TDR For research on diseases of poverty

UNICEF • UNDP • World Bank • WHO

Annual Report 2022

Research for implementation

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ADP	Access and Delivery Partnership (UNDP)
ADR	adverse drug reaction (reporting)
aDSM	anti-TB drug-safety monitoring and management
AFRO	WHO Regional Office for Africa
AMR	antimicrobial resistance
AMRO/PAHO	WHO Regional Office for the Americas
APW	Agreement for Performance of Work
ARV	antiretroviral
AVD	arboviral disease
CAB	Community Advisory Board
CAD	computer-assisted detection
CARN-TB	Central African Regional Network for TB Control
CBD	Convention on Biodiversity
CDC	Centers for Disease Control and Prevention (for Africa, the United States and China)
CEI	community engagement and involvement
CHW	community health worker
COR-NTDs	Coalition for Operational Research for Neglected Tropical Diseases
COVID-19	coronavirus disease 2019; SARS-CoV-2
CRA	community research assistant
CRP	C-reactive protein
CRS	Catholic Relief Services
DEC	disease-endemic country
DIAMA	**DIA**gnostics for **M**ultidrug-resistant tuberculosis in **A**frica
DND*i*	Drugs for Neglected Diseases *initiative*
DOT	directly observed therapy implementation
ECOSUR	El Colegio de la Frontera Sur, Mexico
EDCTP	European and Developing Countries Clinical Trials Partnership
EECA	Eastern Europe and Central Asia region
EMRO	WHO Regional Office for the Eastern Mediterranean
ER	expected result
ERC	WHO Ethics Review Committee
ESPEN	Expanded Special Project for Elimination of NTDs
EURO	WHO Regional Office for Europe
EWARS	Early Warning and Response System
FAO	Food and Agriculture Organization
FDA	Federal Drug Administration, United States
FIND	Foundation for Innovative New Diagnostics
GAI	Global Arboviral Initiative
GAMES	Global Atlas of Medical Entomology Schooling
GBA	gender-based analysis
GBIF	Global Biodiversity Information Facility
GCP	good clinical practice
GDMD	good data management practice
GE	TDR Global Engagement Area of Work

GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GHGI	Global Health Group International
GMP	WHO Global Malaria Programme
GOARN	Global Outbreak and Response Network
GTB	WHO Global Tuberculosis Programme
GVCR	WHO Global Vector Control Response
GVH	Global Vector Hub
HIV	human immunodeficiency virus
HORN	One Health Regional Network
HRP	UNDP/UNFPA/UNICEF/WHO/World Bank Special Programme of Research, Development and Research Training in Human Reproduction
IAEA	International Atomic Energy Agency
ICDDR	International Centre for Diarrhoeal Disease Research, Bangladesh
ICMR	Indian Council of Medical Research
IDDO	Infectious Diseases Data Observatory
IDRC	International Development Research Centre (Canada)
IGRS	Intersectional Gender Research Strategies
IIR	intervention and implementation research (team)
IMP	TDR Research for Implementation Unit
IMP-SWG	TDR Research for Implementation Unit, Scientific Working Group
IPC	infection prevention and control
IPD	Individual Patient Data or Individual Participant Data
IR	implementation research
IR4DTB	implementation research for digital technologies and TB
IRS	indoor residual spraying
ITN	insecticide-treated net
IWP	insecticidal wall painting
JCB	TDR Joint Coordinating Board
JOOUST	Jaramogi Oginga Odinga University of Science and Technology, Kenya
KEP	Kala-azar Elimination Programme
KNEP	KwaZulu-Natal Ecohealth Programme
LAC	Latin American and Caribbean region
LLINs	long-lasting insecticidal nets
LMIC	low- and middle-income country
LSHTM	London School of Hygiene and Tropical Medicine
LTBi	latent TB infection
M&E	monitoring and evaluation
MABISA	Malaria and Bilharzia in Southern Africa
MDA	mass drug administration
MDGH	Medicines Development for Global Health
MDR-TB	multidrug-resistant tuberculosis
MMV	Medicines for Malaria Venture
MoH	Ministry of Health
MOOC	Massive Open Online Course
MoU	Memorandum of Understanding
MPH	Master of Public Health

MSA	multisectoral approach
NDC	nationally determined contribution
NDRS	national TB drug resistance survey
NGO	nongovernmental organization
NIH	National Institutes of Health (US)
NMP	national malaria programme
NTD	WHO Department of Control of Neglected Tropical Diseases
NTDs	neglected tropical diseases
NTP	National Tuberculosis Programme
NTPS	National TB Prevalence Survey
OCP	Onchocerciasis Control Programme
OHA	One Health Approach
OPT–SMC	Optimizing Seasonal Malaria Chemoprevention Project
OR/IR	operational and/or implementation research
PAMCA	Pan Africa Mosquito Control Association
PHE	WHO Public Health, Environmental and Social Determinants of Health Department
PI	Principal investigator
PKDL	Post kala-azar dermal leishmaniasis
PMI	President's Malaria Initiative (USA)
PQT	WHO Prequalification of Medical Products Department
PTLFU	pre-treatment loss to follow-up
PV	WHO Pharmacovigilance Department
R&D	research and development
RBM	Roll Back Malaria Partnership
RCS	TDR Strengthening Research Capacity Unit
RTC	Regional Training Centre
RVF	Rift Valley fever
SAP	Strategic Action Plan to Scale up Health and Environment Interventions in Africa
SDC	Swiss Agency for Development Cooperation
SDF	Strategic Development Fund
SDG	Sustainable Development Goals
SEARO	WHO Regional Office for South-East Asia
SESF	socioecological systems framework
ShORRT	**Sh**ort, all-**O**ral **R**egimens for **R**ifampicin-resistant **T**uberculosis
Sida	Swedish International Development Cooperation Agency
SIHI	TDR Social Innovation in Health Initiative
SIT	sterile insect technology
SMC	seasonal malaria chemoprevention
SOP	standard operating procedure
SORT IT	Structured Operational Research and Training Initiative
SPCP	Social Practice Creative Placemaking approach
STAC	TDR Scientific and Technical Advisory Committee
STH	soil-transmitted helminth
STPH	Swiss Tropical and Public Health Institute
SUPSI	Scuola Universitaria e Professionnale della Svizzera Italiana
TB-RPC	Tuberculosis Research and Prevention Center (Armenia)

TDR	UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases
ToT	training-of-trainers
UHC	universal health coverage
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNION, The	International Union Against Tuberculosis and Lung Disease
UoN	University of Nairobi
USAID	United States Agency for International Development
VBD	vector-borne disease
VCAG	Vector Control Advisory Group (NTD/GMP)
VL	visceral leishmaniasis
WAHO	West African Health Organization
WARN-TB	West African Regional Network for TB control
WASH	water, sanitation and hygiene
WCA	West and Central Africa
WHO IRIS	WHO Institutional Repository for Information Sharing
WMO	World Meteorological Organization
WOAH	World Organization for Animal Health
WPRO	WHO Regional Office for the Western Pacific
WSH	Water, Sanitation, Hygiene and Health Unit

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 2018–2023 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).

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 four main aims of research are included within TDR's current strategy:

- **RESEARCH FOR POLICIES**: 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 IMPLEMENTATION**: 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 INNOVATION**: to provide directions for the development of improved and adapted new tools and strategies needed, and to promote their development and use
- **RESEARCH FOR INTEGRATED APPROACHES**: to understand the complex interactions between people and their environment that affect disease transmission

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

Key achievements for the strategic priority area in 2022

- Operational research on antimicrobial resistance (AMR) demonstrates impact on policy and practice and contributes to a critical mass of frontline investigators
    - Of the first 24 SORT IT studies from Asia and Africa that were assessed 12-months after completion, 69% led to changes in policy and/or practice. In terms of applying acquired skills from SORT IT, 88% of trainees are applying their skills to AMR practice, 67% to the COVID-19 response and 58% completed a new research study. To date, 59% of those trained became mentors after one training cycle. These figures indicate collateral benefits to the health system and capacity built.

- Transdisciplinary teams operationalize a One Health approach to research on vector-borne diseases (VBDs) in the context of climate change in Africa

  - Four pilot studies were completed on operationalizing a One Health approach and the application of the scorecard/metrics in Africa. These consortium projects employed a transdisciplinary approach and holistic framing of the VBD challenges engaging vulnerable communities in several countries (Côte d'Ivoire, Mauritania, Kenya, Tanzania, South Africa, Botswana and Zimbabwe). Human and animal health, and environmental integrity concerns were addressed in an integrated, multisectoral and holistic manner, providing a more comprehensive understanding of the problems and potential solutions that would not be possible with siloed approaches when dealing with diseases such as malaria, schistosomiasis, Rift Valley fever (RVF) and human African trypanosomiasis.

- Investigators in LMICs demonstrate the critical need for gender-based analysis and intersectionality in infectious diseases research

  - The research in Uganda focused on vulnerability to schistosomiasis (West Nile, Uganda) and on tuberculosis (TB) care at four healthcare facilities (Uganda). The team in Nepal looked at gender and its intersection with social stratifiers influencing lymphatic filariasis prevention and care and on an assessment in Nepal regarding a gender-inclusive health system. The studies further highlighted the importance of intersectional gender analysis as the process of analysing how gender power relations intersect with other social stratifiers to affect people's lives and to understand how policies, services and programmes can help address inequities.

- Lessons from the Indian subcontinent confirm critical role of implementation research in visceral leishmaniasis (VL) elimination, relevant to other foci

  - In collaboration with NTD as lead, several consultative meetings and a survey of stakeholders was conducted on prospects for VL elimination efforts in Eastern Africa and on generating lessons learned from the Indian subcontinent. A bi-regional strategic plan for VL elimination in Eastern Africa is being developed through WHO stewardship. IMP will contribute through support to selected implementation research priorities identified in the process.

- Assessment of arboviral disease surveillance capacity in the 47 AFRO countries identifies opportunities for intervention

  - IMP, in collaboration with NTD and AFRO, conducted a survey in all 47 countries to assess health system capacity to prevent, detect, and respond to arboviral disease (AVD) outbreaks. The report "*Surveillance and control of arboviral diseases in the WHO African region: assessment of country capacities*", was released in November 2022. (https://www.who.int/publications/i/item/9789240052918).

- An innovative self-diagnosis and treatment kit for malaria including G6PD testing validated among a hard-to-reach population was integrated into the national programme in Surinam and tested in two countries (Brazil and French Guiana).

- Multisectoral approaches (MSAs) to control VBDs is currently being tested and implemented in 12 LMICs countries, including African countries where governments approved MSA Committees established in Mali and Nigeria.

- Special issue of the GigaByte Journal for data papers on vectors was released in June: Vectors of Human Disease Series (https://doi.org/10.46471/GIGABYTE_SERIES_0002). The special issue includes 11 papers with data on vectors that transmit VBDs (nine of them from LMICs), and presents over 500 000 occurrence records and 675 000 sampling events from more than 50 countries. The journal received the Association of Learned and Professional Society Publishers (ALPSP) innovation award for this publication. (See ALPSP awards at https://www.alpsp.org/Awards).

- Testing of innovative technology for vector control, such as sterile insect technology (SIT), was launched in three Pacific Island countries.
    - TDR, in collaboration with the United States Centers for Disease Control and Prevention (CDC), the International Atomic Energy Agency (IAEA) and NTD is supporting the testing of SIT in the Cook Islands, French Polynesia and Easter Island for a two-year project.

Please refer to the supplementary documentation for more information.

Summary progress description for 2022

TDR project support often occurs over several years, and in some cases, over different diseases. Table 1 provides a summary of current progress within the overall plan of expected results (ERs). More details on progress are provided as narrative in the pages below. Implementation delays due to COVID-related disruptions in the last biennium have, except for a few subprojects, have been addressed, with most ER activities back on track. Three ERs (of 11) are currently working to overcome challenges related to timely initiation of activities, and two others faced challenges this year due to the ongoing Ukraine conflict. Adjustments have been made to avoid further risk of delays.

Table 1. Research for Implementation workplan overall progress

Expected Results – Research for Implementation	
Expected results and deliverables	***Indicators and targets***
Research for policy	
1.1.1 Country preparedness for disease outbreaks: i) Expanded capacity of countries to use EWARS tool; ii) Regional plan to improve arbovirus disease surveillance and vector control in West Africa.	By 2023, 10 countries using EWARS tool By 2023, a situation analysis report on improved arbovirus disease surveillance and vector control in West Africa published ***Progress made:*** ▪ *On track: A total of 17 countries are now using EWARS* ▪ *Completed: The situation analysis is published*
1.1.4 Country resilience to the threat of drug-resistant infections: i) OR/IR strategies for countries to build effective systems for monitoring and responding to emerging drug resistance; ii) Documentation of practical approaches to improve targeted treatment and reduce drug misuse and risk of resistance; iii) Strategies for monitoring and responding to potential emergence of drug resistance.	By 2023, strategies for countries to build effective systems for monitoring and responding to emerging drug resistance endorsed by stakeholders at relevant levels ***Progress made:*** ▪ *74 research studies (from Asia, Africa and the Americas) were completed and solutions are being implemented* ▪ *The first 36 studies evaluated for impact showed 71% influencing policy and/or practice with 86% of those trained applying their acquired skills to the AMR response. A total of 215 individuals were trained on tackling AMR*

Expected Results – Research for Implementation	
Expected results and deliverables	***Indicators and targets***
1.3.3 Population health vulnerabilities to vector-borne diseases: increasing resilience under climate change conditions: i) call for proposals for scaled up One Health transdisciplinary ecosystem approach for vector borne diseases in the context of Climate Change in Africa; ii) Implementation of an online training course on Operationalizing One Health; iii) Research uptake meeting with researchers, project stakeholders and collaborators.	By 2023: • Research uptake meeting successfully conducted • 20–40 African researchers trained in Operationalizing One Health through an online training course (to be offered once a year in 2022 and 2023) ***Progress made:*** ▪ *Call for proposals issued and four projects awarded* ▪ *Online training modules developed*
Research for implementation	
1.1.7 Maximized utilization of data for public health decision-making: i) capacity built for effective collection, analysis and use of data; ii) publications and policy briefs suitable for informing evidence-based policies/ practice guidelines.	By 2023, 15 publications and evidence of change in policies/practice (30 for the 50m scenario) ***Progress made:*** ▪ *A total of 22 publications in 2022 focused on public health emergencies, NTDs and AMR, with 60 evidence briefs and associated tools provided to researchers* ▪ *Approximately 70% of research had an influence on policy and practice*
1.2.1 Strategies to achieve and sustain disease elimination: i) evidence on sustainable strategies for the elimination of visceral leishmaniasis in the Indian subcontinent; ii) evidence to support establishment of programmes towards elimination of VL in Eastern Africa; iii) improved basis for monitoring progress of preventive chemotherapy-based elimination programmes towards elimination and for decisions to stop interventions; iv) data to support WHO guidelines and onchocerciasis-endemic country registration and policies on moxidectin for onchocerciasis elimination.	By 2023: • New results on sustainable VL elimination strategies delivered to country control programmes • Results on improved basis for monitoring progress of preventive chemotherapy-based elimination programmes delivered to control programmes ***Progress made:*** ▪ *Evidence generated for alternative vector control strategies to indoor residual spraying (IRS) presented to country programmes and regional technical advisory groups; a bi-regional VL elimination strategic plan under discussion for Eastern African foci* ▪ *Progress to date on the diverse (though research synergistic) tools suggests that ≥1 will be available for large-scale piloting by onchocerciasis control (elimination) programmes (OCPs) by the end of 2023*

Expected Results – Research for Implementation	
Expected results and deliverables	***Indicators and targets***
1.2.6 Optimized approaches for effective delivery and impact assessment of public health interventions: i) Extend the WARN-TB approach to other geographical areas and/or other disease burdens; ii) Capacity strengthened for improving the effectiveness of safety monitoring of new drugs in target countries; iii) Approaches to optimized delivery and effectiveness of seasonal malaria chemoprevention in West and Central Africa evaluated and other NTD control strategies.	By 2023: ● Report on the expansion provided to stake-holders at country, regional and global levels ● Serious adverse event reporting rates in target countries improved ● Report on approaches to optimize delivery of seasonal malaria chemoprevention (OPT–SMC) provided to stakeholders at country, regional and global levels ***Progress made:*** ▪ *Consultation initiated for an Eastern and Southern African TB Network* ▪ *Safety reporting capacities strengthened in ADP target countries (Ghana, Malawi, Senegal, Tanzania, and Burkina Faso) and the Democratic Republic of the Congo*
1.3.12 Strategies to promote gender-responsive health interventions on prevention and control of infectious diseases of poverty: i) New knowledge and evidence on intersection of sex and gender with other social stratifiers to address power relations, social exclusion, marginalization and disadvantages in access to health services, health impacts, prevention/control of IDPs.	By 2023: ● Two research studies implemented and evidence generated to inform policy and practice (four in the US$ 50 million scenario) ***Progress made:*** ▪ *Two studies completed*
Research for innovation	
1.1.5 Directions for development and accelerated access to new tools and strategies: i) outputs of TDR research projects and TDR staff and adviser expertise used to provide directional perspective for R&D for new tools (including advice/support to R&D sponsors) as well as new ways of implementing tools; ii) generic protocols to address Implementation Research issues encountered by different disease control programmes; iii) strategy development, implementation and monitoring.	By 2023: ● At least four R&D initiatives informed by TDR research project output or TDR staff/adviser expertise ***Progress made:*** ▪ *Expert advice provided to development of moxidectin for onchocerciasis elimination* ▪ *Generic protocols/toolkits developed for digital technologies in tuberculosis (TB) research*
1.3.10 Urban health interventions for the prevention and control of vector-borne and other infectious diseases of poverty: i) Evidence from literature reviews on urban health, gender dimensions of infectious diseases and social determinants in urban settings analysed; ii) Research uptake activity in terms of evidence briefs for policy generated.	By 2023: ● Journal papers published following literature reviews conducted by ICDDR in Bangladesh and the Regional Medical Research Centre in India ● Systematic reviews on infectious diseases among urban poor during COVID-19 pandemic with a focus on gender and health inequities in urban slums ***Progress made:*** ▪ *Evidence generated (two articles published)*

Expected Results – Research for Implementation	
Expected results and deliverables	***Indicators and targets***
1.3.14 Testing of innovative strategies for vector control: i) Evidence of the effectiveness of the Sterile Insect Technology against vectors and arboviral diseases; ii) Global map of the vector control technologies currently used and how new technologies can be integrated into the programmes; iii) capacity building in medical entomology to improve vector control support globally.	By 2023: • At least three countries having performed field tests for SIT and generated evidence • A landscape analysis for the integration of innovative vector control technologies within current technologies now available • Global online directory for courses on medical entomology available and updated • Scientific publications in open-access peer-review journals ***Progress made:*** ▪ *Landscape analysis for the integration of innovative vector control technologies within the current ones completed and under external review* ▪ *Global online directory for courses on medical entomology available on the Global Vector Hub (GVH) platform and updated each year*
Research for integrated approaches	
1.3.11 Multisectoral approach for prevention and control of malaria and emerging arboviral diseases: i) Documentation for training stakeholders from national malaria and other vector-borne disease control programmes on how to implement an MSA for disease control available; ii) new case studies implemented on vector-borne disease control in several countries, iii) collaboration with sectors other than health to prevent and control vector-borne diseases well established.	By 2023: • Ten countries have received and used the training documentation • Three countries with an MSA approach against malaria initiated • Three countries with an MSA approach against AVDs initiated • Lessons learned report from collaboration with the WASH sector available • Scientific publications in open-access peer-review journals ***Progress made:*** ▪ *Eight countries have received training materials in 2021 and four more in 2022* ▪ *Four countries have started MSA approaches against malaria* ▪ *Two countries have initiated MSA approaches against AVDs* ▪ *Lessons learned document initiated under WSH leadership* ▪ *Scientific publications on track*

Progress description in 2022 and plans for 2023

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

Research for policies (with three Expected Results – ER 1.1.1, ER 1.1.4, ER 1.3.3)

Research for Implementation (ER 1.1.7, ER 1.2.1, ER 1.2.6, ER 1.3.12)

Research for innovation (ER 1.1.5, Er 1.3.10, ER 1.3.14)

Research for integrated approaches (ER 1.3.11)

▪ *Workstream: Research for policy*

Identifying which interventions can be translated into policy and go into practice

Support will be provided to countries and regions in: assessing the safety of interventions and identifying factors influencing their effectiveness; developing systems for the prevention, early detection and containment of AMR; accessing baseline information for the deployment of vector control activities; conducting situation analyses and systematic reviews; and promoting new approaches for improved use of existing tools and interventions.

ER 1.1.1: Country preparedness for disease outbreaks

This ER addresses an important public health problem — prediction, early detection and response to devastating outbreaks — especially in consideration of the growing importance of *Aedes*-borne diseases such as dengue, chikungunya, Zika and yellow fever. Dengue is the fastest growing AVD worldwide, with periodic threats of large outbreaks particularly in urban areas of Latin America and Asia, which poses enormous social, economic and health burdens on individuals, families and governments. Chikungunya has been for a long time endemic in South India and surrounding areas. In 2013, it was introduced to Latin America leading to large epidemics in nonimmune populations. This was followed by the introduction of the Zika virus in Latin America which attacks, under largely unknown conditions, the nervous system leading to Guillain Barré syndrome and microcephaly in newborn babies. Yellow fever is (in spite of an efficacious vaccine) a continuous threat in rural areas of Africa and Latin America (mainly Brazil) with the possibility of moving to urban areas and converting into urban yellow fever. Country preparedness and response is generally weak and ineffective. Few vector control measures are backed by evidence and are generally deployed when the outbreak is already flaring.

In the context of this ER, TDR works toward:

1. Establishing and/or strengthening country control programme capacities to identify signals that will alert country control programmes to an impending dengue outbreak. This has led to the development of an **Early Warning and Response System (EWARS)** for arbovirus outbreaks.

2. **Strengthening surveillance and control of AVDs in Africa.** Support to African countries to evaluate national capacities for surveillance and control of AVDs, with the aim to develop national and regional plans to fill the gaps and be prepared to respond to AVDs outbreaks.

Progress in 2022

EWARS

Current status of EWARS use:

1. Full integration of EWARS into the national surveillance platform: Mexico (with 137 endemic municipalities). Due to a change in the Ministry of Health (MoH), the surveillance system was temporarily stalled until the nomination of a new head of department.

2. Countries which started to pilot EWARS for later inclusion into the national surveillance system are: Bangladesh, Cambodia, Colombia, Ethiopia, India, Malawi, Malaysia, Mozambique, Myanmar, Sri Lanka, Thailand, and Timor Leste. Potentially: Bolivia, Chile, Ecuador and Peru.

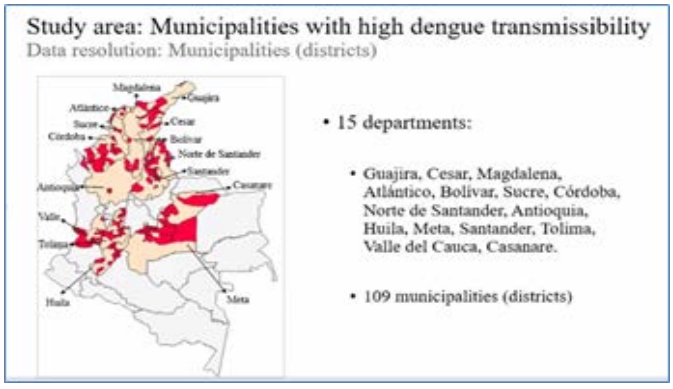
3. Two countries advanced with the widespread use of EWARS, but were affected or slowed down due to political changes. The Dominican Republic, with additional support provided by AMRO/PAHO, is now moving forward again. Malaysia has now made good progress towards installing EWARS into its national server.

4. One country on hold due to political reasons is Brazil.

The collaboration between TDR and PHE continues with EWARS being used in Bangladesh, Cambodia, Ethiopia, Malawi and Mozambique, Myanmar, Nepal, Oman and Timor Leste (with PHE support). Since 2020, webinars are conducted every six months with all countries implementing EWARS (in collaboration with PHE) to maintain momentum and share experiences.

Bi-monthly calls are held with each country supported by TDR to update on progress and plan appropriate virtual trainings. In 2022, a new version of EWARS, called EWARS+ was developed to facilitate the calibration process. Virtual trainings on EWARS+ conducted during the first six months of 2022 primarily focused on understanding and exercising the tool. Training has now advanced to engaging a wider group of stakeholders (e.g. information technology and data management personnel) of partner countries in order to advance the process of installing the tool in national servers. This will ensure engagement of a broader range of stakeholders, beyond epidemiologists, meteorologists, or entomologists, and promote country ownership of the tool. Countries like Mexico, the Dominican Republic, Colombia, India, Sri Lanka (to some extent), Malaysia and Thailand have been key partners benefiting from this process.

Focus on Colombia and Thailand



Two countries, Colombia and Thailand, were selected through a call in 2021 to conduct an evaluation of the feasibility and effectiveness of EWARS in predicting the occurrence of dengue outbreaks and for an early response. National counterparts were the departments of disease surveillance in both countries. Progress was made in 2022 in preparing the countries to conduct of their studies.

Fig. 1. Selection of municipalities for the study in Colombia

Table 2 below summarizes all the steps that have been achieved so far and those in progress for the conduct of the study.

Table 2. Steps for the establishment of EWARS and the conduct of the evaluation and progress made in Colombia and Thailand

		Colombia	Thailand
1	Collect epidemiological and climate data for two or three years to build the early warning model and calibration of the tool to define the cut off best predicting the occurrence of an outbreak	done	done
2	Define decision algorithm and vector control response depending on the level of alert	done	done
3	Train central staff (disease surveillance department) on the use of EWARS	done	done
4	Collaborate with the national department routinely collecting climate data to agree for this data to be shared on weekly basis for feeding the EWARS system	Discussion in progress/MoU not signed	Done MoU signed
5	Install EWARS on a local server to supply access to central and peripheral levels and build a sustainable system	In progress	done
6	Define hotspot geographic areas where EWARS could be used routinely	done	done
7	Train the local staff (those in charge of epidemiological surveillance for dengue and vector control response) in the selected hotspot(s) on EWARS and decision algorithms	done	done
8	Develop protocol and data collection tools for the evaluation of EWARS	done	done
9	Conduct a feasibility and effectiveness study	In progress	In progress
10	Generate sufficient evidence in support of routine use of EWARS for predicting and responding to dengue threat	Too early	Too early

EWARS was presented to the team in charge of coordinating WHO's Global Arboviral Initiative (GAI). This system can address the gaps identified for strengthening Pillar 2 of the GAI strategy. Discussions are ongoing with the GAI team and NTD on possible future collaborations, especially in Africa.

Strengthening AVD surveillance and vector control in Africa

The growing threat and recent epidemics of *Aedes*-borne arboviral infections in Africa has put into question the adequacy of public health systems to control these VBDs. Adequacy relies on countries' capacity to assure timely, effective epidemiological and entomological surveillance and control of AVDs to identify, prevent and respond to outbreaks. In January 2021, in collaboration with NTD and AFRO, TDR conducted a cross-sectional survey to determine the current capacity of countries in the African region for the surveillance and control of AVDs. A self-administered questionnaire covering seven relevant domains was used to measure capacity.

All 47 countries in the African Region contributed to the survey. In general, the countries had adequate capacity for general disease surveillance, arbovirus diagnosis and notification and preparedness for disease outbreaks due to their long experience in the control of malaria and other diseases. Their capacities are not, however, adequately oriented to the surveillance and control of AVDs, and huge gaps were identified in the management of cases including severe cases of AVDs, in virological surveillance, entomological surveillance and control of *Aedes* vectors and community sensitization and engagement related to AVDs. The main challenge is the weakness of systems for arbovirus surveillance in humans, vectors and animals for early detection of outbreak events. Furthermore, despite the existence of a preparedness plan for outbreak events, cases (and severe cases) of AVDs are not effectively managed in all countries because of lack of clinical knowledge and infrastructure.

These findings were discussed during a regional meeting organized with AFRO. This survey highlighted areas where implementation research could be conducted. See section on next year plans.

The report is published and available in English and French on the TDR website (Surveillance and control of arboviral diseases in the WHO African region: assessment of country capacities).

Remaining risks and challenges

The lack of climate data and the weakness of the AVD surveillance systems in Africa are barriers for the implementation and use of EWARS. Surveillance systems (both entomological and epidemiological) need to be strengthened to build a country-specific EWARS predicting model and implement its use.

With the COVID-19 pandemic, activities had to slow down but countries are making renewed progress.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Ministries of health and/or national institutes of health in Brazil, Colombia, Dominican Republic, India, Malaysia, Mexico, Mozambique, Sri Lanka and Thailand.

AFRO and all 47 WHO country offices, TDR, NTD, PHE and the WHO Emerging Diseases and Zoonoses Unit which is in charge of coordinating the Global Arbovirus Initiative. Also included are national Ministries of Health and the West Africa Health Organization.

Leverage created by this project:

Around US$ 75,000 from the PHE was used to expand the use of EWARS to the countries supported.

Gender aspects and vulnerable populations:

Promoting and achieving gender balance is a part of all VBD activities. However, vector control measures are not always possible and are difficult to implement.

Training:

Virtual training of disease control programmes of Colombia, Dominican Republic, India, Malaysia, Mexico, Mozambique, Sri Lanka and Thailand on: i) the use of EWARS+; and ii) the use of climate data.

Strengthened institutions and/or networks:

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

Publications:

A manuscript documenting the experience of Mexico with the integration of EWARS in their national surveillance system is under development

Arboviral diseases in Africa – https://tdr.who.int/publications/i/item/9789240052918

Related news:

Assessing African country capacities to prevent, detect and respond to arboviral disease outbreaks (who.int)

Policy brief: GHHG_PolicyBrief_EWARS-2022.pdf (gu.se)

Results dissemination and uptake:

Expansion of the use of EWARS+

Plans for 2023

In 2023 it is planned:

1. To continue to support country integration of EWARS into national surveillance systems.
2. To finalize the writing of a scientific paper on the experience of Mexico in the full integration of EWARS into their national surveillance system.
3. To continue collaborating with PHE for the rollout of the use of EWARS in new countries.
4. To follow-up with GAI coordination teams in order to benefit from this initiative and address weaknesses in early warning systems in Africa which were identified in the survey.
5. One of the African survey findings indicated that there was insufficient community engagement for arboviral control. This is an area of interest for TDR and NTD. It has been agreed to: i) collaborate and develop a concept note for fundraising to strengthen this aspect in Africa; ii) build on best practices generated in some of the countries; and iii) conduct implementation research projects to pilot these best practices in a couple of selected African countries.
6. To contribute to the global situation analysis, prepared for the GAI.

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

Building country resilience to the threat of drug-resistant infections through the Structured Operational Research and Training IniTiative (SORT IT) in Africa, Asia and Latin America

In January 2019, the Government of the United Kingdom of Great Britain and Northern Ireland, represented by its Department of Health and Social Care, through the National Institute for Health and Care Research (NIHR), committed designated funding (£8 212 943) for a SORT IT project on tackling AMR. This is now referred to as the **AMR–SORT IT project**.

Aim: Build sustainable operational research capacity to generate and utilize evidence to tackle the emergence, spread and health impact of AMR in LMICs.

How: Build strong engagement and partnerships with WHO country offices, AMR committees and 69 SORT IT partners in addressing country priorities and catalysing the evidence-to-action cycle.

Who: Health workers from all levels of the health system and decision-makers in Colombia, Ecuador, Ghana, Nepal, Myanmar, Sierra Leone and Uganda.

Scientific scope: Research priorities are tailored to country and local needs. The project aims to make each of the five pillars of the AMR action plan "data rich, information rich and action rich".

Desired impact: Strengthened health systems, better programme performance and improved public health

Overview of progress and success indicators for research implementation, capacity built and collateral benefits to health systems.

During the course of the project (2019–2022), we continued our engagement with AMR coordinating committees, WHO regional and country offices in Colombia, Ecuador, Ghana, Myanmar, Nepal, Sierra Leone and Uganda, and various SORT IT partners. Seventy-four locally relevant research studies from the human, agricultural and environmental sectors (One Health) were completed. These are *local research,* for *local solutions,* with *local ownership.*

ACHIEVEMENTS SINCE 2019	**74** research studies completed in seven countries	**65** published by LMIC first authors by Dec 2022
71% of research had an impact on policy and/or practice	**69** implementing institutions became part of the AMR–SORT IT partnership	**25%** of trainees became mentors after one training cycle
86% of trainees applying SORT IT acquired skills to AMR practice	**56%** of trainees applying SORT IT acquired skills to the COVID-19 response	**64%** of trainees completed a new research study

For more on AMR–SORT IT, go to https://tdr.who.int/activities/tackling-antimicrobial-resistance.

Progress in 2022

1. *Research has impact and is strengthening health systems against AMR and COVID-19*

   Of the first 36 SORT IT studies from Asia and Africa that were assessed 12-months after completion, 71% influenced policy and/or practice. In terms of applying acquired skills from SORT IT, 86% of trainees are applying their skills to tackle AMR, 56% to the COVID-19 response. Sixty-four per cent completed a new research study after completing a SORT IT cycle and 25% became mentors through a ToT programme (indicating independent capacity built and collateral benefits to the health system).

"If research is to have impact and change health outcomes for the better, the research findings should be translated into recommendations that can shape policy and/or practice and SORT IT is invaluable for this purpose."

Dr Thomas Samba, Chief Medical Officer, Ministry of Health and Sanitation, Sierra Leone

2. *High quality policy/practice relevant research is being rapidly published*

   Using the SORT IT online training platform developed to overcome COVID-19 restrictions, 74 research studies were completed by 2022 and 64 were published in a record time of less than 10 weeks of submission. In 2022, 36 studies from Colombia, Ecuador, Ghana and Sierra Leone reached the manuscript stage. Fast tracked publications were achieved by: i) proactively accelerating the journal processes; and ii) providing structured support to the researchers, especially to promptly respond to editorial requirements and peer review . Such expedited peer-reviewed publications aim to ensure timely evidence for decision-making without compromising rigorous peer review. Publications are available under TDR key performance indicators.

"SORT IT is contributing to the national AMR effort by developing operational research capacity that helps understand in real-time, the situation on the ground. It is about "feeling the pulse" of the situation."

Dr Francis Kasolo, WHO Representative, Ghana

3. *Impact grants provide solutions to the complexities behind antimicrobial resistance (AMR)*

   In collaboration with the six WHO regional offices, TDR's Impact Grants for Regional Priorities supported studies conducted by medical teams and public health institutions in 20 countries. Partly funded by the AMR–SORT IT project, the research topics included: Identifying risk factors linked with drug resistance; migration-related issues; developing evidence-based antibiotics protocols/policies; social inequalities in AMR. More information available at: https://tdr.who.int/newsroom/news/item/26-06-2022-understanding-the-complexities-behind-antimicrobial-drug-resistance.

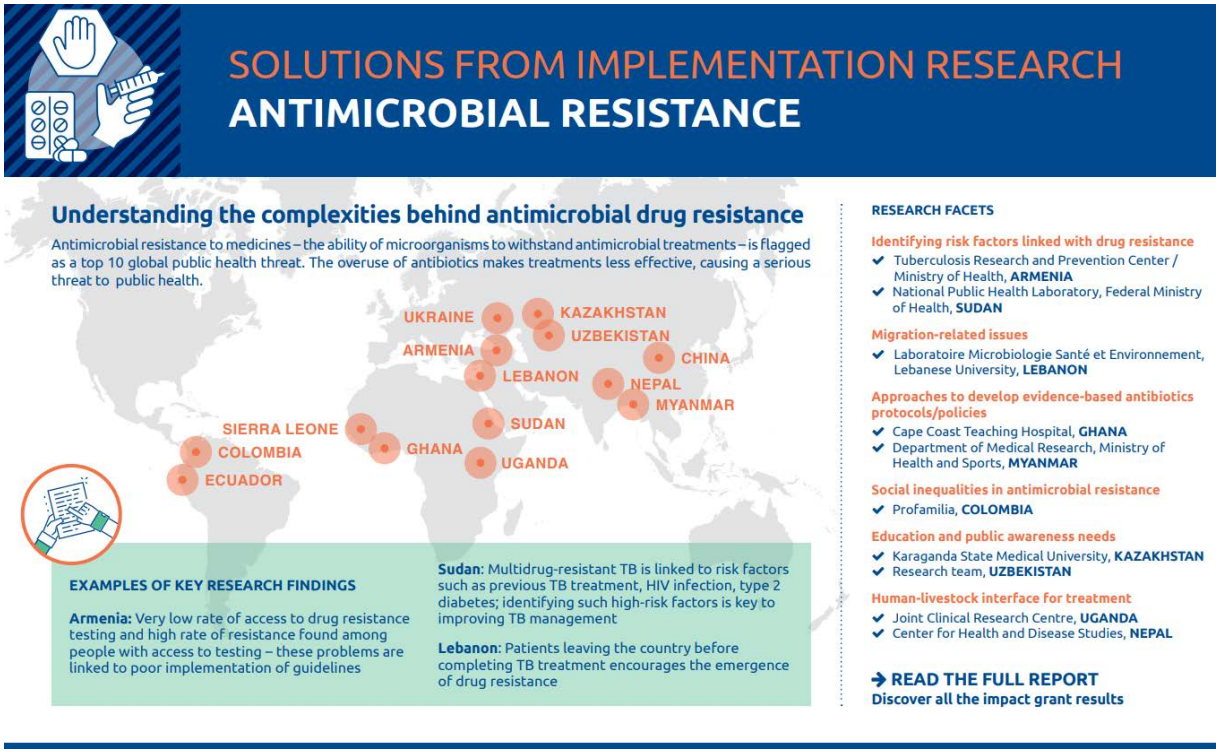


Fig. 2. Understanding the complexities behind AMR in 20 countries

4. *Combining research training with research implementation*

The AMR–SORT IT training model combines *research training* and *research implementation* through hands-on work on a research project with various partners. This process builds communities of practice. To increase *value for money,* Training of Trainers (ToT) was integrated. Each research project includes four layers of training. Table 3 shows the groups of individuals being trained and numbers trained in 2022 .

Table 3. Groups of training in AMR–SORT IT in Africa, Asia and Latin America

Groups of training	Number	Training ratio per research study
Total research studies started	74	~3 persons trained per study
Total numbers of individuals involved in SORT IT training	215	
Group 1: Frontline health workers /programme staff	72	
Group 2: SORT IT alumni	59	
Group 3: Academia/others	54	
Group4: WHO country staff	30	

"I am certain that participants will benefit from the SORT IT training and mentorship programme which is vital for early-career researchers. This training improves the knowledge, skills and competencies to conduct operational research for reducing the AMR burden."

Dr Joseph Kanu, National AMR focal person, AMR country coordinating platform, Sierra Leone.

5. Research communication has improved through a KISS – "Keep It Short and Simple"

Trainees continue to benefit from the newly developed training module (SORT IT Module 4) on effective communication of research findings for research uptake. A total of 215 individuals from various institutions benefited from this module. Outputs can be accessed at: https://tdr.who.int/activities/sort-it-operational-research-and-training/communicating-research-findings

Table 4. Tools developed for effective communication of research findings

Tools	Purpose
1. A communication plan	To target decision-makers and stakeholders
2. One-page plain language summary	Key messages are short and simple
3. A PowerPoint presentation (10 minutes) and a lightening presentation (3 minutes)	For conferences and national decision-makers
4. An elevator pitch – one-minute oral presentation	For opportunistic one-to-one conversations

"The SORT IT training on research communication is vital to present research findings in a simple manner and avoid jargon. It allows decision-makers to easily grasp the key messages and take action to improve public health."

Dr Mohammed Vandi, Director of AMR and health emergences, Sierra Leone

Fig. 3. Peer reviewing at a workshop on effective communication of research findings to combat AMR; dissemination meeting with stakeholders and decision-makers (Sierra Leone)

6. Broader support to countries for building health systems resilience

The AMR–SORT IT project continues to provide support to WHO country offices and AMR committees to propel activities needed to strengthen the AMR response. These include human resources (e.g. appointment of SORT IT technical officers and research fellows) and financial support to hold meetings of technical working groups and conduct research dissemination events. This has galvanized the AMR committees and boosted TDR capabilities to strengthen the health system to tackle not only AMR, but also COVID-19 and other pandemics such as influenza.

Table 5. Examples of building health system resilience in countries

Health system area	Type of health system resilience built
Integrated AMR surveillance	Good surveillance data is essential to feeling the pulse of AMR in countries. Data quality of the Global AMR Surveillance System (GLASS) was improved. Integrated monitoring of antibiotic resistance in humans, animals and the environment was developed through the Tricycle *Escherichia coli* project.
Quality of laboratory testing	Training and supply of essential laboratory reagents needed for AMR, COVID-19 and pandemic influenza was ensured in Ghana, Myanmar, Nepal and Sierra Leone. National quality assurance programmes were established. This prepares countries for future pandemics.
Protection of health workers and communities	Sierra Leone continued the local production of an alcohol-based handrub solution which is seven times cheaper than a commercial version in the local market – US$ 3 compared to US$ 10. Forty-five thousand (45 000) litres are produced annually for use in health facilities.

7. Informing individual and community behaviour to tackle AMR – the World Antimicrobial Awareness Week

The 2022 theme for the World Antimicrobial Awareness Week (WAAW, 18–24 November) was "Preventing antimicrobial resistance together". Awareness raising activities to avoid the further emergence and spread of drug-resistant infections were conducted in all target countries through effective communication, education and training.

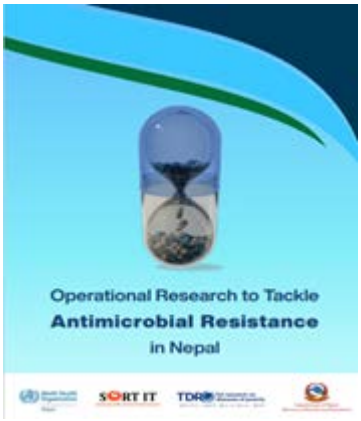


Fig. 4. (left to right): Official release of SORT IT book 'Operational Research to Tackle Antimicrobial Resistance in Nepal' during the WAAW 2022 by Ministry of Health and Population officials; booklet of SORT IT publications on tackling AMR in Nepal

8. Building LMIC equitable research through partnerships to tackle AMR

The AMR collaborative network was expanded to include 69 implementing partners in 30 countries from Asia and Africa, including 80% of mentors from the South and 40% SORT IT alumni. This has boosted HIC–LMIC and LMIC–LMIC partnerships, promoted equitable research and built new communities of practice to tackle AMR at a global level *("thinking global, acting local").* More on partner institutions is available at: SORT IT operational research and training (who.int).

Remaining risks and challenges

The main operational challenge was the COVID-19 pandemic-related delays in implementation — 67% and 73% of the 132 individuals in 2021/2022 who were involved in the AMR–SORT IT project were on the frontlines of the COVID-19 response and had to share their time with their AMR–SORT IT work. To offset the negative effects of delayed implementation due to COVID-19, TDR successfully negotiated a no-cost extension until June 2023.

Another challenge was the political situation in Myanmar. The United Nations guidelines for Myanmar stipulate that meetings and capacity- building activities with de facto authorities should be avoided. As it was not feasible to conduct a national SORT IT in Myanmar, instead, TDR launched a programme in Ghana in November 2021 with 12 research studies reaching the manuscript stage by October 2022.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Through SORT IT, the AMR collaborative network was expanded to include 69 implementing partners in 30 countries from Asia and Africa, including 80% of mentors from the South and 40% SORT IT alumni. This has boosted HIC–LMIC and LMIC–LMIC partnerships and promoted equitable research and built new communities of practice to tackle AMR at a global level ("thinking global, acting local"). Please see more on partner institutions at: SORT IT operational research and training (who.int)

Estimated leverage created by this project:

The total budget of this project is about US$ 10 million from the Department of Health and Social Care, United Kingdom. It runs until June 2023. Discussions continue to try to leverage more funds.

Gender aspects and vulnerable populations:

Of 74 research projects completed, 47% of the PIs are women. Participant selection processes have promoted gender and geographic equity while promoting LMIC first authorship in published outputs. One-hundred per cent of studies have LMIC first authors. The SORT IT AMR programme is focused on LMIC countries where the burden of AMR is high, particularly for the rural poor who have limited access to health facilities and antibiotics. TDR specifically targets vulnerable groups as a priority for research topics with several research projects focused on neonates and women wherever possible. Topics related to "One Health" such as improving water quality, waste management, rational use of antibiotics in animal husbandry will have a wider benefit on the lives of poor communities. The selection of Sierra Leone was a deliberate choice; the country being a vulnerable and fragile state recovering from decades of civil war. Similarly, focusing on cross-border AMR activities in Colombia and Ecuador target vulnerable populations.

Training:

The AMR–SORT IT model uniquely combines research training, research implementation. To increase value for money, ToT has been integrated. Each research project includes four groups of training that involve:
1) frontline workers and programme staff; 2) SORT IT alumni; 3) academia; and 4) WHO country office staff. The average numbers trained per research study is three which adds to the value for money.

Twelve operational research officers are working on the AMR–SORT IT programme while also providing broader support to health systems strengthening and reinforcing research activities at country level.

Strengthened institutions or networks:

Through the AMR project, the SORT IT partnership is strengthened with new funding, new institutional partners, new mentors, and new alumni. Implementing partners include seven WHO country offices and 69 SORT IT partners (e.g. disease control programmes, academia, and NGOs).

Publications:

- Sixty five of 74 completed AMR research studies from Ghana, Myanmar, Nepal, Sierra Leone and Uganda were published in open-access journals. Available at:
- IJERPH | Special Issue : Operational Research to Tackle Antimicrobial Resistance in Ghana (mdpi.com)
- Operational Research and Capacity Building to Tackle Antimicrobial Resistance in Sierra Leone (mdpi.com)
- Operational research to tackle AMR in Nepal. Public Health Action: Ingenta Connect Table Of Contents
- AMR in Low-and-Middle-Income Countries. https://www.mdpi.com/journal/tropicalmed/special_issues/AMR

Related News:

- Operational Research to Tackle AMR: https://tdr.who.int/activities/tackling-antimicrobial-resistance
- Communicating research findings with a KISS – *"Keep It Short and Simple"*: https://tdr.who.int/activities/sort-it-operational-research-and-training/communicating-research-findings

Results dissemination and uptake:

- For research uptake please see the main report (Research has impact and is strengthening health systems against AMR and COVID-19)
- Researchers also benefited from a new SORT IT training module on "effective communication of research findings", maximizing the opportunities for research uptake. Please see evidence summaries of completed AMR research at https://tdr.who.int/activities/sort-it-operational-research-and-training/communicating-research-findings

Plans for 2023

The TDR focus in 22023 is on ensuring that all deliverables are achieved in Asia, Africa and Latin America. TDR will also continue to demonstrate the impact of studies and use this for advocacy, fund raising and visibility of TDR.

- Impact assessments of research studies are an integral requirement of the project log frame as agreed upon with DHSC/NIHR.[1] The 37 studies that will be completed in 2022 will be assessed for impact in 2023 and early 2024.
- The second batch of researchers from Colombia, Ghana and Sierra Leone completed their training cycle during 2022 and will be 'hands-on' with a train-the-trainers programme in 2023 and 2024. Seizing this opportunity is important to build a critical mass of research teams that can integrate research into the health system and become leaders of research.

Please refer to the supplementary documentation: Success stories of impact from Ghana, Nepal and Sierra Leone

[1] UK government offices: Department of Health and Social Care (DHSC) and National Institute for Health and Care Research (NIHR)

ER 1.3.3: Population health vulnerabilities to vector-borne diseases: increasing resilience under climate change conditions

Expected Result 1.3.3 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. The first phase of this ER's implementation was through the TDR/IDRC Research Initiative on VBDs and Climate Change (completed in 2018), composed of a portfolio of projects within a network of researchers and collaborators from several institutions and multisectoral partners in Africa. New knowledge and evidence generated from the research initiative enabled African health and environment officials to better predict and respond to emerging health threats linked to climate change, and to improve the effectiveness of climate change adaptation and health investments.

The IMP-SWG recommended that the 2nd phase of the ER include a One Health approach to document processes and extract key new learning by crystalizing knowledge generated to date and to identifying key new questions that this research network is uniquely well placed to address. The TDR/IDRC Research Initiative thus presented the basis for operationalizing the One Health approach. Responding to this opportunity has become even more urgent and critical with the emergence of COVID-19, re-emergence of Ebola and other zoonotic and VBD threats.

In 2019–2020, during the third phase of this ER, a significant advance was achieved through the design of a Framework/Draft Plan and associated provisional metrics and scorecard for Operationalizing One Health and indicators during the One Health Consultation Meeting held in Brazzaville, Congo, jointly organized by TDR with Fondation Mérieux and other partners. Aligned with the Libreville Strategic Action Plan to Scale Up Health and Environment Interventions in Africa (2019–2029), the scorecard and performance metrics system in the Draft Plan was then envisioned to greatly assist in mitigating the impacts of health consequences brought about by VBDs and climate change on the most vulnerable populations. This portfolio is expected to contribute to WHO's Global Vector Control Response (2017–2030), WHO's 13th Programme of Work and the UN SDGs (2015–2030).

Operationalizing the One Health approach combines well-documented, evidence-based principles and practices that specifically address the problem of population vulnerability, which is a significant contribution to global health. This requires extending the One Health operationalization efforts that are focused on organizational requirements to date, by elaborating methods, including performance metrics, that reflect the interdependence of human health and ecosystem health.

In 2021–2022, the overall goal was to pilot the Draft Plan for Operationalizing One Health for Vector-Borne Diseases in the context of Climate Change through country-specific workplans in Côte d'Ivoire, Kenya, Tanzania and South Africa. Four projects were implemented through TDR support in collaboration with key stakeholders and partners building on the outputs of the TDR/IDRC Research Initiative on VBDs and climate change to which elements of One Health operationalization could be applied on a pilot scale.

Progress in 2022

- Pilot studies were conducted on operationalizing One Health and the application of the scorecard/metrics approach
- One Health training module was developed and applied; African researchers were trained
- Draft manuscripts have been prepared for publication
- A call for proposals to scale up implementation of One Health operationalization has been issued
- A One Health toolkit is being developed

Four pilot studies were conducted:

Project 1. Vulnerability and resilience to malaria and schistosomiasis at the northern and southern fringes of the Sahel band in the context of climate change: from an EcoHealth research project to operationalizing the One Health approach (MTV-CC project: *Maladies à transmission vectorielle à Changements Climatiques*)

The MTV-CC project was implemented based on the main pillars of the EcoHealth approach which include systemic analysis**,** transdisciplinarity, participation, research-action, social and gender equity and sustainability. The study was carried out in two urban-city sites: Korhogo (northern Côte d'Ivoire) and Kaedi (southern Mauritania).

Project 2. Operationalizing the One Health approach: building on the TDR/IDRC Africa Initiative Project on Malaria and Rift Valley Fever in Kenya

This research project was conducted by Jaramogi Oginga Odinga University of Science and Technology (JOOUST) and University of Nairobi (UoN). The study focused on two diseases: malaria and Rift Valley Fever (RVF). In order to operationalize the One Health approach, this project reviewed earlier research findings according to the Social-Ecological Systems Theory (SESR) framework and aligned them to TDR's One Health scorecard's . The project further synthesized data to collate evidence on the effect of climate variability and socioecological dynamics on the human, animal, and environmental interface and, the resultant risk of VBD transmission. This project was implemented through a series of consultative meetings, planning workshops, interviews, capacity-building initiatives and stakeholder engagements with communities in Baringo County.

Project 3: Implementation research to operationalize a One Health approach to VBDs in the context of climate change in Tanzania

This project's focus was to help vulnerable Maasai communities adapt to the devastating effects of zoonotic and VBDs (endemic in the Maasai steppe) through operationalization of the One Health approach.

The operationalization of One Health requires real interventions that take into consideration environmental factors and human behaviour as a complex adaptive system. Specifically, this project addressed a complex system bringing together landscape ecology, public and veterinary health sciences, sociology (including community traditional knowledge), and the effects of climate change. Impacts of climate change are expected to have greater magnitude and far-reaching consequences on diseases of poverty in the Maasai steppe, where the ecology supports a vicious cycle of disease transmission. This multidisciplinary project was therefore designed to employ transdisciplinarity, targeting to scale up implementation of research interventions on health and environment using a One Health approach. The approach taken for this study ensured that human and animal health, as well as environmental integrity concerns, were addressed in an integrated, multisectoral and holistic manner, providing a more comprehensive understanding of the problems and potential solutions that would not be possible with siloed approaches.

Project 4: Operationalizing One Health in Ingwavuma Community: developing a transdisciplinarity methodology

The South African project, branded as MABISA (Malaria and Bilharzia in Southern Africa), was implemented in Botswana, Zimbabwe and South Africa. This project addressed capacity development, knowledge, learning and threat management for operationalizing One Health in South Africa.

In the process of the research, capacity building of local communities focused on routine data collection and promotion of community change makers for prevention and control of VBDs, including zoonosis. Local level structures were enhanced to facilitate co-designing of community-based projects by researchers and communities through genuine community engagement and involvement (CEI). CEI processes were used to identify persisting or/and new health challenges in the study community.

In addressing the overall theme of the TDR/IDRC initiative, the MABISA project identified research gaps that impeded control, prevention and elimination of malaria and schistosomiasis in the three countries, in the context of climate change:

- designing effective community-based strategies for elimination of malaria in endemic areas where elimination phase has been reached, and reducing the burden of schistosomiasis to a low-level impact on public health;
- operational research involving monitoring and evaluating the level at which communities use results from the research project to increase their adaptation and resilience to climate-induced environmental and socioeconomic change; and
- validation and integration of indigenous knowledge systems from communities on the treatment, prevention and control of VBDs.

Development of an Online Training Course for One Health

The overall aim of this activity is to expand the reach of Operationalizing One Health as a transdisciplinary ecosystem approach (employing a metrics/scorecard system) beyond the current TDR One Health network of researchers and practitioners. For this purpose, a prototype online training course (with relevant training materials) was developed with the aim of introducing the knowledge and understanding gained from pilot-testing by teams in Côte d'Ivoire, Kenya, Tanzania and South Africa. The training benefited from technical support and collaboration with TDR and the Global Health Group International (GHGI), which is currently based at Kasetsart University in Bangkok, Thailand.

This task was undertaken in two phases. The first focused on the development, launch and use of a web-based platform by GHGI. The second was the concurrent development and testing of an online e-training course employing the platform's One Health fundamentals, also developed and articulated by GHGI with continuous feedback from the Africa team participants, along with supplementary materials made readily available online on the platform.

Summary of achievements to date include:

1. Functional One Health programme operational platform (including a web-based platform, onehealthscorecard.org, for engagement with partners and collaborators and for knowledge-sharing)
2. Validation of the One Health Metrics and Scorecard (Theory of Change and Capacity Building) in pilot studies in African countries
3. Strengthened operational and technical capacity for integrating human, animal, and ecosystem health among team members and across country teams (researchers, key partners and collaborators)
4. Peer-review publications in the pipeline documenting and confirming the validity of the One Health tools
5. New call for proposals to scale up operationalization of One Health in Africa
6. One Health toolkit currently being developed

Remaining risks and challenges

The manager, Dr Bernadette Ramirez, retired mid–2022 after leading this ER for several years. A succession plan was put into effect rapidly and Dr Corinne Merle has now taken responsibility and is managing the activities without interruption.

Increased attention to climate change is attracting a range of players and creating both challenges and opportunities for a One Health approach. Appropriate strategic partnerships would need to be developed to build on achievements through sustained collaboration and support to networks. The recent call for One Health proposals was jointly issued with AFRO and TDR.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

TDR is engaged with the following partners: WHO AFRO; Fondation Mérieux; United Nations Environment Programme (UNEP); WOAH-Africa (World Organization for Animal Health); FAO-Africa (Food and Agriculture Organization); PAMCA (Pan Africa Mosquito Control Association) and the GHGI. **The projects involve institutions in Africa**: the University of Nairobi (UoN) and the One Health Regional Network (HORN) project; the National Institute of Medical Research (NIMR), University of Dodoma, FAO-Tanzania Office (with Dr Moses Ole Neselle), the Ministry of Livestock and the National One Health Platform of the Tanzanian Prime Minister's Office; the National Institute of Medical Research (NIMR), University of Dodoma, FAO-Tanzania Office (with Dr Moses Ole Neselle), the Ministry of Livestock and the National One Health Platform of the Tanzanian Prime Minister's Office.

Leverage created by this project:

Project in South Africa: The KwaZulu-Natal Ecohealth Programme (KEP) which is composed of many projects is co-funding the activities for community engagement and travel to the project research**. Project in Kenya**: Contribution from the HORN project in the form of technical support for training and module development, and on the use of the scorecard and metrics. **Project in Tanzania**: Salaries and institutional in-kind support for eight researchers in Tanzania. **Project in Côte d'Ivoire:** Technical support from the Programme National de Lutte contre le Paludisme (PNLP), the Programme national de lutte contre les Maladies Tropicales Négligées à Chimiothérapie Préventive (PNLMTN-CP), and from the Office of the Director of Public Hygiene and Environmental Health of the Ministry of Health.

Gender aspects and vulnerable populations:

None

Project in South Africa. Through the Social Practice Creative Placemaking (SPCP) approach, this project is able to engage with different stakeholders in the social and community space (e.g. children in schools, women in gardens, in households and churches, and Ndunas (and their respective Inkosi heads) during community meetings. **Project in Kenya**. Supported by a network of nine researchers with expertise spanning the fields of medical microbiology, medical anthropology, geology, virology and meteorology; of these nine researchers, two are women (both are medical anthropologists). This project conducted a gender analysis of men's and women's risk, vulnerability and resilience to Malaria and RVF. **Project in Tanzania.** Focused on vulnerable Maasai population; supported by a network of eight researchers with expertise spanning the fields of immunology, epidemiology, One Health and One Health economics, ecology, veterinary public health, and community engagement; of these eight researchers, two are women (One Health economics and ecology). **Project in Côte d'Ivoire**. This project is supported by a network of five researchers with expertise spanning the fields of environmental epidemiology, biology and social science; of these five researchers, two are women (both are social scientists).

Benefits: children under five years of age and expectant mothers were considered most vulnerable to malaria compared to other populations in Kenya. Consequently, these categories were provided with a bed net when visiting public health facilities seeking antenatal and/or postnatal/well-baby care. Among the Maasai, social services such as education and health are generally weak, and women and children are particularly most affected. Women have less pronounced roles in decision-making when household resources are to be used in addressing health issues. Some of these issues were directly addressed by this project during community engagement meetings.

Project in South Africa. This project had not funded degree studies directly. However, it has managed to support students:

- Dr Mindu, postdoctoral fellow working on community engagement
- Dr Nkeka, postdoctoral fellow working on Water Sanitation and Hygiene
- Dr Mutero, postdoctoral fellow facilitating Social Practice Creative Placemaking
- Zinhle Mthembu (PhD candidate), working on community empowerment
- Dr Mogaka, postdoctoral fellow, working on community vulnerability assessment
- Thuli May (Masters candidate), assessing malaria situation in the study area
- Herbert Chikafu (PhD candidate), working on NCDs
- Onyekachin Nwoko (PhD candidate) working on schistosomiasis
- One PhD student in Tanzania was incorporated with a separate funding source

Strengthened institutions and/or networks:

Community advisory boards in South Africa, strengthened county monitoring and evaluation structures in Kenya and strengthened capacity for One Health implementation in all four African countries involved.

Publications:

None

Related news:

One Health Handbook published for tackling vector-borne diseases (who.int); Operationalizing One Health (who.int)

Results dissemination and uptake:

Planned for 2022

Plans for 2022–2023

- Scale up implementation of One Health operationalization in Africa with support to the following selected projects through the call for proposals:
    - Strengthening Surveillance of Leishmaniasis in Uganda and Kenya through a Collaborative Multisectoral One Health Capacity-Building Approach in Endemic foci Countries
    - Enhancing One Health Surveillance and Control of Vector-Borne Diseases related to Climate Change in the West Africa region
    - One Health Approach to Control and Understanding the Dynamics of Fascioliasis and Schistosomiases in the Context of Climate Change in Rwanda and Tanzania
    - Application of One Health Approach for Reducing the Burden of Vector-Borne Diseases in Vulnerable Communities in the Context of Climate Change
- Development of a One Health toolkit (as part of TDR Implementation Research Toolkit)
- Organize a Research uptake meeting with stakeholders for dissemination of results
- Preparation of manuscripts for publication

- ***Workstream: Research for Implementation***

This workstream is about understanding how interventions that work in laboratory clinical trials and pilot settings can be transferred to 'real-life' settings and scaled-up at the national level.

TDR applies this approach to disease prevention, control and elimination, and will identify practical impact measures for the research. TDR will also help countries generate the evidence needed for prompt and effective outbreak response. All interventions will take into consideration local governance, community involvement, financing and delivery arrangements, and the building of more robust health systems by integrating strategies and tools. TDR will work to increase community participation and mobilization, and build a body of evidence that supports the essential role of community health workers (CHWs).

ER 1.1.7: Maximized utilization of data for public health decision-making

Generating and utilizing data for health system strengthening and universal health coverage (UHC) through the **S**tructured **O**perational **R**esearch and **T**raining **I**ni**T**iative (**SORT IT**)

The **S**tructured **O**perational **R**esearch and **T**raining **I**nitiative (**SORT IT**) aims to make countries "data rich, information rich and action rich". SORT IT is a global partnership-based initiative coordinated by TDR. It aligns with the SDG 17.18 generating "the availability of high quality, timely and reliable data" for informed decision-making.

SORT IT FOR MAXIMIZING DATA GENERATION AND UTILIZATION

Aim: Build sustainable operational research capacity to generate and utilize data for decision-making to improve public health in LMICs.

Scientific scope: Research priorities are tailored to country priorities. The TDR focus is on catalytic initiatives that will accelerate progress towards UHC for hard-to-reach populations and tackling public health emergencies.

How: Strong engagement with WHO country offices, national stake holders and SORT IT partners in the evidence-to-action cycle. Performance targets are integrated to ensure quality.

Who: Health workers from all levels of the health system and decision-makers.

Desired impact: Strengthened health systems, better programme performance and improved public health.

The SORT IT cycle: The SORT IT cycle englobes the entire evidence-to-action cycle from defining the most relevant research to uptake of the findings. SORT IT also embraces the "Train, Embed, Retain and Enable" philosophy for those working within health systems which is in line with WHO's Thirteenth General Programme of Work, 2019–2023. More on SORT IT is available at: https://tdr.who.int/activities/sort-it-operational-research-and-training.

Key success indicators: coverage, partnerships, capacity build and impact

Achievements since inception	94 countries	26 public health domains
70 implementing institutions in the SORT IT partnership	73% of trainees applying SORT IT acquired skills to the COVID-19 response	67% of research had an impact on policy and/or practice

Progress in 2022

Progress was achieved in six areas: 1) operational research to tackle public health emergencies; 2) real-time operational research: continuum-in-care for TB patients with disability, after TB treatment; 3) building research capacity in francophone Africa for UHC; 4) data sharing for strengthening health systems against emerging infections in West Africa; 5) setting benchmarks for quality of reporting of research evidence; and 6) franchising the SORT IT model and expanding global partnerships.

Details of outputs in 2022

1. Building implementation research capacity for public health emergencies in South-East Asia

Evidence from a WHO pulse survey revealed that during COVID-19, 90% of countries faced continued disruptions to essential services and 42% of households missed health services. Global health outbreaks, such as the current COVID-19 pandemic, stretch healthcare systems to their limits and often overwhelm healthcare teams. In particular, compromised capacity to continue with monitoring and evaluation may result in suboptimal responses due to a lack of systematic feedback loops, benchmarks and subsequent corrective actions.

In collaboration with the Global Outbreak and Response Network (GOARN), SEARO and WHO country offices in Bhutan, East Timor, India, and Nepal, TDR assessed the health system impact of COVID-19 while also building research capacity. The aim is to build robust monitoring and evaluation systems to provide 'real-time intel' that can steer the health system out of trouble and improve its capability to sustain health services. The evidence was published rapidly (10 weeks) in a special journal issue on public health emergencies: https://www.mdpi.com/journal/tropicalmed/special_issues/TDR.

The WHO emergency departments and regional WHO offices have expressed keen interest to expand similar initiatives to Ukraine, Poland, Moldova and the African region.

Fig. 5. SORT IT with GOARN for tackling public health emergencies in Bhutan, East Timor, India and Nepal

In public health emergencies, 'real-time operational research' is needed to steer the health system out of trouble and improve its capability to sustain health services.

2. Data sharing to strengthen health systems against emerging infections in West Africa

Following the 2014/2016 Ebola outbreak, the most affected countries in West Africa (Guinea, Liberia, Sierra Leone and the Democratic Republic of the Congo) provided their Ebola data to the Infectious Diseases Data Observatory (IDDO) based in Oxford. The IDDO also manages a global database which is available for analysis containing over one million patient records related to COVID-19.

In collaboration with the affected countries and WHO country offices, a new SORT IT initiative was launched to use this available data to conduct operational research and build capacity among frontline health workers in the MoHs of the affected countries.

The use of COVID-19 data will also provide a much larger data set (circa one million patient records) broadening the scope of the potential research questions while acting as exemplars for analysis of similar data in any future epidemic.

3. Vulnerable populations: 'Real-time operational research' for holistic management of disability after tuberculosis treatment

A substantial proportion of people who successfully complete TB treatment have complications and ongoing disability, which negatively affects their quality of life and increases mortality. A first ever study from China showed that, 50% had ongoing symptoms (cough, shortness of breath and fatigue), 20% were unable to walk more than 400 meters in six minutes (disability), 20% had associated diabetes mellitus and 10% were smokers. These findings highlight the need to better understand and address the biomedical and social factors that affect the quality of life and prognosis of TB patients.

In 2022, TDR expanded the work in China by assessing TB patients for risk determinants and functional status at the time of registration, at the end of treatment, and six months later, with a view to intervening to improving their health and overall quality of life. The aim is to manage TB holistically and provide a continuum-of-care, particularly for disabled TB patients.

This is a global research priority for improving person-centred TB care and prevention and highly relevant to policy and practice. The SORT IT gains are:

- The China project will serve as front-runner experience to rapidly develop the tools that can then be applied in the EECA and Africa regions.
- Standardized research protocols involving multiple countries will enhance the evidence base for formulating policy and guidelines.
- The initiative is in line with SDG 17.18 to generate and utilize high-quality data.

4. Neglected Tropical Diseases: Bridging the francophone research gap in Africa and accelerating Universal Health Coverage.

While SORT IT has reached 94 countries, an identified gap area is the francophone region of Africa. In 2022, in collaboration with the African Institute of Public Health (Burkina Faso) and the University Gamal Abdel Nasser (Guinea), 21 policy relevant research studies on tackling NTDs and snake bite were launched in francophone countries (Burkina Faso, Guinea, Mali, Niger and Senegal). Ten studies from Ethiopia were published in a special issue entitled, *Moving towards the end of the neglected in Ethiopia*, https://jidc.org/index.php/journal/issue/view/204.

All the SORT IT training materials have also been translated into French, allowing wider utilization and franchising in the region.

5. Setting benchmarks for "quality of reporting of qualitative and mixed methods implementation research studies"

Qualitative and mixed methods research are often inadequately reported, making it difficult to judge their validity for decision-making in public health. Using the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines, TDR assessed reporting quality of 67 mixed methods and qualitative research during seven years of implementing SORT IT. This follows a similar TDR-led assessment on quantitative studies in 2021 (https://www.mdpi.com/2414-6366/5/4/167).

The study involved 18 countries, 32 journals and 13 public health themes. Reporting quality was graded as 'good' to 'excellent' in 89% of publications. First authorship from LMIC countries was present in 96%, LMIC last authorship in 82%, and female first authorship in 45%. The mean LMIC institutions represented per publication was five (range 1–11) and 94% publications were open-access.

In conclusion, most SORT IT publications adhered to COREQ standards, while encouragingly supporting gender equity in authorship and the promotion of LMIC research leadership.

Such assessments set benchmarks on the quality of evidence being reported as SORT IT is increasingly franchised.

Quality of reporting of qualitative and mixed methods studies emerging for SORT IT was graded as 'good' to 'excellent' in 89% of publications.

6. Continued SORT IT franchising and building global partnerships

SORT IT franchising continues using the trained pool of human resources (SORT IT alumni) and available tools, such as Standard Operating Procedures (SOPs) for the organization and conduct of SORT IT courses, online resources (for example, video lectures), standardized reporting metrics, and curricula translated into Spanish and French. A SORT IT online training platform was also developed

which facilitates continued SORT IT trainings. It has also reduced costs and improved efficiencies. https://drive.google.com/file/d/1IpDfzF8_DFHvKP0AFMWxxwv8rUO5lgKG/view?usp=sharing

By September 2022, SORT IT reached 94 countries and 70 partner institutions in 26 countries have become part of the SORT IT partnership. There are close to 1,000 publications in five languages (English, French, Portuguese, Russian, Spanish) and covering 26 public health domains.

Roughly 50% of SORT IT alumni continued new research projects which is evidence that sustainable capacity is being built.

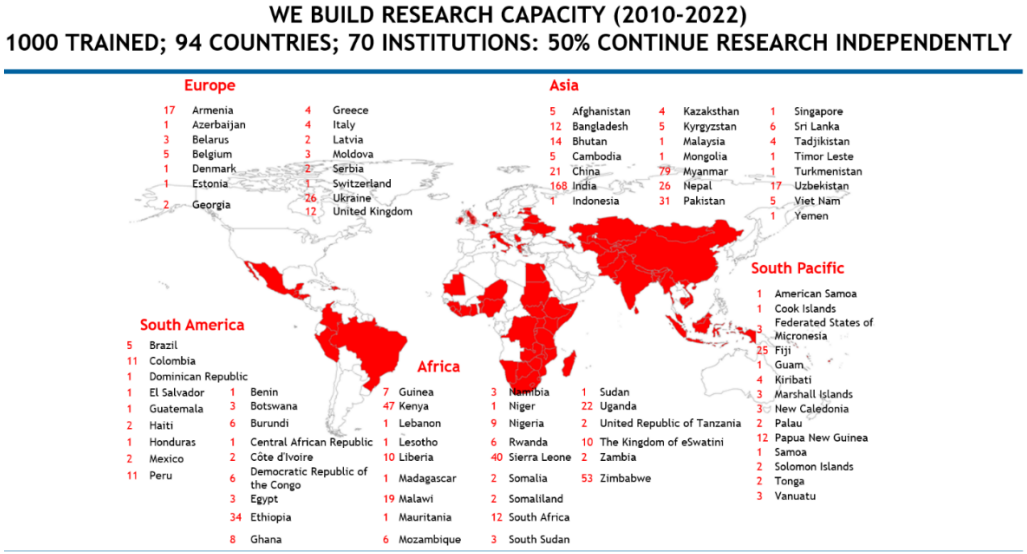


Fig. 6. Geographic scale up of SORT IT projects (2009–2022)

Remaining risks and challenges

The main operational challenge remains the COVID-19 pandemic and related delays in implementation of ongoing projects. About 67% of those involved with SORT IT in 2021 and 2022 were on the frontlines of the COVID-19 response and were obliged to share their time with SORT IT related work. Organizing workshops had also been a challenge due to continued restrictions on travel and gatherings. A SORT IT online training platform developed in 2021 continues to facilitate trainings, including hybrid sessions despite being significantly delayed due to COVID-19 restrictions.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

TDR leads the SORT IT partnership which has become the largest operational research involving implementing institutions around the world. There are 69 institutions involved in SORT IT from 30 countries most of which are from LMICs. HIC–LMIC and LMIC–LMIC collaborations continues and TDR built new communities of practice at a global level ("thinking global, acting local"). Please see more on partner institutions at: SORT IT operational research and training (who.int).

WHO regional and country offices, academic institutions, nongovernmental organizations , various WHO departments and MoHs are part of the partnership.

Estimated leverage created by this project:

TDR received US$ 500 000 from USAID, US$ 140 000 from GOARN and US$ 120 000 from Luxembourg.

Gender aspects and vulnerable populations:

Participant selection processes continue to promote gender and geographic equity and LMIC first authorship in published outputs. In 2022, about 45% being trained were women. TDR specifically targets vulnerable groups (neonates, children, and women) as a priority for research topics wherever possible.

In terms of targeting vulnerable populations, the SORT IT programme focus is on NTDs, hard-to-reach populations, people with disability and those affected by public health emergencies. These populations are also often affected by poverty. In terms of geographic equity, TDR has expanded this work to francophone Africa, as this is a recognized gap area. Paying attention to these geographic and socioeconomic perspectives contributes to an equitable approach to programming.

Training:

In 2022, besides (AMR with 74 projects) there were SORT IT trainings on NTDs in francophone Africa and on tackling public health emergencies in South-East Asia. The SORT IT model uniquely combines research training, research implementation and builds communities of practice. Wherever possible, each research project is used to simultaneously implement four layers of training namely: 1) Training of frontline workers and programme staff; 2) ToT of SORT IT alumni; 3) ToT for academia; and 4) ToT for WHO country staff. The average numbers trained per research study is 3.0, which adds value for money.

Strengthened institutions or networks:

The SORT IT partnership now includes 69 implementing partners and a network of close to 1,000 alumni and 300 mentors who provide support to SORT IT implementation in countries. A SORT IT hub exists in Armenia and India.

Publications:

Cumulatively since 2009, there has been 802 publications by the SORT IT partnership in 50 journals (impact factor 0.4–19) and in five languages (English, Russian, Spanish, Portuguese and French).

In 2022, there were 22 publications including a special issue on public health emergencies. https://www.mdpi.com/journal/tropicalmed/special_issues/TDR

Related news:

Updated SORT IT website with open access to 802 publications: SORT IT operational research and training (who.int)

Operational Research and Capacity Building to Strengthen Health Systems for Tackling Public Health Emergencies https://www.mdpi.com/journal/tropicalmed/special_issues/TDR

Moving towards the end of the neglected in Ethiopia https://jidc.org/index.php/journal/issue/view/204

Results dissemination and uptake:

Roughly 69% of SORT IT studies report an impact on policy and/or practice. Researchers now benefit from a new SORT IT training module on 'effective communication of research findings', maximizing the opportunities for research uptake. Most recent evidence summaries are available at https://tdr.who.int/activities/sort-it-operational-research-and-training/communicating-research-findings

Plans for 2023

- In close collaboration with WHO country and regional offices, TDR will continue to support "initiatives" linked to UHC and enhance TDR leadership, visibility and funding. The focus will be on public health emergencies, hard-to-reach populations and NTDs (including snake bite). Where possible, existing hubs will be strengthened for operational research on marginalized and key populations in the EECA region, francophone Africa and Ethiopia (Africa CDC).

- Where possible, we will strengthen existing hubs for operational research on marginalized and key populations in Armenia (TB RPC), Ethiopia (public health institutes/Africa CDC), Guinea (University of Gamal Abdel Nasser), Burkina Faso (African institute of public health) and Ethiopia (with the Africa CDC).

- TDR will continue to monitor quality standards with franchising.

ER 1.2.1: Strategies to achieve and sustain disease elimination

Disease elimination is one of the priorities recommended by the IMP-SWG to focus on in its implementation research. Currently, there are two projects within this ER: i) Visceral leishmaniasis (VL) elimination in the Indian subcontinent(aka KEP (kala-azar elimination programme); and ii) Onchocerciasis Elimination in Africa.

TDR-managed research was critical for availability of the tools and strategies that have allowed for the inception and progress in VL elimination in the Indian subcontinent and onchocerciasis in Africa.

VISCERAL LEISHMANIASIS ELIMINATION IN THE INDIAN SUBCONTINENT

Implementation research on VL is a TDR-supported and country-led, long-term project that aims to generate the evidence base for policy uptake and rollout of approaches and interventions deployed by national programmes to promote VL elimination, continually seeking solutions to challenges emerging in the course of progress.

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 1,577 cases in 2021). By the end of 2021, 99% (746/756) of the implementation units (IUs) in the Indian subcontinent (all endemic Upazilas of Bangladesh, 99% of blocks in India and 87% of endemic districts in Nepal) have achieved the elimination target. Bangladesh has sustained the target in all the IUs since 2017.

To sustain gains in the last mile of elimination, implementation research remains vital to inform improved strategies and programme efficiency. 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. Currently available tools and case finding strategies are inadequate to address the disease transmission potential posed by reported cases of post Kala-azar dermal leishmaniasis (PKDL) and relapse. The role of asymptomatic infections in transmission is unclear. Rk39 has limited use for PKDL and VL-HIV coinfections and does not detect asymptomatic carriers. PKDL treatment is often incomplete because of long duration and hospitalization. The burden of VL-HIV coinfection is not well known in Nepal and Bangladesh. In vector control, the impact of indoor residual spraying (IRS) on disease incidence Is not well documented. The risk of shift of government attention to other health challenges as VL case numbers drop further is real.

Progress in 2022

Some of the outputs from recently published studies have led to new recommendations or changes in the elimination strategies.

- Active case detection (ACD) combined with sandfly control through indoor wall painting (IWP) or IRS can support VL elimination in the consolidation and maintenance phase. Bangladesh, India and Nepal are implementing active case detection of VL patients, screening all households living within a radius of around 50 m of the house of the index case, and vector control intervention through IRS. This has been incorporated into the national kala-azar elimination strategies based on the evidence from the TDR-supported implementation research in Bangladesh and Nepal and recommendations from the Regional Technical Advisory Group (RTAG) of SEARO.
- Since the number of VL cases has sharply dropped, ACD for only VL and PKDL would not be cost effective. Therefore, VL detection should be integrated with surveillance of other febrile illnesses.
- IWP and bed net impregnation can be effective alternatives to IRS for VL vector control. These provide alternatives to IRS.

Ongoing and completed projects in 2022

- *Determination of Prevalence of Post Kala-azar Dermal Leishmaniasis (PKDL) and Assessment of Treatment-Seeking Behaviour of PKDL Patients in Nepal and Bangladesh*

Knowledge gap: The burden of PKDL is not known in Bangladesh and Nepal. There is no active case detection of PKDL by the national programmes. Macular and nodular PKDL patients are infectious to sandflies. PKDL could be a challenge to sustain VL elimination in the Indian subcontinent. **Progress**: (Screened to date 40 373 individuals in Nepal and 16 205 in Bangladesh; conducted screening for PKDL in leprosy hospitals): Interim results suggest a prevalence of PKDL of 2.23/10 000 population in Nepal and 36/10 000 in Bangladesh; and 4/90 non-leprosy patients had PKDL in Bangladesh.

- *Follow-up Assessment of Visceral Leishmaniasis (VL) Treated Patients and Assessment of Impact of COVID-19 in VL Control Services in Nepal and Bangladesh*

Knowledge gap: The follow-up assessment of treated VL cases is important to monitor the effectiveness of treatment regimens. Although the national strategy recommends follow-up, there is limited compliance in both countries. The ongoing pandemic of COVID-19 might have in addition disrupted access to healthcare services. **Progress:** 107 and 44 VL cases under follow-up in Nepal and Bangladesh. The preliminary analysis revealed that there is relapse of VL in some patients treated with current anti-leishmanial drugs.

- *Epidemiological, Serological and Entomological Investigation of New Visceral Leishmaniasis (VL) Foci in Nepal and Bangladesh*

Knowledge gap: VL cases have been reported in areas previously free from the disease in both Nepal and Bangladesh. Passive reports from the national VL elimination programme suggest that there could be indigenous transmission of VL in new foci. However, no systematic studies have been conducted on these suspected new foci, including epidemiological, serological, and entomological investigations of VL. **Progress:** 736 and 1,078 individuals screened in Nepal and Bangladesh to date. The interim analysis suggests that there is expansion of VL in new foci and local transmission has been established, as demonstrated by the presence of asymptomatic cases in a setting of vector abundance. But this needs further confirmation. There are no programmatic VL prevention and control activities in new foci.

- *Determination of the seroprevalence of HIV among VL patients in Bangladesh*

Knowledge gap: The prevalence of VL-HIV coinfection in Bangladesh is unknown. Coinfected patients could serve as sources for new infections post-elimination. Treatment requires specialized facilities and combinations of drugs. **Progress:** 841 VL treated cases contacted by phone to date of whom 395 agreed to visit the diagnostic centre for counselling and informed consent to use their archived sera.

- *Distilling lessons from the VL elimination efforts in the Indian subcontinent for other regional foci*

The impact of TDR-supported implementation research on VL elimination in Bangladesh and Nepal was assessed from the perspective of each country. The reports highlighted key research contributions that led to impacts in:

- D*iagnosis* (rK39 was validated and used as a confirmatory test for VL);
- T*reatment* (miltefosine replaced sodium stibogluconate as a first line of treatment; liposomal amphotericin B replaced miltefosine subsequently due to increased treatment failures and relapse rates; combination therapy was introduced into the national protocol of treatment);

- *Surveillance* (ACD was incorporated into the national protocol of VL elimination); and
- *Vector control* (integrated vector management was recognized as an important element in the elimination efforts).

Meetings of national programme managers and experts identified research priorities but no funding is anticipated from the national budget allocated for programmes. Continued TDR support is considered "crucial since there are no other committed external funding agencies for VL research in Bangladesh and Nepal".

New projects in 2022

Decision-making for indoor residual spraying in post-elimination phase of visceral leishmaniasis in Bangladesh and Nepal

Knowledge gap: Indoor residual spraying (IRS) is considered as the key tool in vector control for VL elimination. IRS is presently recommended twice a year in those villages which have reported at least one VL case during the past three years. The effectiveness of IRS on morbidity is, however, debated. IRS relies on the indoor resting habit of the sandfly. Knowledge on susceptibility to the pyrethroid insecticides currently in use is limited.

This study will identify the critical determinants that can inform rational decision-making on the application of IRS in the last mile of VL elimination. It will investigate the relationship between the occurrence of VL and the frequency of IRS applied in a specific area on VL vector density, infection rate and insecticide resistance.

Exploring utility of lessons learned on the Indian Subcontinent for visceral leishmaniasis control/elimination in Eastern Africa

The problem: The proportion of reported cases from Eastern Africa, the second biggest focus in the world, increased from 10% to > 50% of the global total in the last 15 years, with a threefold increase in actual numbers in 2018 compared to 2007.

The opportunities: VL endemic countries in Eastern Africa have requested for WHO support to address the growing problem of VL in the region. TDR is collaborating with WHO and other partners to initiate VL elimination efforts in Eastern Africa. The recent WHO-organized VL Programme Review Meeting of South Asia and Eastern Africa held June 14–16 2022 (in which TDR also took part) identified targets for a VL elimination plan as a step towards creating a platform to coordinate efforts in the region. The priorities identified were similar to those previously defined in consultations with research stakeholders currently active in the region.

Progress in 2022

- In collaboration with NTD, conducted several meetings and a survey of stakeholders on prospects for a VL elimination effort in Eastern Africa and lessons learned from the Indian subcontinent These included senior experts, country programme managers, in-country investigators, and international partners engaged in VL care and research
- A bi-regional plan is being developed for VL elimination in Eastern Africa through WHO stewardship.
- Research priorities identified (mapping disease burden, assessing health service and programme constraints, understanding the needs of hard-to-reach populations and identifying interventions that will improve early diagnosis and treatment and reduce transmission through vector control)

Proposed activities in 2022–2023:

- Supporting studies on mapping disease burden
- Facilitating collaboration among investigators and with programme staff.

Remaining risks and challenges

1. Inadequate research funding despite increased need of evidence to inform strategies in the last mile of elimination
2. Decreased attention to VL elimination in countries as burden becomes minimal compared to other priorities
3. Continued civil conflict in the Eastern African focus, instability, internal displacement and interruption of healthcare services

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Public Health and Infectious Disease Research Center (PHIDReC) Nepal; International Centre for Diarrhoeal Disease Research, and the ICDDR in Bangladesh; Epidemiology and Disease Control Division, Department of Health Services, Teku, Kathmandu, Nepal; Director General of Health Services, Bangladesh

Leverage created by this project:

National programme meetings held in Nepal and Bangladesh. Investigators from Bangladesh and Nepal supported to participate in the WorldLeish Seven Conference, Colombia by partners

Gender aspects and vulnerable populations:

Investigator team: One woman

VL is a disease of vulnerable populations. Patients were diagnosed and treated for VL free of charge. Data gathered included on gender.

Training:

94 local health workers in Bangladesh and 10 in Nepal were trained on VL. Leprosy hospital clinicians and lab technologists were trained on PKDL diagnosis and treatment.

Strengthened institutions and/or networks:

Initiation of diagnosis and treatment of PKDL in leprosy hospitals in Bangladesh and Nepal

Publications:

- Banjara MR, et al. Response to visceral leishmaniasis cases through active case detection and vector control in low endemic hilly districts of Nepal. *Am. J. Trop. Med. Hyg.* 2022; 107(2): 349-354. doi: 10.4269/ajtmh.21-0766. PMID: 35895401
- Ghosh D, et al. Comparison of Novel Sandfly Control Interventions: A Pilot Study in Bangladesh. *Am. J. Trop. Med. Hyg.* 2021; 105(6):1786-1794. doi: 10.4269/ajtmh.20-0997. PMID: 34695792
- Singh-Phulgenda S, et al. Serious adverse events following treatment of visceral leishmaniasis: A systematic review and meta-analysis. *PLoS Negl Trop Dis.* 2021;15(3):e0009302. doi: 10.1371/journal.pntd.0009302

Related news:

- https://tdr.who.int/our-work/research-for-implementation/neglected-tropical-diseases-research/visceral-leishmaniasis-research#
- https://tdr.who.int/docs/librariesprovider10/meeting-reports/impact-of-ir-on-vl-in-nepal.pdf?sfvrsn=1c3fc6e9_5

Results dissemination and uptake:

Dissemination events took place in Nepal and Bangladesh, as well as at the World Leishmaniasis Conference in August 2022. Research meeting planned for 2022/2023

Plans for 2023

- Complete ongoing studies and disseminate findings involving national programmes
- Conduct studies on IRS to inform vector control strategies for VL elimination
- Organize research meeting including with Eastern African investigators and programme managers

ONCHOCERCIASIS ELIMINATION IN AFRICA

This project includes two complementary elements:

1. Research for tools for elimination programmes to support decisions to stop ivermectin mass drug administration, funded and managed by TDR to:
    a. Delineate parasite transmission zones (Note: The WHO *Guidelines for stopping mass drug administration (MDA) and verifying elimination of human onchocerciasis* is 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.
2. Research to support WHO and country decisions on inclusion of moxidectin in onchocerciasis elimination guidelines and policies, for which TDR provides scientific and technical support within a donor agreement between WHO and Medicines Development for Global Health (MDGH). MDGH is the not-for-profit Australian biopharmaceutical company to which WHO licensed all moxidectin-related data at its disposal in support of MDGH becoming the regulatory sponsor of moxidectin and ensuring manufacturing of moxidectin for onchocerciasis control and elimination should moxidectin be included in WHO guidelines and country policies. In 2018, the US FDA approved moxidectin for treatment of onchocerciasis in ≥12 year old individuals. The FDA is regarded by WHO as a Stringent Regulatory Authority which facilitates WHO prequalification and country regulatory approvals.

The detailed review of this project summarized for the 2018 IMP-SWG review of projects and fit with the 2018–2023 TDR strategy is available as an Appendix.

Progress in 2022

1. Research for tools for elimination programmes to support decisions to stop ivermectin mass drug administration, funded and managed by TDR

TDR funded research into the utility of genetic epidemiology for transmission zone delineation initially focussed on the parasite genome. Given that, at any particular time, parasites may not be present in sufficient amounts to facilitate use of their genome to delineate transmission zones, this research was extended to evaluate the utility of the vector for transmission zone delineation based on preliminary work done by a Ghanaian student working in the laboratory of the Australian collaborators.

While mitochondrial DNA is easier to analyse, research to date suggests that nuclear DNA, but not mitochondrial DNA data, were consistent with epidemiologically relevant migration of blackflies between an area with continuing transmission and an area assessed as being close to achieving elimination of transmission. Progress has been made on evaluating different technologies for nuclear DNA analysis that are suitable for large-scale use by NTDs programmes and integration into pool-screening (recommended by WHO guidelines for quantifying the presence of infective vectors).

To ensure availability of vectors from different ecological zones, blackflies (larvae, pupae and adults) have been collected in Ghana from sites in the western region (coastal Savanna zone), Oti region (transition zone) and Ashanti region (forest zone) of Ghana. In Cameroon, larvae have been collected from the northern part (Nkam) and preserved for cytotaxonomy in Ghana. Samples were shipped to Australia for genetic analysis. Skin-snips (positive and negative for *O. volvulus* microfilariae by microscopy) have been obtained from the Oti region are parasites are prepared for shipment to Australia. Cytotaxonomical evaluation of the blackflies is ongoing.

The TDR-funded research, together with TDR co-funded research on vectors in Ethiopia, led the Ethiopian National Programme to include genetic criteria into the definition of transmission zones.

The 'patch model' was developed to allow modelling of the risks of importing parasites from an area where MDA was stopped and into an area with ongoing low-level transmission (initially developed to model human migration). Progress has been made in expanding it to incorporate: i) vector migration; and ii) the effect of MDA and heterogeneity of parasite response to the drugs administered. In this context, collection of historical entomological data to inform the parameterization of the model was extended to include not only the countries of past and current TDR-funded investigators (Cameroon, Ghana), but also Ethiopia. Bi-weekly meetings between Australian and Ghanaian researchers serve not only to build modelling capacity in Ghana, but also to discuss how to parameterize the patch model to achieve observed prevalence and how to improve the utility and ease of use of the model in view of the needs of the ultimate users, i.e. country elimination programmes.

Integrated institutional and researcher capacity building and strengthening

Microscope and connections of microscopes to computers to support cytotaxonomy and training of entomologists in cytotaxonomy

Patch model development by the Australian collaborators at La Trobe University is accompanied by capacity building in the Ghanaian collaborators at the Noguchi Memorial Institute for Medical Research, University of Ghana, through bi-weekly virtual meetings between four Australian and three Ghanaian researchers. The latter includes Dr K. Frempong, who had previously benefited from modelling capacity building within a TDR pilot project for modelling fellowships, Ms Millicent Opoku and Mr J. Osei. Besides capacity building, these meetings also serve to inform the planned development of a user interface that will allow the model to be used by national NTDs programme staff.

Ms M. Opoku, a NMIR PhD student in the laboratory of the Ghanaian collaborators, did a lot of the field work for this project as part of her PhD and is now enrolled as a PhD student at La Trobe University . She will continue work on her PhD in the laboratory of the Australian collaborators.

Cytotaxonomical evaluation of blackflies in Ghana includes capacity building of next generation entomologists, for example, from Ghana and Cameroon

2. Research to support WHO and country decisions on inclusion of moxidectin in onchocerciasis elimination guidelines and policies

The paediatric dose-finding study in 4–11 year old conducted in the Research Center of the University of Health and Allied Sciences, in Hohoe, Ghana, was completed. Selection of a paediatric dose (or doses) was also completed and preparation for discussions with the FDA on further data required for extending the indication to this age group was initiated by MDGH.
(https://clinicaltrials.gov/ct2/show/NCT03962062; https://mox4oncho-multimox.net/s/MDGH-MOX-1006-Protocol-v15-Amend-5-final-200703-signed.pdf).

The double-blind study is continuing recruitment. The study compares the parasitological efficacy and safety of moxidectin or ivermectin upon three annual and five biannual treatments conducted at the Centre de Recherche pour les Maladies Tropicales Negligées Rethy, Ituri, Democratic Republic of the Congo (created by TDR for the moxidectin Phase 3 study).
(https://clinicaltrials.gov/ct2/show/NCT03876262; https://mox4oncho-multimox.net/resources)

The double-blind single dose study is continuing recruitment by the team at the Centre de Recherche pour les Maladies Tropicales Negligées Rethy, Ituri, the Democratic Republic of the Congo (https://clinicaltrials.gov/ct2/show/NCT04311671; https://mox4oncho-multimox.net/resources). The aim of the study was to increase the amount of data available on the safety of moxidectin, including individuals without detectable levels of *O. volvulus* microfilariae (in view of use during MDA, when a significant percentage of those treated will not be infected). Preparation is ongoing for a second site in Côte d'Ivoire in an area that is onchocerciasis-lymphatic filariasis co-endemic with the objective to obtain data that can inform inclusion of moxidectin in WHO guidelines and country policies, not only for onchocerciasis but also lymphatic filariasis.

With co-funding from MDGH and EDCTP under another grant (https://www.edctp.org/projects-2/edctp2-projects/paediatric-drug-formulations-poverty-related-diseases-2019/), work towards a paediatric formulation was initiated. The tablet formulation currently approved by the FDA for use in ≥12 year old individuals was developed with a lower age limit of four years in mind, but smaller children aged 4–5 years may prefer a paediatric formulation. Furthermore, moxidectin is also being developed for scabies (without TDR input) which requires treatment of very small children.

Discussions are ongoing between MDGH and WHO for preparation of evaluation of moxidectin for inclusion in WHO guidelines and the essential medicines list as well as for WHO prequalification to facilitate country registration of moxidectin.

The NTDs programmes in Mali, Senegal and Ethiopia, with The END Fund, initiated discussions on pilot implementation projects in areas where onchocerciasis elimination faces challenges that could be better addressed with moxidectin than ivermectin. Such discussions and related implementation projects respond to, for example, the COR-NTD news article, *Action required: demonstrate effectiveness and safety of moxidectin in programmatic settings (moxidectin could replace the need for semi-annual ivermectin MDA)*" which was also identified in the WHO road map document *Ending the neglect to attain the Sustainable Development Goals: A road map for neglected tropical diseases 2021–2030 (https://apps.who.int/iris/handle/10665/338565).* TDR was also involved in discussions through participation in a meeting organized by The END Fund and through provision of inputs upon request (https://www.end.org/).

Remaining risks and challenges

Back-log of unpublished results: It is not only important to publish the results of TDR-funded research, but also to motivate co-funding by other organizations. Currently the following publications are in various stages of preparation:

- Crawford KE, Hedtke SM, Doyle SD, Kuesel AC, Armoo S, Osei-Atweneboana M, Grant WN. 2019. Utility of the *Onchocerca volvulus* mitochondrial genome for delineation of parasite transmission zones. bioRxiv doi.org/10.1101/732446
- Hedtke SM, Armoo S, Doyle SD, Kuesel AC, Wanji S, Boussinesq M, Kamgno J, Mandro M, Tepage F, Mitreva M, Grant WN. Identification of informative genetic markers associated with female worm response to the macrocyclic lactone ivermectin across populations of *Onchocerca volvulus*.

- Hedtke SM, Kode A, Choi Y-J, Colebunders R, Chalasani G, Wanji S, Sirwani N, Makedonka M, Grant WN. Assessing intensity of infection and genetic diversity of *Onchocerca volvulus* using mitochondrial genome sequencing of microfilariae
- McCulloch K, Hedtke Shannon M, McCaw James, McVernon Jodie, Kuesel Annette C., Grant Warwick N. Impact of host movement on sustainability of elimination of *Onchocerciasis volvulus* transmission
- Shrestha H, Hedtke SM, McCulloch K, Wanji S, Grant WN. Suboptimal response of *Onchocerca volvulus* to ivermectin
- Hedtke SM, Ukety T, Grant WN, Kuesel, AC: Preservation of *O. volvulus* parasites for genetic analyses
- Eric M Kanza[2,#b], Nicholas O Opoku[3,#c], Hayford Howard[4,#d], Didier Bakajika[1,#a], Germain L Mambandu[1,#e], Amos Nyathirombo[1,#f], Maurice M Nigo[1,#g], Kambale Kasonia Kennedy[2, #h], Mupenzi Mumbere[2], Kambale Kataliko[2,#j], Kpehe M Bolay[4,#k], Jemmah P Larbelee[4] Simon K Attah[3,#l], George Olipoh[3,#m], Sampson Asare[3,#n], Michel Vaillant[5], Christine M Halleux[6], Annette C Kuesel[6*] Effect of a single dose of 8 mg moxidectin or 150 µg/kg ivermectin on *O. volvulus* ocular microfilariae: Analysis of the data from a double-blind, randomized, controlled Phase 3 study in the Democratic Republic of the Congo, Liberia and Ghana by study area and pre-treatment skin microfilariae density
- Nicholas O Opoku[3,#c], Eric M Kanza[2,#b], Hayford Howard[4,#d], Didier Bakajika[1,#a], Germain L Mambandu[1,#e], Amos Nyathirombo[1,#f], Maurice M Nigo[1,#g], Kambale Kasonia Kennedy[2, #h], Mupenzi Mumbere[2], Kambale Kataliko[2,#j], Kpehe M Bolay[4,#k], [4] Simon K Attah[3,#l], George Olipoh[3,#m], Sampson Asare[3,#n], Michel Vaillant[5], Christine M Halleux[6], Annette C Kuesel[6*] Effect of a single dose of 8 mg moxidectin or 150 µg/kg ivermectin in *O. volvulus* infected individuals: Time course of adverse events during a double-blind, randomized, controlled Phase 3 study in the Democratic Republic of the Congo, Liberia and Ghana

Time, effort and funding for identification of genetic markers of O. volvulus 'suboptimal response' to ivermectin

The results of the TDR-funded research (Doyle SR, Bourguinat C, Nana-Djeunga HC, Kengne-Ouafo JA, Pion SDS, Bopda J, et al. (2017) Genome-wide analysis of ivermectin response by Onchocerca volvulus reveals that genetic drift and soft selective sweeps contribute to loss of drug sensitivity. PloS Negl Trop Dis 11(7): e0005816. (https://doi.org/10.1371/journal.pntd.0005816) shows that *O. volvulus* response to ivermectin is a polygenically-determined quantitative trait with identical or related molecular pathways, but not necessarily individual genes likely determining the response in different parasite populations. This suggests that genetic drift rather than genetic selection drives population differentiation. While this reduces concerns about suboptimal response spreading throughout Africa it makes identification of genetic markers of suboptimal response (which countries use to monitor its prevalence) more time consuming than originally anticipated, in particular given very limited availability of parasites for genetic analysis for which concomitant phenotype data are available. The main source is currently the multidose moxidectin study.

Insufficient funding – Establishment of a coalition of researchers and funders to accelerate the research was planned for 2022, building on the momentum emerging from a session on transmission zone delineation during the 2021 COR-NTD meeting. Insufficient TDR manager time has so far prevented this establishment.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Noguchi Memorial Institute for Medical Research, Ghana; Onchocerciasis Elimination Programme Laboratory Ethiopia; La Trobe University, Australia; University of Antwerp, Belgium; Division Provinciale de la Santé, the Democratic Republic of the Congo; Medicines Development for Global Health, UK and Australia; Division Provinciale de la Santé, the Democratic Republic of the Congo; Eglise du Christ au Congo, Democratic Republic of the Congo; European and Developing Countries Clinical Trials Partnership; Erasmus University, Netherlands; Imperial College, UK; Luxembourg Institute of Health, Luxembourg; Royal Veterinary College, UK; University of Health and Allied Sciences, Ghana; Centre for Research on Filariasis and other Tropical Diseases, Yaoundé, Cameroon; Institut de Recherche pour le Développement, France.

Leverage created by this project:

For research into genetic markers for *O. volvulus* suboptimal response to ivermectin and transmission zones: NIH: US$ 3 488 641, Nov 2019-Nov 2024, The END Fund: US$ 573 864, Oct 2022-Apr 2024

Gender aspects and vulnerable populations:

PIs: Two men from Ghana, One woman from Australia

For training, see below.

Onchocerciasis (and lymphatic filariasis) affect rural marginalized populations. Individuals participating in the efficacy and safety studies of moxidectin will benefit from administration of moxidectin or ivermectin. In the absence of relevant data, pregnant and breast-feeding women are excluded from these studies. The studies include collection of data on the pregnancies of women that became pregnant after taking moxidectin or ivermectin, pregnancy outcome and the health of the newborn up to 1 year of age. This will complement the same type data collected during the TDR-funded and managed Phase 2 and 3 studies of moxidectin which were the pivotal data supporting the 2018 moxidectin FDA approval. Ultimately these and data that will emerge from pilot implementation studies, and if applicable, use of moxidectin for MDA, will allow to provide data on which to determine guidance for inclusion/exclusion of pregnant women from MDA.

Training:

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

Strengthened institutions and/or networks:

Noguchi Memorial Institute for Medical Research, University of Ghana: Microscope and connections of microscopes to computers to support cytotaxonomy and training of entomologists in cytotaxonomy.

Publications:

- Tan B, Opoku N, Attah SK, Awadzi K, Kuesel AC, Lazdins-Helds J, et al. (2022) Pharmacokinetics of oral moxidectin in individuals with *Onchocerca volvulus* infection. PloS Negl Trop Dis 16(3) : e0010005. https ://doi.org/10.1371/journal.pntd.0010005
- Bakajika D, Kanza EM, Opoku NO, Howard HM, Mambandu GL, Nyathirombo A, et al. (2022) Effect of a single dose of 8 mg moxidectin or 150 µg/kg ivermectin on *O. volvulus* skin microfilariae in a randomized trial: Differences between areas in the Democratic Republic of the Congo, Liberia and Ghana and impact of intensity of infection. PloS Negl Trop Dis 16(4) : e0010079. https ://doi.org/10.1371/journal.pntd.0010079
- Shrestha H, McCulloch K, Hedtke SM, Grant WN. 2022. Geostatistical modelling of pre-intervention nodule prevalence of Onchocerca volvulus in Ethiopia as an aid to onchocerciasis elimination. PLOS Negl Trop Dis 16(7): e0010620
- Issraa Al-Obaidi, Anna K. Krome, Karl G. Wagner, Kenneth Pfarr, Annette C. Kuesel & Hannah K. Batchelor 2022. Drugs for neglected tropical diseases: availability of age-appropriate oral formulations for young children, Parasites & Vectors 15, Article number: 462. https://parasitesandvectors.biomedcentral.com/articles/10.1186/s13071-022-05546-7
- Kenneth M. Pfarr, Anna K. Krome, Issraa Al-Obaidi, Hannah Batchelor, Michel Vaillant, Achim Hoerauf, Nicholas O. Opoku, Annette C. Kuesel The pipeline for drugs for control and elimination of Neglected Tropical Diseases: 1. Anti-infective drugs for regulatory registration, Parasites and Vectors (in press)

Related news:

https://tdr.who.int/newsroom/news/item/14-03-2022-progress-on-moxidectin-for-onchocerciasis-elimination

https://mox4oncho-multimox.net/resources

https://www.minimox.eu/

Results dissemination and uptake:

Uptake of tools for onchocerciasis elimination by countries will be driven by inclusion in WHO guidelines, WHO prequalification and the WHO Essential Medicines List (EML). Hence, support to WHO NTD for evaluation of moxidectin for inclusion in guidelines is key, as is support to MDGH in discussion with WHO for prequalification and inclusion in EML. For the development of the other tools, dissemination of concept and progress to a broader range of stakeholders, as represented in the Coalition for Operational Research on Neglected Tropical Diseases (COR-NTDs), which includes researchers, WHO, country programme managers, implementers and donors, is key.

Plans for 2023

- Pending approval of renewal requests submitted, research will continue on tools for elimination programmes to support decisions to stop ivermectin MDA. Further continuation of TDR funding and management of this type of research will be discussed in the context of the next TDR strategy and staff turnover.
- Also planned for continuation is the provision of scientific and technical support towards evaluation of moxidectin for inclusion into WHO guidelines and the paediatric moxidectin formulation.

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

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

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

The activities conducted under this ER can be categorized as follows:

1. tuberculosis-related activities
2. malaria-related activities
3. NTD activities
4. drugs/vaccines safety monitoring, and pharmacovigilance activities
5. digital health activities

Progress in 2022

Tuberculosis-related activities

- As of 2021, 26 of the 27 countries (all except Capo Verde) in the WARN/CARN Regional Network for TB Control were actively engaged in TB research initiatives with support from TDR (See table in Annex 1). Following IMP-SWG guidance, an evaluation of the network was completed in 2022; findings were highly positive and demonstrated wide-scale support for the network continuation. The report highlighted that the emphasis on implementation and operational research was reported to have led to a better understanding of what works and informed emerging best practices for TB control among member countries (see Annex 2 for full evaluation report).
- This year, five of the 11 studies supported by TDR's SDF grant for IR on Mitigating the impact of COVID -19 on TB services throughout West and Central Africa are in print in a special issue for COVID/TB in the Journal of Tropical Medicine and Infectious Diseases (see Annex 3 for table). Under the Robert Koch Institute RKI project, the development of a new DHIS-2 dashboard to improve the sensitivity of national TB surveillance systems to detect and track disruptions during COVID-19 and future public health emergencies was been finalized by University of Oslo and piloted in five West African countries The findings of this pilot test and the data on the impact of COVID on TB services in West Africa was discussed during a recent end of project meeting in Lomé, Togo in December 2022 among 19 countries from the WARN/CARN, including the five piloting countries. Additional funding was received from the German Ministry of Health to expand the activities conducted under the RKI project to the East and Southern Africa region in 2023. Following recommendations from the Global Fund on dual TB and COVID-19 testing algorithms, a **TB and SARS-CoV2 bidirectional screening survey** was developed by TDR and GTB to identify current approaches taken to test for both TB and SARS-CoV-2 in the same individuals, criteria used, any challenges met and the results achieved. Thirty-one countries from all six WHO regions participated. A webinar was held in July 2022 to present preliminary results. A report is available here dual-testing-for-tb-and-sars-cov-2-country-reports.pdf (who.int).
- A new call for research proposals was recently launched by TDR and partners for IR on **Social Protection for people living with TB**, resulting in 12 applications, with eight currently approved for funding who will receive between US$ 20 000–25 000 to fund their studies as well as technical support. Final results expected by the end of 2023.
- The ShoRRT project continues, with 27 countries currently launching or conducting their OR project (see Annex 4 for country updates). The United Kingdom will be using the ShORRT REDCap Database for collecting data on DR-TB patients treated in the United Kingdom. Papua New Guinea is the latest country to start the ShORRT study. The WHO Regional Office for the Western Pacific has commenced using the REDCap database for facilitating data collection on DR-TB patients treated in the small islands of their region and an in-country mission was undertaken by TDR in September 2022 to help the Papua New Guinea NTP prepare for study initiation.
- The **Diagnosis of Multidrug- resistant tuberculosis in Africa (DIAMA)** project ended in November 2022. It was funded by EDCTP and led by the Benin NTP, in collaboration with TDR and partners. The project's objectives were to evaluate new molecular tests for drug-resistant TB (DR-TB) diagnosis and find new methods to replace processes for follow-up of DR-TB patients during treatment. Results are expected early 2023.
- A new SDF was awarded to **Implement a One Health approach for addressing Zoonotic TB in Africa and South/West Pacific regions** in collaboration with GTB and AFRO to: 1) assess the implementation of the "Roadmap for Zoonotic TB" in countries in Africa and Asia; 2) compile best-practice case studies on the successful operationalization of One Health, with particular focus on zoonotic TB; and 3) define a five-year action plan to strengthen the operationalization of the roadmap for the AFRO region. The survey will start early January 2023.

Malaria-related activities

- In 2022, the Seasonal malaria chemoprevention project saw three of the 13 implementing countries complete their activities: 1) qualitative evaluation of the determinants of SMC coverage in the health districts of Kankan and Siguiri in ***Guinea;*** 2) assessing coverage of SMC in ***Ghana***; and 3) facilitators and barriers to the uptake of SMC programme in ***Nigeria***: a mixed method approach. (See Annex 5 for further details.)

- Supporting South-South knowledge exchange to support the roll out of the Malaria RTS,S vaccine. A virtual workshop was held in February 2022 with simultaneous translation offered in English, French and Portuguese. Participants received up-to-date information on vaccine efficacy and safety, information on the joint implementation of SMC and RTS,S vaccine, as well as information on the global plan and steps before vaccine availability.

NTD-related activities

- Supporting the NTD department of Ghana Ministry of Health to conduct implementation research for identifying and addressing gender-related barriers to skin NTDs

Support was provided to the Ghana National Buruli Ulcer and Yaws Eradication Program of the Ghana Health Service to evaluate gender-related factors affecting access to health services and care of skin-related neglected tropical diseases (skin NTDs) in three districts in Ghana, both from the perspective of patients and of healthcare workers. The study highlighted that while women had better knowledge of the causes and symptoms of skin NTDs than men and would seek treatment at hospitals preferentially over herbalists (the opposite to the treatment-seeking behaviour of men), women's treatment-seeking behaviour was strongly influenced by men due to unequal power relations, gender roles and access to resources. This will inform Ghana's plan to integrate NTDs care into basic health services, taking into account gender-based specificities. A feasibility study to test the WHO skin NTDs through a mobile app is planned for 2023.

- Strengthening of the institutional capacity of Tanzania for the integrated rollout of paediatric praziquantel formulation for treatment of schistosomiasis, in anticipation of marketing approval

ADP[2] facilitates the assessment of institutional capacities to introduce the new paediatric praziquantel formulation in Tanzania. The NIMR of Tanzania received financial and technical support in 2022 to develop a protocol for evaluating the implementation of different delivery models and a strategy involving community-based engagement. The research itself will take place in 2023 when the paediatric drug is made available to the Paediatric Praziquantel Consortium. Support is further given for the NIMR to develop national guidelines and a training manual for the integrated delivery model to be implemented longer-term.

Drug and vaccine safety and pharmacovigilance (PV) activities

- TDR's work in this area was undertaken from August 2021 to July 2022. TDR participated in ADP's *Scale Up 4* which provided technical support in the following focus countries: Ghana, Malawi, Senegal, Tanzania, and Burkina Faso. Capacity building focused on facilitating access to and delivery of new health technologies for TB, malaria and NTDs, and for drug and vaccine safety. A new workplan for scaling up Phase 5, proposed by TDR in January 2022, was accepted and will run until March 3, 2023. (Please see the digital health section below for additional PV-related activities).

[2] More information on the Access and Delivery Partnership [the Government of Japan, the United Nations Development Programme (UNDP), and the Global Health Innovative Technology (GHIT) Fund is available at https://adphealth.org.

- **Active TB drug safety monitoring and management (aDSM)** activities and implementation in 2022 included: 1) updated aDSM resources for in-country training in both French and English languages, in line with WHO guidelines; and 2) South-South visits to strengthen the regional technical capacity between NTPs in Senegal (three selected staff), the Democratic Republic of the Congo and Burkina Faso to support the development and testing of national aDSM guides.

Digital health

- TDR's work done in this area is summarized on this TDR page.
- The IR4DTB Toolkit was translated into Russian and used to support an online workshop in the EURO region. Six countries were selected to receive funding to conduct the IR proposals developed during the workshop and are currently being supported by mentors to develop study protocols for submission to local ethics committees (Annex 6). Results from these studies are expected mid-2023 and will be shared at a EURO webinar and submitted to The Union TB 2023 Conference.
- The NTP of Ghana is currently being supported to conduct computer-aided detection (CAD) calibration studies using the CAD for TB detection calibration toolkit. Five additional countries in the EURO region (from IR4DTB workshop) are using the CAD calibration toolkit to develop IR proposals to support the effective use and implementation of CAD in their home countries.
- **IR on digital tools in Burkina Faso:**
    - *99 DOTs for TB treatment adherence:* TDR supported the NTP to develop a full research protocol to assess the acceptability and usefulness of the pilot introduction of the digital tool for TB treatment adherence. This research is currently under way.
    - *Use of the MedSafety App for adverse drug reaction (ADR) reporting:* Support was given to the Agence nationale de regulation pharmaceutique (ANRP) to develop a protocol to evaluate the implementation, acceptability and feasibility of the app and its impact on the ADR reporting rate. This research is currently under way.
- **Evaluating the use of digital health technologies for malaria and TB in West and Central Africa:** WARN and CARN-TB participated in a ADP-led survey on the use, barriers and evaluation of digital technologies introduced by national TB programmes, as well as programme challenges that could be addressed by a digital solution. Results were discussed with the GTB of WHO and a virtual workshop on digital tools using the IR4DTB toolkit is planned for early 2023.

Remaining risks and challenges

One remaining challenge relates to the Central databases and the expected end of TDR's involvement with the management of these database. Discussions are still ongoing with the WHO Pharmacology department. It is expected that the handover will be effectively done by the end of 2023.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

The Global TB Programme, WHO; The Global Malaria Programme, WHO; GFATM; Action Contre la Faim; EDCTP; Institute of Tropical Medicine, Belgium; University of Thies; Access and Delivery Partnership, UNDP; EURO, AFRO, The Union; the Damien Foundation; WARN/CARN Regional Network for TB Control; University of Oslo; Robert Koch Institute; Médecins sans Frontières; Stop TB Partnership; McGill University; London School of Hygiene and Tropical Medicine; US Agency for International Development

Leverage created by this project:

Around US$ 1 million leveraged from the Global Fund for the conduct of the ShORRT operational research projects

Gender aspects and vulnerable populations:

Gender balance is on the guiding principle of this ER.

The activities of this ER are particularly targeting vulnerable populations such as children under five years old (Malaria related projects), pregnant women (pregnancy exposure registry), nomadic populations, prisoners and severely poor people (TB related projects). All research conducted in this ER aim at facilitating access to care for this undeserved population.

Training:

- One week training: IR4DTB WHO EURO (June 2022) - 30 participants (National TB programme Staff of 7 countries)
- One week training for integrating health economic component in Implementation research projects (module 2)– 30 participants (National TB programmes of 15 countries)
- One week training on Operational Research (Module 1 – research protocol development) - 26 participants (National Malaria Programmes of 13 countries)
- 3 days training on external monitoring adapted to Operational Research – 30 participants (8 countries)

Strengthened institutions and/or networks:

Operational/implementation research capacities of the Institutions within the MoHs in target countries were strengthened through learning by doing research activities with TDR support and mentoring.

Publications:

- Delays in TB Diagnosis and Treatment Initiation in Burkina Faso during the COVID-19 Pandemic
- Evaluating the Effectiveness of a Novel Systematic Screening Approach for Tuberculosis among Individuals Suspected or Recovered from COVID-19: Experiences from Niger and Guinea
- Health-related quality of life of tuberculosis patients during the COVID-19 pandemic in Conakry, Guinea: A mixed methods study
- Implementation of a peer support intervention to promote the detection, reporting and management of an adverse drug reactions in people living with HIV in Uganda: a protocol for a quasi-experimental study
- A new online toolkit to support implementation research to enhance the use of digital innovations to End TB PLOS Digital Health (PLoS Digital Health; in progress)
- Guide technique – Surveillance et gestion active de la sécurité des médicaments antituberculeux (aDSM)
- Procédures de mise en œuvre du système de surveillance et gestion actives de la sécurité des médicaments antituberculeux (guide)
- National aDSM guide for Senegal, national aDSM guide for Burkina Faso (national guidelines)
- Assessing the Impact of Training on the Knowledge, Attitude and Practice of Pharmacovigilance in Malawi – A Survey Report
- Guide national de pharmacovigilance, Senegal 2021
- Good practices guidance handbook for national TB surveys (who.int)

Related news:

- https://tdr.who.int/newsroom/news/item/10-06-2022-strengthening-drug-safety-monitoring-through-innovation-in-malawi
- https://tdr.who.int/newsroom/news/item/25-05-2022-the-shorrt-initiative-on-tuberculosis-research-in-the-region-of-the-americas
- https://tdr.who.int/newsroom/news/item/16-03-2022-strengthening-tuberculosis-drug-safety-monitoring-and-management-in-indonesia
- https://tdr.who.int/newsroom/news/item/02-02-2022-the-shorrt-initiative-in-the-africa-region-spotlight-on-mozambique
- https://tdr.who.int/newsroom/news/item/15-12-2022-integrated-delivery-model-for-paediatric-apraziquantel-for-schistosomiasis-treatment-preparatory-work-for-its-implementation-in-the-united-republic-of-tanzania
- https://tdr.who.int/newsroom/news/item/14-12-2022-advancing-the-management-of-skin-related-neglected-tropical-diseases-in-ghana-exploration-of-gender-related-factors-and-mobile-technology

Results dissemination and uptake:

An external evaluation estimated that the results of 70% of the Operational/Implementation research projects conducted by the National TB programmes of the WARN-TB & CARN-TB were translated into country national policies and practices. In parallel, National disease control programmes shared their research results within the networks activities, during international conferences and through per-reviewed publications.

Plans for 2023

Tuberculosis

- Continued technical and financial support to countries funded to undertake IR on social protection and TB. Collaboration with GTP and the SPARKS Network to develop a generic package for measuring the impact of interventions at patient and household levels.
- Development of a research package for the evaluation of the new “childhood TB algorithm” for treatment decisions. This will follow the ShoRRT project model. It will be conducted in collaboration with GTB and all key stakeholders. Results will inform the revision of the GTB guidelines for childhood TB in two years’ time.
- Continued support to countries in the follow-up phase of the ShORRT protocol, and to Papua New Guinea in the establishment and commencement of the study. In 2023, half of the countries will conduct interim analysis (end of DR-TB treatment outcome). Support will be provided for conducting the analysis but also for using research results to inform next Global Fund grant cycle.
- Work with WARN/CARN-TB to establish a five-year strategic plan (2023–2027), describing proposed future activities and developing a monitoring and evaluation plan to better demonstrate the network’s impact – finalization of all the scientific papers and publication.
- As funding from the German Government has been granted, replication of the WARN-TB/CARN-TB model with the East and Southern Africa NTPs is ongoing with the establishment of the Southern and East Africa regional Network for TB control (SEARN-TB). Collaboration with GTB for strengthening their TB surveillance system and defining TB control gaps and research priorities.
- Publication of the all the Diagnosis of Multidrug-resistant tuberculosis in Africa (DIAMA) project results (around eight papers are in the pipeline to be written in 2023).
- Finalization of the evaluation of the implementation of the Zoonotic for TB roadmap, development of a regional plan for the AFRO region. Funds will be sought to implementation priority of actions under IR conditions.

- Creating a TDR resource hub to expand the distribution and access to generic research tools and protocols (data sharing agreements, online space on TDR website, shared generic protocols, etc.).

Malaria

- Collaboration with GMP to update the *Seasonal Malaria Chemoprevention Field Guide*, including the stipulation of research gaps for each of the SMC programmatic activities.
- Continued support of the NMPs involved in the OPT–SMC project for the conduct of their research projects including organizing online and onsite training workshops to strengthen NMP research capacities (same material one used for the WARN-TB/CARN-TB).
- Finalization of the research packages for SMC with generic protocols and questionnaires for the conduct of case-control studies for evaluating effectiveness of SMC, qualitative surveys to understand the barriers to effective delivery of SMC, and coverage surveys.
- Organization of a 2nd webinar on the implementation of the RTS,S vaccine with a focus on the type of research/survey that should be planned in advance for measuring the feasibility, acceptability, coverage and effectiveness of implementing mass vaccination for children aged under 5 with RTS,S.

Neglected Tropical Diseases

- Collaboration with WHO NTD on the evaluation of the skin NTDs app developed by WHO and partners to facilitate the diagnosis of skin NTDs. A feasibility study will be conducted in Ghana.
- Support to the Neglected Tropical Disease Control Department of Tanzania to test delivery models for MDA of praziquantel for children aged under 5 years of age (provided that drugs are available in 2023).

Safety

- Finalization and valorisation of all IR projects conducted on the use of innovative tools to monitor drug and vaccine safety.
- Support to NTPs of the West and Central Africa region for the adaptation of the generic aDSM guidance.
- Finalization and dissemination in French and English of the training material on aDSM developed in collaboration with a working group of the WARN-TB/CARN-TB and GTB.
- Handover of the PV database to the PV department.

Digital health

- Continued support to IR4DTB participants from EURO region IR4DTB Workshop during the conduct and completion of their IR projects.
- Organization of an IR4DTB workshop with using the French and English version of the toolkit for West and Central Africa NTPs to enhance the use of digital tools for TB in this region. Discussions with AFRO to propose this to other African countries.
- The adaptation of the IR4DTB toolkit for the use of digital tools for other diseases than TB (i.e., malaria, NTDs) will be explored.
- Development of a lessons learned document for the use of CAD by the NTPs.
- Enhanced collaboration and potential creation of new partnerships with WHO's Digital Health Department to further develop awareness and scope of the current portfolio of digital health activities.

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

In June 2020, TDR launched its strategy on intersectional gender research, as a pathway to more inclusive and effective response to infectious diseases.

In line with IMP-SWG recommendations and vision included in TDR's intersectional gender research strategy, this ER aims to generate evidence on gender intersecting inequalities in infectious disease epidemiology, prevention and control, as well as to apply gender and intersectionality in infectious disease implementation research processes. Through this ER, research teams in LMICs use an intersectional gender lens which enables them to better understand and consequently more effectively intervene in the prevention and control of infectious diseases. Adopting an intersectional gender lens enhances insights into vulnerability to disease(s), exposures to disease(s), experiences of disease, health-related decision-making, responses to treatment and discrimination and unequal access to healthcare. It also allows insight on how these factors are experienced differently by different groups of men/boys, women/girls and people with non-binary identities, and where these differences might be the result of inequities. It defines, promotes and recognizes the importance of intersectional gender analysis as the process of analysing how gender power relations intersect with other social stratifiers to affect people's lives, to create differences in needs and experiences and to understand how policies, services and programmes can help to address these differences.

Progress in 2022

Two research teams from Nepal and Uganda completed their research studies where they incorporated an intersectional gender analysis in infectious disease (schistosomiasis and tuberculosis (TB) in Uganda and lymphatic filariasis (LF) and TB in Nepal). Both have submitted two articles each for peer-reviewed publication:

- *Gendered Lives, Gendered Vulnerabilities: An Intersectional Gender Analysis of Vulnerability to and Treatment of Schistosomiasis in West Nile Region, Uganda* (PLOS Neglected Tropical Diseases).
- *Piloting intersectional gender analysis to understand challenges in Tuberculosis care at four healthcare facilities in Uganda* (PLOS One).
- *Gender and its intersection with social stratifiers influencing lymphatic filariasis (LF) prevention and care seeking behaviour in Nepal* (Infectious Diseases of Poverty).
- *Conducting intersectional gender analysis for a gender-inclusive health system in Nepal – Where we are and what can be done*? *(Infectious Diseases of Poverty*).

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.

Project 1: *Studying the intersections of sex and gender dimensions with other social stratifies in accessing TB & Dengue healthcare services of Transgender Men, Transgender Women, MSM, WSW in Bhutan* (Bhutan team):

They are collaborating with two organizations in Nepal to conduct this study. The main research objective is to generate evidence on how gender identity, sexual orientation, and other social stratifiers (such as age, ethnicity, education, wealth) intersect to influence access to TB and dengue care and services in Bhutan to inform gender-responsive and human rights-based health policy and

healthcare service delivery. This mixed method study has three phases: i) formative phase; ii) intervention development and its implementation phase; and iii) assessment of the intervention phase.

Two five-day training sessions were conducted for 11 peer researchers and four co-researchers on qualitative and quantitative research methods and to enhance their practical skills on data collection for qualitative methods and on applying gender and intersectional lens while collecting data. This was conducted face-to-face by the Bhutan team and virtually in Nepal.

Data collection started in July 2022. By the end of August 2022, 96 semi-structured interviews have been completed with the key population at all four sites as per plan. The focus group discussions (FGDs) with the key population and health workers are being conducted. So far, 280 interviews have been completed to gather quantitative data.

Project 2: *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*

A multicounty consortium with teams from Kenya, Malawi and South Africa are working on this collaborative study.

- The study in Migori County, Kenya and Chikwawa district in southern Malawi focuses 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 is conducting a gender and intersectionality analysis of tuberculosis pre-treatment loss to follow-up.

In Kenya, required research team members have been recruited and training provided. The two-day intensive training covered methodological (both qualitative and quantitative) and practical details of the project and discussed logistical challenges. Field work has started with, 449 respondents (179 men and 270 women) interviewed for quantitative data collection and 31 In-depth interviews (13 men and 18 women) and four FGDs with 12 members each completed for qualitative analysis. Transcription and translation of the qualitative data is currently ongoing. Follow-up interviews are planned for October.

In South Africa, the study protocol was finalized and local approval secured. Relevant SOPs have been written and translation of the guides and consent/information sheets into Afrikaans completed. Stakeholder engagement with various officials is ongoing since end of March 2022. Recruitment of field researchers is ongoing and training is planned.

In Malawi, District Health Management Team support has been secured. The team visited five health facilities and met with management and engaged with eight community traditional leaders within the catchment area of Chikwawa District Hospital to introduce the study. Recruitment and training of research assistants is under way.

Developing a module on gender for TDR's Implementation Research Toolkit

In collaboration with TDR's research capacity strengthening unit, the existing online version of the IR toolkit https://www.adphealth.org/irtoolkit is being updated with a module on gender entitled, *Integrating an intersectional gender lens in Implementation Research,* to guide researchers and health practitioners on how to develop an implementation research proposal incorporating an intersectional gender lens. It aligns with the format of TDR's current IR toolkit and draws from TDR's *Incorporating intersectional gender analysis into research of infectious diseases of poverty toolkit* https://tdr-intersectional-gender-toolkit.org/.

After completing this module, researchers will be able to:

- understand the relevance and importance of gender and intersectionality in IR;
- develop an IR proposal incorporating an intersectional gender lens; and
- plan to implement IR projects using an intersectional gender lens.

The offline version is complete and is in the process of being uploaded.

Developing a module on gender for TDR's implementation Research Massive Online Open Course (MOOC)

In June 2022, TDR launched a new module of the MOOC entitled, *Incorporating an intersectional gender perspective in implementation research*. The content was developed in collaboration with RCS. The duration of the course is three weeks with 2.5 hours per week of study time. The pilot course for this new module enrolled 450 students, of which 284 completed their registration and 112 got the pass mark of 80% to receive the certificate. The next session was scheduled for 3 October 2022 and was facilitated by the University of Ghana.

By the end of the course, students will be able to understand the relevance of sex, gender and intersectionality to infectious diseases of poverty, with the aim to apply these skills and knowledge to their IR projects. This course will enable students to:

- design their own implementation research projects with an intersectional gender lens;
- critically evaluate and use the evidence produced by other implementation research projects; and
- commission robustly designed IR projects that consider gender dimensions and other intersecting axes of inequality.

Collaboration between TDR and the UNDP/UNFPA/UNICEF/WHO/World Bank Special Programme of Research, Development and Research Training in Human Reproduction (HRP)

Addressing sex, gender and intersecting axes of inequality is important across the entire research process from agenda-setting through communication, stakeholder engagement and decisions for the uptake and implementation of effective interventions. Recognizing this, HRP and TDR have joined forces to develop a virtual repository of resources to support their RCS efforts to incorporate sex and gender in health research. A firm in the UK was contracted to design an interface that can support the easy access of material such as the gender toolkit https://tdr-intersectional-gender-toolkit.org/. This interface will also support existing platforms from TDR and HRP and have uploading access available to all teams. The contracting firm will prove an introductory video to explain usage and purpose and will additionally be responsible for maintenance of uploaded inventory.

Collaboration between TDR and SIHI (Social Innovation in Health Initiative)

TDR announced a call in January 2022 for research applications with the aim to strengthen an intersectional gender lens within TDR's Social Innovation in Health Initiative (SIHI). Research efforts will contribute to the implementation of TDR's Intersectional Gender Research Strategy. This call was limited to applicants from the established five SIHI hubs from LMICs that have been engaged in social innovation in health with expertise in public health, gender and intersectionality research, implementation research, and infectious disease prevention and control. Three hubs, namely, Makerere University in Uganda, the University of the Philippines-Manila, the Centro Internacional de Entrenamiento e Investigaciones Médicas (CIDEIM) in Colombia were selected.

The overall objective of this study is to explore and document research projects and processes that identified gendered dimensions of social innovations in health at community level. SIHI hubs will be able to contribute to evidence generation in this area, and support training and dissemination activities associated with social innovation in health with an intersectional gender lens, with the following objectives:

- to address difficulties in accessing healthcare and treatment within communities; and
- to respond and contribute to overcoming health challenges through tailor-made, locally designed and implemented gender transformative responses and solutions.

SIHI Philippines chose two social innovations which feature strong participation of women throughout the design, implementation, scale up and sustainability of the innovation. SIHI Uganda identified six social innovation projects that incorporate gender dimensions in their work through a rapid assessment of gender in all SIHI Uganda projects. SIHI LAC identified two social innovations which have incorporated gender-responsive practices with an intersectional lens in their social innovations.

With the overall aim to support and strengthen the research capacities of each of the three SIHI hubs, an Intersectional Gender Workshop was held on 12 May 2022, facilitated by Lenore Manderson. During the workshop, each hub was given the opportunity to present and discuss their main concerns and ideas, as well as their processes. The workshop was a learning and feedbacking opportunity to strengthen the research proposals that were due to be revised. The revised and finalized proposals were submitted to TDR by 30 May 2022. All teams have received ethical approval from their local Ethics Review Boards and are preparing for implementation of their projects. All the three studies are estimated to finish by end of March 2023.

Remaining risks and challenges

The study being undertaken by the multicounty consortium teams from Kenya, Malawi and South Africa experienced delays in getting ethical approval for Malawi and sub-contractual delays between University of Nairobi and Malawi and South Africa resulting in the two countries undertaking minimal activities. The sub-contracting is now complete to cover the full work plan (until 30 April 2023), and the two are now in the process of planning to undertake their data collection.

No other specific risks anticipated till study period.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

HERD International, Nepal; Makerere University, Uganda; Institute of Health Partners, Thimphu; Bhutan; Institute of Anthropology, Gender and African Studies (IAGAS), University of Nairobi, Kenya; Human Sciences Research Council, Durban, South Africa; Kamuzu University of Health Sciences, Malawi

Leverage created by this project:

None

Gender aspects and vulnerable populations:

The whole ER is about gender intersectionality. The investigating teams included 13 women and 17 men. Among the PIs, three were women and two men.

All the projects under this ER are working to address specific issues of women, gender and vulnerable population in infectious diseases of poverty in LMICs

Training:

The course with the new module on Incorporating an intersectional gender perspective in implementation research in MOOC enrolled 450 students of which 284 completed their registration. Out of this number, 112 got the pass mark of 80% and received the certificate.

In Bhutan (15 people) and in Kenya (14 people) a total of 29 people were trained on incorporating gender and intersectionality within infectious disease research.

Strengthened institutions and/or networks:

None

Publications:

Two manuscripts each from Nepal and Uganda have been submitted to different peer-reviewed journals.

Related news:

None

Results dissemination and uptake:

In Bhutan, the findings will be shared with policy-makers, the MoH, Members of Parliament, relevant NGOs and associated agencies through formal high-level dissemination meetings. A minimum of two manuscripts as an outcome of this project will be submitted to international peer-reviewed journals for publication. A detailed study report, policy briefs and plans for policy uptake by the government agencies, and awareness materials will also be developed. Efforts will be made to disseminate the study through conferences.

The multi-country consortium of Kenya, Malawi and South Africa share their results with the wider scientific community through presentations at national and international conferences, and through open-access peer-reviewed journal publications and reports. Dissemination will focus on opportunities, informed by an intersectional gender lens, with potential to enhance efficient and sustainable evidence-based programming and interventions towards eradication of TB and other infectious diseases. Advocacy work through various mechanisms at county, national and global levels, based on the findings of the study conducted.

Plans for 2023

In January 2022, TDR launched a call for proposals on "Implementation research and gender: A contribution to implement TDR's *Intersectional Gender Research Strategy*". Out of 33 applications, 13 were reviewed, four shortlisted and finally two were selected from Bangladesh and Ethiopia. The overall objective of these implementation research studies is to generate evidence that helps to identify enablers and bottlenecks that impact the delivery of health interventions.

In Bangladesh, the study entitled, *Facilitators and Barriers of management of Multi-drug Resistant Tuberculosis in Bangladesh: An Implementation Research through Gender Lens,* is being conducted by the 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.

The study will employ an embedded exploratory mixed method design where secondary data analysis, record review and a cross-sectional survey will be embedded within the qualitative component consisting of desk review, in-depth interviews, key informant interviews, focus group discussion (FGD) and observation. The study will be conducted at five tertiary specialized TB hospitals across the country which offer MDR-TB treatment.

Likewise, 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. The objective of this mixed methods IR study is to:

- analyse intersectional gender inequalities in structural (socioeconomic, sociocultural stratifiers) and malaria-related gender norms and behavioural vulnerabilities and access to and uptake of preventive and control resources and services;
- research the effects on malaria risk and burden (morbidities and mortalities); and
- generate empirical evidence that informs policies that remove gender-based systemic and individual barriers of achieving malaria elimination in Ethiopian and beyond.

The project will yield an understanding of systemic and behavioural views of intersectional gender inequalities, and their contribution to malaria elimination; and design locally validated stakeholders and community-engaged gender-responsive inclusive frameworks for informing programs, policies,

and effective malaria prevention and controls practices that support burdened people and resource-limited settings.

Both the new IR studies have got approval from their local Institution Review Board and are awaiting feedback from the WHO Ethics Review Committee. Once the approval comes through, TDR will proceed with the contract. Results of the new research studies are expected by early 2024.

▪ *Workstream: Research for innovation*

This workstream supports research that can fill the gaps when no other practical solution is available

In the past, TDR managed clinical drug trials. However, today a range of different innovations are supported, such as finding new ways to deliver drugs or use diagnostics, some of which were developed by product development partnerships which TDR helped create. This workstream aims to identify gaps in existing tools and advocate for the development or improved surveillance systems for preparedness, monitoring and evaluation. Research for innovation focuses on maintaining the effectiveness of control programmes while building resilience to changing environments, including collaboration and strong joint workplans with other programmes across WHO.

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

The objective of this ER is to ensure that strategic contributions are enabled through engagement with stakeholders where opportunities to foster innovation, pilot approaches or fill evidence gaps are identified in priority areas that are not addressed by, but complement work in, other ERs.

REVIEW, COMPILATION AND PUBLICATION OF UNPUBLISHED DATA AND EXPERIENCE OF THE ONCHOCERCIASIS CONTROL PROGRAMME IN WEST AFRICA AND PEER-REVIEWED LITERATURE ON THE ROLE OF THE VECTOR IN TRANSMISSION OF O. VOLVULUS, VECTOR-RELATED CONSIDERATIONS FOR CRITERIA FOR ELIMINATION OF TRANSMISSION AND DIAGNOSTICS FOR POST-INTERVENTION SURVEILLANCE

With the objectives of onchocerciasis-endemic countries now being the elimination of transmission of the parasite, understanding the role of the vector (*Simulium spp.*) in transmission is becoming critically important to ensure that countries continue interventions as long as, but also not longer, than needed. (https://www.who.int/news/item/30-01-2021-neglected-tropical-diseases-who-launches-new-road-map-to-end-suffering-by-2030, https://www.who.int/publications/i/item/9789240010352)

While the strategy of the African Programme for Onchocerciasis Control (APOC, 1995–2015) and the Onchocerciasis Elimination Programme for the Americas (OEPA, 1991 to date) was based on MDA of ivermectin, the strategy of the Onchocerciasis Control Programme (OCP) in West Africa (OCP, 1974–2002) was based on vector control. Consequently, a significant amount of understanding of the role of the vector for parasite transmission, as well as operational knowledge relevant to breeding site identification and vector capture, was accumulated in the OCP. This knowledge will be valuable to inform onchocerciasis elimination efforts across Africa. Furthermore, the OCP evaluated a number of diagnostics in the context of post-intervention surveillance.

The OCP worked with numerous national and international experts on an ad-hoc basis and as members of its external technical advisory committee, the Joint Programme Committee (JPC) which

advised on basic as well as operational research. Furthermore, the JPC reviewed the research and operations outcomes summarized by the OCP in reports.

The vast majority of this work was never published in peer-reviewed journals and the results, conclusions and lessons learned are thus not available to be taken into account by countries for training new generations of entomologists or for conducting systematic reviews that could inform WHO guidelines.

Recently, documents generated by the OCP have become publicly available on the WHO Institutional Repository for Information Sharing (WHO IRIS) (https://apps.who.int/iris/handle/10665/274421). A current search of this collection shows 2675 documents. Retrieval of documents addressing specific topics is very time consuming due to inaccurate classification and data entry, as well as the limitations of the WHO IRIS search engine and export features. This restricts the extent to which the documented and expert-reviewed OCP experience can inform onchocerciasis elimination efforts.

In 2021, an APW was awarded to the Noguchi Memorial Institute for Medical Research to extract and review all OCP documents, summarize the lessons learned in peer-reviewed publications involving entomologists from different onchocerciasis-endemic countries to strengthen their capacity in *Simulium* entomology.

Progress in 2022

A total of 3091 documents issued from the start of the OCP to its closure in 2002, as well as around 600 documents issued by APOC after OCP closure and until its closure in 2015 were extracted, reviewed and classified by the topics/keywords shown in Table 6 below.

Table 6. Number of document issued from the start of the OCP by category

Topic	Number of documents in WHO IRIS
CDTi	1347
Cytotaxonomy	155
Diagnostics	260
Drug effectiveness	199
Environmental modification	66
Epidemiology	959
Health economics	568
Impact assessment	866
Insecticide resistance	419
Larviciding	1064
Mapping	360
Programme implementation	1444
Slash and burn	1
Social science	379
Transmission assessment	557
Trapping	220
Vector control	1040
Vector research	451

The following publications are being prepared (including peer-reviewed publications):

- A systematic review of traps targeted at *Simulium damnosum s.l*
- A review of the impact of seasonal changes on human onchocerciasis vectors breeding and species distribution
- Is onchocerciasis elimination mapping necessary for the current disease elimination activities?
- Additional publications under consideration are:
- Directory of OCP reports in WHO IRIS
- OCP experience in diagnosing of *O. volvulus* infections. This will add value towards the WHO efforts to improve diagnosis for NTDs, as evidenced by the Diagnostic Technical Advisory Group that NTD established (https://www.who.int/neglected_diseases/news/DTAG-sub-group-TOR-June-2020.pdf).

Remaining risks and challenges

Acceptance of publications by journals, identification of funding for open-access publications beyond the three for which funding was included in the APW.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Noguchi Memorial Institute for Medical Research, University of Ghana, Ghana (engaging six junior entomologists from Nigeria, Burkina Faso, Cameroon, Sudan and Ghana (2))

Leverage created by this project:

None

Gender aspects and vulnerable populations:

None

Training:

Six junior entomologists from Nigeria, Burkina Faso, Cameroon, Sudan and Ghana (2)

Strengthened institutions and/or networks:

NTD programmes in Nigeria, Burkina Faso, Cameroon, Sudan and Ghana will have additional entomology expertise available (critical for evaluations as per WHO guidelines for decisions on when *O. volvulus* transmission can be considered as interrupted and ivermectin MDA discontinued)

Publications:

None

Related news:

None

Results dissemination and uptake:

Peer-reviewed publications

TECHNICAL SUPPORT TO THE WORLD HEALTH ORGANIZATION

Membership to several steering committees (e.g. NTD, One Health, Public Health and Social Measures (PHSM)) as well as assistance in administrative functions [2022 meetings supported**:** PBAC35 and EB150, PBAC36 WHA75 and EB151]. Support to GMP on WHO document translation into French, 20% consultancy during six weeks.

Publications:

- Mduma E, Halidou T, Kabore B, Walongo T, Lompo P, Museveni J, et al. (2022) Etiology of severe invasive infections in young infants in rural settings in sub-Saharan Africa. PLoS ONE 17(2): e0264322 (https://doi.org/10.1371/journal.pone.0264322)
- Obiero CW, Gumbi W, Mwakio S, Mwangudzah H, Seale AC, Taniuchi M, Liu J, Houpt E, Berkley JA. Detection of pathogens associated with early-onset neonatal sepsis in cord blood at birth using quantitative PCR. Wellcome Open Res. 2022 Nov 8;7:3. doi: 10.12688/wellcomeopenres.17386.3. PMID: 35600002; PMCID: PMC9114825

Plans for 2023

Generic protocols will be supported to address IR issues encountered by different disease control programmes.

Support for strategy development is planned through participation in scientific meetings related to past/future activities not linked to a current ER, as well as scientific publications.

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

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 policy and to promote inclusive, equitable and sustainable urban health services. Understanding of 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 long 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 the last quarter of 2020, TDR launched a call for proposals to invite research teams to submit proposals with the aim to synthesize and consolidate evidence from a series of literature reviews and state-of-the-art scoping reviews that will also inform TDR's research agenda on urban health, infectious disease and gender research, including in COVID-19 and pre- and post-COVID-19 scenarios. Following a competitive selection process, two multidisciplinary research teams

from the Health System and Population Studies Division (HSPSD) and ICDDR in Bangladesh, and ICMR, Regional Medical Research Centre in India were selected to conduct the reviews.

The overall objective of this activity was to synthesize and consolidate evidence from a series of literature reviews and state-of-the-art scoping reviews that will inform 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.

Progress in 2022

The systematic reviews have been completed by both study teams in India and Bangladesh.

The team in Bangladesh authored two manuscripts which received WHO Executive Clearance and were submitted to *BMC Systematic Reviews*.

1. *Protocol for a systematic review on exploring the implications of the social determinants of health and identifying effective community-based interventions to prevent and control infectious diseases in urban informal settlements in LMICs*.
2. *Implications of the social determinants of health and identifying effective community-based interventions to prevent and control infectious diseases in urban informal settlements in low- and middle-income countries: a systematic review*.

The Indian Council of Medical Research (ICMR) team in India authored two manuscripts which received WHO Executive Clearance and are currently in submission to two different journals.

1. Housing-related opportunities and challenges during COVID-19 pandemic among urban poor in low-and middle-income countries: A systematic review and gap analysis.
2. Community engagement and involvement in managing the COVID-19 pandemic among urban poor in low-and middle-income countries: A systematic review and stakeholders mapping.

ICDDR team, Bangladesh

The team explored what community-based interventions are effective in preventing and controlling infectious diseases, including COVID-19, in urban informal settlements; and what implementation strategies are effective in overcoming social, economic and gender inequities in the prevention and control of infectious diseases including COVID-19, in urban informal settlements.

In July-August 2021, the team conducted a virtual global expert consultation to gather experts' feedback to the preliminary research questions for the proposed systematic review. This feedback contributed to the design of the review process and research questions. The final protocol was registered in PROSPERO[3] in August 2021 (CRD42021218448).

A stakeholder consultation was performed to refine the preliminary research questions for the proposed systematic review through collation of feedback received from national and regional policy-makers from government bodies, as well as from international organizations, healthcare professionals, researchers, academics and other development partners. This systematic review was conducted following the criteria of Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P). Inclusion criteria were developed in accordance with the PICO (population, intervention, comparison, and outcome) principle (Cochrane). Incidence and prevalence of the selected diseases was measured as the main outcome.

[3] PROSPERO is an international database of prospectively registered systematic reviews with a health-related outcome. More information on PROSPERO is available at: https://library.cumc.columbia.edu/insight/prospero-registry-systematic-review-protocols.

A descriptive analysis of the study findings was done as it was not possible to conduct a meta-analysis due to significant heterogeneity regarding type of interventions, comparison groups, outcomes of interest, outcome measurement and statistical analysis.

Strategies of effective community-based interventions

A range of different techniques for community engagement were extracted from the reviews, however detail was generally sparse.

Across the reviewed studies, it was observed that community-based interventions have the potential to substantially reduce disease incidence among impoverished urban communities. However, it was difficult to pin-point effectiveness of any single social determinant or health component making a significant change in any health outcome. This was because the interventions reviewed were complex and designed with multiple components along with variations in social settings.

Providing health education was identified as the most prevalent community-based intervention. The type of interventions identified in this review were:

- socioeconomic support
- hand washing intervention
- water purification
- counselling
- mobile phone SMS reminder
- health education
- case detection
- DOT implementation
- social mobilization by CHWs
- community-based screening
- nutrition supplementation
- delivery of insecticide-treated material
- community-based vector control

The approaches of community engagement taken to deliver the mentioned interventions were community meetings, pictorial card distribution, household visits, conditional cash transfers, training to CHWs and vocational training to community.

Intersectional gender approaches for community-based intervention

The review identified that social determinants of health can influence the intervention outcome. Different strategies were implemented to overcome those intersecting social stratifiers to increase the success of the intervention. It was found that structural systems like social forces, economy and education systems play a role in tuberculosis by applying an intersectional gender lens, focusing on how gender intersects with other social stratifiers and how such interventions address gender intersecting inequities. For example, Rocha et al. (2011) showed that overcrowded living conditions intersect with poverty, increasing vulnerability to tuberculosis. Moreover, unstable employment in a vulnerable population, along with associated social stigmas, further shaped access and utilization of health services. Thus, integrated socioeconomic and biomedical interventions were considered.

Gender, as a social determinant of health and a relational construct of power, was identified as a barrier to achieve desired intervention outcomes in the prevention and control of infectious diseases in four articles.

The main facilitators identified by the review were: context-specific intervention design; mass vaccination campaigns conducted through health systems; mobile phone ownership and acceptability of receiving SMS; and a strong history of community engagement. The barriers were identified as: high migration levels of urban poor; maintaining high-quality interventions with long-term duration and at large-scale; and low levels of literacy.

ICMR team Review 1

The research team reviewed evidence on gender-related aspects in infectious disease epidemiology, prevention and control, including gender-based violence, under a COVID-19 scenario where infectious diseases prevail. These conditions are often exacerbated by compromised access to healthcare, as well as aspects related to community participation and engagement in risk management of infectious diseases, including through housing and water, sanitation and hygiene interventions.

Consequently, the purpose of this analysis was to evaluate and assess housing-related opportunities and challenges during the COVID-19 pandemic among urban poor residing in LMICs.

The study protocol of this review is registered in PROSPERO (CRD42022300387). The study followed standard procedures and presented the results using thematic framework analysis.

Results:

The urban poor in the included studies comprised refugees, slum dwellers, migrant workers, and the urban homeless. Three main themes emerged in the findings: i) housing infrastructure and existing facilities; ii) challenges related to housing conditions during COVID-19 pandemics; and iii) coping mechanisms, social support, and expectations.

Theme 1: Usual population density of households was four to five individuals living in house dimensions ranging from 9.29 to 13.243 square meters. It was challenging for slum residents to maintain their temporary dwellings as they faced adversity due to heavy rain and flooding. The housing units also lacked connectivity to basic sanitation infrastructure. Most housing units failed to meet the minimum housing lobby space standard of six feet, as they were even smaller than four feet. The majority of urban slum dwellings lacked separate kitchens. The urban slum residents did not have access to safe and sufficient water for drinking and hygienic practices and relied on ordinary communal tap water, borewells, or water tankers for their water needs.

Theme 2: During COVID-19, poor infrastructure and crowding made it challenging to practice physical distancing or follow quarantine measures. Migrant communities struggled to make a living and pay housing rents, which were further aggravated by food insecurity and stringent lockdown measures during the COVID-19 pandemic. Women had no safe location to meet and socialize, and children had no space to play due to crowding. The anger and outrage among the informal settlements was marked by the government's impractical policy on COVID-19 containment.

Most slum women work, but it is usually in a low-paying, transitory, and exploitative job, making them more likely to perform poorly. Many domestic workers could not provide services remotely, resulting in a loss of income that further exacerbated family food insecurity. The poor urban residents felt stigmatized for contracting the infection due to their overcrowded living conditions. Apart from making it impractical to practice physical distancing, they were under threat of getting the disease as a dwelling measuring 6 to 15 square meters was shared by around ten individuals. The poor quality and compacted housing infrastructure significantly affected the anxiety level and exacerbated levels of gender-based violence.

Theme 3: Insufficient spacing and overcrowding led residents to take refuge under trees or opt for makeshift seating spaces outdoors. Deterioration in the health conditions was reported among the residents with insecure housing. The crises dealt with community engagement and involvement. The rural childcare center, educational institution, community center, and train coaches were transformed into isolation centres to ensure physical distancing. Migrant workers were sometimes supported with personal protective equipment, food, and housing by employers.

ICMR team Review 2:

The team conducted a second systematic review of CEI with an emphasis on stakeholder identification, accountability mapping, the support system, and the engagement process among urban poor populations in LMICs during the COVID-19 pandemic. Eleven databases were searched, including PubMed, Embase, Web of Science, and CINAHL, following the PRISMA-2020 guidelines to find articles published between November 2019 and August 2021. They registered their protocol in PROSPERO (CRD42021283599). The process for the second review was similar to the first one described above.

The findings revealed that various stakeholders had a significant role in managing COVID-19 among the urban poor of LMICs with community participation. These included city authorities (urban local bodies), civil society groups, community-based organizations, CHWs, community volunteers, corporate social responsibility groups, mass media, and local nongovernmental organizations (NGOs). The police, a private food supply agency, private hospitals, the public health system, UN specialized organizations, researchers, and academic institutions participated in several community engagement activities and were supported differently. From the grassroot to the central level, these stakeholders supported urban slum communities in different ways and platforms, such as raising awareness of the pandemic, facilitating healthcare, supplying food and water, as well as providing financial support. Many stakeholders were involved in specific COVID-19 support, particularly for healthcare, livelihoods, and WASH infrastructure, as well as accountability mapping by adopting an interest–influence matrix. The detailed accountability mapping of various stakeholders using an interest–influence matrix is presented below. The following symbol was used to map interest high (+), influence high (+), interest low (–), and influence low (–) (see Fig. 7 below).

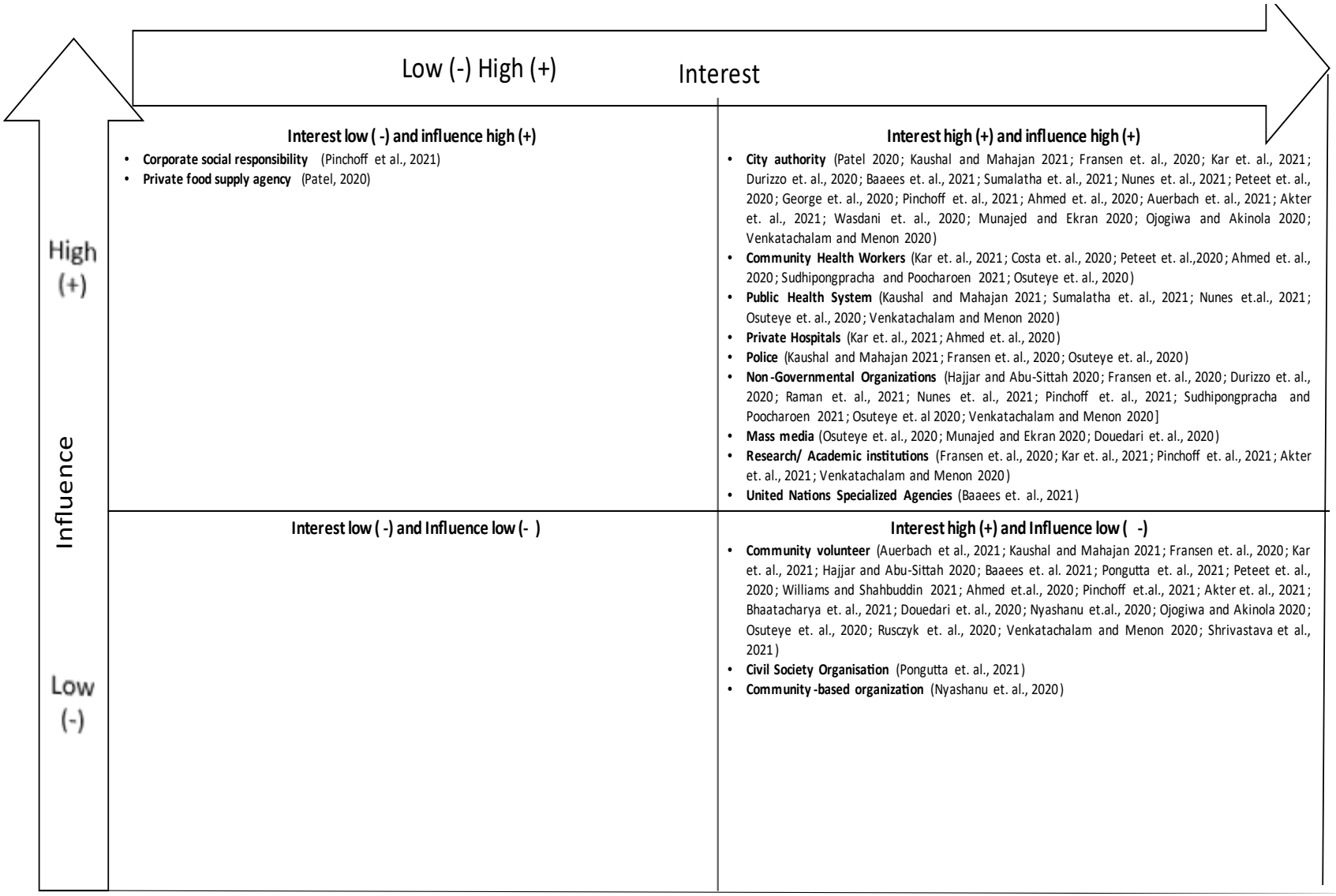


Fig. 7. Interest–influence matrix on the systematic review of CEI

The interest–influence matrix findings revealed that specific community volunteers, community-based organizations, and civil society organizations had high interest but less influence, indicating that it is necessary to recognize and engage them. Similarly, motivation was found to be crucial for those with high influence but less interest (such as relates to corporate responsibility/conscience and private food supply agencies) for the health system's preparedness plan among urban populations. This review emphasized the significance of meaningful CEI in designing and implementing public health efforts for pandemic management among urban slum populations.

Remaining risks and challenges

None

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Health System and Population Studies Division (HSPSD), and ICDDR, Bangladesh

ICMR, Regional Medical Research Centre, Bhubaneswar, India

Leverage created by this project:

None

Gender aspects and vulnerable populations:

Study addresses gender directly. The two investigator teams included four women and nine men. Both PIs were women. Since both projects were conducting systematic reviews of the literature, they did not have immediate direct beneficiaries.

Training:

Project related

Strengthened institutions and/or networks:

None

Publications:

- Dubey S et al. Housing-related opportunities and challenges during COVID-19 pandemic among urban poor in low-and middle-income countries: A systematic review and gap analysis. Front Public Health. 2022; 10: 1029394. doi: 10.3389/fpubh.2022.1029394
- Sahoo KC et al. Community engagement and involvement in managing the COVID-19 pandemic among urban poor in low-and middle-income countries: A systematic review and stakeholders mapping. (2023) Global Health Action, 16:1, DOI: 10.1080/16549716.2022.2133723
- Sahoo KC et al. A Systematic Review of Water, Sanitation, and Hygiene for Urban Poor in Low- and Middle-Income Countries during the COVID-19 Pandemic through a Gendered Lens. Int. J. Environ. Res. Public Health 2022, 19(19), 11845 (https://doi.org/10.3390/ijerph191911845)

Related news:

None

Results dissemination and uptake:

Two workshops were planned: a stakeholder's consultation and a dissemination workshop. Two additional evidence briefs were generated on gender-based violence associated with COVID-19 in urban slums in India, and on challenges of accessing basic amenities during COVID-19 among urban slum dwellers.

Plans for 2023

Now that one systematic review has been completed and submitted to a peer-reviewed journal by Bangladesh, and another is in the process of being submitted by India, the research team needs to conduct workshop and dissemination activities with stakeholders to ensure maximum impact and research uptake of findings. A new APW was awarded to both country study teams on 15 July 2022 for the dissemination activities described above. The new scope of work is expected to be completed by 31 January 2023.

The findings from this ER will continue to inform the planning of future TDR research projects and research calls in this area of work for the next biennium 2023-2024. In addition, specific fundraising activities are also being explored to strengthen the urban health portfolio, including a focus on human health in slums, ensuring a gender and intersectionality lens, and creating synergies with other ERs across the TDR portfolio.

ER 1.3.14: Testing of innovative strategies for vector control

Vector-borne diseases such as malaria, dengue, Zika, chikungunya, yellow fever and others account for 17% of the total morbidity from infectious diseases, causing more than one million deaths per year, with few new drugs or strategies to combat these emerging infectious pathogens. 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.

The rationale of this ER is to work with all partners to test innovative vector control technologies. Among the current alternatives for new vector control technologies, the sterile insect technology (SIT) has been successfully implemented in agriculture since about 60 years, with no side effects and an environmentally safe impact. SIT is a method of pest control using area-wide releases of sterile males to mate with wild females which thus produce no offspring, To test this innovative technology against diseases, technical collaboration was established in 2019 between the IAEA, NTD, with the US CDC joining in 2021. The project is currently supported by designated funds from US CDC lasting until August 2024.

This ER aims to provide countries and stakeholders with up-to-date guidance on how to test new vector control technologies through different materials such as a guidance document, training materials, workshop and in-site evaluations. Research activities under the best standards of quality and ethics will also be implemented to test field conditions for entomological outcomes and the epidemiological outcomes of new vector control technologies. The importance of developing necessary and adequate indicators to evaluate the impact of new technologies on vector populations, human health and health systems has been emphasized strongly and the subject will be included in the outputs from this activity. To support the implementation of this project, supplementary activities are included on capacity building, landscape analysis, as well as the introduction of a new tool to identify *Aedes* mosquito eggs.

The timeline for the SIT project is shown in Table 7 below. For the other activities no timeline is provided since there will be short-term activities (less than one year) for two of them and continuation of maintenance for capacity building.

Table 7. SIT project timeline, activities, outputs and outcomes

Years	*Activities*	*Outputs/Outcomes*
2019	Building partnership with IAEA and NTD	Memorandum of Understanding between IAEA and WHO signed
2019–2020	Development of a guidance document for testing SIT	Workshop with external experts in Mexico in February 2019 Release of the Guidance document in April 2020
	https://academic.oup.com/jid/issue/222/Supplement_8 https://tdr.who.int/publications/i/item/9789240002371	
2020	Call for applications to select consortium for field testing	Four multi-country consortia selected after external review
2020–2021	Fundraising activities within the context of the COVID-19 pandemic	Funds raised to support one consortium (US$ 800 000)
2021–2022	Partnership developed with US CDC	Agreement signed
2022–2024	Field testing of SIT in three countries from the Pacific Region	Workshop in WPRO in 2023 Result on efficiency, effectiveness and cost of SIT against *Aedes*-borne diseases
2023–2024	Engagement with the Vector Control Advisory Group (VCAG) for recommendation on SIT	Outcome from VCAG

Progress in 2022

SIT field testing

Abstract of the proposal from Consortium from the Pacific Region: The Pacific Region is experiencing a high burden of mosquito-borne disease, with concurrent epidemics of dengue, chikungunya and Zika virus infections occurring since 2012. These outbreaks greatly exacerbate the pre-existing burden that Pacific Islands primary healthcare systems face and are directly impeding WHO achievement of the SDGs in the region. The constraints inhibiting the prevention and response to arboviral outbreaks in small Pacific Island countries are many, in particular the limited capacity for mosquito control, especially against *Ae. aegypti, Ae. albopictus* and the Pacific tiger mosquito *Ae. polynesiensis*.

These container-breeding species which use small, dispersed, and sometimes cryptic habitats as oviposition sites, are particularly difficult to control using standard methods. The assessment and integration of innovative mosquito control approaches, including SIT against *Aedes* vectors is thus urgent. Islands are tractable places for scientists to assess the efficacy of novel technologies such as SIT.

The Pacific Islands Consortium for the Evaluation of *Aedes* SIT (PAC-SIT), led by Institut Louis Malardé (ILM) in Tahiti, French Polynesia, will engage three Pacific Island countries and territories (the Cook Islands, Easter Island and French Polynesia) and their communities in a programme evaluating the safety, acceptability and efficacy of SIT under different intervention scales. Following initial testing and validation of standardized production, sorting and sterilization protocols in the laboratory (Tahiti facility), release interventions will be undertaken at two locations (targeting transmission areas where vector intervention is appropriate in Aitutaki and Tahiti islands) in a culturally-relevant approach engaging Pacific Island communities.

Monitoring of SIT efficacy before, during and after intervention will rely on standard as well as new entomological indicators of epidemiological relevance namely, the detection of pathogens in mosquitoes to assess risk of disease transmission, and the monitoring of biomarkers in human cohorts to measure the decreasing exposure to mosquito bites resulting from the SIT-induced population

suppression. Operational implementation of SIT in these contrasted Pacific Island settings will allow the assessment of SIT regulatory constraints and cost-effectiveness (US$/ha/year) including in the context of transnational transport of sterile males (Tahiti to the Cook Islands).

The SIT facility in Tahiti will serve as a training platform for the regional partners, especially the Easter Island team, to increase the success of future SIT interventions (which is outside the scope of this project). PAC-SIT will leverage the expertise of local health and vector control coordinators, community leaders, international scientists, as well as stakeholders from the luxury hotel resort industry in a trans-sectoral approach designed to strengthen the sustainability of SIT at larger intervention scales.

Selection and hiring of the Ad-hoc Committee to follow the SIT proposal

Proposed membership of the ad hoc Committee on SIT				
Name	Gender	Nationality	WHO Region	Expertise
Salome Bukachi	F	Kenyan	AFR	Social Sciences
Gregor Devine	M	Australian	WPR	Risk assessment
Flaminia Catteruccia	F	American	AMR	Medical Entomology, IMP SWG
Antonios Kolimenakis	M	Greek	EUR	Cost-effectiveness
Manju Rahi	F	Indian	SEAR	Epidemiology
Matt Thomas	M	American	AMR	Medical Entomology, IMP SWG

Capacity building on medical entomology

A directory of courses on medical entomology developed previously by TDR is now fully available online hosted by the ***Global Vector Hub (GVH)*** platform, to reach the global community under the names Global Atlas of Medical Entomology Schooling (GAMES) directory. This directory has the objective to help countries build capacity in this specific discipline and for all levels, from the basic technical level to Ph.D. students. Information on GVH can be found at the following link: https://globalvectorhub.lshtm.ac.uk/menu

GVH was contracted to maintain and further develop the GAMES Directory over a two-year period and the programme of work includes the following activities:

1. Maintenance of the current website with regular monitoring of the GAMES course directory on the GVH to ensure that sites/links on the directory are active and that any identified updates or errors are rectified.
2. Development of an interactive map as an alternative means of browsing courses in the GAMES resource. The interactive map will be divided into WHO regions to help users find courses in their country or regions.
3. Integration of additional courses according to the requests from institutions and course responsible officers. This will be done through an SOP detailing methods for selecting courses to be added to the database and outlining specific inclusion and exclusion criteria.
4. Support to a scoping analysis on opportunities to establish Reference Centres for training in medical entomology. This activity will include setting up a working group of experts (under the TDR rules and processes) and the development of a document providing the criteria and potential Terms of Reference for the future Reference Centres.

Landscape Analysis on innovative vector control tools

Abstract of the completed Landscape Analysis: The growing burden and threats of VBDs to human health are due to the changing world in which populations live — vector control is the main control measure. The changing factors relate to a demographic boom, increased and unplanned urbanization, increased global travel and trade, and climate and environmental change. Because technology and innovation have contributed to the improvement of the health of societies, the WHO relies again on these solutions through the GVCR, 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 SIT and analysis of the opportunities made possible by its integration into vector control activities. The inventory of vector control interventions (traditional and news) has mainly been based on desk reviews of literature and informal discussions with stakeholders. The landscape analysis shows that the traditional vector control interventions (such as ITNs, IRS and larval source management) keep protecting vulnerable populations mainly against malaria vectors and to some extent AVD vectors. However, these traditional interventions are limited when facing contemporary issues related to insecticide resistance, the control of exophagic and exophilic mosquito vectors, and the multiple and hard-to-reach mosquito larval habitats. The new promising technologies, based on reduction or suppression of mosquito populations (including SIT technology, Wolbachia-based and gene drive approaches) are expected to cover the limitations of traditional vector control interventions. SIT technology and the Wolbachia-based incompatible insect technique (IIT) are currently the most advanced technologies with many ongoing field trials reporting successful results against *Aedes* vectors. SIT technology has been successfully associated with traditional vector control interventions and a new technology combining SIT and Wolbachia-based IIT offers new future opportunities. Sex separation, methods of release of males and accurate monitoring of male populations need technical improvements to fine tune SIT technology. SIT is on track to provide future strong epidemiological impacts on mosquito-borne diseases as field testing results are reported. The new vector control technologies are impatiently expected to play key roles in the control of mosquito-borne diseases as part of the response to these growing threats. For now, they are promising, but remain pipeline control measures for the protection of communities against mosquito vectors. Investment in vector control research and development should be increased to develop more effective tools and technologies. Endemic countries are encouraged to keep leveraging available vector control options, according to the local contexts and related to vector bionomics, but also the local determinants of the mosquito-borne diseases.

The landscape analysis is under external review for a publication as a TDR web document in 2023, as well as a scientific publication in an open peer-reviewed journal in 2023.

Innovative tool for surveillance of vector control

This activity was co-supported by TDR and NTD.

Abstract: Invasive mosquito species of the genus *Aedes* represent a risk to public health due to their ability to transmit viral diseases (e.g. Dengue, Chikungunya, Zika) and therefore present a need to monitor and control these species. The objective of this project is to develop a high-resolution optical instrument to identify differences in the chorion structure of eggs of the two main invasive species, *Aedes albopictus* and *Aedes aegypti*. This system would allow rapid analysis of samples collected in the field and quantification of the abundance of the two species, if both are present, thus improving surveillance of AVDs. In the implementation of this project, researchers from ECOSUR and the CRISP/INSP laboratories (Mexico) collected the eggs, while the Vector Ecology Sector (SUPSI-DACD-IM) analysed the samples with the optical instrument. The results obtained were analysed in parallel using molecular techniques in order to confirm the method.

Due to important delays in collection and transportation because of COVID-19 travel restrictions, the quality of the collected eggs was not good and the egg chorion structures were not hydrated well enough to conserve the structure. Further, most of the eggs disaggregated and only 169 eggs were used for optical and molecular analysis, with a great majority of *Ae. aegypti* eggs (141) vs *Ae. albopictus* (28) surviving the transportation. The results were thus not found significant, although the methodology was validated for other species.

This new tool needs further testing in better conditions and more favourable conditions, though this may be outside of the scope of TDR activities and thus the problem of surveillance of both species when present in the same place will persist. The recommendation arising from this challenge is that SIT testing must be performed in places where only one species is present, to avoid any bias and mistakes in the entomological surveillance.

Data sharing on vectors and biodiversity of vectors

TDR supported an open call, in partnership with the Global Biodiversity Information Facility (GBIF), for a special issue in GigaByte for data papers on vectors. This publication was released in June and included 11 papers (nine were first authored by a LMIC scientist) with data on vectors that transmit VBDs, presenting over 500 000 occurrence records and 675,000 sampling events from more than 50 countries. Following this publication, the journal GigaByte has been awarded the ALPSP Innovation Award for its innovative approach to publishing and its interactive articles and tools (https://www.alpsp.org/Awards). Due to the success of this first publication, a second call is already open and the link can be found at https://tdr.who.int/grants.

Remaining risks and challenges

The main risk for this ER was due to the lack of funding after the COVID-19 pandemic, which disrupted the attribution of funds and reoriented them for other diseases. Fortunately, this risk was mitigated through funding support from the US CDC, which is now securing this activity for SIT field testing in at least one region and three countries.

The remaining challenges are to raise more funding for supporting at least one more consortium from a different region since four consortia were originally selected. Interactions with different partners continue.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

For SIT field testing, a technical collaboration was established with the IAEA and with the joint IAEA/FAO Team, NTD, WHO regional offices and the US CDC Arboviral Diseases Branch.

The SIT consortium from the Pacific Region will work with the research institutions of French Polynesia, the Cook Islands and the Easler Island (Chile), as well as the WHO country offices and national Ministries of Health.

For the capacity building, a partnership was established with ARCTEC Innovation which manages the Global Vector Hub Platform (GVHP), where the GAMES Directory of courses on medical entomology is currently online.

Leverage created by this project:

This project has leverage designated funds for a total amount of US$ 800 000 for SIT field testing, funded by the US CDC. The countries involved in the projects have already committed to co-support the field testing through their own vector control agencies funding, through staff and materials for an amount which was estimated to be at least equivalent to the funding received. Further leverage will be established through the direct support to the sterile mosquito production facilities of the Technical Cooperation Department of IAEA for about the same amount. The total leveraged by this project is thus about US$ 1 500 000.

Gender aspects and vulnerable populations:

1. Gender aspects were taken into account in the selection process, since all consortia are showing parity among the investigators (50% of men and 50% of women). The selected consortium from the Pacific Region has a research team comprising 11 persons (five men and six women) with a parity rate of 54%. The parity in gender is also well respected within the Ad-hoc Review Committee which includes three women and three men, and finally the management team (IAEA/NTD/CDC/TDR) comprising ten persons (four men and six women).

2. This new vector control technology does not address specifically vulnerable populations, however it is well recognized that AVDs are affecting more strongly the poorer and vulnerable populations, as was well demonstrated during the Zika pandemic.

3. SIT will be deployed in priority areas where the most affected populations are the most vulnerable.

Training:

- The number of advanced degrees under way as a result of the project is not yet available.
- The number of people trained through short courses and training session is not yet available.
- Training materials will be developed during this project on specific items for SIT field testing SIT. Several training workshops and activities are planned through this activity and an evaluation of capacity building and strengthening of participating institutions is already planned with the partners.

Strengthened institutions and/or networks:

All institutions and programmes involved in this project will be strengthened in their capacity to implement innovative vector control technology.

Publications:

- Guidance Framework for Testing the Sterile Insect Technique as a Vector Control Tool against *Aedes*-Borne Diseases. https://www.who.int/tdr/publications/year/2020/guidance-framework-for-testing-SIT/en/
- Oliva CF, Benedict MQ, Collins CM, Baldet T, Bellini R, Bossin H, Bouyer J, Corbel V, Facchinelli L, Fouque F, Geier M, Michaelakis A, Roiz D, Simard F, Tur C, Gouagna LC. Sterile Insect Technique (SIT) against *Aedes* Species Mosquitoes: A Roadmap and Good Practice Framework for Designing, Implementing and Evaluating Pilot Field Trials. Insects. 2021 Feb 24;12(3):191. doi: 10.3390/insects12030191
- Joel Aik, Hamidou Maiga, Florence Fouque, Jérémy Bouyer, Hannah E Clapham. Assessing the epidemiological impact of area-wide integrated pest management programmes that include a sterile insect technique and/or incompatible insect technique components: Considerations for study designs. Submitted
- Soledad Ceccarelli, Agustín Balsalobre, María Eugenia Vicente,Rachel Curtis-robles, Sarah A. Hamer, José Manuel Ayala Landa, Jorge E. Rabinovich, Gerardo A. Marti, American triatomine species occurrences: updates and novelties in the DataTri database, Gigabyte, 2022. https://doi.org/10.46471/gigabyte.62
- Paloma Helena Fernandes Shimabukuro, Daniel Rocha Cangussu Alves, Jéssica Adalia Costa Barros,Luiz Otavio Cordeiro Nascimento, Luke Anthony Baton, Maíra Posteraro Freire, Manoel Edson Medeiros Da Silva, Mauro Diego Gobira Guimarães De Assis, Sofia Ferreira Morais, Tiago Silva Da Costa, Veracilda Ribeiro Alves, Eduardo Stramandinoli Moreno, Occurrence records and metadata forsandflies (Diptera, Psychodidae, Phlebotominae) collected in the lands of indigenous people in the Brazilian Amazon, GigaByte, 2022 https://doi.org/10.46471/gigabyte.61
- Rodrigo Espindola Godoy, Andrey José De Andrade, Paloma Helena Fernandes Shimabukuro, Andreia Fernandes Brilhante, Sand fly (Diptera: Psychodidae: Phlebotominae) records in Acre, Brazil: a dataset, Gigabyte, 2022. https://doi.org/10.46471/gigabyte.60
- Isra Deblauwe, Dimitri Brosens, Katrien De Wolf, Nathalie Smitz, Adwine Vanslembrouck, Anna Schneider, Jacobus De Witte, Ingrid Verlé, Wouter Dekoninck, Marc De Meyer, Thierry Backeljau, Sophie Gombeer, Kenny Meganck, Ann Vanderheyden, Ruth Müller, Wim Van Bortel, MEMO: Monitoring of exotic mosquitoes in Belgium, Gigabyte, 2022. https://doi.org/10.46471/gigabyte.59
- Wim Van Bortel, Veerle Versteirt, Wouter Dekoninck, Thierry Hance, Dimitri Brosens, Guy Hendrick, MODIRISK: Mosquito vectors of disease, collection, monitoring and longitudinal data from Belgium, Gigabyte, 2022. https://doi.org/10.46471/gigabyte.58

- Sara H. Paull, Katherine M. Thibault, Abigail L. Benson, Tick abundance, diversity and pathogen data collected by the National Ecological Observatory Network, Gigabyte, 2022. https://doi.org/10.46471/gigabyte.56
- Maurício Dos Santos Conceição, Samira Chahad-ehlers, Luiz Gonzaga Dos Santos-neto, Adson Luís Sant'ana, Gabriela Princival Marques Ribeiro, Débora Do Rocio Klisiowicz, Cássio Lázaro Silva-inacio, Taciano De Moura Barbosa, Renata Antonaci Gama, Ana Leuch Lozovei, Andrey José De Andrade, Culicidae (Diptera: Culicomorpha) in the southern Brazilian 'Ana Leuch Lozovei' collection, with notes on distribution and diversit., Gigabyte, 2022. https://doi.org/10.46471/gigabyte.55
- Miguel Ángel Miranda, Carlos Barceló, Daniele Arnoldi, Xenia Augsten, Karin Bakran-lebl, George Balatsos, Mikel Bengoa, Philippe Bindler, Kristina Boršová, Maria Bourquia, Daniel Bravo-barriga, Viktória Čabanová, Beniamino Caputo, Maria Christou, Sarah Delacour, Roger Eritja, Ouafaa Fassi-fihri, Martina Ferraguti, Eleonora Flacio, Eva Frontera, Hans-peter Fuehrer, Ana L. García-Pérez, Pantelis Georgiades, Sandra Gewehr, Fátima Goiri, Mikel Alexander González, Martin Gschwind, Rafael Gutiérrez-lópez, Cintia Horváth, Adolfo Ibáñez-justicia, Viola Jani, Përparim Kadriaj, Katja Kalan, Mihaela Kavran, Ana Klobucar, Kornélia Kurucz, Javier Lucientes, Renke Lühken, Sergio Magallanes, Giovanni Marini, Angeliki F. Martinou, Alice Michelutti, Andrei Daniel Mihalca, Tomás Montalvo ,Fabrizio Montarsi, Spiros Mourelatos, Nesade Mujabajraktari, Pie Müller, Gregoris Notarides, Hugo Costa Osório, José A. Oteo, Kerem Oter, Igor Pajović, John R. B. Palmer, Suncica Petrinic, Cristian Răileanu, Christian Ries, Elton Rogozi, Ignacio Ruiz-arrondo, Isis Sanpera-calbet, Nebojša Sekulić, Kivanc Sevim, Kurtesh Sherifi, Cornelia Silaghi, Manuel Silva, Nikolina Sokolovska, Zoltán Soltész, Tatiana Sulesco, Jana Šušnjar, Steffanie Teekema, Andrea Valsecchi, Marlen Ines Vasquez, Enkelejda Velo, Antonios Michaelakis, William Wint, Dušan Petrić, Francis Schaffner, Alessandra Della Torre, Consortium Aim-cost/ Aim-surv: First pan-European harmonized surveillance of *Aedes* invasive mosquito species of relevance for human vector-borne diseases, Gigabyte, 2022. https://doi.org/10.46471/gigabyte.57
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- José Dilermando Andrade-filho, Alanna Silva Reis, Carolina Cunha Monteiro, Paloma Helena Fernandes Shimabukuro, Online catalogue of the Coleção de Flebotomíneos (FIOCRUZ/COLFLEB), a biological collection of American sand flies (Diptera: Psychodidae, Phlebotominae) held at Fiocruz Minas, Brazil, Gigabyte, 2022. https://doi.org/10.46471/gigabyte.52

Related news:

- https://tdr.who.int/newsroom/news/item/26-06-2022-access-to-data-on-vectors-and-vector-borne-diseases-is-improved-through-the-release-of-a-special-issue-publication-of-a-series-of-data-papers
- https://tdr.who.int/docs/librariesprovider10/vbds/tdr-gvh-symposium.pdf?sfvrsn=ab29465d_5
- https://tdr.who.int/newsroom/news/item/14-11-2019-mosquito-sterilization-offers-new-opportunity-to-control-dengue-zika-and-chikungunya
- https://tdr.who.int/newsroom/news/item/14-10-2022-innovation-award-received-by-the-journal-gigabyte

Results dissemination and uptake:

A dissemination plan was established for a SIT field testing proposal.

Plans for 2023

- SIT field testing will start in the three Pacific Region countries (French Polynesia, the Cook Islands and Easter Island (Chile) in early 2023.
- Engagement with WHO VCAG and presentation of SIT at the First VCAG session in February 2023.
- Training workshop on SIT planned according to the CDC-approved project, and to be held in the Pacific region in May 2023.
- Continuation of the online GAMES Directory.
- Publication of the landscape analysis.
- Continuation and expanding the collaboration with GBIF for data sharing on vectors.

▪ *Workstream: Research for integrated approaches*

The main aim of this workstream is determining the complex interactions between people and their environment that affect disease transmission.

In this area of work, TDR supports a holistic, integrated multisectoral approach that helps populations build resiliency to current and future challenges. This includes, among others, research expertise in climate change, biodiversity loss, biological threats, agriculture and societal changes. This approach helps to address parasite and vector resistance to today's tools, and geographical expansion of the diseases, particularly into urban environments. It informs how effective integrated multisectoral responses can be implemented to address these challenges.

ER 1.3.11: Multisectoral approach for prevention and control of malaria and emerging arboviral diseases

Vector-borne diseases including malaria and emerging AVDs, account for about one quarter of all infectious diseases. Although there has been significant progress for malaria, with a recent decrease in malaria morbidity and mortality rates, other diseases, such as those caused by arboviruses like dengue, chikungunya, yellow fever, and more recently Zika, are expanding with an increased number of cases and geographical distribution. It has become evident that the prevention and control of these diseases must include more than a single orientated approach, since the transmission patterns are driven by vector–host–pathogens relationship where natural conditions, human societies and vector parameters are dynamically interacting. Further, the GVCR 2017–2030, approved at the World Health Assembly in 2017 by more than 190 Member States (WHO 2017) considers the intra- and intersectoral approach as one of the four pillars to achieve efficient vector and VBD control.

The rationale of this ER is to better understand how to implement an efficient MSA for preventing and controlling VBDs. Although MSAs are widely used and recommended, the theoretical baselines and the "*how to*" are missing. This ER will also work on developing a framework, tools and guidance on MSAs, as well as test these approaches with case studies in field conditions.

This activity started in 2016 as a collaboration to build a multidisciplinary approach on MSAs for the prevention and control of malaria and emerging AVDs between TDR, the SDC and the IDRC. Following these first steps a collaboration was established in 2019 with WSH (Water, Sanitation, Hygiene and Health Unit) and supported by funding from the Sweden International Development Agency (Sida) to

strengthen country capacity on MSAs against VBDs with a focus on the WASH sector. Finally, the relevance of the MSA against malaria allowed for a collaboration with the GMP and the National Institute of Poverty Diseases from China (NIPD) through funding from the UN Peace and Development Sub-Fund (UNDESA) to test new approaches on malaria control in four African countries (Burkina Faso, Senegal, Tanzania and Zambia). Most of the case studies supported through this project will end by December 2023, but the ERs are planned to continue for at least two more years (to 2025) to extract lessons learned and develop more material, such as a training course for guiding MSA implementation. All collaboration developed with different partners for this project were technical and financial and a summary of the steps within this overall project is provided in Table 8.

Table 8. Timeline, activities, outputs and outcomes of prevention and control of malaria and emerging AVDs

Years	Activities	Outputs | Outcomes
2016–2017	Building partnership around MSA with SDC, STPH and IDRC	Workshop in Geneva
2017–2019	Commissioned reviews supported for knowledge gaps and research questions on MSA	Special Issue published in the Journal of Infectious Diseases (click here)
2018–2020	Development of a Theoretical Framework	Document published and released on TDR website (click here)
2019–2022	Collaboration with WSH supported by Sida funding	Final reports expected by end of 2022
	Support to three case studies ongoing	Scientific publications
2021–2023	Collaboration with GMP supported by UN funds	Training Workshop Scientific publications
	Support to activities including: Case study in Burkina Faso; MOOC on MSA; Development of training course	Update of guidance document
2024–2025	Collaboration with all previous partners and NTD Development of lessons learned document	Document on how countries are implementing MSA against VBDs
	Implementation of training Activities	Deployment of a MOOC

Progress in 2022

Case studies within specific partnerships with the water and sanitation sector (WASH) and the Global Malaria Programme (GMP)

Case Study 1: A pilot multisectoral intervention for controlling malaria vectors, mitigating insecticide resistance and assessing WASH sector facilities at healthcare units in selected costal and west Sahelian African countries (*Mali, Benin, Burkina Faso and Nigeria*).

MSA with the following sectors: Water and Sanitation, Agriculture and Environment

Summary of the mid-term report (June 2022):

The final aim of this research was to contribute to the decrease of nosocomial infection transmission in healthcare environments, reducing vector breeding in and around healthcare facilities and improving the quality of primary healthcare where malaria patients can represent the greatest percentage of people seeking care. The following activities were carried out in Benin, Burkina Faso, Mali and Nigeria.

1. *Assessing WASH practices in healthcare facilities of the selected villages*

Information on WASH practices in the healthcare facilities of the selected study sites in all four project countries were collected, namely Benin, Burkina Faso, Mali and Nigeria.

Activities of this work-package were led by social scientists from each country. Quantitative and qualitative approaches were used to assess the current WASH conditions in healthcare units of the study sites. Qualitative tools included in-depth interviews, focus group discussions, and a semi-structured questionnaire to collect information from healthcare personnel, administrative staff, patients, and other support staff. Both quantitative and qualitative tools were designed to capture information on:

- water supply systems
- quality of supplied water
- piping and water storage systems
- number of functional toilets
- the number of users-to-toilet ratio
- availability of clean water
- disinfecting solutions in toilets
- availability of dust bins
- waste collection
- waste treatment systems

Example of study results, from Benin on the situation of Hygiene in Healthcare facilities, showing that none of the basic criteria for latrines are implemented in the area under study.

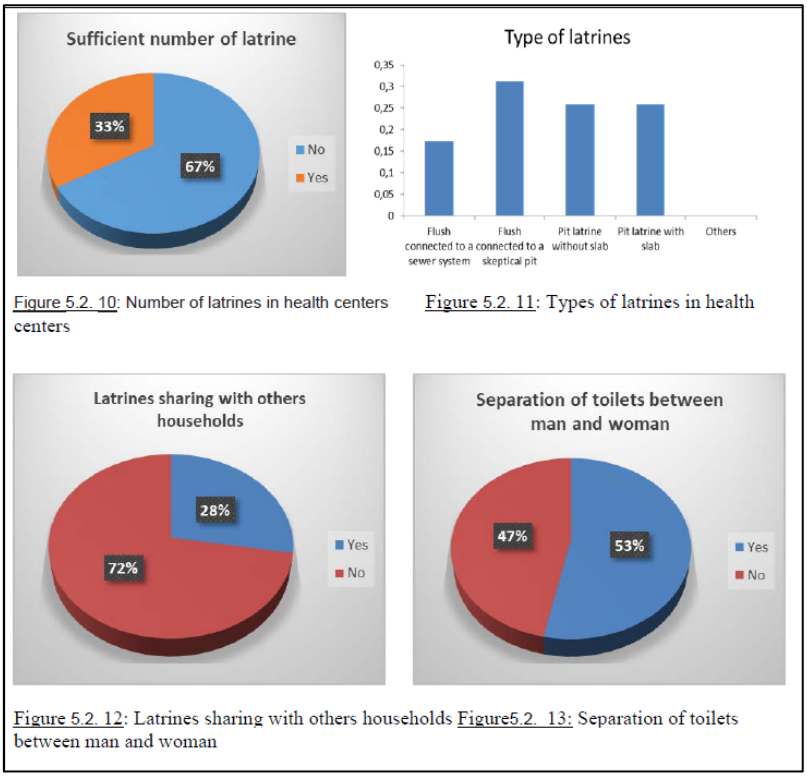

Figure 5.2. 10: Number of latrines in health centers centers

Figure 5.2. 11: Types of latrines in health

Figure 5.2. 12: Latrines sharing with others households Figure5.2. 13: Separation of toilets between man and woman

Fig. 8. Example of study results, from Benin on the situation of hygiene in healthcare facilities

2. *Establishment of a Multisectoral Advisory Task Force under existing integrated vector control*

The MS Task Force is an operational in-country organ which will be put in place in the course of this project. This task force will actively work with this project to acquire enough operational knowledge and experience in planning and implementing MS interventions for improved malaria vectors control. To optimize sustainability and cost, the MS Task Force will be anchored to existing malaria control

committees (e.g. the integrated vector management committee), and put into place by NMPs in most countries. These committees will be reinforced with at least one representative from the farmer group and one from agro-chemical sellers. The role of this MS Task Force is to work with the national malaria control programmes to boost and fast track existing MSAs, organize MSA trainings, design new MSA interventions – hence, sustaining activities of this project.

Case Study 2: Establishment of a multisectoral strategy in order to prevent transmission of *Aedes*-borne diseases, in the city of Manta, at the coastal region of ***Ecuador***.

MSA with the following sectors: Water and Sanitation, Education and Urban Planning

Summary of the mid-term report (August 2022)

Once the areas of highest risk of arbovirus transmission were defined, a survey focused on socioeconomic information, knowledge of mosquitoes and arboviruses, routine activities, and attitudes of the population. The informed consent and the survey were applied in the neighbourhoods *Cuba*, *8 de Enero*, *Bellavista* and *Miraflores*. To carry out this activity, brigades were formed by personnel from CRNV-INSPI, the Public Health Ministry, and students and teachers from Universidad Laica Eloy Alfaro de Manabí (ULEAM), Ecuador, who visited these four neighbourhoods. A total of 4,933 surveys were applied. The surveys were entered into Excel files and descriptive analyses were performed. Up to now, 3,684 surveys have been analysed. The results of this analysis will inform the final report.

Regarding the educational campaign, five products were elaborated: i) a slogan of the campaign; ii) a character who identifies with the community; iii) a mobile application to report mosquito breeding sites (Fig. 9); iv) educational messages that will be disseminated through social networks; and iv) a diptych focused on children educated in local schools. The campaign is being approved by the Secretary of Communication of Ecuador, before being used in the project.

Fig. 9. Mobile application

Case Study 3: Zika, dengue and chikungunya: multisectoral approach for developing solutions applicable to public health in Brasilia, ***Brazil***.

MSA with the following sectors: Water and sanitation, education, urban planning and environment

This case study start was delayed and the mid-term report is expected for October 2022

Case Study 4: Multisectoral approaches to malaria control in Burkina Faso: a study to analyse the different sectors whose activities have an impact on malaria transmission and the establishment of a multisectoral coordination to implement and evaluate at least one joint activity to reduce the transmission.

MSA with the following sectors: List of relevant sectors to be established by the research team

Summary of the proposal (May 2022):

The objective of the case study is to develop tools and approaches to encourage the participation of non-health sectors in the combat against malaria in Burkina Faso as per the conceptual framework developed by TDR and published in 2020. This framework recommends the listing of relevant sectors, the analysis of the needs and impacts of each sector, the establishment of a multisectoral coordination committee, and the implementation of joint activities that benefit participating sectors and populations, resulting in a reduction in malaria transmission.

The expected outcome of the case study is the list of sectors, other than health, that have an impact on malaria transmission, for instance, agriculture, energy, and infrastructure development, as well as sectors that do not have a major impact, such as education. Furthermore, an analysis of the direct benefits, both economic and non-health related, to these sectors should be conducted to encourage their active participation in malaria prevention and control.

The results obtained will be used to establish a Multisectoral Coordination Committee, which will bring together representatives from the related sectors and will be built upon existing structures. To evaluate its performance, a joint multisectoral activity can be considered, and the effects on the decrease of malaria transmission and the benefits for the sectors involved can be analysed.

A technical report will be drafted at the end of the case study, with recommended measures to further promote the implementation of multisectoral approaches.

Development of a training course on MSA within the UNDESA project

This course included several modules and was delivered in a mixed format with some modules available online before and after the training workshop and other modules delivered at the training workshop held in the last week of November 2022 in Ouagadougou, Burkina Faso. This course will be transformed into a full MOOC by 2023. The structure of MOOC Module 1 is presented below:

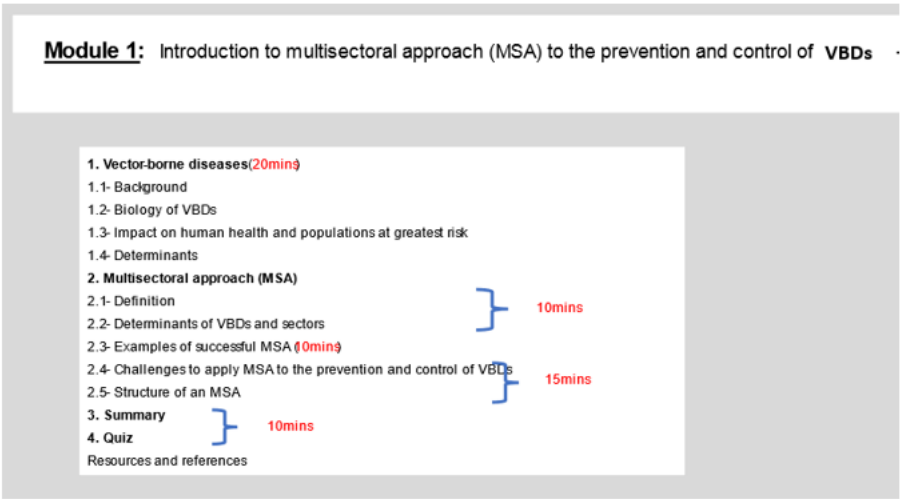

Fig. 10. MOOC Module 1 for an MSA for the prevention and control of VBDs

Remaining risks and challenges

No specific risks and challenges are remaining on this activity. The funds will be fully implemented, and the activities delivered as planned. This ER may close in 2025 when all deliverables will be completed, pending on the new TDR Strategy.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

The partnerships on this project include the SDC, IDRC, STPH, Sida, WSH, NTD, GMP, NIPD/China and the UN for Peace and Development Fund. The partnerships also include several national institutions such as malaria control programmes, research institutes, WHO country offices and other national and regional partners.

Leverage created by this project:

This ER has been and remains funded essentially through designated funds which represent about 80% of the funding received for this ER and which also have different origins for different activities and collaborations. Sida is funding the activities under the collaboration with WSH for a total budget of about US$ 700 000. The UN Peace and Development Fund is funding the activities under collaboration with GMP for a total budget of US$ 390 000. The leverage created through the case studies within the countries are also estimated to represent about the same amount of the funds released for each project, for a total amount of US$ 700 000.

Gender aspects and vulnerable populations:

1. For gender considerations, the following numbers are available in the research teams: for Case study 1, one woman, four men; for Case study 2, seven women and seven men; for Case study 3, four women, one man; for Case study 4, three women, two men; and for Case study 5, four men. The overall gender balance for all case studies in the countries indicates a 44% participation of women.
2. All case studies involved in the project are addressing specific issues for vulnerable and hard-to-reach populations.
3. All projects will have benefits to their specific populations through communication within the implementation of the project and development of new approaches and policies. This not only means better prevention and control of VBDs, but also for better understanding of barriers to health standards.

Training:

- The number of advanced degrees under way as a result of the case studies is not yet available.
- The number of people trained through short courses and training sessions was about 160 people for the virtual course held in 2021 and about the same number is expected for the MOOC.
- A lot of training materials have been and are being currently developed by WSH. More information is available at the following link: https://www.who.int/publications/i/item/9789241515009

Strengthened institutions and/or networks:

All institutions and programmes involved in the case studies will be strengthened in their capacity to develop and implement MSAs. The number of institutions is different for each case study and varies from two to five, for a total number of about 20 institutions.

Publications:

- Herdiana H, Sari JFK, Whittaker M. 2018. Intersectoral collaboration for the prevention and control of vector-borne diseases to support the implementation of a global strategy: A systematic review. PLoS One, 2018, Oct 10;13(10): e0204659. doi: 10.1371/journal.pone.0204659. eCollection
- Jones RT, Tusting LS, Smith HMP, Segbaya S, Macdonald MB, Bangs MJ, Logan JG. The impact of industrial activities on vector-borne disease transmission. Acta Trop, Dec;188:142-151. doi: 10.1016/j.actatropica.2018.08.033. Epub, 2018, Aug 27
- Naing C, Whittaker MA, Tanner M. Intersectoral approaches for the prevention and control of malaria among the mobile and migrant populations: a scoping review. Malar J. 2018 Nov 16;17(1):430. doi: 10.1186/s12936-018-2562-4

- Abdul-Ghani R, Mahdy MAK, Al-Eryani SMA, Fouque F, Lenhart AE, Alkwri A, Al-Mikhlafi AM, Wilke ABB, Thabet AAQ, Beier JC. Acta Trop. Impact of population displacement and forced movements on the transmission and outbreaks of *Aedes*-borne viral diseases: Dengue as a model. 2019 Sep;197:105066. doi: 10.1016/j.actatropica.2019.105066. Epub 2019 Jun 18

Results dissemination and uptake:

Uptake of commissioned reviews output has already started with publications and new research projects supported in 2020–2021. Uptake of research outputs is on a very good track since this ER is implemented with stakeholders and countries, as well as other WHO departments and other agencies/programmes such as UNDP, the RBM Partnership, and National Development Agencies.

Supplement articles:

- Florence Fouque, Karin Gross, Zee Leung, Konstantina Boutsika, Introduction to a Landscape Analysis of Multisectoral Approaches for Prevention and Control of Infectious and Vector-Borne Diseases, Journal of Infectious Diseases, Volume 222, Issue Supplement_8, 1 December 2020, Pages S695–S700, https://doi.org/10.1093/infdis/jiaa489
- Robert T Jones, Lucy S Tusting, Hugh M P Smith, Sylvester Segbaya, Michael B Macdonald, Michael J Bangs, James G Logan, The Role of the Private Sector in Supporting Malaria Control in Resource Development Settings, Journal of Infectious Diseases, Volume 222, Issue Supplement_8, 1 December 2020, Pages S701–S708, https://doi.org/10.1093/infdis/jiaa488
- Rashad Abdul-Ghani, Florence Fouque, Mohammed A K Mahdy, Qingxia Zhong, Samira M A Al-Eryani, Abdulsamad Alkwri, John C Beier, Multisectoral Approach to Address Chikungunya Outbreaks Driven by Human Mobility: A Systematic Review and Meta-Analysis, Journal of Infectious Diseases, Volume 222, Issue Supplement_8, 1 December 2020, Pages S709–S716, https://doi.org/10.1093/infdis/jiaa500
- Cho Naing, Maxine A Whittaker, Marcel Tanner, Multisectoral Approach to Support Use of Insecticide-Treated Net for Malaria Prevention Among Mobile and Migrant Populations in Myanmar: A Systematic Review, Journal of Infectious Diseases, Volume 222, Issue Supplement_8, 1 December 2020, Pages S717–S725, https://doi.org/10.1093/infdis/jiaa335
- Carl Abelardo T Antonio, Amiel Nazer C Bermudez, Kim L Cochon, Ma Sophia Graciela L Reyes, Chelseah Denise H Torres, Sophia Anne S P Liao, Dorothy Jean N Ortega, Abegail Visia Marie C Silang, Deinzel R Uezono, Evalyn A Roxas, Maria Sonia S Salamat, Recommendations for Intersectoral Collaboration for the Prevention and Control of Vector-Borne Diseases: Results From a Modified Delphi Process, Journal of Infectious Diseases, Volume 222, Issue Supplement_8, 1 December 2020, Pages S726–S731, https://doi.org/10.1093/infdis/jiaa404
- Qingxia Zhong, Florence Fouque, Break Down the Silos: A Conceptual Framework on Multisectoral Approaches to the Prevention and Control of Vector-Borne Diseases, Journal of Infectious Diseases, Volume 222, Issue Supplement 8, 1 December 2020, Pages S732–S737. https://doi.org/10.1093/infdis/jiaa344

Related news:

- https://tdr.who.int/activities/multisectoral-approaches-for-controlling-and-preventing-vector-borne-diseases
- http://vbd-environment.org/multisectoral-approaches

Results dissemination and uptake:

Dissemination plans for the uptake of findings from the case studies at the country level are prepared through information briefs, some of them are already available at the following link:

http://vbd-environment.org/multisectoral-approaches

Plans for 2023

- Continuation of the case studies with dissemination of the findings and uptake from the research
- Scientific publications from the case studies, potentially into a special issue
- Release and implementation of the training course as a full MOOC, available on TDR and/or Open WHO platforms

Supplementary note: Malaria in hard-to-reach populations

Jointly supported by TDR and STPH, a symposium on malaria in mobile and hard-to-reach populations was held at the 20th International Congress for Tropical Medicine and Malaria (ICTMM2020) in Bangkok, Thailand, 24–28 October 2022. The symposium provided a forum for discussions on how national malaria control programmes in different settings are facing the challenges posed by mobile and hard-to-reach populations, what innovative solutions are being tested, how these are being deployed and what remains to be addressed.

- https://tdr.who.int/newsroom/news/item/08-12-2022-symposium-on-malaria-in-mobile-and-hard-to-reach-populations-highlights-challenges-to-national-malaria-control-programmes
- https://tdr.who.int/newsroom/news/item/08-12-2022-round-table-meeting-at-cop-27-on-global-warming-and-the-next-pandemic-the-growing-pest-threat

Budget and financial implementation

Table 9. Approved Programme Budget 2022–2023 and funds utilized (provisional data)

		Undesignated funding				Designated funding			
Expected result	Research for Implementation	$40m scenario	$50m scenario	Revised planned costs Jan 2023	Implementation as at 31 Dec 2022	$40m scenario	$50m scenario	Revised planned costs Jan 2023	Implementation as at 31 Dec 2022
		UD	UD	revised UD	UD	DF	DF	revised DF	DF
	Research for policy								
1.1.1	Country preparedness for disease outbreaks	150 000	200 000	250 000	45 266	0	0	0	0
1.1.4	Country resilience to the threat of drug-resistant infections	200 000	400 000	250 000	0	3 400 000	4 500 000	2 030 000	1 447 994
1.3.3	Vector-borne diseases and increasing resilience under climate change conditions	400 000	600 000	550 000	62 100	0	0	0	0
	Research for implementation								
1.1.7	Maximized utilization of data for public health decision-making	250 000	600 000	250 000	108 618	400 000	600 000	993 000	271 147
1.1.8	Maximized utilization of safety information for public health decision-making	0	0	0	0	0	0	0	0
1.2.1	Strategies to achieve and sustain disease elimination	740 000	1 200 000	825 000	203 188	200 000	300 000	5 000	0
1.2.6	Optimized approaches for effective delivery and impact assessment of public health interventions	600 000	1 100 000	750 000	198 850	500 000	700 000	1 290 000	784 894
1.3.12	Strategies to promote gender-responsive health interventions on prevention and control of infectious diseases of poverty	300 000	500 000	444 000	166 098	100 000	100 000	0	0
	Research for innovation								
1.1.5	Directions for development and accelerated access to new tools and strategies	160 000	280 000	185 000	37 994	0	0	0	0
1.3.10	Urban health interventions for vector-borne and other infectious diseases of poverty	150 000	250 000	150 000	90 138	0	0	0	0
1.3.14	Testing of innovative strategies for vector control	100 000	300 000	205 000	64 389	600 000	800 000	612 000	0
	Research for integrated approaches								
1.3.11	Multisectoral approach for malaria and emerging arboviral diseases	200 000	300 000	400 000	268 328	200 000	300 000	649 000	343 746
	Total	**3 250 000**	**5 730 000**	**4 259 000**	**1 244 970**	**5 400 000**	**7 300 000**	**5 579 000**	**2 847 781**

Table 10. Proposed Programme Budget 2024–2025

Expected result	Research for Implementation	2024-2025					
		$40m scenario			$50m scenario		
		UD	DF	Total	UD	DF	Total
	Research for policy						
1.1.1	Country preparedness for disease outbreaks	150 000	500 000	650 000	200 000	500 000	700 000
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
1.3.3	Vector-borne diseases and increasing resilience under climate change conditions	400 000	500 000	900 000	600 000	600 000	1 200 000
	Research for implementation						
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
1.1.8	Maximized utilization of safety information for public health decision-making	0	0	0	0	0	0
1.2.1	Strategies to achieve and sustain disease elimination	540 000	100 000	640 000	1 300 000	300 000	1 600 000
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
1.3.12	Strategies to promote gender-responsive health interventions on prevention and control of infectious diseases of poverty	300 000	100 000	400 000	500 000	200 000	700 000
	Research for innovation						
1.1.5	Directions for development and accelerated access to new tools and strategies	160 000	0	160 000	300 000	0	300 000
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
1.3.14	Testing of innovative strategies for vector control	200 000	700 000	900 000	300 000	1 350 000	1 650 000
	Research for integrated approaches						
1.3.11	Multisectoral approach for malaria and emerging arboviral diseases	0	0	0	0	0	0
New ER	Access to better VBD prevention and control for vulnerable and hard to reach population	200 000	200 000	400 000	500 000	300 000	800 000
	Total	**3 400 000**	**4 400 000**	**7 800 000**	**6 000 000**	**6 750 000**	**12 750 000**

Projects and activities funded

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
(blank)	Appiah-Korang Labi	Labi, Appiah-Korang	Special Services Agreement (SSA) - Technical Assistance AMR Fellowship activities 17 January - 31 December 2022	36 612	ER 1.1.4 - Resist	Ghana
(blank)	Ebo Derban	Total House Clinic	Payment of Medical Examinations.	103	ER 1.1.4 - Resist	Ghana
(blank)	Ehin Komlan	Ada Safari Resort Limited	Accommodation and Conference package for Meeting Participants	49 326	ER 1.1.4 - Resist	Ghana
(blank)	George Hedidor	Hedidor, George Kwesi	Special Services Agreement (SSA) - Technical Assistance AMR SORT IT, 17 January - 31 December 2022	36 612	ER 1.1.4 - Resist	Ghana
(blank)	Katherine Littler	Ethics Review Committee	Submission Protocol No: ERC.0003651	1 200	ER 1.2.1 - Elimination	Switzerland
(blank)	Kofi Larbi	Buck Press Limited	Printing of SORT IT Poster	183	ER 1.1.4 - Resist	Ghana
(blank)	Margriet Den Boer	Den Boer, Margriet	- draft a high-level strategic plan for VL in the East Africa sub-region with regional and country sub-targets within the frame of NTD roadmap 2021-2030. - assist WHO in preparing a call for action by VL endemic countries	9 500	ER 1.2.1 - Elimination	United Kingdom
(blank)	Ms Rita Ohene Larbi	Larbi, Rita Ohene**Trl241246	To support the researcher, carry out field work and data collection per the study protocol, between 30 March to 15 May 2022	762	ER 1.1.4 - Resist	Ghana
(blank)	Paul Sassou	Hospitality Pundit	Payment for Accommodation and Conference Package	23 572	ER 1.1.4 - Resist	Ghana
(blank)	Philip Kennedy Yaro	Accra City Hotel Ltd (Novotel Accra)	Conference Package	1 263	ER 1.1.4 - Resist	Ghana
(blank)	Philip Kennedy Yaro	EIMPREST - AFRO	Data for Router for meeting	99	ER 1.1.4 - Resist	Ghana

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
(blank)	Philip Kennedy Yaro	EIMPREST - AFRO	Data for Router for SORT IT Module 3 Writing Workshop	77	ER 1.1.4 - Resist	Ghana
(blank)	Philip Kennedy Yaro	EIMPREST - AFRO	Fees for IRB Review	351	ER 1.1.4 - Resist	Ghana
(blank)	Philip Kennedy Yaro	EIMPREST - AFRO	Payment for Ethical Fees	1 231	ER 1.1.4 - Resist	Ghana
(blank)	Phillip Kennedy Yaro	EIMPREST - AFRO	Participants Incidental and T&T	8 242	ER 1.1.4 - Resist	Ghana
(blank)	Phillip Kennedy Yaro	EIMPREST - AFRO	Transportation	604	ER 1.1.4 - Resist	Ghana
(blank)	Phillip Kennedy Yaro	EIMPREST - AFRO	Workshop on Antimicrobial Resistance	7 761	ER 1.1.4 - Resist	Ghana
(blank)	Sulekha Shrestha	Dhulikhel Hospital	Development and Implementation of the protocol on Surgical Antibiotic Prophylaxis and develop IPC Guideline to improve IPC in Tertiary care. Dhulikhel Hospital, 16 June to 31 December 2022	7 850	ER 1.1.4 - Resist	Nepal
(blank)	Yousefl@Who.Int	Herrero, Mercedes	To support WHO in developing a bi-regional strategic plan for elimination of visceral leishmaniasis.	10 560	ER 1.2.1 - Elimination	Spain
B80149	Warwick Norman Grant	La Trobe University	B80149: Genetic Markers to Delineate Parasite Transmission Zones Part A	5 164	ER 1.2.1 - Elimination	Australia
B80153	Warwick Grant	La Trobe University	Genetic Markers to Delineate Parasite Transmission Zones Part B	422	ER 1.2.1 - Elimination	Australia
B80267	Warwick Grant	La Trobe University	Utility of Vector Population Genetics for Delineating O. volvulus transmission zones: Population Genetic Component	521	ER 1.2.1 - Elimination	Australia
B80296	Warwick Grant	La Trobe University	Population genetic simulations for tools for onchocerciasis control programmes to determine transmission zones: Part 1 Simulations for Ghana	413	ER 1.2.1 - Elimination	Australia

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
B80309	Emily Adams	Liverpool School of Tropical Medicine	Technical Support for Studies on Visceral Leishmaniasis Diagnosis in Secondary Health Structures	353	ER 1.2.1 - Elimination	United Kingdom
B80311	Faria Hossain	Icddr,B (International Centre For Diarrhoeal Disease Research)	Review of HIV seroprevalence in VL patients in Bangladesh	4 977	ER 1.2.1 - Elimination	Bangladesh
B80311	Faria Hossain	Icddr,B (International Centre For Diarrhoeal Disease Research)	Review of HIV seroprevalence in VL patients in Bangladesh	4 977	ER 1.2.1 - Elimination	Bangladesh
C00037	Emily Adams	Liverpool School of Tropical Medicine	Technical support for studies on VL diagnosis in secondary health structures	1 163	ER 1.2.1 - Elimination	United Kingdom
C00049	Megha Raj Banjara	Banjara, Megha Raj	Management of implementation research projects in the scope of research in support of visceral leishmaniasis elimination in Indian subcontinent	19 000	ER 1.2.1 - Elimination	Nepal
EPR/UCN	Managing Director, Mugerwa Charles	In-Line Print Services Limited	Printing services to support the world anti-microbial awareness week (WAAW).	5 057	ER 1.1.4 - Resist	Uganda
EPR/UGA	Christine Karamagi	EIMPREST - AFRO	SUPPORT TRAINING OF REGIONAL AND SELECTED LABORATORIES ON THE USE OF MICROBIOLOGY HMIS AND WHONET ANTIMICROBIAL RESISTANCE DATA SHARING SOFT-WARE	11 185	ER 1.1.4 - Resist	Uganda
EPR/UGA	Miriam Mutenyo	EIMPREST - AFRO	Support the world anti-microbial awareness week (WAAW) DUE FOR 18TH - 24TH NOV 2022.	37 339	ER 1.1.4 - Resist	Uganda
EPR/UGA		Hotel Africana Ltd	Conference facilities support the world anti-microbial awareness week (WAAW).	6 300	ER 1.1.4 - Resist	Uganda
EPR/UGA		Hotel Paradise on the Nile Limited	Procure conference facilities for Microbiology HMIS and AMR - Jinja: 11 -15 July 2022.	3 909	ER 1.1.4 - Resist	Uganda

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
EVD	Florence Namulinda	Vivo Energy Uganda Limited	Fuel to support the world anti-microbial awareness week (WAAW).	263	ER 1.1.4 - Resist	Uganda
HEG	Katherine Littler	Ethics Review Committee	Protocol Submission Nos: ERC.0003532 - Nepal ERC.0003531 - Nepal ERC.0003530 - Nepal ERC.0003529 - Bangladesh ERC.0003528 - Bangladesh	2 500	ER 1.2.1 - Elimination	Switzerland
HEG	Katherine Littler	Ethics Review Committee	Submission Protocol No: ERC.0003608	1 198	ER 1.2.1 - Elimination	Switzerland
HEG	Katherine Littler	Ethics Review Committee	Submission Protocol ID: TDR-IMP-UNPDF-FF-May2022	500	ER 1.3.11 - Multi Sector Approach	Switzerland
HEG	Katherine Littler	Ethics Review Committee	Submission Protocol No: ERC.0003438	1 000	ER 1.3.11 - Multi Sector Approach	Switzerland
HSE/IDSR	Gachari	EIMPREST - AFRO	Request for Authorization to Incur Expenditures to support MoHs to hold a Multi-sectoral Workshop to Compile 2021 Joint External Evaluation (JEE) self-assessment report and Develop 2022 NAPHS Operational Plan	1 520	ER 1.1.4 - Resist	Sierra Leone
HSE/IDSR	Gachari	EIMPREST - AFRO	Support MoHs to hold a Multi-sectoral Workshop to Compile 2021 Joint External Evaluation (JEE) self-assessment report and Develop 2022 NAPHS Operational Plan (Group/TWG 3&4)	7 023	ER 1.1.4 - Resist	Sierra Leone
HSE/IDSR	Wilson Gachari	EIMPREST - AFRO	Workshops to compile International Health Regulations (IHR) Annual Reports (2 days Plenary Session to Review JEE Report & NAPHS AOP)	9 426	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Ibrahim F. Kamara	EIMPREST - AFRO	Request for Funds to support for AMR Stakeholder Meeting in Freetown	1 942	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Ibrahim F. Kamara	EIMPREST - AFRO	SORT IT Dissemination Meeting	5 179	ER 1.1.4 - Resist	Sierra Leone

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
HSE/IPC	Ibrahim Kamara	EIMPREST - AFRO	National SORT IT Module Three Training	5 822	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Ibrahim Kamara	EIMPREST - AFRO	Request for Funds for refreshment, outdoor shelter and PA System to support Global Hand Hygiene Day Celebrations in Freetown	3 045	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Ibrahim Kamara	EIMPREST - AFRO	Request for Funds to support Global Hand Hygiene Day Celebrations in Freetown	848	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Ibrahim Kamara	EIMPREST - AFRO	Support for the national SORT IT Module 4 Training	2 509	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Slimpr03_Bnk	EIMPREST - AFRO	Purchase Order for payment for Operations SSA staff Unused Leave days.	1 642	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Slimpr03_Bnk	EIMPREST - AFRO	Purchase Order for payment of Backlog Salary	1 330	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Ibrahimfkamara@Gmail.Com	Kamara, Ibrahim Franklyn	Purchase Order for SSA Contract Extension IRO KAMARA Dr. Ibrahim Franklin - AMR Operational Research Fellow NOC Step 1	15 323	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC	Ibrahimfkamara@Gmail.Com	Kamara, Ibrahim Franklyn	Purchase Order for SSA Contract Extension IRO KAMARA Dr. Ibrahim Franklin - AMR Operational Research Fellow NOC Step 1	12 816	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC/ AMR	Ibrahim Franklyn Kamara	EIMPREST - AFRO	Antimicrobial Resistance Stakeholders Meeting in Commemoration of World Antimicrobial Awareness Week 2022-	905	ER 1.1.4 - Resist	Sierra Leone
HSE/IPC/ AMR	Ibrahim Franklyn Kamara	EIMPREST - AFRO	World Antimicrobial Awareness Week 2022 - AMR Scientific Meeting	1 488	ER 1.1.4 - Resist	Sierra Leone
IDSR	Iye.Kowa@Atlantichotel-Sl.Com	Atlantic Lumley Hotel	Purchase Order for the provision of venue and refreshment for Workshops to Develop 2021 Joint External Evaluation (JEE) Report and NAPHS 2022 Annual Operational Plan in Freetown	17 618	ER 1.1.4 - Resist	Sierra Leone

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
IPC	Kargbo107@Gmail.Com	Alimteh Investment Sl Ltd	PO for the for the printing of materials for WAAW week.	1 010	ER 1.1.4 - Resist	Sierra Leone
IPC	Iye.Kowa@Atlantichotel	Atlantic Lumley Hotel	Purchase Order for the provision of venue and refreshment for Africa Regional SORT IT Dissemination Meeting in Freetown.	2 654	ER 1.1.4 - Resist	Sierra Leone
IPC	Iye.Kowa@Atlantichotel-Sl.Com	Atlantic Lumley Hotel	PO for provision of venue and refreshment for AMR Scientific Meeting in Freetown.	1 731	ER 1.1.4 - Resist	Sierra Leone
IPC	Iye.Kowa@Atlantichotel-Sl.Com	Atlantic Lumley Hotel	PO for the provision of venue and refreshment for AMR Stakeholders Meeting in Freetown.	1 952	ER 1.1.4 - Resist	Sierra Leone
IPC	Iye.Kowa@Atlantichotel-Sl.Com	Atlantic Lumley Hotel	PO for the provision of accommodation, venue and refreshment for SL National SORT IT Module 4 training.	22 909	ER 1.1.4 - Resist	Sierra Leone
IPC	Christianaheddwilliams @Gmail.Com	Derick Dixon T/A Deuce Investment	Purchase Order for printing of materials for Hand Hygiene Day Celebration.	5 741	ER 1.1.4 - Resist	Sierra Leone
IPC	Bobson Fofana	EIMPREST - AFRO	National SORT IT Dissemination Meeting	14 259	ER 1.1.4 - Resist	Sierra Leone
IPC	Jaybeekays@Yahoo.Com	Jay Bee Kay Sierra Leone Limited	Purchase Order for the provision of vehicle hiring services to support Technical Unit field trips.	3 114	ER 1.1.4 - Resist	Sierra Leone
IPC	Christiana Kamara	John B. Screen	PO for the for the printing of materials for WAAW week.	4 924	ER 1.1.4 - Resist	Sierra Leone
IPC	S.Kultumi Minah	Lintel Sierra Leone Limited (Africell)	Purchase Order for modem subscriptions for IPC and AMR activities	225	ER 1.1.4 - Resist	Sierra Leone
IPC	S.Kultumi Minah	Lintel Sierra Leone Limited (Africell)	Purchase Order for the provision of internet services (modem) and monthly subscription.	3 869	ER 1.1.4 - Resist	Sierra Leone
IPC	Mohamed Alie Bangura	Moliba Car Rental Services	PO for vehicle hiring services to WCO/SLE to support IPC field trips.	1 926	ER 1.1.4 - Resist	Sierra Leone
IPC	Mohamed Alie Bangura	Moliba Car Rental Services	Purchase Order for vehicle hiring services to WCO/SLE to support IPC field trips.	2 024	ER 1.1.4 - Resist	Sierra Leone

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
IPC	Npsl@Npgroupltd.Com	National Petroleum Company S.L. Ltd	Purchase Order for fuel supply to WCO/SLE to support IPC field trips activities. This is read together with LTA Ref. SIL-18-17	2 234	ER 1.1.4 - Resist	Sierra Leone
IPC	S.Rufina Adjivon-Tucker	Orange Sierra Leone Ltd	PO for the provision of internet dongles with subscription..	415	ER 1.1.4 - Resist	Sierra Leone
IPC	S.Rufina Adjivon-Tucker	Orange Sierra Leone Ltd	Purchase Order for the provision of internet dongles with subscription.	1 045	ER 1.1.4 - Resist	Sierra Leone
IPC	S.Rufina Adjivon-Tucker	Orange Sierra Leone Ltd	Purchase Order for the provision of internet dongles with subscription..	426	ER 1.1.4 - Resist	Sierra Leone
IPC Unit	David Church	Golden Tulip Essential Kimbima	Purchase Order for provision of accommodation, venue and refreshment for Sierra Leone National SORT IT Module three training in Freetown.	28 533	ER 1.1.4 - Resist	Sierra Leone
IPC/AMR	Mohamed Alie Bangura	Moliba Car Rental Services	Purchase Order for vehicle hiring services to WCO/SLE to support IPC/AMR field trips.	708	ER 1.1.4 - Resist	Sierra Leone
IPC/AMR	Npsl@Npgroupltd.Com	National Petroleum Company S.L. Ltd	Purchase Order for fuel supply to WCO/SLE to support IPC/AMR field trips activities. This is read together with LTA Ref. SIL-18-17	3 620	ER 1.1.4 - Resist	Sierra Leone
IPC/AMR	Shareif Hashim	Sierra Palms Resort	Purchase Order for the provision of conference hall and refreshment for National SORT IT Dissemination Meeting	4 779	ER 1.1.4 - Resist	Sierra Leone
NEP WHE	Bishesh Man Mali	Maxmedia Privae Limited	Celebration of World Antimicrobials Awareness week 2022; 07 Nov to 31 Dec 2022	5 397	ER 1.1.4 - Resist	Nepal
NEP WHE Unit	Norbu Wangchuk	EIMPREST - SEARO	COVID-19: Emergency Dr Priyanka Shrestha , Programme Support Officer , SALARY, DSA, and TRAVEL, Leave encashment and other Misc. Cost, 01 April 2022 to 30 April 2022	2 153	ER 1.1.4 - Resist	Nepal

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NEP WHE Unit	Norbu Wangchuk	EIMPREST - SEARO	EMERGENCY COVID 19: Field Medical Officer SORT IT SSA, Salary, Leave encashment, Communication and other Cost, 01 Jan 2023 to 30June 2023	12 729	ER 1.1.4 - Resist	Nepal
NEP WHE Unit	Norbu Wangchuk	EIMPREST - SEARO	EMERGENCY COVID-19: AMR and SORT IT Fellow for WHO Health Emergency Programme, SALARY, DSA and TRAVEL, Leave encashment and other Misc. Cost, 01 January 2022 to 31 December 2022	41 547	ER 1.1.4 - Resist	Nepal
NEP WHE Unit	Norbu Wangchuk	EIMPREST - SEARO	EMERGENCY COVID-19: Field Medical Officer and Admin Programme Assistant, SALARY, DSA and TRAVEL, Leave encashment and other Misc. Cost, 01 May 2022 to 31 December 2022	16 841	ER 1.1.4 - Resist	Nepal
P20-00103	Marie Eve Raguenaud	Raguenaud,Marie-Eve **Trl18693	Support to projects and activities of the Research for Implementation Unit (IMP).	31 500	ER 1.2.6 - PH Interv	France
P20-00105	Tashi Tobgay	Institute of Health Partners	Research Call in Bhutan on: “Generating evidence to strengthen intersectionality and gender research efforts in infectious disease prevention and control”.	39 866	ER 1.3.12 - Gender Responsive	Bhutan
P20-00106	Salome Bukachi	University of Nairobi	Research Call with Kenya consortium on: “Generating evidence to strengthen intersectionality and gender research efforts in infectious disease prevention and control”.	103 811	ER 1.3.12 - Gender Responsive	Kenya
P20-00140	Debashis Ghosh	Icddr,B (International Centre For Diarrhoeal Disease Research)	Epidemiological, Serological and Entomological Investigation of New Visceral Leishmaniasis (VL) Foci in Bangladesh	2 500	ER 1.2.1 - Elimination	Bangladesh

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P21-00344	Sunita Bandewar	Forum For Medical Ethics Society	Part 1 Non-ERC: ERC Part 2 - A collaborative research initiative cataloguing key community engagement practices embedded in Implementation Research Public Health Projects Involving Disadvantaged (rural/indigenous) Communities in India".	14 999	ER 1.2.1 - Elimination	India
P21-00414	Selma Dar Berger	The Union	CONTRACT NOT TO BE SENT TO SUPPLIER AMENDED APW: Public Health Emergency-Independent review of ethics considerations for analysis of routine programme data from SORT IT training courses	3 550	ER 1.1.7 - Data use	France
P21-00415	Hayk Davtyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	Providing technical support for the virtual implementation of modules 1 to 3 of the SORT IT on public health emergency in South East Asia Region – Modules to be conducted using the virtual SORT IT platform	2 500	ER 1.1.7 - Data use	Armenia
P21-00416	Hayk Davtyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on public health emergencies in the South East Asia Region	2 475	ER 1.1.7 - Data use	Armenia
P21-00418	Selma Dar Berger	The Union	CONTRACT NOT TO BE SENT TO SUPPLIER. Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on public health emergencies in the South East Asia Region	17 750	ER 1.1.7 - Data use	France
P21-00454	Marcos Takashi Obara	University of Brasilia - Unb	Zika, Dengue and Chikungunya: multisectoral approach for developing solutions applicable in public health.	10 034	ER 1.3.11 - Multi Sector Approach	Brazil

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P21-00465	Mahamadou Bassirou Souleymane	Souleymane, Mahamadou Bassirou	CONTRACT NOT TO BE SENT TO SUPPLIER. PR FOR RE ENCUMBRANCE ONLY. Technical assistance to support National TB Programs of West and Central African countries in implementing aDSM	3 487	ER 1.2.6 - PH Interv	Niger
P21-00481	Shannon Hedtke	La Trobe University	Population genetic tools for onchocerciasis control programmes to determine transmission zones: Utility of vector nuclear vs mitochondrial DNA and testing of different methods for single microfilariae analysis.	10 800	ER 1.2.1 - Elimination	Australia
P21-00491	Tshokey Tshokey	Tshokey **Trl233093	CONTRACT NOT TO BE SENT TO SUPPLIER. Providing technical support for field data collection for the implementation of the operational research study.	891	ER 1.1.7 - Data use	Bhutan
P21-00501	Hayk Davtyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	CONTRACT NOT TO BE SENT TO SUPPLIER. Providing continued technical and IT support for maintenance of the virtual SORT IT platform (e-SORT IT)	3 000	ER 1.1.7 - Data use	Armenia
P21-00508	Diego Omar Morales Viteri	Instituto Nacional De Investigacion En Salud Publica - Insp	Establishment of a multisectoral strategy integrating Health, Environment, Education, Sanitation and Water sectors to control and reduce mosquito populations in order to prevent transmission of Aedes-borne diseases, in the city of Manta.	72 663	ER 1.3.11 - Multi Sector Approach	Ecuador
P21-00511	S.Katherine Tayler-Smith	Tayler-Smith, Katherine Jayne	Literature search, categorization and archiving of scientific publications for supporting module 3 (manuscript writing) of Sierra Leone national and Colombia/Ecuador SORT IT programs to tackle antimicro	8 640	ER 1.1.4 - Resist	South Africa

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P21-00517	Edith Gavor	Ministry of Health, Ghana	CONTRACT NOT TO BE SENT TO SUPPLIER. Support to the Ministry of Health to analyse and disseminate results from evaluation of adherence to treatment guidel	1 694	ER 1.2.6 - PH Interv	Ghana
P21-00546	Aminata Nacoulma	Agence Nationale de Regulation Pharmaceutique (Anrp)	CONTRACT NOT TO BE SENT TO SUPPLIER. Workshops to develop a plan of action to strengthen the pharmacovigilance system of Burkina Faso	1 477	ER 1.2.6 - PH Interv	Burkina Faso
P21-00551	Hemant Deepak Shewade	Indian Council of Medical Research	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries (2022)	38 750	ER 1.1.4 - Resist	India
P22-00558	Hayk Davtyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	Providing technical support for the virtual implementation of module 3 and module 4 of the Sierra Leone national AMR SORT IT.	5 600	ER 1.1.4 - Resist	Armenia
P22-00559	Timothy France	Inis Communication Ltd	Payment of Invoice No. 2021/099 for "TDR Map"	243	ER 1.1.4 - Resist	United Kingdom
P22-00560	Anthony Harries	Harries, Anthony	Providing senior (second-line) operational research and subject matter expertise support for the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries.	21 750	ER 1.1.4 - Resist	United Kingdom
P22-00569	Liza Doyle	Kirby Institute, The University of New South Wales	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on public health emergencies in the South East Asia Region	3 000	ER 1.1.7 - Data use	Australia

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P22-00570	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.	23 400	ER 1.1.4 - Resist	France
P22-00571	Anderson Ndalama	Pharmacy And Medicines Regulatory Authority	Support for development of promotional materials linked to the implementation of a USSD platform for ADR reporting in Malawi	18 695	ER 1.2.6 - PH Interv	Malawi
P22-00572	Jamie Guth	Jamie Ann Guth	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle Income Countries. (Sierra Leone Module 3)	3 500	ER 1.1.4 - Resist	Switzerland
P22-00575	Selma Dar Berger	The Union	Technical support for the implementation of a real time operational research project for assessing and managing disability, co-morbidities and risk factors associated with tuberculosis in China	30 000	ER 1.1.7 - Data use	France
P22-00577	Gildas Yahouedo	Yahouedo, Gildas	Design and layout of the country analysis report on surveillance and control of arboviral disease in Africa	4 000	ER 1.1.1 - Epidemics	France
P22-00578	Amadou Seck	Gie West And Centre African Bioinformatics (Gie Wca Bioinf)	Implementing and supporting the data collection system of the ShORRT research package.	6 125	ER 1.2.6 - PH Interv	Senegal
P22-00578	Amadou Seck	Gie West And Centre African Bioinformatics (Gie Wca Bioinf)	Implementing and supporting the data collection system of the ShORRT research package.	18 375	ER 1.2.6 - PH Interv	Senegal

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P22-00581	Thang NGO DUC	National Institute Of Malariology, Parasitology And Entomology (Nimpe)	Improving Access to Vector Control Products among Communities at Risk of Malaria in Cambodia & Vietnam.	200 000	ER 1.3.11 - Multi Sector Approach	Viet Nam
P22-00586	Marina Bondareva	Public Library of Science	Prevalence, acceptability, and cost of routine screening for pulmonary tuberculosis among pregnant women in Cotonou, Benin. (INVOICE NUMBER PAB333229).	1 749	ER 1.2.6 - PH Interv	United States
P22-00589	Jean Louis Ndiaye	Ufr Santé / University De Thies	Translation in English, French & Portuguese at the regional meeting on the introduction of RTS,s malaria vaccine (24 February 2022)	2 600	ER 1.2.6 - PH Interv	Senegal
P22-00590	Ms Marie-Cècile Inarukundo	Inarukundo, Ms Marie-Cècile	Technical assistance to support regional workshop to strengthen knowledge of countries on RTS,s malaria vaccine implementation	5 000	ER 1.2.6 - PH Interv	Switzerland
P22-00593	Holley Russel	Artifex Creative Webnet Ltd - ACW	GES (Invoice No. 1819/11276) payment for "WHO material - AMR report"	7 870	ER 1.1.4 - Resist	United Kingdom
P22-00594	Authorbilling@Plos.Org	Public Library of Science	GES payment (Invoice #PAB333558) for manuscript titled "Etiology of severe invasive infections in young infants in rural settings in sub-Saharan Africa" Article Number PONE-D-21-30404	1 749	ER 1.1.5 - Innovation	United States
P22-00595	Gildas Yahouedo	Yahouedo, Gildas	Management of collaborative activities on multi-sectoral approaches (MSA) for the prevention and control of malaria within the activities.	9 000	ER 1.3.11 - Multi Sector Approach	France
P22-00602	Louis, Valerie Renee	Louis, Valerie Renee	French translation of the CAD calibration toolkit.	5 000	ER 1.2.6 - PH Interv	Germany

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P22-00605	Thomas Scalway	Lushomo	Multi-sectoral approach on prevention and control of vector-borne and Innovative technology for Vector Control as well as a new project on malaria among hard to reach populations.	15 600	ER 1.3.11 - Multi Sector Approach	South Africa
P22-00605	Thomas Scalway	Lushomo	Multi-sectoral approach on prevention and control of vector-borne and Innovative technology for Vector Control as well as a new project on malaria among hard to reach populations.	14 020	ER 1.3.11 - Multi Sector Approach	South Africa
P22-00605	Thomas Scalway	Lushomo	Multi-sectoral approach on prevention and control of vector-borne and Innovative technology for Vector Control as well as a new project on malaria among hard to reach populations.	11 800	ER 1.3.14 - Innovative Strategies	South Africa
P22-00606	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1613447 article titled "Hand hygiene compliance at two tertiary hospitals in Freetown, Sierra Leone, in 2021: a cross-sectional study"	2 682	ER 1.1.4 - Resist	Switzerland
P22-00607	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice 1615581 for the article titled "Inconsistent country-wide reporting of adverse drug reactions to antimicrobials in Sierra Leone (2017-2021): a wake-up call to improve reporting!"	2 694	ER 1.1.4 - Resist	Switzerland
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, developed through a TDR activity.	31 333	ER 1.3.14 - Innovative Strategies	United Kingdom

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P22-00614	Annechien Helsdingen	Ecole Polytechnique Federale De Lausanne	Production and diffusion of 1 additional course module for the TDR IR MOOC Module on gender.	22 421	ER 1.3.12 - Gender Responsive	Switzerland
P22-00619	Gildas Yahouedo	Yahouedo, Gildas	Management of collaborative activities on multi-sectoral approaches (MSA) for the prevention and control of malaria within the activities.	67 500	ER 1.3.11 - Multi Sector Approach	France
P22-00622	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1618268 article titled "How well are hand hygiene practices and promotion implemented in Sierra Leone? A cross-sectional study in 13 public hospitals"	2 706	ER 1.1.4 - Resist	Switzerland
P22-00623	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1626973 article titled "Pesticide importation in Sierra Leone, 2010-2021: implications for food production and antimicrobial resistance"	2 706	ER 1.1.4 - Resist	Switzerland
P22-00624	Louise Ackers	Ackers, Professor Helen Louise	Providing senior knowledge management expertise for implementing the SORT IT on antimicrobial resistance in Low- and Middle Income Countries – AMR SORT IT Module 4, Sierra Leone (3-11 May 2022)	3 500	ER 1.1.4 - Resist	United Kingdom
P22-00625	Balazy Babarczy	Babarczy,Balazs **Trl159531	Providing senior knowledge management expertise for implementing the SORT IT on antimicrobial resistance in Low- and Middle Income Countries – AMR SORT IT Module 4, Sierra Leone (3-11 May 2022)	3 500	ER 1.1.4 - Resist	Hungary

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P22-00626	Javier Burgos	Burgos, Javier	Providing senior knowledge management expertise for implementing the SORT IT on antimicrobial resistance in Low- and Middle Income Countries – AMR SORT IT Module 4, Sierra Leone (3-11 May 2022)	3 500	ER 1.1.4 - Resist	Spain
P22-00627	Ama Pokuaa Fenny	Fenny, Miss Ama Pokuaa	Providing senior knowledge management expertise for implementing the SORT IT on antimicrobial resistance in Low- and Middle Income Countries – AMR SORT IT Module 4, Sierra Leone (3-11 May 2022)	3 500	ER 1.1.4 - Resist	Ghana
P22-00628	Jamie Guth	Jamie Ann Guth	Providing senior knowledge management expertise for implementing the SORT IT on antimicrobial resistance in Low- and Middle Income Countries – AMR SORT IT Module 4, Sierra Leone (3-11 May 2022)	3 500	ER 1.1.4 - Resist	Switzerland
P22-00629	Rhona Mijumbi	Mijumbi, Rhona	Providing senior knowledge management expertise for implementing the SORT IT on antimicrobial resistance in Low- and Middle Income Countries – AMR SORT IT Module 4, Sierra Leone (3-11 May 2022)	3 500	ER 1.1.4 - Resist	Uganda
P22-00630	Wilber Sabiti	Sabiti,Wilber **Trl226263	Providing senior knowledge management expertise for implementing the SORT IT on antimicrobial resistance in Low- and Middle Income Countries – AMR SORT IT Module 4, Sierra Leone (3-11 May 2022)	3 500	ER 1.1.4 - Resist	United Kingdom
P22-00632	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1613933 article titled "Antibiotic use in suspected and confirmed COVID-19 patients admitted to health facilities in Sierra Leone in 2020-21: Practice does not follow policy"	2 706	ER 1.1.4 - Resist	Switzerland

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P22-00633	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1630781 article titled "Bacterial isolates and antibiotic resistance of Escherichia coli isolated from fresh poultry excreta used for vegetable farming in Freetown, Sierra Leone"	2 685	ER 1.1.4 - Resist	Switzerland
P22-00636	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1618751 article titled "Achieving minimum standards for Infection Prevention and Control in Sierra Leone: urgent need for a quantum leap in progress in the COVID-19 era!"	2 685	ER 1.1.4 - Resist	Switzerland
P22-00637	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1624945 article titled "Infection prevention and control in three tertiary healthcare facilities in Freetown, Sierra Leone during the COVID-19 Pandemic: More needs to be done!"	2 685	ER 1.1.4 - Resist	Switzerland
P22-00638	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1632917 article titled "An update on the surveillance of livestock diseases and antimicrobial use in Sierra Leone in 2021—An operational research study"	2 685	ER 1.1.4 - Resist	Switzerland
P22-00639	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1625666 article titled "Incidence of Surgical Site Infection and Use of Antibiotics Among Patients who Underwent Caesarean section and Herniorrhaphy at a Regional Referral Hospital, Sierra Leone"	2 685	ER 1.1.4 - Resist	Switzerland

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P22-00640	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1603376 article titled "Culture requests and multi-drug resistance among suspected urinary tract infections in two tertiary hospitals, Freetown, Sierra Leone (2017- 21). A cross-sectional study"	2 685	ER 1.1.4 - Resist	Switzerland
P22-00641	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1634874 article titled "Evaluation of drinking water quality and bacterial antibiotic sensitivity in wells and standpipes at household water points in Freetown, Sierra Leone"	2 312	ER 1.1.4 - Resist	Switzerland
P22-00642	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1635641 article titled "Assessment of Infection Prevention and Control Measures at Points of Entry in Sierra Leone in 2021: a cross-sectional study"	2 569	ER 1.1.4 - Resist	Switzerland
P22-00643	Selma Dar Berger	The Union	Qualitative exploration of self-reported feedback on policy and/or practice changes associated with completed operational research studies in Asia and Africa (2019-2022)	7 000	ER 1.1.7 - Data use	France
P22-00646	Ronald Kiguba	Copyright Clearance Center, Inc	BMJ Publishing	1 863	ER 1.2.6 - PH Interv	United States
P22-00648	Youssoupha Ndiaye	Direction De La Planification De La Recherche Et Des Statistiques (Dprs)	Project Title: Support for the development of contingency plan for minimising the impact of health emergency on Malaria, TB and NTD control in Senegal.	9 986	ER 1.2.6 - PH Interv	Senegal
P22-00649	Muhammad Amir Khan	Association For Social Development Gfatm - Acsm	Operationalizing “Prevent-TB” assisted “CXR-symptom” screening and TB Preventive Treatment (TPT) of the household contacts of known TB patients at public BMUs.	24 700	ER 1.2.6 - PH Interv	Pakistan

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00650	Lyudmila Vitalievna Yurastova	Yurastova Lyudmila Vitalievna	Russian translation support for Implementation Research for Digital Technologies in TB (IR4DTB) toolkit work package.	833	ER 1.2.6 - PH Interv	Russian Federation
P22-00652	S.Katherine Tayler-Smith	Tayler-Smith, Katherine Jayne	Literature search, categorization and archiving of scientific publications for supporting module 3 (manuscript writing) of Ghana national SORT IT programs to tackle antimicrobial resistance (AMR)	4 400	ER 1.1.4 - Resist	South Africa
P22-00654	Tatiana Polunina	Polunina, Ms Tatiana Andreevna	Russian translation support for Implementation Research for Digital Technologies in TB (IR4DTB) toolkit work package.	4 158	ER 1.2.6 - PH Interv	Russian Federation
P22-00655	Dieynaba Ndiaye	N'diaye, Dieynaba Sophie	Support for integrating cost aspects in implementation/operational research projects.	22 500	ER 1.2.6 - PH Interv	France
P22-00656	Jean Louis Ndiaye	Ufr Santé / University De Thies	Translation services for the regional workshop on South-South sharing of experiences on innovative approaches for strengthening safety monitoring, 1 & 8 June 2022	2 600	ER 1.2.6 - PH Interv	Senegal
P22-00658	Dissou Affolabi	Programme National Contre La Tuberculose	Coordination of activities to improve TB surveillance capacity among National TB Programme members of the West and Central Africa Network for TB Control and WARN-TB/CARN-TB activities.	23 322	ER 1.2.6 - PH Interv	Benin
P22-00658	Dissou Affolabi	Programme National Contre La Tuberculose	Coordination of activities to improve TB surveillance capacity among National TB Programme members of the West and Central Africa Network for TB Control and WARN-TB/CARN-TB activities.	1 228	ER 1.2.6 - PH Interv	Benin

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P22-00660	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1739169 article titled "Performance of an emergency road ambulance service in Bhutan: response time, utilization and outcomes"	1 618	ER 1.1.7 - Data use	Switzerland
P22-00662	Prof Rachida Soulaymani	Rabat Who Collaborating Centre For Strenghtening	Burkina Faso: Strengthening safety monitoring system of country through on-line training in Pharmacovigilance	24 194	ER 1.2.6 - PH Interv	Morocco
P22-00663	Thomas Scalway	Lushomo	Design and layout for the French version of the country analysis report on surveillance and control of arboviral disease in Africa.	3 666	ER 1.1.1 - Epidemics	South Africa
P22-00665	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1718142 article titled "Operational gaps in implementing the COVID-19 case investigation and contact tracing in Madhesh Province of Nepal, May-July 2021"	1 506	ER 1.1.7 - Data use	Switzerland
P22-00666	Araksya Hovhannesyan	Hovhannesyan, Araksya	Study mentorship support during the virtual workshop on Implementation Research for Digital Technologies in TB (IR4DTB).	2 000	ER 1.2.6 - PH Interv	Armenia
P22-00667	Kostyantyn DUMCHEV	Dumchev,Kostyantyn**S 200874	Title: Study mentorship support during the virtual workshop on Implementation Research for Digital Technologies in TB (IR4DTB).	4 000	ER 1.2.6 - PH Interv	Ukraine
P22-00667	Kostyantyn DUMCHEV	Dumchev,Kostyantyn**S 200874	Title: Study mentorship support during the virtual workshop on Implementation Research for Digital Technologies in TB (IR4DTB).	4 000	ER 1.2.6 - PH Interv	Ukraine
P22-00668	Ana CIOBANU	Ciobanu,Ana **Trl43295	Study mentorship support during the virtual workshop on Implementation Research for Digital Technologies in TB (IR4DTB).	2 000	ER 1.2.6 - PH Interv	Moldova

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00670	Tatiana Polunina	Polunina, Ms Tatiana Andreevna	Mentor - Russian translation support for Implementation Research for Digital Technologies in TB (IR4DTB) toolkit work package.	2 543	ER 1.2.6 - PH Interv	Russian Federation
P22-00671	Lyudmila Vitalievna Yurastova	Yurastova Lyudmila Vitalievna	Mentor - Russian translation support for Implementation Research for Digital Technologies in TB (IR4DTB) toolkit work package.	2 543	ER 1.2.6 - PH Interv	Russian Federation
P22-00672	Georgy Pignastyy	Pignastyy, Georgy	Russian translation support for Implementation Research for Digital Technologies in TB (IR4DTB) toolkit work package.	170	ER 1.2.6 - PH Interv	Russian Federation
P22-00673	Aminata Nacoulma	Agence Nationale de Regulation Pharmaceutique (Anrp)	Support to evaluate the acceptability and usefulness of a mobile application to report adverse drug reactions in Burkina Faso	17 006	ER 1.2.6 - PH Interv	Burkina Faso
P22-00674	Administrator And Grants Managesther Ssebyala	Global Health Uganda Limited	Support for maintenance of USSD tool for adverse drug reaction in Uganda	6 500	ER 1.2.6 - PH Interv	Uganda
P22-00676	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1737686 article titled "Compliance with medication amongst persons with diabetes mellitus during the COVID-19 pandemic, Kerala, India: a cross sectional study"	1 674	ER 1.1.7 - Data use	Switzerland
P22-00677	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1718185 article titled "COVID-19 amongst travelers at Points of Entry in Nepal: screening, testing, diagnosis and isolation practices"	1 674	ER 1.1.7 - Data use	Switzerland
P22-00678	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1737671 article titled "Epidemiology and Response to the COVID-19 Pandemic in Kerala, India, 2020–2021: A Cross-Sectional Study"	1 674	ER 1.1.7 - Data use	Switzerland

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00681	Jacklyne Ashubwe	Ashubwe,Jacklyne Doris Ambunya**Trl226290	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on AMR in Low- and Middle Income Countries – AMR SORT IT Module 3, Ghana (6-13 July 2022)	3 500	ER 1.1.4 - Resist	Kenya
P22-00682	Ama Pokuaa Fenny	Fenny, Miss Ama Pokuaa	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on AMR in Low- and Middle Income Countries – AMR SORT IT Module 3, Ghana (6-13 July 2022)	3 500	ER 1.1.4 - Resist	Ghana
P22-00683	Nasreen Jessani	Jessani,Nasreen Saleem**Trl36617	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on AMR in Low- and Middle Income Countries – AMR SORT IT Module 3, Ghana (6-13 July 2022)	3 500	ER 1.1.4 - Resist	United Arab Emirates
P22-00684	Hayk Davtyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	Providing technical support for the virtual implementation of three workshops on tackling antimicrobial resistance in Ghana and Colombia	10 800	ER 1.1.4 - Resist	Armenia
P22-00686	Prof Alexandre Delamou	Ste Africa Healt Consulting Sarlu	Translation of SORT IT course materials to French	15 923	ER 1.1.7 - Data use	Guinea
P22-00687	Mahamadou Bassirou Souleymane	Souleymane, Mahamadou Bassirou	Technical update of the aDSM resource documents in French and English	10 400	ER 1.2.6 - PH Interv	Niger
P22-00688	Paul Erasto Kazyoba	National Institute For Medical Research	Support for the development of tools for delivery of pediatric Praziquantel formulation in Tanzania	15 370	ER 1.2.6 - PH Interv	Tanzania, United Republic of

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00689	Paul Erasto Kazyoba	National Institute For Medical Research	Support for the implementation of an integrated delivery model of pediatric Praziquantel formulation in Tanzania	1 065	ER 1.2.6 - PH Interv	Tanzania, United Republic of
P22-00689	Paul Erasto Kazyoba	National Institute For Medical Research	Support for the implementation of an integrated delivery model of pediatric Praziquantel formulation in Tanzania	20 240	ER 1.2.6 - PH Interv	Tanzania, United Republic of
P22-00690	Billing Department	Dartmouth Journal Services	Payment for Publication fee with invoice no. TROP59280	2 500	ER 1.2.1 - Elimination	United States
P22-00701	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1742460 article titled "Trends in Influenza infections in three states of India from 2015-2021: Has there been a change during COVID-19 pandemic?"	1 610	ER 1.1.7 - Data use	Switzerland
P22-00703	Ms Ratchanekorn Wutirat	Inis Communication Ltd	IR4DTB: renewal domain name, hosting and SSL certificate.	609	ER 1.2.6 - PH Interv	United Kingdom
P22-00704	Hayk Davtyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	Payment of invoice N01/22 for OR network hosting	599	ER 1.1.7 - Data use	Armenia
P22-00706	Sanghamitra Pati	Indian Council of Medical Research	Organize workshop and dissemination activities.	25 000	ER 1.3.10 - Urban Health	India
P22-00707	Sohana Shafique	Icddr,B (International Centre For Diarrhoeal Disease Research)	Workshop and dissemination activities.	25 000	ER 1.3.10 - Urban Health	Bangladesh
P22-00709	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1794594 article titled "Resistance pattern of E. coli isolates among apparently healthy adults and local drivers of antimicrobial resistance: A mixed-methods study in a suburban area of Nepal"	1 670	ER 1.1.7 - Data use	Switzerland

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00710	Thomas Scalway	Lushomo	Development of an animated video to introduce the Multi-Sectoral Approaches (MSA) on prevention and control of vector-borne diseases.	7 480	ER 1.3.11 - Multi Sector Approach	South Africa
P22-00711	Thomas Scalway	Lushomo	Support to the development of the Multi-Sectoral Approach (MSA) Training materials on malaria control.	24 400	ER 1.3.11 - Multi Sector Approach	South Africa
P22-00712	Moubassira Kagone	Centre de Recherche en Sante de Nouna	Approches multisectorielles pour lutter contre le paludisme au Burkina Faso : étude des différents secteurs dont l'activité a un impact sur la transmission du paludisme et mise en place d'une coordination...	60 500	ER 1.3.11 - Multi Sector Approach	Burkina Faso
P22-00718	Chandani Kharel	Kharel,Chandani **Trl200523	Facilitate and support the implementation of the gender and infectious disease portfolio.	48 000	ER 1.3.10 - Urban Health	Nepal
P22-00725	Maria Guzman	Pedro Kouri Tropical Medicine Institute (Ipk)	Support to Capacity Building in Medical Entomology through the attendance to the First Edition of the Curso Internacional de Control Integrado de Vectores at Instituto Pedro Kouri, Cuba.	2 000	ER 1.3.14 - Innovative Strategies	Cuba
P22-00727	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1854005 article titled "High levels of outpatient antibiotic prescription at a district hospital in Ghana (2021): Results of a cross sectional study"	2 665	ER 1.1.4 - Resist	Switzerland
P22-00729	Branwen Hennig	Branwen Hennig	Implementation research on diseases of poverty in LMIC	67 217	ER 1.2.6 - PH Interv	United Kingdom

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00730	Gloria Cordoba Currea	Cordoba Currea,Gloria Christina **Trl226269	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries - AMR SORT IT Module 4, Colombia / Ecuado	3 500	ER 1.1.4 - Resist	Denmark
P22-00731	Cristian Anibal Mansilla Aguile	Mansilla Aguilera, Cristian Anibal	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries - AMR SORT IT Module 4, Colombia / Ecuado	3 500	ER 1.1.4 - Resist	Canada
P22-00732	Jamie Rodriguez Moreno	Rodriguez Moreno,Jaime Hernan**Trl226264	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries - AMR SORT IT Module 4, Colombia / Ecuado	3 500	ER 1.1.4 - Resist	Colombia
P22-00733	Emily Vargas Riaño	Vargas Riaño, Ms Emily Maria	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries - AMR SORT IT Module 4, Colombia / Ecuado	3 500	ER 1.1.4 - Resist	Mexico
P22-00734	Jamie Guth	Jamie Ann Guth	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries - AMR SORT IT Module 4, Colombia / Ecuado	3 500	ER 1.1.4 - Resist	Switzerland

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00742	Julius Fobil	School of Public Health Main Account	Piloting Implementation Research Mentorship Guidance Project	24 000	ER 1.2.6 - PH Interv	Ghana
P22-00745	Hajo Grundmann	University of Freiburg	Support to research for Improved VL Surveillance, Case Detection and Vector Control in the scope of VL elimination Initiative in Bangladesh and Nepal	8 340	ER 1.2.1 - Elimination	Germany
P22-00746	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1873713 article titled "Alarming levels of Multidrug Resistance in aerobic Gram-negative bacilli isolated from the nasopharynx of healthy under-five children in Accra, Ghana"	2 572	ER 1.1.4 - Resist	Switzerland
P22-00747	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1873450 article titled "Compliance to guidelines in prescribing empirical antibiotics for individuals with uncomplicated urinary tract infection in a primary health facility of Ghana, 2019-2021"	2 572	ER 1.1.4 - Resist	Switzerland
P22-00748	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1849721 article titled Multi-drug and colistin resistant Enterobacteriaceae in healthy pigs in the Greater Accra Region of Ghana, 2022: a cross-sectional study"	2 572	ER 1.1.4 - Resist	Switzerland
P22-00749	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1873579 article titled "Surveillance of WHO priority gram negative pathogenic bacteria in effluents from two seafood processing facilities in Tema, Ghana, 2021 & 2022: A descriptive study"	2 572	ER 1.1.4 - Resist	Switzerland
P22-00750	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1858520 for article titled "Sepsis among neonates in a Ghanaian tertiary military hospital: Culture results and turnaround times"	2 572	ER 1.1.4 - Resist	Switzerland

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00751	Nadisha Sidhu	Sidhu, Ms Nadisha	Consultant contract to facilitate and contribute to the One Health portfolio of projects, while closely working with TDR One Health core group of scientists and admin staff.	4 800	ER 1.3.3 - Climate Change	India
P22-00751	Nadisha Sidhu	Sidhu, Ms Nadisha	Consultant contract to facilitate and contribute to the One Health portfolio of projects, while closely working with TDR One Health core group of scientists and admin staff.	40 000	ER 1.3.3 - Climate Change	India
P22-00752	Hayk Davtyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) for accelerating progress towards ending TB/ MDR-TB in key populations in eastern Europe and central Asia (EECA)	22 050	ER 1.1.7 - Data use	Armenia
P22-00753	Ms Elena Tudor	Institutul De Ftiziopneumologie Chiril Draganiuc I.M.S.P.	Support to Moldova NTP activities for using digital technologies to support the TB response.	500	ER 1.2.6 - PH Interv	Moldova
P22-00753	Ms Elena Tudor	Institutul De Ftiziopneumologie Chiril Draganiuc I.M.S.P.	Support to Moldova NTP activities for using digital technologies to support the TB response.	9 500	ER 1.2.6 - PH Interv	Moldova
P22-00754	Volodymyr Kurpita	State Institution Public Health Center Of The Ministry Of Health Of Ukraine	Support to NTP activities for using digital technologies to support the TB response in Ukraine.	10 108	ER 1.2.6 - PH Interv	Ukraine
P22-00754	Volodymyr Kurpita	State Institution Public Health Center Of The Ministry Of Health Of Ukraine	Support to NTP activities for using digital technologies to support the TB response in Ukraine.	532	ER 1.2.6 - PH Interv	Ukraine

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00755	Ms Irina Liverko	Republican Specialized Scientific-Practice Medical Centre of Phthisiology And Pulmonology	Support to NTP activities for using digital technologies to support the TB response in Uzbekistan.	10 079	ER 1.2.6 - PH Interv	Uzbekistan
P22-00756	Ms Natalia Adamashvili	National Center For Disease Control And Public Health	Support to NTP activities for using digital technologies to support the TB response in Georgia.	529	ER 1.2.6 - PH Interv	Georgia
P22-00756	Ms Natalia Adamashvili	National Center For Disease Control And Public Health	Support to NTP activities for using digital technologies to support the TB response in Georgia.	10 059	ER 1.2.6 - PH Interv	Georgia
P22-00757	Selma Dar Berger	The Union	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) for accelerating progress towards ending TB/ MDR-TB in key populations in eastern Europe and central Asia (EECA)	50 500	ER 1.1.7 - Data use	France
P22-00762	Debashis Ghosh	Icddr,B (International Centre For Diarrhoeal Disease Research)	Decision Making for Indoor Residual Spraying in Post Elimination Phase of Visceral Leishmaniasis in Bangladesh	49 979	ER 1.2.1 - Elimination	Bangladesh
P22-00763	Anand Ballabh Joshi	Public Health And Infectious Disease Research Centre (Phidrc)	Decision Making for Indoor Residual Spraying in Post Elimination Phase of Visceral Leishmaniasis in Nepal	49 749	ER 1.2.1 - Elimination	Nepal
P22-00764	Gauthier	Centre de Recherche en Sante de Nouna	Technical and logistics support for the planning/organization/implementation of TDR/WHO Work shop on Multisectoral Approaches against Malaria within the UNDESA Project.	18 000	ER 1.3.11 - Multi Sector Approach	Burkina Faso
P22-00765	Osman Eltayeb	Damien Foundation Belgium	Support for the conduct of the ShoRRT project in Nigeria.	2 490	ER 1.2.6 - PH Interv	Nigeria

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P22-00765	Osman Eltayeb	Damien Foundation Belgium	Support for the conduct of the ShoRRT project in Nigeria.	22 410	ER 1.2.6 - PH Interv	Nigeria
P22-00766	Michel Kaswa	Minstere De La Sante / Programme National De Lutte Contre La Tuberculose	Support for the conduct of the ShORRT project in DRC.	2 488	ER 1.2.6 - PH Interv	Congo, The Democratic Republic of the
P22-00766	Michel Kaswa	Minstere De La Sante / Programme National De Lutte Contre La Tuberculose	Support for the conduct of the ShORRT project in DRC.	22 388	ER 1.2.6 - PH Interv	Congo, The Democratic Republic of the
P22-00768	Jacklyne Ashubwe	Ashubwe,Jacklyne Doris Ambunya**Trl226290	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle Income Countries. AMR SORT IT Module 4, Ghana	4 000	ER 1.1.4 - Resist	Kenya
P22-00769	Ama Pokuaa Fenny	Fenny, Miss Ama Pokuaa	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle Income Countries. AMR SORT IT Module 4, Ghana	4 000	ER 1.1.4 - Resist	Ghana
P22-00770	Jamie Guth	Jamie Ann Guth	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle Income Countries. AMR SORT IT Module 4, Ghana	4 000	ER 1.1.4 - Resist	Switzerland

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00771	Nasreen Jessani	Jessani,Nasreen Saleem**Trl36617	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle Income Countries. AMR SORT IT Module 4, Ghana	4 000	ER 1.1.4 - Resist	United Arab Emirates
P22-00772	Wilber Sabiti	Sabiti,Wilber **Trl226263	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle Income Countries. AMR SORT IT Module 4, Ghana	4 000	ER 1.1.4 - Resist	United Kingdom
P22-00773	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1886437 for article titled "Antibiotic resistant bacteria in drinking water from the Greater Accra Region, Ghana: A cross-sectional study, December 2021- March 2022"	2 604	ER 1.1.4 - Resist	Switzerland
P22-00774	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1887535 for article titled "Appropriateness of antibiotic prescribing for acute conjunctivitis: a cross-sectional study at a specialist eye hospital in Ghana, 2021"	2 604	ER 1.1.4 - Resist	Switzerland
P22-00775	Thomas Scalway	Lushomo	Development of training videos for the Malakit research team.	10 000	ER 1.1.5 - Innovation	South Africa
P22-00775	Thomas Scalway	Lushomo	Development of training videos for the Malakit research team.	11 300	ER 1.3.14 - Innovative Strategies	South Africa
P22-00779	Naira Khachatryan	Partnership For Wellbeing Health Ngo	Support to NTP activities for using digital technologies to support the TB response, Armenia.	7 010	ER 1.2.6 - PH Interv	Armenia

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00779	Naira Khachatryan	Partnership For Wellbeing Health Ngo	Support to NTP activities for using digital technologies to support the TB response, Armenia.	7 010	ER 1.2.6 - PH Interv	Armenia
P22-00780	Scott C. Edmunds	BGI Hong Kong Tech Col, Limited	Special issue of data papers on biodiversity data related to vectors of human diseases to support the development of innovative vector control tools.	5 072	ER 1.3.14 - Innovative Strategies	China
P22-00781	Rhona Mijumbi	Mijumbi, Rhona	Providing senior knowledge management expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle Income Countries. AMR SORT IT Module 4, Ghana	4 000	ER 1.1.4 - Resist	Uganda
P22-00783	Pruthu Kalasappa	Kalasappa,Pruthu Thekkur**Trl215755	Technical support for qualitative exploration of self-reported feedback on policy and/or practice changes associated with completed operational research studies in Nepal (2019-2022)	4 000	ER 1.1.4 - Resist	India
P22-00784	Adjima Combary	Programme National De Lutte Contre La Tuberculose (Plnt)	Support to pilot a digital tool (99DOTS) to improve TB patient adherence in Burkina Faso	23 213	ER 1.2.6 - PH Interv	Burkina Faso
P22-00785	Anderson Ndalama	Pharmacy And Medicines Regulatory Authority	Support for the evaluation of the implementation of a USSD platform for ADR reporting by patients in Malawi.	15 754	ER 1.2.6 - PH Interv	Malawi
P22-00786	Nana Konama Kotey	Ghana Health Service Public Health Programme Account	Support to the National Buruli Ulcer and Yaws Eradication Program to evaluate an application for skin disease diagnosis	23 346	ER 1.2.6 - PH Interv	Ghana

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P22-00787	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1922321 for article titled "Adherence to prescribing indicators at a district hospital in Ghana: Do we match WHO standards?"	2 604	ER 1.1.4 - Resist	Switzerland
P22-00788	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1887193 for article titled "What's in the Salad? Escherichia coli and Antibiotic Resistance in Lettuce Irrigated with various water sources in Ghana."	2 344	ER 1.1.4 - Resist	Switzerland
P22-00790	Event Logistics Llc	Event Logistics Llc	Providing logistics support for implementing the Structured Operational Research and Training Initiative (SORT IT) for accelerating progress towards ending TB/ MDR-TB in key populations to be held in Bishkek, Kyrgyzstan	81 049	ER 1.1.7 - Data use	Kyrgyzstan
P22-00791	Emmanuelle Papot	Papot, Emmannuelle	Support to the national TB programme of Niger for defining patients and health system risk factors of death in TB/HIV patients and the development of a generic protocol.	20 500	ER 1.2.6 - PH Interv	France
P22-00793	Lyudmila Vitalievna Yurastova	Yurastova Lyudmila Vitalievna	Further support for Russian-English language translation as part of the activities related to the Implementation Research for Digital Technologies in TB (IR4DTB) toolkit,	1 662	ER 1.2.6 - PH Interv	Russian Federation
P22-00794	Tatiana Polunina	Polunina, Ms Tatiana Andreevna	Russian translation support for Implementation Research for Digital Technologies in TB (IR4DTB) toolkit work package	942	ER 1.2.6 - PH Interv	Russian Federation
P22-00795	Ms Janet Neubecker	Neubecker, Mrs Janet	EDITING of the Seasonal Malaria Chemoprevention field guide.	2 701	ER 1.2.6 - PH Interv	Switzerland

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00796	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment of Invoice tropicalmed-1891172 for article titled "Pattern of Antimicrobial Susceptibility and Antimicrobial Treatment of Neonates Admitted with Suspected Sepsis in a Teaching Hospital in Ghana, 2021"	2 548	ER 1.1.4 - Resist	Switzerland
P22-00797	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	23 400	ER 1.1.4 - Resist	France
P22-00799	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment Invoice tropicalmed-1950989 - article titled "Quality, equity and partnerships in mixed methods and qualitative research during seven years of implementing the Structured Operational Research and Training Initiative in 18 countries	1 631	ER 1.1.7 - Data use	Switzerland
P22-00800	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment Invoice tropicalmed-1881926 - article titled "Antimicrobial resistance in E. coli isolated from chicken cecum samples and factors contributing to antimicrobial resistance in Nepal"	1 223	ER 1.1.4 - Resist	Switzerland
P22-00802	Shreya Garg	Everwell Health Solutions Private Limited	Support for the launch of the 99DOTS project in Burkina Faso	6 620	ER 1.2.6 - PH Interv	India
P22-00809	Dissou Affolabi	Programme National Contre La Tuberculose	Support to Programme National contre la Tuberculose (PNT) for installing and piloting the DHIS 2 TB IMPAX dashboard for monitoring the impact of COVID and other public health emergencies on TB services in Benin.	12 000	ER 1.2.6 - PH Interv	Benin

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00810	Adjima Combary	Programme National De Lutte Contre La Tuberculose (Plnt)	Support to Programme National Tuberculose for installing and piloting the DHIS 2 TB IMPAX dashboard for monitoring the impact of COVID and other public health emergencies on TB services in Burkina Faso.	12 000	ER 1.2.6 - PH Interv	Burkina Faso
P22-00811	Abdelhadi Oumar	Programme National De Lutte Contre La Tuberculose	Support to PROGRAMME NATIONAL DE LUTTE CONTRE LA TUBERCULOSE for installing and piloting the DHIS 2 TB IMPAX dashboard for monitoring the impact of COVID and other public health emergencies on TB services in Chad.	12 000	ER 1.2.6 - PH Interv	Chad
P22-00812	Adama Marie Bangoura	Programme National De Lutte Antituberculeuse (Pnlat)	Support to the National TB Programme for installing and piloting the DHIS 2 TB IMPAX dashboard for monitoring the impact of COVID and other public health emergencies on TB services in Guinea.	12 000	ER 1.2.6 - PH Interv	Guinea
P22-00813	Lyudmila Vitalievna Yurastova	Yurastova Lyudmila Vitalievna	Russian translation support for follow up meeting among participating countries of the IR4DTB training workshop.	225	ER 1.2.6 - PH Interv	Russian Federation
P22-00814	Tatiana Polunina	Polunina, Ms Tatiana Andreevna	Russian translation support for follow up meeting among participating countries of the IR4DTB training workshop.	144	ER 1.2.6 - PH Interv	Russian Federation
P22-00816	Jamie Guth	Jamie Ann Guth	Development of communications material related to the module 4 Structured Operational Research and Training Initiative (SORT IT) in Low- and Middle-Income Countries.	6 750	ER 1.1.4 - Resist	Switzerland
P22-00819	S Janet Neubecker	NEUBECKER, MRS JANET	EDITING of the TB&SARS-CoV-2 dual testing report.	799	ER 1.2.6 - PH Interv	Switzerland
P22-00821	Houessinon Christ Kevin Rajoum	Houessinon, Christ	Support for the conduct of a survey on TB&SARS-CoV-2 dual testing.	6 000	ER 1.2.6 - PH Interv	Benin

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00822	Magassouba Aboubacar Sidiki	Magassouba,Aboubacar Sidiki **Trl130729	Conduct of a survey on TB&SARS-CoV-2 dual testing.	6 000	ER 1.2.6 - PH Interv	Guinea
P22-00825	Federico Carroli	Ocean Translations S.R.L.	Portuguese translation of ShORRT material.	308	ER 1.2.6 - PH Interv	Argentina
P22-00828	James Kamanzi	Rwanda Biomedical Center	Support to the Rwanda Biomedical Centre to support the Rwandan National TB Programme.	11 969	ER 1.2.6 - PH Interv	Rwanda
P22-00830	Affolabi Dissou	Ong Warn-Tb	Coordination and organization of a regional meeting of NTPs in West and Central Africa on improving TB surveillance capacity to monitor and mitigate the impact of COVID-19 and future public health emergencies.	35 922	ER 1.2.6 - PH Interv	Benin
P22-00830	Affolabi Dissou	Ong Warn-Tb	Coordination and organization of a regional meeting of NTPs in West and Central Africa on improving TB surveillance capacity to monitor and mitigate the impact of COVID-19 and future public health emergencies.	37 389	ER 1.2.6 - PH Interv	Benin
P22-00831	Aleksandra Cuculovic	Multidisciplinary Digital Publishing Institute (Mdpi Ag)	Payment Invoice tropicalmed-1959056 - article titled "Audit of clinical care received by COVID-19 Patients Treated at a Tertiary Care Hospital of Nepal in 2021"	1 684	ER 1.1.7 - Data use	Switzerland
P22-00833	Charles Drago Kato	Makerere University	Project Title: Support for the preparatory phase of the project entitled “Strengthening surveillance of leishmaniasis in Uganda and Kenya through a collaborative multisectoral One Health capacity building approach in endemic foci”.	10 000	ER 1.3.3 - Climate Change	Uganda
P22-00834	Abdulhamid Lukambagire	Kilimanjaro Christian Medical Center	Support for the preparatory phase of the project entitled “One Health approach to control and understanding the dynamics of fascioliasis and schistosomiasis in the context of climate change in Rwanda and Tanzania”.	10 000	ER 1.3.3 - Climate Change	Tanzania, United Republic of

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P22-00835	Cheikh Talla	Institut Pasteur De Dakar	Support for the preparatory phase of the the project entitled “Enhancing One-Health Surveillance and Control of Vector-borne Diseases related to Climate change in the West Africa region”.	10 000	ER 1.3.3 - Climate Change	Senegal
P22-00836	Moses Chimbari	University of Kwazulu-Natal	Support for the preparatory phase of the project entitled “Application of One Health approach for reducing the burden of vector-borne diseases in vulnerable communities in the context of climate change”.	10 000	ER 1.3.3 - Climate Change	South Africa
P22-00839	Selma Dar Berger	The Union	Independent review of ethics considerations for analysis of routine programme data from SORT IT training programme on TB /MDR TB in Kyrgyzstan	4 500	ER 1.1.7 - Data use	France
P22-00843	Nafomon Sogoba	Malaria Research Training Center	A pilot multisectoral intervention for controlling malaria vectors, mitigating insecticides resistance and assessing WaSH facilities at health care units in selected costal and sahelian west African countries.	80 000	ER 1.3.11 - Multi Sector Approach	Mali
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	19 800	ER 1.2.1 - Elimination	Nepal
P22-00852	Chukwuma Anyaike	National Tuberculosis And Leprosy Control Programme	Support to NTP activities in Nigeria for mitigating the impact of TB through social protection.	18 782	ER 1.2.6 - PH Interv	Nigeria
P22-00853	Dissou Affolabi	Programme National Contre La Tuberculose	Support to NTP activities in BENIN for mitigating the impact of TB through social protection.	19 286	ER 1.2.6 - PH Interv	Benin

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
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.	19 452	ER 1.2.6 - PH Interv	Burundi
P22-00856	Almamy Amara Toure	Centre De Formation Et De Recherche En Sante Rurale De Maferinyah	Support to NTP activities in Guinea for mitigating the impact of TB through social protection.	20 275	ER 1.2.6 - PH Interv	Guinea
P22-00857	Adama Marie Bangoura	Programme National De Lutte Antituberculeuse (Pnlat)	Support to NTP activities in Guinea for mitigating the impact of TB through social protection.	15 169	ER 1.2.6 - PH Interv	Guinea
P22-00864	Adjima Combary	Programme National De Lutte Contre La Tuberculose (Plnt)	Support to NTP activities in Burkina Faso for mitigating the impact of TB through social protection.	18 465	ER 1.2.6 - PH Interv	Burkina Faso
P22-00865	Shomik Maruf (Siam)	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	19 999	ER 1.2.1 - Elimination	Bangladesh
P22-00866	Selma Dar Berger	Dar Berger, Ms Selma	Technical support for creating an updated database of all SORT IT alumni and ensuring their enrolment in the TDR global database	2 800	ER 1.1.7 - Data use	France
P22-00870	Affolabi Dissou	Ong Warn-Tb	Organization of the 2022 WARN-TB & CARN-TB meeting.	24 710	ER 1.2.6 - PH Interv	Benin
P22-00872	Dieynaba S. Ndiaye	N'DIAYE, DIEYNABA SOPHIE	Support for strengthening the capacities of National Malaria Programmes in health economics.	1 500	ER 1.2.6 - PH Interv	France
P22-00873	Muhammad Amir Khan	Association For Social Development Gfatm - Acsm	Support for implementing a demonstration project on "CXR-symptom" screening and TB Preventive Treatment (TPT) of known type-2 diabetes patients at public facilities.	10 000	ER 1.2.6 - PH Interv	Pakistan

Project ID	Principal Investigator	Supplier Name (Institution)	Project title	Funding in US$	Disease or research topic	Countries involved
P23-00881	Laith Hussain	Hussain, Laith Naser	Support for the implementation of an "Effective, affordable and evidence-based dengue early warning and response systems"(EWARS for dengue control)	18 000	ER 1.1.1 - Epidemics	Sweden
P23-00882	Hajo Grundmann	University of Freiburg	Support for effective implementation of an early warning and response systems for dengue control (EWARS for dengue control).	19 600	ER 1.1.1 - Epidemics	Germany
WHE	Sony Shakya Shrestha	Shakya Shrestha, Sony	Implementation of TDR Small Grant Study, Dr Sony Shakya Shrestha, 01 April to 30 June 2022	6 634	ER 1.1.4 - Resist	Nepal

TDR funding in 2022

CONTRIBUTOR	
Core contributors	**Amount (US$)**
Belgium	681 044
China	55 000
Germany	981 595
India	55 000
Japan	50 000
Luxembourg	1 155 462
Malaysia	25 000
Mexico	10 000
Nigeria (1)	400 000
Norway	306 341
Panama	7 000
Spain (2)	159 744
Sweden	3 220 540
Switzerland	1 925 255
Thailand	44 924
United Kingdom of Great Britain and Northern Ireland	5 370 224
World Health Organization	1 900 000
Subtotal	**16 347 129**
Contributors providing project-specific funding	**Amount (US$)**
Bill & Melinda Gates Foundation	1 600 620
Luxembourg	413 340
Medicines Development for Global Health Limited (MDGH)	47 281
National Institute of Health Research (NIHR), United Kingdom	1 969 580
Robert Koch Institute (RKI)	419 023
Sweden	706 549
Swiss Development Cooperation Agency (SDC/DDC)	11 583
United Nations Development Programme (UNDP)	405 000
United States Agency for International Development (USAID)	987 274
World Health Organization	880 403
Subtotal	**7 440 653**
Total contributions	23 787 782

1. The contribution from the Government of Nigeria for the period 2015 to 2020 was reported in the 2021 Annual Report but will be reported in the certified financial statement in 2022 due to the timing of its receipt. The contribution for 2023 will also be reported in the 2022 certified financial statement due to
2. The contribution from the Government of Spain for the year 2022 will be reported in the certified financial statement in 2023 due to the timing of its receipt.

Scientific Working Group summary recommendations list

- Given the experience and lessons learned from the variety of ERs currently implemented, the SWG recommended continuing to build bridges between ERs through a more strategic set of activities, rather than through the current rather opportunistic ER manager led approach.
- The SWG recommended further clarifying the balance of efforts between and within projects emphasizing “approaches, methods and tools” and those emphasizing “disease/ issue-related objectives”.
- IMP can and should role model sharing of learning and experiences across projects on the ground, where it can also foster South-South collaboration, particularly with its networks.

TDR Strategic Plan 2024-2029

- That IMP conduct a mapping of implementation research approaches that it could further develop, optimise and apply to achieve its strategic goals.
- Emphasised the importance of building bridges between the ERs to:
  - maximise cross-cutting lessons learnt from a range of implementation research approaches being developed and tested; and
  - focus outputs towards fewer “big ticket” issues where TDR could become more widely recognised internationally for leading implementation research.
- An increased focus on NTDs is encouraged.
- A visualisation of the pipeline through which IMP will enable novel interventions being successfully integrated into health services.
- Focus of IMP on building resilience against three major threats (resistance, pandemics and climate change) in LMIC health research systems, particularly in under-served communities.

List of appendices

Summary of major outputs

ER 1.1.4 Success stories of impact from Ghana, Nepal and Sierra Leone

ER 1.2.1 Onchocerciasis: TDR key areas of work 2018–2023 Strategy

ER 1.2.6 annexes:

1. Overview of TDR-supported studies currently ongoing in WARN/CARN
2. WARN/CARN evaluation report
3. Manuscripts published (or in progress) in a special issue on COVID-19 and TB in the Journal of Tropical Medicine and Infectious Diseases
4. ShoRRT initiative country updates
5. OMP-SMC project country update, 2022
6. IR studies following the IR4DTB workshop in China and WHO European Region

ER 1.3.3 Operationalizing One Health – Transdisciplinary Projects in Africa

Research for Implementation

Supplementary annexes to the 2022 Annual Report

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ER 1.3.3 Operationalizing One Health – Transdisciplinary Projects in Africa

Files available on request to the TDR Secretariat.