

WHO
World Health Organization
Vaccination

Overview

Vaccines are one of the most effective tools in medicine, protecting individuals and communities from deadly diseases, illnesses, and outbreaks. In 1954, scientists John F. Enders and Dr. Thomas C. Peebles laid the groundwork for the eradication of measles by isolating the virus during an outbreak in Boston, Massachusetts. This pivotal achievement led to the development of a licensed measles vaccine in the United States (U.S.) by 1963. By 1981, widespread vaccination efforts had reduced the number of reported measles cases in the U.S. by 80% compared to prior years.¹ Globally, the impact of vaccines has been even more profound. Between 2000 and 2017, measles deaths declined by 80% preventing an estimated 21.1 million deaths worldwide due to increased vaccination coverage.²

Despite these remarkable successes, challenges remain in maintaining high vaccination rates globally. The COVID-19 pandemic, for instance, highlighted the importance of addressing vaccine hesitancy and ensuring widespread vaccine access, as misinformation and logistical barriers affected the uptake of life-saving vaccines.³ The global resurgence of vaccine-preventable diseases, such as measles, in certain regions underscores the ongoing need for global cooperation in promoting vaccination as a critical public health priority.⁴

What is Who?

Established on April 7th, 1948, the World Health Organization (WHO) has become a cornerstone of global health and wellbeing. Defined by its constitution as “the directing and coordinating authority on international health” the WHO aims to ensure health security and

¹ History of measles. (2024, May 9). Measles (Rubeola). <https://www.cdc.gov/measles/about/history.html>

² UNICEF. (2024, July 15). Vaccination and Immunization Statistics - UNICEF DATA. UNICEF DATA. <https://data.unicef.org/topic/child-health/immunization/>

³ Rheumatology, N. L. (2021). Going viral: misinformation in the time of COVID-19. *The Lancet Rheumatology*, 3(6), e393. [https://doi.org/10.1016/s2665-9913\(21\)00154-5](https://doi.org/10.1016/s2665-9913(21)00154-5)

⁴ Threat assessment brief: Measles on the rise in the EU/EEA - Considerations for public health response. (2024, February 16). European Centre for Disease Prevention and Control. <https://www.ecdc.europa.eu/en/publications-data/threat-assessment-brief-measles-rise-eueea-considerations-public-health-response>

safety across its 194 member states within the United Nations system.⁵ The organization is particularly invested in supporting developing nations, focusing on building healthcare systems that provide equitable access to hospitals, doctors, vaccines, and essential medical services.

The Evolution of Vaccines

The discovery of the first vaccine by Edward Jenner in 1796 marked a transformative moment in medical science.⁶ Jenner's smallpox vaccine, developed using material from cowpox lesions, laid the foundation for modern immunization and demonstrated that diseases could be prevented through vaccination. Since Jenner's time, scientists have developed vaccines against a wide range of viruses and bacteria, including tetanus, poliomyelitis, measles, mumps, rubella, and Haemophilus influenzae type b (Hib). These vaccines have significantly reduced mortality and morbidity worldwide, saving millions of lives annually.

However, challenges remain. Vaccines for several high-burden diseases, including HIV, tuberculosis, and malaria, are still under development due to the complexity of these pathogens and their interactions with the immune system.⁷ Recent advancements, such as mRNA vaccine technology, have opened new possibilities for tackling these and other diseases, including cancers and emerging infectious diseases.⁸

Modern vaccines differ significantly from those first developed. While Jenner's method involved creating lesions on the patient's skin to induce unaltered virus material, vaccines today are typically administered through syringes and utilize various sophisticated approaches to stimulate immunity. In 1885, Louis Pasteur advanced vaccine science further by creating the first attenuated vaccine, a method that uses weakened strains of a pathogen. This technique enables the immune system to recognize and combat the virus without causing severe symptoms, a safer alternative to using unaltered viruses.^{9 10}

⁵ Who we are. (2025, January 8). <https://www.who.int/about/who-we-are>

⁶ Sullivan, M. (2024, May 11). Early smallpox vaccine is tested. HISTORY.

<https://www.history.com/this-day-in-history/jenner-tests-smallpox-vaccine>

⁷ Matarazzo, L., & Bettencourt, P. J. G. (2023). mRNA vaccines: a new opportunity for malaria, tuberculosis and HIV. *Frontiers in Immunology*, 14. <https://doi.org/10.3389/fimmu.2023.1172691>

⁸ Shi, Y., Shi, M., Wang, Y., & You, J. (2024). Progress and prospects of mRNA-based drugs in pre-clinical and clinical applications. *Signal Transduction and Targeted Therapy*, 9(1).

<https://doi.org/10.1038/s41392-024-02002-z>

⁹ Vaccines, V. (2021, January 17). Louis Pasteur and the development of the attenuated vaccine.

VBI Vaccines. <https://www.vbivaccines.com/evlp-platform/louis-pasteur-attenuated-vaccine/>

¹⁰ Riedel, S. (2005). Edward Jenner and the history of smallpox and vaccination. *Baylor University Medical Center Proceedings*, 18(1), 21–25. <https://doi.org/10.1080/08998280.2005.11928028>

The evolution of vaccines has also included the development of inactivated vaccines, subunit vaccines, and, more recently, mRNA vaccines, which were rapidly deployed during the COVID-19 pandemic to great effect.¹¹ These mRNA vaccines represent a leap forward in vaccine technology, allowing for faster production and adaptability to emerging variants. As vaccine science continues to progress, the hope remains that diseases such as HIV, tuberculosis, and malaria will one day have effective vaccines.

Global Wellbeing

One of WHO's most notable achievements was the eradication of smallpox in 1980. This success followed decades of immunization campaigns and disease surveillance, underscoring WHO's role in monitoring and responding to global health threats. WHO remains pivotal in organizing immunization programs and tracking the spread of diseases to prevent outbreaks.¹²

In collaboration with UNICEF, WHO actively participates in initiatives such as the Child Survival and Development Resolution (CSDR), launched in the 1980s. The resolution focuses on combating child malnutrition through growth monitoring, oral rehydration therapy, breastfeeding promotion, and immunization campaigns. These efforts have significantly reduced child mortality rates worldwide. WHO has also addressed other health priorities, such as reducing acute respiratory infections and maternal mortality. The Safe Motherhood Program, for example, was designed to lower maternal deaths, with particular emphasis on underdeveloped regions such as Africa, where maternal mortality remains disproportionately high.¹³

The fight against HIV and AIDS has been another area of significant WHO involvement. Since 2001, the cost of antiretroviral drugs has dropped dramatically, from \$15 000 per year per patient in industrialized countries to as low as \$350 in developing countries, thanks to coordinated global efforts, including those led by WHO.¹⁴ WHO has also been at the forefront of combating vaccine hesitancy, which it identified as one of the ten leading threats to global health in 2019. In response, the organization has intensified efforts to promote the HPV vaccine, which

¹¹ COVID-19 vaccine Basics. (2024, September 3). COVID-19.

<https://www.cdc.gov/covid/vaccines/how-they-work.html>

¹² World Health Organization. "Smallpox." World Health Organization, www.who.int/health-topics/smallpox#tab=tab_1. Accessed 23 Jan. 2025.

¹³ UNICEF. "Maternal Mortality." UNICEF Data: Monitoring the Situation of Children and Women, <https://data.unicef.org/topic/maternal-health/maternal-mortality/>. Accessed 1 Jan. 2025.

¹⁴ Rosenberg, T. (2018, September 25). Opinion | H.I.V. drugs cost \$75 in Africa, \$39,000 in the U.S. Does it matter? The New York Times.

<https://www.nytimes.com/2018/09/18/opinion/pricing-hiv-drugs-america.html>

prevents cervical cancer, and launched educational campaigns to address misinformation about vaccines.¹⁵

In 2017, during the 7-th World Health Assembly, ministers from WHO's member states endorsed a resolution to strengthen immunization programs under the global Vaccination Action Plan (GVAP). The GVAP outlines a comprehensive framework to achieve ambitious immunization coverage targets, reducing child mortality, and introducing new vaccine technologies. The plan also emphasizes the importance of expanding immunization services beyond infancy, securing domestic funding for vaccination programs, and fostering international cooperation.¹⁶

In recent years, WHO has demonstrated its adaptability and leadership in global health crises, including the COVID-19 pandemic. The organization spearheaded efforts to distribute vaccines equitably through the COVAX initiative, ensuring that low and middle income countries received access to life saving COVID-19 vaccines.¹⁷ WHO also continues to address emerging global health challenges, such as antimicrobial resistance, noncommunicable diseases, and the health impacts of climate change.

By fostering international collaboration, providing ethical support to countries, and promoting public health education, WHO continues to be an indispensable advocate for global health equity and resilience.

Vaccination Efforts & Public Trust

Vaccination campaigns worldwide face the ongoing challenge of ensuring public trust in immunization programs, particularly in areas where vaccine hesitancy remains a concern. Public health concerns regarding the safety and efficacy of vaccines continue to shape global vaccination strategies, despite overwhelming evidence supporting their effectiveness in preventing disease outbreaks. Common objections to vaccines still center around fears of harmful substances such as formaldehyde, Thimerosal (a mercury-based preservative), and

¹⁵ Ten threats to global health in 2019. (2025, January 8).

<https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019>

¹⁶ Decade of Vaccines collaboration. (n.d.).

<https://www.gavi.org/our-alliance/global-health-and-development/decade-vaccines-collaboration>

¹⁷ World Health Organization. "COVAX." World Health Organization, 2020, www.who.int/initiatives/act-accelerator/covax. Accessed 23 Jan. 2025.

aluminum, though scientific research consistently demonstrates that these ingredients, in the trace amounts present in vaccines, are safe for human use.

For example, during the first six months of a child's life, vaccines administered contain approximately 4.4 mg of aluminum, a quantity far lower than the 7 mg naturally ingested through breast milk during the same period.¹⁸ The debate surrounding Thimerosal, largely removed from U.S. childhood vaccines in 2001 due to public concerns, has also been debunked, as multiple studies confirm that it does not pose any harm, especially concerning developmental disorders.¹⁹

Another significant point of contention revolves around the perceived overload of vaccines on the infant immune system. However, immunologists have consistently debunked this concern, pointing out that the immune system is capable of handling exposure to thousands of antigens simultaneously. The number of antigens in modern vaccines is, in fact, far lower than in earlier vaccine generations, thanks to scientific advancements in vaccine development.²⁰

Public Health Education and Advocacy also focus on the benefits of vaccination over naturally acquired immunity. While natural immunity may be strong in some cases (e.g., chickenpox), contracting diseases such as measles, polio, and pertussis poses significant health risks, including complications like encephalitis, pneumonia, and death. Vaccines, on the other hand, offer protection without these severe risks, such as the 97% effectiveness of the measles vaccine, which prevents the disease without the potential harm associated with natural infection.²¹

One of the major turning points in the vaccination debate came in 1998 when a now-debunked study by Andrew Wakefield falsely linked the MMR vaccine to autism. Despite the retraction of his study and overwhelming evidence from large-scale research studies debunking this myth, a significant portion of the population continues to believe in a false connection between vaccines and autism. For example, a major study involving over 650,000

¹⁸ Coronavirus Disease 2019 (COVID-19) Vaccine safety. (2024, December 20). Vaccine Safety. <https://www.cdc.gov/vaccine-safety/vaccines/covid-19.html>

¹⁹ Thiomersal vaccines. (2025, January 8). <https://www.who.int/groups/global-advisory-committee-on-vaccine-safety/topics/thiomersal-and-vaccines/thiomersal-vaccines>

²⁰ Reading, R. (2002). Addressing parents' concerns: do multiple vaccines overwhelm or weaken the infant's immune system? *Child Care Health and Development*, 28(4), 335–336. <https://doi.org/10.1046/j.1365-2214.2002.02802.x>

²¹ Coronavirus Disease 2019 (COVID-19) Vaccine safety. (2024, December 20). Vaccine Safety. <https://www.cdc.gov/vaccine-safety/vaccines/covid-19.html>

children, published in *Annals of Internal Medicine*, found no increased risk of autism in children vaccinated with the MMR vaccine compared to those who were not vaccinated.

The Role of Social Media in the spread of vaccine misinformation has also significantly impacted public trust in vaccines. Social platforms like Facebook, Instagram, and TikTok are often sources of unfounded fears, which undermine years of public health advocacy. The World Health Organization (WHO) has explicitly listed vaccine hesitancy as one of the top ten threats to global health, emphasizing the urgency of public education and outreach efforts to restore confidence in immunization programs.²²

In the context of the COVID-19 pandemic, vaccine hesitancy delayed critical efforts to curb the spread of the virus, leading to preventable deaths. However, global initiatives like COVAX not only addressed inequities in vaccine access but also served as a key platform for providing accurate information to communities and building trust.²³ These efforts are part of an ongoing strategy to rebuild confidence in vaccines, focusing on transparency, equity, and education.

Herd Immunity & Global Public Health

Herd immunity, defined as the collective protection that occurs when a significant portion of the population is vaccinated, has proven crucial in preventing the spread of infectious diseases. This collective immunity helps protect vulnerable populations, including newborns, the elderly, and those with compromised immune systems, who are at greater risk of infection.²⁴

A clear example of the consequences of failing to maintain herd immunity occurred in California in 2015, when a measles outbreak linked to an unvaccinated child visiting Disneyland spread to 125 additional people, mainly in unvaccinated communities.²⁵ This incident highlighted the crucial role of vaccination in maintaining herd immunity, as localized vaccine hesitancy can have ripple effects, resulting in widespread outbreaks even of diseases previously under control.

²² Ibid.

²³ Ibid.

²⁴ Editorial Team. (2021, February 24). What is herd immunity? - VaccinesToday. VaccinesToday. <https://www.vaccines.today.eu/stories/what-is-herd-immunity/>

²⁵ Krakow, M. (2019, August 24). A tourist infected with measles visited Disneyland and other Southern California hot spots in mid-August. Washington Post. <https://www.washingtonpost.com/health/2019/08/24/tourist-infected-with-measles-visited-disneyland-other-southern-california-hotspots-mid-august/>

In 2019, the United States experienced a surge in measles cases, with 1,282 confirmed cases, the highest since 1994. This increase occurred primarily in communities with low vaccination coverage, underscoring how gaps in immunization coverage can jeopardize herd immunity and public health.²⁶

Declining Vaccination Rates continue to be a global concern. For example, during a yellow fever outbreak in Brazil between 2016 and 2018, vaccination coverage dropped to 54.6%, far below the 95% required to maintain herd immunity. This contributed to a sharp increase in yellow fever cases and deaths, further exemplifying the importance of consistent, high vaccination rates to protect both individual and community health.²⁷

The COVID-19 pandemic further underscored the necessity of widespread vaccination to achieve herd immunity. While efforts to vaccinate the global population faced setbacks due to vaccine hesitancy and unequal distribution, initiatives to ensure access and address concerns about vaccine safety played a key role in advancing herd immunity strategies. For instance, as of 2023, only 29% of people in low-income countries had received at least one dose of the COVID-19 vaccine, compared to over 70% in high-income nations. This disparity not only delayed herd immunity efforts but also increased the risk of variants emerging that could evade current vaccines.²⁸

Achieving herd immunity remains a critical public health goal, but its success relies on equitable access to vaccines, continued education, and addressing misinformation. Public health organizations must continue to prioritize the importance of vaccination, ensuring that populations worldwide are protected from preventable diseases.

Various Perspectives

In parts of Asia and Africa, vaccination efforts are often hindered by misinformation and mistrust, sometimes due to conspiracy theories or historical tensions. For example, some communities view vaccinations with suspicion due to perceived "Western influence," leading to decreased vaccination uptake in regions like Southeast Asia. The WHO reported a 50% increase

²⁶ Measles cases and outbreaks. (2025, January 2). Measles (Rubeola). <https://www.cdc.gov/measles/data-research/index.html>

²⁷ World Health Organization: WHO. (2023, May 31). Yellow fever. <https://www.who.int/news-room/fact-sheets/detail/yellow-fever>

²⁸ Mathieu, E., Ritchie, H., Rodés-Guirao, L., Appel, C., Gavrilov, D., Giattino, C., Hasell, J., Macdonald, B., Dattani, S., Beltekian, D., Ortiz-Ospina, E., & Roser, M. (2020, December 16). Coronavirus (COVID-19) vaccinations. Our World in Data. <https://ourworldindata.org/covid-vaccinations>

in measles cases in 2022, largely due to insufficient vaccination coverage.²⁹ This is a stark reminder of the importance of ensuring equitable access to vaccines and addressing any hesitancy or doubts among the population.

In Indonesia, cultural and religious factors can also impact vaccine acceptance. An estimated 70 million children were initially excluded from vaccination programs due to concerns about pig-derived components in vaccines, which are considered haram (forbidden) in Islamic dietary laws.³⁰ In response, countries like Malaysia are considering compulsory vaccination laws for school-aged children, similar to Singapore's mandatory vaccination for school enrollment.

In Africa, the historical challenges of vaccine distribution persist. In the late 1990s, misinformation regarding the oral polio vaccine fueled vaccine hesitancy in Nigeria, with unfounded claims that vaccines were intentionally used to spread HIV/AIDS. Although these myths were debunked, the scars of such misinformation lingered, leading to resistance to vaccination campaigns.³¹ In Nigeria, other barriers such as poverty, insecurity, and inadequate healthcare infrastructure still present major challenges to vaccine access. Similarly, the Democratic Republic of Congo (DRC) faces vaccine skepticism, partly due to historical neglect by the international community, despite the ongoing threat of diseases like Ebola.³²

In Afghanistan, vaccine campaigns have faced violent opposition, with some factions of the Taliban accusing polio vaccination programs of being a covert attempt to sterilize Muslim women. These accusations have resulted in a reduction of vaccination rates and posed serious threats to the safety of healthcare workers administering vaccines.³³

Vaccine hesitancy is also a concern in developed nations. In France, one in three people believe vaccines are unsafe, and in Liberia, one in five individuals express doubts about vaccine

²⁹ Cultural perspectives on vaccination. (n.d.). History of Vaccines.

<https://historyofvaccines.org/vaccines-101/ethical-issues-and-vaccines/cultural-perspectives-vaccination>

³⁰ Cohen, Y. A., & Stefon, M. (1999, July 26). Dietary law | Definition, History, Religions, & Facts. Encyclopedia Britannica. <https://www.britannica.com/topic/dietary-law/Rules-and-customs-in-world-religions>

³¹ Ibid.

³² BBC News. (2019, September 26). DR Congo: Vaccine campaign for world's largest measles outbreak. <https://www.bbc.com/news/world-africa-49836280>

³³ Hussain, S. F., Boyle, P., Patel, P., & Sullivan, R. (2016). Eradicating polio in Pakistan: an analysis of the challenges and solutions to this security and health issue. *Globalization and Health*, 12(1). <https://doi.org/10.1186/s12992-016-0195-3>

efficacy.^{34 35} Romania, in particular, has faced a resurgence in vaccine-preventable diseases, with over 15,500 measles cases reported in recent years. The outbreak in Romania even affected neighboring countries, such as Hungary and Belgium, demonstrating the global consequences of insufficient vaccination coverage.³⁶

The consequences of vaccine skepticism extend beyond public health, influencing international relations and healthcare systems. To address these challenges, a multi-pronged approach is required, including culturally sensitive communication, targeted education campaigns, and improved access to vaccines, all essential for restoring global confidence in vaccination programs.

Recent Issues

In the first half of 2019, the U.S. saw a resurgence of measles, with 1,077 confirmed cases across 28 states, marking the highest number of cases since the disease was declared eliminated in 2000.³⁷ As of May 13th of that year, New York City alone had reported 498 cases, with certain areas like Brooklyn's Williamsburg neighborhood and Rockland County particularly affected.³⁸ The outbreaks were linked to immunization gaps, especially in communities with high religious exemption rates.

In other regions, countries like Ukraine, Madagascar, India, and Pakistan have also faced measles outbreaks, with many nations struggling to control vaccine-preventable diseases like Ebola, which has been especially challenging in the Democratic Republic of Congo (DRC).³⁹

More recent reports indicate significant outbreaks of infectious diseases, further highlighting the need for continued vaccination efforts. In 2023, measles cases surged globally,

³⁴ Blamont, M., & Kelland, K. (2019, June 19). France leads the world in mistrust of vaccines. Reuters.

<https://www.reuters.com/article/us-health-vaccines-france/france-leads-the-world-in-mistrust-of-vaccines-idUSKCN1TK09L>

³⁵ Chapter 5: Attitudes to vaccines | Wellcome Global Monitor 2018. (n.d.). Wellcome.

<https://wellcome.org/reports/wellcome-global-monitor/2018/chapter-5-attitudes-vaccines>

³⁶ World Health Organization: WHO. (2024, November 14). Measles cases surge worldwide, infecting 10.3 million people in 2023. World Health Organization.

<https://www.who.int/news/item/14-11-2024-measles-cases-surge-worldwide--infecting-10.3-million-people-in-2023>

³⁷ History of measles. (2024, May 9). Measles (Rubeola).

<https://www.cdc.gov/measles/about/history.html>

³⁸ Gold, M., & Pager, T. (2019, March 28). New York suburb declares measles emergency, barring unvaccinated children from public. The New York Times.

<https://www.nytimes.com/2019/03/26/nyregion/measles-outbreak-rockland-county.html>

³⁹ Belluz, J. (2019, May 31). 2019 is a very bad year for measles. Vox.

<https://www.vox.com/2019/4/15/18311377/measles-outbreak-2019>

with a 20% increase compared to 2022. The UK reported its largest measles outbreak in a decade, with over 2,600 cases recorded.^{40 41} Countries such as Australia and Vietnam have also experienced significant outbreaks, with Vietnam reporting over 20,000 suspected cases in 2024.⁴²

Additionally, in 2024, Rwanda witnessed its first outbreak of Marburg virus, which spurred vaccination campaigns to control the spread.⁴³ These outbreaks underscore the urgency of strengthening vaccination infrastructure, especially in regions vulnerable to infectious disease.

The rise of misinformation about vaccines, particularly on social media, has become a significant barrier to global vaccination efforts. During the COVID-19 pandemic, platforms like Facebook, Twitter, and YouTube were flooded with unfounded claims about vaccine safety, contributing to growing vaccine hesitancy. False information, such as allegations linking vaccines to infertility or long-term health effects, spread quickly, fostering public fear and confusion.^{44 45} This misinformation has led to significant outbreaks of vaccine-preventable diseases, including a 200% increase in measles cases in Europe in 2023, partly attributed to declining vaccination rates fueled by misinformation (World Health Organization: WHO, 2024).⁴⁶ Combating vaccine misinformation requires public health campaigns that promote accurate, science-based information, alongside efforts to hold social media platforms accountable for spreading false claims. Engaging trusted community leaders and influencers to share reliable health information is also crucial in rebuilding trust in vaccines, ensuring the success of global vaccination efforts.⁴⁷

Despite the remarkable effectiveness of vaccines in preventing infectious diseases, misinformation, political instability, and logistical barriers continue to complicate vaccination

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² Vietnam, U. M. (2024, December 20). Health Alert - Measles in Vietnam - U.S. Embassy & Consulate in Vietnam. U.S. Embassy & Consulate in Vietnam.
<https://vn.usembassy.gov/health-alert-measles-in-vietnam-december-19/>

⁴³ World Health Organization: WHO. (2024, December 20). Marburg Virus Disease - Rwanda.
<https://www.who.int/emergencies/disease-outbreak-news/item/2024-DON548#:~:text=The%20outbreak%20had%20been%20declared,reported%20on%2030%20October%202024.>

⁴⁴ Ibid.

⁴⁵ Broniatowski, D. A., Jamison, A. M., Qi, S. H., & Alhabash, S. (2018). Weaponized health communication: Twitter bots and Russian trolls amplify the vaccine debate. *American Journal of Public Health*, 108(10), 1378-1384.

⁴⁶ Ibid.

⁴⁷ Skafle, I., Nordahl-Hansen, A., Quintana, D. S., Wynn, R., & Gabarron, E. (2022). Misinformation about COVID-19 vaccines on social media: Rapid review. *Journal of Medical Internet Research*, 24(8), e37367. <https://doi.org/10.2196/37367>

efforts worldwide. Global collaboration, public education, and improved access to vaccines are essential to overcoming these challenges and safeguarding public health.

Questions to Consider

1. What is your country's stance on vaccination?
2. Does your country require vaccinations for school, work, or other public services?
3. Has your country ever experienced an outbreak that prompted increased vaccination efforts?
4. Are vaccination campaigns and initiatives active in your country?
5. What solutions has your country implemented to promote vaccination efforts? (such as public health campaigns, laws, or incentives)

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