VACCINES BEAT

THE WORLD OF PNEUMOCOCCUS

Inside the mind of pioneer researcher **Prof. Ron Dagan**

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

WORLD HEALTH ORGANIZATION

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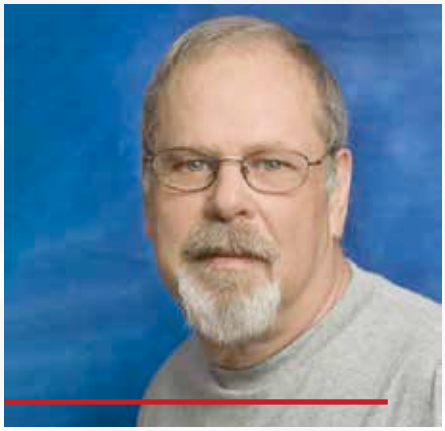

Doctor Ron Dagan is a Distinguished Professor of Pediatrics and Infectious Diseases at Ben-Gurion University of the Negev in Beer-Sheva, Israel. He is also a founding member of the World Society for Pediatric Infectious Diseases (WSPID) and a Fellow of the Infectious Diseases Society of America (IDSA). He has gained international recognition for his pioneering research, which has primarily focused on vaccine-preventable diseases. His work has made significant contributions to several key areas, including: the development and impact of pneumococcal vaccines; understanding the epidemiology of hepatitis A and the introduction of hepatitis A vaccines; the epidemiology of respiratory infections in children; clinical aspects of vaccination against antibiotic-resistant pneumococci; the pathology of otitis media, including the role of resistant organisms and the prediction of bacteriological responses to various antibiotics; and the epidemiology and prevention of enteric and invasive infections in young children. Prof. Dagan founded the Pediatric Infectious Disease Unit at Soroka University Medical Center in Beer-Sheva, Israel, and served as its director from 1987 until June 2014. Additionally, he served as an advisor for Infectious Diseases at the Israeli Ministry of Health and was President of the European Society for Pediatric Infectious Diseases (ESPID). He received his MD degree in 1974 from Hadassah Medical School, Hebrew University, Jerusalem. In 1982, he pursued a three-year fellowship in pediatric infectious diseases at the University of Rochester, New York, where he was appointed Adjunct Associate Professor of Pediatrics.

Full Bio

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LETTER FROM EDITORS

Welcome to our sixth issue of Vaccines Beat. We are excited to continue our mission of communicating, educating, and promoting knowledge in the fields of vaccinology and vaccination.

In our 'Coffee with an Expert' section, we are deeply honored to feature an interview with Doctor Ron Dagan, a worldwide distinguished Professor of Pediatrics and Infectious Diseases at Ben-Gurion University of the Negev in Beer-Sheva, Israel. He is also a founding member of the World Society for Pediatric Infectious Diseases (WSPID), and a Fellow of the Infectious Diseases Society of America (IDSA). He has gained international recognition for his pioneering research, which has primarily focused on vaccine-preventable diseases. His work has made significant contributions to several key areas, including: the development and impact of pneumococcal vaccines; understanding the epidemiology of hepatitis A and the introduction of hepatitis A vaccines; the epidemiology of respiratory infections in children; clinical aspects of vaccination against antibiotic-resistant pneumococci; the pathology of otitis media, including the role of resistant organisms and the prediction of bacteriological responses to various antibiotics; and the epidemiology and prevention of enteric and invasive infections in young children.

The 'Editor's Corner' section is entitled as "Vaccination: A Story of Success and Ongoing Challenges, 50 Years After the Launch of the Expanded Programme on Immunization (EPI)". In this section we summarize the history, as well as achievements, organizations, acts, and contributors that have saved more than 154 million lives, but also emphasize the need for increasing efforts from all parties, since, despite significant achievements, there is still much to be done. In our view, scientific leaders must collaborate with their counterparts in the financial and political sectors. Without this partnership, the substantial disparities in vaccine access and implementation will persist, preventing a net global meaningful progress. First and foremost, there is no comparison between the investment in war and weapons and the investment in preventive medicine.

The 'Best Practice' section highlights the September 2024 meeting of the Strategic Advisory Group of Experts (SAGE) on Immunization. In commemoration of 50 years since the launch of the Expanded Programme on Immunization (EPI), SAGE presented key conclusions and recommendations centered on the Immunization Agenda 2030 (IA2030). The meeting also provided updated guidance on vaccines for Respiratory Syncytial Virus (RSV), Poliomyelitis, Rubella (including Congenital Rubella Syndrome), Mpox, COVID-19, and Avian Influenza.

In the 'Guest Contributor' section, we are honored to feature Dr. Alfonso Rodriguez-Morales, a globally renowned expert in Infectious Diseases and Vaccinology. As the current President of the Latin American Society of Travel Medicine, Dr. Rodriguez-Morales provides a masterful exploration of traveler vaccines in Latin America, thoughtfully dividing the topic into key areas for comprehensive understanding; the Risk Landscape in Latin America; Why Vaccines Are Essential for Travelers? Key Vaccines for Travelers to Latin America; Public Health Implications, and Conclusions.

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 informative and engaging, and we look forward to continuing this unique effort in support of a healthier planet, not to mention our heartfelt best wishes for the year ahead in 2025.

Javier Casellas, M.D., Ph.D.
Chief Editor

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

Javier Casellas

Well-recognized Argentinian Pediatrician and Infectious Diseases Specialist with more than 17 years of experience on Medical Affairs & Clinical Research on Vaccines field within different multinatinational & recognized Pharmaceutical Companies. (GSK and Novartis Vaccines)

From 2005 to 2015 Dr. Casellas worked as Vaccines Medical Affairs / Clinical Research Director (GSK and Novartis vaccines in Latam Region) with experience on vaccine clinical research, medical affairs activities, vaccine pharmacovigilance, public & private vaccine market access, strong relationship with MoHs across Latam and supranational organizations (such as PAHO, and Sabin Institute), and has published several scientific papers and posters in international journals and meetings, among the most relevant medical activities.

Since 2016 Dr. Casellas became an Independent Vaccine Consultant. From 2016 to 2018, Dr. Casellas joined an NPO (FIDEC, Miami, FL, USA) as Medical Manager working on vaccine clinical trials along with Bill and Melinda Gates Foundation. Currently, Dr. Casellas works on global & regional Vaccine and Infectious Diseases (IDs) trials at IQVIA as Global Medical Director within the Infectious Diseases and Vaccines Team.

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.

He is an Overseas Fellow of the Royal Society of Medicine of the United Kingdom and a member of several international associations in Infectious Diseases. 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 a member of the Mexican Committee for the Elimination of Measles, Rubella, and Congenital Rubella, and the Scientific Committee on Health Issues of the Mexican Government in Baja-California. 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.

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Coffee with the Expert

THE WORLD OF PNEUMOCOCCUS

Inside the mind of pioneer researcher Prof. Ron Dagan

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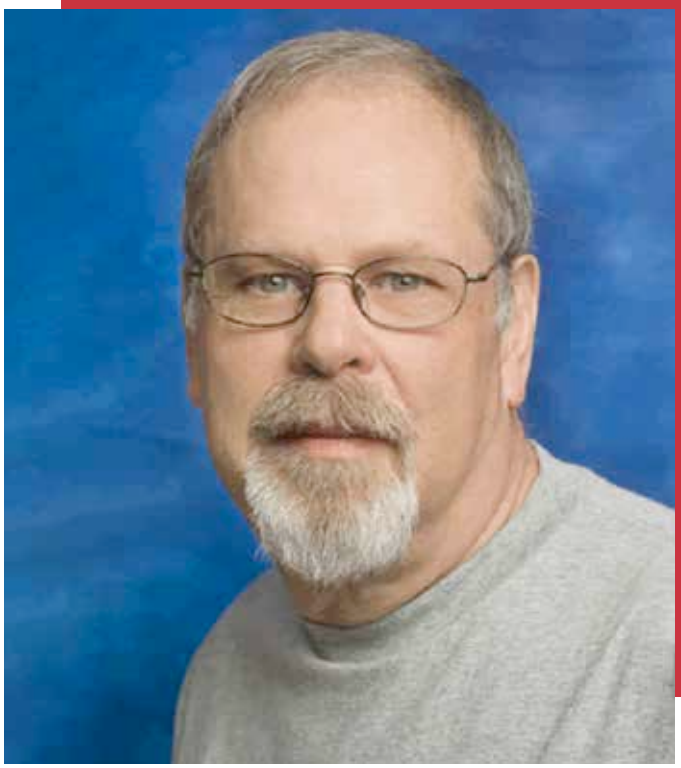

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He has gained international recognition for his pioneering research, which has primarily focused on vaccine-preventable diseases. His work has made significant contributions to several key areas, including: the development and impact of pneumococcal vaccines; understanding the epidemiology of hepatitis A and the introduction of hepatitis A vaccines; the epidemiology of respiratory infections in children; clinical aspects of vaccination against antibiotic-resistant pneumococci; the pathology of otitis media, including the role of resistant organisms and the prediction of bacteriological responses to various antibiotics; and the epidemiology and prevention of enteric and invasive infections in young children.

Prof. Dagan founded the Pediatric Infectious Disease Unit at Soroka University Medical Center in Beer-Sheva, Israel, and served as its director from 1987 until June 2014. Additionally, he served as an advisor for Infectious Diseases at the Israeli Ministry of Health and was President of the European Society for Pediatric Infectious Diseases (ESPID).

He received his MD degree in 1974 from Hadassah Medical School, Hebrew University, Jerusalem. In 1982, he pursued a three-year fellowship in pediatric infectious diseases at the University of Rochester, New York, where he was appointed Adjunct Associate Professor of Pediatrics.

An active member of numerous national and international advisory committees, Prof. Dagan has contributed significantly to global health initiatives, such as the World Health Organization (WHO) on the Pneumococcal Nasopharyngeal Carriage Working Group and the Pneumonia Radiology Working Group.

As he continues to build his legacy, Professor Dagan's research has already played a pivotal role in advancing global understanding of critical health issues, especially in the realm of pediatric infectious diseases.

Pneumococcal conjugate vaccine

Conjugate vaccines are not a new concept, but their widespread use took time to develop. The first conjugate vaccine, the *Haemophilus influenzae* type b (Hib) vaccine, was relatively straightforward as it involved conjugating to a single antigen. However, the development of a pneumococcal conjugate vaccine presented a much more complex challenge, given that there

are over 100 pneumococcal serotypes (STs). The initial challenge was to determine which serotypes were responsible for the most disease.

"And it came out, according to the limited studies that were done at that time, that maybe the seven serotypes that were included in PCV7 are the ones that caused most of disease in children," recalls Prof. Dagan. The next hurdle was combining these seven serotypes into a single vaccine.

"In fact, it's a combined vaccine with seven vaccines. It's a very complex production. And, some other complex questions about what happens when you put all this together, when you conjugate them to the same carrier, which carrier to find that is safe enough, but immunogenic enough," he adds.

The journey from a mono-vaccine to a bi-vaccine, then to a tetra-vaccine, took several years. However, in 2000, the first commercial pneumococcal conjugate vaccine (PCV) was introduced in the United States. Since then, the landscape of pneumococcal disease has evolved significantly.

"I remember when we were part of the people who were discussing PCV in the early 90s. It's about 35 years ago, not like prehistory. And we all were talking about IPD (invasive pneumococcal disease). Because IPD is the easiest disease to look at because, by definition, it's a Pneumococcus isolated from a sterile fluid. And you can do [test] the serotype, and you can do [test] susceptibility," Prof. Dagan explains.

While IPD provided clear data on serotypes and disease burden, Prof. Dagan notes that it also had its limitations stating that "it was an easy definition, but a difficult issue to follow" because IPD was only detectable through blood cultures, CSF and other sterile site cultures, and not every case of pneumococcal disease is blood culture positive. Still, it allowed to gather valuable data on disease specificity, including serotype and disease rates, which helped estimate the burden of disease, in the range of a few dozens to hundreds per 100,000.

"This was our first concept. But we knew the Pneumococcus was much more important than that. We knew Pneumococcus causes a lot of pneumonias. We knew Pneumococcus causes a lot of acute otitis media (AOM). And we knew it causes sinusitis and other diseases. But we didn't know how to measure [the contribution of Pneumococcus, especially that of vaccine serotypes, to] them," he explains.

The roadmap to PCV7

Defining the pneumococcal burden was a big challenge. When Prof. Dagan and his team started the PCV7, new insights were gained.

"First, we understood the big effect [impact] of the pneumococcal conjugate [on] nasopharyngeal (NP) carriage. And, therefore, we understood the big effect on, on one hand, herd protection, and on the other hand, [serotype] replacement. Because we started to understand that Pneumococcus is part of the flora," he details.

Prof. Dagan and his team then started to measure the effect of the vaccine on mucosal diseases, such as acute otitis media (AOM) and pneumonia, both difficult to the define, and with often unclear extent of the contribution of Pneumococcus. The researcher studying the impact of PCVs introduced the concept of vaccine probe, which means you introduce the vaccine, you observe the impact on the burden, and then you go back and you understand how much Pneumococcus, especially of vaccine serotypes, was responsible for that burden.

"When we understood [the true burden of] pneumococcal disease, we [appreciated] that the [estimated] PCV7 potential benefits [before implementation] was basically nothing compared to the real benefits that it brought in. This [PCV7 implementation] brought a huge reduction in IPD first, of course, especially in the developed countries where the 7 serotypes are more important. But it also did not take everything away because there are other serotypes," asserts Prof. Dagan.

Thus, the introduction of PCV7 had a huge effect. It brought relief in recurrent and complicated AOM, it was shown to reduced pneumonia, especially bacteremic pneumonia. Because the effect on carriage started to be very clear in countries that introduced PCV7 into the national immunization program (NIP), it also had an effect on other populations, like the non-vaccinated population (neonates, very young children, immunocompromised persons, and adults).

From PCV7 to PCV13

One key realization for Prof. Dagan was that there had been insufficient real-world epidemiological data before the decision was made to introduce PCV7 as the optimal pneumococcal vaccine. While PCV7 studies had established its potential efficacy, effectiveness, and impact after introduction, the need for further data was clear.

"So, we understood that some STs, like serotype 1, serotype 5, were very, very important in pediatrics, especially the more important the more you go into developing worlds. And they were very invasive, and we just missed them at all in the PCV7," he said.

During the use of PCV7, it became evident that some serotypes were still causing significant disease burden. As the impact of PCV7 began to wane due to increasing disease with some non-PCV7 invasive isolates, in certain populations, the need for a broader-spectrum pneumococcal vaccine became clear. This led to the introduction of PCV13 around 2010, which included six additional serotypes beyond those covered by PCV7. PCV13 showed a substantial improvement in preventing pneumococcal disease, including pneumonia and addressing the evolving challenges of pneumococcal disease.

Beyond PVC13

The question of the vaccine's spectrum is crucial, and it's important to remember that there are over 100 pneumococcal serotypes (STs) present in the nasopharynx (NP). After over 25 years of research, Prof. Dagan agrees that the current consensus is that pneumococci are an essential part of the normal flora in children and may not be completely eliminated.

On the one hand, we know that certain serotypes still cause significant disease. Though somewhat philosophical, according to Prof. Dagan, the question that remains is extremely important: How far can we go in targeting specific serotypes before we disrupt the child's microbiome to the point where it causes harm?

We already know that even PCV7, and definitely PCV13, have changed the microbiome of the child, because each serotype that comes instead of the other serotype has different interactions. Because we are also a part of our microbiome, Prof. Dagan concerns on how much can we change before we start to change the child? And is it going to be a perpetual cycle?

It is well established that both PCV7 and PCV13 have already altered the child's microbiome. Each serotype that replaces another can have different ecological interactions, and these changes might have broader implications. "We are, in essence, part of our microbiome," Prof. Dagan points out, raising concerns about how much we can change it without negatively affecting the child's health.

"We're going to give [eliminate] one more serotype, so others are going to come, and we will never be able to take care of them. And we know that each serotype has different invasiveness, and each serotype has different characteristics, but we cannot always predict," he expands.

Despite these concerns, science has pushed forward, leading to the development of vaccines beyond PCV13. Currently, two new vaccines—PCV15 and PCV20—have received approval.

"And this contains very, very important STs that cause a lot of disease. If you go globally, the [additional] PCV20 serotypes [that are not included in PCV13] usually constitute currently anything between 30% to 60% of the leftover [IPD] disease in children," Prof. Dagan explains.

Several manufacturers are now working on vaccines beyond PCV20, each with slightly different serotype combinations. In the future, we will have a broader range of vaccine options, but this may raise challenges in terms of choosing the most appropriate vaccine.

An additional consideration is how vaccination affects the broader population. In vaccinated children, changes to the microbiome may alter the dynamics of serotype transmission within the community. On one hand, adults are exposed to fewer vaccine-targeted serotypes, resulting in a decrease in these diseases. However, certain serotypes that are not problematic in children can be particularly harmful to the elderly.

As a result, many countries are beginning to see a resurgence of IPD and pneumonia in older populations, that are not caused by vaccine serotypes, returning to pre-vaccination levels. One emerging strategy is to use a

complementary vaccine approach: administering a conjugate vaccine with specific serotypes to children to protect both them and many adults through indirect protection, while also offering a different vaccine to adults, to complement for serotypes more problematic in adults.

Carrier-induced immunosuppression

Carrier-induced epitopic suppression (CIES) is a phenomenon in which pre-existing immunity to a vaccine carrier protein can reduce the antibody response to the antigens conjugated to that carrier. This well-known phenomenon was first described in humans by Prof. Dagan's team during studies in the 1980s and early 1990s, involving tetravalent pneumococcal vaccines conjugated to tetanus or diphtheria toxoids.

"We found out that when the vaccine polysaccharides are conjugated to polypeptides, such as tetanus toxoid or diphtheria toxoid, they can result in decreased immune response to antigens that contain tetanus and diphtheria components, including PCV and conjugate Hib vaccines, when the carriers are given in increasing doses" he reminisces. He explains that this issue arose as scientists grew enthusiastic about using CRM197 (a modified diphtheria toxoid) and tetanus as carriers, which were, and still are, common choices for pneumococcal conjugate vaccines (PCVs).

As research progressed, other issues related to adjuvants came to light. The use of acellular pertussis vaccine which replaced the whole cell pertussis vaccines, for instance, reduced some of the adjuvanticity of the whole-cell vaccines when administered simultaneously or in combination with other vaccines, exacerbating the problem. Some companies developing combined Tetanus and Diphtheria conjugate vaccines, such as the 11-valent conjugate vaccine, ultimately halted production when they realized that the carrier-induced immunosuppression would pose significant challenges.

Prof. Dagan emphasized that this eminent phenomenon was not seen when they used only 7 CRM-conjugate serotypes in PCV7, underlying that PCV13, which added six serotypes to the PCV7 carrier, already faced similar issues.

"I don't know how many remember or know, but PCV13 was licensed despite the fact that 2 serotypes did not meet the non-inferiority. It was 9V and 6B. It happens to be that the non-inferiority is something very, very complicated and artificial to be able to license new vaccines based on just immunogenicity rather than efficacy," he recalls.

However, interestingly, those two serotypes that failed to meet non-inferiority were actually among the best-performing conjugates. In contrast, serotypes that met the non-inferiority benchmarks, like type 3, turned out to be less effective.

This shows that immunogenicity, an indirect measure of the impact on memory B cells and crucial for long-term protection, alone may not be the best indicator of vaccine effectiveness, since we do not really know the thresholds for protection by individual serotypes.

Serotype-specific memory B cells are key for long-term immunity. If the immune response is reduced too much at any point, adequate memory might not develop, which could result in a failure to protect against mucosal diseases or later infections. But where exactly is the tipping point? Nobody knows.

This uncertainty raises concerns about the limits of carrier technology. As the push for vaccines with more serotypes continues, Prof. Dagan warns that including more than 20 serotypes with the current technology may lead to diminishing returns. The conjugation process itself will need improvement to handle this complexity.

"There are several ways to do it. New carrier adjuvant is easy to say. It's difficult to do because we took the old known carriers and adjuvants first in order to be safe and effective with children. And now we cannot just take new ones" explains Prof. Dagan, claiming that new carriers, new conjugation methods and new adjuvants are still interesting.

"But so far, I do not see with the new vaccine that are studied up to 30 serotypes with the results that were published in adults or in phase 1 or 2, I don't see that we are getting to a new order of magnitude of immunogenicity," he cautiously continues. "I think it's a big concern. [However], I'm not concerned about PCV20. If you give enough boosters in your community, [allowing indirect

protection for infants, even with somewhat lower immunogenicity after the primary series]"

As vaccine development continues, there is a growing need to balance the inclusion of additional serotypes with their immunogenicity.

"So, we are yet very primitive in our way. I think that the conjugate vaccine is only one phase before we will know something else in the future. But, at the moment, I don't see in the next five years anything that comes better than that," he concludes.

Protein-based pneumococcal candidate vs. pneumococcal polysaccharide conjugate

The pneumococcal polysaccharide conjugate vaccine is widely recognized for its safety. In contrast, protein-based pneumococcal vaccines may not offer the same level of safety, at least according to some of the data currently available. A large-scale study comparing the protein-based vaccine to the standard PCV10 in The Gambia and PCV13 in the United States, showed that while the protein-based vaccine had a safety profile similar to placebo, it did not demonstrate any significant effect on otitis or carriage.

The study also highlighted that most of the carriage in these children involved non-vaccine types, which suggests that a universal vaccine might have potential. The studies showed a nice safety profile. So, you could look at these children, and the addition of protein was very close to placebo. This, in turn, offers some insights into the vaccine's efficacy. "So, the competition is twofold."

Prof. Dagan elaborates on the two main challenges for protein-based vaccines. "One is how we can show efficacy against IPD where you cannot give placebo anymore. So, you only must aim non-vaccine serotype IPD in children vaccinated with PCV20. It will be very difficult," he points out. "And the second is to evaluate immune response for protein vaccines in regard to predictability of the protection. We have sort of correlates of protection with polysaccharides. We don't have correlates of protection with the protein."

For example, while *H. influenzae* protein D, when combined pneumococcal polysaccharides PHiD-CV (PCV10), elicited a strong immune response and demonstrated excellent safety, it did not provide any meaningful protection against *H. influenzae*. Far from something close to Prof. Dagan's goals, he is not very enthusiastic about this direction.

Cost effectiveness

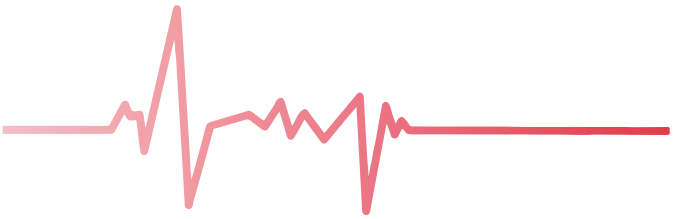
Prof. Dagan, a member of the Israeli National Committee for Infectious Diseases and Vaccines, is somewhat skeptical about how data is often manipulated to make cost-effectiveness decisions. He uses the example of PCV20 to illustrate his point.

"The new serotypes of PCV20 were licensed based on immunogenicity and [serological] non-inferiority. We don't even know if they are effective. We think they should be effective. But effectiveness or efficacy was not tested," he explains. "So, I'm laughing all the way home every time that I see people presenting cost effectiveness of PCV20. What does it mean? How do you evaluate the cost-effectiveness of the seven [additional PCV20] serotypes that have no efficacy studies done ever on them?"

Prof. Dagan further explains that, in making vaccine purchase decisions, the primary focus is often on the potential impact rather than cost-effectiveness. He emphasizes that they are confident that if a prevention method demonstrates a significant impact, the difference in effectiveness between vaccine A and vaccine B will ultimately make it cost effective.

Prof. Dagan stresses the importance of considering the burden of disease rather than just cost-effectiveness when evaluating vaccines. He believes that cost-effectiveness calculations should be taken "with a grain of salt," emphasizing that a vaccine's true value lies in its ability to work.

"You show me one vaccine that is not cost effective, if it works," he concludes eloquently.



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.

Outbreak of Unknown Etiology in the Democratic Republic of the Congo

Updates as of December 17, 2024

A mysterious illness has emerged in a remote region of the Democratic Republic of the Congo (DRC), affecting at least 416 people and resulting in 32 confirmed deaths. Health officials suspect malaria may be a contributing factor, though investigations are ongoing to determine if other diseases are also involved.

According to World Health Organization (WHO) Director-General Dr. Tedros Adhanom Ghebreyesus, 12 initial patient samples were analyzed, with 10 testing positive for malaria. "It's possible that more than one disease is involved," he noted. Over the past week alone, 147 new cases have been reported, alongside one additional death, bringing the total fatalities to 32. The most recent death involved a child under the age of 5.

Africa CDC Director Jean Kaseya, MD, MPH, highlighted that nearly 42% of the cases have been reported in children younger than 5 years old. Investigations are ongoing to verify if 44 additional community-reported deaths are connected to this outbreak.

The illness, which some are referring to as "Disease X," has spread primarily in the Panzi district of Kwango Province. This region is particularly challenging due to its remoteness, poor health infrastructure, and limited communication systems, in addition to recurring military conflict. Travel to the affected area is further hindered by dirt roads that have become impassable due to heavy flooding during the rainy season.

Local vulnerabilities exacerbate the crisis. The Panzi district experiences high levels of malnutrition and low vaccination coverage, leaving children particularly susceptible to diseases like malaria, pneumonia, and measles.

Efforts to combat the outbreak are underway. Teams of laboratory technicians and epidemiologists from the DRC Health Ministry, supported by the WHO and other government partners, are deployed in the field to identify the causative agent and strengthen the response. However, the Panzi health zone, located approximately 700 km (435 miles) from the capital Kinshasa, remains difficult to access, further complicating containment efforts.

The combination of logistical challenges, limited healthcare infrastructure, and a vulnerable population underscores the urgency of addressing this outbreak. Health authorities continue to monitor the situation closely as investigations progress.

1. https://www.who.int/emergencies/disease-outbreak-news/item/2024-DON546
2. https://www.cnn.com/2024/12/10/health/democratic-republic-congo-outbreak-malaria/index.html
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Other News and Alerts

U.S. Purchases $50 Million Additional Anthrax Vaccines
Published: December 16th, 2024.
https://www.vax-before-travel.com/2024/12/16/us-purchases-50-million-additional-anthrax-vaccines

IDSA AMR Partnership
Published : December 14th , 2024
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Progress towards poliomyelitis eradication – Afghanistan, January 2023–September 2024
Published: December 13th , 2024
The Weekly Epidemiological Record (WER)

First isolation of the Sindbis virus in mosquitoes from southwestern Spain reveals a new recent introduction from Africa
Published: December 13th, 2024.
https://doi.org/10.1016/j.onehlt.2024.100947

New Dosing Interval and Schedule for the Bexsero MenB-4C Vaccine: Updated Recommendations of the Advisory Committee on Immunization Practices — United States, October 2024
Published: December 12th , 2024
https://www.cdc.gov/mmwr/volumes/73/wr/mm7349a3.htm#:~:text=ACIP%20recommends%20that%20MenB%2D4C,complement%20inhibitor%20use%3B%20microbiologists%20routinely

Press Release: Two combination vaccine candidates (not mRNA vaccines) for prevention of influenza and COVID-19 granted Fast Track designation in the US
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Marburg Outbreak in Rwanda Situation Summary
Published: December 10th , 2024.
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Epidemiological Alert Measles in the Americas Region - 9 December 2024
https://www.paho.org/en/documents/epidemiological-alert-measles-americas-region-9-december-2024

Mosquito-borne disease has cost the world billions, researchers say. Scientists say there were 18.7 million chikungunya cases that exacted a total cost of nearly $50 billion over a decade.
Published: December 7, 2024.
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Chikungunya Vaccination Outperforms Medication Treatment ROI
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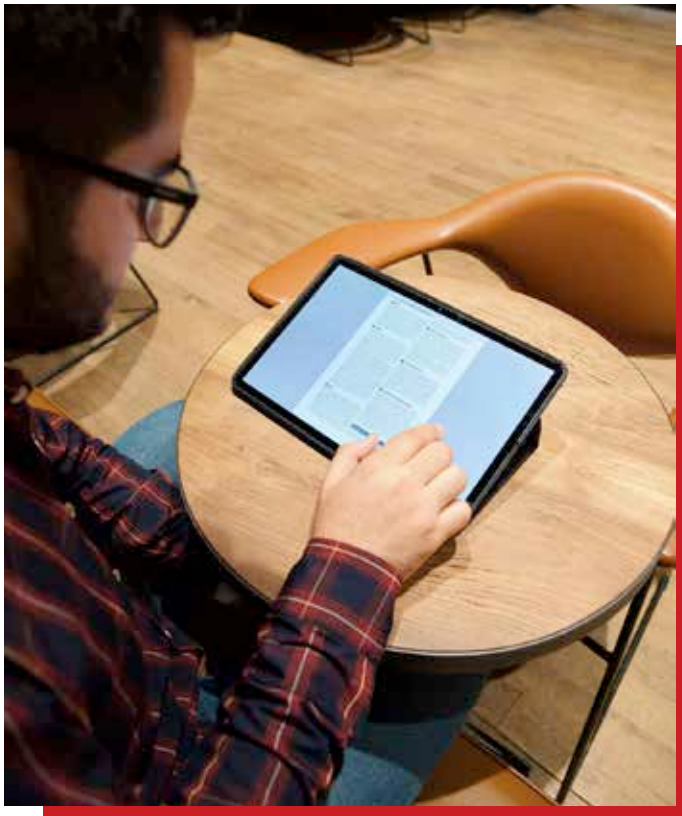
Published: November 14, 2024.
https://www.sabin.org/resources/mpox-vaccine-production-could-put-africa-first-in-line/



Latest Relevant Publications

LATEST PUBLISHED PAPERS AND COMMENTARIES FROM THE CHIEF EDITORS

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

01

"*Streptococcus pneumoniae* serotype 33G: genetic, serological, and structural analysis of a new capsule type"

Published: Microbiol Spectr 12:e03579-23.
https://doi.org/10.1128/spectrum.03579-23

Editorial comment: *Streptococcus pneumoniae* is a bacterial pathogen with the greatest burden of disease in Asia and Africa. The pneumococcal capsular polysaccharide has biological relevance as a major virulence factor as well as public health importance as it is the target for currently licensed vaccines. These vaccines have limited valency, covering up to 23 of the >100 known capsular types (serotypes) with higher valency vaccines in development. Here, authors characterized a new pneumococcal serotype, which we have named 33G. They detected serotype 33G in nasopharyngeal swabs (n = 20) from children and adults hospitalized with pneumonia, as well as healthy children in Mongolia; showing show that the genetic, serological, and biochemical properties of 33G differ from existing serotypes, satisfying the criteria to be designated as a new serotype. Future studies should focus on the geographical distribution of 33G and any changes in prevalence following vaccine introduction.

02

"Epidemiology of Pertussis After the COVID-19 Pandemic: Analysis of the Factors Involved in the Resurgence of the Disease in High-, Middle-, and Low-Income Countries"

Published: Vaccines 2024, 12(12), 1346
https://doi.org/10.3390/vaccines12121346

Editorial Comment: After COVID-19 pandemic it was observed a higher number of pertussis cases, that can be associated with several factors. In 2024, > 3,000 pertussis confirmed cases and 13 deaths in Brazil, most in the cities where there is better access to PCR. In this paper, we discussed relevant topics about pertussis vaccines and pertussis vaccination, based on the most recent publications about this relevant health problem.

03

Effectiveness of rVSV-ZEBOV vaccination during the 2018–20 Ebola virus disease epidemic in the Democratic Republic of the Congo: a retrospective test-negative study.

Published : Lancet Infect Dis 2024; 24: 1357-65.
https://doi.org/10.1016/S1473-3099(24)00419-5

Editorial comment: The findings of this study confirm that rVSV-ZEBOV is highly effective in protecting against Ebola virus disease, supporting its use during outbreaks, including in challenging settings like the eastern Democratic Republic of the Congo.

04

"Entomological investigation after an outbreak of dengue at the riverside of Rio Doce, Espírito Santo State, Brazil."
Published: Trans R Soc Trop Med Hyg 2024; trae213
https://doi.org/10.1093/trstmh/trae123

Editorial comment: Through mosquito collection using traps and subsequent molecular analysis, this study strongly emphasizes the importance of entomological surveillance. The findings highlight the presence of *Aedes albopictus* and *Aedes aegypti* in rural areas, underscoring the need for effective vector control strategies to prevent the spread of arboviruses.

05

"Safety and efficacy of the blood-stage malaria vaccine RH5.1/Matrix-M in Burkina Faso: interim results of a double-blind, randomised, controlled, phase 2b trial in children"
Published : Lancet Infect Dis 2024; Dec 10, 2024,
https://doi.org/10.1016/S1473-3099(24)00752-7

Editorial comment: RH5.1/Matrix-M appears safe and highly immunogenic in African children and shows promising efficacy against clinical malaria when given in a delayed third-dose regimen. This trial is ongoing to further monitor efficacy over time.

06

"Understanding the unprecedented 2023 dengue outbreak in Bangladesh: a data-driven analysis"
Published: IJID Regions 2024; 12: 100406.
https://doi.org/10.1016/j.ijregi.2024.100406

Editorial comment: This retrospective analysis conducted in Bangladesh revealed a dramatic surge in dengue cases and deaths in 2023, with cases increasing fivefold (from 62,382 to 320,835) and deaths nearly sixfold (from 281 to 1,699) compared to 2022. This unprecedented outbreak underscores the urgent need for a multifaceted approach, with a strong emphasis on prioritizing vector control.

07

"Perinatal and Neonatal Chikungunya Virus Transmission: A Case Series"
Published: J Pediatric Infect Dis Soc 2024; 13: 576-84.
https://doi.org/10.1093/jpids/piae102

Editorial comment: This ambispective case series investigated newborns with confirmed exposure to CHIKV either in utero or during the neonatal period. Among viremic individuals during delivery, the transmission rate was approximately 62% (18/29). Key indicators of neonatal chikungunya included fever, irritability, rash, and poor feeding within the first week of life, underscoring its severity.

These findings highlight the importance of closely monitoring healthy newborns during the first week of life in CHIKV-affected areas and among infants born to pregnant travelers returning from outbreak zones. This case series aims to raise neonatologists' awareness of the potential for mother-to-child transmission of CHIKV, especially in newborns presenting with sepsis-like symptoms. Additionally, prioritizing CHIKV vaccination for women of childbearing age should be strongly considered to mitigate this risk.

08

"Vaccination Promotion Strategies in the Elderly: Systematic Review and Meta-Analysis"

Published: Vaccines 2024; 12: 1395
https://doi.org/10.3390/vaccines12121395

Editorial comment: In this meta-analysis, a total of 20 studies were identified, including 17 on influenza vaccines and 3 on other vaccines. Educational strategies demonstrated an odds ratio (OR) of 1.63 (95% CI: 1.22–2.19, I^2 = 0.59), indicating their effectiveness. Medical counseling yielded an OR of 3.13 (95% CI: 0.60–16.37, I^2 = 0.95), while writing strategies had an OR of 1.14 (95% CI: 0.99–1.32, I^2 = 0.93). Only a few studies evaluated the impact of free vaccination.

In conclusion, educational strategies were found to be the most effective intervention in this study. Factors such as free vaccination and age may also play significant roles, but further research is required as this area remains underexplored.

09

"Undernutrition and antibody response to measles, tetanus and *Haemophilus Influenzae* type b (Hib) vaccination in pre-school south African children: The VHEMBE birth cohort study"

Published : Vaccine; December 10, 2024: 126564.
https://doi.org/10.1016/j.vaccine.2024.126564

Editorial comment: In this study, children who were stunted or showed any indicator of impaired growth at 3.5 years exhibited an average reduction in measles antibody titers of 24.1% (95% CI: -44.2, 0.6) and 27.2% (95% CI: -45.1, -1.3), respectively, compared to children with normal growth. The authors conclude that early-life undernutrition may be associated with reduced induction or persistence of antibody responses to certain vaccines.

10

"Use of social media and its influence on HPV vaccine hesitancy: US National Online Survey of mothers of adolescents, 2023"

Published: Vaccine 2024; December 5, 2024: 126571.
https://doi.org/10.1016/j.vaccine.2024.126571

Editorial comment: This study utilized a national online survey conducted in August 2023, targeting mothers of adolescents aged 9–17 years. Participants were recruited from an online research panel of U.S. residents. The study explored socio-demographic factors, social media usage patterns, and the influence of social media on HPV vaccine hesitancy. The survey sample included 3,968 mothers of adolescents. Among social media-related variables, multivariable analysis revealed that influence from Facebook was negatively associated with HPV vaccine hesitancy (β = -0.016, 95% CI: -0.029 to -0.003, p = 0.019). Conversely, uncertainty about the veracity of social media messages was positively associated with increased vaccine hesitancy (β = 0.067, 95% CI: 0.021 to 0.113, p = 0.004). No significant associations were found between HPV vaccine hesitancy and the number of daily-used social media platforms or influence from other platforms.

11

"Oropouche virus: A re-emerging arbovirus of clinical significance"

Published: IJID 2024; 149: 107251.
https://doi.org/10.1016/j.ijid.2024.107251

Editorial comment: An insightful editorial highlights the significance of Oropouche fever as an emerging disease, emphasizing the need for preventive measures and the urgency of research and development efforts for vaccine R&D.

12

"Addressing the rise of autochthonous vector-borne diseases in a warming Europe"

Published: IJID 2024; 149: 107275.
https://doi.org/10.1016/j.ijid.2024.107275

Editorial comment: This perspective examines the growing emergence of autochthonous tropical diseases in Europe, driven by climate change and its impact on vector-borne disease dynamics. Rising temperatures, coupled with changes in humidity and rainfall patterns, have significantly altered the activity, distribution, and diversity of vectors such as mosquitoes and ticks. Species like *Aedes albopictus* and *Aedes aegypti*, primary vectors of dengue, have established self-sustaining populations across Europe, contributing to an increase in cases of dengue fever, West Nile virus, and tick-borne encephalitis in temperate regions.

Predicting these outbreaks is challenging due to factors such as vector diapause, serological cross-reactivity, and land-use changes. This perspective emphasizes the urgent need for enhanced surveillance systems, weather-linked predictive models, and robust vector control strategies to address the public health risks posed by the spread of these diseases. As climate change progresses, Europe faces escalating health threats once confined to tropical regions, underscoring the critical importance of proactive and adaptive public health measures to safeguard populations.

13

"HIV/AIDS and COVID-19: Shared Lessons from Two Pandemics"

Published: Clinical Infectious Diseases, ciae585, 27 November, 2024.
https://doi.org/10.1093/cid/ciae585

Editorial comment: Consideration of the commonality of lessons learned from HIV/AIDS and COVID-19, the two most devastating pandemics over the past half century, will help us—and those who follow us—to minimize the impact of future outbreaks and prevent them from becoming global pandemics.

14

"Who to Boost When: The Effect of Age and Dosing Interval on Delta and Omicron COVID-19 Incidence in the Open Label Phase of the COVE Trial"

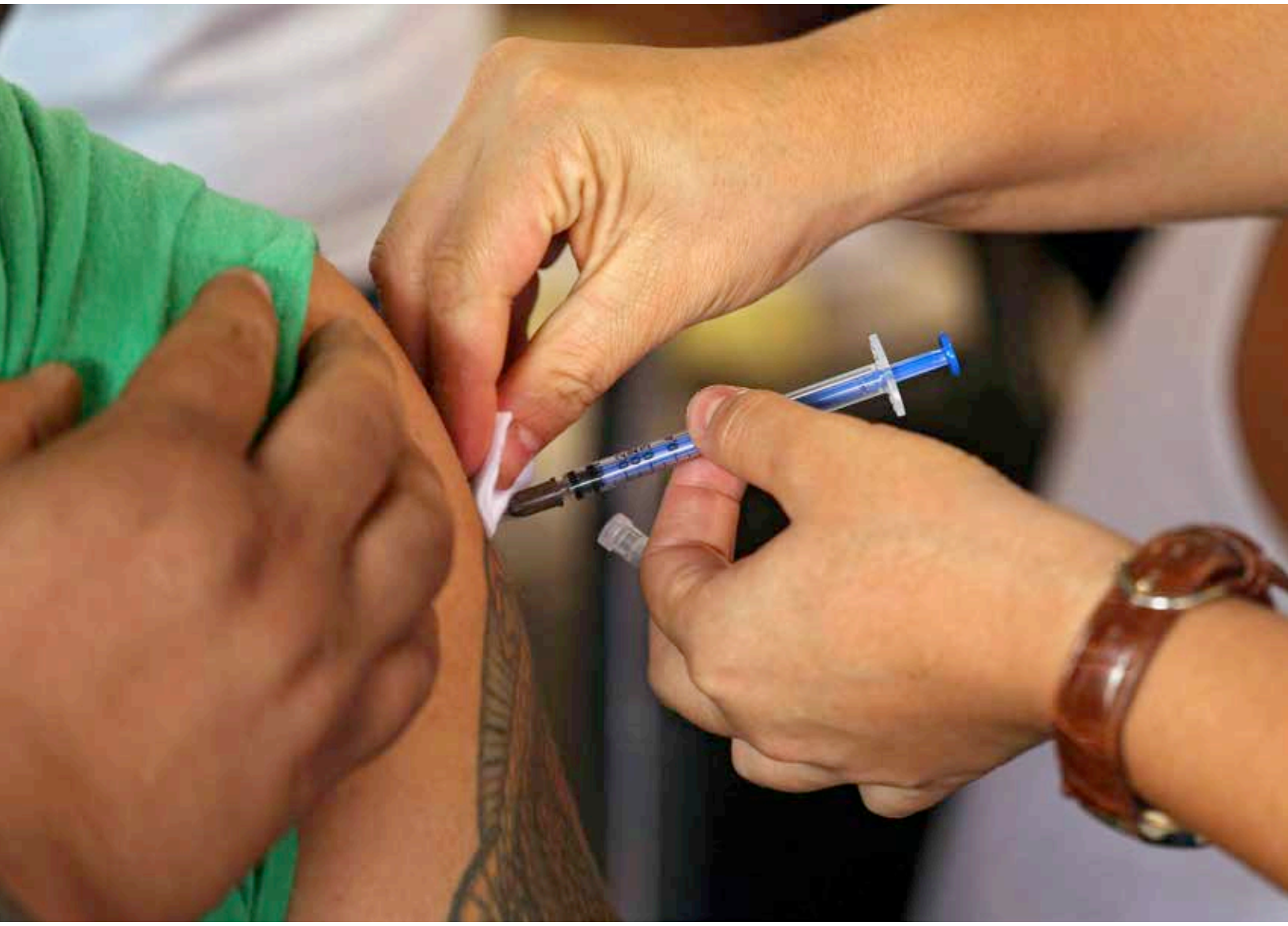
Published: Open Forum Infectious Diseases, ofae689, 25 November, 2024

Editorial comment: These data demonstrate a clinical benefit of additional mRNA-1273 vaccination for SARS-CoV-2 naïve adults against mild to moderate Delta and BA.1 Omicron COVID-19 with an increased benefit in those ≥65 years of age. Additionally, while the research suggests there was a benefit of a longer dosing interval between the primary COVID-19 vaccination and booster dose, the clinical impact of a longer interval is complex. A longer interval may have led to a reduction in Omicron COVID-19, but this is countered by an increased risk of COVID-19 while remaining unboosted.

This modeling suggests similar benefits of 8- or 14-month interval unless one times a boost just before a surge, in which case a longer interval has greater benefit. While updated research is needed on the impact of age and timing of additional boosters on the efficacy of variant-targeting vaccines, these data could be used to inform vaccination policies.

Editors Corner

VACCINATION: A STORY OF SUCCESS AND ONGOING CHALLENGES, 50 YEARS AFTER THE LAUNCH OF THE EXPANDED PROGRAMME ON IMMUNIZATION (EPI)



A. Introduction:

In the late 18th century, Edward Jenner pioneered what immunologists refer to as "active immunization," a process in which administering an antigen stimulates the host immune system to produce antibodies, along with B and T cells. This enables the immune system to mount an immediate response upon subsequent exposure to the same antigen, effectively preventing its progression and either attenuating or eliminating the disease. This groundbreaking work marked the birth of active immunization, paving the way for the emergence of vaccinology and a legacy shaped by countless remarkable scientists whose discoveries have defined modern immunization.

Since the World Health Organization (WHO)'s declaration of smallpox eradication in 1980, two more viruses were declared eradicated – polio 2 in 2015 and polio 3 in 2019. mainly because of the implementation of immunization programs which include cornerstone vaccines but beyond that can differ regionally.

The first Expanded Programme on Immunization (EPI) was established by the World Health Assembly in May 1974, demonstrating a proactive commitment to extending the protective benefits of vaccination globally. Inspired by the success of the smallpox eradication campaign WHO launched this collaborative initiative with the initial goal of vaccinating all children against seven major diseases: smallpox, tuberculosis, diphtheria, tetanus, pertussis, poliomyelitis, and measles by 1990.

Over time, the EPI has expanded to include vaccines targeting additional global and region-specific pathogens and expanded to age groups beyond infancy, with decisions on inclusion made by individual country programs. Since its inception, the programme has seen remarkable growth in the number of diseases covered, supported by catalytic strategies, innovative initiatives, and a unified global vision. This expansion has resulted in significant increases in both the breadth of protection and vaccine coverage.

Global coverage with the third dose of the diphtheria–tetanus–pertussis (DTP3) vaccine—commonly used as a proxy for vaccine program performance—rose from less than 5% in 1974 to 86% in 2019, prior to the COVID-19 pandemic.

Between 1974 and 2024, vaccination is estimated to have prevented 154 million deaths, including 146 million among children under the age of 5, of which 101 million were infants under 1 year old. Additionally, during this 50-year period, vaccination has contributed to the gain of 9 billion life-years and 10.2 billion years of full health. These achievements position vaccines and immunization as one of the most impactful healthcare interventions, second only, perhaps, to access to potable water (see Figures 1, 2, and 3).

FIGURE-1
DEATHS AVERTED BY VACCINES IN MILLIONS
(1974 – 2024)

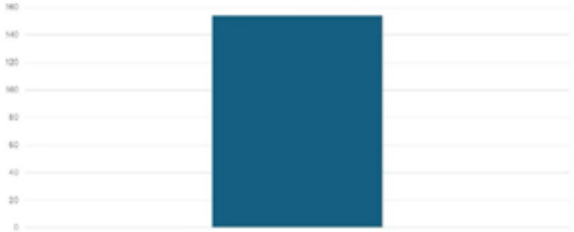


FIGURE-2
LIFE YEARS GAINED BY VACCINES IN BILLIONS
(1974 – 2024)

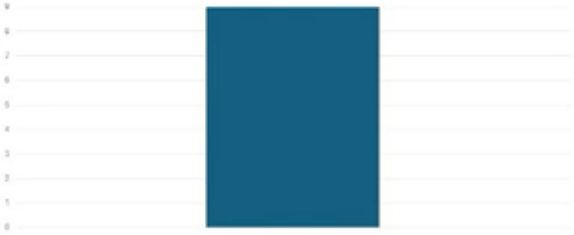
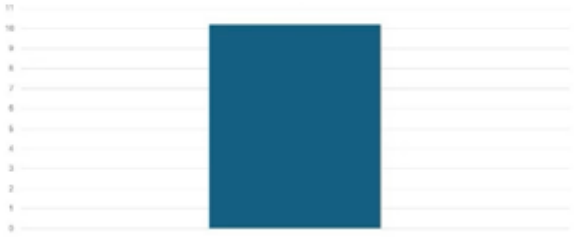


FIGURE-3
YEARS OF FULL HEALTH BY VACCINES IN BILLIONS
(1974 – 2024)



(Data obtained from Shattock AJ, et al. Contribution of vaccination to improved survival and health: modelling 50 years of the Expanded Programme on Immunization. *Lancet* 2024; 403: 2307–16. https://doi.org/10.1016/).

B. The Long and Multifaceted Journey:

The following outlines a chronological sequence of achievements aimed at accomplishing the goals just described:

1. 1974: The 27th World Health Assembly: Formally established EPI against diphtheria, pertussis, tetanus, measles, poliomyelitis, tuberculosis, smallpox, and other diseases, where applicable, according to country-specific epidemiological situation.

2. 1979: Pan American Health Organization (PAHO): The resolution of the Pan American Sanitary Conference established the working capital for the PAHO Revolving Fund, a mechanism designed to facilitate pooled procurement and enhance access to vaccines, syringes, and cold-chain equipment at affordable prices.

3. 1982: UNICEF Child Survival and Development Revolution: The Child Survival and Development Revolution emphasized four key interventions: growth monitoring, oral rehydration therapy, promotion of breastfeeding, and immunization.

4. 1984: EPI's first standardized schedule: Included were vaccinations for tuberculosis (BCG vaccine at birth); diphtheria, tetanus, and pertussis (DTP); poliomyelitis (administered alongside DTP at 6, 10, and 14 weeks); and measles (at 9 months).

5. 1990: Declaration of Manhattan, Children's Vaccine Initiative: Its goal was to accelerate efforts to develop vaccines that would strengthen and enhance the effectiveness of the Expanded Programme on Immunization (EPI).

6. 1999: The Strategic Advisory Group of Experts (SAGE) on immunization: A vital arm of the WHO dedicated to global vaccine-related policies, recommendations, prequalification, strategies, research and development (R&D), and addressing various aspects of vaccine-preventable diseases.

7. 2000: Gavi, The Vaccine Alliance: The "Vaccine Alliance", a combined private-public partnership to make vaccines more affordable to developing countries, an essential tool for equity. In nearly 25 years since its launch, Gavi has made significant strides in advancing equity in vaccine manufacturing. In 2000, four of its five vaccine suppliers were based in wealthy countries. Today, the majority of its approximately 20 suppliers are located in developing countries. Gavi has created a marketplace for large-scale, low-cost manufacturing in countries like India, Brazil, China, Indonesia, and others.

8. 2000 to present: ongoing acceleration of new vaccine production and implementation:

- The Meningitis Vaccine Project facilitated the development, testing, licensure, and introduction of the meningococcal A conjugate vaccine for the meningitis belt in Africa.

- The Accelerated Development and Introduction Plans for pneumococcal conjugate vaccines (PCV) and rotavirus vaccines, along with the *Haemophilus influenzae* type B Initiative, significantly expedited vaccine introduction in Gavi-supported countries.

- The Malaria Vaccine Implementation Programme.

9. 2017: Coalition for Epidemic Preparedness Innovations (CEPI)

As a global response to Ebola virus, Zika virus, and severe acute respiratory syndrome (known as SARS) outbreaks, CEPI was launched to develop safe and effective vaccines for emerging infectious diseases to prevent future epidemics. Currently CEPI plays a vital role in accelerating vaccine implementation during outbreaks, epidemics, and pandemics, as demonstrated by initiatives such as the "100-Day Mission for Pandemic Vaccine Implementation."

10. 2020–23: COVID-19 Vaccines Global Access (COVAX): COVAX was the vaccine mainstem created to accelerate the development, production, and equitable distribution of COVID-19 tests, treatments, and vaccines. Its goal was to reduce COVID-19 mortality and severe disease, while facilitating the full restoration of societal and economic activity.

11. Others, but not less important:

- 2023–24: "The Big Catch-Up"
- EPI expansion
- The Global Polio Eradication -Initiative"
- Maternal and Neonatal Tetanus Elimination
- The Measles and Rubella Initiative
- The End TB strategy
- The Global Health Sector Strategy on Viral Hepatitis

- The Global Technical Strategy for Malaria
- The Eliminate Yellow Fever Epidemics Strategy
- The Global Strategy to Accelerate the Elimination of Cervical Cancer
- The Global Roadmap to Defeat Meningitis

C. A collaborative effort between the private and public sectors:

When Simón Bolívar, the great general who liberated much of South America from Spanish rule, was studying to become a military leader, his professor asked him, "What is the most important tool to start an army?" Bolívar replied, "Strategy." His professor corrected him, saying, "No, money."

WHO, Gavi, UNICEF, the Gates Foundation, Wellcome Trust, PATH, Rotary, the International Vaccine Institute, CEPI, Clinton Health Access Initiative, GSI, the World Bank, and other organizations, along with governments, have collaborated to leverage vaccines as a powerful tool in combating disease and addressing health disparities.

D. Task Priorities:

The WHO Immunization Agenda 2030 (IA2030) has established a structured approach to prioritize vaccine R&D for endemic pathogens based on regional and country-specific health needs. Through surveys conducted with policymakers and immunization stakeholders across WHO regions, eight criteria were used to assess pathogens, with two—*annual deaths in children under five and contribution to antimicrobial resistance*—emerging as top priorities in five of the six regions.

The survey responses revealed that these priority criteria did not significantly vary by region, demographic background, or expertise area of respondents. This consistency helped identify five pathogens—*Mycobacterium tuberculosis*, HIV-1, *Klebsiella pneumoniae*, *Staphylococcus aureus*, and *extra-intestinal pathogenic Escherichia coli*—as shared priorities across all regions. Additionally, six pathogens were uniquely prioritized in individual regions, reflecting localized health needs.

By merging the top ten pathogen lists from each region, WHO derived a global priority

list of 17 pathogens for targeted vaccine R&D. To support this agenda, 34 distinct R&D use cases were identified, divided into categories based on necessary actions: *Advance product development* (the majority), *Research*, and *Prepare to implement*. This categorization helps streamline efforts to accelerate vaccine development and implementation for priority pathogens globally.

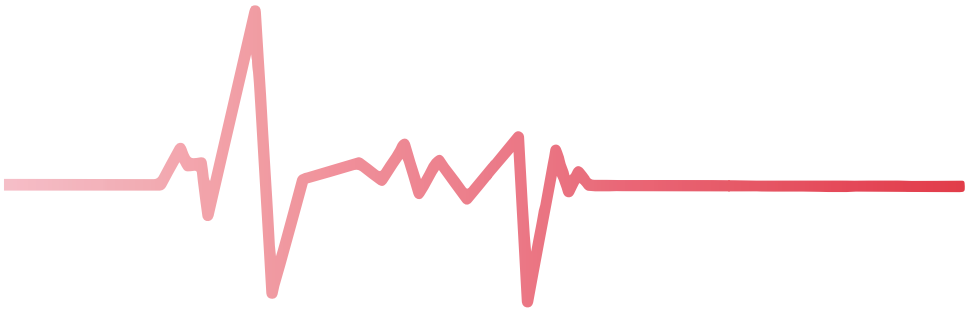
The following are the 17 global priority pathogens for targeted vaccine R&D:

- *Plasmodium falciparum* (Malaria)
- Norovirus
- Non Typhoidal *Salmonella*
- *Leishmania* species
- Group B Streptococcus
- Dengue virus
- Influenza virus
- Cytomegalovirus
- *Shigella* species
- Respiratory Syncytial Virus
- Hepatitis C virus
- Group A Streptococcus
- *Staphylococcus aureus*
- *Mycobacterium tuberculosis*
- *Klebsiella pneumoniae*
- HIV-1
- Extra-intestinal pathogenic *Escherichia coli*

E. Conclusions:

It is impossible to fully conclude such a multifaceted effort, where, despite significant achievements, there is still much to be done. In our view, scientific leaders must collaborate with their counterparts in the financial and political sectors. Without this partnership, the substantial disparities in vaccine access and implementation will persist, preventing a net global meaningful progress. First and foremost, there is no comparison between the investment in war and weapons and the investment in preventive medicine.

We acknowledge Prof. Ralf Clemens for both his input and feedback in this section.



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Best Practice

MEETING OF THE STRATEGIC ADVISORY GROUP OF EXPERTS (SAGE) ON IMMUNIZATION, SEPTEMBER 2024: CONCLUSIONS AND RECOMMENDATIONS

This report summarizes SAGE discussions, conclusions, and recommendations. All recommendations were made using evidence-based methods.

The SAGE meeting in March 2024 celebrated the achievements of the Expanded Programme on Immunization (EPI). A modelling study published in May 2024, estimated that since the EPI was established 50 years ago, ***154 million lives have been saved through immunization efforts against 14 vaccine-preventable diseases***. Of the lives saved, measles accounts for 60%; 40% of the reduction in infant mortality since 1974 can be attributed directly to vaccination.

With these achievements of EPI in mind, this report reflects on the current context, the status of vaccines and immunization, and a vision for maximizing the benefits of immunization in the future.

Immunization Agenda 2030 (IA2030)

SAGE recognized the longstanding challenges to achieving high and equitable vaccination coverage and that the negative impact of the COVID-19 pandemic lingers. Nevertheless, new vaccine introductions increase the opportunity for saving more lives and there are examples where the introduction of new vaccines increased demand for vaccination and contributed to increasing routine immunization coverage.

It was recognized that strengthening health systems, including addressing the shortfalls, capacity and motivation of the health workforce, is beyond the mandates of immunization programs alone and encouraged a collaborative approach between national health programs with coordinated support from bilateral and multilateral development partners.

Respiratory syncytial virus

Both nirsevimab and the RSVPreF vaccine have received market authorization in more than 40 countries. There has been a global access commitment by the manufacturer to supply RSVPreF at an affordable price to low-income countries (LICs) and LMICs through public sector purchases, including through GAVI. Currently, there is no such price commitment enabling LICs and LMICs access to nirsevimab.

Given the global burden of RSV disease, SAGE recommended that all countries introduce products for the prevention of severe RSV disease in infants. ***Decisions to use maternal RSVPreF vaccination and/or nirsevimab should consider cost, financing, supply, anticipated coverage and feasibility of implementation within the existing health system***.

Poliomyelitis

SAGE expressed concern about a significant increase in paralytic poliomyelitis cases caused by wild poliovirus type 1 (WPV1) detected in the endemic zones of Afghanistan and Pakistan in 2024. They also expressed concern about at the continuing detection of circulating vaccine-derived poliovirus 2 or cVDPV type 2 (cVDPV2), which is likely to continue beyond 2024. SAGE reiterated the need for timely responses with nOPV2 campaigns, with >90% coverage in and around the areas of emergence.

Vaccine SAGE experts reiterated that routine polio vaccine coverage of ≥95% is essential for poliovirus eradication. The importance of identifying and vaccinating zero-dose children in endemic and outbreak-affected areas and enhancing environmental surveillance for polioviruses was emphasized.

Since many countries desire to switch to IPV-only schedules ahead of synchronized bOPV cessation, SAGE requested that WHO develop a risk-grading criteria framework to define eligibility for a safe transition ahead of bOPV cessation and to present it to SAGE in 2025. The criteria should encompass vaccine coverage, indicators for sanitation, population density and proximity to outbreak areas.

SAGE acknowledged the use of OPV as the primary tool for outbreak response because of its ability to elicit mucosal immunity. However, the suboptimal immunogenicity of OPV in low- and middle-income country settings where WPV1 or cVDPV outbreaks occur was recognized. Therefore, SAGE recommended the concomitant use of IPV and nOPV2 (bOPV if type 1 or type 3 viruses circulate) in initial outbreak response vaccination campaigns.

Recent genetic and safety data from a clinical trial of co-administration of nOPV2 and bOPV, and additional information from the field, show that the main attenuation determinants for nOPV2 remain intact. Based on these data, SAGE revised its earlier recommendation and recommended concomitant administration of nOPV2 and bOPV as an option in areas where poliovirus types 1 and 2 co-circulate. IPV may be added to concomitant nOPV and bOPV administration.

Rubella and congenital rubella syndrome

As of 2023, rubella elimination has been achieved in 99 (51%) countries. Despite this progress, the remaining 19 countries without access to rubella-containing vaccines (RCV) continue to serve as reservoirs for the virus, with sustained transmission, including to other countries. These countries – all but 3 of which are LICs – account for most of the global burden of congenital rubella syndrome (CRS). The universal use of RCV would significantly advance global equity goals.

Without rubella vaccination, demographic trends such as lower birth rates leading to older age of infection are expected to increase the future risk of CRS.

Universal RCV introduction is expected to substantially reduce overall rubella prevalence and accelerate regional elimination efforts.

Based on the evidence provided, SAGE recommended lifting the requirement for ≥80% MCV coverage through routine immunization or campaigns before RCV introduction.

SAGE also reinforced the existing WHO policy for regular follow-up campaigns in all countries until they reach ≥90% routine coverage with measles and rubella vaccines.

Mpox and avian influenza

Mpox

A Global Strategic Preparedness and Response Plan has been developed, which includes a comprehensive approach addressing surveillance, case management, safe and scalable home care, communication and community protection. The recommended countermeasures include vaccines, therapeutics, diagnostics and other relevant health products. The first phase of the strategy is to interrupt known chains of transmission, then expand protection to limit the potential spread in affected communities and, finally, increase population immunity in areas at risk for future outbreaks or outbreak expansion.

As more vaccines become available, preventive vaccination will be considered as per the recommendations in the 2024 WHO vaccine position paper. The first mpox vaccine (MVA-BN) was prequalified in September 2024 for use in adults aged ≥18 years; discussions are ongoing to have the LC16 vaccine emergency use listed by WHO. SAGE will continue to monitor the situation and update recommendations as required.

Avian Influenza

Human cases have been detected across all WHO regions. Continuous monitoring and response are in place for animal influenza viruses with zoonotic potential. A recent consultation was held to look at options for the use of an H5N1 vaccine in the interpandemic phase; SAGE will be presented with the outcomes of this consultation in due course.

COVID-19

Vaccine demand and uptake have dropped significantly in 2024. (editorial note: due to vaccine fatigue and hesitancy)

Post-COVID conditions include a constellation of post-acute and long-term health effects caused by SARSCoV-2. At the end of 2023, the cumulative number of such cases was estimated to be 409 million, with a point prevalence of 6–7% in adults and 1% in children. Three symptom clusters, namely, persistent fatigue, cognitive problems and respiratory problems, have been reported. Reinfection can lead to post-COVID conditions or exacerbate existing symptoms. Recovery rates are low, although some therapeutics show promise. Vaccination appears to have a protective effect in reducing the likelihood of post-COVID conditions.

While recognizing the steep decline in vaccine demand, SAGE emphasized the importance of revaccinating high-priority groups as per the recommendations in the roadmap, with due consideration given to cost–effectiveness, opportunity costs and delivery challenges.

SAGE also recommended that countries consider co-administering COVID-19 vaccines with seasonal influenza vaccines or other respiratory vaccines when epidemiologically appropriate and programmatically feasible.

Furthermore, SAGE underscored the importance for all countries to have access to variant-adapted monovalent COVID-19 vaccines.

WHO is currently working towards developing a comprehensive position paper on COVID-19 vaccines, which is expected to be published in 2025 and replace the current interim recommendations.

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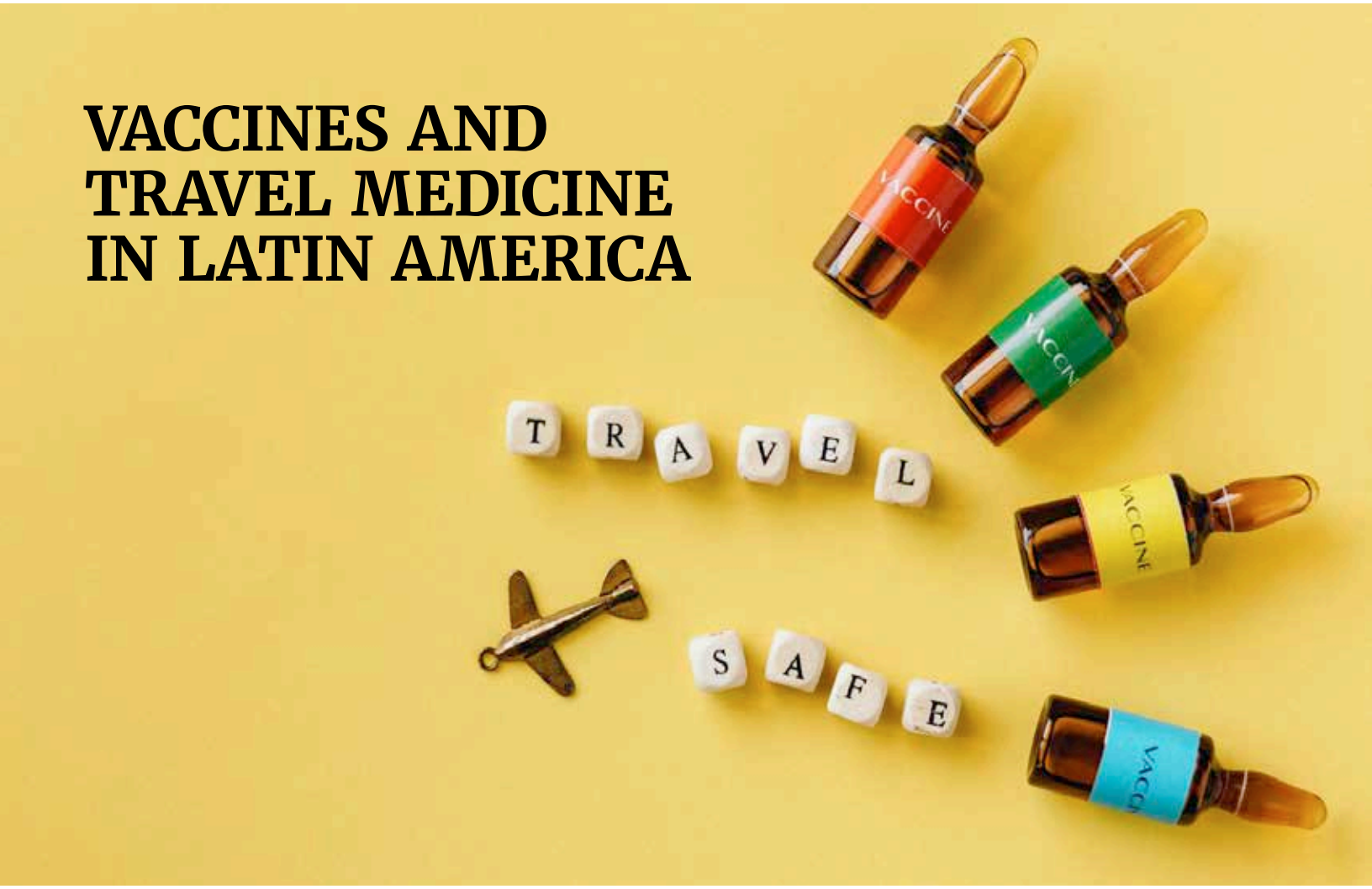
VACCINES AND TRAVEL MEDICINE IN LATIN AMERICA



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Latin America is renowned for its rich cultural heritage, breathtaking landscapes, and vibrant biodiversity. From the Amazon rainforest to the Andean mountains, historic cities, and pristine beaches, it offers travellers unparalleled experiences. However, with this diversity comes a range of health risks that travellers must be aware of. Vaccines play a critical role in safeguarding the health of travellers and the communities they visit.

Understanding the Risk Landscape in Latin America

Latin America's tropical and subtropical climate and varied ecosystems create a unique environment for transmitting tropical and infectious diseases. Additionally, some regions face challenges related to public health infrastructure, which can heighten the risk of disease outbreaks. Travelers may encounter rare or absent illnesses in their home countries, making pre-travel vaccinations essential.

Common vaccine-preventable infectious diseases in Latin America include:

1. Yellow Fever: Endemic in many parts of South America, particularly in the Amazon Basin. Mosquitoes transmit this potentially fatal disease, and vaccination is often required or recommended for travellers to affected areas. Recent cases in the last few years in Venezuela, Brazil, Peru, and Colombia highlight the importance of the yellow fever vaccine.
2. Hepatitis A and B: These viral infections are prevalent in many regions due to varying sanitation and healthcare infrastructure levels. Hepatitis A spreads through contaminated food and water, while Hepatitis B is transmitted via bodily fluids. Vaccines against them are also key among travellers.
3. Typhoid Fever: Caused by *Salmonella* bacteria, typhoid fever is linked to consuming contaminated food or water. It is a significant concern for travellers visiting rural or underdeveloped areas. Vaccines for typhoid fever are relevant in highly endemic areas.
4. Rabies: A fatal viral disease spread through animal bites, rabies poses a risk in areas with inadequate vaccination programs for domestic and wild animals. In recent years, cases of dog and cat bites and scratches in Colombia and Peru, among others, also highlight the importance of rabies prevention, including vaccines.
5. Measles: While vaccination programs have reduced cases globally, measles outbreaks still occur in Latin America, often fueled by unvaccinated populations.
6. Dengue, Zika, and Chikungunya: These mosquito-borne viral diseases are widespread in tropical and subtropical climates. Although vaccines for dengue are now available in some areas, preventive measures remain critical. The FDA recently approved Chikungunya, which will soon be available in Europe and other regions. Zika vaccines are being studied in clinical trials.

Why Vaccines Are Essential for Travelers?

1. Disease Prevention: Vaccines protect travellers from contracting potentially life-threatening diseases. For example, the yellow fever vaccine provides long-term immunity and prevents disease.
2. Protecting Public Health: Vaccinated travellers reduce the risk of bringing diseases back to their home countries or introducing infections to vulnerable communities in the destination region. This is particularly important for diseases like measles, which can spread rapidly.
3. Compliance with Travel Requirements: Many countries in Latin America mandate certain vaccinations for entry. For instance, proof of yellow fever vaccination is required for travellers arriving from or transiting through endemic regions.
4. Avoiding Health Complications: Contracting an illness while travelling can lead to severe health complications, costly medical treatment, and disruptions to travel plans. Vaccines mitigate these risks and provide peace of mind.
5. Long-Term Immunity: Some vaccines, such as those for Hepatitis A and B or yellow fever, offer long-lasting or even lifelong protection, making them a valuable investment for frequent travellers.

Key Vaccines for Travelers to Latin America

1. Routine Vaccinations: Ensure that routine immunizations, including measles, mumps, rubella (MMR), diphtheria, tetanus, and pertussis (DTaP), are up to date. These vaccines are the foundation of personal and public health protection.
2. Yellow Fever Vaccine: Essential for travellers to endemic areas, the yellow fever vaccine is often required for entry into certain countries. A single dose provides lifelong immunity in most cases. However, boosters are sometimes required, especially when visiting high-risk areas with vulnerable populations vaccinated more than 10 years ago.
3. Hepatitis A and B Vaccines: These vaccines are crucial for protecting against liver infections caused by these viruses. Hepatitis A vaccination is crucial for travellers exposed to contaminated food or water.
4. Typhoid Vaccine: Available as an injectable or oral vaccine, this is recommended for travellers visiting regions with poor sanitation or limited access to clean water.
5. Rabies Vaccine: Pre-exposure vaccination is advised for travellers who plan to engage in outdoor activities or visit remote areas where medical care may be delayed.
6. Influenza Vaccine: Given the global circulation of influenza viruses, annual vaccination is recommended, especially for individuals with underlying health conditions or during flu season.
7. Dengue Vaccine: In some countries, the dengue vaccine can protect travellers to high-risk areas, especially those with a history of prior dengue infection.

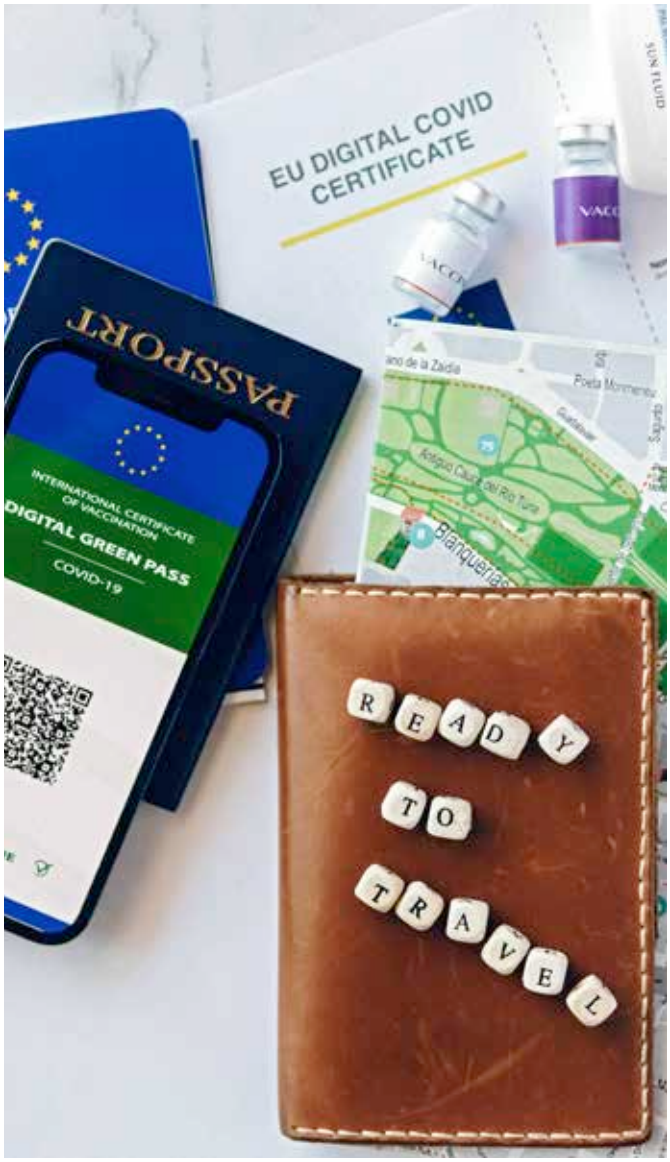
Public Health Implications

The role of vaccines extends beyond individual protection. Vaccines contribute to the health and well-being of entire communities by reducing the spread of infectious diseases. This is particularly significant in Latin America, where tourism is a primary economic driver. Healthy travellers and communities ensure sustainable tourism and economic growth. Moreover, vaccination programs help prevent the resurgence of diseases that have been controlled or eliminated in certain areas. For example, maintaining high vaccination coverage against measles and rubella prevents outbreaks that could otherwise impact locals and visitors.

Conclusions

Vaccines are a cornerstone of safe and responsible travel in Latin America. They protect individuals from serious diseases, support public health initiatives, and ensure compliance with international travel regulations. As travellers explore the wonders of Latin America, they must prioritize their health and the well-being of the communities they visit by staying informed and up to date on recommended vaccinations.

By consulting healthcare professionals, adhering to vaccination schedules, and adopting preventive measures, travellers can confidently enjoy their journeys, knowing they are protected against potential health risks. In a region as diverse and dynamic as Latin America, vaccines are not just a recommendation – they are an essential part of the travel experience.



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VACCINES BEAT

Who we are

At Vaccines Beat, we understand that vaccines and immunization have become a crucial topic of discussion at the center of any public health analysis. Therefore, timely, relevant, accessible, and well-curated information for all vaccine preventable diseases is key to advancing better health policies.

For this reason, a team of passionate vaccine professionals has created Vaccines Beat and each month diligently works to share with the healthcare ecosystem information, knowledge, and insights to improve global health.

Vision

Vaccines Beat aims to become the beacon of insight in the public health ecosystem through its distinctive monthly newsletter. With an in-depth 360 perspective, carefully curated information and expert analysis, this novel platform fosters collaboration among a diverse global network of stakeholders.

Mission

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

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

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

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