Inaugural meeting of the Technical Advisory Group on Arboviruses

Meeting report

8-10 December 2021

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First meeting of the Technical Advisory Group - Arboviruses
8-10 December 2021, Virtual meeting

Introduction

The risk of emergence and re-emergence of arboviruses in the past decade has increased as a global public health threat and will continue to do so in the years to come. The Global Integrated Arbovirus Initiative (GLAI) has been developed in response to this growing threat, with an integrated strategic plan to address emerging and reemerging arboviruses with epidemic and pandemic potential. The GLAI document outlines an integrated approach to prevention, preparedness, detection, and response, and is primarily focused on *Aedes*-borne diseases i.e., an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes. WHO held virtual global stakeholder consultations in November 2021 to solicit input on the activities under GLAI's six pillars. The proceedings of the stakeholder consultations will be published separately.

The Technical Advisory Group on Arboviruses is tasked with providing technical advice to WHO with a view to supporting the development and refinement of the GLAI, as well as the monitoring of the GLAI implementation, and continue as an advisory body to WHO in the field of Arboviruses.

The GLAI overview and document was presented to the newly formed Technical Advisory Group (TAG)-Arbovirus for final feedback at their first meeting December 8-10, 2021. This report provides a summary of the proceedings of this meeting.

Meeting objectives:
- To review and discuss the content of the new version of the GLAI to move forward with endorsement of the document and launch
- To discuss the relevance of other emerging and re-emerging arboviral diseases and challenges and opportunities for these non-*Aedes*-borne pathogens under the umbrella of the GLAI
- To review and discuss as the draft of the detection strategy for *Aedes*-borne arbovirus emergence or re-emergence

Meeting structure and participants

The meeting was held virtually over three days, from 8-10 December 2021, convening newly appointed TAG members (Appendix I) and coordinated by the WHO-Arbovirus Secretariat (Appendix II). Discussions included plenaries involving all participants, and intermittent breakout sessions where members were divided into two groups to discuss Pillars 1 and 2, and 3 and 4. Pillars 5 and 6 were discussed by all participants. On the final day, TAG members were updated and discussed the status of non-*Aedes* borne arboviruses, preliminary findings from global

arbovirus surveillance and response capacity surveys, as well as a proposed arbovirus detection toolkit.

Meeting Proceedings

The TAG-Arbovirus Secretariat welcomed participants and introduced the TAG-members and Secretariat, and Dr Raman Velayudhan provided a summary of members' declaration of interests and determinations of significance of those disclosures (Appendix III). Dr Diana Rojas gave an overview of GLAI, and presented meeting objectives. Dr. Altaf Musani (WHO/WHE), Dr. Gautam Biswas (WHO/NTD), and Dr. Maria Van Kerkhove (WHO/GIH) provided opening remarks, and Dr. Ng Lee Ching and Dr. Samuel Dadzie were appointed with approval by TAG members as the Chair and Vice-Chair of TAG-GLAI. Discussion on activities within each of GLAI's pillars was then held.

Summary of discussions by topic

GLAI Pillar 1: Monitor risk and anticipate
Priority actions are to 1) develop a global risk monitoring framework for arboviruses using an integrated approach, and 2) forecast and model potential epidemic and pandemic scenarios for arboviruses.

A risk modelling framework and global integrated dashboard for *Aedes*-borne viruses requires select real-time input data and parameters, integrated data systems, standardized and interoperable reporting systems, and virus detection capacity . The models are only as robust as the quality of the constituent data and should incorporate local arbovirus transmission dynamics and One Health parameters, being fitted, validated, and recalibrated, as necessary, with local data. Models should also account for differences between viruses rather than viewing *Aedes*-borne diseases as a uniform entity (e.g., yellow fever ecology impacted not just by vector factors but also reservoir hosts and this is different than the other viruses). Mapping risk and vulnerable areas for *Aedes*-borne viruses transmission with a defined epidemic risk threshold will help validate the risk model. Forecasting arbovirus pandemic/epidemic potential, which has historically been challenging, should rely on quality data with appropriate uncertainty estimates, and be translated into practical implementation steps for countries at risk. The dashboard should build on the global assessment of arbovirus diagnostic capacity and include real-time monitoring of arbovirus transmission and outbreak risk, and estimated burden of disease and associated costs for stakeholders. It would be beneficial to compile current best practices globally and build on the available tools for risk determination. The burden of disease and economic impacts of each of the viruses needs to be quantified/updated, particularly in regions where the impact is not readily appreciated by policy-makers.

GLAI Pillar 2: Reduce epidemic risk

Priority actions are to 1) strengthen early detection, 2) increase capacities to perform epidemiologic investigation, 3) improve response to arbovirus outbreaks, and 4) increase

population protection through yellow fever vaccination in high-risk areas through the implementation of the EYE strategy.

Outbreak detection must happen earlier and methods to do so should be evaluated and where effective, standardized and deployed. This should include evaluation of novel methods, such as virological surveillance in vectors, incorporation of entomological surveillance information into epidemiological data etc. Decentralized testing and diagnosis of patients will expand capacity for earlier infection confirmation and initiation of response. Epidemiologic investigation can be improved by use of risk maps to guide surveillance and testing strategies. The current lack of standardization of early detection methods, case definitions, and mapping tools must be addressed. Health systems need to be strengthened to improve arboviral outbreak response, focusing on logistical and clinical management and supported by validated interventions, stocked supplies, and risk communication plans. WHO can support diagnostic development for arboviruses by facilitating rapid sharing of supplies, reagents, and viral specimens, and an economic investment case for arbovirus response may engage policy makers. Yellow fever vaccination is a critical tool in prevention and response in transmission settings. Countries outside of transmission settings but with vector presence should have preparedness plans in place for possible introduction, acknowledging that countries adjacent to transmission zones are likely at most immediate risk.

GLAI Pillar 3: Strengthen vector control

Priority actions are to 1) enhance vector surveillance, 2) strengthen vector control, and 3) increase preparedness in urban and densely populated areas

Vector surveillance must be strengthened including through expansion of entomological training, establishing career paths for entomologists, and leveraging and/or reorienting existing entomological surveillance capacity (e.g., in collaboration with malaria programmes) for *Aedes* vector surveillance. Laboratory capacity needs to be strengthened for entomological surveillance, including insecticide resistance detection and management, and entomological indices should be used in conjunction with human data like population immune status and movement of people in urban settings to guide appropriate action. Additionally, WHO should standardize and develop guidance on vector surveillance, including how to use and scale-up different options and innovative approaches. Similarly, vector control tools must be validated for disease reduction efficacy, which can be supported by laboratory-based investigations of vector and viral dynamics in addition to field-based randomized studies. Engagement of multiple sectors is important for sustainable vector control programs, and direct communication between vector control and epidemiological/clinical sectors is necessary for appropriate arbovirus response. More ecological studies of the vector are needed as changes in dynamics continue to occur along with the climate/ecological adaptations.

GLAI Pillar 4: Prevent and Prepare for Pandemics

Priority actions are to 1) enhance global coordination among stakeholders, 2) strengthen global surveillance mechanisms for rapid response, 3) strengthen community engagement and resilience, and 4) develop and strengthen countermeasures.

Mapping relevant stakeholders at all levels and their activities can identify opportunities for synergy between them, helping to enhance global coordination. Advocacy efforts would be supported by real burden of arboviral disease assessments that motivate more engagement from high-level stakeholders and attract funding. Real time sharing of arbovirus surveillance data following the example of initiatives like UniteDengue would strengthen global surveillance for rapid response, and GLAI's initial focus on one vector species will streamline global surveillance and response efforts. Community trust is important for strengthening community engagement and resilience, as is identifying appropriate individuals to communicate knowledge at the local level. Arbovirus awareness must go beyond community engagement, using traditional media, global awareness campaigns, and social media.

GLAI Pillar 5: Enhance innovation and new approaches

Priority actions are to 1) strengthen partnerships amongst stakeholders and partners, and 2) enhance communication with stakeholders.

The arbovirus public health research agenda should include evaluation and modelling the impact of interventions, a better understanding of arbovirus transmission and disease severity/phenotype, including interactions between arboviruses and associations with virus genotype, and One Health-based research approaches. Developing an evidence base for intervention scale-up and integration of interventions (ex. vaccines and novel vector control tools) is critical, and implementation/operational research should be conducted to support multisectoral implementation including the mechanism of interaction between local government/city councils with the Ministry of Health. AI-based tools using symptomatic history and updated case definitions would help clinicians better diagnose arbovirus infection and differentiate between other infections. More emphasis should be placed on the social sciences to investigate community knowledge, awareness, and perception of arboviruses and what motivates various sectors and the public to take action. Communication for Behavioural Impact (COMBI) and other methods should be reviewed, monitored and promoted to sustain behaviour change. Finally, environmental risk factors should be identified, including climate change impacts, and corresponding community responses identified.

GLAI Pillar 6: Build a coalition of partners

Priority actions are to 1) develop an integrated public health research agenda for Aedes-borne arboviruses, 2) Support the development of innovative countermeasures for arbovirus (vaccines and potential virus therapeutics, diagnostic tools and vector control tools), and 3) develop new tools and approaches for public health preparedness and response.

WHO is seeking to build a broad coalition of stakeholders. Stakeholder engagement at the global level should also filter down through regions and countries to the local level, with development of scientifically sound and validated engagement materials and strategies throughout. Proposed

activities to engage international partners include presentation of the Global Arbovirus Initiative at the World Health Assembly for high-level engagement and to obtain commitment from Member States. Traditional partners such as regional and national public health agencies, e.g., ECDC, U.S.CDC, NGOs, and academic institutions will continue to form the backbone of the initiative, with opportunities to expand to non-traditional partners in the tourism industry and commercial interests. GLAI should leverage already existing networks relevant to its planned activities, and its activities may be more easily co-funded by governments if done in partnership with WHO Collaborating Centers.

Non-*Aedes* borne arboviruses
Dr Erin Staples presented an overview of circulating and emerging arboviruses, with a focus on encephalitic arboviral diseases. The members discussed the need to include more viruses moving forward and use the lessons learned through the focus on Aedes (Stegomyia)-borne viruses to expand to others. This will be particularly important to engage countries where these other arboviruses are of higher public health priority and the research and development could be of global benefit.

Global arbovirus surveillance and response capacity surveys
Dr Gildas Yahouedo and Dr Ingrid Rabe presented preliminary data gathered during a global survey of member states with established *Aedes (Stegomyia)*. Data are still to be validated by participating countries prior to broader report publications and the findings will be of value in targeting programmes and interventions moving forward.

Proposed arbovirus detection toolkit
The final TAG Meeting discussion included an introduction to the proposed arbovirus detection toolkit, which has been developed to support earlier detection of arbovirus emergence/re-emergence. The resource pulls from existing documents and reviews human and vector surveillance options, sentinel sites, laboratory testing, and response. TAG members provided initial input on how to prepare and detect *Aedes*-borne arbovirus emergence or re-emergence, though more discussion on the document will follow.

Meeting conclusion
The first TAG Arbovirus meeting concluded with plans for the GLAI strategy document and future meetings. The GLAI strategy document will be updated based on TAG feedback and circulated to members for final review before publication and GLAI's launch.

Appendix 1
Members of the TAG-Arbovirus

The following persons will serve for the period 2021-2023:

1. Professor NG Lee Ching (CHAIR) is a group Director of Environmental Health Institute at National Environment Agency, Singapore.

2. Dr Samuel Dadzie (VICE-CHAIR) is a Senior Research Fellow at the Noguchi Memorial Institute for Medical Research, Ghana.

3. Mrs Tammy Allen is a senior Lecturer at James Cook University, Australia.

4. Dr Anoja Dheerasinghe is the Head of the Vector Surveillance & Vector Control Unit, Ministry of Health, Sri Lanka.

5. Dr Nuno Faria is a reader in Virus Evolution at the Imperial College London, United Kingdom.

6. Professor Maria Eugenia Grillet is a Full Professor at the Universidad Central de Venezuela,Venezuela.

7. Dr Maria Guzman is the head of the Center for Research, Diagnostic and Reference at the Institute of Tropical Medicine Pedro Kouri in Cuba.

8. Dr Jean Michel Heraud is a Virologist at the Institut Pasteur de Dakar, Senegal.

9. Dr Hmooda Kafy is the head of Integrated Vector Management Department in the Federal Ministry of Health (FMOH) in Sudan.

10. Dr Kleber Luz is an Associate Professor at Federal University of Rio Grande do Norte, Brazil.

11. Professor Suresh Mahalingam is the director of the Global Virus Network (GVN) Centre of Excellence in Arbovirology at the Menzies Health Institute Queensland, Australia.

12. Dr Ehsan Mostafavi is the director of the Research Centre for Emerging and Reemerging Infectious Diseases in Pasteur institute of Iran, Iran.

13. Dr Chantal Reusken is a principal Virologist at the Centre for Infectious Disease Control of the National Institute for Public Health and the Environment in Bilthoven, the Netherlands.

14. Professor Fabrice Simon is a chief executive officer of RISK&VIR, Marseille, France.

15. Dr Thomas Scott is a distinguished Professor of mosquito transmitted disease ecology and epidemiology in the University of California, United States of America.

16. Dr J. Erin Staples is a Medical Epidemiologist at Arboviral Disease Branch, Division of Vector-borne Diseases, Centers for Disease Control and Prevention, United States of America.

17. Dr Naveen Rai Tuli is a Public Health Specialist in South Delhi Municipal Corporation, India.

18. Dr Marietjie Venter is a Professor of the Zoonotic Arbovirus and Respiratory Virus Research Programme at the Centre for Viral Zoonoses, Department of Medical Virology at the University of Pretoria in South Africa.

Appendix 2
WHO TAG-Arbovirus Secretariat

- Laurence Cibrelus : WRE/HEI/EHI

- Jennifer Horton: WRE/HEI/EHI

- Ingrid Rabe: WPE/GIH/EZD

- Diana Rojas Alvarez: WPE/GIH/EZD

- Maria Van Kerkhove: WPE/GIH/EZD

- Raman Velayudhan : UCN/NTD/VVE

- Qingxia Zhong: UCN/NTD/VVE

Appendix 3

Declaration of Interest Statements

All TAG-Arbovirus members completed forms for declarations of interests for WHO experts before the meeting. The TAG-Arbovirus secretariat assessed the interests declared by the experts, and with the exception of those described below, found that they were not directly related to the topics under discussion at the meeting (see Annex for full list of disclosures). It was therefore decided that all experts could participate in the meeting, subject to disclosure of their interests at that time. The following interests were declared and assessed as related to topics under discussion at the meeting. The disclosed interests did not warrant exclusion. Dr Suresh Mahalingam: consultation on Phase II clinical trial to test drug Pentosan polysulphate in Ross River virus disease. Paradigm Biopharmaceuticals Ltd. AUD$1000. 2017; funding from company to test an inactivated chikungunya vaccine in a mouse model. Gamma Vaccine Ltd. AUD$80,000 (current).

- Dr Chantal Reusken: European network for expert labs on emerging and vector-borne viruses, ECDC grant, research unit, grant to establish and EVD-Labnet (1 million)(2016 onwards); research project on surveillance systems for arboviruses; ZONMW (Dutch science organization), research unit; grant (500,000); 2015-2018.

- Dr Thomas Scott: received grants from NIH, BMGF, Unitaid, in the past and the present grant support. Evaluates spatial repellents on dengue transmission in Peru.

- Dr Fabrice Simon: Consulting: Sanofi-Aventis R&D – 1250 Euro, finished in 2017. Consulting as DSMB for CHIKV vaccine candidate Valneva, Austria, 9100 Euro since 2016, current interest. Since 1 Aug 2020 CEO of Risk&Vir, a company on prevention of infectious diseases in companies and other communities.

- Dr Anoja Dheerasinghe is a Co-Principal Investigator of the AEGIS Research Project on spatial repellent in Sri Lanka).

Appendix 4

First meeting of the Technical Advisory Group - Global Integrated Arboviruses Initiative
World Health Organization, Geneva, Switzerland
1-3 December 2021 Virtual meeting – hosted on Microsoft Teams
Listed times represent UTC +1 (CET, Geneva)

Agenda

Day 1

Wednesday, December 1 2021		
12:45 – 13:00 pm	Welcome to the participants and overview of running of meeting, declaration of interests. Objectives and outcomes of the meeting	WHO TAG-Arbovirus Secretariat
Session 1: Introduction and presentations		
13:00-13:15 pm	Introduction of the members of the TAG, observers, and the Secretariat	All the participants
13:15-13:30 pm	Opening remarks	Dr. Maria Van Kerkhove Dr. Altaf Musani Dr. Gautam Biswas
13:35-14:00 pm	Presentation: Overview of the WHO Global arbovirus Initiative	Diana Rojas Alvarez
Break		
Session 2: Discussion of pillars 1 and 2		
14:10–15:10 pm	Breakout session: Pillars 1 and 2	TAG Arbovirus members
15:10-16:00 pm	Discussion Pillar 1 and 2	All the participants

Day 2

Thursday, December 2 2021		
Session 3: Discussions of pillars 3 to 6		
14:00-14:15 pm	Wrap up summary of day 1	TAG- members WHO TAG-Arbovirus Secretariat
14:15-14:45 pm	Breakout session: Pillars 3 and 4	TAG-members
14:45-15:10 pm	Discussion Pillar 3 and 4	All the participants
Break		
15:20–16:00 pm	Discussion Pillar 5	TAG-members

Day 3

Friday, December 3 2021		
13:00 – 13:30 pm	Discussion pillar 5	All participants

Session 3: Additional considerations for TAG and the GLAI		
13:30-14:00 pm	Other emerging and re-emerging arboviruses Integration of these emerging and re-emerging arboviruses to the global arbovirus strategy. Main challenges and opportunities	Dr. J. Erin Staples – US CDC
Break		
14:05–14:35 pm	Presentation results Global arbovirus capacity survey.	Dr. Ingrid Rabe – WHO/WHE/EZD Dr. Gildas Yahouedo – WHO/TDR
14:35-15:05 pm	Review and discussion of the arbovirus detection tool kit	All the participants
15:05 – 15:20 pm	Identification of potential funding opportunities	All the participants
15:20-15:30 pm	Conclusions of the meeting	All the participants
Break		

Appendix 5

Group Photo