing immunisation efforts across all countries as well as address barriers toward achieving projected global and national vaccination rates.
- ❑ Collectively, global leaders can identify gaps in their national **vaccination coverage**, share lessons learned from their vaccination campaigns, and take prompt action to implement the **Immunisation Agenda 2030** framework across their national health systems.
- ❑ Since *immunisations and optimal health outcomes overlap with the SDGs*, global leaders can simultaneously align overarching goals with plans to **expand vaccination coverage** and hence strengthen national primary care health systems.

Question to CHAT GPT4 : "Immunization and Public Health"

This is the subject of 2 hours lecture for medical students.

*What may be the **key messages** to students from Public Health Point of view?*

✓ **Immunization is a fundamental strategy** in achieving other health priorities, from controlling viral hepatitis, to curbing *antimicrobial resistance*, and providing a platform for adolescent health and improving antenatal and newborn care.

At all ages, vaccines save lives and keep us safe.

✓ **From a public health point of view,**

the key messages for medical students in immunization are:

- *The importance of immunization in preventing infectious diseases.*
- The role of vaccines in protecting individuals and communities.
- **The safety and efficacy of vaccines.**
- The importance of «vaccine coverage» in achieving herd immunity.
- The role of medical professionals in promoting vaccination and addressing vaccine hesitancy and rejection.



COVID-19 Vaccine Types

❑ Understanding How COVID-19 Vaccines Work??

Learn how the body fights infection and how COVID-19 vaccines protect people by producing immunity. Also see the different types of COVID-19 vaccines that currently are available or are undergoing large-scale (Phase 3) clinical trials in the United States.

❑ COVID-19 mRNA Vaccines

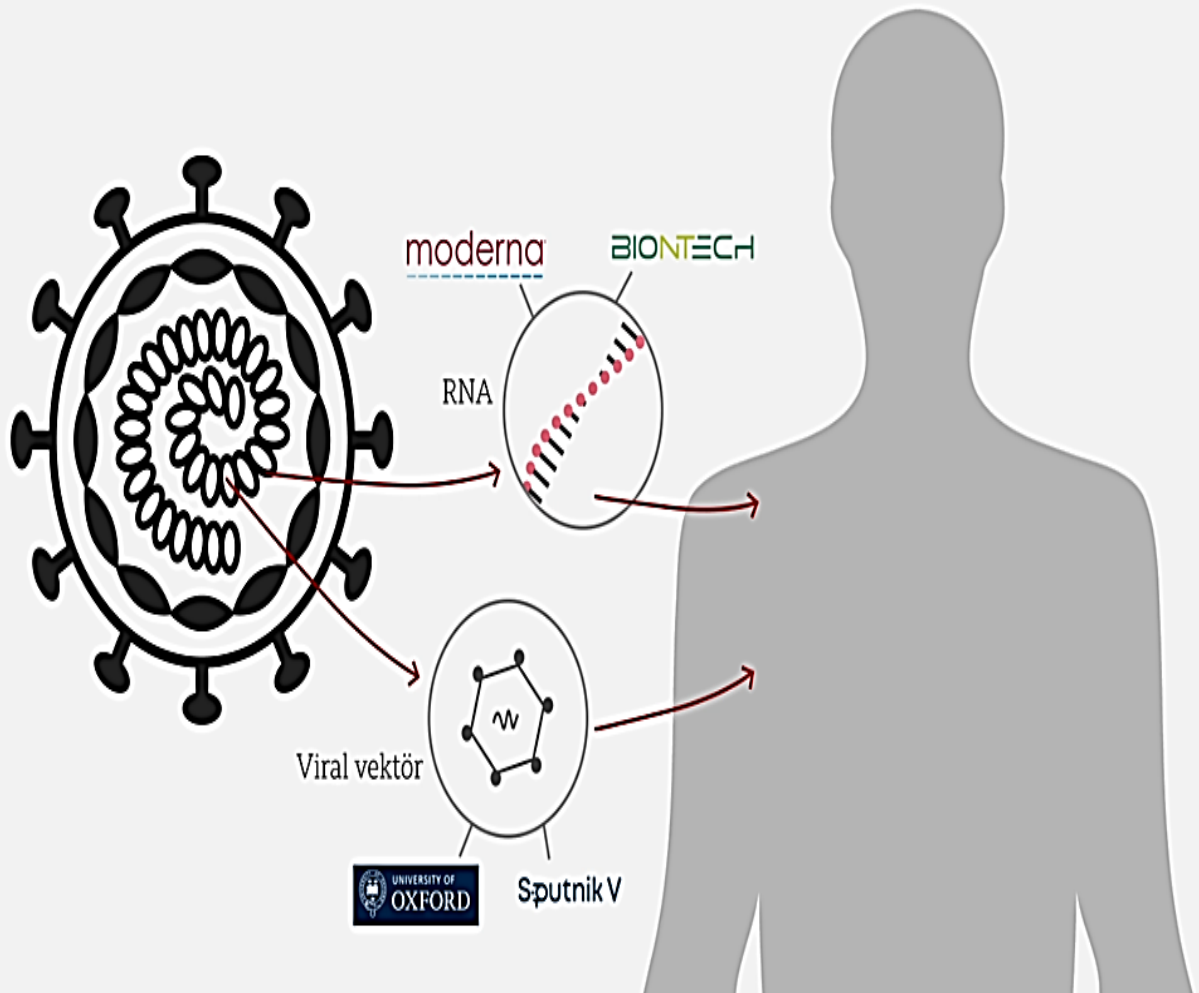
Information about **mRNA vaccines** generally and COVID-19 vaccines that use this new technology specifically.

❑ Viral Vector COVID-19 Vaccines

Information about viral vector vaccines generally and COVID-19 vaccines that use this new technology specifically.



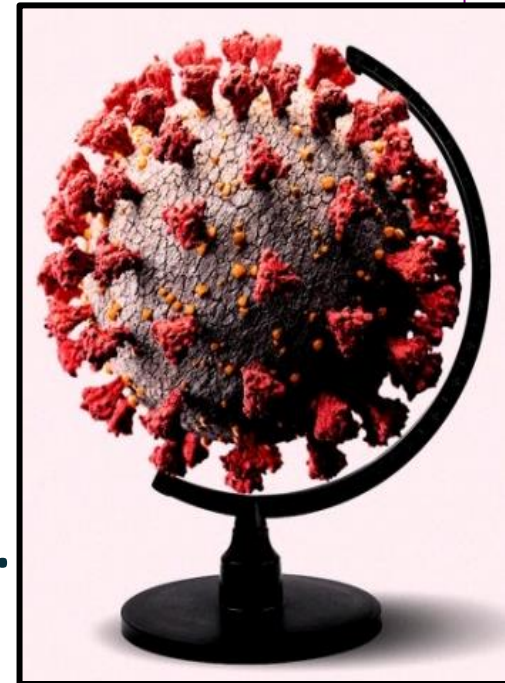
mRNA and Viral Vector vaccines











- ❖ Both **mRNA and viral vector vaccines** are types of **COVID-19** vaccines that use genetic material to help train your immune system to recognize the *spike protein* found on the surface of the coronavirus and respond accordingly.
- ❖ *This means that if you're exposed to the coronavirus in the future, your body is well-equipped to fight it off.*
- ❖ **mRNA-based vaccines** use lipid nanoparticles to deliver spike-encoding mRNA.
- ❖ *On the other hand, vector-based vaccines use adenovirus to deliver spike-encoding DNA to induce the production of **neutralizing antibodies** against the viral spike protein by host cells.*

How rapid Covid-19 vaccine was developed?

- *An unprecedented combination of political will, global collaboration and funding have enabled the **rapid development** of **COVID-19 vaccines**, without compromising vaccine safety.*
- The currently available coronavirus vaccines have been demonstrated to be **safe** for adults of various ages, as well as those with chronic health conditions.
- *But there are a few groups who should avoid being vaccinated for now.*



How some of the Covid-19 vaccines compare

Company	Type	Doses	How effective*	Storage	Cost per dose
 Oxford Uni- AstraZeneca	Viral vector (genetically modified virus)	x2 	62-90%	Regular fridge temperature	£3 (\$4)
 Moderna	RNA (part of virus genetic code)	x2 	95%	-20C up to 6 months	£25 (\$33)
 Pfizer- BioNTech	RNA	x2 	95%	-70C	£15 (\$20)
 Gamaleya (Sputnik V)	Viral vector	x2 	92%	Regular fridge temperature (in dry form)	£7.50 (\$10)

*preliminary phase three results, not yet peer-reviewed

Source: Respective companies, WHO



- There are **4 types of vaccines** in clinical trials:

whole virus, protein subunit, viral vector and nucleic acid

(RNA and DNA), each of which protects people, but by producing **immunity** in a slightly different way.

- Despite the record speed at which they have been developed, COVID-19 vaccines have still been subject to the same checks & balances, and scientific and regulatory rigour as any other vaccine, and shown to be safe.

❖ ***Am I fully protected after my two doses (shots) of vaccine?***

- ❖ While the vaccine will normally protect you from becoming ill, you are still advised to continue following **protective measures** such as wearing **masks**, social **distancing** and **washing-sanitizing your hands** regularly.



World Health Organization

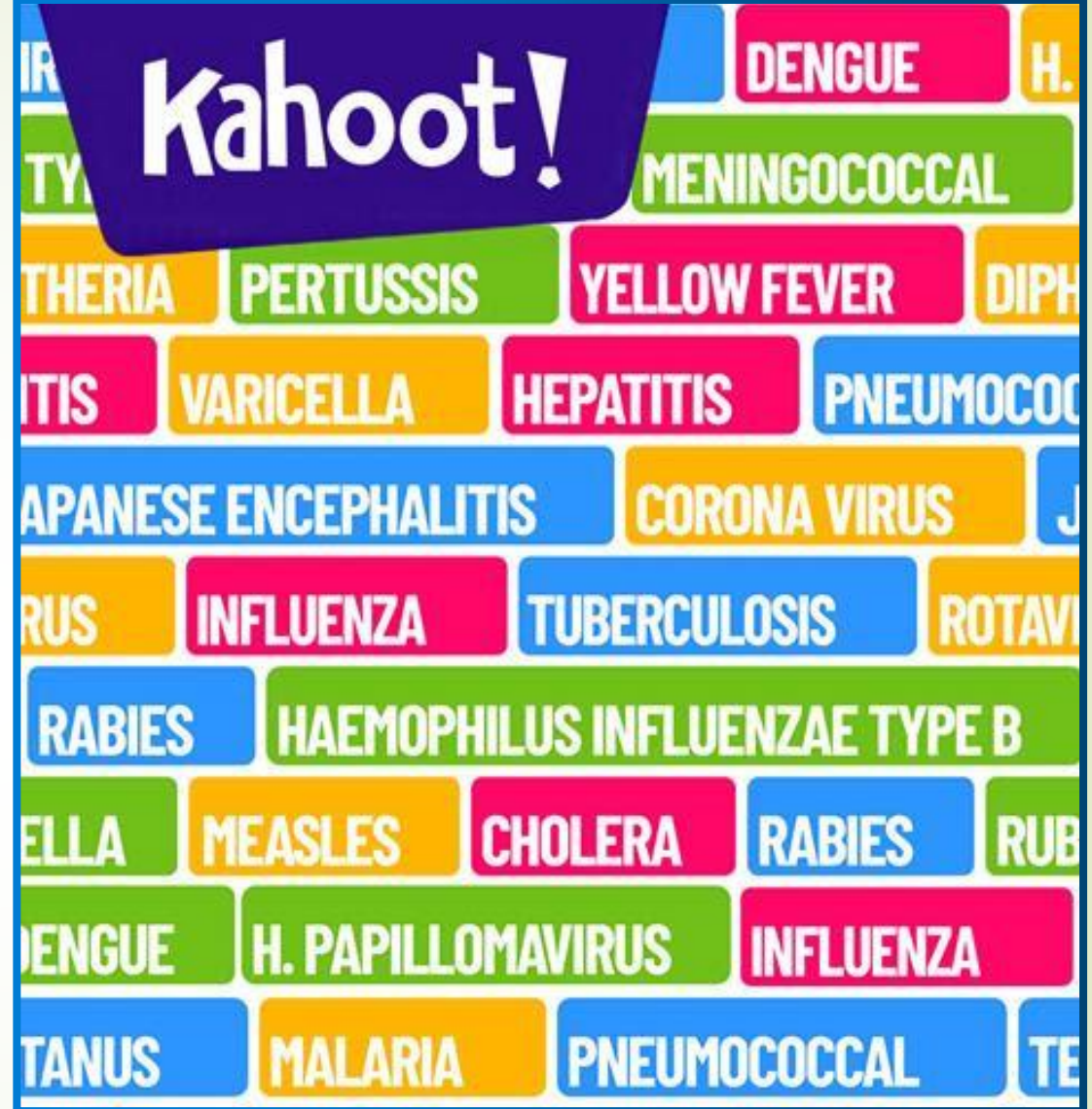
Weekly hot topic

World Immunization Week

24 – 30 April..

World Immunization Week 2022 is celebrated on 24–30 April. It highlights the collective action needed and promotes the use of vaccines to protect people of all ages against disease. Get vaccinated! Don't let viruses and other germs get in the way of life's glorious moments! #LongLifeForAll

Kahoot!



**Everyone's talking about vaccines this week...
How much do you know about vaccines?**

How does WHO help ensure vaccine safety?

- WHO works to make sure that everyone, everywhere is protected by *safe and effective* vaccines.
- *To do this, we help countries set up rigorous safety systems for vaccines alongside other medicines- and work to develop the strictest standards for their regulation.*
- Together with external scientists, WHO experts are continuously monitoring and updating the safety profile of more than 20 vaccines.
- *With external partners, it also helps countries investigate and communicate if potential issues of concern arise.*
- Events that are reported to **WHO** are evaluated by an independent group of experts (*The Global Advisory Committee on Vaccine Safety, or **GACVS***).
On behalf of this committee, WHO issues regular statements on **vaccine safety**.

How is vaccine safety monitored?

As with all medicines, the safety of a vaccine must be continuously monitored, even after trials and vaccine introduction.

This monitoring considers reports from several sources.

Nationally, these include the people who get vaccines, parents or caregivers, and health workers.

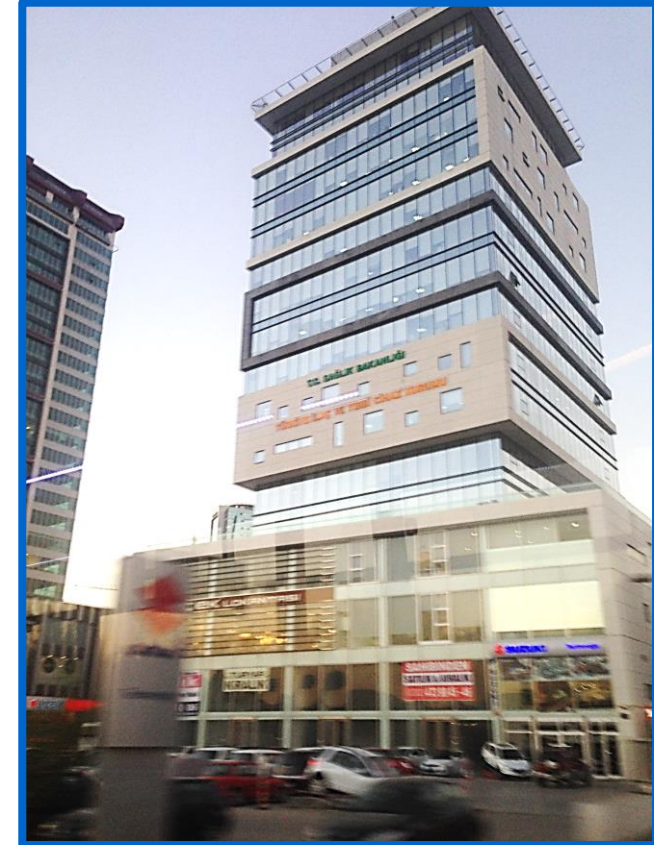
These reports are then submitted to national health authorities.

At a regional and global level, **WHO** and **UNICEF** support countries in collecting and monitoring this information, and ensuring countries have the most up to date evidence on available vaccines.

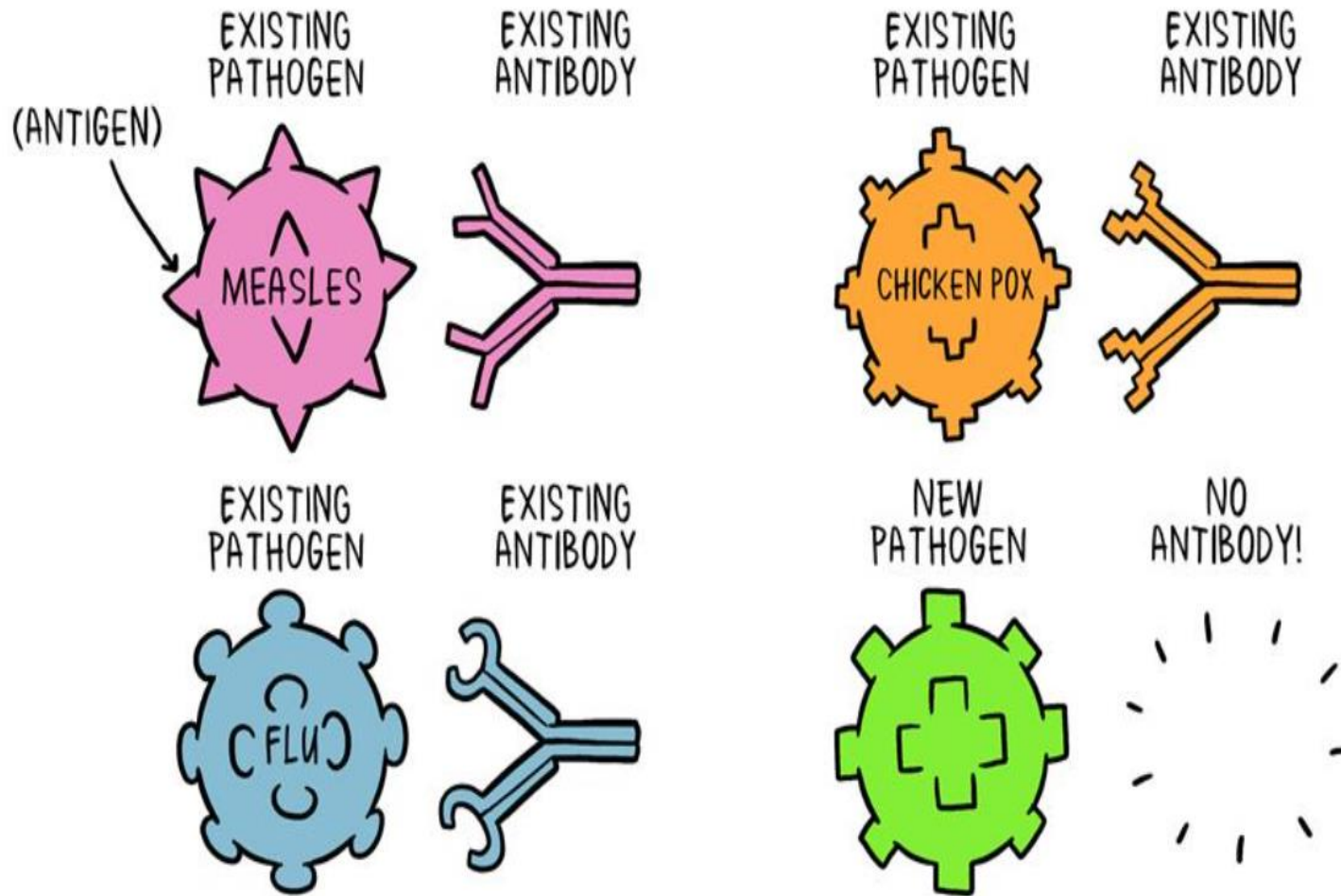
Who approves a vaccine?

❖ In countries where vaccines are manufactured, national or regional regulators oversee a vaccine's development. This includes approving clinical trials, evaluating their results, and taking decisions on licensing. In deciding, regulators must refer to very strict international standards on acceptable **ethical** clinical practice.

❖ *Once a vaccine has been developed, national regulators decide whether to introduce a vaccine in their countries. WHO provides information to support this process, through comprehensive evaluation of the available evidence, and its regularly updated position papers on vaccines.*



**TURKISH MEDICINES
AND MEDICAL DEVICE
AGENCY**



When a new pathogen or disease enters our body, it introduces a new antigen. For every new antigen, our body needs to build a specific antibody that can grab onto the antigen and defeat the pathogen.

If the body is exposed to the same pathogen more than once, the antibody response is much faster and more effective than the first time around because the *memory cells* are at the ready to pump out antibodies against that antigen.

This means that if the person is exposed to the dangerous pathogen in the future, their *immune system* will be able to respond immediately, protecting against disease.