TDR For research on diseases of poverty

UNICEF • UNDP • World Bank • WHO

Annual Report 2024

Research for implementation

Table of contents

List of abbreviations

ADP	Access and Delivery Partnership (UNDP)
AMR	antimicrobial resistance
CARN-TB	Central African Regional Network for TB Control
CDC	Centers for Disease Control and Prevention (for Africa, the US, and China)
COVID-19	coronavirus disease 2019; SARS-CoV-2
DND*i*	Drugs for Neglected Diseases *initiative*
EDCTP	European and Developing Countries Clinical Trials Partnership
ER	expected result
EWARS	Early Warning and Response System
FAO	Food and Agriculture Organization
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
HIV	human immunodeficiency virus
IAEA	International Atomic Energy Agency
IDDO	Infectious Diseases Data Observatory
IDRC	International Development Research Centre (Canada)
IMP	TDR Research for Implementation Unit
IR	implementation research
IRS	indoor residual spraying
ITN	insecticide-treated net
IWP	insecticidal wall painting
JCB	TDR Joint Coordinating Board
KEP	Kala-azar Elimination Programme
LMIC	low- and middle-income country
LSHTM	London School of Hygiene and Tropical Medicine
M&E	monitoring and evaluation
MDA	mass drug administration
MDGH	medicines development for global health
MDR-TB	multidrug-resistant tuberculosis
MMV	Medicines for Malaria Venture
MoH	Ministry of Health
MoU	Memorandum of Understanding
MPH	Master of Public Health
MSA	multisectoral approach
NDC	National Disease Control
NIH	National Institutes of Health (US)
NMP	national malaria programme
NGO	non-governmental organization

NTD	neglected tropical disease
NTP	National Tuberculosis Programme
OPT–SMC	Optimizing Seasonal Malaria Chemoprevention Project
OR/IR	Operational and/or implementation research
PAMCA	Pan Africa Mosquito Control Association
PI	Principal investigator
PKDL	Post kala-azar dermal leishmaniasis
PMI	President's Malaria Initiative (USA)
R&D	Research and Development
RTC	Regional Training Centre
SAP	Strategic Action Plan to Scale up Health and Environment Interventions in Africa
SDG	Sustainable Development Goals
SEARN-TB	Southern and Eastern African Regional Network for TB Control
ShORRT	**Sh**ort, all-**O**ral **R**egimens for **R**ifampicin-resistant **T**uberculosis
SIT	Sterile Insect Technology
SMC	seasonal malaria chemoprevention
SOP	standard operating procedure
SORT IT	Structured Operational Research and Training Initiative
STAC	TDR Scientific and Technical Advisory Committee
STPH	Swiss Tropical and Public Health Institute
SWG	TDR Scientific Working Group
TDA4Child	Treatment-decision algorithm for Children
TDR	UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases
UHC	universal health coverage
UNDP	United Nations Development Programme
UNION, The	International Union Against Tuberculosis and Lung Disease
USAID	United States Agency for International Development
US-FDA	United States Food and Drug Administration
VCAG	Vector Control Advisory Group (WHO)
VBD	vector-borne disease
VL	Visceral Leishmaniasis
WAHO	West African Health Organization
WARN-TB	West African Regional Network for TB control
WCA	West and Central Africa
WHO	World Health Organization
WHO–AFRO	WHO Regional Office for Africa
WHO–EECA	WHO East European and Central Asia region
WHO–EMRO	WHO East Mediterranean Region
WHO–ERC	WHO Ethics Review Committee

WHO–EURO WHO Regional Office for Europe
WHO–GMP WHO Global Malaria Programme
WHO–GTB WHO Global TB Programme
WHO–HQ World Health Organization headquarters
WHO–NTD WHO Control of Neglected Tropical Diseases Department
WHO–PAHO WHO Regional Office for the Americas
WHO–PHE WHO Public Health, Environmental and Social Determinants of Health Department
WHO–SEARO WHO Regional Office for South-East Asia
WHO–WASH WHO's provision of safe water, sanitation and hygiene intervention
WHO–WPRO WHO Regional Office for the Western Pacific
WMO World Meteorological Organization

Introduction

Research for Implementation is one of the three strategic priority areas of the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) within its 2024–202 strategy. The supported research activities are contributing to achievement of the Sustainable Development Goals (SDGs) by 2030, specifically SDG 3 "Ensure healthy lives and promote well-being for all at all ages" and SDG 10 "Reduce inequalities within and among countries," as well as supporting universal health coverage (UHC).

Research for Implementation Unit (IMP) activities focus mainly, but not exclusively, on research leading to the development of policies and guidelines and their effective implementation in public health programmes. The activities are also producing the evidence needed to reduce the burden of infectious diseases of poverty in low- and middle-income countries (LMICs).

We work with national programmes and researchers in LMICs to ensure that more scientific evidence is generated and translated into safe, effective, equitable and accessible health solutions for populations suffering from infectious diseases of poverty. This often means studying how interventions that work in clinical trials and pilot settings can be transferred to "real life" settings and scaled up at the national level. We support research that national and international programmes have identified as priorities for overcoming obstacles from innovation to implementation, access and health impact.

Objectives

The Research for Implementation activities focus on finding new solutions to reduce the burden of infectious diseases of poverty and ensure access to health technologies for those in need. The following three main workstreams of research are articulated around the four global health challenges within TDR's current strategy.

- **RESEARCH FOR DECISION-MAKING**: to understand and produce evidence on large-scale performance, acceptability, feasibility, implementation needs and potential impact of available tools as a basis for determining what tools are suitable for guidelines and policies
- **RESEARCH FOR DELIVERY AND ACCESS**: to understand and address barriers to effective, quality and equitable implementation of health interventions, strategies, guidelines and policies to provide the evidence as to how these can best be implemented for maximum impact
- **RESEARCH FOR INNOVATIVE SOLUTIONS**: to provide directions for the development of improved and adapted new tools and strategies needed, and to promote their development and use

The above-mentioned objectives are being implemented through 11 Expected Results (ERs) that have been developed in coordination with IMP's Scientific Working Group (SWG).

Figure 1 shows how the different ERs aligned with the TDR global health challenges.

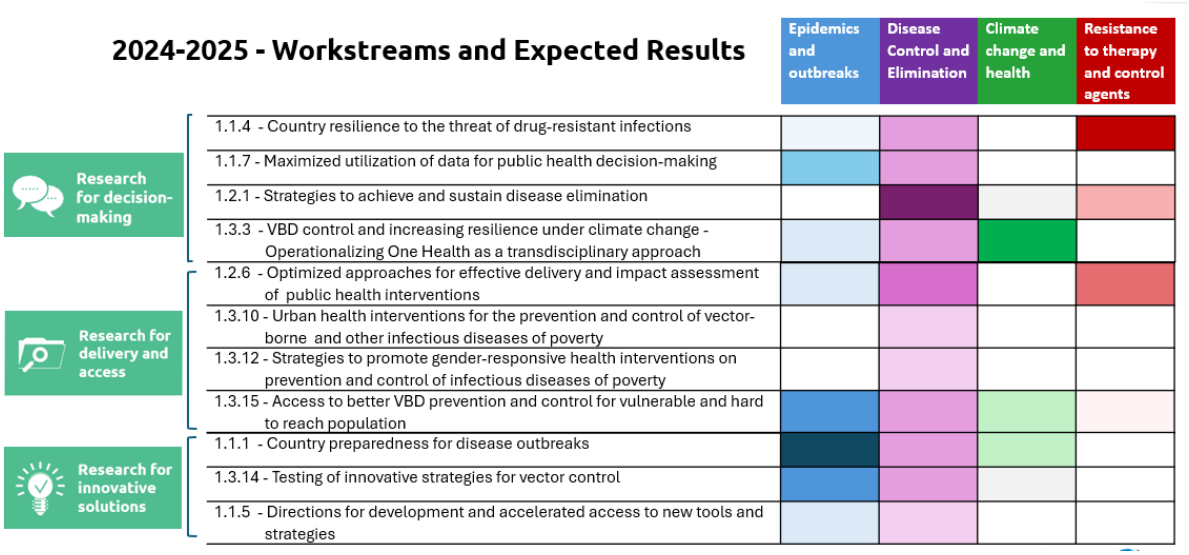

Figure 1 - Matrix of expected results and global health challenges

Key achievements for the strategic priority area in 2024

- The pilot of the Early warning and response system (EWARS-csd) for predicting dengue outbreaks in sentinel sites has been initiated in three new countries in West Africa (Burkina Faso, Nigeria and Senegal).
- A research package for conducting Root Cause Analysis of yellow fever outbreaks in countries with prior mass vaccination campaign(s), and to evaluate the root causes of low fever vaccination coverage at district level was developed, piloted and will be available by end of the year for countries facing yellow fever re-emergence.
- The antimicrobial resistance (AMR) program continues to be a successful and impactful initiative.
  - According to the 2024 TDR metrics survey, 79% of the 75 research studies conducted through SORT IT in Asia, Africa, and Latin America led to tangible changes in policy and practice. The program also strengthened leadership in health research, delivering significant benefits to health systems. Notably, 92% of SORT IT trainees applied their skills to address antimicrobial resistance, 50% were involved in mitigating the threat of emerging infections, 64% completed new research studies, and 38% took on mentoring roles to support others in conducting operational research.
  - WHO Endorsement: The WHO Director-General's office has recognized Sierra Leone's SORT IT approach as a model for multi-level collaboration and capacity building, particularly in the fight against antimicrobial resistance.
- Maximized utilization of data for public health decision-making for UHC and SDGs:
  - Real-Time Implementation Research on TB Disability Informing Policy: Research from Kenya, Zambia, Zimbabwe, and Uganda on TB disability is recognized by the Global TB Programme as a key milestone, directly contributing to WHO policy on TB-associated disability.
  - TDR trainees Tacking Mpox: A recent survey found that 54 out of 124 SORT IT alumni from 28 African countries actively participated in Mpox preparedness and response efforts. Of these, 93% are applying the skills acquired through SORT IT, highlighting the broader health system benefits this training provides.

- TDR supported field preparatory work for the evaluation of the introduction of the pediatric formulation of Praziquantel in Tanzania and facilitate south-south support for building on Tanzania experience and conducting similar implementation research projects in Senegal and Ghana.
- A new implementation research project was initiated supporting 14 countries in West and Central Africa in the introduction of malaria vaccine. As part of this project, TDR leads the development of a research package for conducting coverage surveys, understanding the barriers and drivers influencing malaria uptake and measuring vaccine effectiveness.
- A research package for evaluating the effectiveness, feasibility and impact of using the WHO recommended Treatment Decision algorithm for childhood TB was developed and used by three countries (Burkina Faso, the Democratic Republic of the Congo and Nigeria). Study results have been presented at the world TB conference in November 2024 and will contribute to the update of WHO GTB childhood TB recommendations.
- A new research toolkit for evaluating the impact of social protection programmes among TB patients and their households has been developed and launched at the world TB conference in November 2024. The toolkit complements the financial and technical support that TDR has provided to eight teams from national tuberculosis programmes across West and Central Africa since 2023 in the design and conduct of IR studies to evaluate local social protection schemes for TB.
- The ShoRRT study to support the introduction of all-oral shorter MDR/RR-TB treatment regimens and based on a standardized package developed by TDR, continues to run in 27 countries, with technical and financial support from TDR in Nigeria and DRC. The study results have enabled policy change in two new countries: based on the results of the ShoRRT study in Dominican Republic and Ecuador, the national policy was changed in those countries and short all oral regimens have been adopted for MR-TB patients.
- Country capacity assessment for VL control initiated in Eritrea, Sudan and South Sudan as preliminary work for new implementation research on VL elimination in eastern Africa has been completed in two countries.
- The performance evaluation of VL rK39 RDT in eastern Africa context was initiated, with the completion of the lab performance assessment for one test as prerequisite to field evaluation.
- Global Urban health consultation and research priority setting exercise conducted to identify research gaps on infectious diseases of poverty and implementation research with an intersectional gender lens.
- Further evidence has been generated on infectious diseases of poverty, gender and intersectionality in LMICs
  - Evidence from Nepal assesses gender and equity considerations in key health related national policies and the Health Management Information System of National Tuberculosis Programme for more inclusive health systems.
  - Intersectional gender analysis generates evidence from four health facilities in central Uganda that identifies challenges and bottlenecks in TB care and most at-risk population.
  - Systematic literature reviews on gender, intersectionality, AMR and climate completed and ready for journal submission.
- Testing the sterile insect technique (SIT) to control dengue transmission in the Pacific Region: French Polynesia started preparing for SIT field testing in 2023 and will release sterile males mosquitoes weekly throughout 2025 in two sites (Tahiti and Tetiaroa islands). The Cook Islands is also preparing to test SIT, and the release of sterile males will start by mid-2025 on Akitaku island.
- Research study for transfer of the Malakit technology (self-diagnosis and treatment kit for mobile and hard-to-reach communities) from Guyana countries to the national malaria programme of Senegal is under preparation.
- Research study on the relationships between VBDs and poverty ongoing in Brazil.

- Final workshop to present the findings of the research projects on multisectoral approaches (MSAs) for the prevention and control of vector-borne diseases (VBDs) including malaria and arboviral diseases was held in June 2024.
- The four research teams addressing One Health implementation research priorities for vector-borne diseases in the context of climate change in Africa disseminate their research results and lessons learned at the 8th World One Health Congress.
- A massive open online course (MOOC) was rolled out in 2024 on "Incorporating an Intersectional Gender Perspective in Implementation Research" as part of the overall IR MOOC.
- A MOOC has been developed to support implementation of the multisectoral approach to prevent and control vector-borne diseases.

Summary progress description for 2024

The different projects have made good progress to meet the biennium targets, despite slight delay in few projects. Among the 11 Expected Results (ERs), two ERs have delayed 2024 deliverables, without however impacting the potential to fully achieve biennium targets at end of 2025. More details on progress are provided in table 1 and as narrative in the pages below.

Table 1: Research for implementation workplan overall progress

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
Research for decision-making	
1.1.4 Country resilience to the threat of drug-resistant infections: i) Documentation of practical approaches to improve targeted treatment and reduce drug misuse and risk of resistance, development and spread; ii) OR/IR strategies for countries to build effective systems for monitoring and responding to emerging drug resistance of all relevant infectious agents.	By the end of 2025: - 60 reports/publications and 10 examples of good practice leading to impact made available (72 publications for the US$ 50 million scenario). - Strategies and activities endorsed by stakeholders at relevant levels in seven target countries (nine countries for the US$ 50 million scenario). *Progress made:* - *Cumulatively, since 2019, a total of 112 research projects have been initiated, resulting in 87 publications, 80 evidence briefs, and 80 lightning videos. In 2024, there were 12 publications in a special issue including 11 demonstrating impact on policy and practices in Ghana, Nepal, and Sierra Leone. A total of 34 individuals were trained using 22 new research projects that were launched. This included 12 new projects under a pioneering initiative in the EMRO region focusing AMR challenges in Egypt, Iran, Tunisia, and the UAE.*

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
	Furthermore, 10 studies on research impact in Ghana were also started. The SORT IT program has emerged as a global model for impactful research. According to the 2024 TDR metrics survey, 79% of the 75 studies on anti-microbial resistance conducted through SORT IT have influenced policy or practice, showcasing the program's success in translating research into actionable outcomes. - *All research strategies and activities in 11 countries (Colombia, Ecuador, Egypt, Ghana, Iran, Myanmar, Nepal, Sierra Leone, Tunisia, UAE, and Uganda) have been endorsed by the national AMR committees of the respective countries.*
1.1.7 Maximized utilization of data for public health decision-making: i) Build capacity for the effective collection and analysis and use of data for decision-making; ii) Publications and issue/policy briefs to inform *evidence*-based policies/practice.	By the end of 2025: - 240 successful trainees and 120 data analyses conducted and reported on Universal Health Coverage and SDG themes (280 and 140 respectively for the US$ 50 million scenario). - 120 publications and evidence of change in policies/practice (140 for the US$ 50 million scenario). *Progress made:* - *In 2024, a total of 178 individuals across Asia and Africa were trained, through TDR supported workshops, in protocol writing, effective data collection, analysis, and research communication.* - *A total of 70 data analysis were done across TDR supported projects with partners.* - *That same year, 41 publications were produced, covering topics such as COVID-19, Ebola, mental health, malaria, and innovations in TB management. This included two special issues—one in F1000 and another in the East African Medical Journal. Additionally, 20 evidence briefs and accompanying lightning videos on emerging infections and neglected tropical diseases were developed for decision-makers. Notably, 68% of the research influenced policies and practices, and 52% of those trained went on to pursue new research, showcasing strong capacity-building outcomes. Furthermore, 95% of publications had LMIC first authorship, with 43% of these authors being female.*
1.2.1 Strategies to achieve and sustain disease elimination: i) Improved basis for monitoring progress of preventive chemotherapy-based elimination programmes towards elimination and	By the end of 2025: - Two reports to scientific working group; results of five studies disseminated with the country control programmes and/or NTD

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
for decisions to stop interventions; ii) Data to support WHO guidelines and onchocerciasis endemic country registration and policies on moxidectin for onchocerciasis elimination; iii) Generate evidence on sustainable strategies for the elimination of VL in the Indian subcontinent; iv) Generate evidence to support establishment of programmes towards elimination of VL in Eastern Africa.	programmes/advisory committees at regional and/or headquarters level (eight studies for the US$ 50 million scenario). - Five publications in peer reviewed journals (eight publications for the US$ 50 million scenario). *Progress made:* - *The work under this area is mostly on track beside a delay in progress for the evaluation of the capacity of health systems in East Africa* - *The reports on the progress of research for VL elimination in ISC and on the progress of diagnostic test for VL relevant to elimination in East Africa has been shared with the scientific working group.* - *Results of three additional studies have been disseminated with the VL control programmes in countries and/or NTD (Nepal, Bangladesh, Ethiopia)* - *Three new studies have been initiated in 2024 (1 in Nepal, 1 in Bangladesh and 1 on the evaluation of VL diagnostic)* - *5 publications on moxidectin relevant to onchocerciasis elimination and 1 publication on VL strategies relevant to VL elimination.*
1.3.3 Operationalizing a One Health approach for the control of vector-borne diseases in the context of climate change: Finalization of One Health research projects.	By the end of 2025: - Publication of research results for at least four African research consortia and launch of three new research projects (two more research projects for the US$ 50 million scenario). *Progress made:* - *The study results of the African research consortia were shared at the World One Health conference, Cape Town, 19-23 Sept 2024 (six poster/oral communications) and manuscripts are at a drafting stage.* - *New research projects to be launched in 2025.*

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
Research for delivery and access	
1.2.6 Optimized approaches for effective delivery and impact assessment of public health interventions: i) Approaches to optimize the effectiveness of RTS,S malaria vaccine in countries with high seasonality; ii) Strengthened regional networks of national TB programmes (NTP) in West, Central, East and Southern Africa capable of identifying research priorities; iii) Strengthened NTP capacity to conduct OR/IR to generate the evidence base for improving TB control.	By the end of 2025: - At least three countries should implement strategies to optimize effectiveness of RTS,S with more robust study designs to measure the impact of these strategies if extra funding is provided. - Establishment of the East and Southern Africa network with governance and terms of reference in place and at least 50% of the countries have defined their TB control gaps and developed a national TB research agenda. - OR/IR project results of at least 15 NTPs are disseminated via oral or written study reports/ scientific publications (20 for the US$ 50 million scenario). *Progress made:* *All is in place to reach targets by the end of 2025:* - *TDR is involved in an EDCTP funded project that aims at supporting fourteen countries of the West and Central Africa region in the introduction of malaria vaccine and optimisation of its effectiveness.* - *The SEARN-TB was established in 2022, a workshop in 2023 brought together more than 20 NTPs from the region with the aim to build their capacity to interrogate and utilise their TB surveillance data; this will form the basis of activities to articulate a national plan for IR priorities and activities which will be completed in 2025.* - *Approximately 50 IR/OR projects (on TB, Malaria, NTD) are currently underway with NTPs in the AFRO region with TDR support. Oral and written communications of study results are planned for 2025.*
1.3.10 Urban health interventions for the prevention and control of vector-borne and other infectious diseases of poverty: Evidence informed policy and practice at urban level.	By the end of 2025: - Two research studies implemented following findings from systematic evidence reviews conducted in previous biennium (three for the US$ 50 million scenario). *Progress made:* - *A virtual stakeholders' and experts' consultation to inform TDRs research agenda on urban health and gender, as well as the broader research agenda in*

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
	this area was held. The consultation contributed to a research priority setting exercise which took place in the second half of 2024 to identify and prioritize key research areas in urban health through an intersectional gender lens. Results have informed a subsequent research call for proposals.
1.3.12 Strategies to promote gender-responsive health interventions on prevention and control of infectious diseases of poverty: New knowledge and evidence generated from intersectional gender analyses in IR to address marginalization and disadvantages in access to health systems and services, health impacts, prevention/control of IDPs.	By the end of 2025: - Four implementation research studies and four research uptake initiatives (with six each for the US$ 50 million scenario). *Progress made:* - *Out of two IR projects on gender, intersectionality and infectious diseases of poverty (IDP), one has been completed in Ethiopia with the second team in Bangladesh doing data analysis currently. Manuscripts are under preparation. The research teams in Bhutan and Africa consortium (Kenya, Malawi and South Africa) have completed their projects and are currently developing manuscripts to be submitted to peer reviewed journals. Three systematic reviews on Gender, antimicrobial resistance, and climate change threat to human health in context of IDP have been conducted in India, Philippines and South Africa along with multiple stakeholder consultations and workshops. Manuscripts currently being finalized for journal submission.*
1.3.15 Vector-borne disease prevention and control for vulnerable and hard-to-reach populations: i) Better knowledge of the factors of vulnerability in prevention and control of VBDs; ii) Plan for setting up research activities and case studies.	By the end of 2024: - Description of the factors with qualitative and quantitative analysis through a consultancy report. By the end of 2025: - At least one case study where vulnerable populations have improved access to VBDs prevention and control through the implementation of adequate strategies and tools (three case studies and a workshop to support publications for the $US 50 million scenario). *Progress made:* - *Consultancy report finalized and currently under external review.* - *1 case studies on the relationships on vector-borne diseases and poverty ongoing in Brazil, to provide the qualitative and quantitative analysis of socio-*

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
	economic factors impacting VBDs. - *Preparation for a case study on transfer of technology to reach miners in malarious areas in Senegal are ongoing.*

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
Research for innovative solutions	
1.1.1 Country preparedness for disease outbreaks: Integration of EWARS in countries' surveillance systems.	By the end of 2025: - Three countries using EWARS as integrated tool in their surveillance system (five for the US$ 50 million scenario). *Progress made:* - *Activities are on track to fulfil 2025 targets. Already, in Thailand, a digital solution is piloted to facilitate the use at national scale of EWARS-csd. In Lao PRD, the integration of EWARS-csd into their national DHIS2 system is almost finalized. Collaboration with Oslo University will permit us to develop a dedicated dashboard for weekly alarm.*

1.1.5 Directions for development and accelerated access to new tools and strategies: i) Strategy development, implementation and monitoring; ii) Outputs of TDR research projects and TDR staff and adviser expertise used to provide directional perspective for new R&D tools (including advice/ support to R&D sponsors) as well as new ways of implementing the tools; iii) Generic protocols to address implementation research issues encountered by different disease control programmes.	By the end of 2025:
	- Scientific working group meeting reports and recommendations.
	- Three R&D initiatives informed by TDR research project output or TDR staff /adviser expertise (five for the US$ 50 million scenario).
	- Two disease control programmes using generic protocols to inform their IR studies (four for the US$ 50 million scenario).
	Progress made:
	- *The SWG meeting has been organized end of October 2024 and the activities report provided to the SWG members in advance of the meeting for their review.*
	- *The following R&D initiatives have been informed by TDR research project output or TDR staff / adviser expertise:*
	  ○ *Development of moxidectin for the control and elimination of onchocerciasis (TDR input into protocols and research programme).*
	  ○ *Validation of rK39 for visceral leishmaniais in east Africa (see ER 1.2.1)*
	  ○ *Application of sterile insect technology for control of VBDs (see ER 1.3.14)*
	The generic protocols for the ShoRRT study and TB4Child have been used by several national control programmes to conduct research at country level (see ER 1.2.6). A generic protocol for evaluation of rapid diagnostic test for VL diagnostic is in draft stage.

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
1.3.14 Testing of innovative strategies for vector control: i) SIT against *Aedes* mosquitoes and arboviral diseases presented at the WHO Vector Control Advisory Group (VCAG) for advice and review; ii) Countries integrating SIT into the integrated vector control against Aedes mosquitoes and arboviral diseases.	By the end of 2024: - VCAG recommendation. By end of 2025: - Three countries in the process of integrating SIT (for the US$ 50 million scenario, a second research project with SIT field testing is supported and training tools/activities developed). *Progress made:* - *SIT technology was presented at WHO VCAG in September 2023 and the recommendations were addressed within the ongoing project in 2024.* - *1 country has started SIT field testing and 1 country is prepared for SIT field testing by early 2025.* - *Funding (300K USD) for the organization of a workshop to prepare 3 more countries for SIT testing was raised in 2024; the workshop is expected to take place in February 2025.* - *14 Scientific publications from the workshop on SIT held in May 2023 on track for publication in a special issue of the Journal for Infectious Diseases of Poverty.*
Cross-cutting approaches	
1.3.11 Multisectoral approach (MSA) for prevention and control of vector-borne diseases: i) Countries implementing fully MSA against vector-borne diseases; ii) Deployment of MSA MOOC.[1]	By end of 2024: - 12 countries with MSA implementation (through joint activities and/or coordination committees). - 50 individuals following the MSA MOOC. *Progress made:* - *13 countries have received and used the training documentation: Benin, Brazil, Burkina Faso, Cameroon, China, Ecuador, Ghana, Niger, Nigeria, Mali, Senegal, Tanzania, Zambia.* - *7 Countries implemented MSA approach against malaria: Benin, Burkina Faso, Nigeria, Mali, Senegal, Tanzania, Zambia.* - *2 Countries implemented MSA approach against arboviral diseases: Brazil, Ecuador.* - *Information briefs from case studies available for 9 countries. Training materials on MSA available and training workshop held in Senegal in September 2023.*

[1] Deliverables from previous biennium without budget allocation in 2024–2025

Expected Results – Research for implementation	
Expected results and deliverables	*Indicators and targets*
	- *Modules 1 to 2 of the MOOC on MSA available online by end of 2024. Modules 3 and 4 to be added in January 2025.* - *Scientific publications on track.* - *Final MSA workshop to present the results of the research projects and the countries' implementation held in June 2024 in Brasilia, Brazil.*

Progress description in 2024 and plans for 2025

The following describes progress on the four research workstreams by expected results.

- ***Research for decision-making:*** *Providing data for evidence-based decisions on the inclusion of new tools, strategies and interventions in guidelines and policies* (five Expected Results – ER 1.1.1, ER 1.1.4, ER 1.1.7, ER 1.2.1, ER 1.3.3).
- ***Research for delivery and access:*** *Providing data to inform health system practices for effective delivery and equitable access* (four Expected Results – ER 1.2.6, ER 1.3.10, ER 1.3.12, ER 1.3.15)
- ***Research for innovative solutions:*** *Filling the gaps in tools, strategies, and interventions* (two Expected Results – ER 1.1.5, ER 1.3.14).

Research for decision-making

Providing data for evidence-based decisions on the inclusion of new tools, strategies and interventions in guidelines and policies.

1.1.1: Country preparedness for disease outbreaks

Rationale:

This ER addresses an important public health problem (prediction, early detection and response to devastating outbreaks). Considering the growing importance of *Aedes*-borne diseases, the initial focus was on dengue, chikungunya, Zika and yellow fever but we move slowly towards addressing other climate sensitive diseases such as meningitis, cholera outbreaks and promoting a One Health approach.

Design and methodology:

For this ER, TDR is providing the following support:

- Support to country control programmes worldwide to identify signals that can alert country control programmes to an impending arbovirus outbreak. This has led to a model contingency plan and an Early Warning and Response System (EWARS) for arbovirus outbreaks

- Support to the Ethiopian National Disease Control Programme to pilot EWARS for predicting meningitis outbreak

- Strengthening surveillance and control of Arboviral diseases in Africa including yellow fever outbreak prevention & response in high-risk African countries

Progress in 2024

Outcomes

Process and tools developed to strengthen country capacities for the Surveillance and Control of Arboviral Diseases including Yellow Fever in Africa

Progress: the Root Cause Analysis toolkit for understanding the causes of yellow fever outbreak resurgence and the low yellow fever vaccination coverage that was developped following the TDR supported research conducted in Guinea, Cameroon and Central African Republic will be part of the WHO Eliminate Yellow fever Epidemics (EYE) strategy tools to be used when a new yellow fever outbreak occurs in a country.

Country preparedness and policy decisions for arbovirus outbreaks informed or facilitated by TDR outputs

Progress: Discussions are ongoing to integrate EWARS-csd in the Global Arbovirus Initiative surveillance dashboard. A meeting with other modelling groups was organised in December 2024 to develop guidance for the countries for the choice of the predicting tool to consider depending of their local ressources and context.

Outputs

Integration of EWARS-csd in countries 'surveillance system

Progress:

EWARS-csd for dengue outbreaks (Current status of EWARS-csd use):

1. Full integration of EWARS-csd into the national surveillance platform: Mexico (with 137 endemic municipalities). Because of a change in the MOH, the surveillance system was blocked but with the nomination of the new head of the surveillance disease department it recently restarted. A paper on Mexico experience with EWARS-csd was developed with the team to explain how they moved from research to national implementation.

2. Countries which started to pilot EWARS-csd in hot-spot districts for later inclusion into the national surveillance system: Bangladesh, Cambodia, Dominican republic (for which additional

support is provided by WHO PAHO), Ethiopia, India, Lao, Myanmar, Nepal, Thailand, Timor Leste, Colombia, Oman, Ethiopia, Malawi, Mozambique.

3. Countries which are at a early implementation stage (calibration): Burkina Faso, Nigeria and Senegal

4. Countries which had advanced with the wide-spread use of EWARS-csd but were slowed down due to political changes and are now coming back: Sri Lanka (on hold since the political events), Malaysia (still on hold because of political reason), Brazil (implementation is on hold due to political reasons).

The WHO Climate Change and Health unit (WHO/CCH) is collaborating for the implementation of EWARS-csd system in the following countries: Bangladesh, Cambodia, Lao, Myanmar, Nepal, Timor Leste, Ethiopia, Malawi and Mozambique and Oman.

Beside the monthly calls with all teams to catch-up on the country progress and when appropriate provide online training, since 2020, webinars were organised every 6 months with all countries implementing EWARS-csd (in collaboration with WHO/CCH) to maintain a dynamic and share experiences.

Focus on Lao-PRD and Thailand:

a) The National Disease Control (NDC) programme in Thailand is highly committed to scale-up the use of EWARS-csd at National Scale. Memorandum of understanding was signed between the NCDC and the national meteorological department for automatically share data on weekly basis. This will automatically feed the EWARS-csd system and generate alarm. With TDR and CDC funding, they are collaborating with a start-up NECTEC to help them to implement a digital solution for sharing the alarm level automatically through an in-house app with the health services. This system should be available by the end of 2024. Implementation research will be conducted in 2025 to evaluate the effectiveness, feasibility and satisfaction of end users.

b) In Lao-PRD, progress were made to link EWARS-csd with the DHIS2 of Lao-PRD. We are now discussing with the University of Oslo (developers of the DHIS2) to develop a dashboard in the DHIS2 that could provide weekly alarms at district level.

EWARS for other climate sensitive diseases such as meningitis:

This is a new area of work for which there is a lot of potential. EWARS-csd is tested in Mozambique for predicting Malaria Outbreak. This is led by the WHO/CCH unit. TDR is supporting Ethiopia for using the EWARS-csd platform for predicting meningitis outbreak. The first results are very encouraging and a manuscript was submitted to share the results widely. The MOH of Burkina Faso already expressed interest in using EWARS-csd for meningitis.

Availability of tools for strengthening capacities of countries in Africa for the surveillance and control of arboviral diseases including Yellow fever

Progress: In response to large yellow fever outbreaks in Angola and in Democratic Republic of the Congo in 2016, and with the threat of international spread (11 cases were exported to China), the World Health Organization (WHO), Gavi, the Vaccine Alliance and the United Nations International Children's Emergency Fund (UNICEF) developed a comprehensive multi-partner

global strategy to Eliminate Yellow fever Epidemics (EYE) 2017-2026. In order to reach its three objectives for 2026 (1) protect at-risk population; 2) prevent international spread; and 3) contain outbreaks rapidly), one of the mandates of the EYE strategy is to help at-risk countries to prevent yellow fever outbreaks and to prepare for those which might still occur.

Because of the growing experience of TDR in the development of generic research package (see ER 1.2.6) , the EYE secretariat proposed to TDR to support them in the development of a research package that will guide countries for the conduct of root-cause analysis yellow fever outbreaks in African countries with history of mass vaccination campaign(s), as well as for the investigation of the reasons for delays in vaccination response during an outbreak. with template research protocols (including SOPs and data collection tools). Additionally, a tool was developed to evaluate the causes of low yellow fever vaccination coverage in countries with districts that have a high immunity gap, in preparation for a planned targeted yellow fever campaign.

The research package composed by two research protocols, questionnaires, and guidance documents for conducting the analysis is finalised. It was successfully piloted in Guinea, Cameroon and Central Africa and presented at the EYE annual meeting. This research package will be available in French and English. Its design and layout need to be finalised. It should be available early 2025.

Remaining risks and challenges

Lack of interest outside epidemic peaks resulting in insufficient funding

Actions to mitigate risk: Raise awareness of potential donors; explore alternative ways of supporting work

Status: Planning phase

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Endemic country programmes and researchers, West Africa Health Organization, WHO regional offices, WHO departments (WHO–ECCH, and the WHO Yellow Fever Department, Eliminate Yellow Fever Epidemic (EYE) Secretariat).

Complimentary roles: The partners have complementary role and responsabilities.

Estimated leverage created by this ER:

Estimated leverage amount: (US$): Exact estimation pending – Leverage included work on yellow fever on root cause analysis generic protocol, and support to EWARS+ in countries through GLAI.

Number of people working on projects: 120

Gender aspects and vulnerable populations:

Gender specific Zika issues as they relate to outbreak surveillance and response will be taken into account during research design. All affected regions are considered.

Training: No formal course for this ER.

Strengthened institutions and/or networks:

This includes: i) disease surveillance departments where EWARS is implemented; ii) disease surveillance and vector control departments in 47 African countries; and iii) strengthening the West African network of reference laboratories for arboviral disease. These institutions were strengthened through regular virtual trainings on EWARS-csd and webinars on arboviral diseases.

Publications: Three publications (see Annex 1, ER 1.1.1).

Results dissemination and uptake:

National control programmes and WHO (HQ, ROs) fully involved in research planning, implementation and analysis.

EWARS uptake at various stages of piloting in over 13 countries.

Plans for 2025

For 2025, we plan to:

- Conduct a survey to summarise EWARS-csd progress and challenges. This will guide future implementation activities.
- Create a step-by-step guide for implementing EWARS-csd, from preparation to national integration and roll-out
- The remote support for countries will be maintained through webinars and individual calls, organized in collaboration with the WHO CCH Unit. Best practices will be shared during these webinars.

1.1.4: Country resilience to the threat of drug-resistant infections

Maximized utilization of data for tackling antimicrobial resistance to tackle drug-resistant infections through Structured Operational Research and Training IniTiative (SORT IT) in Africa, Asia and Latin America

Rationale:

Antimicrobial resistance (AMR) poses a significant global public health threat, rendering standard treatments ineffective and allowing infections to persist and spread. To address emerging drug resistance effectively, countries require support in several key areas:

1. Developing sustainable local capacity for conducting operational research and utilizing routine program data
2. Enhancing data generation and application across key global strategic pillars of action plans for tackling AMR
   - Strengthening surveillance, monitoring, and reporting systems
   - Reducing infection incidence across health facilities, communities, and animal health sectors
   - Optimizing antimicrobial use in human health, veterinary practices, and agriculture

  - Investing sustainably in new diagnostics and methods for measuring the burden of AMR
3. Establishing robust structures and processes for informed decision-making and knowledge management to maximize the impact of broader research efforts.

Design and methodology:

The design emphasizes early and multi-disciplinary engagement with national and international AMR stakeholders who will use the results. It incorporates the output oriented Structured Operational Research and Training IniTiative (SORT IT) approach to generate and communicate evidence for informed decision-making. Research questions are aligned with national priorities, and the training model encompasses the three TDR pillars: 1) research implementation, 2) capacity building, and 3) global engagement. Additionally, SORT IT includes a training-of-trainers program designed to create a multiplier effect and ensure long-term sustainability.

Progress in 2024

Outcomes

Guidelines, policies or policy implementation plans (as applicable) informed by TDR outputs

Progress: The SORT IT research training has become a model for global impact: While 86% of applied research globally fails to influence policies, the SORT IT program stands as an encouraging example of success. According to the 2024 TDR metrics survey, 79% of the 75 "One Health" studies conducted through SORT IT have impacted policy or practice. This demonstrates the program's effectiveness in translating research into actionable outcomes.

Key Achievements:

1. Skill Application:

  - 92% of SORT IT trainees applied their skills to antimicrobial resistance.
  - 50% addressed emerging infections.
  - 64% completed new studies.
  - 38% became mentors, showcasing their leadership in health research and contributing to significant health system benefits.

2. Field Impact Success Stories: Eleven success stories have been published in a special issue, including:

  - Two from Ghana,
  - Two from Nepal,
  - Seven from Sierra Leone.

3. Ongoing Impact Assessments: Ten studies from Ghana are currently undergoing formal impact evaluation through a SORT IT program, running from July 2024 to June 2025.

4. Capacity Building and Leadership:

Training of Trainers: Nine former SORT IT trainees are now serving as potential mentors and paired with experienced senior mentors in a Training of Trainers program. Eighteen (9 trainees and 9 potential mentors) are being trained across ten projects in Ghana, demonstrating the leadership and

empowerment fostered by the program. 12 individuals and 4 potential mentors (14 female) are also being trained in Egypt, Iran, Tunisia and UAE making a total of 34 people being trained in 2024.

5. International Recognition and Expansion:

a) WHO Endorsement: The WHO Director-General's office has selected Sierra Leone's SORT IT approach as a model for multi-level collaboration and capacity building, particularly in the fight against antimicrobial resistance.

b) National Leadership in Sierra Leone: Trainees from Sierra Leone have secured Canadian funding to launch a SORT IT program with local partners, highlighting the national leadership and capacity developed through the program. In October 2024, these trainees will lead a TDR-supported initiative to enhance HIV, TB, and malaria programs using Global Fund grants, further demonstrating the impact of SORT IT on health systems.

c) Nepal successfully received the Pandemic grant of 20 million and would be utilizing the SORT IT model for capacity building.

Outputs

Documentation of practical approaches to improve targeted treatment and reduce drug misuse and risk of resistance development and spread

Progress: A total of 112 research projects have been initiated from 2019, leading to 87 publications, 80 evidence briefs, and 80 lightning videos embedded with publication abstracts. In 2024, 22 new research projects were launched. Among these, 12 were part of a pioneering SORT IT initiative in Al Ain, UAE, involving 20 institutions from 10 countries and addressing AMR challenges in Egypt, Iran, Tunisia, and the UAE. Additionally, 10 studies focused on assessing research impact in Ghana. In terms of good practice, eleven success stories (special journal issue) showcasing field impact and best practices were published - two from Ghana, two from Nepal, and seven from Sierra Leone.

OR/IR strategies for countries to build effective systems for monitoring and responding to emerging drug resistance of all relevant infectious agents

Progress: All 112 studies, including the 22 initiated in 2024, have all been vetted and endorsed by national AMR committees and WHO country offices. These studies were recognized as national research priorities and deemed relevant for informing policy and practice.

Remaining risks and challenges

Insufficient funding

Actions to mitigate risk: Expand the scope of fund raising activities. Prospect with new partners on joint projects and fund raising activities.

Status: On Track

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Partners and collaborators include 11 WHO country offices, EMRO regional office, National AMR committees, 87 implementing partners including NGOs, research and academic institutions, relevant MoH departments/programmes, hospitals/clinics in selected countries.

Complimentary roles: WHO country offices and SORT IT partners leverage their local convening power and allow use of their trained and experienced human resources for implementation.

Estimated leverage created by this ER:

Estimated leverage amount: (US$): 80 000 from UAEA

Number of people working on projects: 17

Gender aspects and vulnerable populations:

Beneficiaries: Geographic selection and target countries are determined by available funding and currently include nations in Africa, Asia, the Eastern Mediterranean, and Latin America. TDR is committed to promoting equality, diversity, and inclusivity in science. Researchers of all gender identities, sexual orientations, ethnicities, religions, cultures, social backgrounds, and those with disabilities are strongly encouraged to apply. Collaborators: Collaborators include those engaged in the preparation, implementation, and uptake of the project, with potential funding from third parties where applicable.

Training:

Number of TDR trainees and fellows disaggregated by gender (man/woman/other) and WHO region:

- long courses and postgraduate education (LC); 34 individuals trained through SORT IT (22, 65% female). AFRO=18; EMRO=16.
- proportion demonstrating career progression and/or increased scientific productivity; Overall, 64% of those trained continued with new research, XX% (TBD) published new research and 38% became mentors demonstrating significant capacity-building outcomes. In 2024, there were 3 SORT IT linked PhDs from Ghana
- short courses and MOOC (SC): none

Strengthened institutions and/or networks:

Enumerate and describe briefly how their capacity has been strengthened (e.g., expanded scope of activities or increased funding from alternative sources, or that have influenced research agenda, policy and practice, as a result or related to TDR support. TDR support may include financial, in kind, facilitation and/or expert types of support).

The SORT IT global partnership has expanded to include 87 partners, showing global interest and success of its outcomes. All research strategies and activities in 11 countries (Colombia, Ecuador, Egypt, Ghana, Iran, Myanmar, Nepal, Sierra Leone, Tunisia, UAE, Uganda) were endorsed by the national AMR committees in the target countries increasing likelihood for research uptake.

Trainees from AMR-SORT IT in Sierra Leone have secured Canadian funding to launch a SORT IT program with local partners, highlighting the national leadership and capacity developed through the program. These trainees are leading a TDR-supported initiative to enhance HIV, TB, and malaria programs using Global Fund grants, further demonstrating the impact of SORT IT on health systems. Nepal successfully received the Pandemic grant of 20 million and would be utilizing the SORT IT model for capacity building. The WHO Director-General's office has selected Sierra Leone's SORT IT approach as a model for multi-level collaboration and capacity building, particularly in the fight against antimicrobial resistance.

Publications:

Three publications, see list in Annex 1 – ER 1.1.4

Results dissemination and uptake:

Early engagement with expected end-users ensures local research relevance, while regular updates to stakeholders and related programs, along with their active involvement in project selection, planning, implementation, and policy development, enhance collaboration. New training modules on real-time data management and capacity-building for effective research communication with decision-makers have been developed and integrated into all training sessions.

Dissemination and uptake will be measured by routine surveys conducted 12-15 months after research completions to assess how much new or updated/improved guidelines, policies, implementation plans and/or practice (as applicable) were informed by TDR outputs.

Plans for 2025

Continue to provide support to Ghana on implementing, publishing and effectively communicating 10 priority research studies focused on assessing research impact in Ghana.

Finalize manuscripts from the EMRO region and support their publication in a Special Issue of the Eastern Mediteranian Journal.

1.1.5: Directions for development and accelerated access to new tools and strategies

Rationale:

Control programme objectives cannot be reached for many poverty-related infectious diseases, especially NTDs, because they lack new effective and safe tools, optimally implemented, for their diagnosis and treatment, as well as efficient methods for quantifying the effect.

Design and methodology:

Inclusiveness and openness are the guiding principles. The scope of this project covers essential, intertwined elements to develop and assess the right tools that will help achieve control and elimination targets.

Progress in the current year

Outcomes

Accelerated access to new tools and stategies

Progress: TDR has provided input into a certain number of initiative to support developpment and implementation of new tools and strategies (see cross cutting work with ER 1.2.1, 1.2.6, 1.1.15).

Outputs

Outputs of TDR research projects and TDR staff and adviser expertise used to provide directional perspective for R&D new tools (including advice/support to R&D sponsors) as well as new ways of implementing the tools

Progress: The following R&D initiatives have been informed by TDR research projects output or TDR staff / advisers expertise:

- Development of moxidectin for the control and elimination of onchocerciasis (TDR input into protocols and research programmes)
- Field validation of rapid diagnostic test(s) for visceral leishmaniasis in Africa (see ER 1.2.1)
- Application of sterile insect technology for control of VBDs (see ER 1.3.14)

Strategy development, implementation and monitoring

Progress: The SWG meeting is scheduled for end of October 2024 and the activities report has been provided to the SWG members in advance of the meeting for their review.

Generic protocols to address Implementation Research issues encountered by different disease control programmes

Progress:

The generic protocols for the ShoRRT study and TB4Child have been used by several national control programmes to conduct research at country level, generating evidence that will in turn inform guidelines revisions (link with ER 1.2.6).

Remaining risks and challenges

Resistance to change by key stakeholders unwilling to adopt new solutions

Actions to mitigate risk: Achieving critical mass of supporters; showing concrete results

Status: On Track

Contributions towards TDR key performance indicators

Partnerships and collaborations:

See ER 1.2.1 (overlapping work area for VL and moxidectin)

Complimentary roles: No partners involved yet for this biennium

Estimated leverage created by this ER:

Estimated leverage amount: (US$): None

Number of people working on projects: 2

Gender aspects and vulnerable populations:

Gender and geographic equity considerations will be included

Training: None specific to this ER, see however training reported under the related ERs.

Strengthened institutions and/or networks: None for this ER

Publications

None specific, but see ER 1.2.1 for overlapping work on VL and moxidectin.

Results dissemination and uptake:

We engage with country institutions to identify research need and design research intervention. By involving potential end users from the beginning and ensuring that the research respond to their need, we optimize uptake.

Plans for 2025

Continuation of the work around generic protocols and advice for the roll out of moxidectin.

1.1.7: Maximized utilization of data for public health decision-making for UHC/SDGs

Rationale:

Countries and WHO need real-world evidence on how to apply policies and implement proven interventions. They also need evidence from routine programme settings to guide operational decisions, make recommendations and shape guidelines, practices and policies. TDR can play a key role in this area for defining relevant research questions for decision making and enhancing country capacity to compile, analyze, and interpret data. This aligns with SDG 17.18, which calls for increased capacity-building to ensure high-quality, timely, and dis-aggregated data for informed decision-

making in countries. This ER aims to make countries and institutions "data rich, information rich, and action rich," promoting local research, local solutions, and local ownership.

Design and methodology:

The design emphasizes early and multi-disciplinary engagement with national and international AMR stakeholders who will use the results. It incorporates the output oriented SORT IT approach to generate and communicate evidence for informed decision-making. Research questions are aligned with national priorities, and the training model encompasses the three TDR pillars: 1) research implementation, 2) capacity building, and 3) global engagement. Additionally, SORT IT includes a training-of-trainers program designed to create a multiplier effect and ensure long-term sustainability.

Progress in the current year

The activities under this ER were implemented increasing TDR-wide collaboration with Research Capacity Srenghtening and Global Engagement teams.

Outcomes

Quality controlled publications and strengthened evidence-base for policy and practice decisions

Progress:

A total of 38 publications were produced, all of which appeared in peer-reviewed journals to ensure external quality control. Notably, 68% of the research influenced policies and practices, while 52% of those trained continued with new research, demonstrating significant capacity-building outcomes.

Key achievements include:

1. TB Disability Research Shaping WHO Policy: Multicountry data and publications on TB disability are directly contributing to WHO policy and guidelines. The Global TB Programme recognizes these efforts as a major milestone in shaping global TB policy.
2. Mobile Data Capture in TB Programs is being scaled up: Experience with mobile phone data capture in TB programs is being scaled up in Kenya, Uganda, Zambia, and Zimbabwe, demonstrating successful adaptation and expansion.
3. Mpox Survey and utilization of acquired SORT IT skills. According to a recent survey, 54 out of 124 SORT IT alumni surveyed, from 28 countries, have been actively involved in Mpox preparedness and response. Among these, 93% are applying the skills they acquired through SORT IT in their current roles
4. Metric Approach shaped Global policy on TB prevention: This approach enhances the early detection, notification, and response to TB cases, aiming to reduce transmission and improve outcomes. It was featured in the 2024 WHO Operational Handbook on TB Preventive Therapy and is being adapted for use in outbreak responses and Mpox.
5. The west Africa NTDs and snakebite initiative: A new initiative in west Africa including four countries (Burkina Faso, Mali, Niger and Senegal) is enhancing country's capacity to utilize NTDs including snake bite program data for evidence-informed decision making. A strong south-south collaboration has been established among these countries and AIPH, in Burkina Faso and CEA-PCMT, in Guinea and with the support of national NTDs program, through

provision of technical expertise by SORT IT alumni based in Guinea. 14 manuscripts have been developed and are undergoing peer-review for publication in a special issue of TMID https://www.mdpi.com/journal/tropicalmed/special_issues/NTD_West_Africa. SORT IT module 4 on effective research communication will be conducted in the last week of September 2024.

6. Triggered improvements in international Data sharing and Management: Based on challenges identified through SORT IT work on shared Ebola and COVID-19 data, IDDO is implementing changes to enhance tailored data extraction, address quality issues, standardize reporting forms, and introduce capacity-building measures.
7. Innovative Research Dissemination: TDR has pioneered a new initiative linking lightning videos with journal publications to improve research dissemination to decision-makers. This initiative stems directly from TDR's work on enhancing research communications.
8. Expansion of SORT IT Global Partnership: The SORT IT global partnership has expanded to include 87 partners, a testament to the global interest and success of its initiatives and outcomes. In addition, the SORT IT virtual platform has been translated into French and Russian versions. The French version will be pilot tested during the SORT IT module 4 course in Conakry (see item #4 above).

Outputs

Build capacity for the effective collection and analysis and use of data for decision making

Progress:

a. Individuals trained:

A total of 190 individuals (97, 51% female) were trained:

TDR directly supported:

- 112 trained (69 female) on TB disability: In Kenya, Uganda, Zambia, and Zimbabwe.
- 9 trained (1 female) in manuscript writing and outbreak communication: In Guinea, Liberia, DRC, and Sierra Leone.
- 14 trained (6 female) in manuscript writing and research communication: In Francophone Africa (Burkina Faso, Guinea, Mali, Niger, Senegal).
- 16 trained (6 female) in manuscript writing in Kenya. 12 trained (4 female) in communication on Neglected Tropical Diseases (NTDs)

Three franchised SORT IT courses:

- 7 trained (3 female) through a Global Fund supported training on TB by Axhya+ and NTEP of India;
- 8 Trained (3 female) on Health systems strengthening for cancer care in India (3 female);
- 12 trained (7 female) through Cheshire and Wirral partnership NHS trust on mental health

b. Data analysis done

- A total of 70 data analysis done across Asia, Africa and Europe
  4 - one each on TB disability: In Kenya, Uganda, Zambia, and Zimbabwe
  9 - on outbreak communication: In Guinea, Liberia, DRC, and Sierra Leone
  14 - on NTDs (Burkina Faso, Guinea, Mali, Niger, Senegal)
  16 - on malaria elimination in Kenya

- Three franchised SORT IT courses with following numbers of data analysis
  7 - on a Global Fund supported training on TB by Axhya+ and NTEP of India
  8 - on Health systems strengthening for cancer care in India
  12 - Cheshire and Wirral partnership NHS trust on mental health

c. Other outputs:
   - Revision of training curricula including updating lectures and presentations based on trainee evaluation and feedback.
   - Development of a new SORT IT curriculum (Module 2), including an e-manual and Training-of-Trainers program, using Epicollect5 and Jamovi software based on country feedback.
   - Continued adaptation of the SORT IT online training platform for online or hybrid trainings based on real-time experience.
   - Development of a generic multi-country protocol for managing TB disability in Kenya, Uganda, Zambia, and Zimbabwe that can be used for global scale up.
   - Development of 4 country specific Standard Operating Procedures (SOPs) on management of TB associated disability for use by countries.
   - Production of 22 study protocols and data collection instruments: 10 in Ghana and 12 in the EMRO region.
   - 41 manuscripts: 10 on outbreaks and emerging infections, and 14 on NTDs in Francophone countries and 17 on infectious diseases in Kenya.

Publications and issue/policy briefs to inform evidence-based policies/ practice

Progress: A total of 38 publications have been produced on topics including COVID-19, Ebola, mental health, malaria, and innovations in TB management. This includes two special issues: one in F1000 and one in the East African Medical Journal. Additionally, 20 evidence briefs on emerging infections and NTDs have been developed, along with accompanying PowerPoint presentations for decision-makers.

Remaining risks and challenges

Possibility of limited or dwindling funds

Actions to mitigate risk: Fundraising efforts, including outside usual regular donors

Status: On Track

Contributions towards TDR key performance indicators

Partnerships and collaborations:

The SORT IT global partnership includes 87 partner institutions includuing Public health programmes in target countries, ministries of health, NGOs, academic institutions and WHO country offices.

Complimentary roles: WHO country offices and SORT IT partners leverage their local convening power and allow use of their personnel for expansion. Training of trainers is integrated as part of the strategy.

Estimated leverage created by this ER:

Estimated leverage amount: (US$): 325 000 USD *(300 000 USD three franchised SORT IT courses, and 25 000 USD from EMT)*

Number of people working on projects: 14

Gender aspects and vulnerable populations:

All calls emphasize TDR's commitment to equality, diversity, and inclusivity in science. Researchers of all gender identities, sexual orientations, ethnicity, religious, cultural, and social backgrounds, and (dis)abilities are encouraged to apply. Geographic equity is also prioritized in the selection of trainees and projects but oriented by funding obligations. The focus is on vulnerable and excluded groups, aligning with efforts to achieve UHC.

Training:

Number of TDR trainees and fellows disaggregated by gender (man/woman/other) and WHO region:

i. long courses and postgraduate education (LC); 190 individuals trained through SORT IT (97, 51% female). AFRO=163; SEAR=15; EURO=12
ii. proportion demonstrating career progression and/or increased scientific productivity; Overall, 52% of those trained continued with new research, 37% published new research and 24% became mentors demonstrating significant capacity-building outcomes. In 2024, there are 6 SORT IT linked PhDs including 2 from Armenia, 1 from Egypt, 1 from Guinee and 2 from India.
iii. short courses and MOOC (SC): 54 trained in Data analysis/STATA by partner institutions.

Strengthened institutions and/or networks:

The SORT IT global partnership has expanded to include 87 partners, a testament to the global interest and success of its initiatives and outcomes. Based on challenges identified through SORT IT work on shared Ebola and COVID-19 data, IDDO is implementing changes to enhance tailored data extraction, address quality issues, standardize reporting forms, and introduce capacity-building measures. A new initiative in west Africa including four countries (Burkina Faso, Mali, Niger and Senegal) is enhancing country's capacity to utilize NTDs including snake bite program data for evidence-informed decision making. Multi-country data and publications on TB disability from Africa are directly contributing to WHO policy and guidelines. The Global TB Programme recognizes these efforts as a major milestone in shaping global TB policy.

Publications

Open access publications; policy and issue briefs; TDR gateway, documents for WHO control programmes Published papers in 2024 – see annex 1, ER 1.1.7

Results dissemination and uptake:

Early engagement with expected end-users ensures local research relevance, while regular updates to stakeholders and related programs, along with their active involvement in project selection, planning, implementation, and policy development, enhance collaboration. New training modules on real-time data management and capacity-building for effective research communication with decision-makers have been developed and integrated into all training sessions.

Dissemination and uptake will be measured by routine surveys conducted 12-15 months after research completions to assess how much new or updated/improved guidelines, policies, implementation plans and/or practice (as applicable) were informed by TDR outputs.

Plans for 2025

- Expand real-time implementation research to inform policy and practice on enhancing holistic care, including addressing TB-associated disabilities, in Kenya, Uganda, Zambia, and Zimbabwe.
- Continue to adapt and scale the use of mobile phone data capture across various SORT IT projects to support Universal Health Coverage (UHC).
- Finalize SORT IT initiatives focused on building capacity to engage with and effectively utilize Global Fund grants in Sierra Leone, leveraging the initiative to strengthen collaboration with the Ghana Regional Training Centre of TDR.
- Launch a national leadership SORT IT for UHC, targeting selected health facilities in India.

1.2.1: Strategies to achieve and sustain disease elimination

This work area has been critical for availability of the tools and strategies that have allowed for the inception and progress in the elimination of visceral leishmaniasis (VL) in the Indian subcontinent and onchocerciasis in Africa. It is evolving now to include also efforts towards VL elimination in eastern Africa.

Rationale:

Some diseases are targeted for elimination in certain areas. Research is needed to inform appropriate strategies and practices. While some of these can be broadly applied, others need to be targeted to the disease, and/or the interventions and/or specific epidemiological setting and/or the extent to which prevalence/incidence of infection have been reduced and the elimination goal (elimination as a public health problem or elimination of transmission). TDR has decades long history of research for the tools that have allowed countries targeting VL elimination in the Indian sub-continent (ISC) and onchocerciasis elimination where feasible in Africa. TDR has been funding and managing research to support these elimination goals in past biennia and is continuing this work as recommended by the scientific working group, including support to VL control/elimination in eastern Africa following the recommendations in the new WHO NTD Roadmap 2021-2030.

Design and methodology:

The research under this area is prioritized based on burden of diseases, priorities set by WHO NTD department and countries needs. The design emphasizes early and multi-disciplinary engagement with national and international stakeholders who will use the results and is a continuation of collaboration with and between researchers and national/regional or global control programmes. Research will be designed to address specific knowledge gaps and research priorities, and will be conducted by qualified investigators (with appropriate training).

Progress in the current year

Outcomes

Guidelines, policy decisions and or practice informed by TDR outputs

Progress: The following guidelines, policy decision and/ or practice were informed by TDR outputs:

* Guideline for MDA for onchocerciasis: WHO NTD is planning update of the recommendations for MDA for onchocerciasis: The results from the moxidectin phase 3 study and the subsequent current field studies will be considered as part of the evidence underpinning the new guideline recommendations (guideline not yet published, planned).

* Regulatory approval for moxidectin: Ghana became the first river blindness-endemic country to approve moxidectin: end of 2024, the Ghana Food and Drugs Authority (FDA) has approved the marketing authorisation application for moxidectin. This approval marks the culmination of more than 25 years of work in developing moxidectin for the treatment of river blindness and other human diseases, were TDR played a crucial role.

* Strategies for VL control in Nepal and Bangladesh: evidence generated through the most recent TDR studies (new foci, vector control, role of PKDL cases in transmission) have been presented to the national control programmes ensuring it can guide further the stategy of the elimination programme.

* Strategic framework for the elimination of visceral leishmaniasis as a public health problem in eastern Africa 2023-2030: contribution to the section on implementation which was informed, between others, by past research in Indian sub-continent.

Outputs

a) Improved basis for monitoring progress of preventive chemotherapy-based onchocerciasis elimination programmes towards elimination and for decisions to stop interventions

To support onchocerciasis programmes to monitor progress towards elimination of parasite transmission and decisions to stop interventions, this project is designed to provide tools to

a. Delineate parasite transmission zones (Note: The WHO *Guidelines for stopping mass drug administration (MDA) and verifying elimination of human onchocerciasis* are to be applied to transmission zones, but includes no criteria for delineating them. Objective criteria are currently not available. (https://apps.who.int/iris/handle/10665/204180).
b. Estimate the risk of recurrence through human and vector migration should the criteria to stop MDA be met in only one part of the transmission zone and estimate risk of

recurrence after MDA was stopped and after elimination of *O. volvulus* transmission was verified.

c. Estimate the minimum number of reproductively active adult parasites. This tool would also allow to identify the origin of any resurgence after MDA was discontinued.

And to

d. Build capacity within endemic countries through training of technicians and PhD students from endemic countries (previously Cameroon and Ghana, now only Ghana) within the collaborating endemic country institution and in the laboratory of non-endemic country collaborators.

Progress: This element of ER 1.2.1 has been devolved to investigators who have leveraged the results of TDR funded work for funding from other sources. The last set of TSAs (one to Ghana, one to Australia) were issued in 1Q 2023 and a no-cost extension to 1Q 2025 was issued to maximize the outputs with the funding provided. This includes

(1) Capacity building: the Ghanaian PhD student can complete the analysis of data from samples she obtained during the initial time of working on her PhD in Ghana and which she anayzed during the subsequent (and ongoing) time in the laboratory of the Australian collaborators. She will also be trained on a new parasitological method.

(2) Finalization of an easy to use ("shiny") app developed in the Australian institution with input from the Ghanaian institution. This will allow NTD programmes to use the model developed in this project to estimate the risk of recurrence through human and vector migration should the WHO criteria to stop interventions be met in one area (and thus parasite transmission is presumed to have been interruption) but not in areas within vector and people movement distance where parasite transmission is known to be continuing.

(3) Publication of the model to estimate the risk of recurrence through human and vector migration expanded to incorporate the effect of parasites with different levels of response to ivermectin. Parasites with so-called 'sub-optimal' response were perceived at one point as potentially indicating emerging resistance to ivermectin. While this may not be the case given that the TDR funded Phase 3 study of moxidectin identified such parasites at different prevalences in different ivermectin-naïve areas, increasing prevalence and geographical distribution of such parasites may impact progress towards elimination. Consequently, the ability to estimate such impact will be informative for control programmes (as well as for funders of elimination efforts).

(4) Completion of work including nodulectomies, assessment of the reproductive capacity of the macrofilariae and genetic analysis of the parasites which will contribute to the genome-based objective criteria for delineation of parasite transmission zones. This work had been approved for funding by the IMP SWG. However, the protocol was not finalized in time for WHO ERC approval and thus funding in the 2022-2023 biennium so that the investigators require funding from other sources.

In 2021, a special session was held at the Annual Conference of the 'Coalition for Operational Research on Neglected Tropical Diseases' (COR NTD) on this project. Presentations and discussions focussed on the need for and the risks of the absence of objective criteria for delineation of transmission zones and progress at that time.

Once the final data from this project are available, another special COR NTD session should be targeted as well as presentation of the results to the NTD STAG and the WHO NTD initiated 'Global Onchocerciasis Network for Elimination' to support dissemination of the results.

b) Data to support WHO guidelines and onchocerciasis endemic country registration and policies on moxidectin for onchocerciasis elimination

Progress: TDR is continuing to collaborate closely with Medicines Development for Global Health (MDGH) and the investigators in Ghana, DRC and Côte d'Ivoire of three studies needed (in addition to those which supported the US FDA approval of moxidectin for treatment of individuals at least 12 years old) by WHO and endemic countries to decide on inclusion of moxidectin in onchocerciasis elimination strategies. This includes ensuring WHO ERC continuing approvals.

The paediatric study to identify a moxidectin dose for 4-11 year old children for further evaluation was completed (NCT03962062, for protocol see: https://mox4oncho-multimox.net/resources). Preparation of the publication is ongoing.

The protocol of the study obtaining additional safety data, including in individuals without evidence of O. volvulus infection, was amended to include children 4-11 years old (MDGH-MOX-3002, (https://www.clinicaltrials.gov/study/NCT04311671, for protocol see: https://mox4oncho-multimox.net/resources). The study was completed in 2024. It included 5564 adults, 2293 adolescents (12-17 years old) and 187 children (4-11 years) in the DRC randomized 4:1 to moxidectin:ivermectin and 3240 adults, 890 adolescents and 840 children in Côte d'Ivoire randomized 4:1 to moxidectin:ivermectin with concomitant administration of 400 mg albendazole. The inclusion of co-administration of albendazole in a lymphatic filariasis (LF) co-endemic area could pave the way for a guideline covering both onchocerciasis and LF. WHO NTD staff had indicated their preference for such guideline at the time the additional studies were discussed with them. The statistical analysis plan has been completed with final analyses expected to be available in the first half of 2025. A 'shell publication' is being prepared already to ensure earliest possible availability for WHO systematic reviews for guideline development. The timing of the WHO guideline development will depend on whether WHO/NTD will consider the additional data from the paediatric study and the safety study sufficient to initiate the WHO guidelines process and whether the Guidelines Development Committee agrees with that assessment.

The third study (MDGH-MOX-3001, (https://www.clinicaltrials.gov/study/NCT0387s6262, for protocol see: https://mox4oncho-multimox.net/resources) will provide data on the effect of moxidectin and ivermectin after five biannual and 3 annual administrations. The protocol had to be amended to reduce the sample size from 1000 to around 320 because of a dearth of individuals with the required intensity of O. volvulus infection combined with budget limitations. Enrolment has been completed and the study is currently expected to be completed in the second half of 2026. The statistical analysis has been developed.

TDR is also continuing to collaborate with investigators to disseminate information about moxidectin (see publications section).

c) Generate evidence on sustainable strategies for the elimination of VL in the Indian sub-continent

One of the longest and most successful implementation research programmes at TDR, these efforts have contributed to a sharp reduction of cases in all three endemic countries (from over 50 000 cases in 2007 to 1577 cases in 2021). With further advance, the epidemiological profile in the countries keeps changing. In Nepal and Bangladesh (where TDR support is currently focused because India has other support but is kept informed) new VL cases and foci are appearing in previously non-endemic districts.

Progress:

New evidence on priority challenges of VL elimination has been generated and disseminated – four research projects were completed and analysis finalized:

- Micro stratification of Visceral Leishmaniasis (VL) Endemic Areas to identify hotspots and disease shifting pattern in Bangladesh and Nepal.
- Decision-making for indoor residual spraying in post-elimination phase of visceral leishmaniasis in Bangladesh and Nepal.

Additionally, following the emergence of new foci in Nepal and Bangladesh, two new studies were initiated in 2024:

- In Nepal, a new study was initated to pilot a new approach fo active surveillance for visceral leishmaniasis in selected new foci districts, assessing feasibility, acceptability and cost. Active surveillance is crucial not only for detecting asymptomatic cases but also for verifying the absence of VL cases in targeted areas, thereby consolidating the achievements of elimination efforts. The study aims to address these imperatives by implementing active surveillance programs that are tailored to the specific needs and challenges of the elimination and maintenance phases of the VL programmes in the two countries. The study was initiated mid-2024 and results are expected for end of 2025.
- A new study on the introduction of case detection with visceral leishmaniasis and Post Kala-azar Dermal Leishmaniasis in Non-programmatic Upazila Health Complexes in Bangladesh: Feasibility, acceptability and cost. In 2023, Bangladesh became the first country to eliminate visceral leishmaniasis (VL) as a public health problem. The National Kala-azar Elimination Program of Bangladesh (NKEP) now aims to achieve zero transmission of the infection by *Leishmania* donovani, the causative agent of VL, by 2030. A robust, sensitive and cost-effective surveillance system is crucial to prevent a resurgence in the post-elimination phase. Following elimination, its sustenance and heading to zero transmission requires strong surveillance in the entire country to detect and manage any potential outbreak promptly. Therefore, the NKEP activities in the programmatic upazilas (VL-endemic upazilas) now need to be expanded in the non-programmatic upazilas (VL non-endemic upazilas) too as recently sporadic cases of VL and PKDL have been reported from the non-programmatic upazilas with significant delay. This study aims to assess the feasibility, acceptability, and cost of UHC-based case detection with VL/ PKDL followed by ACD in the selected non-programmatic upazilas in Bangladesh to pave the way for its scale-up by the NKEP through addressing the challenges which will be derived from this study.

This area of work will be progressively reduced in the next years / biennium, as the burden of VL disease is now shifted towards eastern Africa and Brazil (see below).

d) Generate evidence to support establishment of programmes towards elimination of VL in Eastern Africa

After focussing mainly on the ISC region for VL elimination, we have since 2023 expanded our research projects to east Africa following requests from partners and prioritization of this area of work by WHO NTD. This new work in eastern Africa follows Nairobi Declaration (January 2023) where representatives from the ministries of health of Chad, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda, along with key stakeholders in the region, committed to eliminating VL as a public health problem by 2030. TDR engagement is guided by the new framework to eliminate VL in Eastern Africa developed by WHO and launched in June 2024. The new elimination framework outlines five main strategies for guiding VL elimination: (i) early diagnosis and treatment; (ii) integrated vector management; (iii) effective surveillance; (iv) advocacy, social mobilization and partnership-building; and (v) implementation and operational research.

Progress:

Evaluation of VL outbreak in Uromo (South Ethiopia) - rapid risk factors survey

In response to an outbreak of visceral leishmaniasis in the South Omo Zone of the Southern Ethiopia, TDR supported an outbreak investigation. The objective of this study was to assess risk factors of visceral leishmaniasis the outbreak. The study took place from November 2023 to January 2024. A case control, a community based cross-sectional, stakeholder consultative workshop and qualitative study deigns were employed. The results identified that a substantially high proportions of community have poor knowledge and practice towards visceral leishmaniasis transmission, prevention and control. Fifty-seven challenges were identified by the workshop participants. The top three ranked challenges were expensiveness of disease investigation and management, commitment gap from gov't and NGOs, and no outbreak investigation done on VL. Lobbing NGOs and other stakeholders for support, creating discussion forum with relevant officials for improving commitment and conducting outbreak investigation were the top indicated strategies for control of visceral leishmaniasis. Even though it is ranked as the 11th top challenge identified, lack of government structure around the local area was widely discussed by the regional and zonal level workshop participants as the biggest challenges to decentralize health service and screening of cases in the affected community. There is no health extension worker and no mobile health center in the VL affected areas. The in-depth interview finding identified that lack of awareness of the community towards disease consequence if left untreated and carelessness on keeping the environment clean and destroying the insect breeding sites were explored as the possible reasons for the VL outbreak occurrence. Lack of treatment center nearby the community, transport access problem and use of cultural medicines were considered as barriers for early treatment. The study helped to identify area for action to improve access to VL diagnostic and treatment, which will be useful as countries will engage with new roadmap for VL elimination in eastern Africa.

Evaluation of rK39 diagnostic tests:

An important priority for the elimination effort is to identify the best RDT(s) to support the diagnosis of VL in East Africa. Commercial RDTs targeting serum antibodies to rK39, a kinesin-related protein of Leishmania infantum, have now been widely used for VL diagnosis for more than a decade, particularly in the Asian region. However, rK39 RDT were considered less performant in East Africa where the specificity and sensibility were reported lower than in the Indian subcontinent, which is considered the translation of a heterogeneity of Leishmania parasites.

WHO/NTD requested TDR's collaboration on the evaluation of the rk39 RDTs for VL diagnosis in East Africa. This area of work will include work for laboratory performance evaluation with samples from East Africa patients, to be followed by field studies if the tests show promising results in the laboratory performance.

Africa CDC and the International Diagnostics Centre (IDC) has been collaborating with TDR on the first steps of the evaluation of rk39 RDTs for VL diagnosis in East Africa. Laboratory performance evaluation was initiated for the first test identified by WHO NTD, in two laboratories (Gondar, Ethiopia and KEMRI, Kenya), the data analysis is currently being finalized. The first results seem to indicate a better sensitivity and specificity than previously obtained with prior tests. The results will be presented to the WHO NTD advisory group early 2025 for decision before moving towards field evaluation.

Assessment of VL programmes capacity in East Africa:

The status of health system capacity in some high-burden countries in East Africa is unknown. Programme capacity assessment is essential for proper planning of the preparatory phase for VL elimination. Following a joint call for applications issued with WHO–NTD a team of investigators from East Africa (led by the University of Gondar) were selected in 2023 to coordinate an assessment across three VL-endemic countries, Eritrea, South Sudan and Sudan, using a common methodology, and working in collaboration with the respective national VL or NTD programmes and local researchers. The field work has progressed but experienced delay due to the political situation:

- For Eritrea, the field work has been completed, including qualitative and quantitative surveys. The work for the translation of the qualitative data is just completed and the analysis is ongoing.
- For Sudan, the field work has been delayed due to the current instability, but the team is hoping to be able to conduct the surveys in the coming month, working with a local team.
- For South Sudan, the team was instructed by the MoH to wait until the rainy season is over and hope now to be able to move from October onwards with the surveys.

Remaining risks and challenges

Insufficient funding

Actions to mitigate risk: Raise awareness of potential donors; explore alternative ways of supporting work

Status: On Track

Research question are not targetting key priorities for programmes

Actions to mitigate risk: Ensure large involvement of WHO country/regional/HQ level and of country representatives in discussion to identify priority research questions.

Status: On Track

Delay in research activites due to political situation (VL disease distribution in East Africa unfortuantely overlaps largely with politically unstable geographical area)

Actions to mitigate risk: Plan carefully activities, work as much as possible with local partners

Status: On Track (but seems unsuficient measures)

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Control programmes and research institutes in countries; WHO NTD department; global stakeholders. Specifically for oncho elimination, also: Medicines Development for Global Health, Communauté Evangelique au Centre de l'Afrique (CECA20)

Complimentary roles: Partners were select to complement TDR capacity such as being positioned on the field, linked with Ministries of Health and potential end-users, experts bringing their knowledge to support TDR project.

Estimated leverage created by this ER:

Estimated leverage amount: (US$): National programme meetings held in Nepal and Bangladesh. The project benefited also from collaboration with DNDi and FIND for access to VL samples (frozen) in the two sites.

Number of people working on projects: 100

Gender aspects and vulnerable populations:

Work will target LMICs (for oncho in Africa, for VL Nepal/Bangladesh and Eastern African countries). Whenever possible funding to women investigators will be favoured. Whenever possible results of research will be disaggregated by gender.

Training:

Number of advanced degrees underway: One male PhD student from Cameroon in Ghana, one female PhD student from Ghana in Ghana and Australia.

Strengthened institutions and/or networks: pending

Publications

A total of 6 publications. See list in Annex 1, ER 1.2.1

Results dissemination and uptake:

Control programmes and researchers from concerned countries, as well as WHO 3 levels are fully engaged in the design and implementation of the research. By involving potential end users from the beginning and ensuring that the research respond to their need, we optimize uptake.

Plans for 2025

Continuation of the work to support VL elimination:

- Completion of studies initiated in 2024 in Bangladesh and Nepal; completion of the evaluation in Eritrea, Sudan and South Sudan.
- Finalization of the generic protocol for field evaluation of rapid diagnostic test for VL in Africa and initiation of the field study.
- Collaboration with WHO NTD and DNDi for the organization of a Leishmaniasis meeting, allowing for discussion, between others, of priorities for research in east Africa.

Continuation of advisory work for generation of field evidence to support the roll out of moxidectin.

1.2.6: Optimized approaches for effective delivery and impact assessment of public health interventions

Rationale:

Operational/Implementation research (OR/IR) embedded within country disease control programme activities aims to improve the effective delivery of health interventions. IR is a key driver for: assessing the quality and effectiveness of a disease control programme intervention; understanding the barriers to effectiveness; developing new strategies to improve effectiveness and cost-effectiveness; and piloting and implementing successful strategies at scale.

TDR activities are conducted at national, regional, and global levels and are driven by WHO disease control programme demands (primarily the WHO Programmes and departments for global TB, neglected tropical diseases, NTD, Malaria and Pharmacovigilance and/or WHO regional offices), as well as national disease control programme priorities. Activities under this ER combine financial and technical support for conducting IR, translating research into national policy and/or practices, and strengthening capacity for conducting IR among disease control programme staff. The ultimate goal of this ER is to strengthen national capacity to build sustainable mechanisms and processes for evidence-informed decision-making to improve the delivery and effectiveness of public health interventions.

The activities conducted under this ER can be categorized as related to tuberculosis, malaria, NTDs; drugs/vaccines safety monitoring, and pharmacovigilance activities and digital health activities

Design and methodology:

1. Regional approach: establishment of disease control programme networks as a platform for i) the conduct of regional activities/workshops which are based on the research priorities and capacity building needs of partners, and ii) sharing of innovative solutions and challenges that can enhance national response to infectious diseases (in collaboration with relevant WHO programmes, in particular WHO/GTB)

2. Training: Activities which address identified training needs through: i) a regional training programme; and ii) a "learning by doing" approach with technical support and mentoring for the development and conduct of pilot IR projects that generate data for the implementation and scale-up of new public health interventions;

3. Technical and financial support for scaling-up public health interventions and evaluting and documenting the effectiveness, feasibility, acceptability and when appropriate, cost of the innovative strategy through IR.

4. Development of research packages/toolkits to 'democratise' the scientific process and enable users to build skills and self-sufficiency in IR, such as the ShORRT research package, the Implementation research for digital technologies and tuberculosis (IR4DTB) toolkit, the TB cost toolkit, the TDA4Child. These tools also facilitate the development of country-led research protocols and development of data collection tools for the conduct of operational/implementation research projects

5. Collaborative approach with involving WHO departments across the 3 levels, key funders for infectious diseases and key national and international NGOs/researchers.

Progress in the current year

Outcomes

The delivery and impact assessment of public health interventions for NTDs are optimized through IR

Progress:

1. An assessment of the feasibility and acceptability of the WHO SkinNTDs App by the health care workers and community -based surveillance volunteers in Ghana: a pilot study is underway and being technically and financially supported by TDR.

2. Support for the introduction of paediatric formulation of Praziquantel is ongoing in Tanzania as part of the ADP project with other partners. TDR is mainly providing technical and financial assistance to the National Institute for Medical Research of Tanzania for preparatory work with raising awareness and identifying potential introduction barriers within the community, definition of the best model of delivery to consider (national dialogue meeting and key stakeholder engagements) and the development of an implementation research protocol for evaluating the three delivery models that were proposed during the national dialogue and strategies for involving the community in the delivery.

The delivery and impact assessment of public health interventions for malaria are optimized through IR

Progress:

1. Progress continues on the SMC project, with two more countries submitting manuscripts (Guinea and Ghana), analysis has been finalised for seven countries (Niger, Mali, Senegal, Burkina Faso, Cameroon, Benin, and Togo), while three additional countries have finalised their protocols (Chad, The Gambia, and Guinea Bissau)

2. A new project funded by EDCTP was secured in 2024 which aims to optimize the delivery and uptake of malaria vaccines in countries with areas of highly seasonal transmission over five years in partnership with LIH, University of Thies, University Cheik Anta Diop in Dakar, LSHTM in UK, Rabat WHO collaborating centre, WHO and MMV. The project aims to support national immunisation and malaria programmes in 14 countries in West and Central Africa with highly seasonal malaria, to optimise delivery and uptake of malaria vaccines, and to exploit the opportunities of malaria vaccine introduction to strengthen delivery of other vaccines.

The delivery and impact assessment of public health interventions for TB are optimized through IR

Progress:

1. The Regional network of National TB Programmes in Southern and Eastern Africa (SEARN-TB) continues to be supported by TDR, led by the Armaeur Hansen Research Institute (AHRI) as the network secretariat.

2. The West and Central African Regional Network for TB Control (WARN/CARN TB) remains operational, gaining more autonomy and financial support from external sources, such as the Union for Lung Health. A five-year strategic plan was created to facilitate fundraising.

3. The evaluation and implemention of social protection programmes for people affected by TB across Africa have been supported by TDR through 1) technical and financial support to six countries identified under a funding scheme launched in late 2022 to support IR projects in the WHO AFRO region and build the evidence base on the impact of social protection schemes for TB patients and their families, in collaboration with GTB, the Union, and Damien Foundation. Six studies are in progress and expected to be completed by end of 2023; 2) Finalisation of a generic IR toolkit for evaluating the impact of social protection schemes for TB patients and their families has been completed and will be officially launched at the Union Conference in November 2024, and; 3) Support to GTB to conduct a landscape analysis of social protection schemes in DRC, which gathered evidence on key gaps and recommendations for strengthening the overall SP landscape in these contexts which was completed in early 2024

4. The ShoRRT project continues to run in 27 countries, with financial and technical support provided directly by TDR to Nigeria and DRC, and indirect support provided to other countries through the development of a generic statistical analysis plan to inform a standardised approach to analysis of key treatment effectiveness, safety, and quality of life outcomes at end of treatment and follow up time points. Additional technical support for data analysis was provided in 2024 to countries by external consultants and the Luxembourg Institute of Health.

5. The TDA4Child initiative continues, with direct TDR technical support provided to Burkina Faso, the Democratic Republic of the Congo, Nigeria and Uganda for the adaptation of the master protocol and study implementation. Study results were presented at the Union world conference (Bali November 2024).

Guidelines and policy decisions informed by TDR outputs

Progress: The evidence to inform guidelines and policy decision is being generated through research. The following guidelines / policy decision and stakeholder strategies were informed by TDR research output:

- Change in policy for TB treatment (shift to all oral drugs) based on the results of the ShoRRT studies in Dominican Republic and Ecuador; based on the results of the ShoRRT study in those countries, national policy was changed and short all oral regimens has been adopted for MR-TB patients.
- Both the ShoRRT research package and Implementation research for digital technologies and tuberculosis (IR4DTB) toolkit are highlighted as potential type of research that can support the advancement of USAID global TB strategy (see USAID Global TB Strategy, 2023-2030 - USAID Global TB Strategy, 2023-2030, Implementation Approach) .

The delivery and impact assessment of public health interventions for drug and vaccine safety and pharmacovigilance are optimized through IR

Progress: Support to Burkina Faso and Malawi for the MedSafety app, USSD coding system is ongoing, to put in place an online reporting system for pharmacovigilance, which will be partciulary usefull in the context of scale up of new drugs and vaccines.

The delivery and impact assessment of public health interventions using digital health optimized through IR

Progress: 1. Following the IR4DTB workshop in the WHO AFRO region targeting NTP staff in May 2023, 11 country proposals had been selected to receive financial and technical support to conduct IR to test, evaluate and/or scale up new digital technologies within the context of a country's national response to TB throughout 2024. Studies are nearing completion with publication of some papers expected by the end of 2024. The six countries in the WHO EURO region, selected after the 2022 IR4DTB workshop, have finalised their studies with draft or published manuscripts available for all. Through support from the Mayo Clinic, the IR4DTB site was translated into Spanish to extend its reach into Latin and South America.

Outputs

Strengthened regional networks of National Tuberculosis Programmes in West, Central, East and Southern Africa capable of identifying research priorities

Progress: - For WARN/CARN, a series of webinars were held on TB related topics, and increased involvement in various IR projects - SEARN TB network - now has 22 NTP members, has held 2 webinars in 2024 and has an operational governance structure in place

Approaches to optimized the effectiveness of malaria vaccine in countries with high seasonality developed

Progress: Development of a research package for facilitating the conduct of studies/surveys to measure the effectiveness of malaria vaccine, the coverage and understanding the barriers for optimal delivery strategy

Strengthened National TB programmes capacities for conducting OR/IR to generate the evidence-base for improving TB control

Progress: Across West and Central, and Southern and East Africa: - 11 countries are currently conducting IR on digital technologies for TB - 6 countries are conducting IR related to social protection for TB - 3 are conducting IR on the evaluation of other digital appsfor public health (Skin NTP app and MedSafety App) - X (TBD) countries are implementing the TDA4Child toolkit – X (TBD) countries are implementing ShoRRT.

Remaining risks and challenges

Inability of some control programmes to define research priorities and capacity building needs

Actions to mitigate risk: Shared experience and expertise within the regional network and external technical support provided for the weakest control programmes

Status: Planning phase

Insufficient engagement of national control programmes

Actions to mitigate risk: Adequate communication strategy to maintain interaction of all partners within the network

Status: Planning phase

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Control programmes and research institutions in target countries - WHO/Global TB, WHO NTD and WHO Global Malaria Programmes, WHO regional offices, GFATM, USAID, PMI, MMV, LSHTM, The Union and Damien Foundation.

Complimentary roles: partners and collaborators bring complementary expertise and perspectives; they have complementary responsibilities to ensure optimal project delivery and uptake.

Estimated leverage created by this ER:

Estimated leverage amount: (US$): around US$ 1 million leveraged from the Global Fund for the conduct of the ShORRT operational research projects.

Number of people working on projects: 500

Gender aspects and vulnerable populations:

For all activities, we try to ensure that men and women researchers are, as far as we can, equally represented. Concerning the geographic equity, some activities focused initially in West and Central Africa (see rationale) for the WARN-TB and CARN-TB activities- this experience will be expended to East and Southern Africa. Other activities for this ER are not restricted to geographic area allowing us to work with all the 6 WHO regions.

Training: A regional training programme aimed at enhancing the research capacities of the NTPs commenced in November 2024 with Module 1: Basics in Research and Protocol Development.

This training is entirely virtual and incorporates both synchronous and asynchronous components. In total, 80 people from NTPs, Universities, and research institutions participated in module 1. Module 2 (data management) and 3 (data analysis) will be organized in 2025.

Strengthened institutions and/or networks: Strengthening of the WARN/CARN-TB and SEARN-TB networks

Publications

Eleven publications. See list in Annex 1 – ER 1.2.6.

Results dissemination and uptake:

Involvement of different WHO headquarters, regional and country departments, key stakeholders such as the Global Fund to Fight AIDS, Tuberculosis and Malaria, NGOs and control programmes; capacity built at country level

Plans for 2025

In 2025:

- we will continue to support the National Diseases Control Programmes in optimizing the efficiency of public health interventions such as preventive measure for Malaria with using SMC and vaccine.
- The lessons learned from implementing social support for TB patients and utilizing digital technology for TB management will be widely disseminated through peer-reviewed publications and dedicated regional webinars.
- We will also celebrate the 10th anniversary of WARN/CARN-TB in 2025. A multi-country project aimed at demonstrating the network's impact on TB control will be undertaken.

1.3.10: Urban health interventions for the prevention and control of vector-borne and other infectious diseases of poverty

Rationale:

Urban health is influenced by several factors, including governance, population features, urban planning and socioeconomic development and health services, among others, which in turn have major implications for social and environmental determinants of health. Vector-borne diseases, whose agents (parasites, viruses etc) are transmitted by insect vectors such as mosquitoes, flies and triatomine bugs, occur in more than 100 countries worldwide and affect about half of the world's population. The incidence and distribution of infectious diseases is consequently influenced by social, demographic and environmental factors that interact under a changing climate and affect pathogen transmission patterns, especially increasing risk of infection in urban areas. Accurate, consistent and evidence-based interventions for prevention and control of infectious diseases of poverty in urban settings are urgently needed to implement cost- effective public health policy and to promote inclusive, equitable and sustainable urban health systems and services. Understanding the social dynamics, including the gender dynamics that take place in the

urban context, is needed to address bottlenecks in the implementation of effective interventions and strategies and to better understand the differentiated impacts of infectious diseases on various population subgroups and how gender intersects with other social stratifiers to better understand different experience of disease.

TDR has a history of supporting research on the impact of gender dynamics and inequalities that influence prevention and control efforts of infectious diseases of poverty in LMICs, including in urban settings. In response to TDR's call for proposals, the two multidisciplinary research teams from Bangladesh (Health System and Population Studies Division (HSPSD), (icddr,b) and India (ICMR-Regional Medical Research Centre, Bhubaneswar) that conducted literature reviews in 2022/2023 have identified a number of research gaps that will in turn inform the research priority setting exercise being conducted in 2024, which informs TDR's research agenda on urban health, infectious disease and gender research, including in COVID-19 and post-COVID-19 scenarios to the extent possible.

Design and methodology:

This ER is designed to conduct urban health research incorporating gender analysis with an intersectional lens, within infectious diseases of poverty using concrete qualitative and quantitative research methodologies. All the research studies are aligned to the TDR's strategy on intersectional gender research which focuses on strengthening research capacities on intersectional gender analysis in research on infectious diseases, generating evidence on gender intersecting inequalities in access to health services, supporting intersectional gender analysis in research for implementation and promoting an inclusive infectious disease research agenda. TDR's toolkit on intersectional gender analysis in research on infectious diseases of poverty is often used as a reference during the study design process.

Progress in the current year

Outcomes

Evidence generated to inform policy and practice on control of infectious diseases in urban settings in low- and middle-income countries with an intersectional gender lens

Progress: Both the study teams in India and Bangladesh completed the systematic reviews in 2023 and undertook various activities to disseminate the results from such reviews, including stakeholders meeting at national levels. Following the results of the systematic reviews, we see the need to identify and prioritize research areas that address the most pressing and impactful questions in the context of urban health issues and the diverse needs of urban and peri urban populations.

We are conducting a research priority setting exercise, which includes a virtual consultation with global and regional experts. The aim of this consultationis to present identified research gaps following the systematic literature reviews recently completed and identify additional research areas that address critical gaps for the delivery of effective urban health interventions and strategies with an intersectional gender perspective. Furthermore, the exercise will consider the principles of implementation science to ensure that the identified research priorities can be effectively translated into actionable policies and effective delivery of interventions, particularly in emergency and epidemic contexts/scenarios.

We expect to achieve two outcomes from this exercise:

1. A consensus-driven list of research priorities through the systematic identification of implementation research gaps in the field of urban health and infectious diseases from an intersectional gender lens.

2. A comprehensive Research Agenda to inform TDR's subsequent call for research proposals and strategic pathway in the area of urban health, gender and implementation research. The primary research funded through this call will contribute to a deeper understanding of the application of an intersectional gender approach in infectious disease research and address evidence gaps in urban health, ultimately leading to more accessible and equitable health interventions and policies. This research will be critical in developing data-driven, context-specific solutions that can be implemented in urban settings.

Outputs

Evidence informed policy and practice at urban level.

Progress: This output has not started yet, it is for 24/25 and so at planning stages. By end of 2025, 2 research studies following research from systematic reviews conducted in previous biennium (3 under 50M Scenario).

Remaining risks and challenges

Weak capacities at country level to effectively apply an intersectional gender approach in the research processes.

Actions to mitigate risk: Ensuring interdisciplinary teams, with social scientists and biomedical scientists and entomologists

Status: On Track

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Research teams (icddr,b and ICMR) in Bangladesh and India respectively who have worked with Ministry of Health and Family Welfare, NGOs,iNGOs, academic /research institutions, civil society organisations, UN organisations,World Bank and local communities.

Complimentary roles: The complementary roles of the partners have been established.

Estimated leverage created by this ER:

The estimated leverage has increased more than expected as the teams have conducted multiple dissemination activities.

Estimated leverage amount: (US$): None for now. TDR will build on the productive results to mobilize new funding and link up with the environmental and climate work domains within the new TDR strategy to develop funding proposals.

Number of people working on projects: 12

Gender aspects and vulnerable populations:

Sex parity and geographic diversity will be ensured when establishing external review panels, convening meetings of experts, issuing contracts, and in general within all of our collaborations. Intersectional gender analysis will be applied and tools facilitated by the TDR team for local researchers to ensure disaggregated data.

Training:

The research teams in India and Bangladesh have received training related to the concepts of gender and intersectionality, thus enhancing their capacity to conduct the systematic reviews using an intersectional gender lens.

Strengthened institutions and/or networks:

During the various stakeholder meetings conducted by the research teams in India and Bangladesh, they have been able to influence policy makers and researchers to incorporate gender and intersectionality within their forthcoming research agenda to generate evidence to influence policy changes.

Publications:

From the systematic reviews, 1 manuscript entitled 'Effective community-based interventions to prevent and control infectious diseases in urban informal settlements in low-and middle-income countries: a systematic review' has been accepted for publication in September 2024 in 'Systematic Reviews'. 5 articles have already been published in peer reviewed journals in 2022 and 2023. See list in Annex – ER 1.3.10

Results dissemination and uptake:

Evidence generated will also inform the development of information briefs for policy and practice. Local decision-makers will be part of the community engagement strategy in the implementation phase. In addition to oversight by an expert committee, quality assurance mechanisms include fact checking, peer review of concept paper, technical and copy editing.

Plans for 2025

Following a research priority setting exercise and consultation in the last quarter of 2024, which informed a research call for proposals in 2025, two research teams will be selected to implement studies in urban and peri urban settings, ensuring an intersectional gender approach in tackling infectious diseases.

1.3.12: Strategies to promote gender-responsive health interventions on prevention and control of infectious diseases of poverty

Rationale:

Great progress has been made towards combatting infectious diseases of poverty (IDPs). However, considerable public health challenges remain, including gender and intersecting inequalities that affect health conditions associated with infectious diseases. This ER focuses on gender intersecting inequalities that influence differentials in vulnerability to, and the impact of, particular health conditions associated with infectious diseases in low- and middle-income countries. This expected result recognizes that gender norms, roles and relations influence people's susceptibility to different health conditions and they also have a bearing on people's access to and uptake of health services, and on the health outcomes they experience throughout the life-course. It also acknowledges that WHO has recently recognized the importance of being sensitive to different identities that do not necessarily fit into binary male or female sex categories.

In this context, delivery and access to prevention and control approaches and products to prevent and control infectious diseases should not be one-size-fits all but instead should benefit from approaches that take into account the complex interaction of several social stratifiers, and their influence in health outcomes. There is growing recognition that gender roles, gender identity, gender relations, apart from institutionalized gender inequality influence the way in which an implementation strategy works (e.g. for whom, how and why). There is also emerging evidence that programmes may operate differently within and across sexes, gender identities and other intersectional characteristics under different circumstances and contexts. Research should inform implementation strategies to avoid ignoring gender-related dynamics that influence if and how an implementation strategy works. Therefore scientists, including those focusing on research for implementation, would benefit from adequately considering sex and gender intersecting social dimensions within their research programmes, by strengthening both the practice and science of implementation, and by contributing to improved health outcomes and reduction of gender and health inequalities.

Design and methodology:

This ER is designed to conduct implementation research incorporating a gender analysis with an intersectional lens, focusing on infectious diseases of poverty using concrete qualitative and quantitative research methodologies. All the research studies are aligned with TDR's intersectional gender research strategy which focuses on strengthening research capacities on intersectional gender analysis in research on infectious diseases, generating evidence on gender and intersecting inequalities in access to health services, supporting intersectional gender analysis in research for implementation and promoting an inclusive infectious disease research agenda. TDR's toolkit on intersectional gender analysis in research on infectious diseases of poverty is often used as a reference and methodological guidance material during the study design and implementation process.

Progress in the current year

Outcomes

Strengthened implementation research capacities that incorporate intersectional gender analyses within their projects and generated evidence to strengthen equitable health systems and inform the design and implementation of gender responsive health interv

Progress: This is ongoing for the 24/25 biennium and into the 26/27 biennium.

Capacity strengthening activities included embedded research training through the supported projects and provision of online courses for increased knowledge on the concepts of gender and intersectionality:

As integration of sex and gender considerations into health research is critical to achieving gender equality and health equity, TDR in collaboration with the UNDP/UNFPA/UNICEF/WHO/World Bank Special Programme of Research, Development and Research Training in Human Reproduction (HRP) developed and launched a 'Sex and gender in health research' virtual resource hub. This resource hub is a curated repository of resources to strengthen researchers' capacity to consider sex, gender, and their intersections with other axes of inequality and discrimination throughout the research cascade, from conception to design, data collection, analysis, interpretation and reporting. This inventory includes toolkits, guides, research articles, training and audio-visual materials that are readily available in English, French, Portuguese and Spanish. The resources are categorized by type of resource, intended audience, topics covered and creators/developers. It is available online at https://genderinhealthresearch.org/

In June 2022, TDR launched a new module of the Massive Open Online Course (MOOC) on Incorporating an intersectional gender perspective in implementation research. The content was developed in collaboration with TDR's research capacity strengthening unit. Till date, the course has been offered X (nber pending) times and X (nber pending) have enrolled in the course. This course is facilitated by the University of Ghana.

A module on gender entitled 'Integrating an intersectional gender lens in Implementation Research' gender for TDR's implementation Research Toolkit was updated in the second edition of the IR toolkit in collaboration with TDR's research capacity strengthening unit in 2022. It is available online at https://www.adphealth.org/irtoolkit/intersectional-gender-lens/.

Outputs

New knowledge & evidence generated from intersectional gender analyses in IR to address marginalization & disadvantages in access to health systems and services, health impacts, prevention/control of IDPs.

Progress: This activity is ongoing for the 24/25 biennium and beyond. By the end of 2025 two to four research studies and two to four research uptake initiatives are planned.

In 2024, of 2 IR projects on gender, intersectionality and infectious diseases, 1 project in Ethiopia has been completed whereas data collection has been completed with data analysis ongoing in the second project in Bangladesh.

3 research teams from India, Philippines and South Africa have completed systematic reviews on gender, intersectionality, climate change and anti-microbial resistance (AMR) and are finalizing their manuscripts for journal submission.

A. In the last quarter of 2023, TDR launched a call for applicants from LMICs entitled 'Gender, antimicrobial resistance (AMR) and climate change threat to human health in the context of infectious diseases of poverty'. The aim of this call was to strengthen an intersectional gender lens in implementation research to contribute to the implementation of TDR's Intersectional

Gender Research Strategy. Four research teams from India, Philippines, South Africa and Iran were competitively selected to conduct systematic reviews of existing evidence and research gap analysis on gender and related intersectional inequities associated with antimicrobial resistance (AMR) and climate variability and change. Three project teams have completed the systematic reviews, conducted stakeholder mapping, analysed the findings to identify research gaps and held multiple rounds of stakeholder consultations in their respective countries (5 in India, 3 in Philippines and 3 in South Africa).

Key gaps uncovered:

- There is very little work on interaction of AMR and climate, and even less when considering gender and other social determinants of health.
- Most articles consider sex but have missed the opportunity to analyze and produce sex disaggregated data.
- There is a need to sensitize people to understand the term 'gender' as disparities found between authors with conflation of terminologies related to sex, gender and gender identity.
- There exists a paucity of resources for researchers to conduct intersectional gender analysis. Hence, training of researchers to build their capacity to conduct intersectional gender analysis is required.
- Most of the studies have a positivist, quantitative approach and miss the qualitative approach to understand the depth of the problem.
- Baseline knowledge about AMR, climate change, gender and its impact on health is very low.

Key recommendations:

- Need more advocacy to generate interest to understand the interactions AMR, climate change, gender and its impact on health and healthcare. Provide capacity enhancement opportunities for policy makers and researchers to understand these complex interactions.
- Foster cross-sector collaborative partnerships between specialists working on climate, AMR and gender within ministries and institutions.
- Advocacy for the use of the intersectional gender lens in research within current and future research agenda is required.
- Start collecting disaggregated data considering sex and other social stratifiers for all surveillance systems, including for AMR.
- Promote Gender-Sensitive Adaptation Strategies in climate change adaptation and mitigation policies to ensure equitable health outcomes.

Following the results generated from the systematic reviews, TDR launched a call in July 2024 for applicants from low- or middle-income country (LMICs) to conduct implementation research studies to generate evidence that helps to identify enablers and bottlenecks that impact the delivery of health interventions in the face of two major global health threats; climate variability and change and resistance to treatment and control agents, including but beyond antibiotic resistance, such as insecticidal resistance. This call contributes to the implementation of TDR's Intersectional gender research strategy (https://tdr.who.int/publications/i/item/2020-06-05-tdr-intersectional-gender-research-strategy). Out of the 30 proposals received, 2 will be selected

through a competitive process. The research which is expected to start from October 2024, will last for 18 months and the results are expected by 2027.

B. In 2022, TDR launched a call for proposals for 'Implementation research and gender: A contribution to implement TDR's Intersectional Gender Research Strategy'. Two research teams from Bangladesh and Ethiopia were selected.

1. In Bangladesh, the study entitled 'Facilitators and Barriers of management of Multidrug Resistant Tuberculosis in Bangladesh: An Implementation Research through Gender Lens' received ethics approval in 2023 and is being conducted by BRAC James P. Grant School of Public Health, BRAC University. The objective of this implementation research is to generate evidence to identify the enablers and bottlenecks that impact the delivery of current management of multidrug-resistant tuberculosis (MDR-TB) in Bangladesh and see how gender intersects with other social variables influenced by specific contextual and structural determinants potentially leading to different gendered experiences and thus gender inequality. This mixed method study conducted at five tertiary specialised TB hospitals across the country employed quantitative (record review from hospital and TB registry, household and phone surveys) and qualitative (document review, in-depth interviews (IDI), key informant interviews (KII), focus group discussion (FGD) and observation) methods. Till date, data collection has been completed and analysis is ongoing.

2. In Ethiopia, the study entitled 'Uncovering intersectional gender inequalities influencing vulnerabilities, access to and uptake of malaria services, and developing a participatory gender-responsive framework toward malaria elimination in Ethiopia' is being conducted by Jimma University, also started in 2023 following ethics approval from WHO. This study aimed to examine intersecting gender inequalities and underlying factors influencing malaria vulnerabilities, care-seeking behaviors, and access to and uptake of preventive and curative services. This mixed-method sequential study conducted in two urban and four rural areas from two malaria-endemic districts of Jimma zone, Ethiopia involved qualitative (11 FGDs, 12 KIIs, and nominal group discussions (NGDs) and quantitative (desk reviews, review of malaria surveillance data from 2018-2023, household survey with 2,198 respondents) data collection. The findings below reveal substantial gender inequalities in malaria burden, treatment access, and preventive practices, shaped by social roles, age, marital status, poverty, and geographical location.

Finding 1: Social Roles and Activities Social expectations and roles assigned to men and women significantly contribute to gender inequalities in malaria risk and morbidity. Men are more likely to engage in outdoor activities that increase exposure to malaria.

- Gender differences in malaria risk reveal that males are more prone to exposure due to their engagement in outdoor and nocturnal activities such as farming, security work, and staying awake late or waking up early (Male Mean Score: 19.6/23 vs. Female: 18.5/23, $F=39.9$, $P<0.05$). Conversely, females exhibit slightly higher vulnerability during early waking hours (7.17/8 vs. 6.82/8 for males, p-value <0.05). These activities often coincide with peak mosquito biting times, increasing malaria exposure among males.
- Contributing to male vulnerability are factors like improper use of insecticide-treated nets (ITNs), which are less available or utilized by night-shift workers or security personnel. This heightened exposure contributes to more severe malaria cases and poorer treatment outcomes among males. In contrast, females, despite facing delays in seeking treatment

due to their household roles and lower decision-making autonomy, tend to have better treatment outcomes upon hospitalization.

Finding 2: Healthcare Seeking Behavior:

- Men are more likely to seek treatment for uncomplicated malaria early, whereas women tend to seek care later, at more complicated stages due to household responsibilities and decision-making dynamics. Despite presenting later, women experience better treatment outcomes.
- More males (16.4%) report fever and malaria compared to females (13.6%) ($p < 0.05$), with DHIS-2 data confirming higher male malaria cases (54.9%) from 2018 to 2023.
- Rural men (46.7%) are more likely to seek early treatment within 24 hours compared to rural women (44.5%).
- Young boys (<5 years) exhibit better timely care-seeking (60.3%) than adults (37.7%), with a 7.7% higher rate favoring males.
- Men typically access local health facilities as they have control over resources, resulting in shorter hospital stays (57.9% < 3 days) but poorer treatment outcomes (12.7% referral/death). Conversely, females delay care, managing household duties until illness worsens, leading to hospitalizations for complicated malaria (62.0%), yet with higher recovery rates (90.7%). Men are more likely to seek early treatment from local clinics, while women prefer public health facilities. These findings underscore gender-specific challenges in malaria prevention and treatment access.

Finding 3: Inequalities in malaria preventive service uptake were present between males and females-making the women more adherent to preventive services (ITNs) that are already within their control or accessible.

- ITN utilization by sex, age, and education: More females (54.6% versus 50.6%, $X2=19.23$, p-value <0.05) slept under ITN than males in the same household and were more adherent to using preventive services. Age (Adult) and education (attended secondary school) were found to intersect with sex (females) in the utilization of ITN.
- Malaria services that do not account for sex-specific risks and social gender norms worsen transmission among men.

Finding 4: Sex-disparities are observed in knowledge about malaria.

- Men have higher knowledge about malaria due to greater access to broadcast media. Women, despite community communication opportunities, have less access to such media and thus less knowledge.
- Rural, educated men aged 25-44 years exhibit greater knowledge compared to urban, less educated women over 65 years. Men benefit more from broadcast media exposure (Male=288, Female=185, $p < 0.001$), contributing to their higher knowledge. Despite similar community communication opportunities, rural males surpass urban females in malaria knowledge by 5.2%.

Finding 5: Intersectional Inequalities: Gender inequalities in malaria burden and service access intersect with other social factors like occupation, age, education, and residence.

- Adult men have higher malaria cases, while adult women experience more complications but better recovery outcomes.

- Access to ITNs and malaria knowledge varies significantly by age, education, and location.

Finding 6: Resource Control and Decision-Making:

- Men's higher control over resources and decision-making results in earlier treatment seeking.
- Women often require approval from male family members to seek care, affecting their health outcomes.
- Men's lack of approval of the women's sickness, the required financial expenses, and travel time and place determined women's health outcome including complications. This is especially true in rural areas where traditional norms are stronger.

Based on the results and consultations with relevant stakeholders (Malaria program personnel at all levels (MOH, Zonal Health Offices, WHOs), frontline malaria service providers, malaria program partners, gender and health focal persons, policy makers, researchers, community advisory groups), following policy implications and recommendations are suggested:

1. For National Malaria Prevention and Control Programs:

- Revise policies, strategies, and routine data analysis to ensure gender-equitable services. Develop a clear roadmap for integrating gender-responsive strategies into national malaria control policies, outlining objectives, timelines, and responsibilities.
- Program implementers should incorporate intersectional gender dimensions during resource mobilization and distribution to ensure gender-equitable services, considering specific needs and contextual gender norms. Promote multi-sectoral collaboration for malaria prevention.
- Strengthen capacity of program personnel on gender dimensions, providing skills for delivering locally tailored social and behavior change communication (SBCC) to address gender inequalities. Create training manuals tailored for malaria program focal points, coordinators, and implementers to lead gender-responsive activities and foster societal shifts towards gender equality in malaria interventions. Design and deliver training on gender mainstreaming in malaria for healthcare providers, program managers, and policy makers.

2. Strengthening Gender and Health Units:

- Strengthen gender units within health departments to plan, implement, and evaluate gender-responsive activities.
- Strengthen reporting mechanisms to incorporate gender and intersectionality indicators during data collection.
- Promote regular gender analysis of DHIS-2 and hospital data to support investigations and planning.

3. Community engagement:

- Co-design culturally sensitive interventions and social policies with community leaders, women's groups, and youth organizations.

- Develop social and behavior change communication (SBCC) materials and strategies that integrate gender dimensions into malaria elimination efforts. Allocate adequate financial, temporal, human, and material resources to support SBCC, community dialogues, and the delivery of gender-equitable services.

4. Workplace Malaria Protection:

- Enhance protective services for individuals at occupational risk, ensuring institutions provide necessary items like ITNs and repellents.

C. In 2021, two projects were selected following a TDR Call for Proposals on 'Generating evidence to strengthen intersectionality and gender research efforts in infectious disease prevention and control'. Awards were given to a research team in Bhutan and a multi-country consortium with research teams from Kenya, Malawi and South Africa. Both the projects have been completed and research teams are currently developing manuscripts to be submitted to peer reviewed journals by end of 2024.

Project 1 from Bhutan: 'Studying the intersections of sex and gender dimensions with other social stratifies in accessing TB & Dengue health care services of Transgender Men, Transgender Women, MSM, WSW in Bhutan'.

Project 2 from Africa Consortium: "An assessment of Gender and intersectionality in disease exposure, care seeking behaviour and treatment pathways in Malaria and Tuberculosis prevention and control in Kenya, Malawi and South Africa". ¬ The study in Migori County, Kenya and Chikwawa district in southern Malawi focused on gender and intersectionality in disease exposure, care seeking behaviour and treatment pathways in malaria prevention and control. The study in Eastern Cape Province, South Africa conducted gender and intersectionality analysis of Tuberculosis pre-treatment loss to follow up.

Remaining risks and challenges

Knowledge translation outcomes on gender equality are usually beyond the control or influence of projects. Research teams working in silos with limited collaboration between biomedical and social science communities.

Actions to mitigate risk: Continuous engagement with relevant stakeholders and policy makers to make evidence informed decisions based on evidence generated from the research conducted by the research teams adopting an intersectional gender lens.

Status: On Track

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Research teams in Bangladesh, Bhutan, Ethiopia, India, Iran, Kenya, Malawi, Nepal, Philippines, South Africa, Uganda; MOH, civil society organizations, WHO and other entities working on gender and public health (e.g. WHO/GER, WHO/HRP)

Complimentary roles: The complementary roles of the partners have been established.

Estimated leverage created by this ER:

Estimated leverage amount: (US$): None.

Number of people working on projects: 163

Gender aspects and vulnerable populations:

These are gender research projects, exploring the intersections of gender and other axes of inequity relevant for infectious disease research and equitable access to health care and treatment.

Sex parity and geographic diversity will be ensured when establishing external review panels, convening meetings of experts, issuing contracts, and in general within all of our collaborations.

Training:

The IR MOOC (Massive Open Online Course) module entitled, *Incorporating an intersectional gender perspective in implementation research* was launched by TDR In June 2022. Till date the course has been offered four times. Till date, X (TBD) participants have taken the course.

All the individuals working on the projects related to this ER have been trained on the concepts of gender and intersectionality, methodologies to incorporate gender and intersectionality with research of infectious diseases of poverty and conducting intersectional gender analysis in health research. 163 individuals strengthened their capacities, of which 83 were males and 80 were female.

Strengthened institutions and/or networks:

All the research teams have strengthened their capacities to conduct research incorporating an intersectional gender lens. The capacity to do intersectional gender analysis in health research has been strengthened in those institutes where this has been done for the first time as part of the TDR funding within this ER. The table below shows the list of institutes:

S.No	Name of institute/ organization	Place
1.	Alliance for improving health outcomes	Quezon City, Philippines
2.	University of Cape Town	Cape Town, South Africa
3.	One Health Trust	Bangalore, India
4.	Partnership for Research, Opportunity, Planning, Upskilling and Leadership (PROPUL)	Chennai, India
5.	Mazandaran University of Medical Sciences	Mazandaran, Iran.
6.	Jimma University	Jimma, Ethiopia
7.	BRAC James P. Grant School of Public Health, BRAC University	Dhaka, Bangladesh
8.	Institute of Health Partners	Thimphu, Bhutan

9.	Institute of Anthropology, Gender and African Studies (IAGAS), University of Nairobi	Kenya, Nairobi
10.	College of Medicine Kamuzu University of Health Sciences	Blantyre, Malawi
11.	Human Sciences Research Council	Cape Town, South Africa

All the research teams and institutions working under this ER have been constantly engaging stakeholders and policy makers to disseminate the evidence derived from their research and advocating for changes within their relevant policies and program implementation.

Publications:

There are 14 manuscripts currently being developed within this ER which will be submitted to peer reviewed journals. 7 from the systematic reviews conducted on gender, climate change, AMR and infectious diseases by the research teams in India (2), Philippines (1) and South Africa (4). 3 from the research team from Ethiopia who conducted Implementation research on gender and intersectionality and infectious diseases. 1 from the research team from Bhutan and 3 from the consortium from Africa (Kenya, Malawi and South Africa) who conducted research on infectious diseases and gender and intersectionality.

In addition, two research teams from Nepal and Uganda piloted in 2021 and 2022 the TDR Toolkit to incorporate intersectional gender analysis in infectious diseases of poverty, notably schistosomiasis and tuberculosis (TB) in Uganda and lymphatic filariasis (LF) and TB in Nepal. Two original research articles had already been published as a result in 2023 and two additional articles have now been published in 2024.

2024 Publications: See list in Annex 1 – ER 1.3.12

Results dissemination and uptake:

Continuous engagement with various ministries, policy makers, relevant stakeholders (civil societies, local communities, academia, non- governmental organisations) and public health services at all stages of the research cycle/ project implementation.

Plans for 2025

In 2025 the newly selected research teams from South Africa and India will start the implementation of their research projects.

Manuscripts from the recently completed reviews and projects are also in final stages of production and planned to be submitted to peer review journals.

1.3.14: Testing of innovative strategies for vector control

Rationale:

Causing more than one million deaths per year, with few new drugs or strategies to combat these emerging infectious pathogens, vector-borne diseases (VBDs) such as malaria, dengue, Zika, chikungunya, yellow fever and others account for 17% of the total morbidity from infectious diseases. The incidence of some VBDs has grown dramatically in recent decades, with about one third of the world population now at risk from Aedes -borne epidemics. This increase is due to global changes and has prompted WHO to state the urgent need for alternative vector control methods in its Global vector control response (GVCR) 2017-2030, which was approved at the World Health Assembly in 2017 by more than 190 Member States (WHO 2017). The rationale of this expected results is to work with all partners to test innovative vector surveillance and control technologies, as well as to support access to relevant training and capacity building on these technologies : One of these alternative technologies is the 'Sterile Insect Technique' (SIT) a method of pest c ontrol using area-wide releases of sterile males to mate with wild females, which will then not produce offspring. This technique has been successfully implemented in agriculture against numerous insects since about 60 years, with no side effects and environmentally safe impact.

Approach

1) As a first step, a joint collaboration was established between the Department of Nuclear Sciences and Applications (NA), the Department of Technical Cooperation (TC) of the International Atomic Energy Agency (IAEA), and the UNICEF/UNDP/World Bank/ WHO Special Programme for Research and Training in Tropical Diseases (TDR) of the World Health Organization (WHO), in partnership with the WHO Department of Control of Neglected Tropical Diseases (NTD), to develop activities on providing guidance to countries and testing SIT against the Aedes mosquitoes, vectors of arboviral diseases.

2) The second step on the SIT testing was to raise funds to support LMICs countries to test SIT against diseases and this was achieved through the contract with US CDC for testing SIT in 2 to 3 Pacific countries. The testing is currently ongoing.

3) The development and testing of other related tools will also be supported through this activity such as capacity building tools and vector surveillance tools , to be able to provide a full package of innovative technologies for prevention and control of vectors and vector-borne diseases.

Design and methodology:

Design and Methodology for testing the Sterile Insect Technology, which are the core activities of this ER are described below through key activities and timelines. The methods include : Phase 1: January 2019 to April 2020: Development and Production of a Guidance Document on how to test SIT for countries Phase 2: July 2019 to December 2021: Resource mobilization, buildings of ad hoc review committees and Special Project Team, call for proposals and selection of research consortium(s) to test SIT into field conditions. Landscape analysis for new vector control technologies. Development of training and surveillance tools. Phase 3: January 2022 to June 2024: Update of proposals, contracts and development of the rearing facilities as well as laboratory testing necessary such the irradiation dose, sterile male competitiveness and others. Presentation of the technology to the WHO Vector Control Advisory Group for evaluation. Phase 4: July 2024 to December 2025: Field testing of the technology with release of sterile males and

epidemiological evaluation. Presentation of the results to the WHO VCAG and if satisfactory implementation of the results, policy recommendations and deployment of this new vector control technology at the country level. Further activities such as the organization of training workshop on relevant items will be supported to improve capacity in countries to implement these new technologies of vector control.

Progress in the current year

Outcomes

Countries integrating the SIT into the integrated Vector control against Aedes mosquitoes and arboviral diseases.

Progress: Integration of the SIT into the integrated vector control activities of the two countries French Polynesia and Cook Islands currently tested and planned for 2025 if efficient.

SIT technology against Aedes mosquitoes and arboviral diseases presented at the WHO Vector Control Advisory Group for advise and review

Progress: First presentation to VCAG in September 2023, with recommendations addressed by the research team in the second year of the project proposal. Second presentation to VCAG planned for September 2025.

Outputs

Procedure for implementing SIT and integrating the technique into the vector control activities

Progress:

The document on how to integrate SIT into the current vector control tools used against the Aedes-borne diseases has been finalized and went under external review, it is currently revised to take into account the reviewers comments, and will be released as a publication by first half of 2025:

Abstract of the document:
The growing burden and threats of vector borne diseases to human health are due to the changing world populations live in, and vector control is the main control measure. The changing factors relate to demographic boom, increased and unplanned urbanization, increased global travel and trade, climate and environmental change. Because technology and innovation have contributed to the improvement of the health of societies, the World Health Organisation relies again on these solutions by releasing the Global Vector Control Response, which calls on Member States to increase research and innovation to enhance vector control capacity and capability. This landscape analysis is therefore conducted to have an overview on traditional vector control interventions and the new vector control technologies under development with focus on the sterile insect technology and analyse opportunities of its integration into vector control activities in line with the integrated vector management approach. The inventory of vector control interventions (traditional and news) was mainly based on desk review of literature, and informal discussions with stakeholders.
The landscape analysis shows that the traditional vector control interventions such as insecticide treated nets, indoor residual spraying and larval source management keep protecting vulnerable populations, mainly against malaria vectors and somewhat vectors of arboviral diseases, but they are limited to solve contemporary issues related to insecticide resistance, the control of exophagic and exophilic mosquito vectors, the multiple and hard-to-reach mosquito larval habitats. The new promising technologies, based on reduction or suppression of mosquito populations including Sterile

Insect Technique (SIT), *Wolbachia*-based Incompatible Insect Technique (IIT) and gene drive approaches, are expected to cover the limitations of traditional vector control interventions. The SIT and IIT are currently the most advanced technologies with many ongoing field trials reporting successful results against *Aedes* vectors. These emerging technologies, SIT and IIT, have been successfully associated with traditional pest management, breaking new ground for vector control. Sex separation, methods of release of males and accurate monitoring of male populations need technical improvements to fine tune the SIT and IIT technologies. SIT and IIT are on good track for potential recommendation in the near future provided that strong epidemiological impacts on mosquito borne diseases are reported.
The new vector control technologies are expected to play key roles in the control of mosquito borne diseases as part of the growing threats of these diseases. They are the promising control measures in the pipeline for the protection of communities against mosquito vectors. Investment in vector control research should be increased to develop more effective tools and technologies. Endemic countries are encouraged to keep leveraging the available vector control package according to the local contexts related to vector bionomics but also the local determinants of the mosquito-borne diseases.

Evaluation of the vector control activities using SIT for prevention and control of arboviral diseases transmission

Progress:

One country has started SIT field testing and another one is prepared for SIT field testing by end of 2024 (detailed update of activities can be found in the interim report here attached in Annex 2)

Funding (300 000 USD) for the organization of a workshop to prepare 3 more countries for SIT testing was raised in 2024.

14 Scientific publications from the workshop on SIT held in May 2023 on track for publication in a special issue of the Journal for Infectious Diseases of Poverty; to be completed by end of 2024.

Remaining risks and challenges

The completion of all required tests SIT not completed before the end of the biennium

Actions to mitigate risk: Close follow up on the testing activities and engagement with the research team to mitigate the deadlines

Status: On Track

Delays in building capacity for the countries in implementing the technology once the SIT efficiency on the diseases is proven.

Actions to mitigate risk: Development of training packages through MOOC or other materials

Status: On Track

Contributions towards TDR key performance indicators

Partnerships and collaborations:

WHO/NTD; the International Atomic Energy Agency (IAEA); the US CDC Fort Collins

Complimentary roles: The complementary roles of the partners is established through the Grant Agreement between WHO and CDC, as follow: CDC the funder also provides technical support, TDR coordinates and manages the research projects.

Estimated leverage created by this ER:

Staff and material supported by the partners and the countries, including but not limited to new facilities for rearing the mosquitoes, irradiator for sterilizing males, technical staff hired by the countries.

Estimated leverage amount: (US$): 2,000,000

Number of people working on projects: 50

Gender aspects and vulnerable populations:

Gender and geographical equities are taken into account in all activities among which the building of the ad hoc review groups, the consultancies and in the selection criteria of the research teams. The outcomes and outputs of the projects will benefit to populations from LMICs some of them belonging to vulnerable and very poor populations. The impact of the innovation will affect equally all gender in respect to some arboviral diseases such as dengue and chikungunya, but will also have a stronger impact on the pregnant women and their babies affected by Zika virus.

Training:

- 1 side-event for training on communication activities around SIT to be supported as part of a training event from the Mosquito Control Associations.

Strengthened institutions and/or networks:

- Ministries of Health and Vector Control Departments of French Polynesia and Cook Islands were strenghtened through this project. The following institutions and MoHs from LMICs were represented at the training workshops: Institut Louis Malardé, French Polynesia; Ministry of Health, Cook Islands, University of Malaysia; University of Indonesia; Institut de Recherches Scientifique en Santé from Burkina Faso; University of Nairobi, Kenya, Moscamed, Fortalezza, Brazil, Ministry of Health of Sri-Lanka, National Environmental Agency, Singapore.

Publications:

Several publications. See list in Annex 1 – ER 1.3.12

Results dissemination and uptake:

To ensure the uptake of the findings and their application into countries, the different activities performed through this ER are involving since the planning stage the relevant stakeholders. The

partners of the ER, namely US-CDC, IAEA and NTD/WHO also have their own channels to provide recommendations to countries based on the findings.

Plans for 2025

The testing of SIT will continue over 2025 in French Polynesia and the Cook Islands with weekly releases of sterile mosquitoes and weekly collection of entomological data. Surveys of epidemiological data will be conducted every 3 months to assess the impact of the technology on the diseases.

The results of SIT testing will be presented at the WHO VCQG in the second session of 2025.

1.3.15: VBD prevention and control for vulnerable and hard to reach population

This is a new ER but partially building on some work initiated in the last biennium under funding from Strategic Development Fund.

Rationale:

Although there has been tremendous progress in the control of vector-borne diseases (VBDs), these diseases together with other infectious diseases are still causing enormous burden, especially to the more vulnerable populations already facing several challenges such as poverty and displacements. The complex interconnection between different socio-economic aspects and the determinants of health and vulnerability to VBDs require further extensive attention.

The proposed activity will address the challenges linked to vulnerabilities in VBD prevention and control through the following objectives:

1) Better understand the relationships between VBDs and vulnerabilities from poverty, mobility, and other social determinants.

2) Investigate through case studies the vulnerabilities and which solutions can be implemented for VBDs prevention and control.

3) Address vulnerabilities through effective intervention and strategies that can reach the underserved populations in LMICs in order to accelerate universal health coverage. The project is aiming to develop knowledge and skills base and demonstrate how access to health care for vulnerable, hard-to-reach and underserved populations can be improved.

Design and methodology:

The first phase of the project will focus on definitions and factors of vulnerabilities in a range of different situation including but not limited to hard to reach populations, migrants, displaced population either for political unrest or climatic changes. Based on the findings, the project will convey group(s) of experts to develop strategies to increase health care access and improve health outcomes according to context and specificities of the populations. In a second phase of the project, approaches and strategies will be tested through case studies. The lessons learned

from these interventions will then provide the basis for a good practice document for reaching the more vulnerable population and giving them better access to health. Ultimately, the project will engage and empower communities, develop implementation research leadership capacity in local institutions and promote uptake of research findings into policy and practice in countries.

Progress in the current year

Outcomes

Improved access to VBDs prevention and control in vulnerable populations

Progress: Research is ongoing to provide the evidence needed to advance this outcome.

Better knowledge of the factors of vulnerability in prevention and control of VBDs

Progress: Collection of evidence is currently ongoing through one case study on the relationships between VBDs.

Outputs

Guidance document on factors of vulnerabilities and handling/strategies to mitigate them on prevention and control of VBDs.

Progress: The landscape analysis on the factors of vulnerability has been completed and is now under review for publication.

Organization of a workshop and publication of scientific articles on vulnerabilities against VBDs.

Progress:

Two research projects on vulnerable populations have started and one is completed. The 2 research projects are:

1) Access to malaria diagnostic and treatment for hard to reach population which are the illegal gold miners in the Amazon forest. This project called malakit has been completed and results are in publication. Additional work has been initiated on the transfer of the malakit approach to vulnerable and hard to reach populations also working in gold mining in Senegal.

2) Access to better prevention and control of dengue in the biggest open dump of Brasilia through improved sanitation and waste management.

Remaining risks and challenges

Funding not raised for full activities

Actions to mitigate risk: Engagement with funders having specific targets on vulnerabilities

Status: On Track

Delays in the implementation of the activities

Actions to mitigate risk: Close follow up of the activities

Status: On Track

Contributions towards TDR key performance indicators

Partnerships and collaborations:

NTD/WHO, CDC China, AFRO, PAHO

Complimentary roles: Technical and geographical complementarity of the partners

Estimated leverage created by this ER:

Staff and material provided by the contracted research institutions including but not limited to travels to the study areas, materials such as traps and technical staff hired by the countries, students working on the project but not payed by the projects.

Estimated leverage amount: (US$): 500,000

Number of people working on projects: 25

Gender aspects and vulnerable populations:

Gender and geographical equity will be addressed and based on vulnerabilities according to the contexts.

Training:

Several training activities are orgoing within the project, from weekly training for community members, to Matsers and Ph.D. students at the University of Brasilia and one Post-Doc training for one of the scientists at University of Queensland, Australia.

Strengthened institutions and/or networks:

University of Brasilia, Brazil and Ministry of health of Brazil, National malaria control Program from Senegal, Ministry of Health from Senegal.

Publications

Documents on relationship between poverty and VBDs on track. 6 scientific publications will be submitted in a Special Issue of the Journal of Tropical Medicine and Infectious Diseases.

Results dissemination and uptake:

To ensure uptake of findings for more adequate tools and better access of the vulnerable populations to VBDs prevention and control, partnership will be established with stakeholders and communities and research and capacity building activities will be essential component of the ER.

Plans for 2025

The research project to test the transfer of the malakit approach to vulnerable and hard to reach populations also working in gold mining in Senegal will be conducted all over 2025.

The research project on the impact of poverty on vector-borne diseases in the biggest open dump of South-America, in Brasilia, will continue over the first half of 2025.

1.3.3: Population health vulnerabilities to VBDs: Increasing resilience under climate change conditions (Operationalizing a One Health Approach for the Control of VBDs in the Context of Climate Change)

Rationale:

This Expected Result (ER) is about generating evidence to enable the development of innovative strategies to reduce VBD-related human vulnerability and to increase resilience of African populations to VBD-related health threats with using a One-Health approach. It aims to broaden and extend knowledge, research capacity, collaboration and policy advice products that can be used throughout Africa and other regions. Operationalizing One Health combines well-documented, evidence-based principles and practices that specifically address the problem of population's vulnerability. It is widely agreed among international development agencies, medical and public health scientists that One Health can contribute significantly to global health in this regard. In July 2022, a joint call of proposal was launched by TDR in collaboration with WHO Neglected disease department and the focal persons for climate & Health and for One-Health approach of the regional office of the WHO for Africa for consortiums of collaborating institutions in Africa to address One Health implementation research priorities for VBDs in the context of climate change.

Design and methodology:

In July 2022, a joint call of proposal was launched by TDR in collaboration with WHO Neglected disease department and the focal persons for climate & Health and for One-Health approach of the regional office of the WHO for Africa for consortiums of collaborating institutions in Africa to address One Health implementation research priorities for VBDs in the context of climate change.

Progress in the current year

Outcomes

Scaled-up application of the One Health Transdisciplinary Ecosytem Approach for Vector Borne Diseases and other infectious diseases in the context of climate change

Progress: Evidence to support the scale up of the One Health approach in the context of climate change being built up through the different implementation research projects.

Outputs

Conduct of One Health research projects for the control of VBDs in the context of climate change

Progress: The four research proposals selected in 2022 to address One Health implementation research priorities for Vector borne diseases (VBDs) in the context of climate change in Africa have been progressing well.

Project 1 - Strengthening surveillance of leishmaniasis in Uganda and Kenya through a collaborative multisectoral One Health capacity building approach in endemic foci (Uganda and Kenya): This study is conducted by the Makerere University, the University of Nairobi, Africa One Health University Network (AFROHUN) Uganda and the Kenya Medical Research Institute (KEMRI). This study aims to identify leishmaniasis hotspots and decipher the risks and climate factors associated with the disease within endemic foci using retrospective passive and active screening data in humans and animals, as well as climate data.

Project 2 - Enhancing One Health surveillance and control of vector-borne diseases related to climate change in the West Africa region (Senegal and Nigeria): This study is conducted by the Institute Pasteur Dakar (IPD) and the Nigerian Institute of Medical Research (NIMR). The study aims to jointly undertake mixed retrospective-prospective research to determine the effect of climate change on mosquito borne disease emergence, outbreaks and spread in Senegal and Nigeria and establish a process for the systematic translation of strategies for prevention, preparedness, and response, which can then be extended to other parts of West Africa.

Project 3 - One Health approach to controlling and understanding the dynamics of fascioliasis and schistosomiasis in the context of climate change (Tanzania and Rwanda): This study is conducted by the Kilimanjaro Clinical Research Institute (KCRI), the Tanzania Plant Health and Pesticides Authority (TPHPA) and the University of Rwanda. The aim of this study is to co-develop comprehensive One Health approaches in Tanzania and Rwanda to tackle the complex transmission-enabling environment of the snail-borne trematodiases around fresh water-sources.

Project 4 - Application of a One Health approach for reducing the burden of vector-borne diseases in vulnerable communities in the context of climate change (South Africa and Rwanda): This study is conducted by the University of Kwazulu-Natal and the University of Global Health Equity. The aim of this study is to develop metrics, a One Health implementation guide and a collaborative platform for the evaluation of One Health-based schistosomiasis prevention and control projects. The study builds on previous models and will develop novel One Health operationalization metrics relevant for the prevention and control of schistosomiasis in the context of climate change among vulnerable communities. The findings of this exercise will be applicable to a broader range of One Health and Vector borne Disease settings. The collaborative platform will strengthen partnerships among African scientists and research institutions in the field of One Health for the prevention and control of VBDs in the context of climate change among vulnerable communities in Africa.

Six posters/oral presentations were accepted to share research results at the One Health World Conference (Cape Town, 19-23 Sept 2024). Corresponding manuscripts at at a drafting stage and should be submited by the end of 2024.

Remaining risks and challenges

Health researchers and other stakeholders may encounter challenges in working under transdisciplinary circumstances (e.g. across different disciplines, knowledge sources and other multisectoral partners).

Actions to mitigate risk: The transdisciplinary approach will be promoted and advocated for from the onset as an essential aspect required of the proposals and throughout the projects. The online training course will also supplement the implementation of the research projects.

Status: On Track

Knowledge translation outcomes may usually not be under the control or influence of the projects, particularly those in the decision- and policy-making positions.

Actions to mitigate risk: For this research programme, stakeholders, including from the affected communities and policy/decision-makers, will be engaged from the very beginning at the inception and during the course and completion of the research projects to ensure their active involvement in conducting and reporting on the research on the research with the expectation that the results will be utilized as effectively as possible. It is anticipated that the periodic review of successes and failures of the projects and of the implementation of the research programme will allow timely remediation to potential problems that might occur during the course of the implementation of the projects.

Status: On Track

Contributions towards TDR key performance indicators

Partnerships and collaborations:

WHO-CCH, WHO-AFRO, WHO-NTD, Makerere University, University of Nairobi, Africa One Health University Network (AFROHUN), Ministry of Health-Uganda, Daktari NGO Spain, Institute Pasteur Dakar (IPD), Nigerian Institute of Medical Research (NIMR),

Complimentary roles: TDR partners add complementary value and contribution to achieving TDR strategy.

Estimated leverage created by this ER:

Estimated leverage amount: (US$): None

Number of people working on projects: 46

Gender aspects and vulnerable populations:

All proposals follow gender-sensitive approaches, with all research activities having an explicit gender perspective/framework and taking into account possible gender differentials in the epidemiology and transmission of VBDs and will, if possible and appropriate, define gender-sensitive approaches to the community-based adaptation strategies to reduce population health vulnerabilities. This perspective is further stressed in the call for proposals and during proposed training and workshops where the participation of women researchers is actively encouraged. Best approaches to engage women in programmes and activities aimed at climate change adaptation for health and reduced risk for VBDs will also be addressed. The ration male to female is 3.18

Training:

A curriculum was created for a One Health course on Leishmaniasis by Makerere University, College of Veterinary Medicine, Animal Resources and Biosecurity and Centre for Biosecurity and Global Health. Frontline workers were concurrently trained. Under the Uganda-Kenya project, MSc students on the WHO-TDR project, laboratory technicians and Entomologists were trained in the diagnosis of leishmaniasis through ELISA diagnosis training and DNA extraction training.

Strengthened institutions and/or networks: Inter-institutions collaboration strenghtened

Publications

Six posters/oral presentations were presented at the One Health World Conference (Cape Town, 19-23 Sept 2024). Publications manuscripts in preparation.

Results dissemination and uptake:

TDR and collaborating research institutions will conduct networking and policy-advice activities to promote the products generated from the research programme:

a) Translation and dissemination of scientific knowledge, evidence and adaptation tools and strategies generated through partnership and networking (south-south and north-south). Project recipients will facilitate the transfer of research findings to various user groups including academics, policymakers and the public through a range of means including via TDR, projects and partner websites. They will present the results in relevant fora and national dialogues and publish the results in scientific journals from the various disciplines of the investigators, as well as through interdisciplinary publication channels. TDR and collaborators will also produce scientific synthesis and research summaries on the research results;

b) Promotion of research-to-policy uptake of the research results by engaging in researcher, practitioner and policy dialogues at local and national levels through research-to-policy dialogue, policy documents, media, involving policymakers in research meetings/workshops, implementation and evaluation of the projects, strategy events such as Community of Practice meetings and stakeholder consultations;

c) Enhancement of public awareness of climate change adaptation options by communicating research findings to communities, health officials and policymakers through various means (including publications, feedback seminars, dissemination of scientific results to the general public, popularization of research findings by the media in collaboration with research institutions using films and other forms of documentation);

d) Promotion of intersectoral collaboration by integration of representatives of other sectors in the transdisciplinary research activities and in the research meeting process; and

e) Undertake monitoring and evaluation activities (internal and external M&E) to ensure that expected outputs and outcomes are achieved in line with project objectives. In collaboration with the researchers, TDR's communications team and IDRC, the results of the programme will be widely disseminated using various means. The overall performance of the programme will be monitored and evaluated by TDR. In addition to the annual report, TDR activities are reported in the TDR newsletter and on its website.

Plans for 2025

In 2025, we plan to support the four consortia in the valorization of the study results through peer review publications. We will build on the study results to develop implementation research projects piloting mitigation strategies to climate change.

Progress summary on previous expected results

ER 1.3.11: Multisectoral approaches:

The ER closed in December 2023, but the two final achievements was reached in 2024:

- Final workshop to present the findings of the research projects on multisectoral approaches (MSAs) for the prevention and control of vector-borne diseases (VBDs) including malaria and arboviral diseases was held in Brazil in June 2024, and attended by participants from Ministries of Health and Research Institutions from 11 countries from 4 WHO regions.
- Modules 1 to 2 of the MOOC on MSA available online, while modules 3 and 4 will be added early 2025.

Budget and financial implementation

Table 2. Approved Programme Budget 2024–2025 and funds utilized

Expected result	Research for implementation	2024-2025											
		$40m scenario			$50m scenario			Revised planned costs at Jan 2025			Implementation at 31 December 2024		
		UD	DF	Total	UD	DF	Total	UD	DF	Total	UD	DF	Total
	Research for decision-making												
1.1.4	Country resilience to the threat of drug-resistant infections	300 000	200 000	500 000	500 000	700 000	1 200 000	300 000	200 000	500 000	163 546	0	163 546
1.1.7	Maximized utilization of data for public health decision-making	400 000	500 000	900 000	500 000	900 000	1 400 000	400 000	573 000	973 000	205 452	273 668	479 120
1.2.1	Strategies to achieve and sustain disease elimination	540 000	100 000	640 000	1 300 000	300 000	1 600 000	540 000	100 000	640 000	166 564	2 000	168 564
1.3.3	One Health approach for the control of vector-borne diseases in the context of climate change	400 000	500 000	900 000	600 000	600 000	1 200 000	400 000	100 000	500 000	170 007	0	170 007
	Research for delivery and access												
1.2.6	Optimized approaches for effective delivery and impact assessment of public health interventions	600 000	1 500 000	2 100 000	1 050 000	1 700 000	2 750 000	600 000	2 300 000	2 900 000	134 217	667 017	801 234
1.3.10	Urban health interventions for vector-borne and other infectious diseases of poverty	150 000	100 000	250 000	250 000	200 000	450 000	150 000	100 000	250 000	0	0	0
1.3.12	Strategies to promote gender-responsive health interventions	300 000	100 000	400 000	500 000	200 000	700 000	362 000	100 000	462 000	104 957	0	104 957
1.3.15	Vector-borne disease prevention and control for vulnerable and hard to reach populations	200 000	200 000	400 000	500 000	300 000	800 000	310 000	100 000	410 000	191 739	2 436	194 175
	Research for innovative solutions												
1.1.1	Country preparedness for disease outbreaks	150 000	500 000	650 000	200 000	500 000	700 000	150 000	100 000	250 000	83 958	0	83 958
1.1.5	Directions for development and accelerated access to new tools and strategies	160 000	0	160 000	300 000	0	300 000	160 000	0	160 000	27 807	0	27 807
1.3.14	Testing of innovative strategies for vector control	200 000	700 000	900 000	300 000	1 350 000	1 650 000	200 000	800 000	1 000 000	193 273	169 764	363 037
	Total	**3 400 000**	**4 400 000**	**7 800 000**	**6 000 000**	**6 750 000**	**12 750 000**	**3 572 000**	**4 473 000**	**8 045 000**	**1 441 519**	**1 114 886**	**2 556 404**

Table 3. Proposed Programme Budget 2026–2027

Expected result	Research for implementation	2026-2027					
		$40m scenario			$50m scenario		
		UD	DF	Total	UD	DF	Total
	Research for decision-making						
1.1.4	Country resilience to the threat of drug-resistant infections	245 000	300 000	545 000	500 000	700 000	1 200 000
1.1.7	Maximized utilization of data for public health decision-making	300 000	800 000	1 100 000	450 000	900 000	1 350 000
1.2.1	Strategies to achieve and sustain disease elimination	415 000	500 000	915 000	800 000	500 000	1 300 000
1.3.3	One Health approach for the control of vector-borne diseases in the context of climate change	300 000	400 000	700 000	600 000	600 000	1 200 000
	Research for delivery and access	0	0		0	0	
1.2.6	Optimized approaches for effective delivery and impact assessment of public health interventions	465 000	1 500 000	1 965 000	1 000 000	1 700 000	2 700 000
1.2.8	Research for innovative solutions	120 000	120 000	240 000	250 000	300 000	550 000
1.3.10	Urban health interventions for vector-borne and other infectious diseases of poverty	125 000	150 000	275 000	350 000	400 000	750 000
1.3.12	Strategies to promote gender-responsive health interventions	245 000	300 000	545 000	450 000	350 000	800 000
1.3.15	Vector-borne disease prevention and control for vulnerable and hard to reach populations	165 000	150 000	315 000	350 000	400 000	750 000
	Research for innovative solutions	0	0		0	0	
1.1.1	Country preparedness for disease outbreaks	155 000	180 000	335 000	300 000	450 000	750 000
1.1.5	Directions for development and accelerated access to new tools and strategies	100 000	0	100 000	180 000	0	180 000
1.3.14	Testing of innovative strategies for vector control	165 000	800 000	965 000	270 000	1 200 000	1 470 000
	Total	**2 800 000**	**5 200 000**	**8 000 000**	**5 500 000**	**7 500 000**	**13 000 000**

Projects and activities funded

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Diseases/Global health challenges/Research topic	Countries involved
P22-00608	Chris Rixson	ARCTECH INNOVATION LIMITED	Maintenance and further development of the Global Atlas of Medical Entomology Schooling (GAMES) on the Global Vector Hub	3,783	Epidemics and outbreaks; Control and elimination of diseases of poverty; Vector-borne diseases	United Kingdom of Great Britain and Northern Ireland
P22-00718	Chandani Kharel	Individual	Facilitate and support the implementation of a number of projects of the gender and infectious disease portfolio	40,000	Gender; Implementation research	Pakistan
P22-00751	Nadisha Sidhu	Individual	Facilitate and contribute to the One Health portfolio of projects	44,000	Climate and environment	India
P22-00851	Anand Ballabh Joshi	PUBLIC HEALTH AND INFECTIOUS DISEASE RESEARCH CENTRE (PHIDRC)	Micro stratification of Visceral Leishmaniasis (VL) Endemic Areas to Identify Hotspots and Disease Shifting Pattern in Nepal	971	Visceral leishmaniasis	Nepal
P22-00855	Josélyne NSANZERUGEZE	PROGRAMME NATIONAL INTEGRE LEPRE ET TUBERCULOSE (PNILT)	Support to NTP activities in Burundi for mitigating the impact of TB through social protection.	10,699	Tuberculosis	Burundi
P22-00865	Dr Shomik Maruf	ICDDR,B (INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH)	Micro stratification of Visceral Leishmaniasis (VL) Endemic Areas to Identify Hotspots and Disease Shifting Pattern in Bangladesh	840	Visceral leishmaniasis	Bangladesh
P23-00945	Nolwenn Conan	Individual	Addressing the yellow fever immunization gaps by improving its assessment in targeted countries.	18,000	Epidemics and outbreaks; Arboviral diseases	Cameroun
P23-00951	Asrat Mekuria	UNIVERSITY OF GONDAR	Assessing programme capacities in visceral leishmaniasis-endemic countries in East Africa to implement WHOs treatment recommendations towards achieving universal health coverage and NTD roadmap targets	43,314	Visceral leishmaniasis	Yemen, Sudan, South Sudan
P23-00985	Herve Bossin	INSTITUT LOUIS MALARDE	PAcific Islands Consortium for the Evaluation of Aedes SIT (PAC-SIT).	166,365	Epidemics and outbreaks; Control and elimination of diseases of poverty; Arboviral diseases	Chile; Cook Islands; French Polynesia
P23-00987	Emmanuelle Papot	Individual	Support to TDR projects of implementation research on diseases of poverty in LMIC	44,910	Control and elimination of diseases of poverty; Tuberculosis	Several african countries
P23-01008		INSTITUT AFRICAIN DE SANTE PUBLIQUE	Second Structured Operational Research and Training Initiative (SORT IT) on Neglected Tropical Diseases (NTDs) including snakebite in West Africa	12,584	Not Disease-Specific	West Africa
P23-01098	Annette Kuesel	Individual	Conducting TDR project activities specified in the MDGH-WHO donor agreement	1	Onchocerciasis	DRC, Cote d'Ivoire, Ghana
P23-01122	Marcos Takashi Obara	UNIVERSITY OF BRASILIA - UNB	Zika, Dengue and Chikungunya: multisectoral approach for developing solutions applicable in public health by exploring the link between Poverty and Vector-Borne Diseases.	7,000	Epidemics and outbreaks; Control and elimination of diseases of poverty;	Brazil

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Diseases/Global health challenges/Research topic	Countries involved
					Climate change's impact on health; Arboviral diseases	
P23-01125	Miguel Antonio Salazaar	ALLIANCE FOR IMPROVING HEALTH OUTCOMES, INC.	"Intersectionalities of gender, social disparities and antimicrobial resistance (AMR) in the Philippines: a scoping review and research gap analysis from a health policy and systems research perspective.	4,978	Resistance to treatment and control agents	Philippines
P23-01126	ESMITA CHARANI	UNIVERSITY OF CAPE TOWN	Investigating the intersection of gender and other sociocultural determinants of health and antimicrobial resistance in a changing climate: A mixed methods study in South Africa and India	4,989	Climate change's impact on health; Resistance to treatment and control agents	South Africa
P23-01127	Maryam Khazaee-Pool	MAZANDARAN UNIVERSITY OF MEDICAL SCIENCES	Modeling the influence of climatic variability and gender with other social stratifies on the morbidity and mortality trends of malaria in Sistan & Baluchestan province, Iran: a Bayesian hierarchical mapping and systematic review	50,000	Climate change's impact on health	Iran (Islamic Republic of)
P23-01132	Yuvaraj Krishnamoorthy	PROPUL EVIDENCE LLP	"Intersecting Vulnerabilities: Investigating Gender, Antimicrobial Resistance, and Climate Change Influences on Infectious Disease Dynamics among Marginalized Populations in LMICs"	4,990	Climate change's impact on health; Resistance to treatment and control agents	India
P23-01135	Chuchu Churko	ARBA MINCH UNIVERSITY COLLABORATIVE RESEARCH AND TRAINING CENTER FOR NEGLECTED TROPICAL DISEASES (AMU CRTC - NTD)	To support the NTD Programme outbreak response in generating critical data for targeted interventions (VL outbreak assessement).	824	Epidemics and outbreaks; Control and elimination of diseases of poverty; Visceral leishmaniasis	
P23-01155	Paul Kazyoba	NATIONAL INSTITUTE FOR MEDICAL RESEARCH	Support for baseline parasitological assessment of pediatric schistosomiasis in three district councils identified for pilot deployment of pediatric praziquantel in Tanzania	3,008	Control and elimination of diseases of poverty; Neglected Tropical Diseases; Schistosomiasis	United Republic of Tanzania
P23-01156	Dieynaba Sophie N'diaye	N' DIAYE, DOCTOR DIEYNABA SOPHIE	Technical assistance for health economic study development and study analysis	7,250	Control and elimination of diseases of poverty; Neglected Tropical Diseases; Schistosomiasis; Tuberculosis	United Republic of Tanzania
P23-01182	Muhammed Lamin Darboe	NATIONAL LEPROSY AND TUBERCULOSIS CONTROL PROGRAM	Support to NTP activities for using digital technologies to support the TB response in the Gambia.	9,443	Tuberculosis	Gambia
P24-01227	Jacklyne Ashubwe-Jalemba	Individual	Providing mentoring and senior knowledge management expertise for implementing the SORT IT for emergency preparedness and health systems strengthening to tackle Ebola and Emerging Infections in West & Central Africa	3,000	Epidemics and outbreaks; Ebola	Democratic Republic of the Congo; Guinea; Kenya; Liberia; Sierra Leone
P24-01229	Selma Dar Berger	THE UNION	Providing senior technical expertise for a SORT IT for emergency preparedness and health systems strengthening to tackle Emerging Infections and outbreaks in West and Central Africa	15,500	Epidemics and outbreaks; COVID-19; Ebola	France
P24-01233	Selma Dar Berger	THE UNION	Databases, metrics and archives on SORT IT activities and performance standards: courses, participants, facilitators, milestones, outcomes, publications, impact and other relevant materials - (2024/2025)	28,600	Control and elimination of diseases of poverty; Resistance to treatment and control agents; Neglected Tropical Diseases	France

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Diseases/Global health challenges/Research topic	Countries involved
P24-01234	Jean-Louis Ndiaye	UFR SANTÉ / UNIVERSITY DE THIES	Organization of a national dialogue meeting for the introduction of Malaria vaccines in Senegal	17,182	Control and elimination of diseases of poverty; Malaria; Vector-borne diseases	Senegal
P24-01237	Hayk Datvyan	TUBERKULOZI HETAZOTUTYUNNERI YEV KANKHARGELMAN KENTRON	Providing technical and software support for maintenance and adaptation of the virtual SORT IT platform (e-SORT IT) in 2024	12,000	Epidemics and outbreaks; Control and elimination of diseases of poverty; Resistance to treatment and control agents	France
P24-01240	Selma Dar Berger	THE UNION	Senior level expertise & tech support for the implementation of a path?finder project for assessing and managing disability, co-?morbidities and risk factors associated with tuberculosis after completing TB treatment in China	22,000	Control and elimination of diseases of poverty; Tuberculosis	China
P24-01241		EVERWELL HEALTH SOLUTIONS PRIVATE LIMITED	Adaptation of the 99DOTS platform for its use in security compromised districts in Burkina Faso	17,873	Control and elimination of diseases of poverty; Tuberculosis	India
P24-01242	Paul Kazyoba	NATIONAL INSTITUTE FOR MEDICAL RESEARCH	Support for implementing the CASA strategy in preparation of the introduction of the pediatric formulation of praziquantel	49,093	Control and elimination of diseases of poverty; Neglected Tropical Diseases; Schistosomiasis	United Republic of Tanzania
P24-01244	Yacine MAR DIOP	PROGRAMME NATIONAL DE LUTTE CONTRE LA TUBERCULOSE (PLNT)	Support to NTP activities for implementing VOT in for hard-to-reach population in Senegal	38,687	Control and elimination of diseases of poverty; Tuberculosis	Senegal
P24-01245	Adjima Combary	PROGRAMME NATIONAL DE LUTTE CONTRE LA TUBERCULOSE (PLNT)	Use of a digital tool (99DOTS) to improve TB treatment adherence of patients living in areas where the security is compromised in Burkina Faso	16,847	Control and elimination of diseases of poverty; Tuberculosis	Burkina Faso
P24-01249	Anthony D. Harries	HARRIES, DR ANTHONY	Providing senior (second-line) operational research and subject matter expertise for the Structured Operational Research and Training Initiative (SORT IT) on pandemics and antimicrobial resistance in Low- and Middle-Income Countries.	11,000	Epidemics and outbreaks; Resistance to treatment and control agents; One Health; COVID-19; Ebola	United Kingdom of Great Britain and Northern Ireland
P24-01252	Paul Milligan	Individual	Support for the development of a research package for the introduction of malaria vaccine	20,000	Malaria	Several african countries
P24-01253		AMAYA AMAYA, DOCTOR MIRNA PATRICIA	Support update of TDR Intersectional gender research product and equity in science database	28,000	Intersectional gender research	
P24-01254	Paul Kazyoba	NATIONAL INSTITUTE FOR MEDICAL RESEARCH	Training of front line and health workers for arPZQ delivery	37,502	Control and elimination of diseases of poverty; Schistosomiasis	United Republic of Tanzania
P24-01258	Robert Alhassan	UNIVERSITY OF HEALTH AND ALLIED SCIENCES	Baseline measurement of drug uptake acceptability for the standard treatment used for controlling onchocerciasis (ivermectin)	44,789	Control and elimination of diseases of poverty; Onchocerciasis	Ghana
P24-01261	Robert Alhassan	UNIVERSITY OF HEALTH AND ALLIED SCIENCES	Community engagement for mass drug administration to control onchocerciasis	19,107	Control and elimination of diseases of poverty; Onchocerciasis	Ghana
P24-01265	Salimata Gueye	PROGRAMME NATIONAL DE LUTTE CONTRE LE PALUDISME (PNLP)	Le developpement d'une collaboration entre le PNLP du Senegal et le CIC Inserm de Guyane pour transfert de technologie en vue de mettre en reuvre le projet "Malakit' aupres des orpailleurs de la region de Kedougou.	12,200	Control and elimination of diseases of poverty; Malaria	Senegal

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Diseases/Global health challenges/Research topic	Countries involved
P24-01274	Ronald Thulani Ncube	UNION ZIMBABWE TRUST	Financial management support for in-country expenses: operational research project for managing disability, co-morbidities and risk factors associated with tuberculosis in Zimbabwe (phase 2)	18,000	Control and elimination of diseases of poverty; Tuberculosis	Zimbabwe
P24-01275	Monde Muyoyeta	CENTRE FOR INFECTIOUS DISEASE RESEARCH IN ZAMBIA	Financial management support for in-country expenses: operational research project for managing disability, co-morbidities and risk factors associated with tuberculosis in Zambia (Phase 2)	18,000	Control and elimination of diseases of poverty; Tuberculosis	Zambia
P24-01276	Pruthu Thekkur Kalasappa	Individual	Development of databases and quality assurance: operational research project for managing disability, co-morbidities and risk factors associated with tuberculosis in Kenya and Uganda (Phase 2)	9,600	Control and elimination of diseases of poverty; Tuberculosis	India
P24-01277	Divya Nair	Individual	Development of databases and quality assurance: operational research project for managing disability, co-morbidities and risk factors associated with tuberculosis in Zambia, and Zimbabwe (Phase 2)	9,600	Control and elimination of diseases of poverty; Tuberculosis	India
P24-01278	Jeremiah Chakaya	RESPIRATORY SOCIETY OF KENYA	Financial management support for in-country expenses: operational research project for managing disability, co-morbidities and risk factors associated with tuberculosis in Kenya (Phase 2)	18,000	Control and elimination of diseases of poverty; Tuberculosis	Kenya
P24-01279	Selma Dar Berger	THE UNION	2024 - Senior level technical support & training of health staff	27,000	Control and elimination of diseases of poverty; Tuberculosis	France
P24-01281	John Paul Dongo	INTERNATIONAL UNION AGAINST TUBERCULOSIS AND LUNG DISEASE UGANDA (THE UNION)	Financial management support for in-country expenses: operational research project for managing disability, co-morbidities and risk factors associated with tuberculosis in Uganda (phase 2)	18,865	Control and elimination of diseases of poverty; Tuberculosis	Uganda
P24-01287		MONOMOTAPA HOTEL C/O AFRICANSUN PVT LTD	Providing logistics, accommodation and conferencing support for implementing the Structured Operational Research and Training Initiative (SORT IT) on Phase-II of TB ?associated disability workshop	10,855	Control and elimination of diseases of poverty; Tuberculosis	Zimbabwe
P24-01288	Maggie Zhang	SPRINGER NATURE CUSTOMER SERVICE CENTER GMBH	Special issue for Publications of articles from the presentations delivered at the TDR Sterile Insect Technology Workshop, held 2 to 6 Mau 2023 in Papeete, French Polynesia.	42,880	Epidemics and outbreaks; Control and elimination of diseases of poverty; Arboviral diseases	Australia; Brazil; Burkina Faso; China; Cook Islands; Cuba; France; French Polynesia; India; Indonesia; Sri Lanka; Switzerland; United States of America
P24-01298	Hayk Datvyan	Individual	Enhancing Technical and Training Support for Virtual SORT IT Platform Operations in SORT IT Courses	7,000	Epidemics and outbreaks; Control and elimination of diseases of poverty; Resistance to treatment and control agents	Armenia
P24-01299	Eleonora Flacio	SCUOLA UNIVERSITARIA PROFESSIONALE DELLA SVIZZER A I TALIANA	Technical support for the finalization of SIT documentations including the Landscape Analysis for SIT within other vector control tools, the assessment of Caribbean capacities to test SIT against Aedes-borne diseases....	36,630	Epidemics and outbreaks; Control and elimination of diseases of poverty; Arboviruses	Cook Islands; Cuba; United States of America
P24-01300	Raíssa Vieira	H PLUS ADMINISTRACAO E HOTELARIA LTDA	Technical and logistics support for the planning/organization/implementation of TDR/WHO Workshop on the	15,776	Control and elimination of diseases of poverty; Arboviral diseases	Benin; Brazil; Burkina Faso; China; Ecuador; France; Netherlands; Peru; Senegal

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Diseases/Global health challenges/Research topic	Countries involved
			Multisectoral Approaches for prevention and control of vector-borne diseases.			
P24-01303	Magha Raj Banjara	Individual	Management of implementation research projects in the scope of research in support of visceral leishmaniasis elimination in Indian subcontinent	5,720	Visceral leishmaniasis	Bangladesh; Nepal
P24-01303	Magha Raj Banjara	Individual	Management and Support of implementation research projects in the scope of research in support of visceral leishmaniasis elimination in Indian subcontinent	9,500	Visceral leishmaniasis	Bangladesh; Nepal
P24-01307	Jacklyne Ashubwe-Jalemba	Individual	Module 4: Communication of research findings. June 3 – 7, 2024 Nairobi, Kenya. SORT IT for emergency preparedness and health systems strengthening to tackle Ebola and Emerging g Infections in West and Central Africa	6,125	Epidemics and outbreaks; Ebola	Democratic Republic of the Congo; Guinea; Kenya; Liberia; Sierra Leone
P24-01308	Jamie Guth	Individual	Module 4: Communication of research findings. June 3 – 7, 2024 Nairobi, Kenya. SORT IT for emergency preparedness and health systems strengthening to tackle Ebola and Emerging g Infections in West and Central Africa	875	Epidemics and outbreaks; Ebola	Democratic Republic of the Congo; Guinea; Kenya; Liberia; Sierra Leone
P24-01309	Nasreen Saleem Jessani	Individual	Module 4: Communication of research findings. June 3 – 7, 2024 Nairobi, Kenya. SORT IT for emergency preparedness and health systems strengthening to tackle Ebola and Emerging g Infections in West and Central Africa	3,500	Epidemics and outbreaks; Ebola	Democratic Republic of the Congo; Guinea; Kenya; Liberia; Sierra Leone
P24-01310	Ravi Ram	Individual	Module 4: Communication of research findings. June 3 – 7, 2024 Nairobi, Kenya. SORT IT for emergency preparedness and health systems strengthening to tackle Ebola and Emerging g Infections in West and Central Africa	3,500	Epidemics and outbreaks; Ebola	Democratic Republic of the Congo; Guinea; Kenya; Liberia; Sierra Leone
P24-01311	Andrew R. C. Ramsay	Individual	Module 4: Communication of research findings. June 3 – 7, 2024 Nairobi, Kenya. SORT IT for emergency preparedness and health systems strengthening to tackle Ebola and Emerging g Infections in West and Central Africa	3,500	Epidemics and outbreaks; Ebola	Democratic Republic of the Congo; Guinea; Kenya; Liberia; Sierra Leone
P24-01312	Soumik Kha Sagar	ICDDR,B (INTERNATIONAL CENTRE FOR DIARRHOEAL DISEASE RESEARCH)	Introduction of case detection with visceral leishmaniasis and Post Kala-azar Dermal Leishmaniasis in Non-programmatic Upazila Health Complexes in Bangladesh: Feasibility, acceptability and cost	49,990	Visceral leishmaniasis	Bangladesh
P24-01313	Anand Ballabh Joshi	PUBLIC HEALTH AND INFECTIOUS DISEASE RESEARCH CENTRE (PHIDRC)	Active surveillance for visceral leishmaniasis in selected new foci districts in Nepal: feasibility, acceptability and cost	49,750	Visceral leishmaniasis	Nepal
P24-01317	Martin Wambugu	WARIDI PARADISE LTD	Providing logistics, accommodation and conferencing support for implementing the SORT IT on emerging infections in West and Central Africa from 3-7 June 2024, Nairobi Kenya	11,254	Epidemics and outbreaks; COVID-19; Ebola	Kenya
P24-01320	SAMUEL DADZIE	NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH	Fourth West African Aedes Surveillance Network (WAASUN) Meeting Strengthening the capacity of West African countries to control arboviral diseases.	19,500	Epidemics and outbreaks; Control and elimination of diseases of poverty; Arboviral diseases	Ghana; Senegal

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P24-01322	Alexandre DELAMOU	CENTRE D'EXCELLENCE AFRICAIN POUR LA PREVENTION ET LE CONTRÔLE DE MALADIES TRANSMISSIBLE (CEA-PCMT/FSTS/UGANC)	Hosting of SORT IT module 4: Operational Research and effective research communication	48,656	Control and elimination of diseases of poverty; Neglected Tropical Diseases	Guinea
P24-01328	Thomas Scalway	LUSHOMO	Development of Communication materials in relation with the TDR activities on hard-to-reach and vulnerable populations.	16,000	Malaria	South Africa
P24-01329	Scott Campbell	Individual	Development of Videos (including audio) at the Multi-Sectoral Approaches (MSA) final workshop, held 25 to 28 June 2024, Brasilia, Brazil.	5,000	Malaria	Brazil
P24-01330	Chris Rixson	ARCTECH INNOVATION LIMITED	Maintenance of the Global Atlas of Medical Entomology Schooling (GAMES) on the Global Vector Hub and consultancy of the use of GBIF data on vectors into policies.	25,214	Arboviral diseases; Vector-borne diseases	United Kingdom of Great Britain and Northern Ireland
P24-01334	Andrew R. C. Ramsay	Individual	Providing Senior Operational Research Expertise for the SORT IT Initiative on Antimicrobial Resistance in Ghana and Evolving the SORT IT Model for Outbreaks	7,500	Resistance to treatment and control agents; One Health	United Kingdom of Great Britain and Northern Ireland
P24-01335	Selma Dar Berger	THE UNION	Assessing the Impact of SORT IT Research on Antimicrobial Resistance in Ghana: Providing Senior Technical Expertise	18,000	Resistance to treatment and control agents; One Health	France
P24-01346	Dissou Affolabi	ONG WARN-TB	Support to the secretariat of the WARN-TB and CARN-TB.	24,947	Control and elimination of diseases of poverty; Tuberculosis	
P24-01350	Alemseged Abdissa Lencho	ARMAUER HANSEN RESEARCH INSTITUTE	Continued support to the SEARN TB secretariat for regional TB response in Southern and East Africa.	25,000	Tuberculosis	
P24-01353	Stavia Turyahabwe	NATIONAL TUBERCULOSIS AND LEPROSY CONTROL PROGRAM, UGANDA	Support for the conduct of the TDA4Child initiative in Uganda.	49,224	Control and elimination of diseases of poverty; Tuberculosis	Uganda
P24-01355	Thomas Scalway	LUSHOMO	Design and development of a social protection toolkit for TB	6,831	Tuberculosis	South Africa
P24-01358	Selma Dar Berger	THE UNION	Develop a new SORT IT curriculum (Module 2), including an e-manual and Training-of-Trainers program, with senior-level expertise in using Epicollect5 and Jamovi software.	10,500	Epidemics and outbreaks; Control and elimination of diseases of poverty; Resistance to treatment and control agents	France
P24-01359	Katherine Jayne Tayler-Smith	Individual	Literature Search, Categorization, and Archiving of Scientific Publications for Manuscript Support (Module 3) of the EMRO SORT IT Program to Address Antimicrobial Resistance	4,000	Control and elimination of diseases of poverty; One Health	South Africa
P24-01366	Emmanuel Kaindoa	IFAKARA HEALTH INSTITUTE	Technical and logistics support for the organization and implementation of An International Conference on Advances in Surveillance and Control Methods for Aedes-Borne Diseases and Urban Vectors.	24,880	Control and elimination of diseases of poverty; Resistance to treatment and control agents; Arboviral diseases; Neglected Tropical Diseases; Vector-borne diseases	United Republic of Tanzania

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Diseases/Global health challenges/Research topic	Countries involved
P24-01368	Thomas Scalway	LUSHOMO	Development of Communication materials in relation with the TDR activities on Innovative Vector Control Technologies.	17,000	Malaria	South Africa
P24-01369	Pruthu Thekkur Kalasappa	Individual	Technical Support for SORT IT programme (in particular response to Mpox)	2,600	Epidemics and outbreaks	India
P24-01372	Jacklyne Ashubwe-Jalemba	Individual	Providing senior knowledge management (KM) expertise on effective research communication.	3,500	Control and elimination of diseases of poverty; Neglected Tropical Diseases	Burkina Faso; Guinea
P24-01374	Nolwenn Conan	Individual	Support to TDR projects on Research for delivery and access - Malaria vaccine	54,000	Control and elimination of diseases of poverty; Neglected Tropical Diseases	France
P24-01379	Jamie Guth	Individual	Providing senior knowledge management (KM) expertise on effective research communication.	3,500	Control and elimination of diseases of poverty; Neglected Tropical Diseases	Guinea
P24-01380	Ravi Ram	Individual	Providing senior knowledge management (KM) expertise on effective research communication.	3,500	Control and elimination of diseases of poverty; Neglected Tropical Diseases	Kenya
P24-01381	Andrew R. C. Ramsay	Individual	Providing senior knowledge management (KM) expertise on effective research communication.	3,500	Control and elimination of diseases of poverty; Neglected Tropical Diseases	Guinea
P24-01384	Chukwuma Anyaike	NATIONAL TUBERCULOSIS AND LEPROSY CONTROL PROGRAMME	Nigeria – Support for data cleaning, statistical analysis and knowledge sharing activities of the National TB programme of Nigeria regarding the VEDUTA project.	14,620	Tuberculosis	
P24-01385	Michel KASWA KAYOMO	MINSTERE DE LA SANTE / PROGRAMME NATIONAL DE LUTTE CONTRE LA TUBERCULOSE	Support for data cleaning, statistical analysis and knowledge sharing activities of the National TB programme of DRC regarding the TDA4Child project.	20,595	Tuberculosis	
P24-01386	Claire Lajaunie	Individual	Green cities and infectious disease risks: a scoping/systematic review	8,000	Arboviral diseases; Cutaneous leishmaniasis; Neglected Tropical Diseases; Schistosomiasis; Vector-borne diseases	
P24-01387	Vanessa Cruvinel	UNIVERSITY OF BRASILIA - UNB	Support to training activity within the context of the research project entitled: Research Project entitled: Zika, Dengue and Chikungunya: multisectoral approach for developing solutions applicable in public health by exploring the link bet	10,000	Malaria	Brazil
P24-01392	Gildas Yahouedo	Individual	Consultant TDR - vector control, multi sectoral approach and country preparedness	27,445	Control and elimination of diseases of poverty; Arboviral diseases; Arboviruses	
P24-01418	Andrew R. C. Ramsay	Individual	Providing senior operational/implementation research expertise support for implementing the Structured Operational Research and Training Initiative (SORT IT) for HTM in Sierra Leone	4,000	Malaria; Tuberculosis	United Kingdom of Great Britain and Northern Ireland
P24-01429	Selma Dar Berger	THE UNION	Organizing the workshop “Building capacity for real-time operational research: Experiences from Asia and Africa”	4,008	Research	France
P24-01431	Nana Konama Kotey	GHANA HEALTH SERVICE PUBLIC HEALTH PROGRAMME ACCOUNT	Support to the National Neglected Disease programme and National Buruli Ulcer and Yaws Eradication Program for their research activities	18,531	Control and elimination of diseases of poverty; Neglected Tropical Diseases	Ghana

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Diseases/Global health challenges/Research topic	Countries involved
P24-01444		ALOFT AL AIN HOTEL	Providing logistics, accommodation and conferencing support for implementing the WHO/TDR SORT IT on tackling AMR in the Eastern Mediterranean Region (Modules 3 & 4)	20,780	Resistance to treatment and control agents;	United Arab Emirates
P24-01455	Dissou Affolabi	ONG WARN-TB	Organization of the 2024 WARN-TB & CARN-TB meeting.	34,050	Tuberculosis	
P24-01457	Selma Dar Berger	THE UNION	Providing senior technical expertise for a Structured Operational Research and Training IniTiative (SORT IT) for tackling emerging infections and health systems strengthening in Egypt, Iran,Tunisia and the United Arab Emirates (EMRO region)	19,000	Resistance to treatment and control agents;	
P24-01458	Jean-Louis Ndiaye	UFR SANTÉ / UNIVERSITY DE THIES	Organization of a stakeholder engagement meeting for the introduction of the pediatric formulation of arPZQ in Senegal	12,098	Control and elimination of diseases of poverty; Neglected Tropical Diseases	Senegal
P24-01460	Amadou Seck	GIE WEST AND CENTRE AFRICAN BIOINFORMATICS (GIE WCA BIOINF)	To provide support for the development of data collection systems of NTD and TB research packages.	29,200	Tuberculosis	
P24-01461	Dissou Affolabi	ONG WARN-TB	Coordination of FR/EN translation activities for a regional webinar of National TB Programmes.	643	Tuberculosis	
P24-01463	Selma Dar Berger	THE UNION	Independent review of ethics considerations for research protocols for tackling antimicrobial resistance in Ghana	5,000	Resistance to treatment and control agents;	France
P24-01465	Annechien Sarah Helsdingen	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	Production of 3 additional course module for the TDR IR MOOC platform	33,093	Neglected Tropical Diseases; Tuberculosis; Not Disease-Specific	Switzerland
P24-01465	Annechien Sarah Helsdingen	ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE	Recording and production of 1 course modules on Communicating Research results for the TDR IR MOOC platform	16,015	Neglected Tropical Diseases; Tuberculosis; Not Disease-Specific	Switzerland
P24-01470	Philipp Henneke	UNIVERSITY OF FREIBURG	Support for the implementation of an early warning and response systems for dengue control (EWARS-csd)	10,000	Epidemics and outbreaks;	
P24-01505	Chukwuma Anyaike	NATIONAL TUBERCULOSIS AND LEPROSY CONTROL PROGRAMME	Support for dissemination meeting of the results of operational research study conducted by the National TB Programme of Nigeria.	5,715	Tuberculosis	

TDR funding in 2024

CONTRIBUTOR	
Core contributors	**Amount (US$)**
Belgium	681 044
Germany	426 894
India	55 000
Japan [1]	50 000
Luxembourg	1 185 379
Malaysia	25 000
Mexico	10 000
Nigeria [1]	200 000
Norway	277 367
Panama	7 000
Spain [1]	105 042
Sweden	2 408 196
Switzerland	2 035 928
Thailand	40 772
World Health Organization [2]	900 000
Subtotal	**8 407 622**
Contributors providing project-specific funding	**Amount (US$)**
Centers for Disease Control and Prevention (CDC), United States of America [3]	294 945
Expertise France	277 043
Gates Foundation	1 538 499
Luxembourg	413 341
Sweden	199 587
United Nations Development Programme (UNDP)	480 000
United States Agency for International Development (USAID) [3]	1 479 499
Subtotal	**4 682 914**
Total contributions	**13 090 536**

1. The contribution from the Governments of Japan and Spain, and the Government of the Federal Republic of Nigeria for the year 2024 will be reported in the certified financial statement in 2025 due to the timing of its receipt.
2. The contribution from the World Health Organization reflects one year of contributions for the biennium 2024-2025.The certified financial report will reflect 2 years.
3. The contributions from the Government of the United States of America reflect legally binding agreements in place. In January 2025, the Government of the United States of America froze these grants preventing further expenditures. There is significant risk for partial or total loss of these contributions. The reduction will be reflected in the year that the decision is finalized.

TDR acknowledges that funds received as core funding from the Governments of Germany and Norway and Sida (Sweden) enable the Programme to conduct its work in intervention and implementation research, research capacity strengthening and knowledge management, which aligns with the scope of the EDCTP programme supported by the European Union.

Annex 1. Publications list

ER 1.1.1

1. Braack L, Wulandhari SA, Chanda E, Fouque F, Merle CS, Nwangwu U, Velayudhan R, Venter M, Yahouedo AG, Lines J, Aung PP, Chan K, Abeku TA, Tibenderana J, Clarke SE. Developing African arbovirus networks and capacity strengthening in arbovirus surveillance and response: findings from a virtual workshop. Parasit Vectors. 2023 Apr 14;16(1):129. doi: 10.1186/s13071-023-05748-7. PMID: 37059998; PMCID: PMC10103543.
2. Schlesinger M, Prieto Alvarado FE, Borbón Ramos ME, Sewe MO, Merle CS, Kroeger A, Hussain-Alkhateeb L. Enabling countries to manage outbreaks: statistical, operational, and contextual analysis of the early warning and response system (EWARS-csd) for dengue outbreaks. Front Public Health. 2024 Jan 19;12:1323618. doi: 10.3389/fpubh.2024.1323618. PMID: 38314090; PMCID: PMC10834665
3. Sanchez Tejeda G, Benitez Valladares D, Correa Morales F, Toledo Cisneros J, Espinoza Tamarindo BE, Hussain-Alkhateeb L, Merle CS, Kroeger A. Early warning and response system for dengue outbreaks: Moving from research to operational implementation in Mexico. PLOS Glob Public Health. 2023 Sep 20;3(9):e0001691. doi: 10.1371/journal.pgph.0001691. PMID: 37729119; PMCID: PMC10511095.
4. Tinto B, Bicaba B, Kagoné TS, Kayiwa J, Rabe I, Merle CSC, Zango A, Ayouba A, Salinas S, Kania D, Simonin Y. Co-circulation of two Alphaviruses in Burkina Faso: Chikungunya and O'nyong nyong viruses. PLoS Negl Trop Dis. 2024 Jun 13;18(6):e0011712. doi: 10.1371/journal.pntd.0011712.

ER 1.1.4

1. Conteh TA, Thomas F, Abiri OT, Komeh JP, Kanu A, Kanu JS, Fofanah BD, Thekkur P, Zachariah R. Quality of Reporting of Adverse Drug Reactions to Antimicrobials Improved Following Operational Research: A before-and-after Study in Sierra Leone (2017–2023). Tropical Medicine and Infectious Disease. 2023;8(10):470.
2. Kubasari C, Adeapena W, Najjemba R, Kwesi Hedidor G, Adjei RL, Manu G, Timire C, Afari-Asiedu S, Asante KP. Quality of Data Recording and Antimicrobial Use in a Municipal Veterinary Clinic in Ghana. Tropical Medicine and Infectious Disease. 2023;8(11):485.
3. Kamara MN, Lakoh S, Kallon C, Kanu JS, Kamara RZ, Kamara IF, Moiwo MM, Kpagoi SSTK, Adekanmbi O, Manzi M, Fofanah BD, Shewade HD. Hand Hygiene Practices and Promotion in Public Hospitals in Western Sierra Leone: Changes Following Operational Research in 2021. Tropical Medicine and Infectious Disease. 2023;8(11):486.

ER 1.1.7

Published papers that became fully accessible in 2024 (TDR led/funded activities)

1. The Kenya Uganda Zambia and Zimbabwe TB Disability Study Group, Adakun SA, Banda FM, Bloom A, Bochnowicz M, Chakaya J, Chansa A, Chiguvare H, Chimzizi R, Colvin C, Dongo JP, Durena A, Duri C, Edmund R, Harries AD, Kathure I, Kavenga FN, Lin Y, Luzze H, Mbithi I, Mputu M, Mubanga A, Nair D, Ngwenya M, Okotu B, Owiti P, Owuor A, Thekkur P, Timire C, Turyahabwe S, Tweyongyere E, YaDiul M, Zachariah R, Zimba K. Disability, comorbidities and risk determinants at end of TB

treatment in Kenya, Uganda, Zambia and Zimbabwe. IJTLD OPEN. 2024 May 1;1(5):197–205. ttps://www.ingentaconnect.com/content/10.5588/ijtldopen.24.0082

2. Kamara J, Moses F, Thekkur P, Kamara IF, Ashubwe J, Wurie AB, Kamara RZ, Youkee D, Samura S, Bangura T, Nuwagira I, Zachariah R, Sesay T, Kenneh S. The effect of the COVID-19 pandemic on emergency maternal and under-five referrals in Sierra Leone: A cohort study. F1000Research. 2024 Jun 27;13:703. https://f1000research.com/articles/13-703
3. Jalloh AT, Merson L, Nair D, Hassan S, Kamara IF, Nuwagira I, Tengbe SM, Tejan YS, Kabba M, Lakoh S, Grant DS, Samuels RJ, Kamara RZ, Terry RF. Association of cancer and outcomes of patients hospitalized for COVID-19 between 2020 and 2023. F1000Research. 2024 Jun 21;13:673. https://f1000research.com/articles/13-673
4. Yeabah TO, Kaba I, Ramaswamy G, Dahal P, Delamou A, Vonhm BT, Jetoh RW, Merson L, Levine AC, Relan P, Harries AD, Kumar AMV. Factors associated with death in patients admitted with Ebola virus disease to Ebola Treatment Units in Guinea, Sierra Leone, and Liberia – December 2013 to March 2016. F1000Research. 2024 Jun 21;13:672. https://f1000research.com/articles/13-672
5. Dwalu E, Tweya H, Beglaryan M, Umeokonkwo CD, Jetoh RW, Shobayo BI, Tarweh F, Owiti P, Relan P, Hassan S, Goteh GW, Lehyen DB, Ako-Egbe L, Kamara IF, Akpan GE, Adewuyi P, Kpanyen PN, Vonhm BT, Gilayeneh JSM. Epidemiological characteristics and hospital outcomes of hospitalized Lassa fever cases during the 2022-2023 outbreak in Liberia. F1000Research. 2024 Jun 19;13:661. https://f1000research.com/articles/13-661
6. Lehyen DB, Ako-Egbe L, Dwalu E, Vonhm BT, Thekkur P, Zachariah R, Bawo L. Health care workers hospitalized for COVID-19 in Liberia: who were they, and what were their outcomes? F1000Research. 2024 Jun 18;13:656. https://f1000research.com/articles/13-656
7. Millimouno TM, Grovogui FM, Kourouma K, Hassan S, Kaba I, Kamara IF, Mbasha JJ, Collins T, Merson L, Delamou A. Epidemiological profiles and outcomes of healthcare workers hospitalized for COVID-19 in five Sub-Saharan African countries: a cohort study. F1000Research. 2024 Jun 18;13:655. https://f1000research.com/articles/13-655
8. Lampaert E, Nsio Mbeta J, Nair D, Mashako M, De Weggheleire A, Sprecher A, M. Coulborn R, Ahuka-Mundeke S. Evaluation of centralised and decentralised models of care during the 2020 Ebola Virus Disease outbreak in Equateur Province, Democratic Republic of the Congo: A brief report. F1000Research. 2024 Jun 17;13:642. https://f1000research.com/articles/13-642
9. Tejan YS, Ashubwe J, Beglaryan M, Hassan S, Kenneh S, Moses F, Jalloh AT, Grovogui FM, Kaba I, Tengbe SM, Kabba M, Kamara MI, Sesay S, Kamara J, Mbasha JJ, Relan P, Nuwagira I, Kamara IF. The association between non-communicable diseases and COVID-19 severity and mortality among infected hospitalized healthcare workers in 29 countries: a cohort study. F1000Research. 2024 Jun 12;13:624. https://f1000research.com/articles/13-624
10. Chege C, Kosgei RJ, Kihara AB, Gathara D, Kariuki L, Kiarie J, Odhiambo FO, Sigei EC, Kilonzo C, Omar A, Murima P, Kandie R, Machin B, Mwaganu R, Murangiri JG. Adherence to malaria case management guidelines in the treatment of uncomplicated malaria in Public Health Facilities in Kenya, 2023. East African Medical Journal. 2024;101(3). https://www.ajol.info/index.php/eamj/article/view/270592
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14. Mwaganu R, Mwaganu R, Odhiambo FO, Kandie R, Omar A, Kariuki L, Chege C, Kiarie J, Murima P, Ramaita E, Murangiri JG, Machini B, Sakari F, Onyango E, Sigei EC, Kilonzo C, Kamau EM, Kosgei RJ, Gathara D, Kihara AB. Tracking the testing and treatment of uncomplicated malaria using routine data in Public Health facilities in Kenya, 2022. East African Medical Journal. 2024;101(3). https://www.ajol.info/index.php/eamj/article/view/270646
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ER 1.3.15

(papers under review)

ER 1.3.3

(papers under review)

Annex 2. Detailed project report - Interim Report for the SIT activities in French Polynesia and Cook Islands

PAC-SIT Technical Interim Report (August 2024)

Report contributors: Hervé Bossin, Hmeniko Tourancheau

1. Administration

The 2nd WHO Technical Service Agreement (TSA) for the PAcific Islands Consortium for the Evaluation of Aedes SIT (PAC-SIT) is now in place. This TSA covers the period from 20 June, 2024 to 31 October, 2025.

Human resources

Ms. Amélie BROCHERIEUX's contract with ILM ended in early August 2024. The ILM team is now assisted by Ms. Aeata RICHERD (Reva Atea Consulting). Ms. RICHERD is more specifically involved in project coordination and management as well as the implementation of the PAC-SIT communication plan.

Procurement of mass-rearing equipment

The ILM mass-rearing facility is now equipped with all equipment (high-throughput mosquito rearing, larvae counters, male:female pupae separation, etc.) necessary to launch the Tetiaroa and Paea release interventions. A few additional pieces of equipment procured through PAC- SIT are expected to reach ILM by the end of this year which will allow the production of sterile males for all three pilot sites (Tetiaroa, Paea and Aitutaki) in early 2025. This includes a Wolbaki automatic pupae sorter. A couple recent publications (Gong et al;, 20241; Mamai et al., 20242) support higher male:female pupae sorting efficiency using this device especially when combined with a preliminary salt-treatment to kill all remaining larvae prior to sorting. This device will further improve the pupae sorting accuracy and thus further reduce the inadvertent risk of female mosquito release in the pilot sites. The sorting efficacy of a prototype pupae separation system developed by Mapa Technology (Spain) will also be tested at ILM in 2025 with support from the INOVEC (EU) research & innovation partnership. Stereomicroscopes were also received which will allow regional training of PAC-SIT partners (incl; Cook Islands field officers).

2. Regional collaboration

Cook Islands Health Agency, Te Marae Ora

Stemming for the initial mosquito survey conducted in March 2024 on the atoll of Aitutaki with TMO staff, a complete dossier is being prepared with the assistance of TMO to obtain the research permit, sterile male mosquito import permit as well as an Environmental Impact Assessment of the PAC-SIT intervention.

Sub-agreements are being drated with TMO co-PIs to allow 1) specific laboratory and field training of designated-TMO staff at ILM SIT facility in Tahiti during the upcoming Paea trial, and 2) the subsequent implementation of the PAC-SIT intervention in Aitutaki.

3. Development and validation of the SIT package

A technical visit by ILM representative Mr. Jérôme MARIE was conducted at the National Environmental Agency (NEA) Mosquito Production Facility in Singapore (6-17 May, 2024) to speed-up ILM's transition to state-of-the-art industrial mosquito production.

Optimized rearing (including egg drying and hatching, larval counting, mosquito cage design pupae emergence) and release protocols used at NEA Singapore are now progressively being implemented at ILM's INNOVENTOMO Facility to increase male mosquito output.

1 Gong JT, Mamai W, Wang X, Zhu J, Li Y, Liu J, et al. Upscaling the production of sterile male mosquitoes with an automated pupa sex sorter. Sci Robot. 2024;9(92):eadj6261

2 Mamai W, Bueno-Masso O, Wallner T, Nikiema SA, Meletiou S, Deng L, et al. Efficiency assessment of a novel automatic mosquito pupae sex separation system in support of area-wide male-based release strategies. Sci Rep. 2024;14(1):9170

Staff organization such as rotation of staff between the various laboratory and field tasks will also be adjusted to improve work flexibility.

Mosquito handling (chilling and compaction) experiments for male irradiation and transport have been conducted to verify male survival and fitness. Cohorts of adult male mosquitoes were handled at various compaction rates (40, 70 and 100 males/cm3) during two chilling periods (6 and 30h) at 7°C (± 2°C) of relevance for the PAC-SIT field interventions (transportation to Tetiaroa and Aitutaki respectively). Their survival was compared to non- treated male mosquitoes and the experiment was replicated 6 times. The results indicate a negligeable mortality at all compaction rates and chilling durations with less than 1% mortality (6hr chilling duration) and between 1.7% (100 males/cm3) and 3.1% (40 males/cm3) (30hr chilling duration) 1 week after treatment.

4. Preparation of the Paea study site

Acquisition of entomological baseline data

The entomological monitoring network of the PAC-SIT program was deployed at the Paea release and control sites. A total of 50 BG-Sentinel (v2) traps + olfactory lure were installed, with 25 traps per site (ca. 1 BG trap every 4ha). Sampling stations were distributed by randomly projecting 25 points into each zone using QGIS. Following information of the property owners on the objectives and modalities (trap placement, duration of the study) of the PAC-SIT mosquito monitoring and after obtaining their consent, the traps were installed at each location. Ovitraps also complete the sampling scheme, with 25 traps per site to assess induced sterility in females.

Fig. 1: Distribution of mosquito traps (blue dots) at the Paea PAC-SIT study site

All traps are visited and sampled once weekly. For all trial locations, captured mosquitoes are sorted, identified to species using relevant morphological keys (Rueda, 2004)3, sexed and counted by date of capture and sampling location.

Calibration of SIT male releases

In order to calibrate the release of *Aedes aegypti* sterile males, a mark-release-recapture (MRR) experiment was carried out in Paea. The operation ran from June 24, 2024 to July 19, 2024, with 3 consecutive marked mosquito releases, one a week apart. The purpose of this work is to determine important parameters such as mean survival, mean and maximum flight distance, as well as the overall size of the target population.

Production, sterilization, marking and release.

For this operation, 3 batches of 10,000 males were produced for each release. The males were sorted at the pupal stage, grouped in batches of 1000 and placed in an emergence and release container. Once adult, the males were chilled, compacted, and sterilized at 65 Gy (RS-2400Q irradiator, RADSOURCE, USA) (Figure 2).

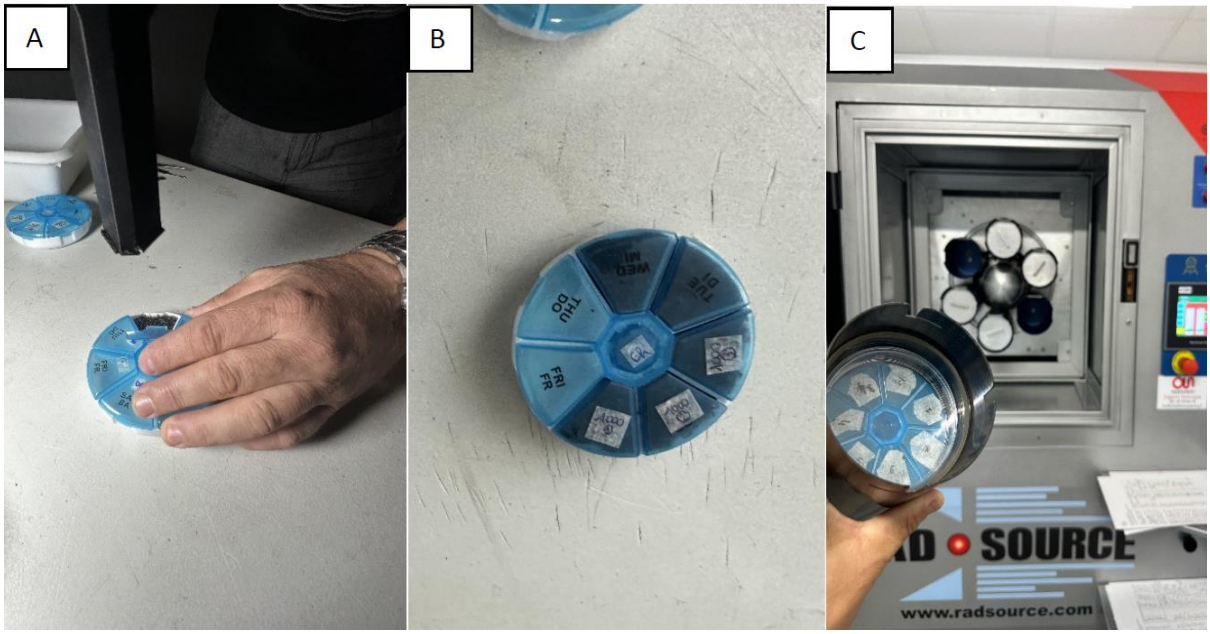

Fig. 2 : Compaction of chilled adult male mosquitoes (1000/batch) into pill box cells (A & B) for X-ray sterilization (C)

Prior to each release, sterile males were marked with fluorescent powder according to FAO/IAEA MRR guidelines (IAEA, 2020)4. The dose of fluorescent powder was adjusted (down to 200 mg of powder per 1000 male) to preserve male flight and behavioral capacity while ensuring reliable marking (Figure 3). Each release was characterized by a unique color: pink for the first week, green for the second week, and yellow for the 3rd and last week of the experiment. The mosquitoes were given 1 hour to groom before transport and release at the field site.

3 *Rueda LM. Pictorial keys for the identification of mosquitoes (Diptera:Culicidae) associated with Dengue Virus Transmission. Zootaxa 2004; 589: 1–60*

4 FAO/IAEA. 2020. Guidelines for Mark-Release-Recapture procedures of Aedes mosquitoes, Jérémy Bouyer, Fabrizio Balestrino, Nicole Culbert, Hanano Yamada, Rafael Argilés (eds.), Food and Agriculture Organization of the United Nations/International Atomic Energy Agency. Vienna, Austria. 22 pp.

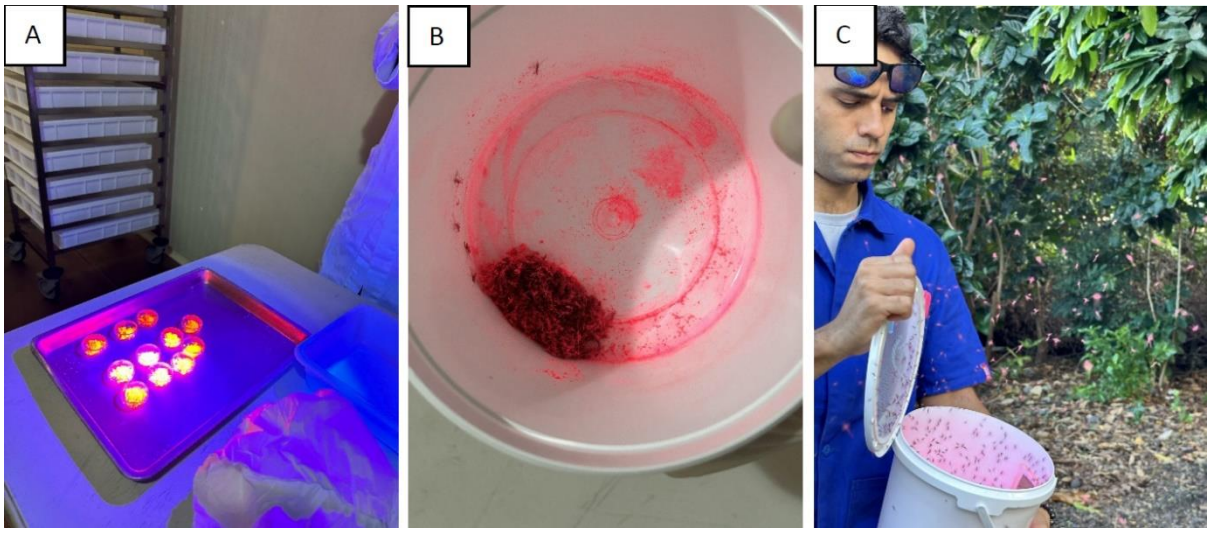

Fig. 3 : Batches of 200 mg fluorescent powder (A) for sterile male marking (B) and field release (C)

Recapture network

A total of 20 traps were deployed around a single release point, covering an area of 20 hectares (Figure 4). The traps were activated on the day following each release to allow sufficient time for the marked males to disperse freely. Mosquitoes were then collected daily. The sampling effort was stopped when no more marked mosquitoes were caught over 3 consecutive days.

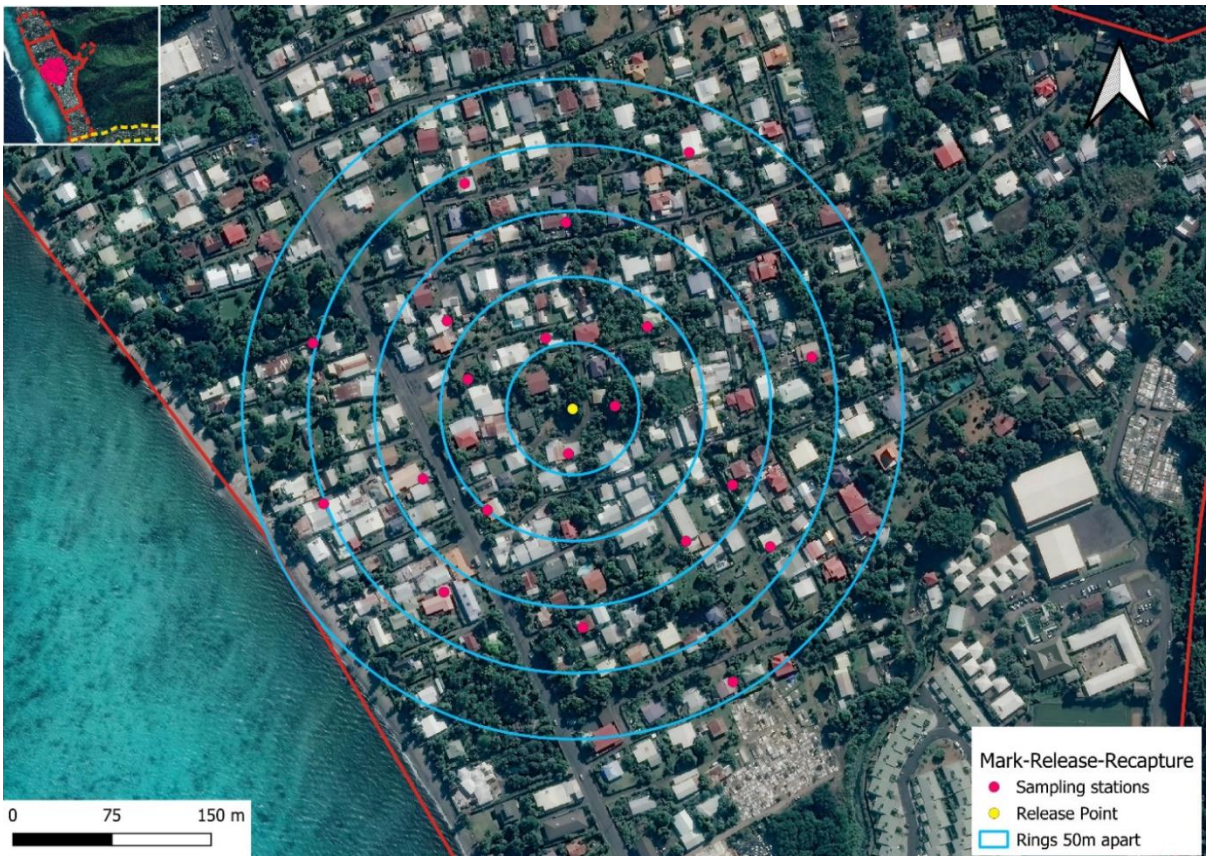

Fig. 4 : Recapture trap network deployed over a 20 ha area centered on the release point

Preliminary MRR results

A total of 2101 mosquitoes were caught over the course of the study, including 1190 (57%) *Aedes aegypti* specimens, 53 (3%) *Aedes aegypti* marked males [green], 31 (1%) *Aedes aegypti* marked males [Yellow], 30 (1%) *Aedes aegypti* marked males [Pink], 773 *Culex quinquefasciatus*, 23 *Aedes polynesiensis*, and 1 *Toxorhynchites amboinensis.* This assemblage with dominant *Aedes aegypti* and *Culex quinquefasciatus* species (Figure 5) is in line with previous entomological field data collected in Paea. MRR data are currently being analyzed to determine the critical parameters for calibrating the male releases.

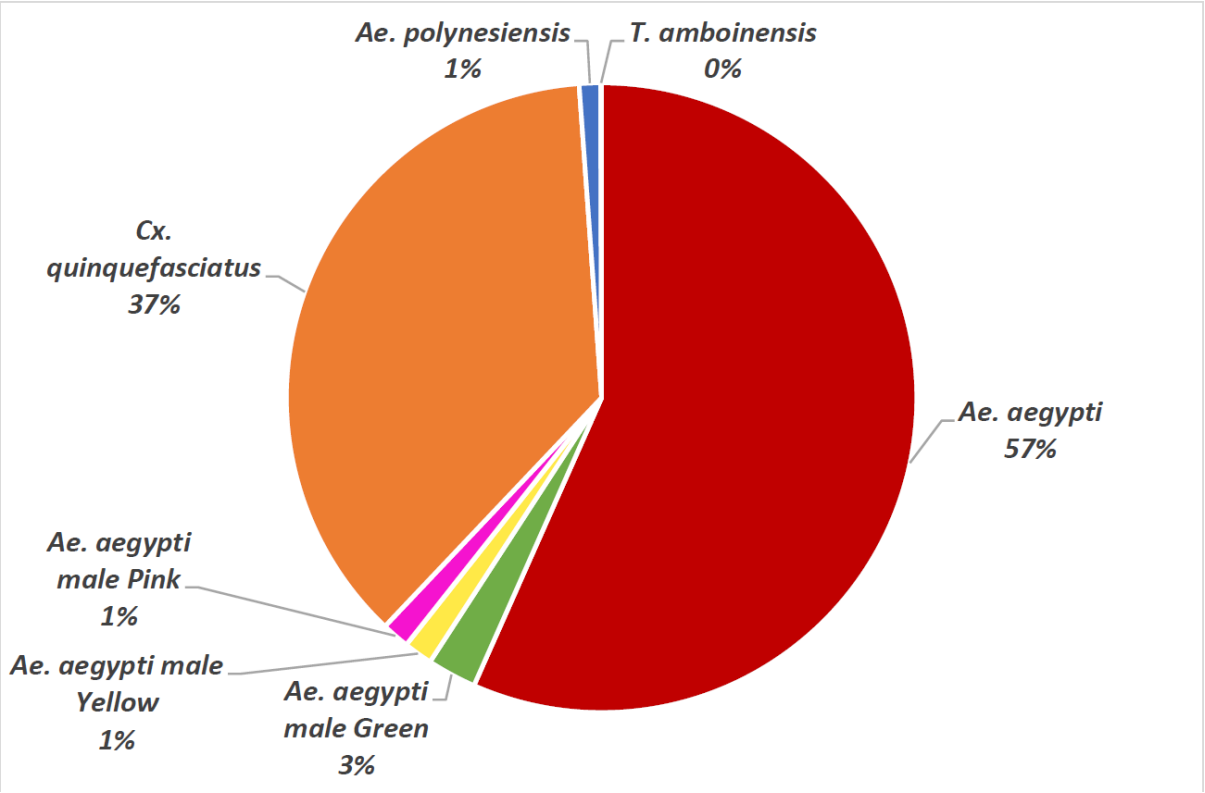

Fig. 5 : Assemblage of species captured during the MRR study in Paea

5. Epidemiological Survey - Protocol review and approval

Recommendations of the VCAG were taken into consideration, particularly the request to prepare a detailed SAP that includes power analyses for ability to detect an epidemiological impact. To this end, survey specialists from the French Polynesian Statistics Institute (FPSI) and an epidemiologist from the South Pacific Commission (SPC, Nouméa) were consulted to develop a more detailed SAP (incl. a revision of the minimum sample size and of the overall statistical power of the study). Recently released demographic data from the 2022 French Polynesia census (FPSI) and the most recent estimates of dengue prevalence in Tahiti (ILM, 2023) were used. The primary end-point of the trial is whether we can detect differences in dengue serology after the intervention, with an current dengue prevalence of 73% as a "likely" starting point and also whether these differences would be statistically significant.

Owing to the limited size of the human population at the Paea study site (1,970 households for a total of 4701 potentially eligible adults), no matter how large the sample size, there is no guarantee to detect a significant epidemiological impact solely based on dengue prevalence variations between “SIT” and “Control” sites. The dengue serology data therefore are supplemented by data on possible dengue cases (seroconversion) that might occur during the intervention, by serology data of exposure to mosquito bites and also importantly entomological data (from ovitraps and adult mosquito traps). If the SIT reduces the target *Aedes aegypti* mosquito populations to near elimination, the impact on transmission will ultimately follow, even if the serology data are not statistically significant during the first

evaluation period. These elements were recently discussed with Dr. Florence Fouque at WHO- TDR. The decision was made to not drastically change the survey protocol, which has already been approved by WHO ERC, because 1) changes are not likely to improve the statistical power of the study, 2) the serology data are supplemented by other data that may be significant and 3) because the project has already fallen well behind schedule.

Final approval from the French National Human Beings Protection Committee can now be sought. This is the final but mandatory procedure before the epidemiological survey can begin and the SIT males can be releasesd.

6. Community engagement

Community engagement needs to be aligned with the launch of the epidemiological survey. With the survey being delayed (see paragraph above), the timeline for community engagement has been reset to September 2024. The community will be progressively engaged starting with the Paea school children (series of educational actions using different game-based activities specifically developed for PAC-SIT) to build awareness and participation. The PAC-SIT messages will be disseminated through various media (posters, distribution of flyers, social media, emailing, etc.). The communication strategy, which includes open-days at the ILM INNOVENTOMO center to allow members of the community to visit the production facility, will culminate with the official launch of the PAC-SIT intervention now expected toward November.