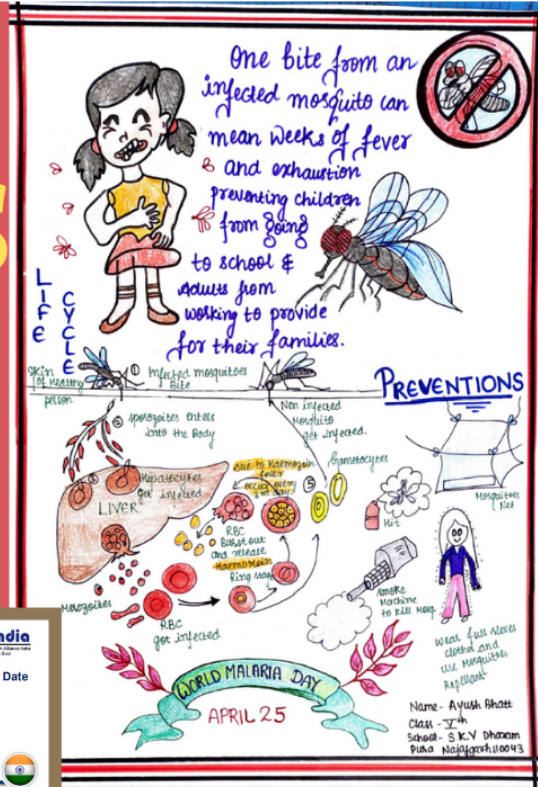
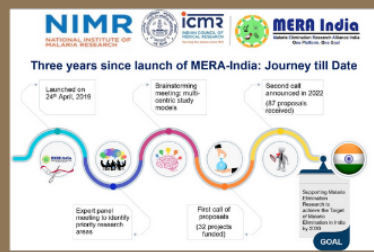


NEWS & VIEWS

Issue 18, April 2022



MERA-India completes 3 years



A Child's Perception of Malaria



- Editorial
- Activities
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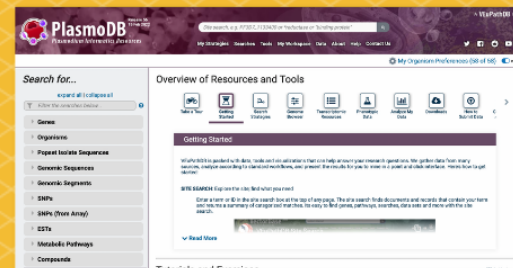
Dr Jyoti Das
Scientist F,
ICMR-NIMR, Delhi



Dr Rama Shankar Rath
Assistant Professor,
AIIMS, Gorakhpur



Memorandum of Understanding signed between ICMR and Oxford University, UK : Capacity Building for Indian Scientists and Researchers



Resource for Malaria Researchers

Editorial

Dear Readers,

MERA-India team brings you the eighteenth issue of our newsletter.

Every year on World Malaria Day, celebrated on the 25th of April, the global efforts and progress on malaria control and elimination are brought into focus. This year, WHO emphasized on the importance of harnessing innovation to bring down the malaria burden globally and reduce mortality.

Despite being a preventable and curable infectious disease, malaria is having a huge devastating effect on people's health worldwide. Increasing resistance to the existing antimalarial drug regime and insecticides poses a threat to global malaria control and elimination. However, the innovative strategies and new available tools enable us to prepare better to fight against malaria. The global priority is to reduce the morbidity and mortality associated with the disease while maintaining the long-term aim of eradicating malaria.

Like every edition, this edition of the newsletter highlights the significance of collaborative research and devoted efforts toward malaria control and elimination.

On 24th April 2022, MERA-India completed three years since its launch in 2019. We, at MERA-India, brace and encourage the innovative interventions coming through operational, implementation, and translational malaria research that are tailored to achieve malaria elimination in India by 2030.

It was a delightful experience to listen to the inspiring lectures by Professor David A. Fidock, Columbia University Medical Centre, and Professor Anuradha Chowdhary, Vallabhshai Patel Chest Institute, University of Delhi. These lectures gave relevant information about molecular mechanisms of drug resistance in malaria and fungal infections and are summarized in our current issue.

MERA-India and ICMR-NIMR organized a meeting at AIIMS Jodhpur for the MERA-India Community Behaviour-themed multi-centric project, in which, training was imparted to conduct household surveys for identifying the community's knowledge, attitude and practice for malaria control and prevention. Further details of these activities are provided in this issue.

Along with energizing and inspirational interviews by scientists Dr Jyoti Das (ICMR-NIMR, Delhi), and Dr Rama Shankar Rath (AIIMS, Gorakhpur) in the 'Malaria Scientists to Watch' section, this issue will also provide updates in malaria research. We have highlighted the research articles giving insights into a new class of insecticide for LLINs, the implementation research for redirecting malaria control activities, identifying the vulnerable population at the risk of death due to malaria and assessing malaria mortality trends in India using the data from Million Death Study, and identifying novel biomarkers to detect *P. vivax* transmission reservoirs. Moreover, under the stimulating "Resources for Malaria

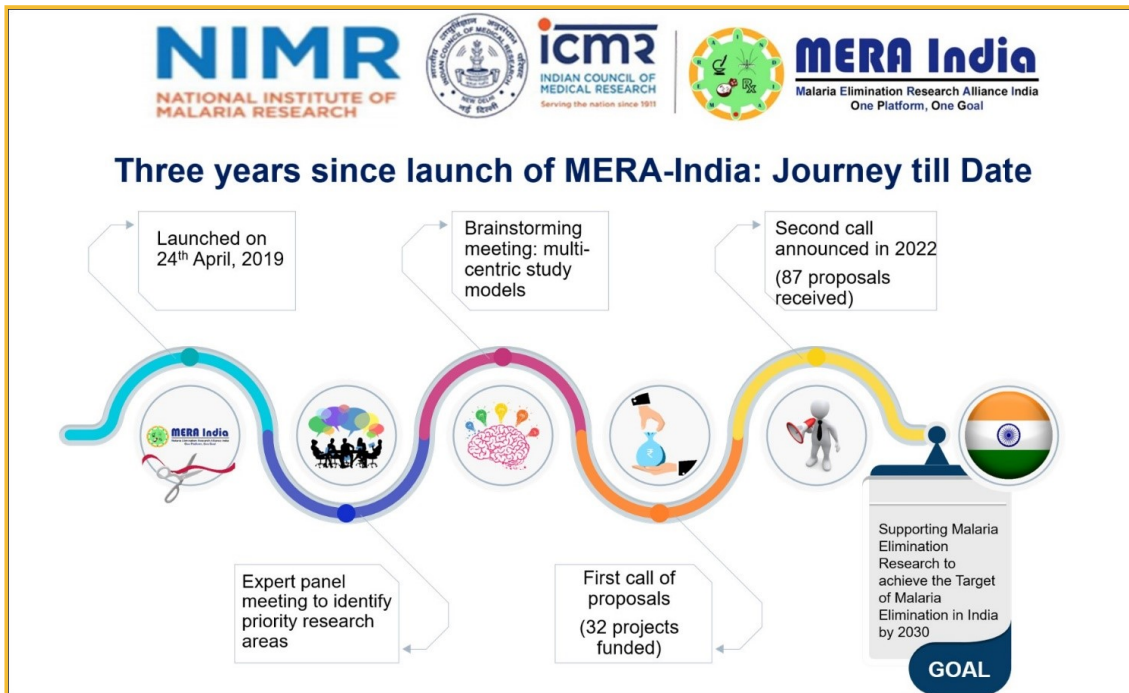
Researchers” section, we have highlighted the PlasmoDB, an online functional Plasmodium genomic database providing a plethora of information about the malaria parasite species and bringing forth different tools for comparisons between species. In our “A Child’s Perception of Malaria” section, we have showcased another beautiful and informative sketch from a young kid demonstrating his understanding of malaria disease.

It is a great pleasure to share the news that Union Cabinet recently approved a Memorandum of Understanding (MoU) signed between the Indian Council of Medical Research (ICMR) and the Oxford University UK, with the idea of promoting collaboration and capacity building to tackle vector-borne diseases and emerging infections. The details related to this development are provided in this issue.

We hope that you will find this issue invigorating and enjoyable. Please write to us for any feedback or suggestions regarding the content of the newsletter at meranewsletter@gmail.com.

With best wishes
MERA-India team

MERA-India completes three years



The Malaria Elimination Research Alliance (MERA) India was launched by the Indian Council of Medical Research (ICMR) Director-General, Dr Balram Bhargava, on the eve of 'World Malaria Day' in 2019. On 24th April 2022, MERA-India completed three years since its launch in 2019. The mandate of MERA-India is to bring together researchers working in the field of malaria in ICMR and non-ICMR research institutions, universities and national programs and strengthen the country's research ecosystem for malaria elimination from India by 2030. In the first round of funding, we funded 32 projects in the thematic areas identified by the experts as the priority areas for supporting malaria elimination in India. To know more about MERA-India's aims, organizational & scientific vision, read the article by the MERA-India Team: Rahi et al., Connecting the dots to strengthen malaria elimination strategies in India A Malaria Elimination Research Alliance - India initiative (<https://pubmed.ncbi.nlm.nih.gov/34782526/>).

Distinguished Lecture by Professor David Fidock

The screenshot shows a Webex meeting window. The main content is a presentation slide with the title "Mutant K13 Has Arisen in Africa and S America". The slide is divided into two main sections: "Phylogenomic tree of mutant K13 parasites" and "R561H emergence in Rwanda". The phylogenetic tree shows branches for S America, Africa, and SE Asia, with a specific branch for Rwanda highlighted in red. The map of Africa shows the R561H emergence in Rwanda, with a bar chart showing the percentage of R561H emergence in Rwanda (100%) and other regions (0%). The slide also mentions "3,300 genomes sequenced" and cites "Mathieu eLife 2020; Uwimana 2020 Nature Medicine; Stokes eLife 2021". The meeting interface includes a list of participants on the right, including Barbara Stokes, Amit Sharma (Cohost), David Fidock, Sachin Sharma (Cohost), IT NIMR (Cohost), and Ashis Das. The control bar at the bottom includes buttons for Unmute, Start video, Share, and other meeting controls.

Professor David Fidock was the speaker in the ICMR-NIMR & MERA-India “Distinguished Lecture Series” for March. Professor Fidock is the CS Hamish Young Professor of Microbiology & Immunology and of Medical Sciences (in Medicine) at the Columbia University Medical Centre. He is also the founding Director of the Columbia University Centre for Malaria Therapeutics and Antimicrobial Resistance and the Director of the NIH-funded Columbia University Graduate Training Program in Microbiology and Immunology. Dr Amit Sharma, the Director of ICMR-NIMR, welcomed Professor Fidock, and Dr Sachin Sharma, Chief Consultant, MERA-India, introduced the speaker to the attendees.

Professor Fidock’s lecture was entitled “Leveraging Genetic and Pharmacological Approaches to Tackle the Global Spread of Drug-Resistant Malaria”. In this lecture, Professor Fidock described the work done in his research group focusing on the drug resistance in malaria parasites and using that information to improve the treatment outcomes and develop new drugs for malaria. He talked about the current tools available to fight against malaria, like the anti-malaria drugs, insecticides, bed-nets and the WHO-approved malaria vaccine RTS, S/AS01. He further presented the timeline of the discovery and use of the different antimalarial drugs and the emergence of resistance to them. He next described his work identifying the molecular basis of the resistance mechanism for the artemisinin drug. He also talked about his work identifying the mutations in the chloroquine drug transporter (PfCRT) that could drive piperaquine resistance, and the mechanism behind this resistance. The use of the humanized mice model to set up genetic crosses in the parasites and to identify the possible resistance traits that could evolve in the field was also explained. He further showed how research into studying the resistance mechanisms could help identify novel drug targets and develop new drugs.

After the lecture, Professor Fidock answered questions from the attendees. The session concluded with Dr Sachin Sharma thanking the speaker and the attendees.

The recording of this lecture is available on the MERA-India website (<https://www.meraindia.org.in/lecture-series>).

Lecture Series on Infectious Diseases

Lecture 10 by Professor Anuradha Chowdhary

The screenshot shows a Zoom meeting interface. The main content is a presentation slide from mBio titled "Candida auris on Apples: Diversity and Clinical Significance". The slide includes the authors' names: Anamika Yadav, Kusum Jain, Yue Wang, Kalpana Pawar, Hardeep Kaur, Krishan Kumar Sharma, Vandana Tripathy, Ashutosh Singh, Jianping Xu, and Anuradha Chowdhary. The slide features a diagram illustrating the relationship between stored apples, the environment, and human health, showing how *C. auris* can be isolated from stored apples and then spread to humans. The diagram includes labels for "Stored Apples", "Environment", "Human Health", and "Isolation and identification of multi-resistant C. auris". Below the diagram is a caption: "FIG 9. Schematic representation of stored apples as a possible reservoir of isolation and identification of multi-resistant C. auris." The Zoom interface also shows a "Participants (75)" list on the right, including names like Neha Surela, PANKAJ BARFAL, Paras Mahale, Partha Protim D., Payal Mittal, phd.nimr@gmail..., pooja yadav, Poonam, priya agrohi, Priyanka Sharma, and Priyanka Verma. At the bottom, there are controls for "Unmute", "Start video", "Share", and "Mute All/Unmute All".

Professor Anuradha Chowdhary was the speaker for the tenth lecture in the ICMR-NIMR & MERA-India “Lecture Series on Infectious Diseases”. Professor Chowdhary is a professor of Medical Mycology in the Department of Medical Mycology at Vallabhbhai Patel Chest Institute, University of Delhi. Her research focuses on antifungal resistance, molecular typing, and the epidemiology of emerging fungal pathogens. Dr Sachin Sharma, Chief Consultant MERA-India, welcomed everyone and introduced Professor Chowdhary.

Professor Chowdhary delivered the lecture on the topic entitled “*Candida auris*: Understanding the recent emergence and spread of MDR fungal pathogen”. In the lecture, Professor Chowdhary talked about the work that led to identifying of the fungal pathogen *Candida auris* and its emergence as a pathogen of global concern. She described the varied spectrum of fungal infections and expressed that despite the high burden of fungal infections, which leads to the death of 150 people every hour, the fungal infections are still being ignored. She next described the work leading to identifying the multi-drug resistant pathogen *Candida auris*, after its isolation for the first time in 2009 from the external ear canal of a patient in Japan. She next described how this pathogen has emerged in multiple countries in the last seven years, with several global outbreaks reported in hospitals. She further described the challenges of misidentifying the new pathogens and stressed the need to regularly update the protocols for detecting and identifying the emerging pathogens. She talked about her landmark study reporting the isolation of susceptible *Candida auris* isolates from the natural environment. She further shared her recent work, which showed the isolation of drug-resistant *Candida auris* strains from stored apples, suggesting that the resistance development in this pathogen is possibly related to the use of fungicides in the environment. She also described the risk factors and the cases of candidemia in the COVID-19 patients admitted to ICUs.

The lecture was followed by answers to the questions from attendees and ended with a note of thanks from Dr Sachin Sharma. The recording of this lecture is available on the MERA-India website (<https://www.meraindia.org.in/lecture-series>).

Training for MERA-India multi-centric project on Community Behavior theme

With an aim for capacity building and in line with promoting the spirit of collaborative research, MERA-India conducted training at AIIMS-Jodhpur for the MERA-India multi-centric Community Behaviour project under the guidance of the experts Dr Arun Sharma (Director ICMR-NIIRNCD), Prof Rajib Dasgupta (JNU), Dr Bontha Babu (Scientist G, ICMR), Dr Amit Sharma (Director ICMR-NIMR), Dr Manju Rahi (Scientist F, ICMR) and Mr Sanjeev Gupta (Technical Officer, ICMR-NIMR).



The training was attended by the Principal Investigators and their teams from the institutions across India running the MERA-India multi-centric Community Behaviour in Malaria project.

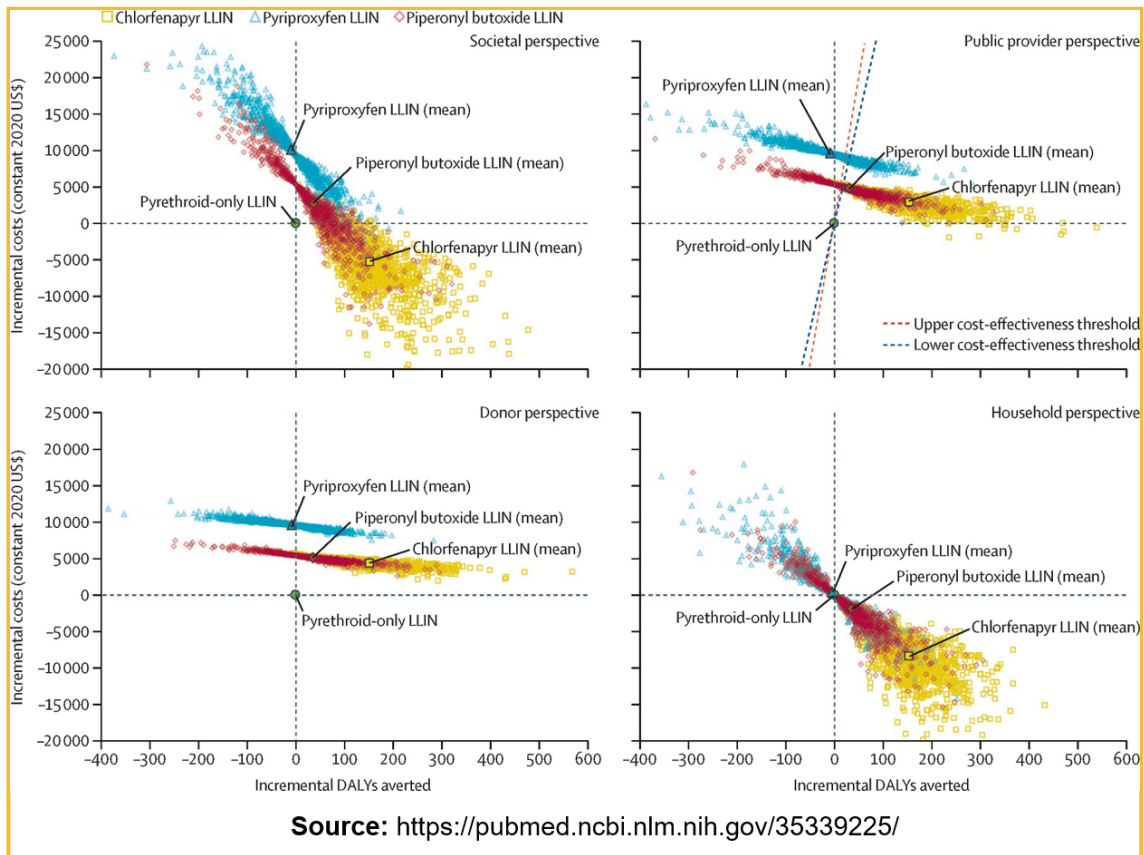


During the training, there were discussions on the factors to consider while conducting household surveys to determine the community's knowledge about malaria prevention and control, to assess the acceptance and practice of using interventions such as bed-nets & mosquito-repellents, and the community's healthcare-seeking attitude. The data quality monitoring parameters while conducting such surveys were also discussed. A field activity to conduct household surveys using digitized forms was also organized to expose the participants to the challenges in real-life situations.



Research in Spotlight

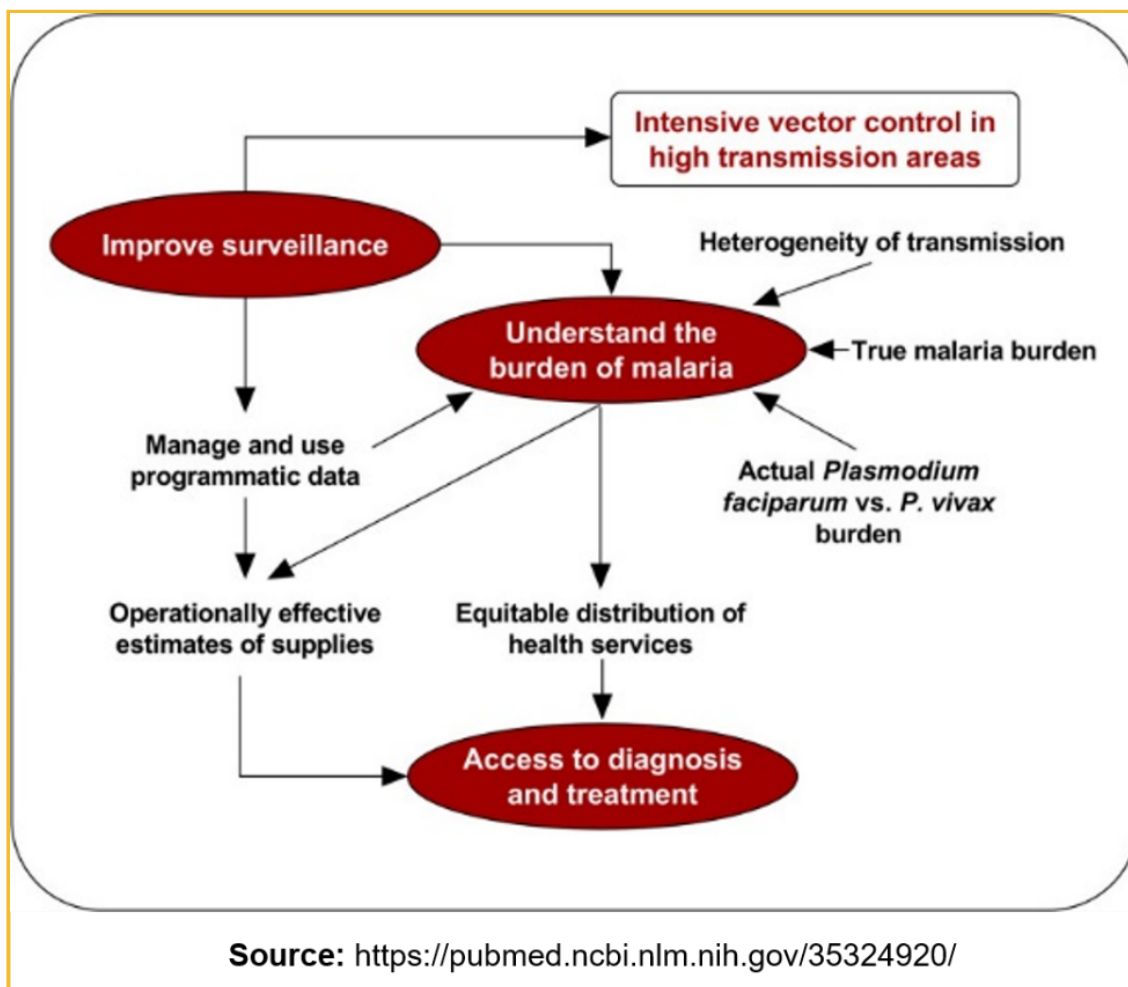
Mosha JF *et al.*, *Lancet*, 2022: Effectiveness and cost-effectiveness against malaria of three types of dual-active-ingredient long-lasting insecticidal nets (LLINs) compared with pyrethroid-only LLINs in Tanzania: a four-arm, cluster-randomised trial



Long-lasting insecticide-treated bed nets (LLINs) are one of the major intervention tools that have helped reduce the malaria burden in malaria-endemic countries. However, the emergence of insecticide-resistant mosquitoes has led to the reduced efficacy of this tool. In this [study](#), the authors have assessed the efficacy of the new classes of LLINs treated with a new combination of two insecticides having different modes of action. For this study, a four-arm cluster-randomized trial was carried out in 84 clusters in Misungwi, Tanzania, which has pyrethroid-resistant mosquitoes. Each cluster had at least 119 households and children between the ages of 6 months and 14 years living in the cluster's core area. The distribution of the four different types of LLINs: pyriproxyfen and α -cypermethrin (pyriproxyfen group); the synergist piperonyl butoxide and permethrin (piperonyl butoxide group), chlorfenapyr and α -cypermethrin (chlorfenapyr group); or α -cypermethrin only (pyrethroid-only [reference] group), was done in each of the clusters using constrained randomization, with at least one LLIN distributed for every two people. The malaria prevalence in children from randomly selected households was compared after 24 months of the LLIN distribution, and it showed that the chlorfenapyr group LLINs imparted better protection against malaria (25.6% malaria prevalence), as compared to the reference pyrethroid-only group (45.8%), or the piperonyl butoxide group (40.7%), or the pyriproxyfen

group (37.5%). The entomological inoculation rate was also 85% lower in the chlorfenapyr group LLINs than to the pyrethroid-only group, and the cost-effectiveness of the chlorfenapyr-treated LLINs was better than the other three classes of LLINs. This study has thus demonstrated the efficacy of a new class of insecticide, chlorfenapyr with a pyrrole group, for use in LLINs for malaria control.

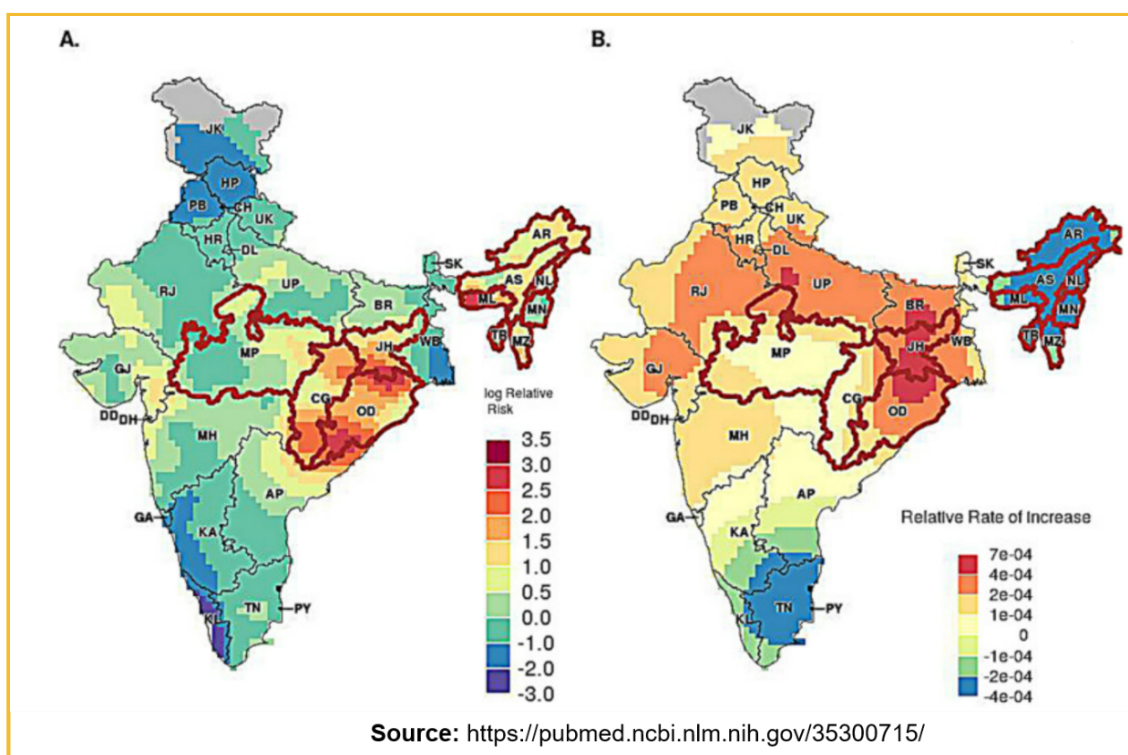
Pradhan MM *et al.*, *PLoS One*, 2022: Impact of the malaria comprehensive case management programme in Odisha, India



Odisha state in India accounts for around 40% of India's total malaria cases. The anti-malaria efforts in 2008 and 2009 led to a reduction in the malaria burden in the state between 2011 and 2013. However, since 2014, malaria cases have been higher than in 2009. In 2013, a collaborative implementation research initiative of the Government of Odisha & the National Institute of Malaria Research (NIMR), and supported by Medicines for Malaria Venture (MMV), the Comprehensive Case Management Project (CCMP), was launched in Odisha to strengthen early detection and case treatment (EDCT) with the usual vector control measures being undertaken by the programme. To assess the impact of CCMP in different transmission settings, this two-arm quasi-experimental implementation [study](#) was set up in four districts having different malaria endemicities: Kandhamal (hyper), Angul (high), Dhenkanal (moderate) and Bolangir (low). In each district, one CCMP intervention block and one control block with routine malaria control activities were identified. The monthly malaria detection and case incidence were compared in these

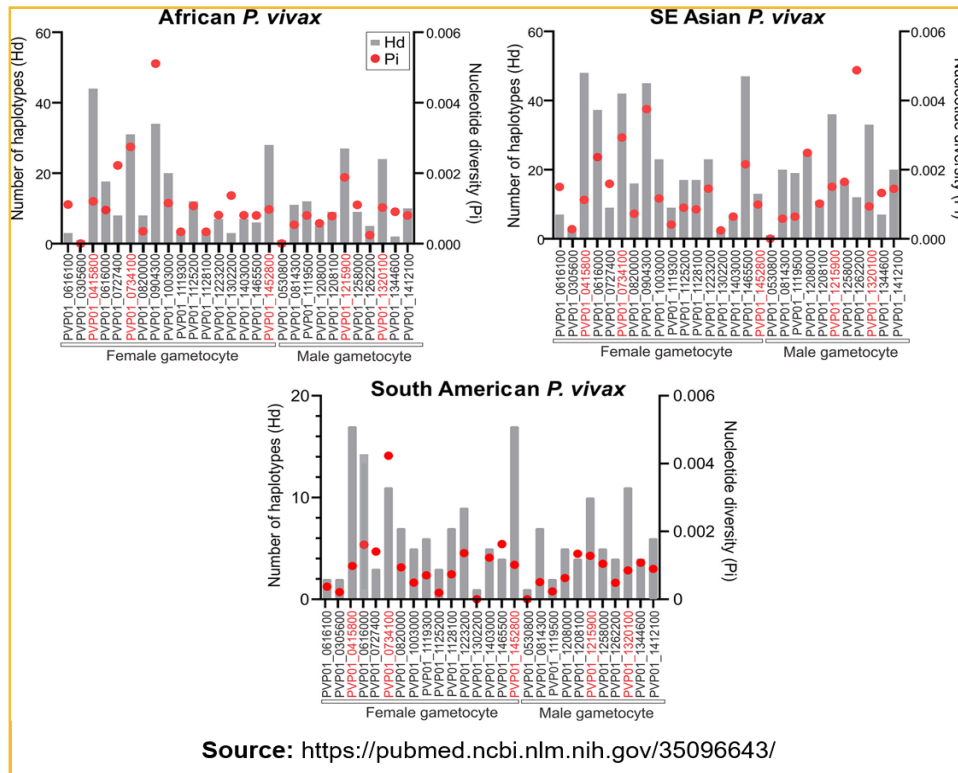
districts before the implementation of CCMP (2009-2012), during CCMP (2013-2015) and post-CCMP (2016-2017). The analysis presented in this study shows that CCMP led to an improved EDCT, reflected by an increase in monthly blood examination rate (MBER) and malaria parasite incidence (MPI) during CCMP implementation. At the same time, a decline in MPI was observed in the post-CCMP phase, even though MBER was maintained. The impact of CCMP interventions in areas with different malaria endemicities would thus help revise the malaria control activities to make them more effective for reducing malaria transmission.

Jana S et al., *Malar J.*, 2022: Spatio-temporal modelling of malaria mortality in India from 2004 to 2013 from the Million Death Study



In this [study](#), the authors used the malaria mortality data from the 2004-2013 Million Death Study (MDS) to construct a spatio-temporal model for identifying the spatial distribution and temporal trends of malaria mortality in India and the areas and populations with high vulnerability. The analysis shows that the rural population is at a higher mortality risk due to malaria than the urban population, thus highlighting the need for more attention and malaria control, treatment and prevention activities and awareness in the rural areas. The study also shows that the rate of malaria mortality has been declining since 2010, with the fastest decline in the high-burden states like Odisha and Jharkhand and the slowest decline in the north-eastern states. The authors further point out the need to restart MDS to collect the data and changes after 2013.

Ford A et al., *Front. Cell. Infect. Microbiol.*, 2022: Gene Polymorphisms Among *Plasmodium vivax* Geographical Isolates and the Potential as New Biomarkers for Gametocyte Detection



Source: <https://pubmed.ncbi.nlm.nih.gov/35096643/>

Due to the distinctive biological features of the parasite, there are many challenges associated with the control and elimination of *P. vivax* malaria. The sexual stages of the malaria parasite, i.e. gametocytes, are responsible for transmitting the parasite to its vector. Reports have indicated that sub-microscopic gametocytes might act as hidden reservoirs of malaria parasites in the low transmission areas. The detection of the transmission potential of infection by conventional methods like microscopy might lead to depreciated counts of gametocyte populations as the reservoir. Identifying genes by molecular methods in male and female gametocytes that are expressed in higher proportions and show polymorphisms is important to understand the relative proportions of these gametocytes. In this [article](#), the authors studied the genetic variations in 17 and 11 genes expressed in female and male gametocytes respectively in geographical isolates of *P. vivax* from Southeast Asia, South America and Africa. They further constructed phylogenetic trees and determined the clusters of gametocyte clones. It was found that genes *Pvs25* (PVP01_0616100) and *Pvs16* (PVP01_0305600), expressed in the female gametocytes, were among the highly conserved genes in the all these isolates. However, a high level of polymorphisms was observed in two female gametocyte genes *Pvs230* (PVP01_0415800), *ULG8* (PVP01_1452800) and two male gametocytes genes that belong to CPW-WPC family proteins. Based on transcriptomics data, the authors also compared the expression levels of many female and male gametocyte genes among the subset of Ethiopian *P. vivax* isolates to identify highly sensitive RNA biomarkers and found that *Pvs230* (PVP01_0415800) and a CPW-WPC family protein (PVP01_0904300) showed higher expression as compared to *Pvs25*. Together, this study indicated that the genes *Pvs230*, *ULG8*, and CPW-WPC family proteins (PVP01_0904300, PVP01_1215900, and PVP01_1320100) could be deployed as novel biomarkers for the detection of *P. vivax* gametocytes, especially in asymptomatic/low-density infections.

Malaria Scientists to Watch

An interview with Dr Jyoti Das



[Dr Jyoti Das](#)

**Scientist F,
ICMR, National Institute of Malaria Research, Delhi**

1. What motivated you to work in the field of malaria research?

During my PhD and postdoctoral training, I worked on airway inflammation. However, one day during a discussion with Prof VS Chauhan at ICGB, he redirected me to think and start my career in malaria, and handed over his book on malaria. That was the moment which changed my research field and motivated me to work on malaria.

2. What has been your most surprising and unexpected discovery in malaria so far?

During malaria infection, it is known that malaria infection causes splenomegaly. However, it was not clear what all cells get accumulated in the spleen. For the first time, my lab was able to figure out that a huge infiltration of mesenchymal stem cells was responsible for splenomegaly. Moreover, the adoptive transfer of these cells to syngenic mice protects them from malaria infection. Mesenchymal stem cells reprogram bone marrow cells towards colony forming unit-erythroid (CFU-E) while malaria infection arrests the conversion of Burst forming unit (BFU) to CFU-E.

3. What do you see as the biggest challenge for India in achieving the malaria elimination goal by the year 2030?

Life in itself is a big challenge every day. Though malaria is a disease in developing countries, a lot of countries are now free from malaria. Malaria elimination in India is possible only with sincere dedication and good teamwork. However diverse geographical distribution, the emergence of anti-malarial drug-resistant parasites and lack of awareness among people in India may pose a challenge to intervention/therapeutic strategies to achieve the goal.

4. What is one advice that you would like to give to early-stage researchers?

Each and everyone can achieve more than one's desire provided you have faith and determination within you. Just respect your mentor and be honest to yourself, your institute and your work, no matter what the situation is.

5. *What significance do you see for MERA-India in achieving India's malaria elimination target?*

In my opinion, MERA-India is doing a great job in bringing together new and innovative ideas of youngsters and the experience of experts in the malaria field under the leadership of ICMR and NIMR. NIMR is a premier institute for malaria research, working tirelessly for the last 42 years. I am confident that with the guidance of Director-NIMR and other experts, MERA-India will be able to achieve the target of malaria elimination.

An interview with Dr Rama Shankar Rath



[Dr Rama Shankar Rath](#)
**Assistant Professor,
Department of Community Medicine & Family
Medicine,
All India Institute of Medical Sciences, Gorakhpur**

1. *What motivated you to work in the field of malaria research?*

Public health in India is mainly linked to many diseases in India, malaria is one such disease. This program is close to the heart of every medical graduate. If we see India's journey in malaria elimination, many a time we came very close to malaria elimination after the success of the National Malaria Control Programme in 1953, but we failed.

During my post-graduation at AIIMS, Delhi I closely visited the District Health System its working style and closely observed the programme National Vector Borne Disease Control Program (NVBDCP) and other programmes at the grass-root level. After my residency, I joined NVBDCP as a National Consultant under Dr Avdhesh Kumar, Additional Director, NVBDCP, for a short period. His guidance helped me to get more insight into the programme. During that time, I was involved in monitoring and evaluation activities in the North-eastern States and was closely involved with the programme at the grass-root level, district and state level. This close association with malaria although for a short period it motivated me to do further research on malaria.

2. *If you have to pick one intervention that has played the biggest role in our fight against malaria, which one would that be?*

There are many interventions which helped us in fighting malaria. One such intervention is the Rapid Diagnostic Kits which helped in the following ways:

- Providing diagnosis in the distant remote places
- Early diagnosis and early initiation of treatment thereby decreasing the mortality and morbidity
- Decreasing the parasite load in the patient decreased the transmission of malaria in the community
- Eliminating the presumptive treatment in the country which could have led to drug-resistant malaria.

3. What do you see as the biggest challenge for India in achieving the malaria elimination goal by the year 2030?

The biggest challenge that I think for malaria elimination would be drug-resistant malaria, low-density malaria infection, migration of people from state to state and from one country to another and complacency among the ground-level malaria workforce.

4. What is the best piece of career advice that you have ever received?

"Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time." —Thomas A. Edison

This great quote by Thomas Edison was given to me by one of my friends. I have taken this as my life lesson and am trying to work on this.

5. What significance do you see for MERA-India in achieving India's malaria elimination target?

MERA-India acting in a multipronged approach:

- Promoting research
- Training & Capacity Building of the young researcher like me
- Multipronged research in the malaria elimination (Community Behaviour, Parasite Research, Vector Dynamics)
- Program oriented research for answering the questions raised by the program
- Providing a platform for all the stakeholders like researchers, public health personnel, Programme managers

These points make MERA-India one of the key components of the Malaria Elimination in India.

Resource for Malaria Researchers: PlasmoDB

Source: <https://plasmodb.org/plasmo/app>

PlasmoDB is one of the genomic resources under the EuPathDB (<http://EuPathDB.org>) Bioinformatics Resource Center (BRC). It is a functional genomics database containing extensive genome, proteome, and metabolome information. It provides a genome-wide or gene-by-gene resource for data analysis and visualization for *Plasmodium* spp. The data is available under broad categories, including genes (annotation, curation, and identifiers; epigenomics, function prediction, gene models, genetic variation, genomic location, immunology, orthology and synteny, pathways and interactions, phenotype, protein features and properties, protein targeting and localization, proteomics, sequence analysis, structure analysis, taxonomy, transcriptomics), SNPs, ESTs, and metabolic pathways. The latest release was on April 21st, 2022, with data on 58 different *Plasmodium* strains.

To know and explore more about PlasmoDB, visit <http://PlasmoDB.org>

A Child's Perception of Malaria

In this issue, we showcase the sketch of Mr Ayush, aged nine years old. Through the drawing, Mr Ayush has pointed out how a single bite from an infected mosquito could lead to illness resulting in children's absence from school and has also highlighted the precautions that one could take to prevent mosquito bites. In the sketch, Mr Ayush also shows the malaria parasite's life cycle in the human host.



Sketch by: Mr Ayush Bhatt (son of Mr Pandeo, ICMR-NIMR Delhi); **Age:** 09 years; **Class:** Fifth

News: Memorandum of Understanding signed between ICMR and Oxford University, UK

In a significant development, the Union Cabinet of the Government of India, chaired by the Prime Minister Shri Narendra Modi, accorded the approval for the Memorandum of Understanding (MoU) signed between ICMR (NIMR) and the Oxford University UK (IDDO) to share and exchange ideas on the elimination of three vector-borne diseases in the elimination phase: malaria, visceral leishmaniasis & filariasis, and the emerging infections. The objectives under this MoU include capacity building for Indian scientists and researchers, developing best practices for data collection, management and sharing as per international standards and regulatory requirements.

The full news released by Press Information Bureau, Government of India can be accessed at: <https://pib.gov.in/PressReleasePage.aspx?PRID=1804285>

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