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Temasek Life Sciences Laboratory highlights research-driven approach to mosquito-borne disease control in Asia

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Life sciences research, cross-border collaboration and new technologies such as genomics, diagnostics and AI-enabled surveillance could strengthen Asiaâ??s preparedness against dengue and other mosquito-borne infections.



Temasek Life Sciences Laboratory has highlighted the importance of life sciences research in strengthening Asia's prevention and control of mosquito-borne diseases, especially as the region continues to face risks from dengue and other vector-borne infections.

According to Peter Chia, Chief Executive Officer at Temasek Life Sciences Laboratory, research can help countries move from reactive mosquito control towards more predictive, targeted and sustainable prevention strategies. By studying how mosquito-borne diseases are transmitted and spread in both mosquitoes and humans, researchers can develop better tools to understand and interrupt disease transmission.

This includes research into mosquito reproduction, behaviour, immunity, microbiomes and virus transmission. These areas can support the development of public health tools such as Wolbachia-based control, sterile insect techniques, improved diagnostics, genomic surveillance and safer repellents or attractants.

However, several scientific and operational gaps continue to limit the region's ability to respond effectively to mosquito-borne disease outbreaks. Chia noted that these include limited real-time surveillance, insufficient ability to predict outbreak risk, uneven implementation capacity and limited inter-country coordination. Fragmented regional data sharing also slows response, making it harder for countries to act quickly when outbreaks begin to emerge.

From a scientific perspective, there is also a need to translate laboratory discoveries into scalable, cost-effective and publicly accepted tools that can be deployed during outbreaks. This remains a key challenge for public health innovation, as promising research must be tested, validated and adapted for real-world conditions before it can be used widely.

Cross-border collaboration is especially important because mosquitoes and viruses do not follow national borders. They can move through human travel and goods transport, making regional coordination essential for surveillance, research and intervention strategies. Sharing data, virus and mosquito samples, field experience and intervention approaches can help countries detect emerging threats earlier and compare strategies that are working in different settings.

New technologies could also play a growing role in improving outbreak preparedness. Genomics can help reveal how pathogens move and how mosquito populations adapt, while improved diagnostics can support faster identification of infections. AI-enabled surveillance could integrate climate, population and vector data to guide more targeted interventions before outbreaks escalate.

For Asia's public health systems, these technologies could support a more future-ready approach to mosquito-borne disease control. Instead of waiting for outbreaks to grow, health agencies may be able to identify early warning signals, predict higher-risk areas and deploy interventions more effectively.

Chia also highlighted the importance of research translation. Laboratory discoveries can move faster into public health use when researchers, public health agencies, regulators, industry, philanthropic organisations and communities work together from an early stage. Field relevance, scalability, safety, cost-effectiveness and public acceptance should be considered from the beginning of the research process.

Pilot studies, clear regulatory pathways and sustained funding are also important in converting promising science into deployable public health solutions. Philanthropic funding can play a key role, especially in supporting early-stage work that may not yet be ready for commercial investment but is needed to de-risk new technologies.

Temasek Life Sciences Laboratory noted that support from partners has helped advance the establishment of a Wolbachia transinfection platform and the development of new Wolbachia-carrying mosquito strains. Ongoing optimisation of sterile insect technique protocols is also supporting efforts to improve mosquito population suppression strategies.

These efforts help form the bridge between laboratory research, pilot-scale validation, and eventual field-ready public health solutions. As mosquito-borne diseases continue to affect communities across Asia, a stronger connection between science, surveillance, funding, and regional collaboration could be crucial in building more sustainable outbreak prevention systems.