VACCINES BEAT

DENGUE PREVENTION NEW TOOLS AND PERSISTENT CHALLENGES

Dr. Paz-Bailey offers hope in the fight against a relentless virus

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

WORLD HEALTH ORGANIZATION

Dengue prevention: New Tools and Persistent Challenges

Dr. Paz-Bailey offers hope in the fight against a relentless virus

Dr. Gabriela Paz-Bailey is Chief of the Dengue Branch at the Division of Vector-Borne Diseases of the Centers for Disease Control and Prevention (CDC), San Juan, Puerto Rico. In this role, she oversees research, surveillance, and evaluation of interventions aimed at reducing the burden of arboviral diseases. Her work focuses on translating scientific evidence into public health action, with an emphasis on interventions that can be implemented at scale and sustained over time.

Dr. Paz-Bailey earned her MD from the University of San Carlos, Guatemala, and completed postgraduate training at the London School of Hygiene and Tropical Medicine, earning an MSc in Tropical Medicine and International Health and a PhD in Clinical Epidemiology. She joined the CDC in 2000 as an Epidemic Intelligence Service officer and has since devoted over two decades to understanding infectious diseases across the United States, Central America, Africa, and Asia.

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LETTER FROM EDITOR

Welcome to Vaccines Beat 19th issue!

In our **"Coffee with the Expert"** section, we had the pleasure of featuring **Dr. Gabriela Paz-Bailey,** MD, PhD, MSc, DTM&H, Head of the Dengue Branch at the CDC's National Center for Emerging and Zoonotic Infectious Diseases in San Juan, Puerto Rico. Dr. Paz-Bailey earned her medical degree from the University of San Carlos in Guatemala and completed postgraduate training at the London School of Hygiene and Tropical Medicine, where she obtained both an MSc in Tropical Medicine and International Health and a PhD in Clinical Epidemiology. She joined the CDC in 2000 as an Epidemic Intelligence Service (EIS) officer. With over 20 years of experience in public health across the United States, Central America, Africa, and Asia, she has led research on the natural history, acquisition, and treatment response of infections such as tuberculosis, Chagas disease, HIV, hepatitis B and C, herpes viruses, and arboviral diseases including dengue and Zika. Her recent work includes establishing dengue research cohorts, strengthening surveillance, and supporting ACIP recommendations for the first dengue vaccine approved in the U.S. During our conversation, Dr. Paz-Bailey offered valuable insights into global dengue-control strategies, the usefulness of predictive outbreak models, Wolbachia-based vector interventions, and, very important, her perspectives on currently available dengue vaccines— with emphasis on Qdenga, and the Butantan-DV.

In this edition's *Editor's Corner*, we address a critical public-health issue shaped largely by misinformation. Our goal is to clarify, demystify, and accurately communicate what the evidence shows regarding the effectiveness and safety of COVID-19 vaccines. The feature article, **"COVID-19 Vaccines: Debunking Myths, Understanding Risks, and Reinforcing the Reality of Protection,"** provides a clear and balanced analysis to help readers separate facts from misconceptions and strengthen confidence in scientifically grounded information.

Our *Best Practice* section highlights the importance of maintaining strong vaccination practices against rotavirus, hepatitis A, hepatitis B, respiratory syncytial virus, and meningococcal disease in the United States. In light of the recent adjustments made by the U.S. Centers for Disease Control and Prevention (CDC) to routine childhood immunization recommendations, it is essential to continue reinforcing the proven value of these vaccines. Each of these pathogens remains a significant cause of preventable illness, and sustained immunization efforts are critical to protecting children, reducing disease burden, and ensuring equitable access to effective prevention strategies.

Finally, in our *Guest Contributor* section, Dr. Arturo Perea Martínez—an internationally recognized Pediatric Internal Medicine Specialist from the Nutrition Unit of the National Institute of Pediatrics in Mexico City—and his collaborators provide a detailed analysis of how a child's nutritional status is fundamental to an optimal immune response. They also explain how undernutrition, as well as overweight and obesity, can each disrupt immune function and potentially lead to altered vaccine responses.

As always, this issue features carefully curated and up-to-date information on the *'Latest Scientific Publications'* along with the most recent and important *'News and Alerts'*.

We hope you find this December issue both informative and engaging, and we look forward to continuing this shared commitment to advancing global health and building a healthier planet.

Enrique Chacon-Cruz, M.D., MSc
Chief Editor

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 Committee 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.

Coffee with the Expert

DENGUE PREVENTION: NEW TOOLS AND PERSISTENT CHALLENGES

Dr. Paz-Bailey offers hope in the fight against a relentless virus

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Enrique Chacon-Cruz, M.D., MSc
Felicitas Colombo, MPA

Dr. Gabriela Paz-Bailey is Chief of the Dengue Branch at the Division of Vector-Borne Diseases of the Centers for Disease Control and Prevention (CDC), San Juan, Puerto Rico. In this role, she oversees research, surveillance, and evaluation of interventions aimed at reducing the burden of arboviral diseases. Her work focuses on translating scientific evidence into public health action, with an emphasis on interventions that can be implemented at scale and sustained over time.

Dr. Paz-Bailey earned her MD from the University of San Carlos, Guatemala, and completed postgraduate training at the London School of Hygiene and Tropical Medicine, earning an MSc in Tropical Medicine and International Health and a PhD in Clinical Epidemiology. She joined the CDC in 2000 as an Epidemic Intelligence Service officer and has since devoted over two decades to understanding infectious diseases across the United States, Central America, Africa, and Asia.

Her research spans the natural history, acquisition, and treatment of infectious diseases including tuberculosis, Chagas disease, HIV, hepatitis B and C, herpes viruses, and arboviruses such as dengue and Zika. She has led long-standing dengue research cohorts and surveillance platforms that have directly informed policy decisions and program implementation. Notably, she served as CDC lead for the Advisory Committee on Immunization Practices (ACIP) Dengue Vaccines Workgroup, guiding the first dengue vaccine recommendation in the United States, which supported the first U.S. dengue vaccine recommendation.

Dr. Paz-Bailey's work addresses several core public health challenges, including reducing the impact of mosquito-borne diseases through vaccination and vector control, strengthening surveillance systems for early threat detection, and generating evidence to inform prevention strategies for emerging pathogens.

Her work has been widely published in peer-reviewed journals. Rather than focusing solely on scientific outputs, Dr. Paz-Bailey has emphasized public health impact. Her approach combines research design with attention to feasibility, implementation, and long-term sustainability, elements she considers essential for strengthening health systems and protecting populations.

The path into medicine

Born and raised in Guatemala, where she also attended medical school, Dr. Paz-Bailey began her career working with Doctors Without Borders, providing primary care to Guatemalan refugees living in Mexico during the civil war. Working in resource-limted settings early in her career shaped her decision to pursue a career in public health.

"I did a master's in tropical medicine at the London School, and then I entered the EIS program to do field epidemiology, and that started my long career with the CDC and in public health," she recalls.

She initially worked in sexually transmitted diseases and HIV. During the Zika outbreak, when there was an urgent need to understand the risk of sexual transmission, she was called upon as an expert. She moved to Puerto Rico, where she implemented a cohort study to examine the duration of virus shedding in semen and other body fluids.

"I fell in love with Puerto Rico and decided to stay on and work in dengue," she shares. "It's a fascinating disease, with four serotypes, and also an exciting time to be working in dengue because of vaccines and new vector control strategies. I've been working on dengue and Zika since 2017 and enjoying every minute of it."

Controlling dengue

Dengue is the most common mosquito-borne viral disease globally and, after malaria, one of the leading causes of morbidity and mortality worldwide. Dr. Paz-Bailey explains that vector control is extremely challenging. Once an outbreak is established, it is very difficult to control or stop. As a result, most efforts during outbreaks focus on clinical management, ensuring that clinicians can recognize dengue and provide appropriate treatment, primarily through fluid replacement.

Global efforts to control dengue have evolved over time. In the Americas, the Aedes aegypti elimination campaign using DDT achieved significant success in the 1960s and 1970s. However, insecticide resistance and a lack of sustained resources ultimately undermined those efforts. Today, insecticide resistance is widespread, limiting the effectiveness of many traditional mosquito-control tools.

"There are other new tools, like spatial emanators, that do not attempt to kill mosquitoes," Dr. Paz-Bailey explains. "They [instead] change the biting behavior [by] disorienting mosquitoes and affecting their nervous system. And there are some promising results from dengue trials," she adds, emphasizing that new tools are now available.

Novel technologies, including *Wolbachia*-based methods, have also demonstrated reductions in dengue incidence.

"*Wolbachia*-based methods, which can be used for mosquito suppression or for mosquito replacement, provide hope [for] non-insecticide [approaches] to control mosquitoes," she says.

Dengue transmission occurs when a mosquito bites an infected person and subsequently feeds again, biting someone who is not infected and thereby transmitting the virus. Travelers who visit endemic areas can introduce the virus multiple times into regions where Aedes aegypti mosquitoes are present, creating a risk of local transmission.

Dr. Paz-Bailey also stresses the importance of integrated strategies that target mosquitoes at multiple stages of their life cycle. These include the use of larvicides, community cleanup campaigns, elimination of standing water, and personal protection measures such as repellents and bed nets.

"We have a huge opportunity to combine vaccines and vector control methods to really [make] an impact," she points out. "Personal protection is still an important tool."

Wolbachia-based interventions

Wolbachia is a naturally occurring bacterium that is not normally found in Aedes aegypti mosquitoes. Laboratory studies have shown that when *Wolbachia* is introduced into Aedes aegypti, it reduces viral loads not only for dengue, but also for other arboviruses such as Zika and chikungunya. Similar approaches are also being explored for malaria. *Wolbachia* naturally exists

in approximately 60% of insect species and is considered safe for humans and animals.

"The strategy can be used both for mosquito population suppression and for replacement," Dr. Paz-Bailey explains. "When used for mosquito suppression, you have to release male mosquitoes continuously, and [studies have] shown reductions of mosquito populations [of] 50% to 80%. However, once releases stop, the populations will come back to their original levels."

Mosquito population replacement follows a different approach. In this strategy, enough male and female *Wolbachia*-infected mosquitoes are released over a period of roughly six months to replace the natural mosquito population. Studies have demonstrated significant reductions in dengue incidence using this method. One key advantage is that once *Wolbachia* becomes established in the mosquito population, ongoing releases are no longer necessary.

"However, there are challenges to scaling up this intervention," she adds. "It is resource-intensive. You need to breed millions of mosquitoes, pack them and have an army of trained staff to release them. [It is also essential] to use the local mosquito strain and backcross [them] with *Wolbachia*-infected mosquitoes to ensure the mosquitoes are robust and well adapted to [local] climate and altitude."

Wolbachia appears to be genetically stable and does not tend to mutate frequently. The mosquito genome also remains relatively stable, while dengue viruses continue to mutate.

"There could be enough [selective] pressure to [favor] virus genotypes that are more likely to evade the protection provided by Wolbachia," she notes.

This underscores the importance of long-term surveillance systems to monitor effectiveness and detect any potential development of resistance. In addition, the lack of established regulatory frameworks means that countries often must learn while implementing these interventions.

Predictive models

Predictive modeling and forecasting for dengue have proven very challenging. Short-term predictions, up to one month, can perform reasonably well but with important caveats. These models tend to perform poorly during epidemics and during periods of low transmission.

Forecasts that attempt to predict dengue trends beyond one month generally show poor performance. The models that tend to perform better are relatively simple ones, including those that rely on historical data, spatial models, or ensemble approaches that combine multiple models. Overall, however, the business of predicting when and where dengue epidemics will occur is not flourishing at present.

"However, we have used mathematical modeling to understand the impact of interventions and inform cost-effectiveness [analyses] for the dengue vaccine and other interventions and to also guide vector control programs," Dr. Paz-Bailey recalls, emphasizing that these tools can effectively inform and support public health programs.

Dengue vaccines

Experts have emphasized that dengue vaccines present unique challenges because they must protect against four distinct dengue serotypes. Unlike vaccines that target a single virus, dengue vaccines must be effective against all four. From the natural history of dengue, we also know that a second infection carries the highest risk of severe disease.

"If a [dengue] vaccine does not protect against all four serotypes, there is the risk that the person develops antibodies towards the vaccine," explains Dr. Paz-Bailey. "And then when they are infected naturally through a mosquito bite, those antibodies may help the [dengue] virus enter the cell, increasing viral load and the risk of severe disease."

Dengvaxia was the first dengue vaccine to be developed. It was initially recommended by the World Health Organization (WHO) and used in several countries, including the Philippines. Its history is now well known.

"We're all familiar with what happened there," says Dr. Paz-Bailey, referring to studies that identified an increased risk of severe dengue among the youngest trial participants. Researchers ultimately determined that individuals who had not previously been infected with dengue faced a higher risk of dengue if they were vaccinated.

As a result, WHO revised its recommendation

to limit dengue vaccination to individuals with laboratory-confirmed prior dengue infection. In the U.S., Dengvaxia is the only dengue vaccine approved and recommended for use in children and adolescents 9 through 16 years old who have laboratory-confirmed previous dengue virus infection and are living in an area where dengue is endemic. Eventually, the manufacturer discontinued production citing lack of demand in the global market, and Dengvaxia will no longer be available.

Q-denga (also known as TAK-003) is a two-dose vaccine administered three months apart. WHO recommends its use in areas of high transmission, defined as regions where dengue seroprevalence among children is approximately 60 percent, an indicator of very intense transmission. Q-denga has demonstrated efficacy against all serotypes among individuals with prior dengue infection (seropositive) and provides strong protection against dengue serotypes one and two. However, clinical trials did not demonstrate protection against serotypes three and four among those dengue-naive or seronegative.

The vaccine has been implemented in Europe for travelers and in Brazil as part of routine immunization programs, and post-implementation effectiveness studies have already been published.

"A study in Lancet demonstrated vaccine protection [under real-world conditions during a dengue outbreak in Sao Paulo, Brazil], which is really promising," Dr. Paz-Bailey notes.

The manufacturer of Q-denga is continuing studies to better understand the efficacy and safety against dengue serotypes three and four. Dr. Paz-Bailey is particularly interested in additional safety and efficacy data for these serotypes among seronegative individuals.

TV003, a one-dose vaccine originally developed by the U.S. National Institutes of Health (NIH) and recently approved in several countries, has completed phase three trials. These trials demonstrated efficacy among both among both seropositive and seronegative, with good protection against dengue serotypes one and two. However, there was no transmission of serotypes three and four during the trial period.

"[As a result,] there is no data yet on efficacy for these serotypes," she notes, adding that further studies are underway. "Despite these limitations, having multiple vaccines available represents real progress."

Currently, WHO recommends dengue vaccination in high-transmission areas, which do not include all dengue-endemic regions. At present, Q-denga is the only dengue vaccine recommended by WHO for widespread use.

Public health challenges

The world is navigating uncertain times in public health, particularly for vaccines, as science and public institutions operate within an increasingly complex political landscape. Nevertheless, the evidence supporting vaccine safety and effectiveness is strong and undeniable. Vaccination has been instrumental in extending global life expectancy and contributing to a healthier world.

"It is essential that public health recommendations continue to be guided by scientific evidence," says Dr. Paz-Bailey.

CDC works closely with the Food and Drug Administration (FDA), the National Institutes of Health (NIH), and international partners including the Pan American Health Organization (PAHO), to generate disease intelligence, strenghthen laboratory capacity and align guidance.

"Through [our] collaboration with the Pan American Health Organization, we have distributed [PCR testing] kits and significantly strengthened laboratory capacity across the Americas," Dr. Paz-Bailey notes. "So, there is already a lot of coordination among these agencies."

After decades of limited options for dengue prevention, and declining effectiveness of traditional vector control programs due to insecticide resistance, the field now stands on the brink of a new era. Dr. Paz-Bailey emphasizes the need for coordinated action across private sectors and governments to fully leverage the tools now available to combat dengue.

"We finally have innovative tools that offer real hope to significantly reduce morbidity and mortality due to dengue," she 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.

Valneva Reports Positive Final Phase 2 Antibody Persistence and Safety Results in Children for its Chikungunya Vaccine IXCHIQ®.

Valneva Reports Positive Final Phase 2 Antibody Persistence and Safety Results in Children for its Chikungunya Vaccine IXCHIQ®
Published: December 10, 2025.
https://www.globenewswire.com/news-release/2025/12/10/3203393/0/en/valneva-reports-positive-final-phase-2-antibody-persistence-and-safety-results-in-children-for-its-chikungunya-vaccine-ixchiq.html

He made beer that's also a vaccine. Now controversy is brewing.

A scientist's unconventional project illustrates many challenges in developing new vaccines. This article presents the first potential vaccine platform in which antigens are delivered through yeast incorporated into a beer formulation.
Published: December 19, 2025.
https://www.sciencenews.org/article/vaccine-beer-polyomavirus-chris-buck

ECDC: Early estimates of seasonal influenza vaccine effectiveness against influenza requiring medical attention at primary care level in Europe, week 41 - 49, 2025.

Preliminary data from the Vaccine Effectiveness, Burden and Impact Studies (VEBIS) primary care multicentre study indicate that the seasonal vaccines available in EU are providing protection against influenza A(H3N2) infection, with vaccine effectiveness ranging from 52% to 57%.
Published: December 19, 2025.
https://www.ecdc.europa.eu/en/news-events/early-estimates-seasonal-influenza-vaccine-effectiveness-against-influenza-requiring

Nepal reports sharp rise in Japanese encephalitis in 2025; Seeks help for 2026 vaccination campaign.

The Nepal Ministry of Health and Population has reported 35 fatalities to Japanese encephalitis (JE), and another 175 cases since June, numbers significantly higher than 2024 when 80 cases were reported, including 23 deaths.
Published: December 18, 2025.
https://outbreaknewstoday.substack.com/p/nepal-reports-sharp-rise-in-japanese

Cytomegalovirus Breakthrough Could Lead to New Treatments

New antibody design blocks cytomegalovirus from hiding from the immune system and could lead to safer, more effective treatments for vulnerable patients. Researchers at Texas Biologics at The University of Texas at Austin, working with scientists internationally, have made an important discovery that could improve treatment of human cytomegalovirus (HCMV), a common but overlooked virus that poses serious risks to vulnerable populations, including people with compromised immune systems.
Published: ***December 15, 2025.***
https://news.utexas.edu/2025/12/15/cytomegalovirus-breakthrough-could-lead-to-

new-treatments/#:~:text=Cytomegalovirus%20Breakthrough%20Could%20Lead%20to,to%20evade%20the%20immune%20system

Press Release: Sanofi to acquire Dynavax, adding a marketed adult hepatitis B vaccine and phase 1/2 shingles candidate to the pipeline.
Sanofi announced today that it has entered into an agreement to acquire Dynavax Technologies Corporation (Dynavax), a publicly traded vaccines company with a marketed adult hepatitis B vaccine (HEPLISAV-B®) and differentiated shingles vaccine candidate.
Published: December 24, 2025.
https://www.sanofi.com/en/media-room/press-releases/2025/2025-12-24-06-15-00-3210241?utm_source=LinkedIn_ThoughtLeader&utm_medium=Social&utm_campaign=VAX_2025_Dynavax+PR&utm_term=TT_post

CDC: Measles Cases in 2025. As of December 23, 2025, a total of 2,012 confirmed measles cases were reported in the United States.
Among these, 1,988 measles cases were reported by 44 jurisdictions: Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York City, New York State, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, Wisconsin, and Wyoming. A total of 24 measles cases were reported among international visitors to the United States. There have been 50 outbreaks reported in 2025, and 87% of confirmed cases (1,760 of 2,012) are outbreak-associated. For comparison, 16 outbreaks were reported during 2024 and 69% of cases (198 of 285) were outbreak-associated.
Published: December 24, 2025.
https://www.cdc.gov/measles/data-research/index.html

Sudan's Darfur grapples with severe measles outbreak amid ongoing violence
MSF official tells Al Jazeera South Darfur hospital 'overwhelmed' by rapid increase in measles cases. The outbreak of measles, a vaccine-preventable virus, comes as violence between the Sudanese military and the paramilitary Rapid Support Forces (RSF) in the western region of Darfur and neighbouring areas has surged in recent weeks. More than 100,000 people have fled their homes in el-Fasher, the capital of North Darfur State, after the RSF seized control of the city in late October after an 18-month siege.
Published: December 22, 2025.
https://www.aljazeera.com/news/2025/12/22/sudans-darfur-grapples-with-severe-measles-outbreak-amid-ongoing-violence

WHO: World Malaria Report. Addressing inequity in the global malaria response.
Published: December 11, 2025.
https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2024

WHO: Cambodia introduces lifesaving rotavirus vaccine nationwide to protect children from severe diarrheal disease.
The Ministry of Health of the Kingdom of Cambodia announces the nationwide introduction of the rotavirus vaccine into the National Immunization Schedule, marking a significant milestone in protecting infants and young children from one of the leading causes of severe diarrhea and child mortality.
Published: December 10, 2025.
https://www.who.int/cambodia/news/detail/10-12-2025-cambodia-introduces-lifesaving-rotavirus-vaccine-nationwide-to-protect-children-from-severe-diarrheal-disease#:~:text=Phnom%20Penh%2C%2010%20December%202025,of%20severe%20diarrhea%20and%20child.

WHO: Statement on the antigen composition of COVID-19 vaccines.
The WHO Technical Advisory Group on COVID-19 Vaccine Composition (TAG-CO-VAC) held its twice-yearly decision-making meeting in December 2025 to review the evolution of SARS-CoV-2, the performance of currently approved COVID-19 vaccines and the implications for COVID-19 vaccine antigen composition.
Published: December 18, 2025.
https://www.who.int/news/item/18-12-2025-statement-on-the-antigen-composition-of-covid-19-vaccines.

WHO Rapid Risk Assessment - Chikungunya virus disease, Global v.1.
Through December 10, the world has seen more than 500,000 chikungunya cases worldwide,

with almost 300,000 in the Americas region alone, the World Health Organization (WHO) reported in a risk assessment yesterday. With a high degree of confidence, the WHO classified the risk of infection with chikungunya virus to be moderate worldwide, driven by widespread outbreaks across multiple WHO regions during the 2025 season including areas with previously low or no transmission.
Published: December 29, 2025.
https://www.who.int/publications/m/item/who-rapid-risk-assessment---chikungunya-virus--global-v.1

Scientific American: Whooping Cough Deaths Rise in U.S. as Surge in Infections Continues.
Whooping cough cases are sweeping in the U.S., with tens of thousands infected and at least 13 people dead from the bacterial infection this year. While the infection rate is lower than last year, it remains above typical prepandemic years, and the number of deaths has risen. As of December 20, the U.S. and its territories have seen 27,871 diagnosed cases of whooping cough so far this year, according to the Centers for Disease Control and Prevention. Last year at this time, the number was 41,922.
Published: December 30, 2025.
https://www.scientificamerican.com/article/whooping-cough-deaths-rise-in-u-s-as-surge-in-infections-continues/#:~:text=Whooping%20cough%20cases%20are%20sweeping,number%20of%20deaths%20has%20risen

BBC: Children from struggling families to be offered jabs at home.
Young children from struggling families in some parts of England will be offered vaccinations at home to protect them from preventable diseases.
Published: January 1, 2026.
https://www.bbc.com/news/articles/cn407dyx24go.amp

WHO guidance on the use of licensed human influenza A(H5) vaccines for the interpandemic and emergence periods.
Published: December 19, 2025.
https://iris.who.int/items/6edd8e07-bdfc-46db-8550-9d49b8bee1bf/full

Nature News: Will mpox go global again? Research shows it's evolving in curious ways.
Analyses of monkeypox virus clades currently in circulation provide clues to how the virus managed to spread worldwide in 2022 — and how it might go global again.
Published: January 8, 2026.
https://www.nature.com/articles/d41586-025-04154-6

GAVI: Pilot programme massively boosts hepatitis B "birth dose" vaccination in Nigeria's Delta state.
The hepatitis B "birth dose" protects newborns from chronic, liver-killing infection, but the jab's 24-hour window of opportunity leaves little room for logistical inefficiency. A new project in Delta State may have cracked the timeliness code.
Published: December 19, 2025.
https://www.gavi.org/vaccineswork/pilot-programme-massively-boosts-hepatitis-b-birth-dose-vaccination-nigerias-delta.

Independent expert group to review HPV vaccine evidence after US recommendation change.
An independent vaccine advisory group said on Thursday it will conduct a scientific evidence review of a vaccine used to prevent cervical and other cancers that U.S. health officials this week said should only be given as a single dose, contrary to the shot's FDA approval.
Published: January 8, 2026.
https://www.reuters.com/business/healthcare-pharmaceuticals/independent-expert-group-review-hpv-vaccine-evidence-after-us-recommendation-2026-01-08/

Oxford Vaccine Group: Ambitious research aims to develop multivalent vaccines to protect against multiple deadly filoviruses.
Scientists at the University of Oxford, in collaboration with partners, will spearhead the development of new vaccines that aim to provide comprehensive protection against multiple lethal filoviruses, including Ebola virus, Sudan virus, Bundibugyo virus, and Marburg virus.
Published: January 8, 2026.
https://www.ovg.ox.ac.uk/news/ambitious-research-aims-to-develop-multivalent-vaccines-to-protect-against-multiple-deadly-filoviruses

Methodological framework for estimating the value of combination vaccines.

the value of combination vaccines can be quantified across four domains: reduced tangible and intangible costs for caregivers (including time, travel, and injection burden), operational efficiencies for health systems, the opportunity cost of limited slots in vaccination schedules, and the benefits of more streamlined schedules overall.
Published: January 7, 2026.
https://immunizationeconomics.org/recent-activity/2026/1/7/methodological-framework-for-estimating-the-value-of-combination-vaccines/#:~:text=The%20authors%20argue%20that%20the,in%20vaccination%20schedules%2C%20and%20the

How effective is the flu shot this year? New report shows promising results.
While the new findings are encouraging, "vaccines won't do any good if people don't get them," one expert said. Flu is surging across most of the U.S. But, amid an early, harsh season, there is a glimmer of promising news: The flu shot may be more effective than experts predicted.
Published: January 7, 2025.
https://www.nbcnews.com/news/amp/rcna252659

India stopped polio 15 years ago; now it can end polio everywhere.
For decades, many doubted whether polio could ever be eliminated from India. The obstacles were immense: A population exceeding one billion, widespread poverty, poor sanitation, unsafe drinking water, malnutrition, and vast, hardtoreach communities. Delivering vaccines repeatedly and reliably to every household seemed like an impossible task. What followed, however, was one of the most ambitious public health mobilizations in modern history.
Published: January 13, 2026.
https://www.hindustantimes.com/ht-insight/public-health/india-stopped-polio-15-years-ago-now-it-can-end-polio-everywhere-101768301320202-amp.html

India: Nipah virus cases reported in West Bengal, according to media reports.
India media report two cases of human Nipah virus infection in West Bengal, in eastern India. The patients are nurses and have been admitted to a Kolkata hospital. "The health condition of both of them remains extremely critical. They are still in a coma and admitted to the ICCU," according to an official of the health department.
Published: January 14, 2026.
https://outbreaknewstoday.substack.com/p/india-nipah-virus-cases-reported

South Carolina reports 124 new measles cases as outbreak grows.
At least 124 new measles cases have been reported in South Carolina since last Friday, health officials said. This brings the total number of cases in the outbreak to 434. There are currently over 400 people in quarantine.
Published: January 13, 2026.
https://abcnews.go.com/amp/Health/south-carolina-reports-124-new-measles-cases-outbreak/story?id=129136137

Overviewing Emerging Evidence of Vaccines, Dementia Risk, and Pathogen Protection:
Pierre Tariot, MD. At CTAD 2025, the director of Banner Alzheimer's Institute discussed emerging epidemiologic and translational evidence suggesting that certain vaccines may confer protection against dementia.
Published: January 16, 2026.
https://www.neurologylive.com/view/overviewing-emerging-evidence-vaccines-dementia-risk-pathogen-protection-pierre-tariot

Latest Relevant Publications

LATEST PUBLISHED PAPERS AND COMMENTARIES FROM THE CHIEF EDITOR

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

Frenck RW Jr, Naficy A, Feser J, Dickey MP, Leyva-Grado VH, Egan MA, Chen T, Eldridge JH, Sciotto-Brown S, Hermida L, Promeneur D, Luckay A, Medina H, Lazaro GA, Patel NR, Naqvi T, Broder CC, Dimitrov AS, Gast C, Mercer LD, Raine M, Andi-Lolo I, Innis BL, Aponte JJ, Hamm S, Rathi N. **Safety and immunogenicity of a Nipah virus vaccine (HeV-sG-V) in adults: a single-centre, randomised, observer-blind, placebo-controlled, phase 1 study.** *Lancet*. 2025 Dec 13;406(10521):2792-2803.
doi: https://doi.org/10.1016/S0140-6736(25)01390-X

Editorial comment: This phase 1, randomized, placebo-controlled study is the first to assess the safety and immunogenicity of a Nipah virus vaccine using the Hendra virus soluble G glycoprotein (HeV-sG-V), known to elicit cross-protective immunity due to strong structural similarity between NiV and HeV G proteins. Among healthy adults aged 18–49, immune responses were dose-dependent: one dose produced limited immunogenicity, while two doses—especially the 100 µg regimen given 28 days apart—generated robust antibody responses. All dosing regimens were well tolerated. The rapid antibody induction and enhanced persistence after two doses support the potential of HeV-sG-V for both outbreak response and preventive vaccination.

02

Zambon M, Hayden FG. **Influenza A(H3N2) Subclade K Virus: Threat and Response.** *JAMA*. 2025 Dec 18.
doi: https://doi.org/10.1001/jama.2025.25903

Editorial comment: This editorial provides a clear and timely overview of the growing number of patients infected and ill with the AH3N2 subclade 2 strain, detailing its clinical characteristics and the age groups most affected. Most importantly, it emphasizes that although the strain shows a reduced response to the current influenza vaccine, the vaccine still offers substantial protection—particularly against hospitalization.

03

Levrier A, Soudier P, Garenne D, Izri Z, Bowden S, Lindner AB, Noireaux V. **A synthetic cell phage cycle.** *Nat Commun*. 2025 Dec 15.
doi: https://doi.org/10.1038/s41467-025-67249-8

Editorial comment: In this *in vitro* study, the authors reconstructed an entirely cell-free viral cycle in which T7 phages infect synthetic cells engineered with lipopolysaccharides on the outer leaflet of their lipid membranes and containing a cell-free gene expression system. They quantified key parameters of this system—including multiplicity of infection, replication efficiency, liposome size limitations, and phage rebinding dynamics. This work establishes a versatile and fully defined platform for reconstructing and dissecting viral infections from their individual molecular components, offering valuable opportunities for vaccine epitope characterization and related applications.

04

Jabagi MJ, Bertrand M, Gabet A, Kolla E, Olié V, Zureik M. **Nirsevimab vs RSVpreF Vaccine for Respiratory Syncytial Virus-Related Hospitalization in Newborns.** *JAMA.* 2025 Dec 22:e2524082.
doi: https://doi.org/10.1001/jama.2025.24082

Editorial comment: This population-based cohort study used data from the French National Health Data System. Maternal vaccination with the RSVpreF vaccine occurred during 32 to 36 weeks' gestation among infants born in mainland France between September 1 and December 31, 2024. Passive infant immunization with nirsevimab occurred prior to hospital discharge. Compared with the RSVpreF vaccine, passive infant immunization with nirsevimab was associated with a lower risk of hospitalization for RSV-associated lower respiratory tract infection (adjusted HR, 0.74 [95% CI, 0.61 to 0.88]). Compared with the RSVpreF vaccine, passive infant immunization with nirsevimab was associated with a lower risk of severe outcomes, including PICU admission (adjusted HR, 0.58 [95% CI, 0.42 to 0.80]), requiring ventilator support (adjusted HR, 0.57 [95% CI, 0.40 to 0.81]), or requiring oxygen therapy (adjusted HR, 0.56 [95% CI, 0.38 to 0.81]). The results were consistent across subgroups and in the sensitivity analyses.

05

Finn A, Guiso N, Wirsing von König CH, Martinón-Torres F, Palmu AA, Bonanni P, Bakhache P, Maltezou HC, Van Damme P. **How to improve pertussis vaccination in pregnancy: a European expert review.** *Expert Rev Vaccines.* 2025 Dec;24(1):175-182.
doi: https://doi.org/10.1080/14760584.2025.2473328

Editorial comment: In this publication, resulting from a European expert meeting, participants discussed optimal strategies for pertussis vaccination during pregnancy. The group concluded that, although current maternal immunization programs have been effective, the use of combined Tdap or Tdap-IPV vaccines is not ideal and reflects the absence of pertussis-only vaccines, which are currently unavailable in Europe. A pertussis-only vaccine could avoid repeated and unnecessary exposure of pregnant women to tetanus and diphtheria boosters with each pregnancy. Furthermore, recombinant pertussis vaccines with enhanced immunogenicity may offer prolonged passive protection against pertussis in young infants.

06

Semenzato L, Le Vu S, Botton J, Bertrand M, Jabagi MJ, Drouin J, Cuenot F, Olié V, Dray-Spira R, Weill A, Zureik M. **COVID-19 mRNA Vaccination and 4-Year All-Cause Mortality Among Adults Aged 18 to 59 Years in France.** *JAMA Netw Open.* 2025 Dec 1;8(12):e2546822.
doi: https://doi.org/10.1001/jamanetworkopen.2025.46822

Editorial comment: In this French study, Cox models weighted for sociodemographic characteristics and 41 comorbidities were used to estimate 4-year all-cause mortality. Time to event was censored at all-cause death, COVID-19 vaccination for unexposed individuals, or study termination on March 31, 2025. Vaccinated individuals had a 74% lower risk of death from severe COVID-19 (weighted hazard ratio [wHR], 0.26; 95% CI, 0.22–0.30) and a 25% lower risk of all-cause mortality (wHR, 0.75; 95% CI, 0.75–0.76), with similar associations observed after excluding deaths due to severe COVID-19. Sensitivity analyses consistently demonstrated a lower risk of death among vaccinated individuals, regardless of cause.

07

Meglic E, Ploner A, Clements M, Elfström M, Lei J. **Herd effect of human papillomavirus vaccination on incidence of high-grade cervical lesions: a population-based cohort study in Sweden.** *Lancet Public Health.* 2026 Jan;11(1):e35-e43.
doi: https://doi.org/10.1016/S2468-2667(25)00297-X

Editorial comment: The authors conducted a nationwide retrospective cohort study of 857,168 girls and women born between 1985 and 2000, using data from the Swedish National Cervical Screening Registry and other national health registries. Among unvaccinated women, High Grade Cervical Lesions (HSIL)+ incidence declined in the birth cohort eligible for the school-based HPV vaccination program, demonstrating that high vaccine coverage can generate a strong herd effect.

08

Gbesemete D, Ramasamy MN, Ibrahim M, Hill AR, Raud L, Ferreira DM, Guy J, Dale AP, Laver JR, Coutinho T, Faust SN, Reed TAN, Babbage G, Weissfeld L, Lang W, Locht C, Samal V, Goldstein P, Solovay K, Rubin K, Noviello S, Read RC. **Efficacy, immunogenicity, and safety of the live attenuated nasal pertussis vaccine, BPZE1, in the UK: a randomised, placebo-controlled, phase 2b trial using a controlled human infection model with virulent Bordetella pertussis.** *Lancet Microbe.* 2025 Dec;6(12):101211.
doi: https://doi.org/10.1016/j.lanmic.2025.101211

Editorial comment: The resurgence of pertussis is largely attributed to suboptimal vaccination coverage, particularly in countries that rely exclusively on acellular vaccines, which fail to induce mucosal immunity and generate minimal indirect (herd) protection. Consequently, sustained coverage levels above 95% are required to control transmission. BPZE1 is a live-attenuated Bordetella pertussis strain developed for intranasal administration, engineered through the genetic inactivation or deletion of three key virulence factors—pertussis toxin (PT), dermonecrotic toxin (DNT), and tracheal cytotoxin (TCT)—to safely prevent whooping cough while closely mimicking natural infection. This vaccine elicits robust Th1-biased cellular immunity alongside strong humoral responses. In a phase 2b human challenge study, intranasal BPZE1 vaccination prevented or markedly reduced infection following exposure to virulent B. pertussis, supporting its potential as a promising next-generation pertussis vaccine. Given its favorable safety profile, large-scale phase 3 clinical trials are warranted to confirm these findings and further assess its public health impact.

09

Moline HL, Tannis A, Goldstein L, Englund JA, Staat MA, Boom JA, Selvarangan R, Michaels MG, Weinberg GA, Halasa NB, Toepfer AP, Rutkowski RE, Salthouse A, Sahni LC, Schuster JE, Stewart LS, Williams JV, Payne DC, Klein EJ, Szilagyi PG, Dawood FS; New Vaccine Surveillance Network Collaborators. **Effectiveness and Impact of Maternal RSV Immunization and Nirsevimab on Medically Attended RSV in US Children.** *JAMA Pediatr.* 2025 Dec 22:e255778.
doi: https://doi.org/10.1001/jamapediatrics.2025.5778

Editorial comment: In this study, maternal RSV vaccine effectiveness was assessed by evaluating outcomes among newborns and infants younger than 6 months at the time of medical encounters. Nirsevimab effectiveness was estimated among newborns and infants younger than 8 months as of October 1, 2024, or born after that date. Among infants younger than 6 months, maternal RSV vaccination demonstrated 64% effectiveness (95% CI, 37%–79%) against medically attended RSV-associated acute respiratory illness (ARI) and 70% effectiveness (95% CI, 37%–86%) against RSV-associated hospitalization. Nirsevimab showed 81% effectiveness (95% CI, 71%–87%) against RSV-associated hospitalization, with sustained protection of 77% (95% CI, 42%–92%) at 130 to 210 days after receipt.

10

Dalisay SN, Landicho M, Lota MM, Fujimori Y, Acacio-Claro PJ, Roxas E, Abeleda A, Rosuello JZ, Dato M, Vogt F, Danchin M, Belizario V Jr, Kaufman J. **Behavioural and social drivers of routine childhood immunization in selected low coverage areas in the Philippines**. *Glob Health Res Policy.* 2025 Sep 29;10(1):48.
doi: https://doi.org/10.1186/s41256-025-00447-5

Editorial comment: This study focused on three low–vaccine-coverage regions in the Philippines. Focus groups were conducted with caregivers of vaccinated and unvaccinated children (0–11 years), and key informant interviews were held with immunization program managers and coordinators. Guides were based on the WHO Behavioural and Social Drivers (BeSD) of Vaccination framework. Perceived benefits and concerns about vaccine side effects emerged as key intrapersonal drivers. Social influences—including family members, barangay health workers, and community leaders—shaped decisions across socioecological levels. Practical barriers, such as vaccine availability and access to vaccination sites, continued to hinder uptake.

11

Shaaban FL, Groenendijk RW, Baral R, Caballero MT, Crowe JE Jr, Englund JA, Esteban I, Hirve S, Jit M, Kalergis AM, Karron RA, Lukacs N, Martinon-Torres F, Mejias A, Nair H, Nisar MI, Nyiro JU, Pecenka C, Sparrow E, Srikantiah P, Thwaites RS, Zar HJ, Bont LJ. **The path to equitable respiratory syncytial virus prevention for infants: challenges and opportunities for global implementation.** *Lancet Glob Health.* 2025 Dec;13(12):e2165-e2174.
doi: https://doi.org/10.1016/S2214-109X(25)00379-1

Editorial comment: This Review outlines the challenges and opportunities for expanding access to RSV prevention for infants in resource-restricted settings, guided by WHO's Immunization Agenda 2030 and the UN's *Leave No One Behind* framework for equitable, non-discriminatory development. Key domains discussed include disease burden, vaccine and monoclonal antibody development, health economics and impact modelling, policy and implementation considerations, programmatic delivery, surveillance, and public awareness. The Review synthesizes recent scientific advances and identifies the urgent actions required to achieve equitable global access to RSV prevention for all infants.

12

Capucetti A, Falivene J, Pizzichetti C, Latino I, Mazzucchelli L, Schacht V, Hauri U, Raimondi A, Virgilio T, Pulfer A, Mosole S, Grau-Roma L, Bäumler W, Palus M, Renner L, Ruzek D, Goldman Levy G, Foerster M, Chahine K, Gonzalez SF. **Tattoo ink induces inflammation in the draining lymph node and alters the immune response to vaccination.** *Proc Natl Acad Sci U S A.* 2025 Dec 2;122(48):e2510392122.
doi: https://doi.org/10.1073/pnas.2510392122

Editorial comment: In this study, the authors examined how different tattoo inks are transported and accumulate in the lymphatic system using a murine model. They observed rapid lymphatic drainage, followed by macrophage uptake of ink within the draining lymph nodes (LNs). This triggered an immediate local and systemic inflammatory response that persisted, with clear inflammation still present in LNs two months after tattooing. Ink-loaded macrophages were also associated with apoptosis in both human and mouse models. Importantly, ink accumulation in the LNs altered immune responses to two different vaccines. These findings highlight potential risks of tattooing related to immune modulation and provide valuable information for toxicology assessments, regulatory decision-making, and public awareness.

13

Carnalla-Barajas MN, Soto-Noguerón A, Solórzano-Santos F, Macías-Parra M, Díaz-Jiménez V, Sánchez-González G, Jiménez-Juárez R, Parra-Ortega I, Sánchez-Francia D, Luévanos-Velázquez A, Merlo-Palomera M, Flores-Santos A, Magaña-Aquino M, Tinoco-Favila JC, Corte-Rojas RE, Garza-González E, Guajardo-Lara CE, Vázquez-Narváez JA, Hernández-Magaña R, Sánchez-Reyes BA, Pacheco-Gil L, Monroy-Colín VA, Rincón-Zuno J, Feliciano-Guzmán JM, Echániz-Aviles G. **Pneumococcal meningitis in Mexico. Serotype distribution and antimicrobial resistance before and after the introduction of pneumococcal conjugate vaccines in pediatric patients. Results from the GIVEBPVac group.** *J Infect Public Health.* 2026 Jan;19(1):103030.
doi: https://doi.org/10.1016/j.jiph.2025.103030

Editorial comment: Using passive surveillance, the authors conducted a prospective analysis of pneumococcal isolates from children aged 0–17 years with meningitis between 1993 and 2024 through the GIVEBPVac network. A total of 575 isolates were examined. PCV13 serotypes declined from 77.2% in the pre-PCV period to 33.3% in the PCV13 era, while non-vaccine serotypes increased to 66.7%. Before PCV introduction, serotypes 14, 6B, 19F, and 23F predominated. In the PCV13 era, serotypes 19A and 15B became more common, and non-vaccine serotypes 23B and 6C emerged.

14

Kimathi, Derick et al. **Low-dose yellow fever vaccination in infants: a randomised, double-blind, non-inferiority trial.** *The Lancet:*
doi: https://doi.org/10.1016/S0140-6736(25)02069-0

Editorial comment: In Kenya, between Oct 7, 2021, and June 14, 2023, a total of 420 infants were enrolled and randomly assigned (210 per group). At day 28, seroconversion rates in the per-protocol population were 99% (95% CI 96–100; 177/179 infants) for the standard dose and 93% (95% CI 88–96; 166/179 infants) for the 500 IU dose. Compared with the standard yellow fever vaccine dose, the 500 IU dose did not meet the non-inferiority criterion, indicating that minimum dose requirements established for adults may not be directly generalizable to infants.

15

Saso A, Fröberg J, Jobe H, Eleveld M, Okoye M, Kanteh E, Arns A, van Opzeeland F, Kumado M, Faal A, Roberts E, Fofana ML, Baldeh AK, Conteh K, van Cranenbroek B, Roetynck S, de Jonge M, de Silva TI, Huynen M, Kampmann B, Diavatopoulos DA; GaPs Study Team. **Mucosal immune responses to Bordetella pertussis in Gambian infants after maternal and primary vaccination: an immunological substudy of a single-centre, randomised, controlled, double-blind, phase 4 trial.** *Lancet Microbe*. 2026 Aug 21:101219.
doi: https://doi.org/10.1016/j.lanmic.2025.101219

Editorial comment: This Gambian substudy included 160 infants from the GaPs trial (Feb 2019–May 2021). At 8 weeks of age—before primary vaccination—infants of mothers vaccinated with Tdap-IPV in pregnancy had significantly higher nasal anti-pertussis toxin IgG (GMR 3.84) and anti-*B. pertussis* IgG (GMR 6.45), but not IgA, compared with infants of mothers who received TT.

After primary vaccination, infants who received DTwP had substantially higher nasal anti-*B. pertussis* IgG GMCs than those vaccinated with DTaP, regardless of maternal vaccine group. Notably, DTaP-vaccinated infants born to Tdap-IPV-vaccinated mothers showed the lowest post-vaccination IgG levels, even when their baseline maternal antibody concentrations were low.

16

Sacchetto L, Marques BC, Banho CA, Bernardi V, Estofolete CF, Dos Santos CLS, Timenetsky MDCST, de Lacerda MVG, Freitas AC, Pereira DB, da Fonseca AJ, Gurgel RQ, Coelho IC, Fontes CJF, Marques Júnior ETA, Romero GAS, Teixeira MM, de Siqueira AM, Boaventura VS, Ramos F, Elias Júnior E, de Moraes JC, Vasilakis N, Miranda É, Moreira JAS, Boulos FC, Kallás EG, Nogueira ML. **Dengue virus genetic diversity in unvaccinated and vaccinated dengue-infected individuals: an observational analysis of the Butantan-DV phase 3 trial in Brazil**. *Lancet Reg Health Am*. 2025 Nov 29;53:101309.
doi: https://doi.org/10.1016/j.lana.2025.101309

Editorial comment: In this study, the authors analyzed 365 DENV-1 and DENV-2–positive samples from unvaccinated participants and vaccinated participants (28 days post-vaccination) enrolled in the Butantan-DV phase 3 trial in Brazil (2016–2021). Although sample numbers limited statistical power, vaccinated individuals—especially with DENV-1—showed significantly lower RT-qPCR Ct values, suggesting reduced viral replication. Breakthrough infections were not associated with any specific DENV-1 or DENV-2 lineage. Genetic analyses revealed no differences in intra-host mutation rates and no evidence of positive selection in viral coding regions. Breakthrough infections in Butantan-DV recipients were not linked to distinct viral lineages. Circulating DENV-1 and DENV-2 strains in both vaccinated and unvaccinated groups reflected normal transmission dynamics, including co-circulation and lineage replacement.

17

A, Hossain ME, Spiropoulou C, Shoemaker T, Rahman MZ, Banu S, Hensley L, Satter SM, Montgomery JM, Shirin T. P-586. 2025 **Nipah Outbreaks in Bangladesh: Clinical Patterns, Emerging Risks, and Future Preparedness in an Expanding Epidemiologic Landscape**. *Open Forum Infect Dis*. 2026 Jan 11;13(Suppl 1):ofaf695.800.
doi: https://doi.org/10.1093/ofid/ofaf695.800

Editorial comment: Nipah virus (NiV), a high-risk pathogen with pandemic potential, continues to cause near-annual outbreaks in Bangladesh. Since January 2025, IEDCR and icddr,b have investigated three sporadic outbreaks in urban or peri-urban areas of Pabna, Bhola (the first case reported there), and Faridpur. All primary cases were linked to consumption of raw date palm sap, with nearby bat roosts (2–13 km) housing 20–500 *Pteropus medius* bats. Patients tested NiV-positive within 4–11 days of symptom onset and 2–3 days after hospitalization. All presented with fever, neurological symptoms, respiratory distress, and died within 3–12 days. As in 2024, the 2025 cases showed 100% fatality, underscoring persistent NiV virulence. Continued raw sap consumption and delays in care-seeking highlight the urgent need for strengthened community awareness and surveillance.

18

Coelho LE, Goedert GT, Genari J, Luz PM, Carvalho LM, Santos CVBD, Csillag D, Konečný T, Campos Pellanda L, Struchiner CJ, Freitas da Silveira M, Hallal PC. **COVID-19 vaccine trust and uptake: the role of media, interpersonal and institutional trust in a large population-based survey.** *Lancet Reg Health Am.* 2025 Dec 8;53:101324.
doi: https://doi.org/10.1016/j.lana.2025.101324

Editorial comment: Among 29,281 participants (63.9% women; median age 51 years), 60% reported trusting the COVID-19 vaccine and 72% had received ≥3 doses. Vaccine uptake closely mirrored trust: 67% of unvaccinated or unsure individuals distrusted the vaccine, whereas trust rose progressively with the number of doses—62.6% among those with 3 doses, 73.8% with 4 doses, and 89.8% with ≥5 doses. Gen Z adults (18–30 years) were less likely to trust the vaccine (-0.07). Positive predictors of trust included higher education and reliance on television or nurses.

19

Lopatynsky-Reyes EZ, Rodriguez-Valencia JA, Chacon-Cruz E. **Active Surveillance and Polymerase Chain Reaction (PCR) Between Two Passive Surveillance Periods Improve Detection and Characterization of Pleural Empyema: A 20-Year Study in Tijuana, Mexico.** *Cureus* 2026 (January).
doi: https://doi.org/10.7759/cureus.101369

Editorial comment: To date, no published studies have systematically compared passive versus active surveillance for pleural empyema. The objective of this study was precisely to evaluate the impact of implementing active surveillance by comparing detection rates and the characterization of all variables associated with PE across passive and active surveillance periods, as well as after active surveillance was discontinued. The findings of this 20-YEAR study are truly remarkable and provide valuable insights into the importance of enhanced surveillance strategies for improving case detection, laboratory confirmation, and clinical understanding of pleural empyema—and to measure in detail the impacts of pneumococcal protein-conjugate vaccines (PCV7–PCV13) on reducing pneumococcal cases and the corresponding rise of methicillin-susceptible S. aureus cases.

20

Zhou D, Chan S, Zhong Y, Xu Z, Wang J, Wang Y, Gao Y, Xia Y, Zhang D, Tang W. **Disease and Economic Burden Averted by Hib Vaccination in 160 Countries: A Machine-Learning Analysis.** *Vaccines*. 2025 Nov 27;13(12):1197.
doi: https://doi.org/10.3390/vaccines13121197

Editorial comment: Between 1990 and 2021, Hib immunization prevented an estimated 1.32 million deaths (95% UI: 32,034–2.72 million) and 90.9 million disability-adjusted life-years (95% UI: 3.57–197.1 million) worldwide. The largest health and economic gains occurred in Africa and other LMICs. Deaths averted declined with later vaccine introduction (r = −0.56). Despite its impact, Hib vaccination has not improved health equity, as access remains limited in many LMICs. Overall, Hib immunization delivers substantial and highly cost-effective global benefits.

21

Gupta D, Kaur A, Verma V, Van Oorschot DAM, Penders Y, Guzman-Holst A. **Prevalence of Respiratory Syncytial Virus in Adult Patients with Respiratory Illnesses in Low to Middle-Income Countries: A Systematic Review and Meta-Analyses.** *Infect Dis Ther.* 2025 Dec 23.
doi: https://doi.org/10.1007/s40121-025-01265-5

Editorial comment: There remains a significant gap in understanding the burden of respiratory syncytial virus (RSV) among adults in low-, lower-middle-, and upper-middle–income countries. In this study, the authors used data identified through a previously described systematic literature review and applied a random-effects model to estimate pooled RSV prevalence across study populations. The findings show a substantial disease burden among high-risk adults aged 18–59 years and adults aged ≥50 years with respiratory illness in these settings, underscoring the need for strengthened RSV surveillance and improved prevention strategies for these populations.

22

Rahman MM, Sultana S, Dutta P, Hossain MS, Aquib WR, Sachi S, Prince KTP, Das R, Oyshee NT, Antara AJ, Choudhury SS, Farzin A, Karim MR, Khan AKMD, Sarkar T, Chowdhury NN, Khan MA, Malek FM, Fatema U, Parvin H, Habib MN, Hasan J, Chisty NN, Alam MR, Islam MA, Niloy N, Mahmood SJB, Siddika A, Rahman MM, Chowdhury M, Qayum MO, Islam Maerz MD, Makatsa MS, Bucsan AN, Sutton MS, Bishop E, Tian Z, Layton ED, Roederer M, Shalek AK, Seder RA, Scriba TJ, Wang C, Darrah PA, Seshadri C. **BCG vaccination induces antibacterial effector functions among Vδ1/3 T cells that are associated with protection against tuberculosis.** *Cell Rep Med.* 2026 Jan 12:102536.
doi: https://doi.org/10.1016/j.xcrm.2025.102536

Editorial comment: The authors used multimodal single-cell RNA sequencing, mass cytometry, and flow cytometry to characterize γδ T-cell responses in human infants and macaques following BCG vaccination. In BCG-vaccinated infants, a subset of Vδ1/3 T cells showed clonal expansion and differentiation into Mtb-reactive cytotoxic effector cells. In macaques, intravenous BCG similarly induced pro-inflammatory and cytotoxic Vδ1/3 T-cell responses, with these cells enriched in the airway compared with blood. Higher frequencies of cytokine-producing Vδ1/3 T cells in the airway correlated with protection against Mtb challenge. These findings suggest that BCG activates and recruits Vδ1/3 T cells to the lung, where they acquire functions that may contribute to protective immunity.

23

Vakaniaki EH, Barhishindi I, Mubiala A, Malembaka EB, Braunack-Mayer L, Nganga B, Sabiti Nundu S, Brosius I, Bracke S, Bangwen E, De Vos E, Colebunders R, Ngale M, Kayembe G, Tshongo C, Dilu A, Tshimanga C, Biampata JL, Bugeme PM, Ntamabyaliro N, Kirenga B, Wayengera M, Siewe Fodjo JN, Lupande Mwenebitu D, Rimoin AW, Wawina-Bokalanga T, Vercauteren K, Mukadi-Bamuleka D, Muyembe-Tamfum JJ, Krasemann S, Kindrachuk J, Azman AS, Nussenblatt V, Crozier I, Dodd LE, Tshiani-Mbaya O; MBOTE-SK Consortium; PREGMPOX Consortium; PALM007 Consortium; Uvira Study Group; Low N, Katoto PDMC, Mbala-Kingebeni P, Liesenborghs L. **Maternal and neonatal outcomes after infection with monkeypox virus clade I during pregnancy in DR Congo: a pooled, prospective cohort study.** *Lancet.* 2026 Jan 19:S0140-6736(25)02309-8.
doi: https://doi.org/10.1016/S0140-6736(25)02309-8

Editorial comment: Monkeypox virus (MPXV) has been associated with vertical transmission; however, systematic data remain limited. In this prospective cohort analysis, we pooled data from three cohort studies (MBOTE-SK, PREGMPOX, and Uvira mpox) and one randomized controlled trial (PALM007) conducted in the South Kivu, Maniema, and Sankuru provinces of the Democratic Republic of the Congo between Dec 29, 2022, and June 20, 2025. Pregnant women and adolescent girls with PCR-confirmed mpox were followed throughout hospitalization, delivery, and the postpartum period until discharge. Final pregnancy outcomes were available for 69 (78%) participants. Adverse pregnancy outcomes occurred in 35 women (51%; 95% CI 38–63), including fetal loss in 31 cases (45%; 95% CI 33–57), comprising 16 (52%) spontaneous abortions, four (13%) missed abortions, and 11 (35%) stillbirths. Among 38 live births, four neonates presented with congenital mpox-like lesions, and one neonate died within hours of birth. No preterm deliveries or structural congenital anomalies were observed. MPXV infection during the first trimester was associated with a significantly higher risk of adverse pregnancy outcomes compared with infection during the second (risk ratio [RR] 0.6; 95% CI 0.4–0.9) or third trimester (RR 0.2; 95% CI 0.1–0.4; p=0.0008). Overall, MPXV clade I infection during pregnancy was associated with a substantial risk of fetal loss and congenital infection, particularly when infection occurred during the first trimester.

Editor's Corner

COVID-19 VACCINES: DEBUNKING MYTHS, UNDERSTANDING RISKS, AND REINFORCING THE REALITY OF PROTECTION

Introduction

Between 2020 and 2024, global COVID-19 vaccination efforts are estimated to have averted 2.5 million deaths (range, 1.4–4.0 million) and saved 15 million life-years (range, 7–24 million). Despite these remarkable achievements, public mistrust regarding potential serious adverse events associated with various SARS-CoV-2 vaccine platforms has persisted. While some concerns have been evaluated scientifically, evidence from case-control studies consistently shows that COVID-19 infection itself causes these adverse events more frequently than vaccination. More concerningly, many claims

of vaccine-related harm lack credible evidence. In this section, we address some of the most common misconceptions—each ultimately reinforcing the strong case for vaccination.

Overview of Reported Claims and Supporting Evidence Regarding COVID-19 Vaccine Safety:

1) Myth — ***mRNA vaccines (Pfizer/Moderna) cause myocarditis at high rates / are very dangerous***

- **What evidence shows:** There is a small increased risk of myocarditis or pericarditis following mRNA COVID-19 vaccination, occurring most frequently in young males after the second dose. Compared with unvaccinated individuals without prior SARS-CoV-2 infection, vaccination was associated with an elevated risk of myocarditis (risk ratio, 3.24; 95% CI, 1.55–12.44; risk difference, 2.7 events per 100,000 persons; 95% CI, 1.0–4.6). However, the risk was substantially higher among unvaccinated individuals after SARS-CoV-2 infection (risk ratio, 18.28; 95% CI, 3.95–25.12; risk difference, 11.0 events per 100,000 persons; 95% CI, 5.6–15.8).

2) Myth — ***AstraZeneca / adenovector vaccines cause dangerous blood clots (VITT / TTS)***

- **What evidence shows:** A rare but severe syndrome, vaccine-induced immune thrombotic thrombocytopenia (VITT/TTS), has been associated mainly with adenoviral-vector vaccines such as ChAdOx1 (AstraZeneca) and Ad26.COV2.S (Johnson & Johnson). Incidence is very low (a few cases per 100,000 doses) and occurs predominantly in women of reproductive age. Although mortality among VITT cases can be significant, regulatory agencies responded promptly by adding safety warnings and adjusting vaccine recommendations. Overall, the benefit–risk balance remained favorable for most populations, with some restrictions applied in higher-risk groups. Both adenoviral vaccines have since been withdrawn from the market as COVID-19 incidence declined and newer platforms became available. Nonetheless, in regions with limited vaccine access, these vaccines could still play an important role in reducing disease burden.

5) Myth — ***Vaccines cause Guillain-Barré syndrome (GBS) frequently / severe neuropathy***

- **What evidence shows:** Vaccination with adenoviral vector vaccines, but not mRNA vaccines, has been associated with a higher risk of Guillain–Barré syndrome (GBS). Over 80% of affected individuals developed GBS within 21 days after the first vaccine dose. The onset interval was shorter following mRNA vaccination than vector vaccination (9.7 ± 6.7 days vs. 14.2 ± 6.6 days). The relative incidence (RI) of GBS within 1–42 days after vector vaccination was 3.10 (95% CI, 1.12–8.62), slightly higher than the RI observed after SARS-CoV-2 infection (2.25; 95% CI, 1.21–4.19), but lower than that following any infection (3.35; 95% CI, 1.83–6.11). Other vaccine platforms showed a much lower risk of GBS.

6) Myth — ***Vaccines cause Bell's palsy or facial paralysis***

- **What evidence shows:** Clinical trials and observational studies initially flagged possible signals (a few cases in trials), but systematic reviews and larger analyses have produced inconsistent results — overall no strong, consistent causal link established. Surveillance continues.

7) Myth — ***Vaccines cause long-term chronic disease, cancer, autoimmune disease***

- **What evidence shows:** There is **no high-quality evidence** that COVID-19 vaccines cause cancer or widespread chronic autoimmune diseases. Vaccines are intensively monitored, and no credible causal signal linking vaccination to cancer emergence has been validated. Autoimmune events are monitored; rare immune-mediated adverse events have been reported but are uncommon and evaluated. Public-health

authorities and long-term surveillance have not confirmed a broad chronic disease risk.

8) Myth — *Vaccines (or spike protein) circulate and cause systemic "toxic spike" effects / persistent spike protein damage*

- **What evidence shows:** Some lab studies show spike protein can be bioactive in certain contexts; however, vaccine-generated spike is typically transient and produced locally in small amounts that stimulate immune response. Clinical evidence that vaccine-produced spike protein causes systemic "toxic" disease in the general vaccinated population is lacking. Regulatory and expert reviews interpret the balance of evidence as vaccines being safe for approved uses.

9) Myth — *Vaccines lead to increased deaths attributed to vaccination (reports in VAERS prove this)*

- **What evidence shows:** Passive reporting systems such as VAERS (U.S.) collect reports of adverse events following vaccination, including deaths; however, a VAERS report does not imply causation. Most reported deaths are determined to be coincidental or within expected background rates upon investigation. Epidemiologic analyses from more than 50 countries comparing expected versus observed mortality consistently show no evidence of widespread vaccine-related deaths. Comprehensive case reviews and large population studies confirm that COVID-19 vaccines have a strong safety profile.

10) Myth — *Vaccines disrupt menstrual cycles, cause long-term reproductive changes*

- **What evidence shows:** Multiple observational studies and reviews report **transient** menstrual changes (timing, flow) in some people after vaccination; most effects appear short-term and resolve within a few cycles. Some registry/epidemiologic studies report small transient increases in presentations for menstrual changes; causality mechanisms are under study. The consensus: short-term changes occur for some individuals, but persistent reproductive harm is not established. Additionally, evidence indicates that SARS-CoV-2 infection and long COVID are associated with significant disruptions in menstrual bleeding patterns, whereas the impact of COVID-19 vaccination on menstruation appears to be considerably milder and less persistent.

11) Myth — *Vaccines contain microchips / tracking devices / magnets (conspiracy claims)*

- **What evidence shows:** These are conspiracy claims with **no credible evidence**. Vaccine vials and ingredients are public (regulatory filings list components) and do not include microelectronics. Public health agencies and fact-checks have repeatedly debunked these myths.

12) Myth — *Graphene/graphene oxide in vials*

- **What evidence shows:** A small number of private analysts and a few papers/posts (some in low-quality journals or preprint outlets) claimed to detect graphene/graphene oxide in vials. These results were widely criticized for weak methods and unknown sample provenance.
- A Spanish analysis (and related reports) used Raman and other microscopy on a vial they said was vaccine and reported signals they interpreted as graphene. The sample's origin was uncertain, and experts flagged methodological flaws and lack of controls — so conclusions were not validated. That report and similar small studies were amplified on social media and politicized.
- What evidence shows: Independent fact-checks conclude the claims are unfounded. Major regulators (EMA, MHRA/UK, FDA) and vaccine manufacturers state the authorized vaccines do **not** contain graphene or graphene oxide; ingredients are public and subject to independent batch-release testing. Freedom-of-Information replies, and regulatory statements explicitly say no graphene is present.
- Graphene oxide has legitimate research uses (including as a lab tool to study

nanomaterials) but is **not** an approved vaccine excipient; detecting it reliably needs validated methods and known, chain-of-custody vials. Single, non-reproducible tests on unidentified vials are weak evidence. OMCL (official medicines control laboratory) batch testing would find undeclared excipients.

Conclusions

Vaccine hesitancy fueled by myths and misinformation became especially visible during the COVID-19 pandemic. False claims about vaccine safety, fertility, DNA alteration, and mortality spread rapidly, often overshadowing the overwhelming scientific evidence supporting vaccination. While rare adverse events such as **myocarditis**, **Guillain–Barré syndrome**, and **thrombotic events** have been associated with certain COVID-19 vaccines, extensive research shows that these conditions occur **far more frequently and severely following SARS-CoV-2 infection** itself. The **benefit–risk balance remains overwhelmingly in favor of vaccination**, which continues to prevent millions of hospitalizations and deaths worldwide.

Combating myths and misinformation requires open, ongoing communication that anticipates and addresses emerging fears before they take hold. Physicians and other health care professionals remain the most trusted voices in countering misinformation, but restoring confidence also depends on understanding the psychological, social, and cultural factors that make such myths persuasive.

Effective responses must be **evidence-driven and locally tailored**, supported by skilled science communicators who can translate data into clear, accessible messages. Ultimately, consistent and transparent communication—grounded in science rather than emotion—is essential to dismantle misinformation, strengthen trust, and ensure resilient public health systems capable of withstanding future waves of vaccine skepticism.

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Best Practice

THE IMPORTANCE TO VACCINATE AGAINST ROTAVIRUS, HEPATITIS A, HEPATITIS B, RESPIRATORY SYNCYTIAL VIRUS, AND MENINGOCOCCAL DISEASE IN THE UNITED STATES

The recent updates issued by the U.S. Centers for Disease Control and Prevention (CDC) on routine childhood immunization underscore the importance of evidence-based guidance to support effective disease prevention and equitable access to vaccination.

The proposed changes to routine childhood immunization recommendations reflect a shift in how certain vaccines are positioned within the national immunization framework. Rather than indicating concerns about vaccine safety or regulatory approval, these updates primarily affect the strength and scope of CDC recommendations, with some vaccines no longer included as part of routine use for all children. This distinction is important, as the underlying vaccines remain authorized and available, but their uptake may increasingly depend on individual clinical decision-making, state policies, insurance coverage, and public perception.

Such changes have the potential to introduce greater heterogeneity in vaccination coverage across populations and regions. While overall vaccination rates are unlikely to fall to zero, reduced uniformity in recommendations may weaken herd immunity for specific diseases, making outbreaks more sporadic and less predictable. The full public health impact remains difficult to estimate, particularly given that available data largely derive from pre-vaccination eras or from current effectiveness studies that assume higher baseline coverage than may exist under the revised framework.

In addition, alterations to CDC guidance can have downstream effects beyond U.S. borders, as CDC recommendations often inform global policy decisions, procurement strategies, and public confidence in vaccination programs. Taken together, these proposed changes underscore the need for careful monitoring, transparent communication, and continued emphasis on evidence-based decision-making to safeguard disease prevention efforts and promote equitable access to immunization.

The perspective portrayed on this article is rooted in rigorous scientific evaluation, global public-health principles, and the collective responsibility to protect children from preventable diseases. Without political affiliation, this statement is guided exclusively by the commitment to safeguarding pediatric health, maintaining high vaccination coverage, and ensuring that policy decisions remain aligned with the best available scientific evidence to mitigate potential public-health implications on disease prevention, vaccine confidence, and equitable access across diverse populations.

- **Clarification**: The FDA has not withdrawn these vaccines; what has changed is the CDC's decision to no longer recommend them as part of routine immunization.
- **Herd immunity variability**: Coverage rates will not drop to zero, but herd immunity, though decreased, will become variable and unpredictable.
- **Uncertainty**: At this point, it is impossible to know the precise impact of this change.
- **Limitations**: The available data come from the pre-vaccination era and current effectiveness data, which limits accurate projections.
- **Scope**: We will address rotavirus, hepatitis A, hepatitis B, respiratory syncytial virus (RSV), and meningococcal disease. Discussing influenza currently is not feasible, as even a probable estimate is unrealistic under current uncertainty.
- **Exclusion**: comparisons with previous changes related to SARS-CoV-2 vaccination are not included.
- **Globalization**: The CDC's "non-recommendation" position will likely have consequences beyond the United States—an impact that is currently impossible to quantify.

Rotavirus, implemented in 2006.

Impact of Rotavirus Vaccination in the United States (2000–2019)

From 2000 to 2019, childhood vaccination against rotavirus in the United States had the following impact:

- ~1.1 million fewer emergency department visits

- ~400,000 fewer hospitalizations
- ~1.2 billion dollars in medical costs avoided
- ~1,400 infant deaths prevented

Overall, rotavirus vaccination reduced the incidence of severe rotavirus disease in children by approximately **80%**.

Hepatitis A, implemented in 1995.

Even with this great reduction of cases in children, there have been ongoing outbreaks of hepatitis A disease in the US since 2016, mostly spread through close personal contact in adults:

- 37 states affected
- More than 44,000 cases
- More than 400 deaths

A review of published studies evaluated the health outcomes, economic burden, and outbreak management considerations of US hepatitis A outbreaks since 2016.

Health Outcomes (33 studies), the most common adverse health outcomes from Hepatitis A disease were:

- Acute liver failure
- Liver transplantation
- Sepsis/septic shock
- Hepatic encephalopathy

Across studies, hepatitis A disease was reported to result in:

- Over 41% hospitalization rate
- Up to 11% case fatality rate

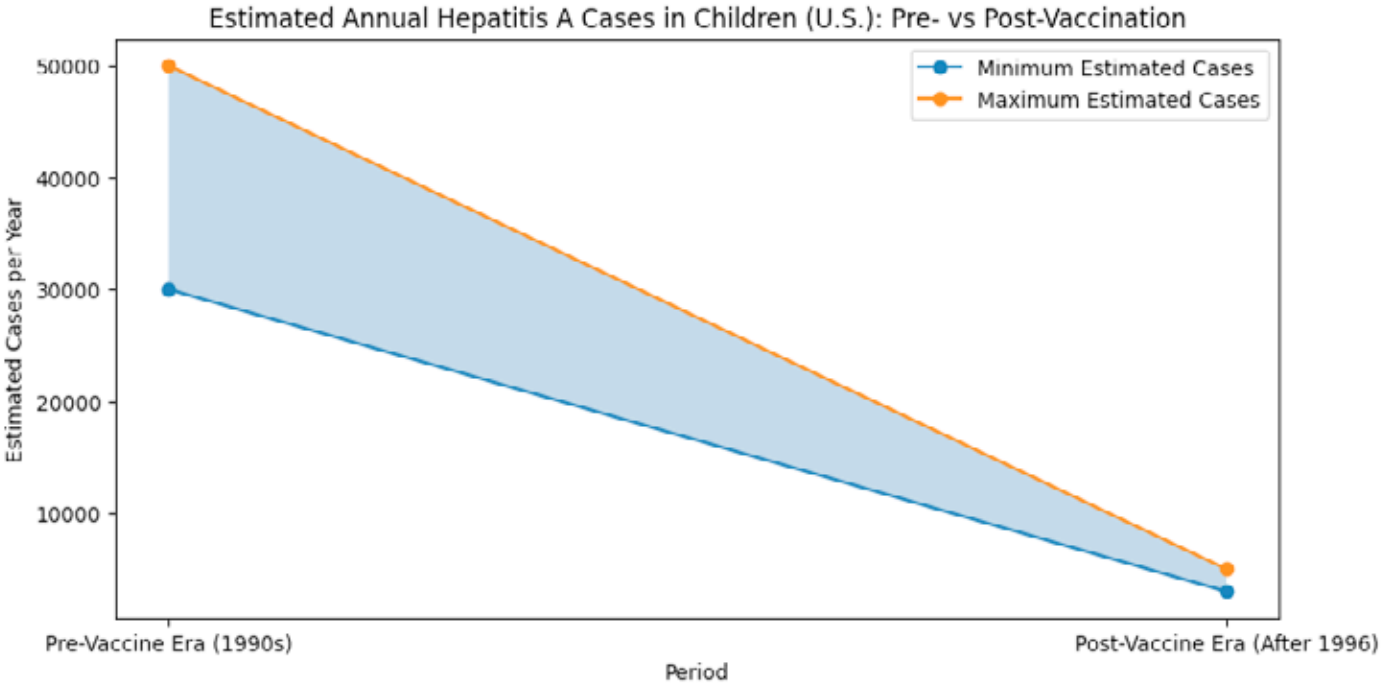
Economic Burden (10 studies), the estimated national average cost per hepatitis A–related hospitalization in 2017 was:

- Over $16,000 per person
- A 2017 outbreak resulted in:
- $253 spent per employee evaluated for Hepatitis A exposure by a city health department.

What impact can we expect now without even vaccinating children?

Hepatitis B (HBV), implemented in 1994.

Vertical transmission of hepatitis B virus (HBV)—from mother to child—is highly efficient. In the absence of preventive



interventions, transmission rates range from:

- 70–90% in HBeAg-positive mothers
- 10–40% in HBeAg-negative mothers

Factors that contribute include:

- Mode of delivery
- Amniocentesis and other invasive obstetric procedures
- Breastfeeding

Since 1994, the first dose of the HBV vaccine has been administered within the first 24 hours of life. As a result, approximately 90,100 infant deaths have been prevented.

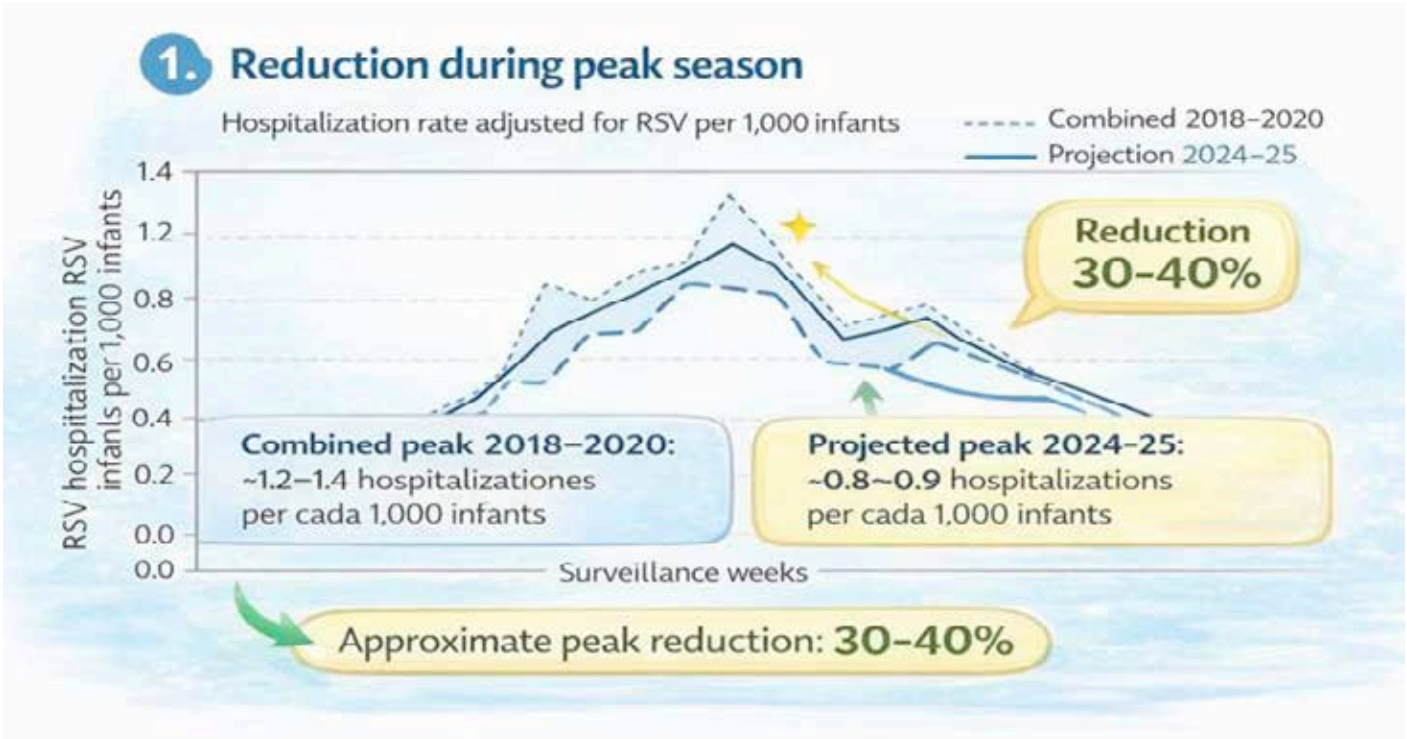
The birth dose is the only intervention that provides immediate protection for the newborn, even when maternal infection has not yet been detected.

Potential impact of discontinuing vaccination:

- Projections show that without the HBV vaccine birth dose, between 18,000 and 20,000 babies per year in the United States would be born infected.
- In the short term, this increase may not be immediately apparent, but the negative consequences would emerge over time.
- Most of these babies would develop chronic HBV during childhood. As the years go by, these children would face an increased risk of:
  - Liver cirrhosis
  - Hepatocellular carcinoma (liver cancer)
  - Liver failure and premature death
- Suspending birth-dose vaccination would create a silent burden, with the most severe effects emerging decades later.

Respiratory Syncytial Virus (RSV), implemented in 2023.

The available data are relatively new. However, even with less than two years since its introduction, nirsevimab has already demonstrated a substantial reduction in RSV-related hospitalizations. Early surveillance reports consistently show meaningful decreases in seasonal peak admissions, reinforcing the real-world effectiveness of nirsevimab in preventing severe RSV disease among infants.



Serogroups A, C, W, Y Meningococcal Disease, implemented routinely in 2005 at 11-12 years old.

Adolescents and young adults are the primary transmitters of meningococcus.
This age group has the highest rates of *nasopharyngeal carriage* of *Neisseria meningitidis*, meaning they often carry the bacteria in the throat without showing symptoms. Through close social behaviors—including kissing, sharing drinks or utensils, living in close quarters, and attending crowded social events, they play a central role in spreading the bacteria to others, including infants and young children who are at much higher risk of severe disease.

Neisseria meningitidis can cause rapid, life-threatening infections such as meningitis and meningococcal septicemia, where early vaccination is crucial for prevention.

To reduce transmission and protect vulnerable populations, routine meningococcal vaccination has been recommended for adolescents at 11–12 years of age since 2005.

This strategy not only protects the vaccinated individual but also helps reduce community transmission, lowering the overall incidence of meningococcal disease.

Estimated Impact of the MenACWY Vaccine in the United States (2005–2021):

Between 2005 and 2021, MenACWY vaccination in the U.S. is estimated to have prevented:

Adolescents aged 11–15 years:

- 172 cases of invasive meningococcal disease (95% CI: 85–345)
- 16 deaths prevented (95% CI: 8–31)
- Young adults aged 16–23 years:
- 328 cases of invasive meningococcal disease (95% CI: 164–646)
- 38 deaths prevented (95% CI: 19–75)

Impact without vaccination:

Without the MenACWY vaccine, the cumulative incidence of invasive meningococcal disease in these age groups would have been at least 59% higher.

In total, without MenACWY vaccination, at least 54 deaths and around 500 additional cases of invasive meningococcal disease would have occurred among adolescents and young adults between 11 and 23 years of age.

Overall Consequences of Not Routinely Recommending Childhood Vaccination Against Rotavirus, Hepatitis A, Hepatitis B, RSV, and Meningococcal Disease:

If routine childhood vaccination against these pathogens is discontinued or no longer recommended, multiple serious consequences can be expected at the individual, community, and national levels. These consequences will not always be immediate. In many cases, the full impact will emerge gradually over years or decades.

Risks:

1. Increased disease incidence and outbreaks:

Without routine immunization, the incidence of all five vaccine-preventable diseases would rise. Outbreaks could become more frequent and more severe due to lower population immunity. This increase may occur:

- Rapidly (e.g., rotavirus, RSV, hepatitis A) due to seasonal circulation.
- Slowly but steadily (e.g., hepatitis B, meningococcal disease), with cases accumulating over time.

2. Loss of herd immunity and higher transmission:

Routine childhood vaccination is essential for maintaining herd immunity. Stopping routine vaccination would:

- Reduce overall immunity in the population.
- Allow silent transmission to increase.
- Increase risk for vulnerable individuals such as newborns, immunocompromised people, and older adults. (This effect is particularly significant for *meningococcal disease* and *hepatitis A*, which spread efficiently through asymptomatic carriers)

3. Increased hospitalizations and emergency visits:

All five diseases commonly lead to hospitalization in children. Without routine vaccination, the U.S. would likely see:

- More emergency visits for severe dehydration (rotavirus).
- Higher hospitalization rates in infants (RSV).
- More admissions due to fulminant hepatitis or liver failure (hepatitis A and B).
- Intensive care hospitalizations for meningococcal sepsis and meningitis.

Hospital burden would rise seasonally and unpredictably.

4. Preventable deaths:

Each of these pathogens can cause fatal disease, which could occur quickly or decades later. The absence of routine vaccination would predictably increase:

- Infant and toddler deaths from rotavirus.
- Deaths from fulminant hepatic failure due to hepatitis A.
- Premature deaths from chronic hepatitis B progressing to cirrhosis or liver cancer.
- Infant deaths from severe RSV infection.
- Rapid, unexpected deaths from meningococcal septicemia or meningitis

5. Long-term complications and chronic disease:

Many of these infections increase lifetime healthcare needs and reduce quality of life and have long-term or permanent consequences:

- Chronic hepatitis B → lifelong infection, cirrhosis, liver cancer.
- Meningococcal disease → amputations, neurological disability, hearing loss.
- Severe RSV → recurrent wheezing, long-term pulmonary issues.
- Rotavirus → impaired nutrition and growth in severe or repeated cases.

6. Higher healthcare costs:

Economic analyses show that prevention is dramatically more cost-effective than managing outbreaks and chronic disease. Stopping routine immunization would increase:

- Emergency room visits.
- Hospital admissions.
- ICU stays.
- Use of antivirals, monoclonal antibodies, and long-term treatments.
- Public health outbreak responses.

7. Increased community spread from adolescents and adults:

When children are not vaccinated, adolescents and adults become the main carriers. This creates sustained reservoirs of infection, particularly relevant for:

- Meningococcal disease, spread through close contact.
- Hepatitis A, spread through person-to-person contact.
- RSV, which adults can transmit back to infants.

8. Delayed but severe long-term burden:

Some consequences would emerge only after many years, creating a hidden burden that becomes visible only when complications develop:

- Infant hepatitis B infections would progress to chronic disease.
- Chronic liver disease and liver cancer would rise decades later.
- Meningococcal carriage would increase silently until outbreaks occur.

9. Widening health inequities:

Out-of-pocket costs and prescription requirements would reduce access further. Removing routine vaccination disproportionately harms:

- Low-income families.
- Rural communities.
- Infants without regular medical access.
- Populations with higher baseline disease prevalence.

10. Decline in public trust and confusion:

A shift in recommendations increases broader public-health risks and can lead to:

- Misinterpretation that vaccines are unsafe.
- Sharp drops in uptake of other routine vaccines.
- Increased vaccine hesitancy

Summary Statement

The consequences of not routinely vaccinating childhood against rotavirus, hepatitis A, hepatitis B, RSV, and meningococcal disease are not theoretical—they are measurable, predictable, and historically documented before vaccines existed. Routine vaccination remains the most effective strategy to protect children and the community. The United States could potentially face:

- Higher disease incidence
- More outbreaks
- Increased hospitalizations
- Preventable deaths
- Long-term disability and chronic illness
- Higher healthcare spending
- Greater transmission in unprotected communities
- A delayed but significant burden of severe disease

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Guest Contributors

NUTRITIONAL STATUS AND IMMUNE RESPONSE TO VACCINES

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Introducción

The interaction between nutritional status and systemic immune response has been established for decades. Optimal nutritional status is associated with a better immune response, while conditions that compromise nutritional health contribute to a higher risk of infectious diseases, their clinical course, and prognosis.

Globally, children experience one or more forms of malnutrition that affect their health and development (1 – 3).

The immune system integrates two fundamental response mechanisms: the innate and the adaptive immune responses. Various factors regulate these functions, with adequate nutritional status being crucial for the development, maintenance, and expression of the immune response (4 – 6).

Vitamins and minerals regulate and modulate all stages of the immune response, so a deficiency in one or more of these micronutrients can affect both, favoring a state of

greater vulnerability of the host to infections of any type (7 – 9).

The immune system and its association with nutritional status.

Children with undernutrition have an increased risk of dying from infectious diseases. Undernutrition has been considered the underlying cause of 45% of child deaths; that is, it is estimated to be a direct or indirect factor in just over 3 million deaths of children under 5 years of age.

Immune deficiency associated with malnutrition leads to (10):

a. Impaired intestinal barrier function

b. Reduced exocrine secretion of protective substances

c. Low levels of plasma complement

d. Structural changes in lymphatic tissue

e. Retarded delayed-type hypersensitivity responses

f. Reduced levels of antibodies produced after vaccination

g. Cytokine patterns skewed toward a Th2 response

Immunizations are considered the most effective public health intervention strategy for containing morbidity and mortality from infectious causes (10). The humoral and cellular immune response achieved with immunizations has an individual profile that is determined, among other things, by the following factors:

a. Host. Age, sex, genetics, and the presence of any acute or chronic condition.

b. Vaccine. Vaccine-related factors include type, schedule, dose, adjuvants, route of administration, and quality of the biological product.

c. Perinatal stage. The pregnant woman's biological and nutritional status, gestational age, birth weight, breastfeeding, and maternal immunity.

d. Microbiological regulation. Pre-existing immunity, microbiota, infections, and antimicrobial use.

e. Habits. Alcohol or tobacco consumption, stress, physical exercise, and sleep quality.

f. Environment and culture. Seasonality, geography, and family size.

g. Nutrition. The influence of nutritional status on immunity and response to vaccination is mediated by factors such as body mass index (BMI), nutritional status, and micronutrient intake (zinc, vitamins A, D, E, and C).

Impact of nutritional status on vaccine-induced immunity

Undernutrition

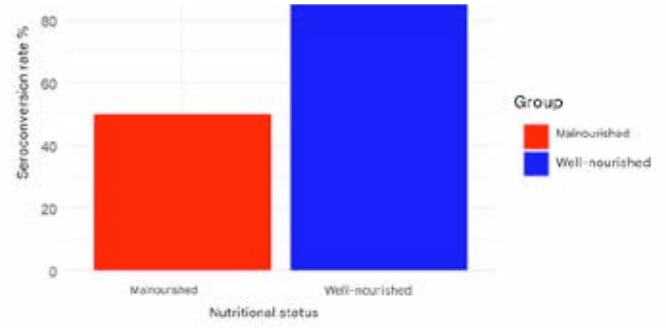
The type and severity of undernutrition affect various immunological pathways. Protein-energy malnutrition affects both innate and adaptive immunity by reducing lymphocyte proliferation, impairing T-cell function, and decreasing the production of specific antibodies and the memory response.

Deficiencies in vitamin A, zinc, and iron further impair host immunity by altering mucosal integrity, modifying cytokine production, and reducing the synthesis of neutralizing antibodies.

Therefore, vaccines against poliomyelitis, measles, and rotavirus exhibit reduced immunogenicity and lower seroconversion rates in children with these nutritional conditions (11-15).

Seroconversion rates for oral polio vaccine (OPV) in undernutrition (undernutrition) children versus well-nourished children (14).

Other studies have shown that malnourished children have lower antibody responses to the



hepatitis B, MPVS, measles, polio, pertussis, salmonella and tetanus vaccines (16-19).

Micronutrients

In a prospective study of 300 infants aged 6 months to 5 years, the effect of micronutrient supplementation prior to immunization with various vaccines was evaluated. Serum levels of vitamin A, zinc, vitamin D, and iron were measured before and after supplementation. Antibody titers against the DTP, MMR, hepatitis B, and pneumococcal vaccines were assessed by ELISA before and between 4 and 6 weeks after vaccination. The results showed that children in the intervention group exhibited significantly greater improvements in serum micronutrient levels and increased seroconversion rates for all vaccines studied (DTP: 90% vs. 77%; MMR: 91% vs. 72%; Hepatitis B: 95% vs. 79%; Pneumococcal: 88% vs. 71%; $p < 0.01$). Mean antibody titers after vaccination were between 30% and 40% higher in the intervention group. Regression analysis confirmed that vitamin A and zinc are strong positive predictors of vaccine response (20).

Studies in children have not found any association between vitamin D levels or supplementation with antibody responses to the trivalent influenza vaccine; however, they do show a tendency towards a decrease in antibody responses following administration of the measles, mumps, and rubella vaccine.

Supplementation with vitamins A and D results in more intense tuberculin skin reactions and a lower interferon response following BCG vaccination.

Vitamin A administered concurrently with the measles vaccine at 6 months of age leads to

a decrease in the seroconversion rate only in infants with maternal antibodies (21-47).

Overweight and Obesity

Numerous studies in adults demonstrate that an increase in BMI is inversely correlated with antibody responses to hepatitis A and hepatitis B vaccination (47). Following vaccination with the trivalent influenza vaccine, initially, an increase in BMI correlated with greater antibody responses. However, twelve months after vaccination, a higher BMI was associated with a lower antibody response, and obese individuals also showed fewer specific CD8 T cells and less interferon-gamma production (47).

Conclusions

The immune response is influenced by various external and internal factors.

Nutrition is one of the most important regulatory factors of the immune system and its functions.

Integrating nutritional assessment and support into immunization programs could improve outcomes in resource-limited settings and strengthen herd immunity.

Micronutrient supplementation and improved nutrition significantly increase the immunogenicity of vaccines in early childhood.

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