

Key Messages and Answers about Vaccine Safety

MANUAL FOR HEALTH WORKERS



PAHO



Pan American
Health
Organization



World Health
Organization
REGIONAL OFFICE FOR THE
Americas

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Washington, D.C., 2021

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Key Messages and Answers about Vaccine Safety. Manual for Health Care Workers

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Introduction

The Pan American Health Organization (PAHO) has prepared this publication to provide material to assist health workers in their daily practice in vaccination programs in different areas and countries. This manual supplements the information provided in its earlier guide *Communicating about Vaccine Safety: Guidelines to help health workers communicate with parents, caregivers, and patients*.

Various studies have shown that health workers tend to be the most reliable sources of information on vaccines and vaccination for their communities and for users of the health services. It is therefore imperative that they be able to answer questions, clear up doubts, and debunk rumors with empathy and accurate information. PAHO has therefore compiled a series of typical questions and answers in the pages that follow.

Chapter 1 contains answers to questions frequently asked by parents, caregivers, and patients about immunization in general and about the vaccines administered through the regular program.

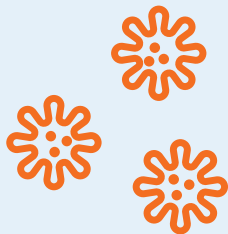
Chapter 2 contains key messages designed to dispel doubts, change attitudes, or confirm knowledge, employing accurate and reliable evidence-based information to empathetically and forcefully reduce vaccine hesitancy and increase the demand for COVID-19 vaccination.



History of vaccines up to the present

1

The world was a far more dangerous place before the advent of vaccines. Millions of people died each year from diseases. Smallpox, for example, killed more than 300 million people worldwide in the 20th century alone.



2

In 1775, Dr. Edward Jenner investigated how to protect children from dying from smallpox and conducted a study on the relationship between pox infection in cattle and smallpox in humans. After experimenting with animals, he discovered that if he took material from a cowpox lesion and injected it into a human being, that person was protected against smallpox.



3

His first subject was an 8-year-old boy, whom he inoculated with a small amount of material from cowpox pustules. When the child remained healthy, the doctor confirmed that he had been protected against the disease. He then tested this method on other children, including his 11-month-old son. In 1798, he published his research, in which he coined the word "vaccine," from the Latin for "cow".



4

Many years before Dr. Jenner's inquiries, similar experiments had been conducted in China, Turkey, and some places in Africa.



5

For over 200 years—from Dr. Jenner’s first medical experiments through the mid-20th century—scientists continued experimenting with new technologies. One of those scientists was Louis Pasteur. Thanks to their efforts, today we have vaccines.



6

The 1930s saw the development of antitoxins and vaccines against diseases such as diphtheria, tetanus, anthrax, cholera, plague, typhoid fever, and tuberculosis.



7

The 20th century gave rise to new scientific research. Methods for culturing viruses in the laboratory yielded rapid discoveries and innovations, including the development of polio vaccines.



8

Year after year, global vaccination campaigns brought the number of smallpox cases down until 1980, when the World Health Organization (WHO) declared the world free of the disease.



9

Given the proven advances, investigators turned their attention to other common childhood illnesses, such as measles, mumps, and rubella. The vaccines for these diseases substantially reduced the burden of disease.



For more information, see College of Physicians of Philadelphia. The History of Vaccines. An Educational Resource by the College of Physicians of Philadelphia. Philadelphia: College of Physicians, n.d. Available from: <https://www.historyofvaccines.org>.

1 Immunization schedules in the regular program



1.1 KEY MESSAGES

Vaccines **help people survive** and have saved millions of lives.



Vaccines can only save lives **if people agree to receive them.**



In almost every country, **the vast majority of people are vaccinated and vaccinate their children,** making an important contribution to public health and people's lives.



IMPORTANT FACTS

Vaccines **save five lives per minute.**



The eradication of smallpox—a serious disease that leaves survivors with lifelong sequelae, such as scars—**saves approximately 5 million lives annually.**



If a vaccine had not eradicated smallpox, the disease would **continue causing the death of one person every 6 seconds each day.**



Before the advent of the vaccine against measles, that disease **caused more than 2.6 million deaths worldwide annually.**

Fortunately, **the majority of people get vaccinated.** For example, 85% of the world's children are vaccinated against diphtheria, tetanus, and whooping cough; **in 125 countries, over 90% are vaccinated against these diseases.**





Raising children involves making many decisions. Some are a matter of preference, such as the type of furniture in their bedroom. Others are essential, such as their education and safety. Others, however, have to do with their right to a healthy life and to protection against hidden dangers that can cause their death or permanent disability. And this is where vaccines come into play.

1.2 QUESTIONS AND ANSWERS

1.2.1 What is vaccination?

As WHO explains:

- > Vaccination is a simple, safe, and effective way of protecting us against harmful diseases before we come into contact with them. Vaccines use the body's natural defenses to build resistance to specific infections and make the immune system stronger.
- > After vaccination, our immune system creates antibodies, just as it does when we are exposed to a disease, the difference being that vaccines contain only killed or weakened germs such as viruses or bacteria and do not cause the disease or its complications.

Source: World Health Organization. Vaccines and immunization What is vaccination? WHO; 2020. Available from: <https://www.who.int/es/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination>.

1.2.2 Why get vaccinated?

As WHO explains:

- > Although many people believe that vaccine-preventable diseases (such as polio, diphtheria, measles, etc.) are things of the past, the truth is that they still exist and are kept at bay precisely because the community prevents by getting vaccinated. An unprotected person can contract them, putting the entire population at risk.
- > Both before birth (during gestation) and after they are born, children are exposed to viruses and bacteria that can give them incapacitating and fatal illnesses. People working in different areas of science and technology have developed vaccines as the best tool for protecting children.

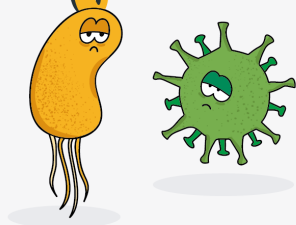
- > Childhood immunization is one of the most effective health interventions that exists. Childhood vaccines save up to 3 million lives each year and prevent unnecessary suffering. They also save time and money that can be spent on other important interventions. Immunization eradicated smallpox, is on track to ending polio, and has reduced deaths from measles by 78% worldwide.
- > Although more vaccines are increasingly available to protect children against diseases, the past 10 years have seen a reduction in the number of children vaccinated in the Region of the Americas. This makes it very important for parents and caregivers to keep immunizations up to date and give children the protection they offer. Vaccines stimulate the body's natural defenses and reduce the risk of contracting diseases.
- > Our immune system is designed to remember. After receiving one or more doses of a vaccine for a specific disease, we remain protected against it, usually for years, decades, or even our lifetime. That is why vaccines are so effective. Instead of treating a disease once it appears, we are prevented from contracting it.
- > If we fail to vaccinate our children, we run the risk of their contracting serious diseases such as measles, meningitis, pneumonia, tetanus, and polio, many of which can cause disabilities or prove fatal. According to WHO calculations, vaccines save 2-3 million lives every year.
- > Although some vaccine-preventable diseases are less common, the germs that cause them are still circulating in many parts of the world. Today, infectious diseases can easily cross borders and infect unprotected people.
- > The two main reasons to get vaccinated are to protect ourselves and to protect the people around us, especially our children.

Source: World Health Organization. Vaccines and immunization: What is vaccination? Geneva: WHO; 30 December 2020. Available from: <https://www.who.int/es/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination>.

1.2.3 What are the different types of vaccines?

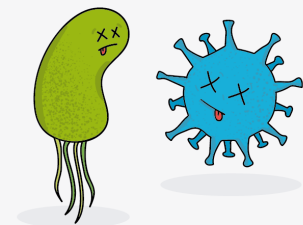
Classification of Vaccines

Live attenuated vaccines



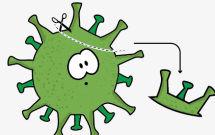
Comprised of **bacteria or viruses** that have been **modified to lose their pathogenic power** but are capable of reproducing in the body and stimulating humoral and cellular immunity. **A single dose or booster is usually sufficient.**

Killed or inactivated vaccines



Comprised of **whole bacteria or viruses, they are inactivated using physical or chemical methods.** The immune response is less robust, and **several doses are therefore required** to achieve adequate immunity.

SUBUNIT VACCINES

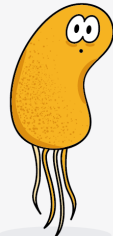


Viral
Contain specific fragments of the virus.



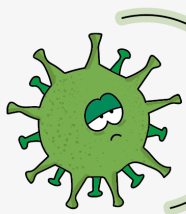
Bacterial
Bacterial components, **purified capsular polysaccharides, or conjugates with a carrier protein** that increases its immunogenicity

TOXOID VACCINES



Comprised of toxins produced by the microorganisms. These substances are detoxified, eliminating their pathogenic power but preserving their immunogenic capacity.

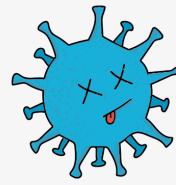
VIRAL



LIVE ATTENUATED

- Oral polio
- Yellow fever
- Rotavirus
- Chicken pox
- Measles
- Mumps
- Rubella

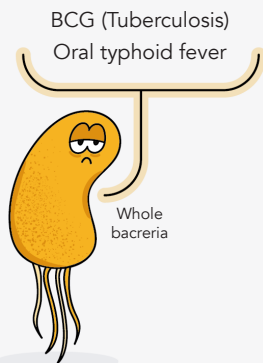
Triple viral



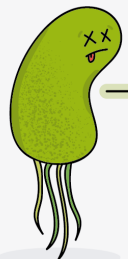
MORTS OU INACTIFS

- Injectable polio
- Japanese encephalitis
- Hepatitis A
- Rabies
- Influenza
- Hepatitis B
- Human papillomavirus

BACTERIAL



LIVE ATTENUATED



KILLED OR INACTIVATED

Acellular	Acellular pertussis
Polysaccharid-protein conjugate	Haemophilus influenzae type B Meningococcal C and ACWY 10- and 13-valent pneumococcal
Whole cell	Oral cholera
Capsular polysaccharide	Parenteral typhoid fever 23-valent pneumococcal
Surface protein	Meningococcal B
Toxoid	Diphtheria Tetanus

Source: Generalidades de las vacunas | comité asesor de vacunas de la aep (n.d.). Cited 15 January 2020 from <https://vacunasaep.org/documentos/manual/cap-1#5>

> **There are five main types of vaccines:**

1. **Live attenuated**
2. **Inactivated**
3. **Subunit, recombinant, polysaccharide, and combination**
4. **Toxoid**
5. **mRNA**



1. Live attenuated vaccines:

These vaccines use a weakened or attenuated form of the germ that causes the disease.

Because these vaccines are so similar to the natural infection that they help prevent, they create a strong and long-lasting immune response. For the majority of live attenuated vaccines, a 1- or 2-dose schedule can provide lifelong protection against a germ and the disease it causes.

Live vaccines are used to protect against:

- Measles, mumps, rubella (the combination MMR vaccine).
- Rotavirus.
- Smallpox (eradicated from the world in 1980)
- Chickenpox
- Yellow fever

2. Inactivated vaccines:

These vaccines use the killed version of the germ that causes a disease.

The immunity (protection) they provide is generally not as strong as that of live vaccines. Several doses may be required over time (boosters) to ensure ongoing immunity against the disease.

Inactivated vaccines are used to protect against:

- Hepatitis A.
- Influenza (shot only).
- Polio (shot only)
- Rabies.

3. Subunit, recombinant, polysaccharide, and conjugate vaccines:

These vaccines use specific parts of the germ, such as its protein, sugar, or capsid (the casing that surrounds it).

Because these vaccines use only specific parts of the germ, they provide a very strong immune response that targets key parts of the infectious agent. They can also be used on almost everyone who needs them, even people with a weakened immune system or long-term health problems.

These vaccines are used to protect against:

- Hib disease (*Haemophilus influenzae* type b)
- Hepatitis B.
- Human papillomavirus (HPV).
- Whooping cough (part of a DTaP combined vaccine)
- Pneumococcal disease.
- Shingles.

4. Toxoid vaccines:

These vaccines use a toxin (harmful product) made by the germ that causes a disease. They create immunity to the parts of the germ that cause the disease instead of the germ itself. This means that the immune response targets the toxin instead of the whole germ.

Like other types of vaccines, a booster dose may be needed to achieve ongoing protection against the disease.

Toxoid vaccines are used to protect against diseases such as:

- Diphtheria
- Tetanus

5. Messenger ribonucleic acid (mRNA) vaccines:

These are a new type of vaccine that protects against infectious diseases. They train the body's cells to produce a protein, or even part of one, that stimulates an immune response. That reaction produces antibodies that will protect the body against infection if the real virus invades the body.

Scientists have been studying and working with mRNA vaccines for decades. Interest

in them has increased because they can be developed in a laboratory with materials that are easily available. This means that the procedure can be standardized and disseminated to develop them faster than would be possible with traditional vaccine production methods.

Versions of mRNA vaccines against the flu, Zika virus, rabies, and cytomegalovirus have been studied.

As a result of the COVID-19 pandemic, several types of vaccine against the virus that causes the disease were developed in 2020 with mRNA technology.

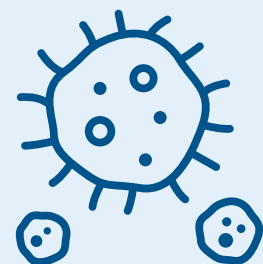
Source: U.S. Department of Health and Human Services. Washington, D.C.: HHS, 2021. Available from: <https://www.hhs.gov/immunization/basics/types/index.html>.

The first human vaccines against viruses were made from weak or attenuated viruses that triggered immunity. The smallpox vaccine used material from cowpox, a virus similar to that of human smallpox with the ability to protect against that disease without causing serious consequences. Rabies was the first virus attenuated in a laboratory to create a vaccine for human use.

The first vaccine (for smallpox) contained a live attenuated virus. "Attenuating" a virus means weakening it to the point where it can still trigger an immune response but does not cause the disease in a human recipient.

Many of the vaccines used today, including those for measles and some for seasonal flu, use live attenuated viruses. Others are based on killed forms of viruses, bacterium fragments, or inactive forms of toxins produced by bacteria. Killed viruses, bacterium fragments, and inactive toxins cannot cause the disease but are capable of triggering an immune response that protects against future infections.

New techniques are also being used to create different types of vaccines, such as live recombinant and DNA vaccines.



- > Other vaccines are in development. Some of them are already being administered experimentally, among them those that protect against the Ebola virus or malaria, and are not yet available worldwide.
- > It is important to know that vaccine development is a lengthy and complex process that often takes 10 to 15 years, with the participation of public and private entities. The current system for developing, testing, and regulating vaccines was created in the 20th century, when the groups that developed the vaccines standardized their procedures and regulations.
- > COVID-19 vaccines are the culmination of years of research on new technologies and are based on what was learned during the development of the vaccines against severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), as well as the vaccines against the Ebola virus. To fight the COVID-19 pandemic, different institutions and commercial enterprises developed vaccines, and researchers throughout the world worked at an unprecedented speed and scale to develop safe and effective COVID-9 vaccines (see Chapter 2 of this manual).

1.2.4 How do vaccines work in the body?

> They work by triggering a response by our immune system:

First: The vaccine recognizes the invading germ, such as a virus or bacterium.

Second: It creates the antibodies that the body produces naturally to fight disease

Third: The body's immune system has a memory; it remembers the disease and how to fight it.

Finally: If, in the future, we are exposed to the germ that the vaccine protects against, the immune system can quickly destroy it before we get sick.

Source: World Health Organization. Vaccines and immunization: What is vaccination? Geneva: WHO Europe; 2020. Available from: https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination?adgroupsurvey=%7badgroupsurvey%7d&gclid=CjwKCAjw47eFBhA9EiwAy8kzNOs3DI4tNgqpb1-8v0Pfq2Y0jKECdOtDSb-NiXpwKyTiPss44B0X8xoC6w8QAvD_BwE.

1.2.5 What diseases do vaccines prevent? What do they protect us from?

Vaccines protect us from many diseases, among them:

Cervical cancer
Chickenpox
Cholera
COVID-19
Diphtheria
Hepatitis B
Influenza (known as "grippe" in some countries)
Japanese encephalitis
Measles
Meningitis
Mumps
Pneumonia
Rabies
Rabia
Rotavirus
Rubella
Tetanus
Typhoid fever
Whooping cough
Yellow fever

All these vaccines may not be necessary in your country. Some only need to be administered in specific situations, such as before traveling to certain locations, in areas where a person could be exposed to the germ that causes the disease, or when someone is at high risk of getting infected due to their job. Health professionals will tell you about the vaccines that you and your family need.

Source: World Health Organization. Vaccines and immunization: What is vaccination? Geneva: WHO Europe; 2020. Available from : https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination?adgroupsurvey=%7badgroupsurvey%7d&gclid=CjwKCAjw47eFBhA9EiwAy8kzNOs3DI4tNgqpb1-8v0Pfq2Y0jKECdOtDSb-NiXpwKyTiPss44B0X8xoC6w8QAvD_BwE.

Do I have to get vaccinated against the flu?



According to the Pan American Health Organization (PAHO):



“Seasonal influenza, also known as flu, is an illness that can lead to serious complications requiring hospitalization and can even cause death. People often fail to recognize its severity, mistaking it for a cold, but each year around 772,000 people are hospitalized, and between 41,000 and 72,000 die as a result of influenza in the Americas.

Vaccination is the most effective way to prevent serious complications. Although there is a moderately effective vaccine—given the constant changes in circulating viruses that make it necessary to annually update its composition—it is estimated that only half of the at-risk population gets vaccinated each year in the countries of the Region that report data.”

Source: Pan American Health Organization. Myths and FACTs about Seasonal Influenza and the Flu Vaccine. Washington, D.C.: PAHO; n.d. Available from: https://www3.paho.org/hq/index.php?option=com_content&view=article&id=15150:myths-and-truths-about-seasonal-influenza-and-the-flu-vaccine&Itemid=1926&lang=en.

1.2.6 Why is it important to maintain high vaccination coverage?

- > In communities with high immunity against a disease, people who are not immune have a lower risk of disease than they otherwise would. But that lower risk derives from the immunity of the people in their community (that is, herd or population immunity), not because they are personally immune.
- > When herd immunity is first reached, people who are not vaccinated are at lower risk of contracting the disease, and if vaccination coverage increases, the disease circulates less and the risk can be lowered even further. Thus, the importance of expanding coverage.
- > Vaccines train and prepare the body's natural defenses (the immune system) to recognize and fight viruses and bacteria. If, after vaccination, the body is exposed to these pathogens, it will be prepared to quickly destroy them, preventing the disease.
- > When people are vaccinated against a disease, their risk of infection is also lower, making them much less likely to transmit the virus or bacteria to others. The more people in a community that are vaccinated, the fewer vulnerable people there will be, and the lower the probability of an infected person transmitting the infectious agent to others. By reducing the probability of a pathogen circulating in the community, people who cannot receive the vaccine in question due to clinical conditions, such as allergies or age, will be protected against the disease.
- > The term “community immunity” (also called “population” or “herd” immunity) refers to the indirect protection from an infectious disease obtained when a population becomes immune as a result of vaccination or previous infection.

- > According to WHO, herd immunity prevents a disease from spreading to any segment of the population, because it reduces the total amount of virus that can spread in the entire population.

Source: World Health Organization. Vaccines and immunization: What is vaccination? Geneva: WHO; 30 December 2020. Available from: https://www.who.int/news-room/q-a-detail/vaccines-and-immunization-what-is-vaccination?adgroup_survey=%7badgroupsurvey%7d&gclid=CjwKCAjw47eFBhA9EiwAy8kzNOs3DI4tNgqpbI-8v0Pfq2Y0jKECdOtDSb-NiXpwKyTiPss44B0X8xoC6w8QAvD_BwE

For more information on national immunization coverage in the Region of the Americas, visit Pan American Health Organization. Immunization in the Americas: 2020 Summary. Washington D.C: PAHO; 2020. Available from: <https://www.paho.org/es/tag/folleto-inmunizacion>.

1.2.7 What are adverse events supposedly attributable to immunization (ESAVI)?

- > The majority of reactions to vaccines are mild and temporary and include soreness at the injection site or low-grade fever. It is important to tell patients what to expect after they are vaccinated and what to do. If these reactions last more than 24 hours, they should consult a physician.
- > The most serious events are very rare, and vary from vaccine to vaccine. They are defined as any ESAVI that causes death or entails the risk of death of the person vaccinated (or the embryo, fetus, or newborn when that person is a pregnant woman), that requires hospitalization of the affected person, and that can result in long-term conditions such as birth defects or disability.
- > The dangers of vaccine-preventable diseases are much greater than any risk associated with the vaccines.

*For more information on ESAVIs, visit Pan American Health Organization. Crisis communication related to vaccine safety: technical guidance. Washington, D.C.: PAHO; 2021. Available from: <https://iris.paho.org/handle/10665.2/53221>.

1.2.8 Is all the information published in social media true?

- > No. According to the studies of organizations that review social media content, the information on websites or from influencers that talk about vaccines is not always based on scientific evidence.
- > For example, many people on social media claim that vaccines are harmful because they contain substances that cause autism. How did this misinformation begin spreading? In 1998, Dr. Andrew Wakefield, a London physician, published a report erroneously linking autism and intestinal diseases with the triple viral vaccine administered to young children to fight measles, mumps, and rubella.
- > Even though his report was discredited and Wakefield was banned from practicing medicine in the United Kingdom, his claims had an impact. In 2004, 100,000 fewer children received the measles, mumps, and rubella vaccine in that country, leading to a rise in measles cases.
- > A study conducted in Spain¹ concluded that more than half the people (59%) searching for information on vaccines on the internet using terms such as “safe vaccine” and “dangerous vaccine” believed that the information they found was accurate, even though more than half of the websites studied published erroneous information and was not from accredited organizations.
- > That same study says that “the nature of the Web allows any user to publish information or comment sporadically without becoming a reference or an opinion leader.”

¹ See article in Cuesta-Cambra U., Martínez-Martínez L., Niño-González J.I. (2019). An analysis of pro-vaccine and anti-vaccine information on social networks and the internet: Visual and emotional patterns. *El profesional de la información*, v. 28, no. 2, e280217. Available from: <https://doi.org/10.3145/epi.2019.mar.17>.

There is no association between the measles, mumps, and rubella vaccine and autism. In 1998, a single poorly designed and subsequently discredited study reported such an association, which turned out to be false. Since then, hundreds of well-designed studies have confirmed that getting vaccinated does not pose any risk of autism.



1.2.9 Where can I find accurate information on vaccines?

The Vaccine Safety Net portal is a global network of websites established by the World Health Organization to offer reliable information on vaccine safety. It is a place where internet users, whether health professionals or members of the public, can access verified sources of reliable information on vaccine safety.

The portal can be consulted at World Health Organization. Vaccine Safety Net. Available from: [Vaccinesafetynet.org](https://www.vaccinesafetynet.org). Geneva: WHO Europe; n.d. Available from: <https://www.vaccinesafetynet.org>.

For accurate, evidence-based information in social media, you can visit the accounts of institutions such as PAHO and WHO, below, or the Ministry of Health of each country:

- > World Health Organization.
Available from: <https://www.facebook.com/WHO>
- > Pan American Health Organization
Available from: <https://www.facebook.com/PAHOWHO>

1.2.10 What are anti-vaccination movements?

- > Anti-vaccination movements are nothing new. According to different investigators' reports on this phenomenon, groups that oppose vaccines have existed from the very beginning (over two centuries ago), when vaccines were a new development that aroused distrust.
- > However, their evolution and the scientific evidence of their benefits showing that children were no longer dying from diseases such as rubella or measles, led in subsequent years to the view that they were a highly effective tool for preventing morbidity and mortality.

- > Long afterwards, in 1998, Dr. Andrew Wakefield published a study in the scientific journal *The Lancet* according to which 12 vaccinated children had developed autism.
- > A subsequent review of the study's evidence showed that its author had distorted the data and had a conflict of interest (he wanted to develop his own vaccine) and that there was no association between the vaccine and autism.
- > The authorities banned Andrew Wakefield from practicing medicine and *The Lancet* issued a retraction, stating that the study's conclusions were totally false.
- > Today, anti-vaccination groups continue to spread Wakefield's scientifically baseless claim among the vast amount of information circulating in the social media, even though his conclusions have been debunked.
- > Due in part to the decline in vaccination rates in the United States, more than 20 states reported at least one case of measles in 2018, while in Europe more than 40,000 cases were reported.
- > In 2019, WHO included this rejection of vaccines among the top 10 threats to global health. It should be noted that anti-vaccination groups, which spread scientifically unfounded information are one thing, and people who have concerns and questions about vaccines are another. It is therefore important to listen to them and address their concerns with clear and accurate scientific information.

1.2.11 What are the main doubts raised by anti-vaccination groups and what are the facts?

1. Do vaccines cause autism?

No. There is no evidence of a link between any vaccine and autism or autism spectrum disorders.

Furthermore, there is no relationship between the measles, mumps, and rubella vaccine and autism. A single poorly designed study that has been discredited reported such an association in 1998. Since then, hundreds of well-designed studies have confirmed that vaccination poses no risk of autism.

2. Do vaccines contain any dangerous toxic ingredients?

No. Although the ingredients on vaccine labels (for example, mercury, aluminum, or formaldehyde) may be alarming, these substances are generally found naturally in the human body, the food we eat (i.e., tuna fish), and the environment around us. The amounts in vaccines are very small and will not poison or harm the body.

Furthermore, vaccines are tested and subjected to rigorous scientific trials, as well as certification by WHO and national regulatory authorities, to ensure their safety and efficacy. The vaccines offered in public clinics are as safe and effective as those offered in private clinics.

3. Do vaccines have long-term side effects?

No. Vaccines go through extensive rigorous scientific trials to ensure that they are safe and are continuously monitored for safety issues. The risk of long-term effects from vaccine-preventable diseases, such as measles and polio, is much higher.

Shortly after vaccination, some people may experience mild side effects, such as pain at the injection site, low-grade fever, malaise, or a rash. Although these may be uncomfortable for a little while, they are not serious and mean that the immune system is practicing how to fight the virus or bacteria if it is exposed to them.

Other myths about vaccines, according to *Myths and facts about immunization* published by WHO: World Health Organization. *Myths and facts about immunization*. Geneva: WHO; 2017. Available at: https://www.euro.who.int/__data/assets/pdf_file/0005/339620/Myths-and-facts.pdf.

4. Vaccines are not safe:

False. For use of a vaccine to be authorized, it must be evaluated by accredited agencies such as the FDA in the United States or the European Medicines Agency in Europe. These agencies regulate and monitor all drugs, including vaccines. They perform exhaustive tests for this purpose to ensure the safety and effectiveness of these products. Each lot of vaccine is monitored separately

5. Administering more than one vaccine at the same time to a young child can produce side effects and overwhelm its immune system:

False. This is generally a concern of first-time parents with infants who are just starting the vaccination schedule. When their child receives several vaccines at the same time, they are concerned that its immune system could be overwhelmed. However, the vaccination schedule is based on scientific evidence and follows medical and scientific recommendations to provide the safest and best coverage for the infant.

Source: Pan American Health Organization. Debunking Immunization Myths. Washington, D.C.: WHO; n.d. Available from: <https://www.paho.org/en/topics/immunization/debunking-immunization-myths>

World Health Organization. Vaccination and trust. Geneva: WHO; 2017. Available from: <https://www.euro.who.int/en/health-topics/disease-prevention/vaccines-and-immunization/publications/2017/vaccination-and-trust-2017>.

1.2.12 How can risk aversion be overcome?

- > Although the ingredients that appear on vaccine labels can be intimidating (e.g., mercury, aluminum, or formaldehyde), they are usually found naturally in the body, the food we eat (in tuna fish, for example), and the environment around us. The amounts in vaccines are very small and will not poison or will harm the body.
- > In addition, vaccines are tested and subjected to extensive rigorous scientific trials, as well as certification by WHO and the national regulatory authorities, to ensure their safety and efficacy. The vaccines offered in public clinics are as safe and effective as those offered in private clinics.

To learn more about myths and facts about vaccines, see World Health Organization. Myths and facts about immunization. Geneva: WHO; 2017. Available from: https://www.euro.who.int/_data/assets/pdf_file/0005/339620/Myths-and-facts.pdf.

ANNEX 1. Difficult questions and answers about vaccines in the regular program



Does thimerosal pose any risk?

- 1. No.** Scientific studies have shown that the preservative thimerosal does not pose a health risk to vaccinated children or adults. A 1999 study examined the effects of this preservative on two groups of children. One received a vaccine with thimerosal and the other, one without it. The groups were then compared, and it was found that the risk of autism was the same in both groups.

Do vaccines contain mercury?

- 2. Only some vaccines** (such as the flu vaccine) contain mercury, which is used as a preservative to prevent contamination with bacteria. The mercury is used in minimal quantities, so, according to the scientific evidence, it is not harmful.

Mercury is used because, in the early 20th century, vaccines were manufactured in vials containing several doses and were stored in refrigerators. Scientific research demonstrated that vaccines were contaminated by bacteria in this process, which led to infections. In 1930, preservatives began to be used, which solved that problem.

Do vaccines contain antibiotics?

- 3. Yes.** But only trace antibiotics or stabilizers, which are used precisely to prevent their inadvertent contamination with fungi and bacteria during manufacture. However, these antibiotics (neomycin, streptomycin, or polymyxin b) are not those administered to children or adults. That is why patients with allergies to antibiotics such as penicillin, amoxicillin, sulfa drugs, or cephalosporins can still receive vaccines.

Do vaccines contain aluminum?

- 4. Yes,** but it is used as an adjuvant—that is, it helps improve the immune response, but very small doses are added. For parents' peace of mind, it should be noted that aluminum is in the air, water, and food and that the amounts received with the vaccination schedule in first six months of life is less than the amounts we are exposed to in the air, water, or food.

Do vaccines contain gelatin?

- 5. Yes.** Gelatin is used as a stabilizer to protect their active ingredients and prevent them from degrading during manufacture, storage, and transport. Like many other products, this gelatin is manufactured with swine by-products, and this is a concern in the case of people who are allergic to them. However, we know that approximately 1 out of every 2 million people could have a mild allergic reaction.

Although some religious groups do not eat pork products, they have approved the use of vaccines containing gelatin because they are not ingested but injected.

It should also be noted that the gelatin is purified through a process called hydrolyzation.

6.

Do vaccines contain fetal cells?

Vaccines do not contain fetal cells.

Cell lines originating from cells harvested from fetal tissue obtained from abortions performed in Sweden and England over 40 years ago have been used in the production of some vaccines. These abortions were voluntary, legal, and their purpose was not to generate cell lines for vaccine production.

These cell lines revolutionized scientific research, as they made it possible to study different biological processes of some live organisms in the laboratory. They are generated using cells obtained from human, animal, or plant tissue and are cultivated in a laboratory to investigate new drugs or vaccines, for example. Different types have been used to develop vaccines such as those for rubella, chickenpox, hepatitis A, rabies, and, recently, some of the COVID-19 vaccines.

Scientists use cell lines because, unlike bacteria, viruses need cells to grow and multiply. Cell lines are necessary for them to grow and multiply and make it possible to study viruses in the laboratory. The advantage of cell lines developed with fetal tissue is that they can grow and multiply indefinitely under proper laboratory conditions, because fetal cells are in a continuous process of differentiation and growth. Thus, in research they are preferable to other cell lines or primary cell cultures, which can reproduce only a limited number of times.

Some vaccines use cell lines in the research and production process, but no vaccine contains fetal cells.

7.

Do vaccines cause allergic reactions?

Vaccines contain gelatin, egg protein, and antibiotics that could trigger an allergic reaction. The flu and yellow fever vaccines, for example, are cultured in eggs but rarely cause a reaction

Source: European Centre for Disease Prevention and Control. Questions and answers about childhood vaccination. Solna (Sweden): ECDC; n.d.f. Available from: <https://www.ecdc.europa.eu/en/immunisation-vaccines/childhood-vaccination/faq>.

2 COVID-19 vaccines



2.1 KEY MESSAGES

COVID-19 IS A SERIOUS DISEASE.

- As of May 2021, **more than 157 million people around the world had contracted the disease and 3.2 million had died. As of 9 May 2021, 63,677,932 cases of COVID-19** and 1,556,180 deaths had been reported in the Region of the Americas..
- Patients with COVID-19 **require hospital intensive care at six times** the rate seen during the 2009 H1Na influenza pandemic.
- Many survivors suffer **serious long-term** health effects.

COVID-19 VACCINES ARE A SAFE AND EFFECTIVE WAY OF SAVING LIVES.

- Although mitigation measures such as isolation, the use of masks, and physical distancing have slowed the spread of the virus, **vaccines offer a better path to putting an end to the COVID-19 pandemic.**
- It is important to **continue current protective measures**—such as the use of masks, physical distancing, ventilation, and hand washing—**even after vaccination.** According to WHO, getting the coronavirus vaccine is not a carte blanche for ignoring health measures such as physical distancing and hand washing.
- Clinical trials have demonstrated **that vaccines protect people against developing COVID-19 disease**, which may be mild, moderate, or serious. What was still unknown in March 2021 is whether they protect against transmission to another person.

Source: PAHO Daily COVID-19 Update: May 9, 2021.

Available from: <https://www.paho.org/en/documents/paho-daily-covid-19-update-may-9-2021>

Advice for communicating about COVID-19 vaccines

According to WHO recommendations:

- > Many people have questions about COVID-19 vaccines, and they very likely consider you, a health professional, a reliable source for answers.
- > If people approach you with concerns, listen to them empathically and do not judge them. Pay attention to understand exactly what they are asking and acknowledge their concerns. Correct any misinformation, rumors, or misperceptions. Stress the safety of the vaccines and their benefits for COVID-19 prevention.
- > As WHO has explained, we know that vaccination protects people against developing the disease, which may be mild, moderate, or serious. However, as of April 2021, we still do not know whether a vaccinated person can transmit the virus. Thus, it is essential to stress the need to continue with isolation, use of masks, and hand washing. These measures are essential after vaccination. We cannot let our guard down.
- > Be transparent and honest in your conversations. If you do not know the answer to a question, say so and offer a reliable source that the patient can consult for more information, such as the Ministry of Health or PAHO/WHO website, or printed matter in the health center.

PEOPLE ARE MORE LIKELY TO GET VACCINATED WHEN:

Vaccination is practical, **free**, and **easy**.



They have confidence in the safety of the vaccine **and the system that provides it**.



Their health professionals **recommend it**.



Behavioral models, friends and family, or others **"like themselves"** have been vaccinated.



People can **contribute to community immunity** and help others.

People recognize the risk of the disease **and understand that vaccination is an effective solution to that risk**.



2.2 QUESTIONS AND ANSWERS

2.2.1 What are the facts about the development of the COVID-19 vaccines?

- > While it is true that COVID-19 vaccines have been developed faster than any other vaccine, each of them has gone through the same clinical trials as all other vaccines, where safety and efficacy are the priorities.
- > Since COVID-19 has impacted the whole world, it has sparked global collaboration and an unprecedented increase in government financing that it has made it possible to develop vaccines against the disease faster than usual.
- > The virus that causes COVID-19 is not the first coronavirus to cause an epidemic. For years since the SARS and MERS epidemics, numerous scientists have been working on vaccines to combat coronaviruses; this gave them an initial advantage in the development of COVID-19 vaccines. For example, the technology used in the mRNA vaccines has been in development for over a decade.

How to combat the spread of misinformation about COVID-19 vaccines:

Although the clinical trials of COVID-19 vaccines involved a rapid process, their safety was not jeopardized. Four key points should be considered:

1. One of the most important factors in vaccine development is financing. In this case, the research costs were guaranteed. Among other factors, the laboratories assumed the cost and invested in the research.
2. Trials are another key factor. Generally, many volunteers are needed to test vaccines, which takes a long time, usually a year or more. In this case, thousands of volunteers in different countries signed up to participate, making it possible to conduct the trials in less time and with more people.
3. Monitoring the efficacy of COVID-19 vaccines took less time than with vaccines for other diseases due to its high rate of incidence in the population.
4. The professional and technical skills of the world's most renowned and experienced scientists were put to use during the trials.

Source: SciBeh. COVID-19 Vaccine Communication Handbook & Wiki. Available from: https://hackmd.io/@scibehC19vax/misinfo_myths#Myths-about-COVID-19-vaccination

2.2.2 Why trust in the safety of the vaccines?

Although COVID-19 vaccines are new, clinical trials are conducted by the manufacturers during the development process. Moreover, this information is reviewed by both the national regulatory authorities (NRAs) and WHO prior to the WHO emergency use recommendation.

Information on quality and manufacturing aspects, non-clinical and clinical information, and risk management plans for each vaccine are the basis for decisions by NRAs and WHO to authorize the emergency use of safe and effective quality vaccines. These evaluations are conducted to determine whether the benefits of the vaccines outweigh their potential risks. In any case, after recommendations for use are issued, there is follow-up of each authorized vaccine to monitor safety aspects.

In addition, NRAs have authorized other vaccines for emergency use but have not yet requested WHO approval; the vaccines can be used in some countries because they have obtained national emergency use authorization. On this point, it should be noted that such authorizations are based on national requirements, and safety monitoring is an activity shared by the NRA and the respective national immunization program.

Source: Pan American Health Organization. Frequently Asked Questions (FAQs) about COVID-19 Candidate Vaccines and Access Mechanisms. Washington, D.C.: OPS, 2021. Available from: <https://iris.paho.org/handle/10665.2/53195>.

Pan American Health Organization. Questions and answers (Q&A) on regulatory matters related to the introduction and pharmacovigilance of vaccines against COVID-19. Washington, D.C.: PAHO, 2021. Available from: <https://iris.paho.org/handle/10665.2/53229>.

Pan American Health Organization. Frequently Asked Questions (FAQs) about COVID-19 Candidate Vaccines and Access Mechanisms. Washington, D.C.: PAHO, 2021. Available from: <https://iris.paho.org/handle/10665.2/53246>.

2.2.3 What are clinical trials? How are they conducted?

As WHO explains in its information documents:

- > Vaccine safety is always the highest priority. All vaccines go through different phases of clinical trials before their administration to the population is approved. The purpose of the different phases of clinical trials includes guaranteeing the safety of the vaccine and its efficacy in protecting against the disease, as well as other aspects, such as the number of doses, the duration of the vaccination schedule, and who can get vaccinated.

Vaccine development phases

The priority of the different research trials is the safety of a vaccine, followed by its efficacy. Trials are conducted in phases: the preclinical phase and **phases I, II, III, and IV**.

- **Preclinical phase:** Preclinical studies use tissue or cell cultures and testing in animals, either mice or monkeys, to evaluate the safety of the candidate vaccine and its capacity to produce an immune response.
- **Phase I:** A new vaccine in the experimental stage is usually tested on a small number of people, generally fewer than 100 adult volunteers, to evaluate its safety and biological effects, including the capacity to generate immunity (immunogenicity). This phase can include studies on dosage and routes of administration.
- **Phase II:** A vaccine that was considered safe in phase I and needs a larger group of human volunteers (usually between 200 and 500) is tested for safety and the trials that will determine its efficacy. The purpose of phase II trials is to study the safety, immunogenicity, proposed dosages, and route of administration of the candidate vaccine.

- **Phase III:** The purpose of this phase is to more fully evaluate the vaccine’s safety and efficacy in preventing disease in a larger number of volunteers. These individuals participate in a multicenter study – that is, a controlled clinical trial conducted in different hospitals under a single lead entity and standard protocol to determine the effectiveness of the vaccine being tested. The study can include hundreds of thousands of people from one or more countries.

Phase III trials are random and double-blind — that is, neither the participants nor the investigators know which volunteers are receiving the vaccine and which the placebo. These trials use the experimental vaccine, which is tested against a placebo (the placebo can be saline solution, a vaccine for another disease, or some other substance). This is generally the step prior to the approval of a vaccine.

- **Phase IV:** These studies are conducted once a vaccine has been approved in one or more countries. Their purpose is to determine how the vaccine works in the “real world”. They are generally studies of effectiveness, and they also continue the monitoring of adverse events.

For more information, see World Health Organization. “Solidarity” clinical trial for COVID-19 treatments. Washington, D.C.: WHO; n.d. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/global-research-on-novel-coronavirus-2019-ncov/solidarity-clinical-trial-for-covid-19-treatments>

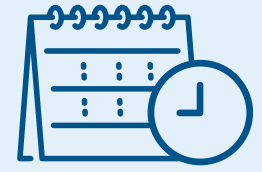
Find more information in Pan American Health Organization. COVID-19 Vaccines. Washington, D.C.: PAHO; n.d. Available from: <https://www.paho.org/en/covid-19-vaccines>.

2.2.4 What is a placebo? How is it used?

- > A placebo can be saline solution, a vaccine for another disease, or some other substance that is administered to a patient as if it were a drug. According to the definition in the Merriam-Webster Dictionary, a placebo is a substance that, lacking therapeutic action in itself, produces some curative effect in the patient if the person who receives it is convinced that that substance really has such an effect.
- > One of the most common uses of a placebo is in clinical trials for new drugs. In these trials, some of the patients are given the drug that is being tested and the others, a placebo—both with the same appearance. Neither the patients nor the physicians know which of the two are being administered (double-blind system). Thus, at the conclusion of the trial, when the results are compared, it can be determined whether the drug has greater activity than the placebo and whether the research should continue; or if there is no significant difference, whether it should be concluded.
- > To test the efficacy and safety of the vaccines developed, volunteers in the clinical trials for the different COVID-19 vaccines were divided into two groups. One group received a placebo and the other, the vaccine. In this case, there were thousands of volunteers in several countries.
- > The volunteers do not know whether they received the placebo or the vaccine.
- > The final phase of the clinical trials for the COVID-19 candidate vaccines are the phase III trials, in which the vaccine is administered to tens of thousands of patients. Investigators then compare how many of them become infected with COVID-19 compared to a different group of patients who received a placebo in order to determine efficacy and safety of the vaccine.
- > According to WHO, the candidate vaccines that went through phase III were tested with a placebo.

Pauses in vaccine trials: Safety is one of the main concerns of clinical vaccine trials. When a potential illness of unknown origin appears in a trial participant—one that may or may not be related to the vaccine under evaluation—the rigorous and customary practice is to investigate it. Temporary suspension of clinical vaccine trials while more information is gathered is not unusual.

This demonstrates that the manufacturers and investigators are doing everything possible to ensure that the vaccine is safe and effective



2.2.5 Which COVID-19 vaccines were available as of January 2021?

- > The purpose of COVID-9 vaccines is to create immunity to the virus.
- > Several vaccines were developed, but each of them has the same purpose: to protect the body from developing the disease through a protective mechanism that creates “memory” T cells (lymphocytes), as well as B cells that will remember how to fight that virus in the future.

The CDC website describes the three main types of COVID-9 vaccines in phase III trials in January 2021:

- **RNA vaccines:** These contain material from the virus that causes COVID-19 that instructs human cells to create an innocuous protein is exclusive to the virus.
- **Protein subunit vaccines:** These include innocuous parts (proteins) of the virus that causes COVID-19, instead of the whole organism.
- **Vector vaccines:** These contain a weakened version of a live virus—different from the one that causes COVID-19—containing genetic material from the virus that causes COVID-19 (this is known as a viral vector).

There is another type of vaccine made with inactivated viruses; vaccines of this type are being developed and tested in other clinical trials.

- **Vaccines with inactivated or attenuated viruses:** A previously attenuated or inactivated virus is used that does not produce the disease but triggers an immune response.

None of these vaccines can give someone COVID-19.

Sources: Centers for Disease Control and Prevention. Understanding How COVID-19 Vaccines Work. Atlanta: CDC; 2021. Available from: <https://cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/how-they-work.html>

For more information on all the COVID-9 vaccines in development, see World Health Organization. Draft landscape and tracker of COVID-19 candidate vaccines. Washington, D.C: WHO; n.d. Available from: <https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines>. This publication is periodically updated.

2.2.6 What is a messenger RNA (mRNA) vaccine?

According to information from the Centers for Disease Control and Prevention (CDC):

- > mRNA and DNA vaccines against COVID-19 were developed using a new technology that was being studied prior to the current pandemic to fight other diseases.
- > mRNA vaccines “give instructions” to human cells to produce the protein found on the surface of the virus that causes COVID-19.
- > While the cells create that protein, they do not cause the disease – that is, the body does not develop it but creates what is known as an immune response.

- > The mRNA never enters the nucleus of the cell where the DNA is stored; thus, the vaccine does not affect people’s DNA.
- > mRNA technology also has other medical uses—for example, it is the customary treatment for some types of cancer.

Source: Centers for Disease Control and Prevention. Understanding How COVID-19 Vaccines Work. Atlanta: CDC; 2021. Available from: <https://cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/how-they-work.html>

2.2.7 How do mRNA vaccines work?

According to information from the CDC:

- > Put simply, the mRNA vaccines developed to generate immunity against COVID-19 are like a messenger that instructs the cells to reproduce a harmless “spike” protein.

- > When the vaccine is introduced into an arm through a syringe, it instructs the cells to make a new fragment of protein. Once this piece is created, the cell breaks down the instructions and discards them.
- > Then, the cell shows the fragment of protein on its surface. Our immune system recognizes that the protein does not belong there and begins developing an immune response and producing antibodies, as it does when we are infected with COVID-19.
- > At the end of the process, the body has learned to protect itself against future infections. As with all vaccines, the benefit of mRNA vaccines is that vaccinated people obtain this protection without having to risk the serious consequences of contracting COVID-19.

Source: Centers for Disease Control and Prevention. Understanding How COVID-19 Vaccines Work. Atlanta: CDC; 2021. Available from: <https://cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/how-they-work.html>

More information:

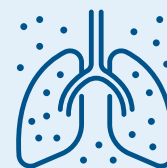
To understand how COVID-19 vaccines work, it is useful to know, first, how our bodies fight disease.

When germs—such as the virus that causes COVID-19—invade our bodies, they attack it and multiply.

This invasion is the infection, and it is what it causes the disease. Our immune system has a number of tools to fight infections. Our blood contains red blood cells that carry oxygen to our tissues and organs and white blood cells (immunity cells) that fight infections. The different types of white blood cells fight infections differently:

- > **Macrophages:** These are white blood cells that absorb and digest germs and dead or dying cells. They leave something in the body called antigens, which are parts of the invasive germs. The body recognizes the antigens as dangerous and stimulates the production of antibodies to attack them.
- > **B lymphocytes (B cells):** These are white blood cells that act as defense. They produce antibodies that attack the parts of the virus that the macrophages leave behind.
- > **T lymphocytes (T cells):** These are another type of white blood cell. They attack cells in the body that are already infected.

Source: Centers for Disease Control and Prevention. Understanding How COVID-19 Vaccines Work. Atlanta: CDC; 2021. Available from: <https://cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines/how-they-work.html>



ANNEX 2. Difficult questions and answers about COVID-19 vaccines



1. Is all the information on COVID-19 vaccines published in social media true? Which information is accurate?

- > Several factors contribute to doubts about the COVID-19 vaccine, among them:
- Safety concerns.
 - Ideological reasons.
 - About a third of those who do not intend to get vaccinated against COVID-19 are opposed to vaccination and often believe in conspiracy theories.
 - Many marginalized communities traditionally face obstacles and inequalities in health care. They may also have a collective history of experience with poor medical practice that undermines their trust.
 - Some people are opportunists and seek to take advantage of others who get vaccinated so they themselves can benefit from herd immunity.
 - Some young people and healthy individuals believe that they are not at risk of COVID-19. They fail to perceive the risk of the disease.

FIRST DRAFT is a project of the Harvard Kennedy School's Shorenstein Center. It is an open-access website that publishes practical and ethical guidance on how to search for, verify, and publish social network content.

From 15 June to 15 September 2020, the FIRST DRAFT's team studied over 14 million publications on Twitter, Instagram, and public and group Facebook pages that included the words 'vaccine' or 'vaccination' in three languages: English, French, and Spanish.

Although this figure is significant, only some of these publications had a significant level of participation.

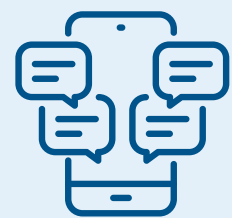
These were some of the team's conclusions about what is circulating on the internet:

Our research demonstrates the complexity of the vaccine information ecosystem, where a cacophony of voices and narratives have created an environment of extreme uncertainty".

Two topics are driving a large proportion of the current global vaccine discourse, especially around a COVID 19 vaccine: ... 'political and economic motives' ... and 'safety, efficacy and necessity' concerns...

The information ecosystem is full of 'data deficits' – situations where the demand for information...is high, but the supply of credible information is low.

THUS, HEALTH WORKERS HAVE A KEY ROLE TO PLAY IN FILLING THESE INFORMATION GAPS.



2. Where does the misinformation come from?

- > In addition to social media platforms, YouTube was a major source of misinformation during previous public health crises such as the Ebola and Zika outbreaks.

In March 2020, a YouTube search revealed that more than one quarter of the most watched videos contained misinformation, while the videos from reliable sources did not have as many views.

Source: SciBeh. COVID-19 Vaccine Communication Handbook & Wiki. Available from: https://hackmd.io/@scibehC19vax/misinfo_myths#Myths-about-COVID-19-vaccination.

- > Unfortunately, misinformation about COVID-19 vaccines and COVID-19 itself is sometimes also disseminated for political reasons.

3. What do the anti-vaccination movements say about COVID-19? Myths

- > Since the creation of vaccines more than two centuries ago, there have been movements that oppose them. There is nothing new about this development. However, with the internet, speedy access to information, social media, and influencers, these groups spread their theories around the world, unsupported by scientific evidence or expert studies.
- > With the COVID-19 pandemic and vaccines to fight it, the baseless criticisms of these movements now spread more swiftly than the disease itself. That is why it is important to indicate what kind of ideas are being disseminated and why they are false.
- > Information about vaccines from the internet and social media can be effective, ineffective, or counterproductive, so it is important to be aware of the type and quality of the information provided and to evaluate variables related to:
 - Where it comes from (type of source and channel).
 - The message (content and pro- or anti-vaccine bent).
 - The audience (information preferences).
- > Although there is a great deal of information on the internet and in the media and social networks, anti-vaccination groups continue to question the scientific evidence on vaccines.

In the study *Análisis de la información pro vacunas y anti vacunas en redes sociales e internet, Patrones visuales y emocionales (Analysis of pro-vaccine and anti-vaccine information on social networks and the internet: Visual and emotional patterns)*, Spanish investigators Ubaldo Cuesta-Cambra, Luz Martínez-Martínez, and José-Ignacio Niño-González,² explain that:



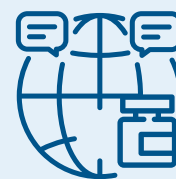
- > Individuals do not always form their opinions based on evidence but develop an attitude based on emotions or sentiment, which then motivates them to seek information and communication channels that support their opinions.
- > This means, for example, that individuals with an anti-vaccination attitude consume and value types of information that reinforce their convictions more than the scientific evidence that may or may not support it, or they do not “see” information that may discredit what they want to believe.

² See Cuesta-Cambra U., Martínez-Martínez L., Niño-González J.I. (2019). An analysis of pro-vaccine and anti-vaccine information on social networks and the internet: Visual and emotional patterns. *El profesional de la información*, v. 28, no. 2, e280217. Available from: <https://doi.org/10.3145/epi.2019.mar.17>.

4. Myths and facts regarding the information about COVID-19 vaccines circulated by anti vaccination groups

According to CDC information and recommendations:

Millions of people in different countries around the world today are getting vaccinated against COVID-19. The different vaccines that have been approved and are being used have undergone strict safety assessments to ensure that they are safe and effective.



Thanks to the protocols followed in the clinical trials, the results showed them to be safe and effective, and indicated that when side effects occurred, they were not serious and quickly disappeared (for example, pain at the injection site, headache, chills, or fever).

The discomforts are few and minor. To see how vaccinated people react, they are asked to remain at the vaccination site for 15 to 30 minutes.

As of May 2021, a number of extraordinarily rare cases of serious reactions were reported, including anaphylaxis, thromboses, and other very uncommon events. All such reactions are treatable if the vaccinated person gets to a health service immediately and the necessary supplies are available.

Experts recommend that, once vaccinated, people should continue practicing public health measures such as wearing a mask, physical distancing, and hand washing.

Everyone should consult their country's vaccination program and schedule to learn when and where they can get a vaccine.

Source: Centers for Disease Control and Prevention. Ensuring COVID-19 Vaccine Safety in the US. Washington, D.C.: CDC; 2021. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety.html>

5. Increasing health workers' knowledge about COVID-9 vaccines

FactCheck.org is one of the organizations that works with Facebook to debunk misinformation shared on social media.

The portal offers several resources for readers: a guide on how to flag suspicious narratives on Facebook and a list of websites that have published satirical or false articles, as well as a video and explanation of how to identify false narratives. Available from: <https://www.factcheck.org/2020/01/social-media-posts-spread-bogus-coronavirus-conspiracy-theory/>

Vaccine Safety Net is a global network of 60 websites in 16 languages from 28 countries. The World Health Organization reviews the websites to ensure that they share reliable information about vaccine safety. Associated websites must maintain high standards of credibility, content, access, and design. Available from: https://www.vaccinesafetynet.org/news_

The World Health Organization works in collaboration with scientists, business, and global health organizations to accelerate the pandemic response and facilitate equitable access and distribution of COVID-19 vaccines. The Organization has created a course in English with general information about COVID-19 and specific information on the storage, handling, and administration, registration, and monitoring of vaccines and covers adverse events following immunization and communication (acceptance and demand) through a series of videos and questionnaires to test users' knowledge. It is designed primarily for front-line health workers who will be vaccinators and priority recipients. Available from: <https://openwho.org/courses/covid-19-vaccination-healthworkers-en?locale=en>



The Food and Drug Administration (FDA) is the U.S. government agency responsible for regulating food, drugs, cosmetics, medical equipment, biologicals, and blood products. The agency has published information about the COVID-19 vaccine. Available from: <https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/covid-19-vaccines>.

The Centers for Disease Control and Prevention (CDC) publishes content on its vaccine and immunization websites researched, written, and approved by experts in the field, including physicians, epidemiologists, and analysts. Everything it publishes is based on science and subjected to external review. Its scientific and public health data are frequently updated. Available from: <https://www.cdc.gov/>.

First Draft is a nonprofit coalition founded by nine members in June 2015. It offers practical and ethical guidance on how to find, verify, and publish content in social media. Available from: <https://firstdraftnews.org/>.

ResearchGate is a search engine for scientific and research topics in different disciplines and at the same time, an academic social network for scientists that enables them to announce publications, pose questions, and share experiences. Available from: <https://www.researchgate.net/>.

6. According to the *COVID-19 Vaccine Communication Handbook*, the most widespread myths and facts about the vaccines are:

 MYTH:	 FACT:
people are not receiving any vaccine. The videos show that there is no needle in the syringe.	the syringes commonly used today have a retractable needle to prevent health workers from sticking themselves. When the syringe’s plunger is depressed, the needle retracts. Thus, the vaccination is not visible, but the recipient is inoculated.
vaccines cause infertility.	this is one of the many conspiracy theories disseminated through social media that have no scientific basis. As the scientists who developed the vaccine have explained, the vaccine contains a protein that is introduced into the cells so that they recognize and attack the virus. It has nothing to do with fertility. Use of a vaccine that affects fertility will never be approved.
the vaccine contains a live version of the virus, and the patient could be infected.	the vaccines developed and approved have only one objective: to train each person’s immune system to recognize and fight the virus. Therefore, certain mild symptoms appear in some cases because the body is developing the means to fight COVID-19. To accomplish this, it needs a few days, and it is during that brief period when symptoms can appear, but only in some cases.
the vaccine causes people to test positive for COVID-19.	no. In the 2020 clinical trials, the vaccines did not cause people to test positive. The purpose of the vaccination is for the body to develop immunity to the virus. When developed, it generates a level of protection and antibodies but not the disease.

X MYTH:	✓ FACT
<p>people who have had COVID-19 and recovered do not need to get vaccinated.</p>	<p>on the contrary, they should be vaccinated, because experts do not know how long the protection generated by the body lasts after a person contracts COVID-19 and recovers. According to the CDC, reinfection is possible, though infrequent.</p> <p>Regarding the benefits of getting vaccinated against COVID-19, additional information can be found in Centers for Disease Control and Prevention. Myths and Facts about COVID-19 Vaccines. Atlanta: CDC; 15 April 2021. Available from: https://espanol.cdc.gov/coronavirus/2019-ncov/vaccines/facts.html.</p> <p>Due to the serious health risks associated with COVID-19 and the fact that reinfection is possible, it is recommended that people get vaccinated against COVID-19 even if they have already had the disease.</p> <p>At this time, experts do not know how long a person is protected from getting sick again after recovering from COVID-19. The immunity developed after an infection (natural immunity) varies from person to person. Some preliminary evidence suggests that natural immunity may not last long. However, we will not know how long vaccine-induced immunity will last until we have more data from the research in progress.</p> <p>Both natural and vaccine-induced immunity are important aspects of COVID-19 that experts are studying to learn more about.</p>
<p>there is no need to get vaccinated if you can still contract the COVID-19 virus.</p>	<p>in fact, we do not know how seriously ill a person will get when he/she is infected. Unfortunately, that is one of the aspects that is still unknown as of April 2021. While it is possible to develop mild disease, in some patients the disease can have serious, critical, and even fatal consequences. The vaccine helps to protect everyone so that they have immunity and do not run risks.</p>
<p>mRNA alters people's DNA.</p>	<p>no mRNA vaccine alters people's DNA. mRNA vaccines "give instructions" so to speak, so that the cells produce a protein found in the COVID-19 virus. However, the mRNA does not enter the cell's nucleus, where the DNA is stored, and thus, it cannot alter it.</p>
<p>the COVID- 19 vaccine is going to implant a microchip in our bodies to track us.</p>	<p>this is false. Social media are circulating fake news and conspiracy theories claiming that Bill Gates and the Gates Foundation are trying to implant tracking chips in people through vaccines. This has been widely refuted by scientists and the Foundation itself.</p> <p>What is true is that the Gates Foundation has invested billions of dollars in research and vaccination programs for vulnerable areas in different parts of the world to improve vaccination coverage in places where, for example, some children are still infected with polio.</p>
<p>the vaccine from some laboratories will turn people into monkeys.</p>	<p>no, this is false. Some vaccines researched and developed after rigorous clinical trials were based on a chimpanzee adenovirus in order to test the immune response to the virus. There is no possibility of a human being turning into a monkey after getting vaccinated against COVID-19 or in any other way. This information has no scientific basis. It is more fake news.</p>
<p>COVID-19 vaccines contain fetal tissue.</p>	<p>no, this information is false. It is one of a series of myths that have circulated in the social media in the form of videos and there is no scientific evidence of this. These myths are based only on false rumors.</p>

Source: SciBeh. COVID-19 Vaccine Communication Handbook & Wiki. Available from: https://hackmd.io/@scibehC19vax/misinfo_myths#Myths-about-COVID-19-vaccination.

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Health workers are among a community's most reliable sources of information on immunization. The purpose of this publication is to provide them with information they can use to respond to frequently asked—and sometimes difficult—questions about vaccination. These pages also review the myths and negative rumors that have been circulating about the regular vaccination program and COVID-19 vaccines.

This manual supplements *Communicating about Vaccine Safety: Guidelines* to help health workers communicate with parents, caregivers, and patients, published by the Pan American Health Organization.

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