



BEYOND ANTIBODIES: RETHINKING THE FUTURE OF VACCINOLOGY

After six decades in vaccinology, Prof. Stanley Plotkin
shares drops of wisdom for the next generations

October
2026

“IMMUNIZATION IS A GLOBAL HEALTH AND DEVELOPMENT
SUCCESS STORY SAVING MILLIONS OF LIVES EVERY YEAR”

WORLD HEALTH ORGANIZATION

VACCINES
BEAT

Beyond Antibodies: Rethinking the Future of Vaccinology

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In the world of vaccinology, **Prof. Stanley A. Plotkin needs no introduction.** Widely regarded as one of the leading figures in vaccine science, his groundbreaking research has helped shape modern vaccinology and advance global immunization for more than six decades.

Prof. Plotkin played a pivotal role in the development of the rubella vaccine, which is used worldwide, and made major contributions to the development of vaccines against a range of infectious diseases, including polio, rabies, varicella, rotavirus, and cytomegalovirus. His distinguished career has spanned academic research, clinical practice, and industry, including senior positions at the Wistar Institute in Philadelphia, the Children's Hospital of Philadelphia, the University of Pennsylvania, and Pasteur-Mérieux-Connaught, now part of Sanofi.

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LETTER FROM THE EDITORS

Welcome to the 27th issue of **Vaccines Beat**!

Given **Vaccines Beat**'s growing global audience, we are delighted to introduce **ImmPulse**, our new monthly polls section designed to capture the perspectives of the multidisciplinary immunization community worldwide. Through timely questions on science, policy, ethics, and access, ImmPulse aims to explore diverse viewpoints, highlight shared challenges, and gain insights into the realities shaping immunization across regions. **Join the conversation... because your voice matters!**

In our “Coffee with an Expert” section, we are extremely honored to have had the chance yet again to interview **Professor Stanley Plotkin**, the legend behind vaccines, and indeed the top leader in vaccinology nowadays. He is Emeritus Professor at the University of Pennsylvania and Adjunct Professor at Johns Hopkins University, and the longtime editor of *Plotkin's Vaccines*, one of the world's most authoritative references in vaccinology. During our engaging conversation, Prof. Plotkin shared his invaluable insights into the evolution of vaccinology, emphasizing the critical importance of mucosal immunity in preventing infection and transmission. He also explored emerging vaccine technologies, the role of correlates of protection in vaccine development, and the scientific advances shaping the future of immunization. Drawing on decades of extraordinary experience, he offered a unique perspective on the challenges and opportunities defining the next generation of vaccines.

In our **Editor's Corner**, “**Vaccinating Animals, Protecting Humanity and the Planet: A One Health Imperative**,” we highlight the vital role of animal vaccination in preventing zoonotic diseases, reducing antimicrobial resistance, strengthening food security, and protecting planetary health. Animal immunization is not only a veterinary priority but also an essential investment in human health and pandemic preparedness.

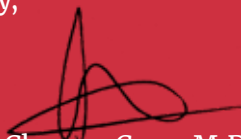
In our **Best Practice** section, “**Catch-Up Vaccination: What to Do When the Schedule Is Interrupted**,” we highlight practical, evidence-based strategies to address missed or delayed vaccinations, restore protection, and ensure timely immunization across all age groups.

In our **Guest Contributor** section, **Dr. Timothy Chege Kuria, PhD**, a Kenyan scientist and Postdoctoral Research Scientist at Columbia University in New York, USA, addresses one of Africa's most pressing public health challenges in his article, “**Africa's Vaccine Future: Population Growth, Infectious Disease Burden, and the Clinical Trial Gap**.” He provides an insightful analysis of the complex interplay between rapid population growth, the persistent burden of infectious diseases, and the critical need to expand clinical trial capacity across the continent to advance vaccine research, development, and equitable access.

As always, this issue also features carefully curated summaries of the **Latest Scientific Publications**, together with the most relevant and timely **News and Alerts** from the world of vaccines and infectious diseases.

We hope you find this **October 2026 Issue** both informative and engaging. We look forward to continuing our shared commitment to advancing immunization, strengthening public health, and contributing to a healthier and more resilient world.

Sincerely,



Enrique Chacon-Cruz, M.D., MSc
Chief Editor, *Vaccines Beat*

Felicitas Colombo, MPA.
Chief Editor, *Vaccines Beat*



Dr. Enrique Chacon-Cruz

Enrique Chacon-Cruz, M.D., MSc, Mexican-born medical doctor with a degree from Guadalajara, Mexico, and further specializations in Pediatrics and Infectious Diseases from institutions in Mexico City and the USA (Eastern Virginia Medical School). He also holds a Master's degree in Vaccinology and Drug Development from the University of Siena, Italy.

Currently, he is the CEO and Founder of "Think Vaccines" (Research, Education, and Consultancy for Vaccines and Vaccinology) based in Houston, Texas.

With over 140 research items published and/or presented at international meetings and more than 500 international lectures, all focused on vaccines, vaccination, clinical trials, and vaccine-preventable diseases. The latter conducted independently or in association with the Centers for Disease Control and Prevention (CDC), the University of California in San Diego, Eastern Virginia Medical School, and several other institutions.

Additionally, He is the President of the Immunization Committee of the Mexican Association of Pediatric Infectious Diseases, he is a member of the Mexican Committee for the Elimination of Measles, Rubella, and Congenital Rubella, member of the Immunization and of the Health Equity Committees of the European Society of Medicine and Overseas Fellow, Royal Society of Medicine, United Kingdom. He is also the former Director of the Mexican Active Surveillance Network for Bacterial Meningitis and the former Head of the Pediatric Infectious Diseases Department and the Research Department at the General Hospital of Tijuana, Baja-California, Mexico.



Felicitas Colombo

Felicitas Colombo, MPA.Intelligethics LLC. Public affairs and policy strategist with over 20 years of experience developing initiatives with regional and global impact while fostering multi-stakeholder collaboration to advance public policy. She holds a Bachelor's degree in Mass Communications and an Executive Master of Public Administration from the London School of Economics, with a concentration in regulatory analysis, policy design, and risk management.

Throughout her career, Felicitas has advised leading pharmaceutical companies and industry organizations on strategic communications, healthcare policy and market access. Her expertise spans regulatory analysis, government relations, stakeholder engagement, public-private partnerships, advocacy, and health education, with a focus on translating evidence into policy advancements and improving healthcare access. She also brings extensive experience in governance, ethics, transparency, compliance, and risk management at the intersection of public policy and private-sector engagement.

Felicitas is a member of the World Association of PPP Units and Professionals (WAPPP) and the OECD Auditors Alliance. She has also completed executive and specialized training in leadership, ethics, compliance, integrity, and collective action, including the *Leadership for the 21st Century: Chaos, Conflict and Courage* program at Harvard Kennedy School and the Anti-Corruption Collective Action Certificate at the International Anti-Corruption Academy (IACA).

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Coffee with the Expert

BEYOND ANTIBODIES: RETHINKING THE FUTURE OF VACCINOLOGY

After six decades in vaccinology, Prof. Stanley Plotkin shares drops of wisdom for the next generations

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Dr. Enrique Chacon-Cruz, M.D., MSc

In the world of vaccinology, **Prof. Stanley A. Plotkin** needs no introduction. Widely regarded as one of the leading figures in vaccine science, his groundbreaking research has helped shape modern vaccinology and advance global immunization for more than six decades.

Prof. Plotkin played a pivotal role in the development of the rubella vaccine, which is used worldwide, and made major contributions to the development of vaccines against a range of infectious diseases, including polio, rabies, varicella, rotavirus, and cytomegalovirus. His distinguished career has spanned academic research, clinical practice, and industry, including senior positions at the Wistar Institute in Philadelphia, the Children's Hospital of Philadelphia, the University of Pennsylvania, and Pasteur-Mérieux-Connaught, now part of Sanofi.

He is currently Emeritus Professor of Pediatrics at the University of Pennsylvania and Adjunct Professor at Johns Hopkins University. He has also served in prominent advisory roles with leading scientific and public health institutions, including the American Academy of Pediatrics, the Advisory Committee on Immunization Practices (ACIP), and the National Institutes of Health.



Another of Prof. Plotkin's enduring legacies is *Plotkin's Vaccines*, first published in 1988. As longtime editor of this landmark textbook, he has helped establish it as one of the most authoritative references in vaccinology, offering an extensive resource on vaccine science, development, and clinical application. He has authored or co-authored hundreds of scientific publications and helped establish the Advanced Course of Vaccinology at Fondation Mérieux in Annecy, France.

His influence extends beyond scientific discovery. In 2015, he proposed an international mechanism to support the development of vaccines against emerging infectious diseases, an initiative that contributed to the creation of the Coalition for Epidemic Preparedness Innovations (CEPI). His contributions have been recognized through numerous distinctions, including the French Legion of Honor, the Sabin Gold Medal, the Hilleman Award, and the Fleming Award. He has also been elected

to several prestigious scientific institutions, including the U.S. National Academy of Medicine.

A founding figure in pediatric infectious diseases and a tireless advocate for vaccine research, Prof. Plotkin has helped shape not only the vaccines available today but also the scientific foundations on which future advances will depend. His remarkable legacy reflects a lifelong commitment to scientific rigor, innovation, and the protection of public health worldwide.

It was an honor to once again have an hour of his precious time for a conversation with *Vaccines Beat*.

A broader understanding of vaccine-induced protection

Few scientists have witnessed and influenced the evolution of modern vaccinology as extensively as Prof. Plotkin. Over a career spanning more than six decades, his work has helped shape the scientific foundations of vaccine development and the understanding of immune protection.

In this conversation with *Vaccines Beat*, Prof. Plotkin reflects on how the field has evolved beyond its traditional reliance on antibody neutralization tests, why mucosal immunity represents a critical frontier, and how vaccine safety, education, and public trust will influence the future of immunization.

For Prof. Plotkin, one of the most important scientific developments has been the recognition that vaccine-induced protection cannot always be captured by a single laboratory measurement.

“When I first started out, the test was neutralization,” he recalls.

Traditionally, researchers assessed whether antibodies could neutralize a pathogen under laboratory conditions. Today, however, the understanding of immune protection encompasses a wider range of antibody functions, cellular responses, and other mechanisms.

“The neutralization test that we have used for many years is only one way of determining whether an immune response has occurred,” he emphasizes.

This distinction is important because preventing a pathogen from infecting a cell, limiting its replication, and preventing the disease it causes are related but different outcomes. A vaccine may protect an individual against severe illness without completely preventing infection.

Consequently, understanding protection requires a more comprehensive assessment of the immune response, including its quality and functionality, rather than relying exclusively on antibody concentrations or neutralization measurements. This broader approach is consistent with Plotkin’s longstanding work on immune correlates of protection.

Mucosal immunity: Protecting the body at the point of entry

Among the most compelling challenges facing vaccinology is the development of vaccines capable of establishing effective immunity at mucosal surfaces.

Many infectious agents first encounter the body through the respiratory tract, gastrointestinal system, or genital mucosa. Yet, as Prof. Plotkin explains, conventional vaccination has generally been more successful at generating systemic immunity than at preventing pathogens from establishing themselves at these entry points.

“We’re pretty good at neutralizing agents when they get into the bloodstream,” he says. “But we’re not really very good at this point in preventing an agent to invade the mucosa before it can get into the bloodstream.”

This limitation has important implications for respiratory and enteric infections. A vaccine that protects against severe disease may not necessarily prevent the initial infection, viral or bacterial replication at the mucosal surface, or subsequent transmission.

For this reason, Prof. Plotkin identifies the induction of mucosal immunity as one of the field’s main priorities.

“One of the major areas of vaccinology today is how to induce mucosal responses that will prevent an agent from multiplying sufficiently on the mucosa to allow

invasion of the tissues,” he explains.

Mucosal immunity involves a complex interaction of local antibodies, including immunoglobulin A (IgA), cellular immunity, and the specialized immune environment of mucosal tissues. Developing vaccines that reliably stimulate these responses remains challenging, particularly when researchers must establish how to measure those responses at the site of infection.

The challenge is not simply to generate a local immune response. A successful vaccine must also prevent the pathogen from crossing the mucosal barrier and spreading into the body. The objective is to achieve mucosal protection while ensuring that the vaccine itself does not cause disease.

“The main issues for the mucosal vaccines are the ability to induce an immune response that blocks invasion,” he says.

This balance presents both a scientific and a regulatory challenge. Vaccine developers must demonstrate that a candidate can induce an appropriate protective response without unacceptable replication, dissemination, or other safety risks.

The implications extend beyond the development of intranasal or oral vaccines. They also raise broader questions about how vaccine efficacy should be evaluated when the desired outcome includes preventing infection and transmission, rather than primarily reducing severe disease.

Pertussis: preventing disease and preventing infection

The discussion of mucosal immunity leads to a particularly relevant example: the evolution from whole-cell to acellular pertussis vaccines.

Whole-cell pertussis vaccines have historically been associated with greater reactogenicity, contributing to the development and adoption of acellular alternatives with more favorable tolerability profiles. However, the two vaccine approaches do not generate identical immune responses.

“The efficacy of the whole-cell vaccine is better than the efficacy of the acellular vaccine

because the latter does not induce T cell responses as well as the whole-cell vaccine,” Prof. Plotkin explains acknowledging the trade-offs involved in this transition.

He adds that infection can still occur at the mucosal surface even when an individual is protected against clinical disease. This distinction has been examined in research on pertussis, including studies suggesting that acellular vaccines can protect against disease without preventing colonization and transmission as effectively as whole-cell vaccines in animal models.

The issue is particularly important when considering indirect protection. If vaccination reduces disease severity but does not consistently prevent infection or transmission, the population-level effects may differ from those achieved by vaccines that more effectively interrupt transmission.

The pertussis example therefore illustrates a broader principle: protection against disease and protection against infection are not interchangeable endpoints.

For vaccine developers, regulators, and public-health authorities, recognizing this distinction is essential when defining the objectives of next-generation vaccines and assessing their potential contribution to population-level protection.

Beyond a single correlate of protection

As vaccine technologies become more sophisticated, Prof. Plotkin believes that the assessment of immunity must reflect the complexity of the immune system itself.

A single biomarker may be useful for predicting protection in a particular setting, but it may not capture every mechanism required to control a pathogen.

At mucosal surfaces, local antibodies may help prevent initial infection. If a pathogen crosses that barrier, circulating antibodies and cellular responses may become important in limiting further replication and disease.

“The critical thing is induction of the

immune system in general, as well as on the surface of the mucosa,” he says.

This approach has implications for clinical development and regulatory evaluation. Researchers need to determine which immune responses are genuinely associated with protection, which serve as useful surrogate measurements, and how different components of immunity interact.

Plotkin’s work on correlates of protection has long emphasized the importance of antibody functionality, immune memory, and cellular immunity alongside antibody measurements.

As new platforms and vaccine candidates emerge, a more complete understanding of these mechanisms may help researchers select antigens, design trials, interpret results, and establish more meaningful measures of protection.

Vaccine safety: An ethical obligation, not simply a statistical calculation

Beyond scientific innovation, Prof. Plotkin identifies vaccine safety as a continuing responsibility for the vaccinology community.

His argument is not that vaccines lack a strong safety record. Rather, it is that the scientific and ethical obligations associated with vaccination require sustained attention to rare adverse reactions, even when the overall benefits of vaccination are substantial.

“If a vaccine causes a reaction in one in 100,000 vaccinees, that deserves as much attention as the protective effects of the vaccine,” he says.

He explains that the issue has two dimensions. First, researchers have an ethical obligation to understand and prevent harm wherever possible. Second, rare adverse reactions can influence public confidence and affect the willingness of others to be vaccinated.

“From the point of view of a single vaccinee, it’s him or her that counts,” he underscores.

This perspective highlights the importance of investigating the biological mechanisms underlying rare adverse events, strengthening

post-authorization surveillance, and communicating findings transparently.

The World Health Organization (WHO) similarly emphasizes the importance of continuous vaccine-safety monitoring, expert assessment of potential adverse events, and evidence-based communication when safety concerns arise.

For Prof. Plotkin, safety and efficacy must remain complementary priorities.

“We need to spend more effort on vaccine safety as well as efficacy,” he says.

This is a central lesson for the next generation of vaccinologists: rigorous safety science is essential not only to protect individuals but also to sustain confidence in immunization programmes.

Public trust begins with education

Scientific advances alone cannot guarantee high vaccination coverage. Their impact depends, in part, on whether people understand the benefits and limitations of vaccination and trust the institutions responsible for recommending, evaluating, and delivering vaccines.

Prof. Plotkin is concerned that public perceptions of vaccination have increasingly emphasized individual benefit at the expense of collective protection.

He recalls a time when vaccination was more readily understood as a way to protect both oneself and others. Today, he argues, that shared responsibility is more difficult to communicate.

“It’s more and more whether it’s good for me or not,” he sustains.

The challenge is particularly significant when vaccines are expected to prevent not only disease in the vaccinated individual but also, where supported by evidence, infection and transmission within communities.

Prof. Plotkin returns repeatedly to education, especially during childhood.

“I think that the only way to deal with this situation is to teach children about vaccines,” he says with the wisdom of

a physician who has seen it all.

He believes that explaining why vaccines are administered, what benefits they provide, and why mild reactions such as a sore arm may occur can help children develop a better understanding of immunization before they encounter the more polarized debates that often characterize adult discussions.

He also supports stronger education about vaccinology within medical training. The ability of healthcare professionals to explain vaccine science clearly is particularly important when they must address questions about safety, effectiveness, and the rationale for recommended schedules.

Education, however, must be accompanied by practical improvements in vaccination delivery. Prof. Plotkin highlights combination vaccines as one opportunity to reduce the number of injections required.

“Making combination vaccines is a task ... important not simply for the vaccinator, but for the vaccinee,” he explains.

Reducing the number of injections may make vaccination more acceptable and convenient for families and healthcare professionals while supporting the timely completion of recommended schedules.

His broader message is that public acceptance should be considered alongside scientific progress, not treated as an afterthought once a vaccine has been developed.

The future of vaccinology: Science, ethics and responsibility

Looking ahead, Prof. Plotkin expects vaccine science to continue expanding, including the development of vaccines against diseases that have historically been difficult to prevent.

“Vaccine science is increasing, that as time goes on, there will be more and more vaccines, including vaccines against cancer,” he anticipates.

Such progress will create new opportunities, but

it will also increase the importance of explaining why new vaccines are needed, establishing their safety and effectiveness, and ensuring that people can make informed decisions about their use.

For emerging vaccinologists, his advice is grounded in scientific rigor and ethical responsibility. Researchers must understand the protective responses a vaccine induces while also identifying responses that may be harmful or unrelated to the intended protection.

“They must also recognize that rare adverse reactions deserve careful investigation, even when a vaccine provides substantial benefits to the population as a whole,” he advises.

Ultimately, Prof. Plotkin’s reflections point to a future in which the success of vaccinology will depend on more than technological breakthroughs. It will require a deeper understanding of immune protection, better tools for evaluating vaccines, sustained investment in safety research, and more effective public education.

“The scientific community must continue to ask not only whether a vaccine works, but how it works, whom it protects, what risks it may carry, and how its benefits can be understood and trusted by the people who need it,” he says, underlining that these questions are inseparable from the ethical responsibilities of vaccine development.

As vaccinology advances toward a more sophisticated understanding of immune protection, Prof. Plotkin argues that the next generation of vaccines must do more than generate antibodies. They must address immunity at the site of infection, strengthen our understanding of rare adverse reactions, and ensure that the public understands why vaccination matters.

“The future of immunization will depend on our ability to translate scientific knowledge into protection that is not only effective and safe, but also understood and accepted by society,” he concludes.

News & Alerts

MOST RELEVANT MONTHLY NEWS ON VACCINATION AND EMERGING DISEASES WITH BIBLIOGRAPHIC ALERTS

A summary of the latest News & Alerts in the fields of vaccinology, vaccines, vaccination, and vaccine-preventable diseases. We curate the latest information on regulatory updates, emerging trends, breakthroughs in vaccine technology, vaccine safety and efficacy, global immunization developments and outbreak alerts, as a resource to keep our community informed.

WHO prequalifies multi-dose RSV vaccine vial, paving the way to protecting more infants globally.

The World Health Organization (WHO) has prequalified the multi-dose vial presentation of the maternal respiratory syncytial virus (RSV) vaccine, RSVpreF (ABRYSVO®), marking a major step toward protecting more infants from severe respiratory illness and pneumonia globally. The new presentation is expected to make maternal RSV vaccination more affordable and easier to deliver, particularly in countries supported by Gavi, the Vaccine Alliance.

Published: September 9, 2026.

<https://www.who.int/news/item/09-09-2026-who-prequalifies-multi-dose-rsv-vaccine-vial--paving-the-way-to-protecting-more-infants-globally>

Bangladesh has lost 900 children to measles – a warning to other countries where vaccine rates have slipped.

After a pandemic-era collapse in vaccination, Bangladesh is racing to protect children from measles, but lasting protection depends on reaching 95% coverage.

Published: September 23, 2026.

<https://www.gavi.org/vaccineswork/bangladesh-has-lost-900-children-measles-warning-other-countries-where-vaccine>

UK rabies vaccine trial could also unlock protection against Disease X.

A first-in-human UK trial is evaluating an innovative RNA-based rabies vaccine designed to be easier and potentially cheaper

to manufacture than current vaccines. The RAB-Vac study will enroll approximately 48 healthy adults to assess safety and immune responses. Beyond rabies—a disease causing an estimated 60,000 deaths annually—the study has broader implications. Its rapid and flexible RNA platform could potentially be adapted to emerging pathogens, providing valuable insights for preparedness against future epidemics, pandemics, and even an unknown “Disease X.”

Published: September 28, 2026.

<https://chatgpt.com/c/6abace2c-45fc-83e8-871b-d958220a6aa7>

World Rabies Day 2026.

Every year on 28 September, the global community comes together to raise awareness about rabies elimination! This year's World Rabies Day theme, “Stronger Together,” highlights a simple truth: rabies elimination is only possible when we work together.

Published: September 28, 2026.

<https://www.who.int/news-room/events/detail/2026/09/28/default-calendar/world-rabies-day-2026>.

World Meningitis Day October 5, 2026.

Since 2009, people around the world have united on World Meningitis Day with one shared goal: a future free from meningitis. Today, coordinated by Meningitis Research Foundation, it has become the world's largest Global Day of Action against this devastating disease—a powerful call to raise awareness, strengthen prevention, expand vaccination, and save lives. Yet many cases of meningitis are preventable. Effective

vaccines are available against several of its major causes, making vaccination, early recognition, rapid treatment, and strong surveillance essential tools in the fight against this disease. We have the knowledge. We have vaccines. We have the tools. Now is the time for action.

<https://worldmeningitisday.org/>

A 'Wildly Unusual' Outbreak of Dengue Is Hitting Florida Hard as Several Counties Declare State of Emergency.

Last week, three Florida counties declared a state of emergency in an attempt to corral what health officials have called “wildly unusual” outbreaks of dengue in the area. Nearly 200 cases of locally acquired dengue have been documented in the state so far this year, which now threatens to surpass the previous record set in 2023. At least one person has also died of the viral disease.

Published: September 28, 2026.

<https://gizmodo.com/a-wildly-unusual-outbreak-of-dengue-is-hitting-florida-hard-as-several-counties-declare-state-of-emergency-2000818145>

Cholera deaths rise 30% in 2025, Seven countries account for 91% of deaths.

The World Health Organization reported a significant rise in cholera deaths last year, despite seeing overall fewer cases reported. In 2025, 47 countries, territories, and areas reported 451,499 cholera cases and 7,870 deaths. This is the highest number of annual cholera deaths reported to WHO since 1999.

Published: September 30, 2026.

<https://outbreaknewstoday.substack.com/p/cholera-deaths-rise-30-in-2025-seven>

PAHO: Health Ministers approve new regional strategy to prevent and control dengue and other arboviral diseases in the Americas.

In 2024, the Region of the Americas recorded more than 13 million dengue cases and over 8,400 deaths, the largest epidemic on record. In recent years, the Region has also faced major chikungunya outbreaks, the spread of Oropouche virus disease beyond its traditional transmission areas, and an increase in yellow fever cases in new geographic locations.

Published: October 1, 2026.

<https://www.paho.org/en/news/1-10-2026-health-ministers-approve-new-regional-strategy-prevent-and-control-dengue-and-other>

Russian lab worker dies of suspected plague as 200 enter medical observation.

The female staffer at the Irkutsk Anti-Plague Institute of Siberia and the Far East died from a “pneumonia of undetermined” origin last week, according to a regional governor. The death of a worker at an anti-plague laboratory in Russia has prompted officials to put at least one hospital facility under quarantine and nearly 200 people reportedly under medical observation as of Monday.

Published: October 5, 2026.

<https://www.nbcnews.com/world/europe/russia-plague-suspected-lab-worker-dies-200-medical-observation-rcna601559>

Pakistan reports this year's sixth polio case.

The National Emergency Operations Centre for Polio Eradication (NEOC) on Monday said Pakistan had reported its sixth polio case in the ongoing year. Pakistan and Afghanistan are the only two countries where polio is still endemic.

Published: October 5, 2026.

<https://www.dawn.com/news/2034975/pakistan-reports-this-years-sixth-polio-case>

Measles outbreak mapped: New York declares state of emergency after virus wreaks havoc in Pennsylvania.

Measles is surging at historic levels in the United States with nearly 3,900 cases reported in 47 states and Washington, D.C. this year so far. New York Governor Kathy Hochul declared a state of emergency due to the virus Monday after 109 cases were reported – the most since a 2019 outbreak. Pennsylvania has experienced the nation's largest measles outbreak in over three decades with infections surpassing the 1,000 case threshold this week, with five deaths.

Published: October 7, 2026.

https://www.yahoo.com/news/us/articles/pennsylvania-measles-outbreak-passes-1-030546924.html?fr=sycsrp_catchall

Global Measles Outbreaks:

Country	Number of Cases
Bangladesh	62,351
Guatemala	30,239
India	21,523
Yemen	13,984

Country	Number of Cases
Pakistan	10,313
Mexico	10,303
Cameroon	8,243
South Africa	5,418
Kazakhstan	5,079
Angola	5,066

This table is based on provisional monthly surveillance data reported to the World Health Organization (Geneva) as of August 2026. The data reflected covers February 2026 – July 2026.
Published: September 14, 2026.

<https://www.cdc.gov/global-measles-vaccination/data-research/global-measles-outbreaks/index.html>

Ebola in the DRC: More than 4,100 deaths recorded in 7 provinces.

According to the report, the cumulative number of confirmed cases in the seven provinces is 8,665. Of these, 890 patients are in isolation or hospitalized. The cumulative number of recoveries is 2,259, while the number of deaths among confirmed cases has reached 4,178. The overall case fatality rate is 48.2%, and the overall contact tracing rate is 80.4%.

Published: October 7, 2026.

<https://outbreaknewstoday.substack.com/p/ebola-in-the-drc-more-than-4100-deaths>

Experimental approach uses AI to eliminate cold storage for mRNA vaccines.

Using artificial intelligence, researchers may have found a way to make vaccines based on mRNA technology, such as Moderna's (MRNA.O), opens new tab and Pfizer's (PFE.N), opens new tab COVID shots, storable at room temperature, which would lower costs and make them available in regions where ultra-cold storage is not possible.

Published: October 7, 2026.

<https://www.reuters.com/business/healthcare-pharmaceuticals/experimental-approach-uses-ai-eliminate-cold-storage-mrna-vaccines-2026-10-07/>

Why high vaccination coverage doesn't always mean low measles risk.

Clusters of unvaccinated children can leave

communities vulnerable to measles even when vaccination coverage across the wider area appears high, new research suggests.

Published: October 5, 2026.

<https://www.gavi.org/vaccineswork/why-high-vaccination-coverage-doesnt-always-mean-low-measles-risk>

What impact will climate change have on malaria?

More than 600,000 people die from malaria every year. Will climate change make this worse? Climate change has probably led to a decline in malaria in West Africa, but an increase in the southern and eastern parts of the continent.

Published: October 5, 2026.

<https://ourworldindata.org/what-impact-will-climate-change-have-on-malaria>

What are the 4 vaccines Florida wants to make optional for schools and daycares?

Florida schools and daycares may soon end requirements for four childhood vaccines, after the state department of health holds a hearing on the matter Thursday. The idea to relax these rules came from Florida Surgeon General Joseph Ladapo, who has advocated for parental choice and medical freedom, and likened all vaccine mandates to "slavery." Meanwhile, pediatricians across the country have warned that making immunizations voluntary. These vaccines no longer required to attend schools and daycares are Hepatitis B, Pneumococcal conjugate, Hemophilus influenzae type b, and varicella, a potential enormous public health risk for all those communities.

Published: October 7, 2026.

<https://www.wusf.org/health-news-florida/2026-10-07/the-four-vaccines-florida-wants-to-make-optional-schools-daycares>

Eight numbers that explain the impact of Gavi, the Vaccine Alliance in 2025.

In the time it takes you to read this article, Gavi-supported vaccines will have saved 25 lives. In 2025 alone, Gavi-supported vaccines prevented more than 2.2 million future deaths. That's around 6,000 every day, and the most in any single year in Gavi's history.

Published: October 7, 2026.

<https://www.gavi.org/vaccineswork/eight-numbers-explain-impact>

[gavi-vaccine-alliance-2025](#)

WHO South-East Asia Region Epidemiological Bulletin.

This Epidemiological bulletin, published by 'Health Emergency Information and Risk Assessment' (HIM) unit in World Health Organization, aims to provide the situation of key infectious diseases in the WHO South-East Asia region to inform risk assessment and response by countries. The bulletin uses information from publicly available sources and will be published every two weeks.

Published: October 2026.

<https://www.who.int/southeastasia/outbreaks-and-emergencies/surveillance-and-alert/sear-epi-bulletins>

WHO-Africa: Weekly bulletins on outbreaks and other emergencies.

Published: October 2026.

<https://www.afro.who.int/health-topics/disease-outbreaks/outbreaks-and-other-emergencies-updates>

E. coli Is Not the Pneumococcus.

Today, the results of the E.mbrace study were published: a vaccine against infections caused by Escherichia coli does not work. More than fifteen years of research, encouraging results in Phase 1 and Phase 2 trials, and an investment of hundreds of millions of euros preceded this outcome.

Published: October 13, 2026.

<https://mbonten.substack.com/p/e-coli-is-not-the-pneumococcus>



Latest Relevant Publications

LATEST PUBLISHED PAPERS AND COMMENTARIES FROM THE CHIEF EDITORS

Latest impactful scientific publications that stand out for their potential bearing on healthcare. We introduce groundbreaking research findings, innovative treatment modalities, results from phase 1 to 3 vaccine clinical trials, or paradigm-shifting discoveries that redefine our understanding of infectious diseases and therapeutic approaches for all vaccine-preventable diseases.

01

Disis ML, Chun BMN, Dhillon KK, Liao JB, Hunter N, Cecil DL. **Vaccines for Cancer: A Translational Science Review.** *JAMA.* 2026 Sep 21.

doi: <https://doi.org/10.1001/jama.2026.15540>

Editorial comment: Cancer vaccines are entering a new era, driven by advances in tumor immunology, neoantigen discovery, mRNA platforms, and personalized medicine. Beyond established therapeutic vaccines, emerging strategies—particularly combinations with checkpoint inhibitors—are showing encouraging results in cancers such as melanoma and prostate cancer. The field is rapidly evolving from treating established disease toward preventing recurrence and, potentially, cancer itself, positioning vaccination as an increasingly important component of precision oncology.

02

Wiggins J, Madapong A, Weaver E. **Systemic and Mucosal Immune Responses From Serotype-Switched Viral-Vector Ebola Vaccines.** *J Med Virol.* 2026 Sep;98(9):e71161.

doi: <https://doi.org/10.1002/jmv.71161>

Editorial comment: Adenoviral-vector Ebola vaccines may offer promising strategies to broaden and strengthen protection against this highly lethal disease. In mice, Ad5 and Ad6 vectors generated the strongest GP-specific antibody responses, while serotype-switching further enhanced humoral immunity. Importantly, the route of administration shaped the immune response: intramuscular vaccination induced robust systemic antibody and T-cell responses, whereas intranasal delivery generated mucosal IgA but limited detectable cellular immunity. These findings highlight how vector selection, vaccination sequence, and delivery route can substantially influence Ebola vaccine performance and support further evaluation in protective challenge models.

03

Espinal C, Becerra-Posada F, Sanmartín JL, dos Santos T, Gutiérrez G, Coronell W, Siqueira JB Jr., Sáez-Llorens X, Uboldi A, Gatti E, et al. **Toward an Integrated Response to Arboviral Threats in the Americas: Perspectives from the Dengue Summit of the Global Health Conference of the Americas 2025.** *Pathogens.* 2026; 15(10):1019.

doi: <https://doi.org/10.3390/pathogens15101019>

Editorial comment: Dengue has reached unprecedented levels in the Americas, with more than 13 million cases reported in 2024 alone. Promising tools—including new-generation vaccines such as TAK-003 and Butantan-DV, *Wolbachia*-based vector control, digital surveillance, and climate-informed forecasting—are reshaping prevention. Notably, large-scale *Wolbachia* deployment in Colombia was associated with >90% reductions in dengue incidence in areas where it became established. The path forward is clear: dengue control will require integrated strategies combining vaccination, innovative vector control, surveillance, community engagement, and stronger health systems.

04

Rumgay H, Georges D, Huang Y, Hirabayashi M, Shah R, de Martel C, Park JY, Soerjomataram I, Clifford GM. **Global burden of cancer attributable to infections in 2024: a worldwide incidence analysis.** *Lancet Oncol.* 2026 Oct;27(10):1237–1248.

doi: [https://doi.org/10.1016/S1470-2045\(26\)00307-4](https://doi.org/10.1016/S1470-2045(26)00307-4)

Editorial comment: Infections remain a major—and often preventable—cause of cancer. In 2024, an estimated 2.3 million new cancer cases worldwide (12% of all cancers) were attributable to infectious agents. *H. pylori* and HPV accounted for approximately 760,000 and 750,000 cases, respectively, followed by HBV (360,000), EBV (260,000), and HCV (160,000).

These findings reinforce a powerful but sometimes overlooked role of vaccination: vaccines are also cancer-prevention tools. HPV and HBV vaccines already prevent infections responsible for hundreds of thousands of cancers, yet their full potential remains limited by inadequate coverage and inequitable access. Expanding vaccination, together with screening, diagnosis, and treatment of carcinogenic infections, could substantially reduce the global cancer burden.

The message is compelling: preventing infection today can mean preventing cancer decades later.

05

Bähner F, Faust SN, Davies LRL, Blokhina O, Brandon DM, Smith WB, Chatterjee VKK, Hassanin H, Babu TM, Zuiani A, Steinhäuser S, Poran A, Brittain C, Mucker E, Hooper JW, van der Most RG, Alonso PL, Türeci Ö, Mensa FJ, Şahin U. **Safety and immunogenicity of mRNA-based mpox vaccine candidate BNT166a: an open-label, dose-escalation, first-in-human trial.** *Lancet Infect Dis.* 2026 Oct;26(10):1045–1057.

doi: [https://doi.org/10.1016/S1473-3099\(26\)00177-5](https://doi.org/10.1016/S1473-3099(26)00177-5)

Editorial comment: BNT166a, a novel quadrivalent mRNA vaccine targeting four monkeypox virus antigens, showed a favorable safety and immunogenicity profile in this first-in-human phase I trial. Two doses generated 100% seroresponse to all four encoded antigens, with binding antibodies persisting for 12 months. Neutralizing responses against MPXV clade IIb were also demonstrated, although they waned over time. These early findings support further clinical development and highlight the potential of multivalent mRNA platforms as a scalable next-generation approach to mpox prevention.

06

Pley C, Jeffries DJ, Kanteh E, Strandmark J, Baldeh AK, Leigh MN, Ndow P, Clarke E, Kampmann B. **Yellow fever vaccination in healthy Gambian children of different ages to establish safety and immunogenicity of a booster dose: a open-label, non-randomised, single-site, phase 3 vaccine trial.** *Lancet Infect Dis.* 2026 Oct;26(10):1070–1078.

doi: [https://doi.org/10.1016/S1473-3099\(26\)00193-3](https://doi.org/10.1016/S1473-3099(26)00193-3)

Editorial comment: A phase 3 trial in The Gambia raises important questions about the durability of yellow fever protection after infant vaccination. Among 589 children, baseline neutralizing antibody seropositivity declined to 65–67% in children aged 4–9 years, compared with 82% in younger children. After a booster, 99% were seropositive, with no vaccine-related serious adverse events. These findings suggest that immunity acquired in infancy may wane earlier than expected and support further evaluation of whether—and when—yellow fever boosters should be considered for children in endemic settings.

07

Onofrio I, Belcher T, Quinn ME, Lupoli E, Freslov T, Owen N, Dissanayake SN, Grudzein LA, Freixeiro P, Rollier CS and MacLennan CA. **A candidate gonococcal outer membrane vesicle vaccine which induces persistent immunity in three genetically distinct species of mouse and is similarly immunogenic when formulated with and without aluminum adjuvant.** *Front. Immunol.* 2026 Oct;17:1923399.

doi: <https://doi.org/10.3389/fimmu.2026.1923399>

Editorial comment: With multidrug-resistant *Neisseria gonorrhoeae* becoming an increasing global threat, the need for a specific gonococcal vaccine is growing. GonoVac, a native outer membrane vesicle (nOMV) vaccine candidate, induced robust and durable anti-gonococcal immune responses across three genetically distinct mouse strains, with functional antibody activity maintained for up to one year. Importantly, GonoVac generated greater complement-mediated bacterial killing than 4CMenB in two of the three strains. Although still preclinical, these findings support GonoVac as a promising candidate for the development of a targeted vaccine against gonorrhoea.

08

Kapelus DJ, Olwage CP, Izu A, Ranchod H, Mukendi CK, Mutsaerts EAML, Koen A, Jose L, Kwatra G, Faustini SE, Richter AG, Madhi SA. **Immunogenicity up to age 5 years following a single-dose or two-dose infant primary series of 10-valent or 13-valent pneumococcal conjugate vaccine each followed by a booster dose in South Africa: extended follow-up of a single-centre, open-label, non-inferiority, randomised controlled trial.** *Lancet Child Adolesc Health.* 2026 Nov;10(11):797–806.

doi: [https://doi.org/10.1016/S2352-4642\(26\)00164-1](https://doi.org/10.1016/S2352-4642(26)00164-1)

Editorial comment: This study provides important evidence supporting reduced-dose pneumococcal conjugate vaccine schedules. A 1+1 PCV13 schedule, with a single primary dose followed by a booster, maintained serotype-specific antibody responses that were non-inferior to the traditional 2+1 schedule through 5 years of age. In contrast, PCV10 1+1 did not maintain non-inferiority beyond age 3 years.

These findings support the potential use of a 1+1 PCV13 schedule in countries with mature, well-established PCV programs. Importantly, however, such dose-reduction strategies depend on maintaining high vaccination coverage, which is essential to sustain strong population-level protection and minimize the risk associated with reducing the number of doses.

09

Falcão de Oliveira E, Cerqueira-Silva T, Tedde J et al. **Zika exposure during pregnancy and the risk of hospitalisation and death due to community-acquired pneumonia in early childhood: a nationwide registry-based cohort study in Brazil.** *The Lancet Regional Health – Americas.* 2026: 64.

doi: <https://doi.org/10.1016/j.lana.2026.101649>

Editorial comment: This large population-based Brazilian study, involving more than 4.1 million children, highlights the long-term respiratory consequences of congenital Zika syndrome (CZS). Children with CZS had a fourfold increased risk of pneumonia-related hospitalization or death, with a cumulative incidence of 15.6% by 42 months of age, compared with 4.6% among unexposed children. Importantly, prenatal Zika virus exposure without CZS was not associated with increased risk, providing reassuring evidence for most exposed children. These findings underscore the importance of long-term clinical surveillance, targeted respiratory infection prevention, and appropriate immunization strategies for children affected by CZS.

10

Boer M, Klugkist I, Kroese F. **Educational background and vaccination beliefs in the Netherlands: A Bayesian Evidence Synthesis from four studies.** *Vaccine.* 2026 Sep 24;93:129132.

doi: <https://doi.org/10.1016/j.vaccine.2026.129132>

Editorial comment: This Dutch study, involving more than 23,000 participants, found that individuals with higher educational attainment consistently reported more positive attitudes toward vaccination, although differences between educational groups varied and were generally small. Importantly, vaccination attitudes remained largely stable over time following the COVID-19 pandemic, regardless of educational background. These findings highlight the need for targeted, evidence-based vaccine communication strategies, particularly among populations with lower educational attainment, while recognizing that vaccine skepticism is not exclusive to any educational group.

11

Fernández-Veiga L, Elguezabal N, Fuertes M, Geijo MV, Molina E, Mugica-Unamuno M, Ramos A, Espada Y, Melgarejo C, Vidal E, Pérez de Val B, Juste RA, Garrido JM, Sevilla IA. **Pathological, microbiological and immunological performance of three tuberculosis vaccine candidates in goats.** *Vaccine.* 2026 Sep 26;93:129196.

doi: <https://doi.org/10.1016/j.vaccine.2026.129196>

Editorial comment: This experimental study in goats demonstrates the potential of vaccination as an additional strategy for controlling animal tuberculosis, particularly where test-and-cull programs have been unsuccessful or are impractical. Three vaccine candidates—heat-inactivated *Mycobacterium bovis*, phage-inactivated *M. caprae*, and live *M. microti*—reduced disease lesion severity by 44–54% and substantially decreased bacterial burden following experimental *M. caprae* infection. Importantly, all three vaccines remained compatible with interferon- γ diagnostic testing using defined antigens. These promising findings support further vaccine development and highlight the potential contribution of animal tuberculosis vaccination to One Health strategies.

12

Amicizia D, Marchini F, Schenone I, Massaro E, Landa P, Nicosia A, Orsi A, Icardi G, Ansaldi F. **Adjuvanted Influenza Vaccines Versus Other Influenza Vaccines in Adults Aged ≥ 60 Years: A Systematic Review and Meta-Analysis of Relative Effectiveness for Preventing Influenza-Related Hospitalization.** *Vaccines*. 2026; 14(10):883.

doi: <https://doi.org/10.3390/vaccines14100883>

Editorial comment: This systematic review suggests that MF59-adjuvanted influenza vaccines provide comparable protection to high-dose influenza vaccines against hospitalization and emergency department visits among adults aged 65 years and older. Importantly, MF59-adjuvanted vaccines showed an approximately 18% lower risk of these outcomes compared with standard-dose vaccines. Although heterogeneity and methodological limitations warrant cautious interpretation, these findings support the potential advantages of enhanced influenza vaccines in protecting older adults against severe influenza-related outcomes.

13

Wang M, Yu J. **Group A Streptococcus-Attributable Mortality and Disability in Asian Adults Aged 60 Years and Older: Global Burden of Disease Study 2023 and Projections to 2050.** *Vaccines*. 2026; 14(10):880.

doi: <https://doi.org/10.3390/vaccines14100880>

Editorial comment: This comprehensive analysis of 34 Asian countries (1990–2023) highlights the growing burden of Group A Streptococcus (GAS)-attributable mortality and disability among adults aged 60 years and older. Central Asia and Southeast Asia experienced the greatest increases in mortality rates, with projections suggesting a particularly substantial rise in Central Asia by 2050, although considerable uncertainty remains. Importantly, the disease burden was overwhelmingly driven by premature mortality. These findings underscore the urgent need for strengthened surveillance, targeted prevention strategies, and accelerated development of effective GAS vaccines, particularly as Asia's population continues to age.

14

Mhanna D, Salman B, El Hakim R, Aridi L, Abou Ali W, Al Halabi B, Faour V, Harb F, Azar S, Ghadieh HE. **Therapeutic melanoma vaccines: Platforms, neoantigen strategies, and emerging combination immunotherapies.** *Ther Adv Vaccines Immunother*. 2026 Sep 9;14:25151355261488241.

doi: <https://doi.org/10.1177/25151355261488241>

Editorial comment: This review highlights the rapidly evolving field of therapeutic melanoma vaccines, particularly personalized neoantigen vaccines using mRNA, DNA, peptide-based, and dendritic cell platforms. Advances in artificial intelligence, machine learning, and tumor genomics are improving neoantigen identification and vaccine design, while combinations with immune checkpoint inhibitors offer promising opportunities to enhance antitumor immunity. Although early clinical studies demonstrate encouraging safety and immunogenicity, challenges remain regarding tumor heterogeneity, immune evasion, and manufacturing complexity. These developments position personalized cancer vaccines as a promising frontier in precision oncology, with the potential to transform future melanoma immunotherapy.

15

Okubo Y, Uda K. **Maternal COVID-19 During Pregnancy and Offspring Neurodevelopmental Disorders: A Nationwide Birth Cohort Study.** *Pediatr Infect Dis J*. 2026 Oct 7.

doi: <https://doi.org/10.1097/INF.0000000000005436>

Editorial comment: This nationwide cohort study involving more than 108,000 children found no evidence that maternal COVID-19 during pregnancy increased the risk of neurodevelopmental disorders, including autism, ADHD, and intellectual disability. These reassuring findings were consistent across multiple analyses, although longer-term follow-up remains important.

16

Marin M, Raparti L, Leung J, Oliver SE, Levin MJ. **Safety and Immunogenicity of Varicella Vaccination in Children and Adolescents Living With HIV: A Systematic Review.** *Pediatr Infect Dis J.* 2026 Oct 1;45(10):916–924.

doi: <https://doi.org/10.1097/INF.0000000000005264>

Editorial comment: This systematic review of 18 studies demonstrates that varicella vaccination is generally safe and immunogenic in children living with HIV who are not severely immunocompromised. Following two doses, 60–79% developed antibody responses, although immunity may decline faster than in HIV-negative children. Serious adverse events were reported only in severely immunosuppressed children, for whom the live vaccine remains contraindicated. These findings support varicella vaccination in appropriately selected HIV-positive children, while highlighting the need for longer-term effectiveness data.

17

Mazuba E, Kazibwe J, Chirwa J, Banda A, Kaonga O, Chitah B, Orangi S, Barasa E, Masiye F. **Supply, demand and use of economic evidence in vaccine policymaking in Africa: A scoping review.** *PLOS Glob Public Health.* 2026 Sep 24;6(9):e0007080.

doi: <https://doi.org/10.1371/journal.pgph.0007080>

Editorial comment: A scoping review of 140 studies published between 2000 and July 2025 highlights the limited but growing use of economic evaluations to guide vaccination policies in Africa. Research remains concentrated in a few countries, largely led and funded by institutions outside the continent. Limited local research capacity and insufficient integration of economic evidence into policymaking remain major challenges. Strengthening African expertise in health economics and promoting evidence-based decision-making are essential to optimizing scarce healthcare resources and improving sustainable, equitable immunization programs.

18

Huus KE; μ HEAT Study Group†; Abo H, Tan YH, Atay E, Rytter H, Keller R, Dauser S, Vu DL, Azad MB, Knight R, Ke A, Lotoski L, Langlois MA, Liu R, Tyakht AV, Youngblut N, Kang SM, Parsonnet J, Maier L, Chassaing B, Kreamsner PG, Gewirtz AT, Esen M, Ley RE, Gabor JJ, Gaile JM, Fleischmann WA, Siebner AS, Smeenk G, Flügge J, De Moraes RA, Jakob D, Prokipchuk A, Wilhelm C. **The human gut microbiome primes fever after vaccination.** *Science.* 2026 Oct 8;394(6820):eaea7733.

doi: <https://doi.org/10.1126/science.aea7733>

Editorial comment: A longitudinal study of 171 adults receiving COVID-19 mRNA vaccines identified the gut microbiome as a potential contributor to postvaccination fever. Increased abundance of flagellated Lachnospiraceae, elevated bacterial flagellin expression, and low-grade intestinal inflammation were associated with higher fever risk. Experimental findings also suggest that diet may influence these microbiome-related inflammatory responses. These findings open promising avenues for microbiome-targeted strategies to reduce vaccine reactogenicity, potentially improving vaccine acceptance and uptake, although further clinical research is needed.

19

Verheyden JGL, Mudogo CN. **Sixteen Days Undetected: Growth Dynamics and the Case for Pre-Positioned Response Capacity in the 2026 Bundibugyo Virus Disease Outbreak, Democratic Republic of the Congo.** *Int J Infect Dis.* 2026 Oct 8:109170.

doi: <https://doi.org/10.1016/j.ijid.2026.109170>

Editorial comment: An analysis of the 2026 Bundibugyo virus disease outbreak in the Democratic Republic of the Congo, the largest recorded to date, revealed exceptionally rapid transmission, with cases doubling every 5.5 days—approximately three times faster than in previous outbreaks. Transmission was estimated to have begun on April 19, nearly four weeks before laboratory confirmation. The reported case-fatality ratio increased from 12.1% to 44.3%, likely reflecting changes in case classification rather than increased viral virulence. These findings underscore the urgent need for earlier detection, particularly of unexplained deaths and infections among healthcare workers, alongside strengthened surveillance, rapid diagnostics, and pre-positioned outbreak response capacity to prevent uncontrolled transmission.

20

Ostrowsky JT, Gellin BG, Cavaleri M, Bresee JS, Venkayya R, Cox RJ, Schultz-Cherry S, Hollingsworth R, Subbarao K, Cohen C, Settembre EC, Belongia E, McCauley JW, Rappuoli R, Cowling BJ, Taaffe J, Vestin NC, Mehr AJ, Ulrich AK, Osterholm MT, Moore KA. **Innovation, development, and licensure of improved influenza vaccines: the way forward.** *Vaccine*. 2026 Oct 24;92:129135.

doi: <https://doi.org/10.1016/j.vaccine.2026.129135>

Editorial comment: The Influenza Vaccines R&D Roadmap (IVR) Initiative highlights the urgent need for more effective, longer-lasting, and rapidly producible vaccines against seasonal and pandemic influenza. Despite progress, significant gaps remain in vaccine efficacy, durability, transmission prevention, and manufacturing capacity. Without accelerated innovation, the world risks confronting the next influenza pandemic with outdated vaccine technologies. Sustained investment, scientific collaboration, and advances in vaccine platforms are essential to strengthening global influenza preparedness.

21

Madhusoodanan J. **Vaccine data suggest immunity could mitigate dementia. What's the biology behind these apparent effects?** *Proc Natl Acad Sci U S A*. 2026 Oct 13;123(41):e2633554123.

doi: <https://doi.org/10.1073/pnas.2633554123>

Editorial comment: Emerging evidence suggests a potentially important relationship between infections, immune responses, and the development of dementia, including Alzheimer's disease. Although a causal association has not been established, and the possible protective effects of shingles vaccination against dementia remain under investigation, these findings are reshaping our understanding of neurodegenerative diseases. Moving beyond a brain-centered perspective, researchers are increasingly exploring how systemic inflammation, infections, and immune mechanisms may influence long-term brain health. This evolving field highlights the broader implications of infectious diseases and vaccination, opening new avenues for research into the role of immunization in healthy aging and the prevention of chronic diseases.

22

Ooi, Y.S., Cattrall, J., Brady, O. *et al.* **Dengue virus infection.** *Nat Rev Dis Primers*. 2026 Oct; 12: 68.

doi: <https://doi.org/10.1038/s41572-026-00744-4>

Editorial comment: Dengue remains a major and expanding global public health threat, affecting approximately 100 million people annually. Climate change, urbanization, and increased international travel are accelerating its geographical spread. With no licensed specific antiviral treatment, clinical management relies on supportive care and careful fluid management. Although dengue vaccines are available in several countries, their implementation remains challenging due to the complex immunopathogenesis of the disease. Optimizing the use of existing vaccines, strengthening surveillance, and integrating vaccination into comprehensive prevention strategies are essential to reducing dengue transmission, severe disease, and its growing global burden.



Editors' Corner

VACCINATING ANIMALS, PROTECTING HUMANITY AND THE PLANET: A ONE HEALTH IMPERATIVE



Introduction

Vaccination is usually discussed through the lens of human health. Yet some of the most consequential opportunities for immunization occur before a pathogen ever reaches a human being. Humans, animals, and the environment are part of interconnected biological systems in which infectious agents—and antimicrobial-resistant organisms—can move across species, ecosystems, and geographic boundaries.

Animal vaccination should therefore not be viewed simply as a component of veterinary medicine. It is an essential tool for One Health, global health security, food security, antimicrobial stewardship, and environmental sustainability.

This perspective has become increasingly important as animal diseases expand into previously unaffected geographic areas and species. Preventing infection in animals can protect not only animal health and welfare, but also human populations, food systems, economies, and the environment.

Animal vaccination is also human protection

The concept is straightforward: preventing infection in animals can interrupt transmission before pathogens reach humans.

Rabies provides perhaps the clearest example. Vaccinating dogs addresses infection at its principal reservoir and reduces the risk of human exposure, rather than relying exclusively on post-exposure interventions after transmission has already occurred. This approach demonstrates an important principle of One Health: sometimes the most effective way to prevent a human infectious disease is to control it in the animal population responsible for maintaining transmission.

But the principle extends far beyond rabies. Vaccination has an important role in controlling diseases affecting livestock, poultry, aquaculture, companion animals, and wildlife. Vaccination strategies have been used or investigated against infections such as brucellosis, avian influenza, anthrax, Rift Valley fever, *Escherichia coli* O157, Hendra virus, and other zoonotic diseases.

Wildlife vaccination further expands this concept. Oral vaccination campaigns against rabies, for example, have demonstrated that

immunization can target reservoirs beyond traditional domestic animal populations.

By reducing infection and transmission in animals, vaccination can indirectly protect farmers, veterinarians, food-industry workers, communities, consumers, and ultimately entire populations.

This changes the way we should think about vaccines. The benefits of a veterinary vaccine do not necessarily end with the vaccinated animal. They can extend across species and ultimately contribute to human health.

Vaccines as a weapon against antimicrobial resistance

The relationship between animal vaccination and antimicrobial resistance (AMR) deserves considerably greater attention.

The mechanism is remarkably logical:

Vaccination prevents infections → fewer infections require treatment → antimicrobial consumption decreases → selective pressure for antimicrobial resistance can be reduced.

Vaccines and other preventive interventions can minimize the need for antibiotics by preventing and controlling infectious diseases in animal populations. This makes vaccination an important component of strategies designed to preserve antimicrobial effectiveness.

This matters because antimicrobial resistance does not recognize species boundaries. Resistant microorganisms and resistance determinants can circulate among humans, animals, food systems, water, soil, wastewater, and the wider environment. AMR is therefore fundamentally a **One Health problem**.

Importantly, vaccines should not be presented as substitutes for antimicrobials when treatment is medically necessary. Rather, they offer something potentially more powerful from a preventive perspective: the opportunity to prevent the infection that would have required antimicrobial treatment in the first place.

For this reason, reducing antimicrobial consumption should not depend exclusively on restricting antimicrobial prescribing. We should simultaneously invest in vaccines, surveillance,

biosecurity, appropriate husbandry, diagnostics, and other interventions that decrease the incidence of infections requiring treatment.

Veterinary vaccines should therefore increasingly be considered part of the global strategy against AMR—not an intervention separate from it.

Protecting food systems and livelihoods

Healthy animals are fundamental to healthy societies.

Infectious diseases affecting livestock and aquaculture can decrease productivity, threaten food availability, disrupt international trade, produce major economic losses, and jeopardize the livelihoods of farmers and producers.

Preventing disease through vaccination can reduce mortality and production losses while improving animal welfare and strengthening the resilience of food systems.

Norway: a remarkable salmon vaccination success story

Norwegian salmon farming provides one of the most compelling real-world examples of the relationship between vaccination, food production, and antimicrobial stewardship.

During the rapid development of Norwegian aquaculture in the 1980s, bacterial diseases resulted in extensive antibiotic use. The subsequent introduction and widespread implementation of effective vaccines, particularly against important bacterial diseases, fundamentally changed disease management. Vaccination was accompanied by improvements in biosecurity, husbandry, surveillance, and other preventive measures.

The transformation was remarkable. Midtlyng and colleagues documented the dramatic decline in antibacterial use accompanying the adoption of vaccination and other preventive measures in Norwegian aquaculture. Subsequent Norwegian surveillance confirmed that the most common bacterial diseases became largely controlled through vaccination, with only 212 kg of antibacterials sold for Norwegian aquaculture in 2016.

The experience becomes even more striking when viewed over several decades. The Norwegian salmon industry was able to expand enormously

while antimicrobial dependence declined rather than increased. Modern reviews of aquaculture and AMR now specifically identify the vaccination of farmed salmon in Norway as an important case study demonstrating how disease prevention can reduce reliance on antibiotics.

The Norwegian experience demonstrates a powerful principle:

Increasing food production does not necessarily require increasing antimicrobial consumption.

When effective vaccination is combined with surveillance, biosecurity, appropriate husbandry, and responsible animal-health management, production can expand while dependence on antibiotics falls dramatically.

This is particularly relevant to the global AMR discussion. Rather than focusing exclusively on restricting antimicrobial use, we should simultaneously invest in interventions that reduce the need to use antimicrobials in the first place.

Animal vaccination therefore represents not only an infectious-disease intervention but also an important strategy for food security, sustainable agriculture and aquaculture, economic development, animal welfare, and antimicrobial stewardship.

Vaccinating animals can also protect the environment

The environmental dimension of vaccination is sometimes overlooked.

Antimicrobials administered to animals and antimicrobial-resistant organisms can enter the wider environment through animal waste, wastewater, agricultural runoff, and food-production systems. Reducing preventable infections can consequently reduce the need for antimicrobial treatment and potentially diminish one pathway through which antimicrobial selection pressure enters ecosystems.

The environmental argument extends beyond AMR. Animal disease outbreaks can cause substantial losses of livestock and food, require large-scale control measures, disrupt ecosystems, and place additional demands on land, water, feed, energy, and other natural resources. Disease prevention can therefore contribute to more efficient and resilient animal-production systems.

Climate change adds another dimension. Changing temperatures, rainfall patterns, vector distributions, wildlife migration, land use, and human–animal interactions can alter the geographic distribution and transmission dynamics of infectious diseases. Diseases previously restricted to particular ecosystems may emerge in new animal populations and potentially create new opportunities for zoonotic transmission.

Vaccination alone, however, is not sufficient. It must be integrated with responsible husbandry, biosecurity, disease surveillance, appropriate antimicrobial stewardship, environmental protection, and sustainable agricultural practices.

This is precisely why the One Health framework is so important: human health, animal health, and environmental health cannot be effectively protected when they are treated as independent domains.

Conclusions: From Veterinary Vaccines To Planetary Health

The value of animal vaccination extends far beyond protecting individual animals. By preventing infections, vaccines can reduce zoonotic transmission, decrease antimicrobial use and the selective pressure driving AMR, protect food production and livelihoods, and contribute to

more sustainable use of environmental resources. The Norwegian salmon experience provides a powerful example of how vaccination, combined with surveillance, biosecurity, and good husbandry, can support expanding food production while dramatically reducing dependence on antibiotics.

These benefits are interconnected. An infection prevented in an animal may mean an antimicrobial treatment avoided, a zoonotic transmission interrupted, food production preserved, and economic losses prevented. Veterinary vaccination should therefore be increasingly incorporated into One Health strategies addressing pandemic preparedness, AMR, food security, and environmental sustainability.

Vaccination cannot accomplish this alone. Its greatest impact comes when integrated with surveillance, biosecurity, responsible antimicrobial use, good animal husbandry, and environmental protection.

Ultimately, animal vaccination is not simply a veterinary intervention—it is an investment in human health, animal health, food security, antimicrobial preservation, and planetary health.

Vaccinating animals does not only protect animals. It protects humans, preserves our antimicrobial arsenal, strengthens our food systems, and helps protect the planet we all share.

REFERENCES

1. Monath TP, Kahn LH, Kaplan B. Introduction: One Health perspective. *ILAR J*. 2010;51(3):193–198. doi:10.1093/ilar.51.3.193.
2. Monath TP. Vaccines against diseases transmitted from animals to humans: a One Health paradigm. *Vaccine*. 2013;31(46):5321–5338. doi:10.1016/j.vaccine.2013.09.029.
3. World Organisation for Animal Health (WOAH). The State of the World's Animal Health 2025. Paris: WOAH; 2025. <https://www.woah.org/app/uploads/2025/05/the-state-of-the-worlds-animal-health-2025.pdf>
4. World Organisation for Animal Health (WOAH). Antimicrobial Resistance: A One Health Response to AMR. Paris: WOAH. <https://www.woah.org/en/what-we-do/global-initiatives/antimicrobial-resistance/>.
5. World Organisation for Animal Health (WOAH). Ninth Annual Report on Antimicrobial Agents Intended for Use in Animals. Paris: WOAH; 2025. <https://www.woah.org/app/uploads/2025/05/en-woah-amu-report-2025.pdf>
6. World Health Organization. Estimating the Impact of Vaccines in Reducing Antimicrobial Resistance and Antibiotic Use: Technical Report. Geneva: WHO; 2024. ISBN 978-92-4-009878-7. <https://www.who.int/publications/i/item/9789240098787>.
7. Food and Agriculture Organization of the United Nations, United Nations Environment Programme, World Health Organization, World Organisation for Animal Health. One Health Joint Plan of Action (2022–2026): Working Together for the Health of Humans, Animals, Plants and the Environment. 2022. doi:10.20506/9789295121430.
8. Hoelzer K, Bielke L, Blake DP, et al. Vaccines as alternatives to antibiotics for food producing animals. Part 1: challenges and needs. *Vet Res*. 2018;49:64. doi:10.1186/s13567-018-0560-8.
9. Hoelzer K, Bielke L, Blake DP, et al. Vaccines as alternatives to antibiotics for food producing animals. Part 2: new approaches and potential solutions. *Vet Res*. 2018;49:70. doi:10.1186/s13567-018-0561-7.
10. Roth JA. Veterinary vaccines and their importance to animal health and public health. *Procedia Vaccinol*. 2011;5:127–136. doi:10.1016/j.provac.2011.10.009.
11. Swayne DE. Impact of vaccines and vaccination on global control of avian influenza. *Avian Dis*. 2012;56(4 Suppl):818–828. doi:10.1637/10183-041012-Review.1.
12. OECD. Embracing a One Health Framework to Fight Antimicrobial Resistance. OECD Health Policy Studies. Paris: OECD Publishing; 2023. doi:10.1787/ce44c755-en.
13. Midtlyng PJ, Grave K, Horsberg TE. What has been done to minimize the use of antibacterial and antiparasitic drugs in Norwegian aquaculture? *Aquac Res*. 2011;42(Suppl 1):28–34. doi:10.1111/j.1365-2109.2010.02726.x.
14. Lillehaug A, Børnes C, Grave K. A pharmaco-epidemiological study of antibacterial treatments and bacterial diseases in Norwegian aquaculture from 2011 to 2016. *Dis Aquat Organ*. 2018;128(2):117–125. doi:10.3354/dao03219.
15. Barnes AC, Rudenko O, Landos M, et al. Autogenous vaccination in aquaculture: a locally enabled solution towards reduction of the global antimicrobial resistance problem. *Rev Aquac*. 2022;14:907–918. doi:10.1111/raq.12633.
16. Bondad-Reantaso MG, MacKinnon B, Karunasagar I, et al. Review of alternatives to antibiotic use in aquaculture. *Rev Aquac*. 2023;15:1421–1451. doi:10.1111/raq.12786.

Best Practice

CATCH-UP VACCINATION: WHAT TO DO WHEN THE SCHEDULE IS INTERRUPTED



Introduction

Timely vaccination provides protection at the ages when individuals are most vulnerable to vaccine-preventable diseases. In clinical practice, however, vaccination schedules are frequently interrupted by illness, missed appointments, vaccine shortages, migration, conflict, limited healthcare access, hesitancy, or disruptions to immunization programs.

Catch-up vaccination is therefore not an exceptional activity; it is an essential component of routine immunization. WHO defines catch-up vaccination as vaccinating individuals who, for any reason, have missed vaccines for which they are eligible according to the national immunization schedule. The objective is straightforward: identify the missing doses and provide them at the earliest appropriate opportunity.

The Fundamental Rule: Do Not Start Over

One of the most important principles of catch-up vaccination is also one of the simplest:

A vaccination series that has been interrupted generally does not need to be restarted, regardless of the time that has elapsed.

Instead, the series should usually be resumed from where it stopped, respecting vaccine-specific minimum ages, minimum intervals, age limitations, and national recommendations.

Longer-than-recommended intervals between doses generally do not reduce the final immune response once the complete series has been administered. The principal disadvantage of the delay is that the individual remains incompletely protected for longer. There are vaccine-specific exceptions, so current national guidance should always be consulted.

Start With The Vaccination History

Before constructing a catch-up schedule, clinicians should establish which vaccines and doses have already been administered.

Whenever possible, review:

- official immunization records;
- electronic immunization registries;

- previous medical records;
- school vaccination records;
- vaccination cards or other reliable documentation.

When documentation is unavailable or uncertain, the approach should follow national recommendations. Clinicians should avoid delaying vaccination indefinitely while searching for records that may never become available.

The goal is not simply to determine what the patient received in the past, but to establish what protection the patient still needs today.

Use The Patient's Current Age

Catch-up schedules are determined not only by the doses previously received but also by the individual's **current age**.

This is important because the number of required doses, minimum intervals, indications, and upper age limits can change as a person becomes older. A child presenting late may therefore not necessarily receive the same schedule that would have been administered had vaccination begun during infancy.

WHO specifically provides recommendations for individuals who begin vaccination late as well as those whose primary series has been interrupted.

Respect Minimum Ages And Minimum Intervals

Routine schedules are designed around preferred ages and intervals. Catch-up schedules may use **minimum intervals** to achieve protection more rapidly.

However, doses should generally not be administered before the established minimum age or at intervals shorter than the established minimum interval. Doses administered substantially too early may produce an inadequate immune response and, depending on the vaccine and applicable recommendations, may need to be repeated.

Therefore, every catch-up plan should answer four basic questions:

What doses have already been given? →
What doses are missing? → What is the

minimum acceptable interval? → When can the next valid dose be administered?

Give Multiple Vaccines During The Same Visit When Appropriate

A catch-up visit represents an important opportunity to close several immunity gaps simultaneously.

Most routinely recommended vaccines can be administered during the same visit when indicated, using separate anatomical sites and appropriate administration techniques. Simultaneous vaccination reduces missed opportunities, accelerates protection, and decreases the number of additional visits required.

Particular attention is required when administering multiple live vaccines. Injectable or intranasal live vaccines that are not administered on the same day generally require appropriate spacing; CDC guidance specifies a minimum interval of **28 days** between two such live vaccines when they are not administered simultaneously.

Do Not Create Unnecessary Contraindications

Catch-up vaccination is frequently delayed because conditions are incorrectly perceived as contraindications.

Minor illnesses and many other common clinical situations do not automatically justify postponing vaccination. True contraindications and precautions are vaccine-specific and should be assessed according to current guidance.

Every unnecessary postponement extends the period during which an incompletely vaccinated individual remains susceptible to infection.

Prioritize When Everything Cannot Be Given At Once

Some individuals may be missing many vaccines. When all required vaccines cannot reasonably be administered during a single encounter, prioritization becomes important.

Clinical decisions should consider:

- current age;
- number of missing doses;
- immediate risk of exposure;

- local epidemiology and ongoing outbreaks;
- underlying medical conditions;
- pregnancy or immunocompromising conditions when applicable;
- upcoming travel;
- school or occupational exposure;
- likelihood that the individual will return for subsequent visits.

During an outbreak, the epidemiologic context may substantially change vaccination priorities.

Special Attention To Migrants And People Vaccinated In Different Countries

Increasing international mobility means clinicians frequently encounter patients vaccinated according to schedules different from those used in their current country of residence.

A different schedule does not necessarily mean an inadequate schedule.

Clinicians should evaluate documented previous doses according to the vaccine product or antigen administered, age at vaccination, interval between doses, and compatibility with current national recommendations. Valid previous vaccination should generally be recognized rather than automatically repeated.

Catch-up vaccination is particularly important for migrants, refugees, displaced populations, and individuals whose access to routine health services has been interrupted.

Every Healthcare Encounter Is An Opportunity

Catch-up vaccination should not be restricted to dedicated immunization visits.

Primary-care appointments, hospital discharge, specialist consultations, adolescent health visits, school health programs, travel consultations, and other healthcare encounters can provide opportunities to review vaccination status.

This represents a broader change in perspective:

Instead of asking only, “Why is this patient here today?” healthcare professionals should also ask, “Is this patient fully vaccinated for their age and risk?”

WHO considers continuous catch-up vaccination an essential component of a well-functioning national immunization program rather than simply an emergency response following disruptions.

Document Today—And Plan The Next Dose

Catch-up vaccination does not end when the first missing vaccine is administered.

Every visit should conclude with clear documentation of the vaccines administered and, when additional doses are required, a specific plan for completing the schedule. Reminder and recall systems, electronic immunization registries, scheduled follow-up appointments, and communication with patients or caregivers can substantially reduce future missed opportunities.

The objective is not merely to provide a

vaccine. It is to restore the individual to complete and sustained protection according to the appropriate immunization schedule.

Conclusion:

Interrupted vaccination schedules are common, but they should not become permanently incomplete schedules. In most circumstances, there is no need to restart a vaccine series simply because time has elapsed. Instead, healthcare professionals should identify valid previous doses, determine what remains necessary, respect minimum ages and intervals, use every appropriate healthcare encounter, and complete vaccination as efficiently as possible.

Catch-up vaccination is ultimately about recovering missed opportunities. Every missed dose identified is an opportunity to restore protection—not only for the individual, but also for the community.



REFERENCES

1. World Health Organization. Leave No One Behind: Guidance for Planning and Implementing Catch-up Vaccination. Geneva: WHO; 2021. ISBN 978-92-4-001651-4. <https://www.who.int/publications/i/item/9789240016514>.
2. World Health Organization. Table 3: Recommendations for Interrupted or Delayed Routine Immunization—Summary of WHO Position Papers. Geneva: WHO; updated December 2025. <https://www.who.int/publications/m/item/table-3-recommendations-for-interrupted-or-delayed-routine-immunization-summary-of-who-position-papers>.
3. World Health Organization. Table 1: Summary of WHO Position Papers—Recommendations for Routine Immunization. Geneva: WHO; updated December 2025. <https://www.who.int/publications/m/item/table1-summary-of-who-position-papers-recommendations-for-routine-immunization>.
4. World Health Organization. Table 2: Summary of WHO Position Papers—Recommended Routine Immunizations for Children. Geneva: WHO; updated December 2025. <https://www.who.int/publications/m/item/table-2-summary-of-who-position-papers-recommended-routine-immunizations-for-children>.
5. World Health Organization. Catch-up Vaccination. Essential Programme on Immunization. Geneva: WHO. <https://www.who.int/teams/immunization-vaccines-and-biologicals/essential-programme-on-immunization/implementation/catch-up-vaccination>.
6. World Health Organization Regional Office for Europe. Operational Considerations for Planning and Implementing Catch-up Vaccination in the WHO European Region. Copenhagen: WHO Regional Office for Europe; 2022. WHO/EURO:2022-4751-44514-63005.
7. Centers for Disease Control and Prevention. General Best Practices for Immunization: Timing and Spacing of Immunobiologics. Atlanta, GA: CDC; 2024. <https://www.cdc.gov/vaccines/hcp/imz-best-practices/index.html>.
8. Issa AN, Wodi AP, Moser CA, Cineas S. Advisory Committee on Immunization Practices Recommended Immunization Schedule for Children and Adolescents Aged 18 Years or Younger – United States, 2025. MMWR Morb Mortal Wkly Rep. 2025 Jan 16;74(2):26-29. doi: 10.15585/mmwr.mm7402a2.
9. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. 14th ed. Washington, DC: Public Health Foundation; 2021. Chapter 2: General Best Practice Guidance for Immunization. <https://stacks.cdc.gov/view/cdc/252997>.
10. World Health Organization. Immunization Agenda 2030: A Global Strategy to Leave No One Behind. Geneva: WHO; 2020. <https://www.who.int/publications/m/item/immunization-agenda-2030-a-global-strategy-to-leave-no-one-behind>.
11. World Health Organization, UNICEF. The Big Catch-Up: An Essential Immunization Recovery Plan for 2023 and Beyond. Geneva/New York: WHO and UNICEF; 2023. <https://www.who.int/publications/i/item/9789240075511>.
12. World Health Organization. Monitoring and Reporting of Essential Immunization Catch-up: Implementation Guidance. Geneva: WHO; 2025. <https://www.who.int/publications/i/item/9789240098572>.

Guest Contributors

AFRICA'S VACCINE FUTURE: POPULATION GROWTH, INFECTIOUS DISEASE BURDEN AND THE CLINICAL TRIAL GAP

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Africa's population is increasing rapidly. By 2026, the continent is estimated to have about 1.6 billion people, almost one-fifth of the world's population. According to the United Nations' medium variant forecasts, Africa's population should reach 2.5 billion by 2050 and 3.8 billion by 2100; at the end of the century the continent may contain nearly four out of every ten people on the globe. Although these are projections and not certainties, their scale is impressive[1].

These figures are usually discussed in demographic terms. Still, for those of us interested in infectious diseases and vaccines, they raise a larger question: will Africa's scientific, economic, and health infrastructure grow fast enough to meet this population's needs? The economic picture makes that question particularly important.

In 2024, Africa's 54 countries produced a nominal economic output of about US\$3 trillion. To put this in context, France alone had a GDP of around US\$3.16 trillion that year, even though its population was about 69 million, less than 5% of that of Africa[2]. GDP is not equivalent to wealth, public spending capacity, or living standards; moreover, nominal comparisons are affected by exchange rates and do not account for differences in purchasing power or the role of the informal economy. Yet the difference in per-capita economic output is hard to overlook.

According to World Bank data, South Africa, Egypt, Algeria, Nigeria and Morocco together

generated approximately US\$1.47 trillion in nominal GDP in 2024[2], representing close to half of Africa's aggregate output. This disparity is particularly concerning given Africa's rapidly growing population, which places increasing demands on health systems that already operate with relatively limited resources.

A growing population and a heavy infectious disease burden

Africa bears a disproportionate burden of several major infectious diseases. In 2024, the WHO African Region accounted for about 94% of all global malaria cases and 95% of malaria deaths[3]. HIV and tuberculosis also remain major problems on the continent, together with repeated outbreaks of cholera, meningitis, Ebola, mpox and other infections that are either emerging or re-emerging.

This is the context in which Africa's population is growing. Over the coming decades, hundreds of millions more people will require access to vaccines, diagnostics, medicines, laboratories, hospitals and trained healthcare workers. A growing population can be an enormous economic and social asset, but without corresponding investment in health systems, research and infrastructure, it can also magnify existing vulnerabilities.

Vaccines sit at the center of this challenge. Vaccination is among the most successful public health interventions ever developed. Smallpox

has been eradicated, and wild poliovirus transmission has been reduced dramatically, although it remains endemic in Afghanistan and Pakistan, and outbreaks of circulating vaccine-derived poliovirus continue[4]. Many diseases that once routinely killed or disabled children can now be prevented. Yet vaccines are expensive and technically demanding to develop. Researchers may spend years understanding a pathogen, identifying antigens, selecting a vaccine platform, conducting preclinical studies, and establishing manufacturing processes before proceeding to clinical trials involving thousands or tens of thousands of participants.

Here Africa faces a difficult paradox. Some of the populations with the greatest need for new vaccines also have the least purchasing power to drive their commercial development. From a public health perspective, developing a vaccine against a disease affecting millions of people may be an obvious priority. From the perspective of a pharmaceutical company deciding where to invest substantial research and development resources, the calculation can be very different.

The fact that there is a heavy disease burden does not mean that a commercially viable market will result. That is why grants, pooled procurement, tiered pricing, advance market commitments, priority review vouchers, and other market-shaping mechanisms have become important tools in global health; they help bridge the gap between public health need and the financial risk of developing and supplying vaccines.

The clinical trial gap

The same imbalance becomes apparent in clinical trials. Africa accounts for close to a fifth of the global population, yet published estimates suggest that fewer than 3% of all clinical trials worldwide have been conducted on the continent[5]. A separate, vaccine-specific landscape analysis published in 2025 found that only 8% of global vaccine clinical trials assessed for 2007–2024 included a site in Africa[6]. These estimates use different datasets and denominators, so they should not be treated as interchangeable. Both, however, point to limited African participation in global clinical research relative to population size and disease burden.

Vaccine trials conducted in Africa are also unevenly distributed. A 2025 scoping review

identified 662 vaccine trials and reported the highest country counts in South Africa (220), Kenya (88), Uganda (52), Mali (44), Tanzania (41), and Burkina Faso (41)[7].

Part of the explanation is straightforward: clinical research tends to go where clinical research infrastructure already exists. Sponsors need experienced investigators, research nurses, laboratories, pharmacists, statisticians, data managers, ethics committees, regulators, cold-chain systems, and reliable mechanisms for recruiting and following participants. Countries that possess more of this infrastructure are often better positioned to attract new studies[5].

This process can become self-reinforcing: a center that conducts trials gains experience, trains researchers, and attracts additional investment, which in turn makes it more competitive for the next study. Countries without that initial capacity will end up with fewer trials and therefore fewer opportunities to develop the expertise and infrastructure sponsors require.

Funding is also a significant consideration. A 2025 analysis using G-FINDER data on vaccine R&D funding for diseases disproportionately affecting low- and middle-income countries found that Africa received less than 2% of the funding recorded between 2007 and 2023. The study also found that 95% of the funding was channeled through high-income countries, underscoring the concentration of financial flows and research funding structures outside Africa[6]. Although international partnerships have led to important scientific advances and have helped to set up strong research institutions in Africa, the way in which funding is arranged can also influence the kinds of questions that are supported and the locations where strategic decisions are made.

Therefore, simply increasing the number of clinical trials in Africa is only part of the problem. A trial carried out in Kilifi, Johannesburg, Kampala, or Accra does not mean the vaccine candidate was developed or originated there; African researchers might lead key elements such as recruitment, sampling, and analysis, while decisions on product strategy or intellectual property are made elsewhere. The long-term aim should be greater African involvement not just in carrying out the trials but also in shaping and leading the science that comes before and after them[6].

Why African populations matter to vaccine science

There is also a strong scientific basis for conducting more vaccine research in Africa, since the African population as a whole has greater human genetic diversity than any other part of the world, a result of both its deep evolutionary history and its considerable population structure[8]. Examining vaccine responses within this genetic diversity could show immunological variations that research focusing on a narrower range of populations would fail to detect.

Genetics is only one component of that variation. Previous infections, maternal antibodies, nutritional status, microbiota, environmental exposures, and coexisting illnesses can also influence vaccine responses, while pathogens themselves may differ between regions. The importance of any one factor varies with the vaccine and setting, and the mechanisms underlying geographic differences are not always established. Understanding these interactions can improve vaccine development and how we interpret vaccine performance[9].

A 2024 study of 2,499 infants from Uganda, Burkina Faso and South Africa found associations between variation in the HLA region and antibody responses to five of eight vaccine antigens tested[10]. This demonstrates the value of including populations historically underrepresented in genomic and immunological research, although differences in antibody titers do not necessarily translate directly into differences in clinical protection.

Rotavirus provides a particularly clear example of why context matters. In a randomized trial that enrolled 4,939 infants in Malawi and South Africa, vaccine efficacy against severe rotavirus gastroenteritis was 61.2% overall, but differed between the two countries: 76.9% in South Africa and 49.4% in Malawi[11].

The lower percentage efficacy in Malawi did not translate into lower public health value. Because severe rotavirus disease was more common there, vaccination prevented an estimated 6.7 episodes of severe rotavirus gastroenteritis per 100 vaccinated infants per year in Malawi, compared with 4.2 in South Africa[11]. The example illustrates why relative efficacy must be interpreted alongside the underlying burden of

disease; the trial itself did not establish a single cause for the difference between countries.

Oral poliovirus vaccine offers another example. Researchers have recognized reduced immunogenicity in some low-income settings for decades. A systematic review found that concurrent nonpolio enterovirus infection was associated with reduced per-dose seroconversion to poliovirus type 1, while corresponding estimates for types 2 and 3 were less conclusive. Concurrent diarrhea was also associated with lower overall seroconversion[12]. These findings reinforce the importance of evaluating vaccines in the biological and epidemiological settings in which they will be used.

COVID-19 provided a more recent illustration. South Africa participated in several major vaccine trials. When the SARS-CoV-2 Beta variant emerged, a South African trial of the ChAdOx1 nCoV-19 vaccine found no demonstrated protection against mild to moderate disease caused by that variant. The efficacy estimate against Beta-associated illness was 10.4%, with a wide 95% confidence interval from -76.8% to 54.8%; the study could not establish efficacy against severe disease[13]. The result was globally relevant because it provided early evidence that viral evolution could substantially affect measured vaccine performance.

Clinical research conducted in Africa can therefore answer questions of global importance. Broader participation is not simply about increasing diversity within clinical trials. It expands the biological and epidemiological settings in which vaccines are evaluated and can reveal information that might otherwise be missed.

From vaccine access to vaccine development

There are indications that the situation regarding vaccines in Africa is starting to change. The COVID-19 pandemic revealed the weaknesses of a global vaccine system in which production was concentrated outside the continent; when demand increased, many African countries struggled to obtain supplies on time, which in turn sped up initiatives to expand local manufacturing capacity.

African contributions to vaccine innovation are not new. South African-born scientist Max Theiler developed the yellow fever 17D vaccine in 1937

while working in the United States, earning the 1951 Nobel Prize in Physiology or Medicine[14]. More recently, South Africa's Biovac has advanced local vaccine manufacturing through technology transfer from the International Vaccine Institute, with its investigational oral cholera vaccine entering clinical trials in 2025[15]. Another notable example is Kenyan vaccinologist Professor George Warimwe, who led the development of ChAdOx1 RVE, a vaccine candidate against Rift Valley fever designed to protect humans and livestock. After successful preclinical studies and a Phase I human trial, the vaccine entered Phase II clinical evaluation in Kenya in 2025[16], [17]. Together, these examples demonstrate Africa's scientific contributions and growing vaccine development capabilities, while highlighting the need for sustained investment in African-led vaccine discovery, clinical research, technology ownership and manufacturing.

The African Union and the Africa CDC aim to meet at least 60% of the continent's routine immunization vaccine needs through local production by 2040[18]. The African Vaccine Manufacturing Accelerator, which was launched in June 2024 and backed by Gavi, is expected to make US\$1.2 billion available over a ten-year period to help establish commercially sustainable vaccine manufacturing in Africa[19]. Another way of developing technological capability is through the mRNA Technology Transfer Program supported by the WHO. This program's hub in South Africa involves Afrigen, Biovac and the South African Medical Research Council, and it offers technology transfer and training for manufacturing partners in Africa and in other regions[20].

Although these initiatives are important, manufacturing capacity represents only one element of the vaccine development process. A vaccine can be filled and finished in Africa even though its antigen, the platform technology, the intellectual property, and the development strategy come from elsewhere. This helps to improve supply security, but on its own it does not establish a full vaccine research and development ecosystem. Just as the Africa CDC's assessment of manufacturing capacity has pointed out the difference between the continent's increasing ability to carry out fill-and-finish operations and its more limited capacity for local antigen production[21].

Building such an ecosystem requires connections between pathogen surveillance, basic science,

antigen discovery, immunology, preclinical development, clinical trials, regulatory science, manufacturing, and pharmacovigilance. It also requires markets that can sustain the products that emerge from these activities.

What would progress actually look like?

The real measure of progress will therefore not be the number of new trial sites or vaccine factories alone. It will be whether African institutions can increasingly move vaccine candidates through the full development pathway, from identifying a pathogen and designing a candidate to preclinical evaluation, clinical trials, regulatory review, manufacturing and deployment. Different pieces of this pathway already exist across the continent, but analyses of vaccine R&D, trial activity, regulation, and manufacturing show that capabilities remain unevenly distributed[6].

It doesn't mean that each country has to go through the whole process of developing a vaccine. A more practical approach is to build a linked continental ecosystem in which countries develop different areas of strength. For example, one country might have outstanding capacity in early-phase trials, another might have a large number of people involved in Phase III trials, a third could have advanced genomic surveillance or regulatory expertise, and others might have the ability to manufacture. The key issue then is whether these different strengths can function as part of a connected system.

It is the responsibility of African governments to make this a reality. Universities, laboratories and research institutes need continuous investment, and scientists must have secure long-term careers. Moreover, clinical research centers also require support which goes beyond that provided by individual grants. Better coordination of procurement, regulatory procedures, and purchasing commitments could create a more predictable market for vaccines manufactured on the continent.

The international financing mechanisms needed to support this transition are not new. Global health funders already use grants, pooled procurement, advance market commitments, and other approaches to reduce the financial risks associated with products that have high public health value but uncertain commercial returns. The more important question is whether these mechanisms

can increasingly build durable capacity, stronger African research institutions, functioning clinical trial networks, manufacturing expertise, and greater ownership of vaccine technologies.

International partnerships will remain important, but their nature matters. Progress should increasingly involve African investigators leading multi-country studies, African laboratories conducting advanced analyses, African regulators evaluating complex products, and African companies participating in the ownership and development of vaccine technologies.

African institutions should be involved when researchers formulate research questions, not only when they need to recruit participants.

The ultimate test is whether a vaccine can originate in an African laboratory, move through African clinical trial networks, undergo rigorous regulatory review, be manufactured at scale on the continent, and reach the populations that need it. When that pathway becomes routine rather than exceptional, Africa will no longer be defined mainly by its participation in vaccine research. It will help shape the global vaccine landscape.



References

1. "World Population Prospects 2024 | Population Division." Accessed: Oct. 08, 2026. [Online]. Available: <https://www.un.org/development/desa/pd/world-population-prospects-2024>
2. "World Development Indicators | DataBank." Accessed: Oct. 08, 2026. [Online]. Available: <https://databank.worldbank.org/id/c4511412>
3. "World malaria report 2025." Accessed: Oct. 08, 2026. [Online]. Available: <https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2025>
4. "Statement of the Forty-fifth Meeting of the Polio IHR Emergency Committee." Accessed: Oct. 08, 2026. [Online]. Available: <https://www.who.int/news/item/25-08-2026-statement-of-the-forty-fifth-meeting-of-the-polio-ih-er-emergency-committee>
5. N. Ndembu et al., "Strengthening and expanding capacities in clinical trials: advancing pandemic prevention, preparedness and response in Africa," *Nat. Commun.*, vol. 15, no. 1, p. 8662, Oct. 2024, doi: 10.1038/s41467-024-53126-3.
6. C. Fleck-Vidal et al., "A landscape analysis of the vaccine ecosystem in Africa: research and development funding, clinical trials, regulation, and manufacturing readiness," *Lancet Glob. Health*, vol. 13, no. 11, pp. e1983–e1990, Nov. 2025, doi: 10.1016/S2214-109X(25)00314-6.
7. O. A. Uthman, P. D. M. C. Katoto, S. S. Anjorin, T. Marais, A. Amiche, and J. B. Nachega, "Gaps in vaccine clinical trials in Africa: A mixed scoping review and bibliometric analysis before, during, and post- COVID-19 pandemic," *Hum. Vaccines Immunother.*, vol. 21, no. 1, p. 2481802, Dec. 2025, doi: 10.1080/21645515.2025.2481802.
8. L. Pereira, L. Mutesa, P. Tindana, and M. Ramsay, "African genetic diversity and adaptation inform a precision medicine agenda," *Nat. Rev. Genet.*, vol. 22, no. 5, pp. 284–306, May 2021, doi: 10.1038/s41576-020-00306-8.
9. M. M. A. R. van Dorst et al., "Immunological factors linked to geographical variation in vaccine responses," *Nat. Rev. Immunol.*, vol. 24, no. 4, pp. 250–263, Apr. 2024, doi: 10.1038/s41577-023-00941-2.
10. A. J. Mentzer et al., "High-resolution African HLA resource uncovers HLA-DRB1 expression effects underlying vaccine response," *Nat. Med.*, vol. 30, no. 5, pp. 1384–1394, May 2024, doi: 10.1038/s41591-024-02944-5.
11. S. A. Madhi et al., "Effect of human rotavirus vaccine on severe diarrhea in African infants," *N. Engl. J. Med.*, vol. 362, no. 4, pp. 289–298, Jan. 2010, doi: 10.1056/NEJMoa0904797.
12. E. P. K. Parker, B. Kampmann, G. Kang, and N. C. Grassly, "Influence of Enteric Infections on Response to Oral Poliovirus Vaccine: A Systematic Review and Meta-analysis," *J. Infect. Dis.*, vol. 210, no. 6, pp. 853–864, Sep. 2014, doi: 10.1093/infdis/jiu182.
13. "Efficacy of the ChAdOx1 nCoV-19 Covid-19 Vaccine against the B.1.351 Variant | NEJM," *N. Engl. J. Med.*, Accessed: Oct. 08, 2026. [Online]. Available: <https://www.nejm.org/doi/full/10.1056/NEJMoa2102214>
14. S. Y. Tan and K. Pettigrew, "Max Theiler (1899–1972): Creator of the yellow fever vaccine," *Singapore Med. J.*, vol. 58, no. 4, pp. 223–224, Apr. 2017, doi: 10.11622/smedj.2017029.
15. International Vaccine Institute, "Phase I/II, Multicenter, Observer-Blinded, Randomized, Active Controlled Trial to Evaluate Immunogenicity Non-Inferiority, Safety and Lot-to-Lot Consistency of Biovac OCV-S to Euvichol®-Plus in 1 to 45 Years Old South Africans," *clinicaltrials.gov*, Clinical trial registration NCT07304284, Jan. 2026. Accessed: Oct. 09, 2026. [Online]. Available: <https://clinicaltrials.gov/study/NCT07304284>
16. D. Jenkin et al., "Safety and immunogenicity of a ChAdOx1 vaccine against Rift Valley fever in UK adults: an open-label, non-randomised, first-in-human phase I clinical trial," *Lancet Infect. Dis.*, vol. 23, no. 8, pp. 956–964, Aug. 2023, doi: 10.1016/S1473-3099(23)00068-3.
17. "First volunteers receive Rift Valley fever vaccine in Kenya Phase II trial," University of Oxford, Medical Sciences Division. Accessed: Oct. 09, 2026. [Online]. Available: <https://www.medsci.ox.ac.uk/news/first-volunteers-receive-rift-valley-fever-vaccine-in-kenya-phase-ii-trial>
18. "African vaccine manufacturing capacity," Africa CDC. Accessed: Oct. 08, 2026. [Online]. Available: <https://africacdc.org/news-item/african-vaccine-manufacturing-capacity/>
19. "African Vaccine Manufacturing Accelerator (AVMA)." Accessed: Oct. 08, 2026. [Online]. Available: <https://www.gavi.org/our-work/market-shaping/regional-manufacturing-strategy/avma>
20. "mRNA Technology Transfer (mRNA TT) Programme." Accessed: Oct. 08, 2026. [Online]. Available: [https://www.who.int/initiatives/mrna-technology-transfer-\(mRNA-tt\)-programme](https://www.who.int/initiatives/mrna-technology-transfer-(mRNA-tt)-programme)
21. C. Mwila et al., "Operationalizing African self-reliance in vaccine manufacturing," *Glob. Health Action*, vol. 18, no. 1, p. 2560209, doi: 10.1080/16549716.2025.2560209.

VACCINES BEAT

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Mission

Vaccines Beat's main task is to inform through the review of the most recent developments in vaccines, immunization, and vaccine preventable diseases. Our mission extends to sharing best practices from successful initiatives worldwide while building bridges through editorial collaboration with regional and international stakeholders.

Vaccines Beat highlights the importance of information sharing & collaborative efforts within the public health community to boost vaccination campaigns, R&D, public policy, access, awareness, and equity.

Vaccines Beat encourages stakeholders to take action and promote sustainable commitment with continued support through multi-stakeholder synergies.

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