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NEWS & VIEWS

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INTERVIEW

Professor Utpal S. Tatu
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UPCOMING

Distinguished Lecture

Professor Marcel Tanner
President, Swiss Academies of Arts and Sciences,
Bern, Switzerland

Lecture Series on Infectious Diseases 2.0

Dr Farah Ishtiaq
Principal Scientist,
Tata Institute for Genetics and Society (TIGS),
Bengaluru, India

Editorial

Dear Readers,

MERA-India team brings you the thirty-third issue of our newsletter, "News & Views".

We would like to begin this issue by congratulating the people and government of Belize for getting the malaria-free certification from the World Health Organization (WHO). Belize is the fourth country in the Americas and the second in Central America to attain this significant milestone of being certified free of malaria within the past five years. Sustained investment and commitment to end malaria over the last three decades have driven the achievement of a dramatic reduction in its malaria burden, from a peak of about 10,000 cases in 1994 to zero indigenous cases in 2019. The WHO Director-General, Dr Tedros Adhanom Ghebreyesus, praised Belize for setting an example of how, with the right tools and the right approach, we can dream of a malaria-free future.

While Azerbaijan, Tajikistan, and Belize have obtained malaria-free certifications in 2023, the Centers for Disease Control and Prevention (CDC) has reported new instances of locally acquired malaria in the states of Florida and Texas in the US. This development has raised concerns and emphasized the importance of vigilant surveillance to uphold their 'malaria-free status'.

In the current issue, we have enclosed the highlights of Dr Alison Krentel's talk on “Elimination of lymphatic filariasis as a public health problem: current global challenges”, with a focus on mass drug administration as a means of elimination. Dr Krentel is an Associate Professor at the School of Epidemiology and Public Health, University of Ottawa, and Senior Investigator at the Bruyère Research Institute, Ottawa, Canada. The 'Malaria Scientists to Watch' section encompasses an insightful and edifying interview with a renowned molecular biologist and biochemist, Professor Utpal Tatu (Chairman, Department of Biochemistry, Indian Institute of Science, Bengaluru, Karnataka, India).

The "Research in Spotlight" section covers the summary of three malaria-relevant research articles. In the first article, Whittaker *et al.* reported the threat to disease control efforts imposed by the invasive malaria vector *Anopheles stephensi* across sub-Saharan Africa and the urgent need for longitudinal entomological monitoring of the vector in its new environments. In another article by Corder *et al.,* the role of host genetics, acquired immunity, and asymptomatic reservoirs was studied in the lesser-explored malaria risk heterogeneity in regions where *Plasmodium vivax* is the dominant species. In the third article, Khan *et al.* provided information for the development of an evidence-based sustainable vector control strategy for malaria control and reported the possible variations in the behavior of malaria vectors due to the extensive use of insecticide-based interventions.

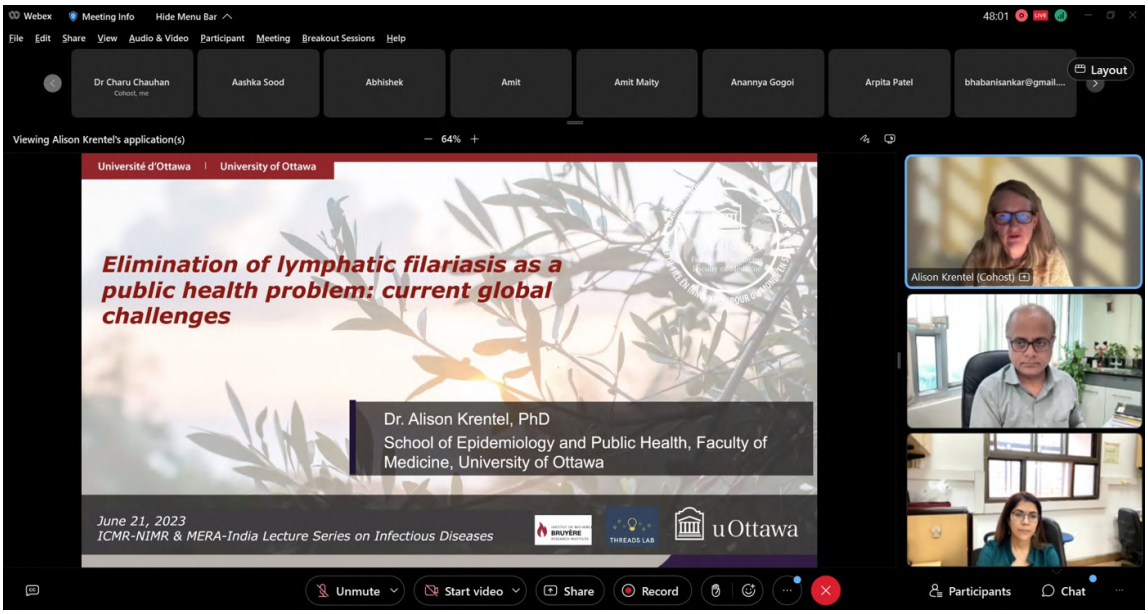
Further, the "Malaria Through the Lens of Researchers" section showcases an image submitted for the MERA-India Image Competition 2022 by Dr Ankit Raj, MD Student, Department of Preventive & Social Medicine, Sawai Man Singh Medical College, Jaipur, India. The "Upcoming Events" section includes details about two upcoming lectures. The first is a distinguished lecture by Professor Marcel Tanner, President of the Swiss Academies of Arts and Sciences, Bern, Switzerland. The second is the eighth lecture in the “Lecture Series on Infectious Diseases 2.0”, to be presented by Dr Farah Ishtiaq, Principal Scientist at Tata Institute for Genetics and Society, Bengaluru, Karnataka, India.

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

With best wishes,
MERA-India team

ICMR-NIMR & MERA-India Activity

Lecture Series on Infectious Diseases 2.0: Lecture 06 by Dr Alison Krentel



On the 21st of June 2023, the sixth lecture in the ICMR-NIMR and MERA-India Lecture Series on Infectious Diseases 2.0 took place, featuring Dr Alison Krentel as the esteemed guest speaker. Dr Krentel currently holds the position of associate professor in the School of Epidemiology and Public Health at the University of Ottawa, Canada. She also serves as a senior investigator at the Bruyère Research Institute. Dr Krentel boasts an impressive career as a researcher and consultant in the field of public health. Her extensive expertise spans across 14 countries in Africa, Southeast Asia, Latin America, and the Western Pacific. Dr Manju Rahi, Scientist-F, ICMR, and Principal Investigator, MERA-India, welcomed Dr Krentel, and Dr Sachin Sharma, Chief Consultant, MERA-India, introduced her to the audience.

Dr Alison Krentel commenced her lecture titled "Elimination of lymphatic filariasis as a public health problem: current global challenges" with an introductory session on lymphatic filariasis and its global epidemiological impact. She particularly emphasized its prevalence in India. She highlighted the "Filariasis mukt abhiyan" initiative in India, which aims to eradicate filariasis from the country by the year 2030. Dr Krentel also shed light on the Global Programme to Eliminate Lymphatic Filariasis (GPELF) and its two main pillars. The first pillar involves interrupting transmission by reducing parasite levels in the blood, while the second pillar focuses on providing morbidity management. The steps to interrupt the transmission of lymphatic filariasis were then explained, encompassing mapping, Mass Drug Administration (MDA), surveillance, and verification. In relation to MDA, Dr Krentel

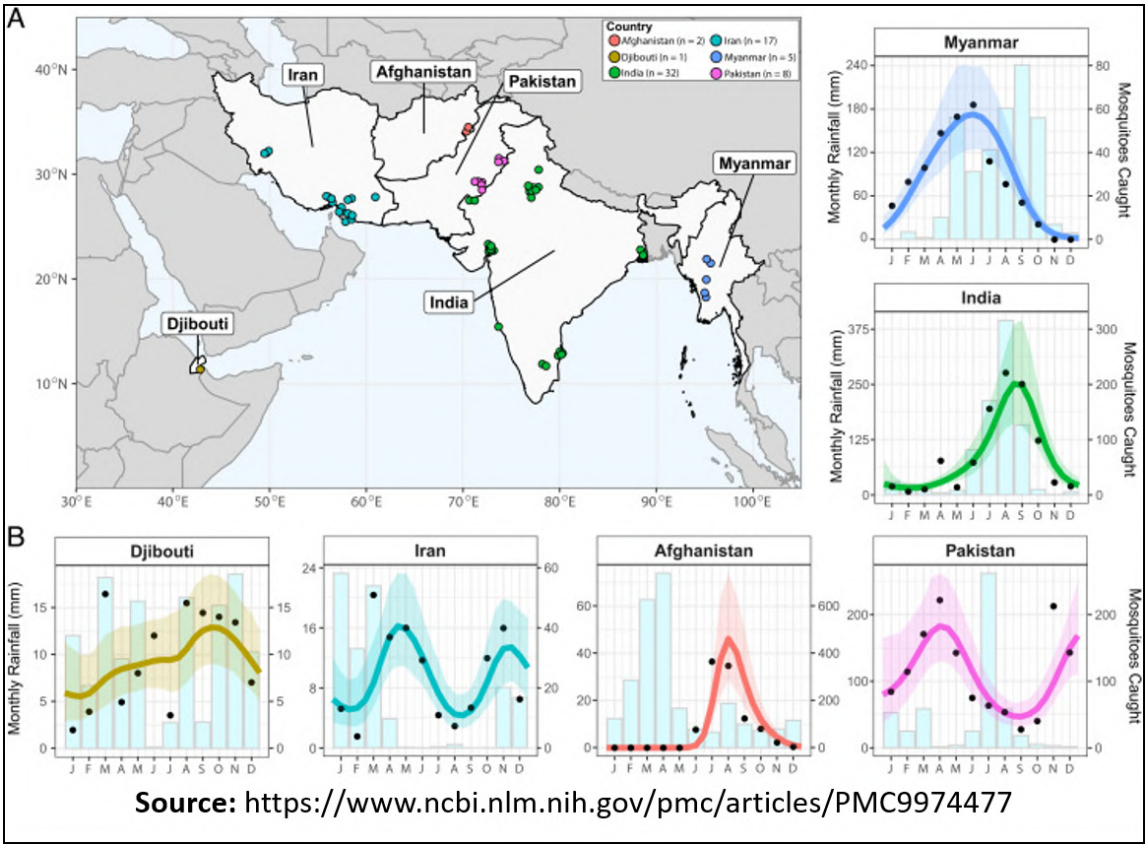
detailed the two regimens used: one consisting of two drugs (Diethylcarbamazine (DEC) + Albendazole) and the other consisting of three drugs (Ivermectin + DEC + Albendazole). Notably, the three-drug regimen has demonstrated greater effectiveness compared to the two-drug regimen. Throughout the lecture, various challenges encountered during the MDA process were discussed. These challenges included issues related to accessing treatment, difficulties at the provider and patient levels, concerns regarding drug resistance and treatment professionalism, as well as adverse events associated with the medications. Additionally, Dr Krentel described the characteristics of individuals who self-reported, never having been treated during the lymphatic filariasis MDA efforts, providing valuable insights into potential obstacles in achieving comprehensive treatment coverage.

After the lecture, Dr Alison Krentel graciously addressed the questions posed by the audience, further enriching the discussion with her expertise and insights. The session came to a close with Dr Sachin Sharma, delivering a vote of thanks to Dr Krentel. He also expressed gratitude to all the attendees for their active participation and engagement during the event.

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

Research in Spotlight

Whittaker C. *et al., Proc Natl Acad Sci U S A.* 2023: Seasonal dynamics of *Anopheles stephensi* and its implications for mosquito detection and emergent malaria control in the Horn of Africa.



The invasion of the malaria vector *Anopheles stephensi* across sub-Saharan Africa poses a threat to disease control efforts, particularly in cities where malaria transmission has historically been low but where this invasive vector can thrive.

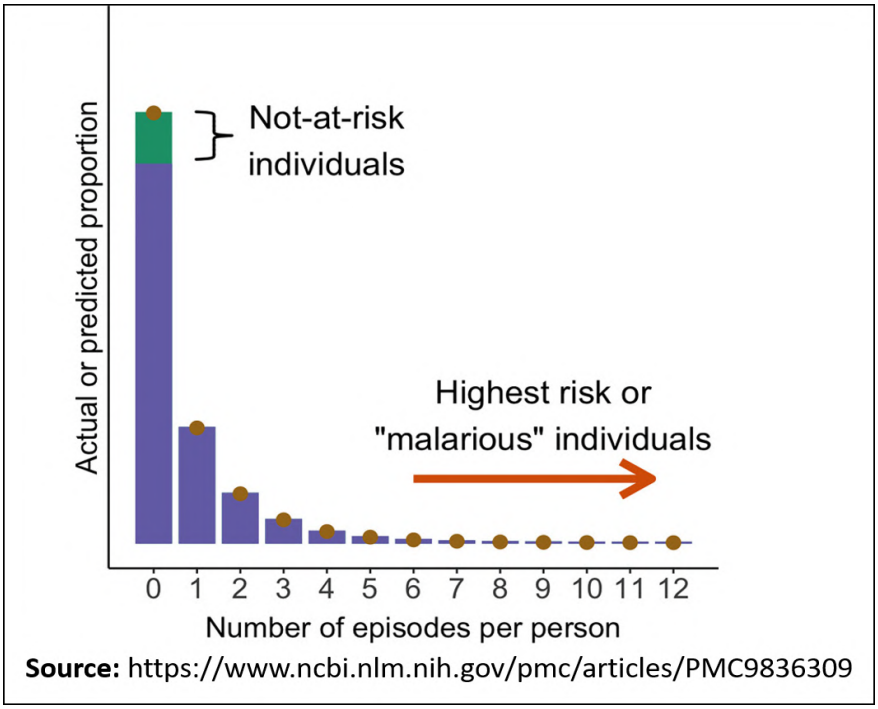
Whittaker *et al.* compared the longitudinal data to characterize the seasonal dynamics of *An. stephensi* in order to guide surveillance and control activities in areas at risk of invasion. Their work highlights significant variations in pattern with respect to time and surrounding environment (temporal dynamics) across *An. stephensi* populations and distinct ecological factors differing between urban and rural settings that can interrupt the effectiveness of vector control interventions. The study also highlights the need to better understand the vector's dynamics in settings where it has been newly established, how these dynamics might differ from and interact with other *Anopheles* species also present, and the mechanistic relationships underpinning these different responses to factors such as urbanization. Indeed, the trajectory of *An. stephensi* establishment and subsequent dynamics in the Horn of Africa remain deeply unclear, and the scarcity of published entomological studies from the region accentuates the need for studies longitudinally

surveying locations where *An. stephensi* has recently arrived. This will be important in understanding the patterns of seasonal variation, and the vector displays, and support optimizing the delivery of malaria control interventions aiming to mitigate the impact of this invasive vector.

Since, the efficacy of many malaria control interventions [such as seasonal malaria chemoprevention, indoor residual spraying (IRS), or larval source management (LSM)] depends on optimally timing their delivery relative to seasonal peaks in vector abundance, a better understanding of the seasonality of *An. stephensi* across its current range will help guide entomological monitoring and surveillance activities in areas of possible invasion and have material consequences for the effective control of *An. stephensi*-driven malaria transmission.

The study revealed that the seasonal dynamics of *An. stephensi* are associated with temperature and patterns of land use, frequently differing between rural and urban settings. Therefore, unlike other malaria vectors in Africa, rainfall may be a poor guide to predicting the timing of peaks in *An. stephensi*-driven malaria transmission. This highlights the urgent need for longitudinal entomological monitoring of the vector in its new environments, given the recent invasion and potential spread across the continent. Integrating these results with a previously published model of malaria transmission also highlights how this variation will influence the efficacy of malaria control efforts in parts of the Horn of Africa where the disease is currently (or has previously been) largely absent and underscores the need for rapid scale-up of entomological monitoring across the region.

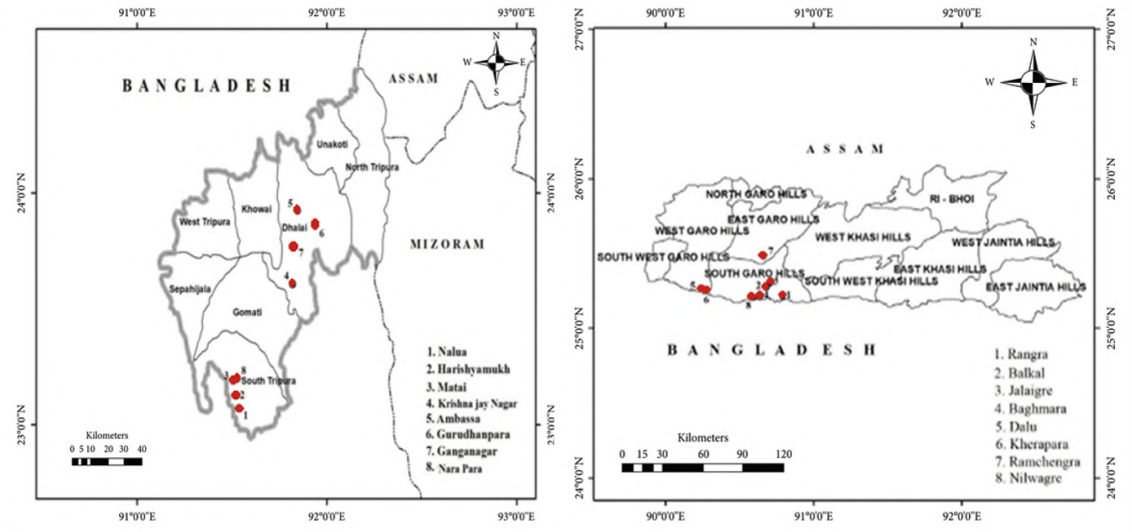
Corder RM. *et al., PLoS Negl Trop Dis.* 2023: Individual variation in *Plasmodium vivax* malaria risk: Are repeatedly infected people just unlucky?



Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9836309

Malaria risk heterogeneity remains understudied in regions where *P. vivax* is the dominant species. In this article, Corder *et al.* briefly reviewed the evidence that human genetic polymorphism and acquired immunity after repeated exposure to parasites can modulate the risk of *P. vivax* infection and disease in predictable ways. For the present review, the authors identified studies that describe malaria risk heterogeneity and its causes and consequences, especially in endemic settings where *P. vivax* is the dominant malaria-causing species. Some malaria-exposed people have repeated malaria episodes, while most individuals remain free of disease over extended periods of time. This happens because people differ in the frequency at which they are bitten by infected vectors. There are several factors that affect *P. vivax* hypnozoite's survival, and activation can promote or prevent relapses. Moreover, host genetics may either favor or block red blood cells (RBC) invasion and the intracellular multiplication of parasites. At the community level, the individual risk of vivax malaria varies widely as a result of sociodemographic, genetic, and behavioral factors. There could be a minority of high-risk people who are repeatedly exposed to blood-stage parasites and eventually become immune, while low-risk individuals are seldom infected and remain susceptible to infection and disease during their lifetime. Finally, factors that preclude the use of the anti-malarial drug primaquine to eliminate hypnozoites (e.g., pregnancy) or reduce its efficacy (e.g., low activity of the cytochrome P450 isoenzyme CYP2D6) may specifically increase the burden of *P. vivax* disease and transmission potential by rendering some people more likely to have relapses. The review concluded with a statement that the above-mentioned factors are “vivax-specific” malaria resistance factors.

Khan SA. *et al, Journal of Tropical Medicine.* 2023: A study on the bionomics of primary malaria vectors *Anopheles minimus* and *Anopheles baimaii* in some states of North East region of India.



Source: https://www.hindawi.com/journals/jtm/2023/9946754

Malaria control in India is complex due to the presence of multiple ecotypes and vector systems across the country. The vector diversity of the northeast region, due to its eco-geography and rich biodiversity is different from that of peninsular India. Furthermore, rapid urbanization and changes in climate are also affecting the vector biology and behavior of existing species. Insecticide-based vector control continues to be the major component of malaria control. Currently, chemical-driven control is recommended for malaria vectors in India. Improved tools and strategies like artemisinin-based combination therapy (ACT), rapid diagnostic tests (RDTs), long-lasting insecticidal nets (LLINs), indoor spraying of residual insecticides (IRS), and revision of the National Drug Policy for malaria in 2013 have been fundamental in reducing malaria and are still effective.

In the North East (NE) region of India, *An. baimaii* and *An. minimus* are prominent vector species and are found in the foothills and forest fringe areas; however, recent information on the bionomics of these prevalent malaria vectors and their role in transmission is lacking. In this study, *Khan et al.* covered 16 villages in different ecotypes, i.e., plain, foothill, and forested areas in Tripura and Meghalaya to generate information for the development of an evidence-based sustainable vector control strategy for malaria control. The study analyzed species-specific morphological characteristics, the entomological survey of adult *Anopheles* mosquitoes to determine the source of blood meal for the vectors and determine the host feeding preference, and insecticide susceptibility.

Tripura and Meghalaya are the high malaria prevalence states of NE India. Both *An. minimus* and *An. Baimaii* showed anthropophagic behavior. However, a slight shift (~14%)

in *An. baimaii* towards zoophagic behavior is advantageous for the decreased transmission of disease. Insecticide susceptibility tests confirmed that these two major vector species are susceptible to Dichlorodiphenyltrichloroethane (DDT) and Malathion to date, unlike other vector species, and indicate the efficacy of ongoing interventions like DDT-IRS. Thus, for the sustenance of gains, more effective implementation of appropriate strategies based on this recent information on the bionomics of the two major malaria vectors in the northeast region of India will provide a good opportunity to achieve malaria elimination by date in the majority of states in this region.

Malaria Scientist to Watch

An interview with Professor Utpal Shashikant Tatu

Professor Utpal Shashikant Tatu
Chairman and Professor,
Department of Biochemistry,
Indian Institute of Science, Bengaluru, India

1. Please describe your journey and milestones achieved during your tenure at IISC since 1997.

I joined IISc as a faculty in 1997 after my tenure as a postdoc and then as an assistant professor at Yale University. Usually, scientists who return to India continue their research in the area that they pursue as postdocs. This is very helpful because they already have a lot of experience, the necessary network in the academic community, and probably the availability of reagents to kick-start their careers. I decided on an unusual path, not to continue in my research area but instead focus on “what would be relevant for my country and my community”.

Malaria was rampant in the 90s in India, and it was a priority for our country to control its spread. I, therefore, decided to turn my attention to this important problem in the country. This was before the genome era and the whole genome sequence of the malaria parasite was not known.

Professor Padmanabhan, then Director of IISc, was already a known international figure in malaria research and had established all the necessary tools to study the intra-erythrocytic cycle of malaria at IISc. He and Professor Rangarajan both offered unconditional support to initiate research in this area to my lab.

I was curious as to how a single-cell parasitic organism copes with wide temperature changes during its transmission from the mosquito to humans and then during fever episodes in the patient. Heat shock proteins were not invoked in this coping mechanism in the parasite and nothing much was known about whether the parasite has a well-developed heat shock response pathway.

Over the next decade or more my lab studied an important group of heat shock proteins, namely Hsp40, Hsp60, Hsp70, and Hsp90, as well as accessory cis and trans factors involved in the regulation of heat shock response in the parasite. The study highlighted an

intimate link in the regulation of these stress proteins with the life cycle of the parasite. Several groups around the world took this idea further and the study was highlighted in Nature Medicine as an editorial.

Investigating this pathway has provided valuable insights into the parasite's adaptive mechanisms and its ability to cope with challenges in the host. The research also sheds light on their role in vector biology, influencing vector competence and transmission of vector-borne diseases. Additionally, my work on drug resistance in malarial parasites has contributed to understanding the mechanisms underlying resistance and exploring potential drug targets. The study of the clinical proteome of malarial parasites has allowed us to identify crucial proteins and pathways that could be targeted for developing novel anti-malarial interventions.

2. What are the emerging research areas or technologies that have the potential to transform malaria control and prevention efforts?

Emerging research areas and technologies hold immense potential to transform malaria control and prevention efforts. Some of the key areas that show promise are:

a) Gametocyte Biology and Transmission: Studying the factors that regulate gametocyte development and induce their maturation in the human host can lead to interventions that disrupt transmission from human to mosquito.

b) Genomic Studies and Molecular Epidemiology: Advances in genomics and molecular techniques have enabled researchers to study the genetic diversity and population dynamics of malaria parasites. From this field, we can gain insights into drug resistance, and patterns of transmission, which can lead to the design of targeted interventions and personalized treatment strategies.

c) Vector Control Strategies: Novel mosquito control technologies, such as genetically modified mosquitoes or Wolbachia-based approaches, show promise in reducing vector populations and curbing malaria transmission. Integrating these strategies with existing interventions like insecticide-treated bed nets and indoor residual spraying can further enhance malaria prevention efforts.

d) Artificial Intelligence and Data Analytics: The integration of artificial intelligence and data analytics in malaria research can accelerate the analysis of vast datasets, improving disease surveillance, monitoring, and predictive modelling. Machine learning algorithms can identify trends, patterns, and risk factors, aiding in the early detection of outbreaks and guiding targeted interventions.

By investing in these emerging research areas and technologies, the scientific community can make significant strides in malaria control and prevention. Comprehensive strategies that target various stages of the malaria life cycle, including gametocytes, combined with the effective use of available tools, will pave the way towards reducing malaria incidence and achieving the ultimate goal of malaria elimination.

3. What advice would you offer young researchers in the field of malaria?

As a scientific leader on malaria research in the country, I would advise the young generation of researchers to explore the following topics.

a) Zoonotic potential in malaria is vital for proactive public health measures. Understanding the potential transmission between animals and humans fosters early detection, targeted interventions, and collaborative efforts toward preventing outbreaks and achieving effective malaria control. Emphasizing this aspect ensures a comprehensive approach that considers the complexities of zoonotic malaria and advances our understanding of disease dynamics, ultimately contributing to the protection of both human and animal populations.

b) Research in the field of malaria transmission control is of paramount importance for devising effective strategies to combat the disease. Understanding the intricate interactions between the malaria parasite, mosquito vectors, and human hosts is crucial for developing targeted interventions. Studies on vector biology, insecticide resistance, transmission dynamics, and novel vector control methods can inform evidence-based approaches. Such research equips us with the knowledge to implement comprehensive and sustainable measures, ultimately reducing disease burden, preventing transmission, and advancing global efforts toward malaria elimination.

c) Research in the field of malaria vector biology is of utmost importance in the global efforts to combat malaria. Vector mosquitoes play a pivotal role in transmitting the malaria parasite from infected individuals to healthy ones. By studying vector biology, we can gain crucial insights into the mosquito's behaviour, breeding habitats, feeding preferences, and resistance to insecticides. This knowledge is instrumental in developing targeted and innovative vector control strategies to disrupt the transmission cycle. Understanding the intricate interactions between vectors and the malaria parasite empowers us to devise effective interventions, ultimately reducing the burden of malaria and moving closer to the goal of eradication. NIMR is internationally known for its efforts in this area and I am aware that many scientists there are exploring new avenues to control malaria transmission.

Young researchers can play a pivotal role in advancing our understanding of malaria and contribute to efforts aimed at its prevention, control, and eventual eradication.

4. Please highlight the challenges associated with diagnosing malaria in areas with low transmission or asymptomatic individuals.

Diagnosing malaria in areas with low transmission or asymptomatic individuals presents several challenges that can hinder accurate detection and treatment. Some of the key challenges include:

a.) Low Parasite Density: In areas with low malaria transmission, the number of parasites in the blood of infected individuals is significantly reduced. As a result, standard diagnostic tests like microscopy or rapid diagnostic tests (RDTs) may fail to detect the infection due to the low parasite density.

b) Atypical Symptoms: Asymptomatic individuals or those with low parasite density may not exhibit typical malaria symptoms, such as fever or chills. Instead, they may present with non-specific symptoms or remain entirely asymptomatic, making it difficult to identify the infection based on clinical signs alone.

c) Lack of Sensitivity of Diagnostic Tests: Conventional diagnostic tests like microscopy and RDTs may have lower sensitivity in detecting malaria infections with low parasite densities. False-negative results can lead to delayed treatment and increase the risk of disease transmission.

d) Sub-microscopic Infections: In low transmission settings, some individuals may harbour malaria parasites at levels too low to be detected even by sensitive molecular tests like PCR (Polymerase Chain Reaction). These sub-microscopic infections can contribute to ongoing transmission and complicate malaria control efforts.

e) Seasonal Variation: Malaria transmission in low-endemic areas can be highly seasonal, with a greater risk during specific times of the year. Detecting infections during non-transmission periods may require more sensitive and specific diagnostic tools.

f) Overreliance on Clinical Diagnosis: In the absence of sensitive diagnostic tests, healthcare providers in low-transmission areas may resort to clinical diagnosis based on symptoms alone. This can lead to misdiagnosis and inappropriate use of antimalarial drugs, contributing to drug resistance.

g) Cost and Resource Constraints: Implementing highly sensitive molecular tests like PCR may be challenging in resource-limited settings due to high costs, infrastructure requirements, and skilled personnel needed to conduct these tests.

h) Surveillance Challenges: In low-transmission areas, passive case detection may not be sufficient to detect all malaria cases. Active case surveillance and community-based screening programs may be required to identify asymptomatic infections and prevent further transmission.

5. From your perspective, what role does MERA-India play in attaining India's target of malaria elimination and what significance does it hold in this context?

MERA-India (Malaria Elimination Research Alliance-India) plays a crucial role in attaining India's target of malaria elimination by providing a collaborative platform for research, innovation, and strategic planning. It holds immense significance in the context of malaria elimination for the following reasons:

a) Coordination and Collaboration: Malaria elimination requires a coordinated effort involving various stakeholders, including government agencies, research institutions, NGOs, and healthcare providers. MERA-India acts as a unifying platform, bringing together these diverse entities to collaborate and share knowledge, expertise, and resources.

b) Research and Innovation: MERA-India fosters research and innovation in malaria elimination strategies. By supporting and promoting research studies, the alliance contributes to the development of evidence-based approaches, novel tools, and interventions that can accelerate progress toward malaria elimination.

c) Surveillance and Monitoring: Effective surveillance and monitoring are critical for tracking malaria cases, identifying hotspots, and measuring progress toward elimination goals. MERA-India facilitates the establishment of robust surveillance systems, allowing for real-time data collection and analysis to inform decision-making.

d) Capacity Building: Malaria elimination requires a skilled workforce capable of implementing new approaches and technologies. MERA-India invests in capacity-building initiatives, providing training and workshops to healthcare professionals, researchers, and community health workers to strengthen their abilities in malaria control and elimination.

e) Policy Advocacy: The alliance advocates for evidence-based policy development and implementation. By synthesizing research findings and providing policymakers with crucial data, MERA-India influences national and regional malaria control policies, leading to more effective and targeted interventions.

f) Innovation Adoption: MERA-India acts as a bridge between research findings and on-the-ground implementation. The alliance promotes the adoption of innovative tools, strategies, and best practices, ensuring that successful research outcomes are translated into practical applications for malaria elimination efforts.

g) Public Awareness and Engagement: Malaria elimination requires community involvement and public awareness. MERA-India engages with communities, stakeholders, and policymakers through awareness campaigns, social mobilization, and education programs to garner support and active participation in malaria control activities.

h) Program Evaluation and Learning: Regular evaluation and learning from experiences are essential to refine and improve malaria elimination strategies. MERA-India facilitates program evaluation, encouraging feedback and learning from implementation to continuously enhance the effectiveness of malaria control measures.

By bringing together a diverse group of experts and stakeholders, MERA-India strengthens India's efforts to achieve its target of malaria elimination. Through research, innovation, capacity building, policy advocacy, and community engagement, the alliance plays a pivotal role in driving sustainable and effective malaria elimination initiatives across the country.

Malaria Through the Lens of Researchers

In this issue, we are highlighting one of the shortlisted entries in the MERA-India Image Competition 2022, submitted by Dr Ankit Raj, MD Student at the Department of Preventive & Social Medicine, Sawai Man Singh Medical College, Jaipur, India.

Image title: “A boy looks with curiosity as a tank is examined for the presence of mosquito larvae”

A brief description of the image is as follows:
In Rajasthan, where water scarcity is a perennial problem, water tanks like the one in the photograph are often used by lower socio-economic families in urban slums to store water. These tanks are often left uncovered, leading to the growth of mosquito larvae and malaria cases in these communities. This photograph was taken during a malaria surveillance activity where house-to-house surveys are done to look for filled and open water tanks and the presence of mosquito larvae in them. This is often accompanied by surveillance of fever cases in households and the mixing of larvicidal temephos in water tanks.

Upcoming Events

Distinguished Lecture by Professor Marcel Tanner

ICMR-NIMR and MERA-India are pleased to announce the upcoming lecture in the "Distinguished lecture series", featuring Professor Marcel Tanner as the speaker. He is the President of the Swiss Academies of Arts and Sciences; Professor Emeritus of Epidemiology and Medical Parasitology at the University of Basel; and also Director Emeritus and Hon. President of the R. Geigy Foundation, Swiss Tropical & Public Health Institute (Swiss TPH), Switzerland. His research interests include the fields of global health, epidemiology, health systems, public health, and basic research in cell biology and immunology on infectious diseases including malaria, schistosomiasis, trypanosomiasis, and filariasis.

The lecture is scheduled for Monday, August 7th, 2023, at 2:30 PM IST. Professor Tanner will talk on the topic entitled "How the Corona pandemic develops global public health", where he will illustrate the learnings from the management of the Corona pandemic, which has now become a driving force to stimulate and develop public health science and effective public health action.

To join this lecture, please click on this link: bit.ly/MI-DL-Aug

Lecture Series on Infectious Diseases 2.0: Lecture 08 by Dr Farah Ishtiaq

Dr Farah Ishtiaq will be the next speaker in the ICMR-NIMR and MERA-India "Lecture Series on Infectious Diseases 2.0," to be organized on 18th August 2023. She holds the prestigious position of Principal Scientist at the Tata Institute for Genetics and Society, located in Bengaluru, Karnataka. As an expert, Dr Ishtiaq leads the Disease Ecology and Environmental Surveillance research group, where she focuses on studying the field ecology and population genomics of crucial mosquito species involved in the transmission of malaria and dengue in India. Her efforts in this area contribute significantly to understanding and combatting these infectious diseases. Further details about the lecture will be made available through the ICMR-NIMR and MERA-India's official website (https://meraindia.org.in/) and social media accounts. Make sure to keep an eye out for updates on these platforms to stay informed about this important event.

To receive regular updates about the events being organized by MERA-India, please subscribe at https://www.meraindia.org.in/event_sub.

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