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Inside This Issue

- Editorial
- The Saga of Malaria in India: From Control to Elimination
- Mosquito Control In Urban Local Bodies In India
- Scrub Typhus: A Contemporary Mini-Review
- Reducing Breeding Grounds Over Killing Mosquitoes: A Better Approach to Dengue Control
- From Hyper-Endemic Burden to Global Model: How Odisha Rewrote the Playbook for Malaria Elimination
- Engaging Universities and Colleges in Sustainable Strategy to Eliminate Mosquito Breeding Site to Interrupt Vector-Borne Disease Transmission
- AHCF at a Glance
- Upcoming Events

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Editorial: WORLD MOSQUITO DAY

From Awareness to Action

World mosquito day is observed on **20 August**, to commemorate landmark discovery of Sir Ronald Ross's on this day of 1897. The discovery proved that mosquitoes are responsible for transmission of malaria. More than a century later, mosquitoes continue to pose a major public health challenge, transmitting malaria, dengue, chikungunya, japanese encephalitis and other diseases.

The growing impact of **urbanization, climate change, population mobility and inadequate water management** has created new opportunities for mosquito breeding and disease transmission. Therefore, mosquito control cannot remain the responsibility of health agencies alone. It requires the active participation of communities, educational institutions, local bodies, researchers, scientific institutions, corporate sectors and policymakers.

This world mosquito day, we must move **from awareness to ownership and from reactive control to preventive action.**

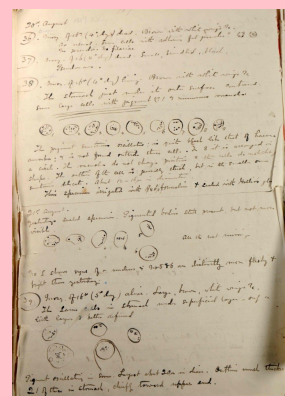
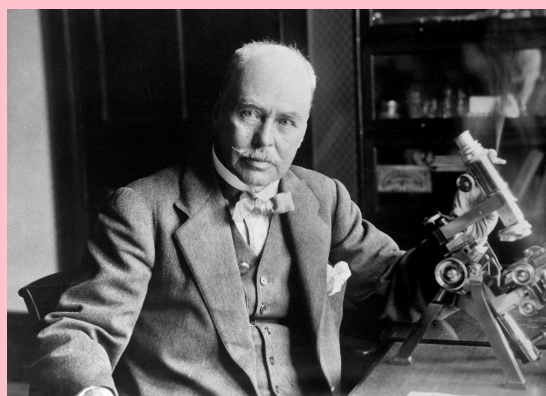
The motive should be to ensure that

- *Every water-holding container is eliminated,*
- *Every breeding site is identified*
- *Every citizen is sensitized & contributes to breaking the chain of transmission.*

Educational institutions, in particular, can become **model mosquito-breeding-free campuses**, where students and staff actively participate in surveillance, source reduction and health awareness. Such initiatives can extend beyond the campus and create a culture of responsible vector control in surrounding communities.

Message is simple: no breeding sites, fewer mosquitoes, fewer risk of diseases.

Let us work together to build healthier, safer and more resilient communities—because **mosquito control begins with each one of us.**



The notebook page of Ross recording the “pigmented bodies” in mosquitoes, later identified as malaria parasites.



Helping to Shape Future of India

The Saga of Malaria in India: From Control to Elimination

(The breakthroughs, the setbacks, and the race to zero cases)

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The History and Milestone Discovery:

India has been a hotbed for malaria since ancient times, with clinical features resembling the disease mentioned in classical texts like the *Charaka Samhita* and *Sushruta Samhita*. Working in Secunderabad (in present-day Telangana) on August 20, 1897, Sir Ronald Ross made a monumental discovery by demonstrating the presence of the malaria parasite in the stomach walls of mosquitoes and establishing the role of *Anopheles* mosquitoes in malaria transmission. This landmark breakthrough eventually paved the way for organized malaria control programs in India.

During the pre-DDT era, malaria control relied heavily on environmental and biological management toward altering aquatic habitats to disrupt the insect's life cycle and suppress vector populations before synthetic chemicals transformed public health. Sanitarians and engineers focused on "source reduction" by draining swamps, filling marshlands, and reshaping reservoir banks to eliminate stagnant water. Agricultural and engineering interventions included the systematic de-weeding of canals, clearing of aquatic vegetation, and intermittent flushing of irrigation channels to prevent larvae from maturing. To complement these physical changes, early programs deployed biological controls, such as introducing larvivorous fish *Gambusia affinis* and *Poecilia reticulata* (Guppy) into wells, ponds, pools and rice fields, alongside the surface application of crude larvicides like petroleum oils, kerosene, and Paris Green (copper acetoarsenite).

How DDT shaped the Disease Incidence:

The DDT era of malaria control in India was a dramatic public health journey that began in 1953 with the National Malaria Control Programme, utilizing widespread Indoor Residual Spraying (IRS) to combat a crisis of 75 million annual cases and 0.8 million deaths in pre-independent India. This aggressive campaign achieved stunning early success, driving malaria cases down to a historic low of roughly 100,000 by 1965 and recording zero deaths. However, this progress was derailed in the late 1960s and 1970s as the primary mosquito vector, *Anopheles culicifacies*, developed widespread resistance to DDT, causing cases to rebound to 6.4 million by 1976. This resurgence forced India to abandon blanket spraying by 1997 in favour of selective, targeted applications and integrated management strategies under modified plan of operation (MPO), such as insecticide-treated bed nets (LLINs). Although India remained the world's largest producer and user of DDT for public health under a Stockholm Convention exemption, the country ultimately phased out its usage in the 2020s, replacing it entirely with modern synthetic pyrethroids, LLINs and bio-larvicides, that helped to reduce the incidence to a significant level.

Road to Malaria Elimination: How close-How Far

Today, India stands at a critical, highly successful turning point on its road to malaria elimination, moving closer to its twin national targets: achieving *zero indigenous cases by 2027* and securing a *completely malaria-free certification by 2030*. The country's current standing is defined by the following milestones, strategic frameworks, and lingering challenges:

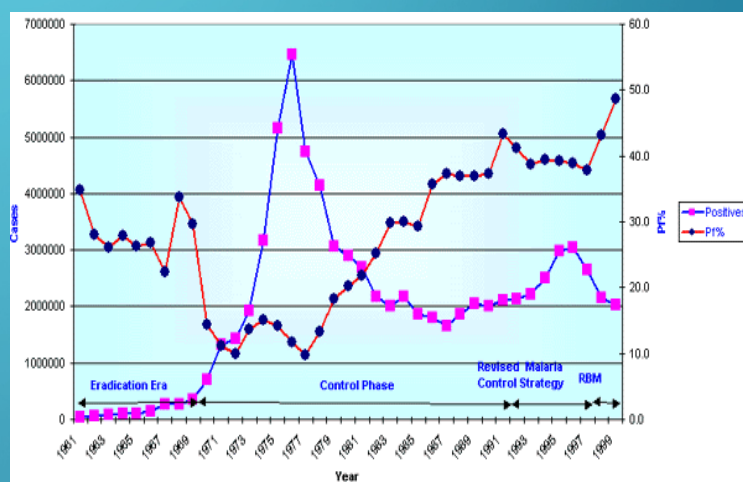


Fig.1 Malaria in India from near Eradication to resurgence and control phase

(In pre-independent India, 75 million cases, 0.8 million deaths were estimated)



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Key Milestones and Progress

Exit from the HBHI Group: In a historic public health shift, India officially *exited the WHO's "High Burden to High Impact" (HBHI) group of nations*. This signifies that India is no longer classified among the world's most heavily burdened countries.

Massive Case Reduction: Between 2015 and 2023, India achieved a staggering 80.5% reduction in malaria cases and a 78.3% decline in malaria-related deaths.

Zero Parasite Districts: Over 160 districts across 23 States and Union Territories have reported zero indigenous malaria cases. Regions like Ladakh, Lakshadweep, and Puducherry have achieved official "Category 0" (completely malaria-free) status.

The Current Strategy: The T3 Protocol

India's malaria control is aligned with National Strategic Plan for Malaria Elimination (2023-2027), as well as a National Framework for Malaria Elimination (2016-2030) aligned with WHO global Technical Strategy for Malaria Control-2016-2030, which provides a roadmap and helps in establishing a robust system, which operates on a rigid Test, Treat, and Track (T3) protocol:

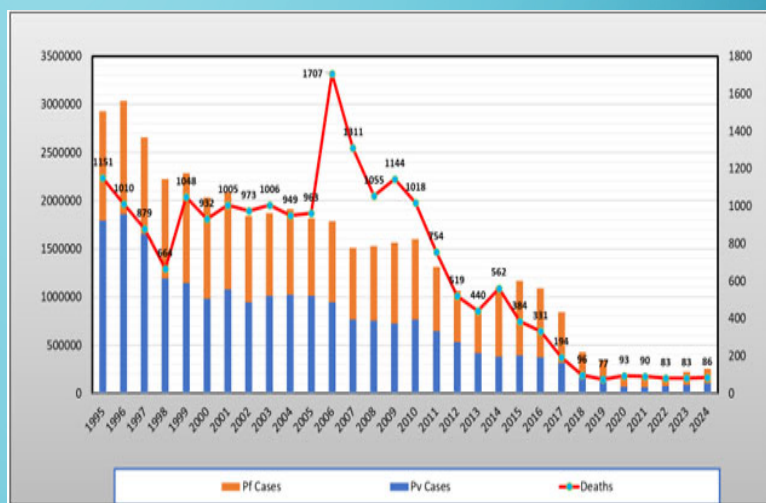
- **Dynamic Stratification:** The country categorises states into 4 distinct zones (Category 0 to 3) based on their Annual Parasite Incidence (API), focusing aggressive, micro-managed funding on high-transmission zones.
- **Universal Vector Control:** Handing out millions of Long-Lasting Insecticidal Nets (LLINs) and using Indoor Residual Spraying (IRS) with modern synthetic pyrethroids instead of blanket chemical spraying.

Remaining "Last Mile" Roadblocks

Despite being on track to meet global technical targets, India's final push toward 2030 faces complex operational hurdles:

- **Concentrated Geographies:** Roughly 70% of all remaining malaria cases are heavily concentrated in just five states with vast forested, hilly, or tribal terrains: Odisha, Chhattisgarh, Jharkhand, Madhya Pradesh, and Maharashtra.
- **The Vivax Challenge:** Over half of India's cases are caused by *Plasmodium vivax*, a parasite strain notorious for hiding dormant in the human liver, causing unpredictable relapses.
- **Cross-Border & Migrant Transmission:** Constantly shifting migrant worker populations and shared borders with endemic neighbours (like Myanmar) make tracking and interrupting local transmission highly difficult.
- **Asymptomatic reservoirs/Low Density/Sub-microscopic Malaria:** A massive chunk of the population in highly endemic zones carries asymptomatic carrier or "sub-microscopic" infections. These individuals do not show symptoms, making them invisible to standard rapid diagnostic tests (RDTs) while continuing to infect local mosquitoes.

The Saga of Malaria in India: From Control to Elimination (The breakthroughs, the setbacks, and the race to zero cases) Contd.....



(Source: NCVBDC, New Delhi)

Fig. 2. Malaria reduction in India: Road to elimination



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The Saga of Malaria in India: From Control to Elimination (The breakthroughs, the setbacks, and the race to zero cases) Contd.....

- **False negative Diagnostic Failures:** The deletion of the *pfhrp2* and *pfhrp3* genes in *Plasmodium falciparum* parasites is a quiet but severe diagnostic threat that directly compromises India's malaria elimination goals. Though, multistate surveillance studies indicate that while the overall nationwide prevalence of *pfhrp2/3* deletions remains relatively low—typically hovering under 2% to 4% across major endemic states with immense regional volatility, there is a need to remain vigilant.

Reaching the Last Mile:

To achieve absolute malaria elimination by 2030, India must transition from a general public health programme to an aggressive, hyper-localized response that interrupts transmission in the final remaining hotspots. This requires moving away from passive hospital reporting toward highly synchronized, community-driven, and technology-backed interventions that target the root causes of lingering transmission. Key actionable strategies to close this final gap include:

- Enforcing a strict 1-3-7 surveillance response to report a case within 1 day, investigate it within 3 days, and contain local transmission within 7 days.
- **Next-Generation Bed Nets:** Distribute dual-active ingredient Long-Lasting Insecticidal Nets (LLINs) that feature Piperonyl Butoxide (PBO) to neutralize metabolic resistance in areas where mosquitoes survive standard pyrethroid nets.
- **Community-Led "Malaria Mukta" Committees:** Empower local self-governing bodies (*Gram Panchayats*) to map local cases, distribute nets, and run village-level awareness campaigns, shifting ownership from top-down government programs to the citizens themselves.
- Scaling up **radical-cure drug therapies** (like Tafenoquine) to completely eliminate dormant liver-stage *Plasmodium vivax* parasites and prevent patient relapses. Or replacing shorter regimen of primaquine to achieve adherence alongside active, mobile screening units tailored specifically for hard-to-reach tribal, migrant, and cross-border populations.
- **Sustenance in Malaria Free Zones:** Districts which have shown zero indigenous cases in last 3 years needs to be monitored regularly without any complacency. Here we can learn lessons from Sri Lanka approach of 'The Anti Malaria Campaign', which ran sustained health education and IEC (information-education-communication) campaigns alongside free distribution of insecticide-treated bed nets, and pushed mobile clinics into remote migrant-worker settings — security camps, gem-mining sites, and shifting cultivation areas — specifically because these mobile, hard-to-reach populations were both high-risk and hard to educate through standard channels. Even after malaria free certification, this behavioural push didn't stop. That helped to maintain the malaria free status.
- India stands at a critical crossroads in its fight against malaria, balancing monumental achievements with persistent, localized challenges. By leveraging targeted interventions based on National Framework for Malaria Elimination and expanding the distribution of long-lasting insecticidal nets and artemisinin based chemotherapy (ACTs), the nation has dramatically reduced its disease burden over the past decade. However, achieving elimination targets requires overcoming significant hurdles, including drug-resistant parasite strains, climate-driven transmission shifts, and reaching remote, tribal populations. Ultimately, the road to a malaria-free India depends on sustaining political will, securing robust funding, and implementing real-time digital surveillance to turn the vision of elimination into a reality.



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Mosquito Control In Urban Local Bodies In India

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Introduction:

In India, mosquito borne infections affect several thousand people every year during monsoon and post monsoon season in urban areas because of the availability of diverse breeding habitats. Besides the disease burden due to these infections by vector mosquitoes, several species of mosquitoes breed in clean and polluted water systems and cause nuisance to local populations. Several mosquito control operations are in use to combat mosquito menace in Urban Local Bodies. However, there is a paucity of information on the systematic and technically improvised control operations that could provide desired results in Urban Health system. This brief note highlights the mosquito control activities that are in use and recommends the need for vitalization of mosquito control activities in urban areas.

Mosquito control activities are carried out throughout the year in urban areas involving Field workers/Domestic Breeding Checkers with a well prepared action plan and door to door *Aedes* mosquito surveillance and control are implemented in almost all parts of the country. Mosquito Vector control activities include application of Temephos 50% EC in potable water containers, source reduction and minor engineering activities to prevent water stagnation and thereby reducing the incidence of vector-borne diseases like malaria, dengue and Chikungunya. However, the mosquito menace in the urban areas is aggravated in urban agglomerations during monsoon and post-monsoon seasons due to both man-made and other natural habitats. Urban mosquitoes mainly *Culex quinquefasciatus*, breed enormously in drains, cesspits and cesspools containing domestic effluents and such habitats are extensive and diverse in urban areas which also favour the breeding of *Aedes* mosquitoes indoors and outdoors.

In spite of various mosquito control activities carried out in urban areas, water stagnation in vacant plots and barren lands in the newly extended areas in the urban areas support mosquito breeding particularly when these plots receive sullage water from the houses and cess pools. In certain segments of the urban areas, slabs have been used to cover the drains. As the drainage system is open in the rest of the areas, dumping of garbage in the drains is very common and many areas are perennially water logged and thereby prone to mosquitogenic conditions. Mosquito breeding can be controlled in such situations by (i) spraying larvicides (ii) channeling–water can be drained out into the nearby drains/canals (iii) covering of septic tank vent pipes with mosquito nets and (iv) as a permanent measure the vacant plots should be filled to avoid water stagnation. In order to implement the control measures effectively, it is essential to have adequately trained and skilled technocrats like Medical/Public Health Entomologists in Urban Local Bodies. In Tamil Nadu, except Greater Chennai Corporation, no other municipalities or corporations deploy Entomologists exclusively for planning and implementation of the mosquito control operations.

The magnitude of the mosquito menace in urban areas in recent years has drawn the attention of health planners as well as the common man. It is therefore, effective strategies for mosquito control in these mosquitogenic habitats need to be formulated and they should be environment friendly and non-toxic to human. Personal protection measures such as using mosquito nets or repellents are not a practical solution in view of the socio-economic background of the community and poor sustainability. The other approach is to eradicate immatures of mosquitoes or to make the habitats unsuitable for mosquito breeding through environmental modification/ manipulation. The latter may be considered as an environment friendly approach but cannot be applicable to all the habitats in all situations. Though source reduction is a permanent solution for the prevention of mosquito breeding, it needs an engineering solution, which involves⁶ huge expenditure. Therefore, larvicidal operation considered to be an alternative measure of choice has received adequate attention in recent times. Besides several larvicides used in mosquito control programmes in the country, bio-larvicide like *Bacillus thuringiensis* (Bti) which contains spores and produce toxins to kill mosquito larvae, has yielded promising results on several urban areas. The advantages of using Bti is, it has no toxicity on humans, no resistance has been proved in mosquitoes and it requires no special precautions for applying in the field. Further, unlike other larvicides, Bti can be used in large surface areas like water stagnations in the vacant plots, a major challenge in urban limits and also in peri domestic areas in urban situations.



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Mosquito Control In Urban Local Bodies In India Contd...

Each Metropolitan city including Delhi in India, has implemented certain innovative strategies on mosquito control, but not all of them are sustainable. One such example is application of larvicide using drones in the Greater Chennai Corporation to target mosquito breeding sites in inaccessible areas. Similarly, the Delhi corporation spraying larvicides using large tanker vehicles. Since the problem of mosquito borne diseases is spreading to newer areas because of rapid expansion of urban agglomerations, commercial establishments, industrial corridors etc., But whatever the technology we implement, it should be sustainable, feasible and cost-effective.

Besides the mosquito menace in urban local bodies, recent reports on vector borne diseases reveal that certain diseases (eg. Japanese encephalitis) which were once confined to rural areas are now reported in urban areas in certain exceptional situations though not in outbreak proportions. Hence, It is imperative the disease surveillance and mosquito density monitoring should be done in an area simultaneously to contain mosquito abundance as well as the disease transmission. Adult control by thermal fogging will give visibility and develop confidence among local public as the effectiveness of the insecticide is transient. Community participation and involvement will be of much helpful in combating the mosquito menace in the Urban Local Bodies, besides the mosquito control interventions implemented by the local health authorities.

Conclusion:

It is obviously known that it is necessary to strengthen and re-vitalize the mosquito control activities in Urban areas for improving the health status of the people. It is therefore, scientifically proven methodologies are to be adopted in the field situations and we need to evaluate the efficacy of the insecticides in use for fogging and larval control or any other method that is adopted suitably. The bionomics of mosquitoes (both immatures and adults) are to be studied in urban areas to select appropriate control measures and to implement during appropriate time. This will pave the way for new horizons in mosquito control in Urban Local Bodies.

Scrub Typhus: A Contemporary Mini-Review

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Scrub typhus, caused by *Orientia tsutsugamushi*, has historically been reported from the famed “tsutsugamushi triangle”, but inopportunely is now being reported not only from its previous stronghold across South and Southeast Asia but also from previously unreported areas in South America with sporadic European presence as well. In India, scrub typhus has emerged as a major cause of undifferentiated febrile illness with a near pan-Indian presence. The disease dynamics have been further challenged by land-use modification, vegetation encroachment, rodent population dynamics, and climatic variability, all of which contribute to the establishment of new transmission foci.

Burden of Disease

Scrub typhus is currently estimated to impact one billion people residing in endemic regions, with approximately one million cases occurring annually. In India, scrub typhus is fast emerging as a leading cause of AUFI with exposure rates ranging between 15% and 40% as reported in various community seroprevalence studies. The hospital-based studies from across India indicate that scrub typhus accounts for up to 25–30% of AUFI admissions during monsoon and post-monsoon seasons, its main transmission season. The disease accounts for a nearly 30–40% case fatality rate depending on diagnostic access and treatment delays; however, mortality may be as low as 5% with timely doxycycline therapy. Intensive care amongst patients hospitalized with complications such as ARDS, myocarditis, meningoencephalitis, acute kidney injury, and multi-organ dysfunction hospitalized patients has been reported to the tune of 10–20%. The burden is further augmented by underdiagnosis or misdiagnosis, inadequate surveillance, and non-availability of sensitive diagnostic kits in peripheral settings.

Clinical Features and Unusual Presentations

The clinical presentation of scrub typhus is a challenge as the symptoms are nonspecific, with fever, headache, myalgia, lymphadenopathy, hepatosplenomegaly, and thrombocytopenia being the most common manifestations. These features are shared by the commonly endemic diseases viz. dengue, malaria, leptospirosis, and enteric fever, thereby complicating the early diagnosis and treatment. Although the eschar is a pathognomic feature of scrub typhus, its presence is not consistent and is mostly missed.

Scrub typhus is notorious for presenting with unusual or atypical manifestations, which may range from acute abdomen, myocarditis without respiratory involvement, meningoencephalitis, gastrointestinal bleeding, hearing loss, fulminant hepatic failure etc. Patients of scrub typhus presenting with septic shock without a clear infectious focus is not uncommon as the disease mimics bacterial sepsis. These presentations are known culprits of clinical dilemmas/suspicion and are the most common reasons for delayed initiation of doxycycline, leading to increased risk of mortality.

The extensive range of clinical spectrum ranging from typical to atypical highlights the need for intensified awareness campaigns in endemic regions for public health professional, clinicians as well as the community.

Diagnostics

Diagnostic challenges are vital confounders to estimate the burden of scrub typhus. The most well-known and often used Weil–Felix test, although lacks sensitivity and specificity, yet is the most used diagnostic test in resource stricken point-of-care settings due to its low cost and accessibility. IgM ELISA based diagnostic kits provide improved case detection but are affected by cross-reactivity and the timing of antibody response.

Scrub Typhus: A Contemporary Mini-Review

The advanced molecular assays, particularly PCR, which target the 47-kDa and 56-kDa antigen genes, are increasingly being used and offer superior sensitivity and specificity and are vital for early detection and strain characterization. However, the feasibility of using these molecular diagnostics is severely limited outside the tertiary centres. There is a need for availability of point-of-care molecular platforms, which although are receiving focus, but it may take time before its availability for use in real-life settings. The current scenario of a fragmented diagnostic landscape is undoubtedly contributing to delayed treatment initiation, which remains a major driver of morbidity and mortality.

Genetic Diversity and Virulence

O. tsutsugamushi is characterised by its remarkable genetic and antigenic diversity, with multiple circulating genotypes and region-specific variants viz. Karp, Kato, Gilliam, Kawasaki, Shimokoshi globally. This diversity is facilitated by high recombination rates coupled with extensive genomic plasticity, thus making *O. tsutsugamushi* one of the most variable intracellular bacteria known to mankind.

It is widely reported that the antigenic variations impact virulence; for example, Karp-like strains are known to be more associated with higher bacterial loads, more severe disease, and increased risk of complications such as ARDS and multi-organ dysfunction. In contrast to this, Gilliam-like and Kato-like strains often are associated with milder clinical spectrum although exceptions are known to occur. It has been reported that 56-kDa type-specific antigen (TSA56), a major surface protein, is central to this variability. The presence of structural differences in TSA56 have been found to influence pathogenicity, host immune recognition, and the performance of serological assays.

A large number of published genomic studies have additionally also reported that virulence is shaped by outer membrane proteins, accessory genes and host-pathogen interaction pathways, with strain-specific variability in endothelial invasion, immune evasion, and inflammatory responses. The interesting interplay between antigenic diversity and virulence has substantial implications where diagnostics, clinical management, and vaccine development against scrub typhus is concerned. It is envisaged that a future scrub typhus vaccine will likely require multivalent or pan-strain coverage to address this extensive heterogeneity of *O. tsutsugamushi*.

Vector Ecology

Vector ecology, undoubtedly, is critical in understanding the transmission dynamics. Chigger mites, particularly of trombiculid mites viz. *Leptotrombidium deliense*, are the most important vectors globally and are known to inhabit areas called mite islands, which are characterized by the presence of moist soil, scrub vegetation, forest fringes, and agricultural fields. Recent years have witnessed the recognition of other trombiculid mites like *Schoengastiella ligula* as competent vectors in several parts of India and Southeast Asia. *S. ligula* is also known to be frequently associated with agricultural landscapes, peri-urban vegetation, and rodent-rich environments, contributing to transmission in areas where *Leptotrombidium* species may be less prevalent.

Rodents viz. *Rattus*, *Bandicota*, and *Suncus* species serve as hosts, whereas chiggers species serve as reservoirs of *Orientia tsutsugamushi*. Deforestation, construction activity, shifting cultivation, and climate variability have contributed significantly to the expansion of vector habitats and enhanced vector-human contact. The presence of many regional vector species with unique and distinct ecological niches underlines the intricacy of scrub typhus transmission dynamics and necessitates extensive entomological surveillance.

Vector Control and Prevention

The control of scrub typhus vectors is extremely challenging as the chiggers are soil dwelling stages and have a patchy distribution – the mite islands. Nonetheless, the following vector management strategies can help reduce the risk of transmission:

Scrub Typhus: A Contemporary Mini-Review

- **Environmental management** is an effective preventive measure. Targeting scrub vegetation removal coupled with reduction in rodent harbourages in and around residential complexes, agricultural fields, and military camps can substantially reduce chigger density.
- **Rodent management** is important as rodents are the primary hosts. Measures like trapping, habitat modification, and rodent-proofing of dwellings significantly reduce rodent populations and the associated chigger infestations.
- **Personal protective measures** are one of the most effective measures to reduce man-chigger contact. Measures like barrier clothing, i.e. wearing long-sleeved clothing, full trousers and using boots in fields, wearing repellent/permethrin treated clothing, avoiding sleeping or drying clothes, boots in fields, wearing repellent/permethrin treated clothing, avoiding sleeping or drying clothes on the jungle floor, scrubbing while taking a bath after returning from infested areas, and use of insect repellents on exposed parts of the body with DEET or other herbal-based repellent products reduce the risk of exposure.
- **Community-level interventions** especially risk communication, environmental sanitation, and awareness campaigns, have shown noticeable impact in scrub typhus endemic regions.
- **Targeted vegetation control** around human habitations viz. schools, public gardens, construction sites, farms, camps etc. can reduce the favoured ecological niches - the “mite islands”.

One of the major constraints to effective vector management is the lack of trained manpower for chigger and rodent surveillance. There is an urgent need for enhancing and strengthening expertise in trombiculid mite identification, ecological sampling, and rodent-mite monitoring. The time is ripe to enhance surveillance capacity through competent, trained personnel who can impart training in field surveillance, sample collection, mite identification, vector control and community education along with ecological monitoring. This measure will undoubtedly improve outbreak preparedness and help formulate control strategies adapted to local settings.

Public Health Gaps and Advances

Despite a long historical past and a decadal resurgence of scrub typhus pan India, it is truly disheartening to note that epidemiological as well as public health gaps persist to this date. Inadequate surveillance, nonavailability of diagnostic kits at point-of-care setting, and low index of clinical suspicion are still the most vital challenges. Training in AUFI recognition differs across healthcare settings, besides the fact that many primary health centres still lack the tools required for early diagnosis, thus leading to delayed treatment and its consequences. Molecular surveillance is still lacking penetration in many health care settings, coupled with the fact that Indian public health programs have failed to prioritise scrub typhus as an emerging public health challenge and incorporate ecological monitoring of scrub typhus vectors and the rodent hosts.

There is an imperative need to augment research throughout the country on various facets of scrub typhus transmission lacking clarity to date. These research outcomes can then help strengthen vector control. Research also needs to focus on ecological risk mapping using climatic and land-use data for identification of outbreak hotspots. There is also a felt need to sensitize the community for effective interventions such as barrier clothing in endemic or risk prone areas, vegetation management, and scrub typhus awareness campaigns in high-risk regions. The paucity of antigenic diversity and its prevalence is a known impediment in the development of a multivalent or pan-strain vaccine, which needs urgent research prioritization.

Conclusion

Scrub typhus, indubitably, is a public health challenge in India. It's time we accept and acknowledge that scrub typhus is an emerging public health threat. There is indisputably a compelling case to include this disease in the national vector control program of our country given its endemicity and the morbidity and mortality profile of the disease. The time is also opportune to formulate and institute scrub typhus surveillance guidelines, strengthen diagnostic accessibility at point-of-care setting, and incorporate ecological monitoring within a One Health framework as critical drivers for preventing the spiralling of scrub typhus into a major public health threat. **THE TIME TO ACT IS NOW.**

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Despite significant advancements in the fight against dengue fever, the disease remains a serious public health concern in many parts of the world. The absence of effective antivirals remains the main tactic to fight dengue. Insecticides have historically been used to reduce dengue-carrying mosquito populations. However, eliminating the resources that enable mosquitoes to spawn is the most efficient, long-lasting, and ecologically friendly method of illness prevention.

Identifying the Problem

The dengue virus is primarily spread by the *Aedes aegypti* mosquito, which breeds in any water that stands still. Any kind of water holding objects such as open containers, tires, pots and gutters serve as breeding sites. The availability of these sites in the rural and urban areas serves as a perfect condition for the mosquito population to grow. For many years, the popular method for fighting Dengue was the control of adult mosquito population through the use of insecticides. While these methods are effective palliatives, they also have a number of disadvantages:

- Impact on the Environment:** The application of insecticides over an extensive area endangers non-target organisms and the environment, contributing to environmental deterioration.
- Development of Resistance:** It is important to note that over time, these solutions become undesirable since mosquitoes ultimately become resistant to the insecticide making it ineffective.
- Health issues:** Control of the adult population through insecticides contribute to long term health challenges for people and animals alike through the exposure to harmful chemicals

Reasons Why Source Reduction is Better

- The arteries of the source reduction method is minimizing the population of breeding mosquitoes. It involves removing the mosquitoes through tackling the point of origin where their eggs are laid. This helps in solving the problem not only on a larger but a more specific scale especially targeting the core issue.
- Cost-effective source reduction also involves sophisticated techniques like cleaning of water tanks, construction of container covers, and removal of unnecessary waste. These measures are cheaper than purchasing insecticides and applying them on a routine basis.
- In contrast to the application of insecticide, source reduction strategies are not detrimental to the conservation of biological variety and ecological equilibrium. They also assist in preserving it. Hence, source reduction techniques are environmentally friendly and aid in achieving long term control in spending.
- Effective source reduction measures are heavily reliant on the participation of the community. Facilitating community education on discovery of breeding sources and eliminating them will engender a sense of responsibility and will ensure compliance .



Figure- Showing the source reduction activities



Reducing Breeding Grounds Over Killing Mosquitoes: A Better Approach to Dengue Control

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Implementing Source Reduction Strategies

There are many actors in the strategy of source reduction, and communication among all of them is crucial for efficacy. The most basic strategies are:

- **Public Awareness Campaign:** Promoting the eradication of stagnant water and eliminating existing or potential breeding sites.
- **Legislation and Enforcement:** Controlling construction waste, at the construction site and water storage, to lower fertility rates .
- **Infrastructure Improvements:** Providing sealed covers to water storage facilities and modifying drainage systems to avoid water collection
- **Regular Inspections:** Routine monitoring or checkups between residential and commercial areas looking for breeding sites and their proper disposal.

The Role of Technology

Advanced technologies can reinforce source reduction activities. Surveillance via drones, Geographic Information Systems (GIS), and mobile applications can be utilized to monitor breeding sites and other priority areas more efficiently. These types of active methods targeting interruptions are achieved through computation, which improves outcome and optimizes resource use.

Conclusion

Compared to the use of insecticides to kill mosquitoes, the control of dengue by reducing the potential mosquito breeding sites is more effective and environmentally friendly. This source reduction strategy is not only more efficient because it works to reduce the underlying problem, but it also causes less harm to the environment and reduces costs while engaging the community. Reducing the source of the problem should be the first approach taken because it is certainly the most ideal and necessary step needed to win the battle of dengue in the world.



From Hyper-Endemic Burden to Global Model: How Odisha Rewrote the Playbook for Malaria Elimination

Helping to Shape Future of India

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Once contributing nearly **40% of India's malaria burden**, Odisha has achieved one of the most remarkable public health transformations in vector-borne disease control. Over the past decade, the State has reduced malaria cases by approximately **85%**, brought malaria-related deaths down to single digits, and transitioned most districts into the **pre-elimination phase**.

This achievement is not merely a story of declining disease burden; it represents a fundamental shift from conventional malaria control to **precision public health**. Odisha has demonstrated that malaria elimination is achievable even in remote, forested, tribal, and geographically challenging settings when political commitment, scientific evidence, and community-based delivery converge.

The Odisha Model: From Control to Elimination

Odisha's success rests on an integrated strategy that combines last-mile service delivery, village-level micro-planning, robust surveillance, empowered frontline workers, and evidence-based programme management.

Last-Mile Equity Through the DAMaN Initiative

A defining feature of Odisha's malaria programme has been **DAMaN (Durgama Anchalare Malaria Nirakaran)**—an innovative initiative designed to reach populations living in inaccessible and high-transmission areas.

Recognizing that conventional facility-based healthcare often failed to reach remote tribal communities, DAMaN shifted the focus from passive case detection to proactive community outreach. Health teams travelled directly to villages and hamlets to provide:

- Active case detection and mass screening
- Prompt diagnosis using Rapid Diagnostic Tests (RDTs)
- Immediate treatment with Antimalarials
- Distribution of Long-Lasting Insecticidal Nets (LLINs)
- Indoor Residual Spraying (IRS)
- Community awareness and behaviour change interventions

By taking services to the doorstep of vulnerable populations, DAMaN substantially reduced the delay between infection, diagnosis, and treatment, interrupting malaria transmission in areas that had long remained beyond the effective reach of routine health services.

The Core Village Strategy: Precision Public Health in Action

As the malaria burden declined, Odisha refined its approach through the **Core Village Strategy**, marking a transition from broad district-level interventions to village-level elimination.

Using detailed epidemiological and entomological data, villages with persistent malaria transmission were identified as **core villages**. These villages became the focus of intensified surveillance and targeted interventions rather than applying uniform measures across entire districts.

The strategy emphasized:

- Village-level risk stratification and micro-planning.
- Active surveillance to detect both symptomatic and asymptomatic infections.
- Prompt investigation and response to every confirmed malaria case.
- Intensified vector control through targeted LLIN distribution and IRS.
- Continuous monitoring of transmission trends to prevent resurgence.
- Strong community participation led by ASHAs, village volunteers, and local institutions.

13



From Hyper-Endemic Burden to Global Model: How Odisha Rewrote the Playbook for Malaria Elimination

Helping to Shape Future of India

This precision approach ensured that resources were concentrated where transmission persisted, accelerating progress toward interruption of indigenous malaria transmission.

- Distribution of Long-Lasting Insecticidal Nets (LLINs)
- Indoor Residual Spraying (IRS)
- Community awareness and behaviour change interventions

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Science-Led Surveillance and Entomological Intelligence

Scientific evidence has remained central to Odisha's malaria programme.

Supported by the **State Entomological Unit** and **Zonal Entomological Teams**, routine surveillance informed operational decisions throughout the programme. Continuous monitoring focused on:

- Vector species distribution and changing mosquito behaviour.
- Insecticide resistance to guide effective vector control.
- Quality assurance of LLIN coverage and Indoor Residual Spraying.
- Epidemiological surveillance to identify emerging hotspots and monitor intervention effectiveness.

This data-driven approach enabled rapid adaptation of strategies in response to evolving transmission dynamics.

Empowering Frontline Health Workers

The operational backbone of Odisha's success has been its extensive network of **Accredited Social Health Activists (ASHAs)**, **Auxiliary Nurse Midwives (ANMs)**, and **Multipurpose Health Workers (MPWs)**.

Equipped with Rapid Diagnostic Tests and effective antimalarial medicines, these frontline workers decentralized diagnosis and treatment to the household level, ensuring timely care in even the most remote communities.

Their close engagement with local populations improved early reporting, treatment adherence, health education, and community trust—critical elements for sustained malaria elimination.

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Strong Partnerships and Programme Leadership

Odisha's achievements have been strengthened through close collaboration between the Department of Health and Family Welfare, technical institutions, and development partners.

Technical support from the **Indian Council of Medical Research (ICMR)**, the **World Health Organization (WHO)**, and other national and international partners enhanced surveillance, operational research, programme evaluation, and capacity building, while sustained political commitment and dedicated state financing ensured continuity and scale



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The Road to 2030: Sustaining Elimination

As Odisha advances toward the goal of **zero indigenous malaria transmission by 2030**, its strategy is increasingly focused on eliminating the final reservoirs of infection.



Key priorities for the next phase include:

- **Eliminating residual transmission hotspots** through focused interventions in persistent endemic villages.
- **Detecting asymptomatic parasite carriers** who silently sustain malaria transmission despite the absence of clinical illness.
- **Strengthening case-based surveillance**, with every confirmed malaria case rapidly investigated and followed by appropriate public health action, consistent with internationally recognized surveillance-response frameworks.
- **Preventing re-establishment of transmission** through continuous surveillance, cross-border coordination, and sustained community engagement.

Lessons for Global Malaria Elimination Programmes

Odisha's experience offers valuable lessons for malaria-endemic regions worldwide.

Political commitment and sustained financing remain indispensable for long-term success.

Granular epidemiological and entomological intelligence should guide resource allocation and intervention design rather than relying on blanket approaches.

Community-centred healthcare delivery, supported by empowered frontline workers, is essential for achieving equitable access and lasting impact.

Finally, **precision public health**—combining village-level micro-planning, real-time surveillance, targeted interventions, and continuous programme adaptation—provides a scalable model for eliminating malaria in complex and resource-constrained settings.

A Blueprint for the World

Odisha's transformation demonstrates that hyper-endemic malaria is not an immutable reality but a solvable public health challenge. By integrating last-mile service delivery through DAMaN, village-level precision planning through the Core Village Strategy, scientific surveillance, strong political leadership, and empowered community health workers, the State has established a model that extends well beyond India.

As countries strive to achieve global malaria elimination targets, the Odisha Model illustrates that sustained political commitment, evidence-based decision-making, and community ownership can transform even the most challenging malaria landscapes into success stories. More than a regional achievement, Odisha's experience offers a practical and replicable blueprint for malaria elimination in endemic settings across the world.



Helping to Shape Future of India

Engaging Universities and Colleges in Sustainable strategy to eliminate Mosquito Breeding Site to Interrupt Vector-Borne Disease Transmission

Dr Naveen Rai Tuli
Deputy Health Officer (HQ), MCD

Introduction

Vector-borne diseases (VBDs) especially Dengue remains a major public health challenge in India as well as in Delhi. Rapid urbanisation, population mobility, inadequate solid waste management, water storage practices, climatic conditions create favourable conditions for transmission of vector borne diseases. Prevention and control of mosquito breeding sites is beyond the purview of Public Health authorities and efforts of civic bodies need to be augmented by support from stakeholders and community members. Sustained source reduction and environmental management are essential components of an integrated and long-term VBD prevention strategy.

As envisaged under Urban Malaria Scheme, three Civic Bodies of Delhi i.e. Municipal Corporation of Delhi (MCD), New Delhi Municipal Council (NDMC) and Delhi Cantonment Board (DCB) have been given the responsibility to take all measures for prevention and control of vector Borne Diseases in areas under their jurisdiction. Institutional settings, including universities and colleges having huge campuses harbour mosquito breeding habitats remain a grey area and establish local transmission to students and faculty members. It's not feasible for Domestic Breeding Checkers of MCD to check these campuses every week to eliminate breeding sites due to limited number of staff. These are neglected campuses/ Institutions which lack ownership of authorities to carry out source reduction. There is need to address behavior of authorities, faculty and students to promote institutional ownership and strengthen community participation. A structured, continuous, and participatory programme with component of surveillance, source reduction, capacity building, monitoring, and evaluation can help maintain mosquito-breeding-free environments and contribute to sustained interruption of VBD transmission.

Need

In 2019, challenge of VBD cases being reported from **Indira Gandhi National Open University (IGNOU)**. campus was analyzed by Dr. Naveen Rai Tuli, Deputy Health Officer, South Zone, MCD and it was observed that campus is spread over more than 100 Acre area and it was not feasible for limited Domestic Breeding Checkers of Malaria Circle of Saidullajab ward of south zone of MCD. Awareness-generation activities were inadequate and lacked sufficient coverage and intensity to achieve desired impact. The issue was discussed with HOD Zoology, IGNOU and they were requested to participate in the model conceived by Deputy Health Officer, South Zone for engaging staff of IGNOU in source reduction.

After taking necessary approvals from VC and Deputy Commissioner, South Zone the Project” **Mosquito Breeding-Free College Campus Initiative**” was launched on World Malaria day in 2019 at IGNOU. The successful implementation of the project necessitated its expansion. The next launch is scheduled on 20th August 2026 with a non-profit Organization-Absolute Human Care Foundation, Hindu College and MCD along with two more Colleges, Acharya Narendra Dev College and Dayal Singh.

16



Helping to Shape Future of India

Engaging Universities and Colleges in Sustainable strategy to eliminate Mosquito Breeding Site to Interrupt Vector-Borne Disease Transmission

Model Mosquito Breeding-Free College Campus Initiative

Objectives

1. To identify and eliminate mosquito breeding sources within IGNOU Campus through surveillance and source reduction activities by Team led by PHD Scholars.
2. To promote behavioural change Communication (BCC) activities amongst University authorities, faculty, students, and support staff on vector surveillance, source reduction, and preventive measures.
3. To carry out Fortnightly Cross checking by Entomological Team of south Zone under Zonal Entomologist.
4. To Felicitate University for maintaining breeding-free premises

Activities

- An Agreement was drafted and signed by authorities of MCD and IGNOU
- 6 teams were constituted headed by Research Scholars with 3 members from security staff, sanitation staff and staff from maintenance department
- All Teams were given designated areas i.e. Academic Block, Administrative Block, Residential areas, Recreational areas and open areas.
- Capacity Building of all Teams was done by Entomologist South Zone with emphasis on Source reduction.
- Reporting Formats were developed for Team members and Cross Checking by Entomological Teams.

Impact was campus was breeding free and only one Dengue case was reported. The expert and University authorities declared the project successful and activities were implemented again in 2020 by IGNOU. In 2020, the COVID-19 pandemic, coupled with the transfer of the Deputy Health Officer, resulted in a gradual decline and eventual discontinuation of programme activities. Same Model was replicated in Nazafgarh Zone and Central Zone.

Building on this successful experience, it is proposed to launch the IGNOU model across colleges with Hindu College of North Campus and Acharya Narender Dev College of South Campus on 20th Aug 2026 i.e. to commemorate World Mosquito Day as these institutions have the potential to become centres of excellence for vector-borne disease prevention and community engagement. The initiative will be implemented through active collaboration between the Municipal Corporation of Delhi (MCD), college authorities, and the Absolute Human Care Foundation (AHCF).



Absolute Human Care Foundation At Glance

Helping to Shape Future of India

ABSOLUTE HUMAN CARE FOUNDATION

AHCF

Multidisciplinary Expertise for Sustainable Human Development

Health • Education • Skill Development • Agriculture

HEALTH

Public Health • Vector-Borne Diseases

EDUCATION

Academic Collaboration • Research

SKILL DEVELOPMENT

Capacity Building • Training

AGRICULTURE

Pest Management • Sustainability

AHCF – Four Core Areas of Strength

A multidisciplinary network of experts, institutions and practitioners

HEALTH

Public Health • VBDs • Disease Prevention

Prof. (Dr.) A. P. Dash
Dr. P. K. Srivastava
Dr. R. S. Sharma
Dr. N. R. Tuli
Mr S Sridharan

EDUCATION

Academic Collaboration • Research • Student Engagement

Prof. (Dr.) Anupam Varshney Sharma
Dr. Jayalakshmi K.
Dr. M. Raja
Dr. Uma Rani Agrawal
Ms Bhawana Shiksharhi

SKILL DEVELOPMENT

Capacity Building • Training • Professional Development

Dr. Kalpana Baruah
Dr. Rajni Kant
Dr. B. N. Nagpal
Dr Anju Viswan K
Mr Pankaj Arora

AGRICULTURE

Agricultural Sciences • Pest Management • Sustainable Practices

Dr Chitra Srivastava
Dr Umesh Srivastava
Dr. J. P. Singh
Dr. R. R. Sharma
Dr Kirti Tripathi

AHCF with State Chapters across India

A growing network connecting experts and institutions across regions

AHCF with State Chapters across India

Working Together for a Healthier India – Free from Vector-borne Diseases

GUJARAT

• Ms Mamta Dattani
• Dr Rajesh Sharma
• Mr George Kurien

MAHARASHTRA

• Dr. M. Jagtap
• Dr. Ujwala Oturkar
• Mr. Subhash Bishen

KARNATAKA

• Dr M. Shariff
• Ms Usha A
• Dr Ravi Kumar



Together for a
Healthier India –
Free from
Vector-borne Diseases

MADHYA PRADESH

• Dr. J. C. Paliwal
• Dr. Satendra Pande
• Ms. Bhavna Pandey
• Dr. Rashmi Sharma

ASSAM

• Prof. Bulbuli Khanikar
• Dr. Kumarendra Nath
• Ms. Barnali Saikia
• Mr. Deep Jyoti Roy

WEST BENGAL

• Dr Indranil Kar
• Dr Surajita Banerjee
• Mr Indranil Ghosh

JHARKHAND

• Dr. Sagya Singh
• Dr. Alok Suman Sharma
• Mr. Abhimanyu Kumar

TELANGANA & ANDHRA PRADESH

• Dr. Anil Kumar Makkapatti
• Dr. Rambabu

TAMIL NADU

• Dr. Jayalakshmi
• Mr. S. Sridharan
• Dr. M. Raja
• Dr. John Victor



Prevent Mosquito Breeding
Protect Health
Build a Safer Tomorrow

Absolute Human Care Foundation (AHCF)

AHCF – Selected Areas of Engagement

From capacity building and scientific exchange to community-oriented public health action

Capacity Building

Webinars, training, sensitization
and
professional development

Vector-Borne Diseases

Technical symposia,
conferences, entomological
intelligence and field
learning

Academic Partnerships

Collaboration with colleges,
universities, research
institutions and experts

Community Action

Awareness generation,
mosquito breeding prevention
and public health engagement

Research & Knowledge

Scientific exchange,
newsletters, evidence sharing
and applied learning

One Health

Connecting human, animal,
environmental and agricultural
perspectives

Absolute Human Care Foundation (AHCF)

AHCF – A Multidisciplinary Platform

Bringing together expertise, institutions and communities

“A multidisciplinary network supporting healthier
communities, stronger skills, meaningful education and
sustainable development.”

HEALTH

EDUCATION

SKILL DEVELOPMENT

AGRICULTURE

Absolute Human Care Foundation (AHCF) • Delhi



Helping to Shape Future of India

Upcoming Events

AHCF – Upcoming Events

Outreach Programme

Public Health • VBDs • University Colleges & Students

Hindu College, University of Delhi

20 August, 2026-World Mosquito Day

Technical Symposium

Joint Collaboration with Corporate partners in Public Health

Kolkata, West Bengal

25 August 2026

International Conference

Academic Collaboration • Vector Risk Management • Public Health

Loyola College, Chennai, Tamil Nadu

26-28 November 2026

Launch of Project – Mosquito Breeding Free Campus

Capacity Building • Training • Professional Development

Hindu College, Delhi

Acharya Narendra Dev College, Delhi

Dayal Singh College, Delhi

Loyola College, Chennai

International Conference

Public Health • VBDs • University Colleges & Students

Zoology Department, University of Allahabad

Prayagraj

Tentatively in October 2026

International Conference

Public Health • VBDs • University-Deptt of Biotechnology

Central University Tamil Nadu,

Thiruvallur

Tentatively in March 2027

Absolute Human Care Foundation (AHCF)

DEPARTMENT OF ZOOLOGY, GENESIS & EARTHLINGS-THE WILDLIFE SOCIETY
HINDU COLLEGE, UNIVERSITY OF DELHI
ORGANIZE
OUTREACH PROGRAM TO COMMEMORATE THE 'WORLD MOSQUITO DAY (20th August)
Launch of Model Initiative for Mosquito-Breeding Free Campus
under the aegis of DBT STAR COLLEGE SCHEME & IQAC
IN COLLABORATION WITH
Municipal Corporation of Delhi (MCD)
&
Absolute Human Care Foundation (AHCF)-a non-profit organization

ENTRY FROM GATE NO.1
DATE: 20 Aug. 2026
TIME: 9 am to 12 pm
VENUE: Seminar Hall, Hindu College

World Mosquito Day
Google Meet
August 20, 2026 @ 7:00 PM-9:00 PM IST
[Link to Join](#)
<https://meet.google.com/skd-igse-qj?authuser=0&hs=122>

Welcome & Introductory Remarks by: DR. P. K. SRIVASTAVA, Director, AHCF Foundation

Patron's Message on World Mosquito Day: PADMA SHREE PROF. A.P. DASH, Founder Director, AHCF Foundation, New Delhi

Talk on 'From Discovery to Challenges (1897 to 2026)' by: DR. KALPANA BARUAH, Sr. Consultant & Ex-Asst. Director, NCVBDC, Delhi, Gd

Moderator: DR. R.S. SHARMA, Director, AHCF Foundation, New Delhi

Talk on 'From Breakthrough in Malaria Transmission to Malaria Elimination' by: DR. ROOP KUMARI, Sr. Asst. Director, NCVBDC, New Delhi

Concluding Remark by: DR. R.R. SHARMA, Founder Director, AHCF Foundation, New Delhi

Organized by Absolute Human Care Foundation, New Delhi - A Non-Profit Organization

TECHNICAL SYMPOSIUM
In collaboration with ABSOLUTE HUMAN CARE FOUNDATION (AHCF) & ENVU INDIA (SPONSOR)
Date: 25th August 2026
Time: 10 AM - 5 PM
Venue: Hotel Lemon Tree Premier, New Town, Action Area 1B, Kolkata.

Integrated Vector Management Policy to Implementation

Patron AHCF
Padma Shree Prof. A.P. Dash
Ex-VC, Central University T.N.
Ex-VC, APJLU, Bhubaneswar
Ex-Regional Advisor, WHO (SEARO)

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Senior Consultant & Former Additional Director - NCVBDC, Govt. of India

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Who Should Attend
Public Health Specialists
Public Health Policy Makers
Programme Managers

Mode of Presentations
Oral Presentations
Panel Discussions
Field Experiences

4th INTERNATIONAL CONFERENCE ON
LIFE SCIENCES AND VECTOR RISK MANAGEMENT FOR A SUSTAINABLE HEALTHY ENVIRONMENT
(Hybrid Mode)
26th - 28th November, 2026
Organised by
Centre for Insect Molecular Studies and Environmental Research (CIMSER)
PG & Research Department of Advanced Zoology and Biotechnology
Loyola College (Autonomous), Chennai - 34

IN ASSOCIATION WITH
Indian Academy of Environmental Sciences (IAES), Hyderabad
Absolute Human Care Foundation (AHCF), New Delhi
Public Health Entomological Society (PHES), Chennai