

3.Gavi–Unicef Agreement – Science

Gavi and UNICEF have signed a new procurement agreement to make the R21/Matrix-M malaria vaccine more affordable and widely available in malaria-endemic countries.

R21/Matrix-M Malaria Vaccine

A. Background & Development – R21/Matrix-M is a next-generation malaria vaccine developed by

1. University of Oxford (Jenner Institute)
2. Serum Institute of India (SII) – world's largest vaccine manufacturer

Designed to offer high efficacy, easy scalability, and affordability for malaria-endemic countries.

B. Matrix-M Adjuvant – Developed by Novavax. Enhances immune response by

1. Increasing antigen presentation
2. Boosting antibody titers
3. Improving long-term immunological memory

Enables lower doses, better durability, and scalable low-cost production.

C. Target Pathogen – Specifically targets *Plasmodium falciparum*, the deadliest and most prevalent malaria parasite in Africa, responsible for most global malaria deaths.

D. WHO Approval – In October 2023, WHO recommended R21/Matrix-M for broad use. Became the second WHO-approved malaria vaccine after RTS, S (approved in 2021).

E. Efficacy & Strengths – Shows ~70–80% efficacy over 12 months. Best efficacy when administered as

1. Three-dose primary series
2. One booster dose

Advantages over RTS, S

1. Higher efficacy
2. Lower cost
3. Easier storage and scalability
4. Faster mass-production due to SII's capacity

F. R21 is Important for Global Health – Enables widespread vaccination in sub-Saharan Africa, where transmission is highest. Supports global malaria elimination goals (WHO Global Technical Strategy 2030). Helps reduce mortality among children (<5 years), the most vulnerable group.

RTS, S/AS01 (Mosquirix)

A. Introduction – RTS, S is the world's first malaria vaccine to receive WHO endorsement (October 2021).

Developed over 30 years of research by

1. GSK (GlaxoSmithKline)
2. PATH Malaria Vaccine Initiative
3. Supported by the Gates Foundation.

B. Target Parasite – Also targets *Plasmodium falciparum* – responsible for most malaria deaths globally.

C. Efficacy Profile – Offers 30–40% protection over 4 years – lower than R21. When combined with seasonal malaria chemoprevention, protection increases to 60%+.

D. Dosage Schedule

4-dose regimen –

1. First 3 doses – at monthly intervals (starting ~5 months of age).
2. Fourth booster – 18 months later.

E. Limitations

1. Moderate efficacy
2. Immunity declines over time
3. Requires multiple boosters
4. Cold-chain and cost challenges
5. Manufacturing capacity more limited than R21

F. Significance Despite Limitations

1. First vaccine ever to reduce child mortality from malaria.
2. Opened a new era of vaccine-based malaria prevention.

Gavi – The Vaccine Alliance

A. Introduction

1. Gavi is a public–private global health partnership focused on increasing access to vaccines in low-income nations.
2. Created in 2000 at the World Economic Forum, Davos.
3. Headquarters – Geneva, Switzerland.

B. Core Mission

1. To save lives, reduce disease, and strengthen immunization systems.
2. Ensures equitable access to life-saving vaccines.
3. Helps countries introduce new and underused vaccines.

C. Key Partners

1. Donor & recipient governments
2. WHO, UNICEF, World Bank
3. Gates Foundation
4. Vaccine manufacturers
5. Civil society organisations

D. Achievements

1. Immunised 1+ billion children since 2000.
2. Prevented 17.3 million future deaths.
3. Supported rollout of vaccines for
 1. Pentavalent
 2. Pneumococcal
 3. Rotavirus
 4. HPV
 5. COVID-19 (via COVAX, co-led by Gavi)

E. India & Gavi

1. India graduated from Gavi support in 2017.
2. Now a major vaccine supplier & contributor, not a recipient.
3. India pledged \$10 million to Gavi's latest funding cycle.
4. SII's involvement in Gavi-backed programs has made India a pillar of global vaccine supply chains.

Malaria – Detailed Overview

A. Malaria – A mosquito-borne infectious disease caused by *Plasmodium* parasites. Transmitted by female Anopheles mosquitoes during blood feeding.

B. Causative Parasites (5 Species)

1. *P. falciparum* – deadliest; causes cerebral malaria.
2. *P. vivax* – most common in India; relapse potential due to dormant liver stage (hypnozoites).
3. *P. malariae* – chronic infections.
4. *P. ovale* – similar to *P. vivax*; causes relapses.
5. *P. knowlesi* – zoonotic malaria from macaques (SE Asia).

C. Modes of Transmission

1. Not spread person-to-person.
2. Transmission occurs via –
 1. Mosquito bites
 2. Blood transfusion
 3. Contaminated needles
 4. Congenital transmission (rare)

D. Symptoms

1. High fever
2. Chills and sweating
3. Headache
4. Fatigue
5. Severe anaemia
6. Organ failure (in *P. falciparum* cases)
7. Cerebral malaria (coma, seizures)

E. Global Burden (2023 WHO Data)

1. 263 million cases
2. 597,000 deaths
3. Africa accounts for ~95% of both cases and deaths.
4. Children under 5 are the highest-risk group.

Malaria in India – Current Scenario

A. Progress Toward Elimination

1. India has made impressive progress under
 1. National Framework for Malaria Elimination (2016–2030)
2. Cases have declined significantly due to
 1. LLINs (Long-lasting Insecticidal Nets)
 2. IRS (Indoor Residual Spraying)
 3. Improved diagnostics (RDTs)
 4. Better surveillance

B. Problem Hotspots

1. Tribal and forested districts, including
 1. Lawngtlai (Mizoram) – 56 cases per 1,000
 2. Narayanpur (Chhattisgarh) – 22 cases per 1,000
2. *Falciparum* prevalence remains high in
 1. Odisha
 2. Chhattisgarh
 3. Northeast India

C. Species Distribution

1. *P. vivax* — most widespread in urban & plains regions.
2. *P. falciparum* — dominant in tribal belts, forests, and hilly areas.

D. India's Goal - India aims for malaria elimination by 2030, in sync with WHO Global Technical Strategy.

These Vaccines Are Important for India & the World

A. Addressing the Limitations of Current Tools

1. Bed nets and spraying alone cannot eliminate malaria.
2. Drug resistance (artemisinin resistance in SE Asia) is rising.
3. Climate change is expanding mosquito habitats.

B. Vaccines Provide -

1. Additional layer of protection
2. Reduced child mortality
3. Lower economic burden on health systems
4. Increased resilience of malaria-prevention programs

C. India's Strategic Advantage - As the world's largest vaccine producer, India -

1. Supplies affordable vaccines to Gavi
2. Supports African vaccination campaigns
3. Strengthens its global health diplomacy

Conclusion

Malaria remains one of the world's oldest and deadliest infectious diseases. The introduction of R21/Matrix-M and RTS, S vaccines mark a historic breakthrough in global malaria control. India, through Serum Institute and its partnership with Gavi, is emerging as a leader in global vaccine equity. Achieving malaria elimination by 2030 will require simultaneous efforts in vaccination, surveillance, vector control, and health system strengthening.

Source - <https://www.thehindu.com/sci-tech/health/gavi-unicef-announce-new-agreement-to-make-r21matrix-m-malaria-vaccines-more-accessible/article70317510.ece>