TDR For research on diseases of poverty

UNICEF • UNDP • World Bank • WHO

Annual Report 2020

Research for Implementation

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List of abbreviations

ADP	Access and Delivery Partnership (UNDP)
aDSM	Anti-TB drugs active drug safety monitoring
Africa CDC	African Centers for Disease Control and Prevention
AFRO	WHO Regional Office for Africa
AMR	Antimicrobials resistance
ARV	Antiretroviral
CAD	Computer-assisted detection
CARN-TB	Central African Regional Network for TB Control
CBD	Convention on Biodiversity
CDC	Centers for Disease Control and Prevention
CRP	C-reactive protein
CRS	Catholic Relief Services
DEC	Disease endemic country
DIAMA	**DIA**gnostics for **M**ultidrug resistant tuberculosis in **A**frica
EDCTP	European and Developing Countries Clinical Trials Partnership
EECA	East European and Central Asia
ER	Expected Result
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
FIND	Foundation for Innovative New Diagnostics
GBA	Gender-Based Analysis
GCP	Good clinical practices
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
IAEA	International Atomic Energy Agency
IDDO	Infectious Diseases Data Observatory
IDRC	International Development Research Centre (Canada)
IIR	Intervention and Implementation Research team
IMP	TDR Research for Implementation Unit
IMP SWG	Scientific Working Group of the TDR Research for Implementation Unit
IR	Implementation research
IRS	Indoor Residual Spraying
JCB	TDR Joint Coordinating Board

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
MDA	Mass drug administration
MDGH	Medicines development for global health
MDR–TB	Multidrug-resistant tuberculosis
MMV	Medicines for Malaria Venture
MoH	Ministry of Health
MPH	Master of Public Health
MSA	Multisectoral approach
NDCs	National Determined Contributions
NDRS	National TB drug resistance surveys
NIH	National Institutes of Health
NMP	National malaria programme
NPCS	National survey of cost faced by TB patients and their household
NTD	Neglected tropical diseases
NTP	National tuberculosis programme
NTPS	National TB prevalence surveys
OIE	World Organization for Animal Health
OPT–SMC	Project for seasonal malaria chemoprevention
OR/IR	Operational and / or implementation research
PAHO	Pan-American Health Organization
PAMCA	Pan Africa Mosquito Control Association
PHE	Public Health England
PI	Principal investigator
PKDL	Post kala-azar dermal leishmaniasis
PMI	President's Malaria Initiative (USA)
R&D	Research and development
RBM	Roll Back Malaria Partnership
RTC	Regional Training Centre
SAP	Strategic Action Plan to Scale up Health and Environment Interventions in Africa
SDC	Swiss Development Cooperation
SDF	Strategic Development Funds

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
SIT	Sterile Insect Technology
SMC	Seasonal malaria chemoprevention
SORT IT	Structured Operational Research and Training Initiative
STAC	TDR Scientific and Technical Advisory Committee
STH	Soil-transmitted helminth
STPH	Swiss Tropical and Public Health Institute
TB-RPC	Tuberculosis Research and Prevention Center (Armenia)
TDR	UNICEF/UNDP/World Bank/WHO Special Programme for Research on Tropical Diseases
UHC	Universal health coverage
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNION, The	International Union Against Tuberculosis and Lung Disease
USAID	United States Agency for International Development
US–FDA	United States Food and Drug Administration
VBD	Vector-borne disease
VL	Visceral Leishmaniasis
WAHO	West African Health Organization
WARN-TB	West African Regional Network for TB control
WCA	West and Central Africa
WHO-GMP	WHO Global Malaria Programme
WHO–GTB	WHO Global TB Programme
WHO–HQ	World Health Organization headquarters
WHO–NTD	WHO Control of Neglected Tropical Diseases Department
WHO–PHE	WHO Public Health, Environmental and Social Determinants of Health Department
WHO–PQT	WHO Prequalification of Medical Products Department
WHO–PV	WHO Pharmacovigilance Department
WHO–WASH	WHO's provision of safe water, sanitation and hygiene intervention
WMO	World Meteorological Organization
WPRO	WHO Regional Office for the Western Pacific

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 wellbeing for all at all ages" and SDG 10 "Reduce inequalities within and among countries," as well as supporting universal health coverage (UHC).

The Research for Implementation 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.

Four main areas of activity are included within TDR's current strategy:

1. **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.
2. **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.
3. **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.
4. **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 14 Expected Results (ERs) that have been developed in coordination with TDR's Scientific Working Groups (SWGs).

Progress in 2020: Key Achievements

Research on the burden and ***causes*** of residual and persistent malaria

- A *Supplement of the Journal of Infectious Diseases,* including publications from all the research teams supported through the Expected Result on residual and persistent malaria (ER 1.3.6), closed in 2018. It presents the main findings of six supported projects and has been finalized in December 2020, to be released in early 2021.

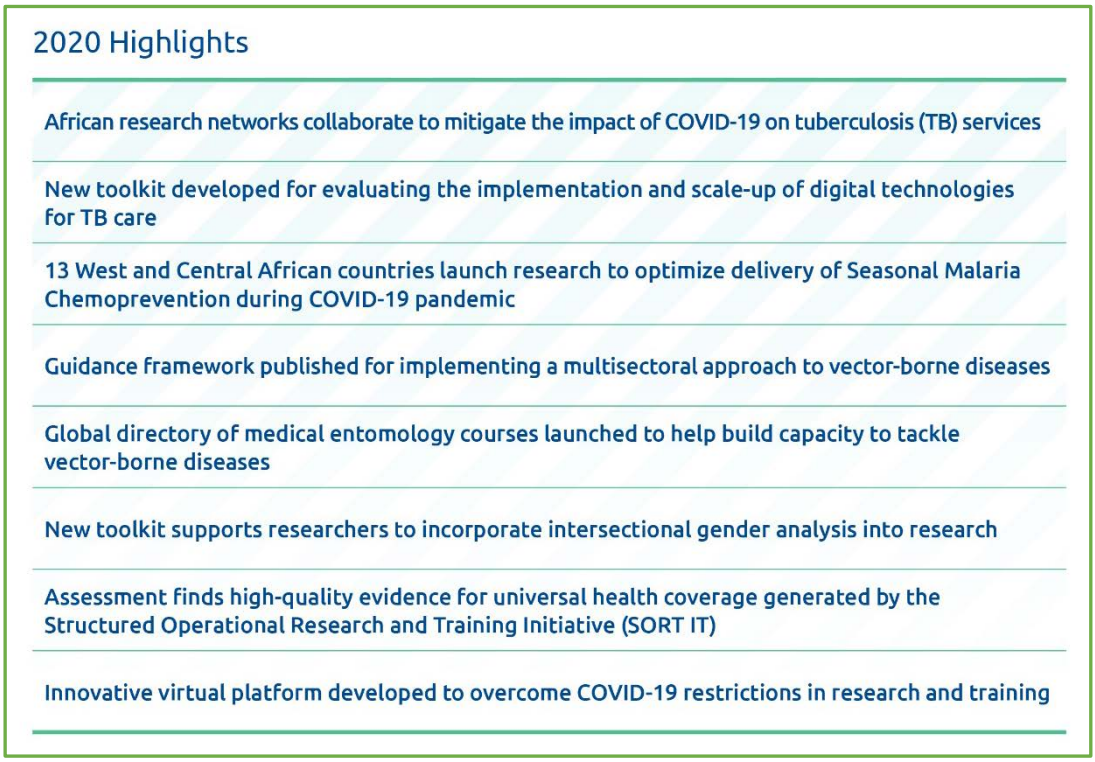
Urban health

- Evidence briefs for policy were prepared in collaboration with policy-makers (ministries of health) from three LMICs: Brazil, Burkina Faso and Colombia. These were published in 2020 and are accessible at: https://www.equiperenard.org/verdas-en and https://www.equiperenard.org/verdas-fr.

- In support of a long-term effort to strengthen research on urban health interventions for the control of infectious diseases of poverty, TDR launched a call for proposals to synthesize and consolidate evidence from a series of literature reviews that aims to inform TDR's research agenda on urban health, infectious diseases and gender research, including in COVID-19 and post-COVID-19 scenarios. Multidisciplinary research teams from Bangladesh and India were identified in 2020 and findings are expected by end of 2021.

VBDs and climate change

- A research initiative is being piloted in the context of climate change in Africa. A draft plan/framework will operationalize **One Health** approaches (including a scorecard/metrics system) for the control of vector-borne disease (VBD).



Multisectoral approaches

- A guidance framework on multisectoral approaches to prevention and control of VBDs was developed and released online in April 2020 and is accessible at: https://www.who.int/tdr/publications/year/2020/mca-for-prevention-and-control-of-vbds/en/.
- A *Supplement of the Journal of Infectious Diseases*, including publications for four of the commissioned reviews supported through this Expected Result was released in October 2020 at the following link: https://academic.oup.com/jid/issue/222/Supplement_8.
- The partnership with WHO–WASH, the safe water, sanitation and hygiene group from the WHO–PHE Department was developed with the financial support from the Swedish International Development Agency (Sida) to investigate the importance of the water sector on VBDs, through WASH indicators within health-care facilities. The collaboration also includes a substantial capacity-building package on WASH and VBDs.

Innovative vector control technologies

- A guidance framework on testing **sterile insect technology** (SIT) against the Aedes mosquito and vectors of arboviral diseases was jointly developed with the International Atomic Energy Agency and released online in April 2020. It can be found at the following link:

  https://www.who.int/tdr/publications/year/2020/guidance-framework-for-testing-SIT/en/.

- A call for applications to test SIT technology in the field was launched and the selection process was conducted through an external review committee. This resulted in the selection of four consortia including 12 countries.

Country preparedness for disease outbreaks: Early warning and response system (EWARS) for arboviruses

- Progress was made in the expansion of the use of EWARS for dengue outbreak preparedness in new countries through collaboration with WHO–PHE and improvement of the tool for integrating an environmental dimension in the model.

Gender

- The University of Ghana has institutionalized the gender training course, which is now being offered to students in their Master of Public Health (MPH) programme.
- The University of the Witwatersrand in South Africa offered the gender-based analysis training course in September 2020. The Wits School of Public Health is also initiating a new degree programme starting in 2021 – a Bachelor of Health Sciences Honours in Public Health. This is a one-year, full-time programme for students wanting to pursue postgraduate studies in public health. The course *Gender-based analysis of infectious diseases and climate change*, approved in 2020, is one of the courses which students can take as part of the new honours programme. It will run with slight modifications online using all five modules. The first cohort of students has been selected after the closing date (30 September 2020). Students will begin their academic programme in February 2021.
- A TDR toolkit on intersectional gender analysis in research on infectious diseases was completed and launched in September 2020 as an interactive web tool. Expected results and research outcomes from the pilot are expected to be published in 2021 after research activities resume, following slight delays due to COVID-19.
- The TDR intersectional gender research strategy was launched in June 2020 consolidating the strategic direction to embrace intersectional gender analysis and promote an inclusive gender research agenda within TDR's core research and research capacity-strengthening efforts.

African subregional networks for TB control and malaria

- Support was provided to national TB programmes of the West and Central African regional networks (WARN-TB and CARN-TB) to mitigate the impact of COVID-19 on TB control through the conduct of implementation research projects.
- Finalization of up to 40 TB research projects is under way to improve case findings and access to TB care for vulnerable populations.
- OPT-SMC project[1] was launched, which aims to define and overcome barriers for an effective seasonal malaria chemoprevention in thirteen countries in West and Central Africa.

[1] The OPT–SMC project is implementation research to optimize delivery and effectiveness of seasonal malaria chemoprevention.

Research in support of TB control

- A generic research package for facilitating the use of all-oral MDR-TB treatment regimens under operational research conditions was developed and is used by 23 countries worldwide. The research package is called ShORRT (Short, all-Oral Regimens for Rifampicin-resistant Tuberculosis) which, through the conduct of these OR projects, is providing patients access to a new less toxic TB treatment regimen of a shorter duration.
- The development of an IR research toolkit for the use of digital technology for TB control is now completed and a web version of the tool is available at https://ir4dtb.org.
- Development of a TB costing tool for favouring the integration of a health economics component in implementation research projects is completed.
- Development of a generic research package for the use of assisted chest X-ray reading (CAD) for improving TB screening is under way.
- Development of guidance for improving compliance with the Good Clinical Practices (GCP) of population- and facility-based TB surveys is under way.

Structured Operational Research and Training Initiative (SORT IT)

- To accelerate Universal Health Coverage (UHC) and progress towards the SDGs, the SORT IT initiative focuses on hard-to-reach and vulnerable populations, neglected tropical diseases (NTDs) and antimicrobial resistance. SORT IT now catalyses the evidence-to-action cycle from defining relevant research questions to identifying eventual impact.
- Globally, SORT IT has been scaled-up to 93 LMICs in collaboration with 50 implementing partners. Seventy per cent of its research is focused on influencing policy and practice and 51% of trainees continue on to do independent research. Eighty-eight per cent of SORT IT publications have been graded as having "excellent reporting quality" for decision-making in public health.
- To promote "locally generated research, with local solutions and local ownership", SORT IT alumni have championed the establishment of two operational research hubs in Armenia and Ukraine, for East European and Central Asian (EECA) countries, and in Ethiopia (linked to the Africa Centres for Disease Control and Prevention (Africa CDC).
- To overcome COVID-19 restrictions, an innovative online SORT IT virtual platform was developed to enable trainings to continue in 2021 and beyond. This has demonstrated that alumni are using their acquired SORT IT skills in tackling the pandemic in 85 countries.
- The capacity-building perspective for individuals now embraces the *Train, Embed, Retain and Enable* concept which is in line with WHO's General Programme of Work (GPW-13).

Antimicrobial resistance – SORT IT programme (AMR–SORT IT)

- Embracing a "One Health" approach in the planning process, comprehensive engagement has been established with AMR coordinating committees, WHO country and regional offices and implementing partners in target countries in Asia, Africa and Latin America. SORT IT activities are fully aligned with national AMR action plans.
- Thirty-six research studies have been started in Ghana, Myanmar, Nepal, Sierra Leone and Uganda and high-level endorsement has been established for 24 more projects in Myanmar and Sierra Leone. TDR also joined forces with WHO regional offices in Africa, the Americas and South-East Asia with a grants scheme to support 13 additional AMR studies.

- All TDR-supported operational research officers and 73% of the 132 individuals involved with the AMR–SORT IT projects are applying their acquired skills on the front lines of the COVID-19 response. These activities have been synergistic with and complement ongoing AMR activities and further contribute to health system resilience in: protecting health workers, keeping health facilities safe, improving laboratory diagnostic capacity, and informing communities on preventive measures.

Research to support visceral leishmaniasis (VL) elimination in the Indian subcontinent

- Two studies are ongoing to evaluate new approaches for active case detection, vector control and entomological surveillance adapted to the maintenance phase of VL elimination in Bangladesh, India and Nepal.
- Protocols are being developed for new studies to be initiated in 2021.

Research to support visceral onchocerciasis elimination

- Protocols for two studies of moxidectin received Ethics Committee and Regulatory Authority approval in the Democratic Republic of the Congo (DRC). Protocol for a study received Ethics Committee approval and is undergoing Regulatory Authority review.

Strategic Development Fund (SDF) projects on networks and the plague

- Insecticide Resistance: In Madagascar the project supporting testing of insecticide resistance of fleas, the vectors of the plague disease, has been completed and shows important and variable resistance of fleas to the commonly used insecticides. This strongly hampers the effect of vector control against fleas, and consequently against plague.
- A malaria study in hard-to-reach and vulnerable populations is ongoing.
- An innovative project on new tools for diagnosis and treatment of malaria in hard-to-reach illegal gold miner populations in the Amazon region (using the Malakit) started in partnership with the Global Fund (GFATM). The project will estimate the impact of this new tool on malaria control and elimination in Surinam. TDR will support the addition of the gucose-6-phosphate dehydrogenase (G6PD) testing to the Malakit to allow the use of the anti-vivax treatment when necessary.

Maximized utilization of safety information

- Protocols for two new studies on approaches to strengthen pharmacovigilance in public health programmes are being prepared.

  The central safety databases were flagged as WHO global public goods (GPGs) for the current biennium, highlighting their added value.

Table 1 presents a summary of progress achieved of TDR's Expected Results and deliverables, and their indicators and targets, for the reporting period.

Summary progress description

TDR project support often occurs over several years, and in some cases, over different diseases. The following table provides a summary of current progress within the overall plan of expected results. More details on progress are provided as narrative in subsequent pages below.

Table 1: Research for implementation workplan – Overall progress

Ongoing expected results by outcome	*Indicators and progress against targets*
Research for policy	
1.1.1 Country preparedness for disease outbreaks: i) Expanded capacity of countries to use EWARS tool; and ii) Regional plan to improve arbovirus disease surveillance and vector control in West Africa.	By 2020, five countries using EWARS tool. By 2021, agreement on the regional plan to improve arbovirus disease surveillance and vector control in West Africa. ***Progress: On track***
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 of all relevant infectious agents; ii) Documentation of practical approaches to improve targeted treatment and reduce drug misuse and risk of resistance; iii) Evaluation of biomarkers to guide management of fever at field level (US$ 50 million scenario budget); and iv) Strategies for monitoring and responding to potential emergence of drug resistance.	By 2021, evidence on potential of at least one biomarker generated (US$ 50 million scenario budget). By 2023, strategies for countries to build effective systems for monitoring and responding to emerging drug resistance endorsed by stakeholders at relevant levels. ***Progress: On track***
1.3.3 Population health vulnerabilities to VBDs: increasing resilience under climate change conditions: i) One Health approaches operationalized for VBD control and prevention in the context of climate change; and ii) Broader application of the One Health operationalization to zoonoses and other emerging/re-emerging infections, including COVID-19.	By 2021: • Proof of concept validating the One Health scorecard/metrics. • Proof of concept validating One Health intervention science and risk management components. • Impact of previous TDR–IDRC Research Initiative on VBD management at community and health system levels. • Lessons learned from COVID-19 management. ***Progress: On track***
Research for implementation	
1.1.7 Maximized utilization of data for public health decision-making: i) Capacity built for effective collection and analysis of data; and ii) Issues and policy briefs suitable for informing evidence-based policies/ practice guidelines.	By 2021, 15 new publications and policy briefs informing evidence-based policies and/or practice documents. Progress: 75 publications in 2020 with 69% influencing policy and practice, with a focus on UHC. ***Progress: On track***

Ongoing expected results by outcome	*Indicators and progress against targets*
1.1.8 Maximized utilization of safety information for public health decision-making: i) Innovative approaches for safety monitoring piloted that facilitate and improve normative guidance; and ii) Capacity for safety monitoring of new drugs built in target countries.	By 2021, evaluation report on approaches using mobile health (mHealth) tools facilitating safety monitoring in the field. ***Progress: On track**: protocols being finalized, study to be initiated early 2021.* *By 2023, improved reporting rate of adverse events in target countries.*
1.2.1 Strategies to achieve and sustain disease elimination: i) Evidence on sustainable strategies for the elimination of VL in the Indian subcontinent; ii) Improved basis for monitoring progress of preventive chemotherapy-based elimination programmes towards elimination and for decisions to stop interventions; and iii) Data to support WHO guidelines and onchocerciasis-endemic country registration and policies on moxidectin for onchocerciasis elimination.	By 2021: • 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. By 2024, moxidectin study reports provided to WHO and countries (directly and/or via ESPEN). ***Progress:** For VL on track. For onchocerciasis delayed due to laboratory and field work not progressing as planned due to COVID-19 lockdown and travel restrictions. Start of moxidectin studies delayed due to need to revise protocols (to adapt) to conduct studies during COVID-19 pandemic – which will also translate into slower recruitment.*
1.2.6 Optimized approaches for effective delivery and impact assessment of public health interventions: i) Strengthened regional networks of West African National Tuberculosis Programmes (WARN-TB) and of Central African Tuberculosis Programmes (CARN-TB) capable of identifying research priorities, and designing and conducting OR/IR to generate the evidence base for policy decisions to achieve the goals of the End TB Strategy; ii) Extend the WARN-TB approach to other geographical areas and/or other disease burdens; and iii) Approaches to optimized delivery of seasonal malaria chemoprevention evaluated.	By 2021, capacity built in WARN-TB and CARN-TB countries to generate evidence for policy decisions for End TB Strategy and reported to stakeholders at country, regional and global level. By 2023: • Report on the expansion of WARN-TB to other regions and/or diseases provided to stakeholders at country, regional and global levels. • Report on approaches to optimized delivery of seasonal malaria chemoprevention provided to stakeholders at country, regional and global level. ***Progress: On track***

Ongoing expected results by outcome	*Indicators and progress against targets*
1.3.12 Strategies to promote gender-responsive health interventions on prevention and control of infectious diseases of poverty: i) Piloted and applied intersectional gender analysis guidance toolkit within infectious diseases research projects; ii) Scaled-up training course modules on gender-based analysis in research on VBDs and climate change; iii) TDR Strategy/Strategic Plan on gender and intersectionality on infectious diseases of poverty developed; and iv) New knowledge and evidence on the 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.	In June 2020, a TDR Strategy/Strategic Plan on gender and intersectionality was launched and disseminated in regions. By 2021, five to seven case studies developed and/or lessons learned documented on applying an intersectional gender lens in infectious disease research projects. By 2021, two courses included in at least two university curricula or TDR regional training centres' curricula. ***Progress: On track*** • *Intersectional gender analysis guidance toolkit finalized and launched in September 2020. Toolkit was piloted and applied for the generation of case studies in Nepal and Uganda that were developed and implemented in 2020 despite COVID-19 challenges (small delays took place).* • *Training course on gender-based analysis in research on VBDs and climate change offered at the University of Witwatersrand (piloted in February and offered to a larger audience in September 2020).* • *TDR intersectional gender research strategy developed, finalized, launched and disseminated in 2020. Also presented to TDR's JCB in June 2020.* • *Launched call for research proposals to generate evidence to strengthen intersectionality and gender research efforts in infectious disease prevention and control.*
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) Optimized methodologies to assess response to case-based and population-based interventions; and iii) Strategy development, implementation and monitoring.	By 2021, at least two R&D initiatives informed by TDR research output or TDR staff/adviser expertise. ***Progress*** • *On track, R&D initiative for Human African Trypanosomiasis via TDR participation in Neglected Tropical Diseases (NTD) Advisory Group.*

Ongoing expected results by outcome	*Indicators and progress against targets*
1.3.10 Urban health interventions for the prevention and control of vector-borne and other infectious diseases of poverty: i) New knowledge and evidence generated on effectiveness of interventions at household level to prevent and control VBDs by addressing identified socioeconomic determinants of health in urban settings; and ii) Evidence review on human mobility in urban areas and its impact on disease transmission (particularly dengue and Chikungunya).	By 2021: • Evidence published from two different research teams in a selected country in Latin America, addressing urban health issues in tropical diseases. • Evidence generated from two different research teams in a specific location that has experienced demographic increase recently, addressing urban health issues in tropical diseases. ***Progress: On track*** *A call for proposals launched in 2020 to conduct literature reviews and research gap analysis on social determinants of urban health and to explore, to the extent possible, how social and gender dynamics in a COVID-19 context affect the prevention and control of infectious diseases of poverty in urban settings (to the extent possible). Hence, the above-mentioned indicators and targets are slightly modified to reflect the evidence from the research teams in Bangladesh and India selected from the 2020 call for proposals.*
1.3.14 Testing of innovative strategies for vector control: i) Improved methodology available for sexing of mass-reared mosquitoes; ii) Assessment of the impact of an integrated vector control approach that includes SIT technology on vector population density and disease transmission into a controlled field situation; and iii) Monitoring and evaluation (M&E) after experimental SIT deployment of the consequences on target mosquito populations and the environment.	By 2021: • Improve SIT technology: The number of females contaminating the batches of sterile males, before release, should be less than 0.1%. • Two multi-country research projects were selected and are ongoing, providing evidence on *Aedes aegypti* adult female densities before and after release, as well as epidemiological endpoints on disease transmission. ***Progress:*** • *The guidance document to help countries test this new vector control technology has been developed and released.* • *The consortia of institutions that field test the SIT have been selected through a call for applications and are in process.* • *The update of the proposals as well as the contract and the field work have been delayed due to the COVID-19 situation.*

Ongoing expected results by outcome	*Indicators and progress against targets*
Research for integrated approaches	
1.3.11 Multisectoral approach for prevention and control of malaria and emerging arboviral diseases: i) Knowledge and evidence from a multisectoral approach has been generated and made available for stakeholders; and ii) A multisectoral approach for prevention and control of VBDs implemented in some countries.	By 2020, a guidance framework document published. By 2021: • Two to three case studies supported and ongoing. • Five countries are implementing multisectoral approaches, with M&E of epidemiological results. **Progress:** • *The guidance document has been released.* • *Two proposals for case studies have been selected and the process of contracting these case studies is on track.* • *A new call for applications to select more case studies on a multisectoral approach (MSA) for arboviral diseases has been released and three research projects were selected.* • *A new collaboration with a specific sector, the Water and Sanitation Sector, has been developed supported by funds from Sida.*

Progress description in 2020 and plans for 2021–2023

▪ Workstream: Research for policies

ER 1.1.1: Country preparedness for disease outbreaks

TDR is working with countries and researchers to identify signals that can alert country control programmes to an impending dengue outbreak. This has led to a model contingency plan and an Early Warning and Response System (EWARS) for arbovirus outbreaks. Countries can test and potentially customize this to apply to other arboviral diseases, such as Zika, chikungunya, yellow fever, and other infectious diseases.

Progress in 2020

Overview of the development of the Early Warning and Response System (EWARS)

1. The EWARS programme started in 2012, funded until 2016 by an EU grant together with TDR. After that, it was funded mainly by TDR and supported by WHO-NTD.
2. Analysis of dengue surveillance systems in ten countries: Brazil, Colombia, Dominican Republic, Peru, Venezuela, Indonesia, Malaysia, Sri Lanka, Viet Nam, Maldives.
3. Retrospective study; testing the first version of EWARS in five countries: Brazil, Mexico, Dominican Republic, Malaysia, Viet Nam.
4. Prospective study (comparing ten EWARS-municipalities with ten non-EWARS municipalities) in three countries (Brazil, Mexico, Malaysia) using the first generation of EWARS (run with STATA). Training workshops in Brazil, Mexico.
5. Development and testing of the 2nd generation of EWARS (run with open access software "R", dashboard). Testing in Mexico, Dominican Republic and Malaysia. Web publication of the user guide (2017, updated in 2018). Regional training workshops in Cuba and Sri Lanka.
6. Development and testing of the 3rd generation of EWARS (with automatic calibration of thresholds). Dissemination through in-country workshops in Colombia, Mexico, India, Sri Lanka, Thailand, Malaysia (2019). Web publication in Spanish for the PAHO region.
7. Development of risk mapping and inclusion in the EWARS dashboard in 2020. Capacity building in further African and Asian countries.

Current status of EWARS use:

1. Full integration of EWARS into the national surveillance platform: Mexico (with 137 disease-endemic municipalities).
2. Countries which started to pilot EWARS for later inclusion into the national surveillance system: Bangladesh, Cambodia, India, Nepal, Malaysia, Myanmar, Sri Lanka, Thailand, Timor Leste, Colombia, Ethiopia, Malawi, Mozambique (potentially Bolivia, Peru, Chile, Ecuador).
3. Countries which had advanced with the widespread use of EWARS but were affected (slowed down) due to political changes and are now coming back: Dominican Republic, and Malaysia.

The following activities were conducted in 2020:

In collaboration with the climate team at WHO-PHE, meetings were held to discuss the use of EWARS by the PHE partners in a number of countries concerned with the impact of climate change on health. This resulted in a WHO–PHE initiative to include country focal points on climate change in EWARS activities, mainly capacity building and ensuring implementation. WHO-PHE is conducting EWARS training for countries they are involved with, in particular Nepal, Ethiopia, Malawi and Mozambique.

As suggested by the scientific working group (SWG), a call for proposals was prepared for conducting implementation research projects to evaluate application of EWARS in different settings and its

effectiveness in triggering control activities. The call for proposals will be posted Q1 2021 for the conduct of at least three research projects in 2021.

A webinar for all countries using EWARS was organized by TDR in December 2020 to discuss current challenges and country plans. The EWARS tool was improved with integrating environmental information in its prediction model. Countries were trained to conduct risk mapping. Follow-up activities will be conducted in 2021 for improving EWARS use and its integration into national surveillance systems.

Strengthening arboviral disease surveillance and vector control in West Africa and beyond

This is a continuation of a project that started at the end of 2018 and is conducted in collaboration with the WHO-NTD department and the West African Health Organization (WAHO). The emergence of Aedes-borne arboviral infections in Africa, including in the West African region, raised the question of the adequacy of health systems to identify, prevent and respond to outbreaks in a timely, efficient manner. In 2019, a situation analysis was done to understand the capacity of countries for arboviral disease surveillance and vector control and the capacity strengthening needs. It showed that the region has some capacity in epidemiological and entomological surveillance and vector control but requires support to strengthen their capacity to ensure timely detection of arboviral infections and adequate preparedness for epidemics. Countries expressed interest in using EWARS but need capacities to properly collect entomological, epidemiological and meteorological data.

By the end of 2020, TDR started to lead the conduct of similar situation analysis on country capacities for arboviral disease surveillance and vector control for the rest of sub-Saharan Africa (i.e. central and south-eastern Africa). This activity is conducted in collaboration with the WHO-NTD, the WHO Emerging Diseases and Zoonoses Unit, the WHO regional office for Africa and all WHO country offices of the corresponding countries. Results should be made publicly available by the end of Q3 2021.

Since the end of 2019, a project is being conducted in collaboration with WAHO to support seven west African countries (three supported by TDR and four by WAHO) to strengthen entomological surveillance. Some activities had to slow down because laboratory personnel were busy with COVID-19 surveillance. Activities now seem to have returned to normal and progress is expected in 2021.

A regional webinar will be organized with WAHO and WHO-NTD early in 2021 to catch up with countries and discuss 2021 plans.

Remaining challenges

The further dissemination of EWARS in WHO regions and countries continues to be important, as well as the incorporation of the tool into national surveillance systems. Surveillance systems (both entomological and epidemiological) need to be strengthened for building context-specific EWARS and implementing its use.

With the COVID-19 pandemic, activities had to slow down as countries and partners were busy responding to national epidemic priorities.

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, Sri Lanka, Thailand.

WHO AFRO, ministries of health of the 16 West African countries, WAHO, the WHO country offices of all countries in Central, East and southern Africa, the WHO regional office for Africa, the WHO–NTD department, WHO–PHE and the WHO Emerging Diseases and Zoonoses Unit.

Estimated leverage created by this project:

- US$ 75,000 from the WHO–PHE to expand the use of EWARS to new countries they are supporting
- US$ 50,000 from the WHO–NTD to duplicate the situation analysis for West Africa for the central and south-eastern African regions
- Training workshops in Colombia, India, Malaysia, Sri Lanka and Thailand were financed by partner countries; TDR financed the facilitator only.

Gender aspects and vulnerable populations:

Target diseases affect the poor population strata more. Activities are conducted with the MoHs of the corresponding countries. Participants in meetings or training are designated by the ministries. TDR cannot interfere in the selection and unfortunately gender balance is rarely respected.

Training:

Training workshops for the use of the EWARS on Aedes-borne arboviral diseases in Colombia, India, Sri Lanka with follow-up activities by electronic media.

Strengthened institutions or networks:

- Surveillance and response teams in partner countries.
- Strengthening of the West African network of the reference laboratories for arboviral diseases.

Publications:

- None

Results dissemination and uptake:

Uptake of the EWARS tool by a number of countries as described above.

Plans for 2021–2023

1. Continue to strengthen surveillance capacities in African countries willing to implement EWARS in collaboration with WAHO and the WHO Regional Office for Africa. A new situation analysis should be conducted at the end of the year to inform 2022–2023 activities.
2. Finalize the situation analysis on arboviral disease in Central, East and Southern Africa.
3. Support the countries selected to conduct research demonstrating the impact of the use of EWARS and to communicate their results.
4. Continue collaboration with the WHO-PHE department for the rollout of the use of EWARS in additional countries.

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

SORT IT FOR TACKLING ANTIMICROBIAL RESISTANCE

Building sustainable operational research capacity to tackle antimicrobial resistance in low- and middle-income countries

The Structured Operational Research and Training Initiative (SORT IT) is a global partnership-based initiative coordinated by the WHO Special Programme for Research and Training in Tropical Diseases, TDR, UNICEF, UNDP, and the World Bank. SORT IT seeks to make countries "data rich, information rich and action rich", thereby improving health care delivery and outcomes.

In January 2019, the United Kingdom's Department of Health and Social Care contributed designated funding for a SORT IT project on tackling antimicrobial resistance (AMR). This is now termed the AMR–SORT IT project. This report highlights the mission, the target countries and progress made to date.

Mission: Build sustainable capacity to generate and utilize evidence on the emergence, spread and health impact of AMR.

How? Strong engagement with WHO country offices, AMR committees, and SORT IT partners in the evidence to action cycle championed by TDR and addressing country priorities.

Where? Six countries (2019–2021)

Expected strategic impact: Improved policy and/or programme practice for preventing the emergence and spread of AMR; sustained capacity to generate and utilize evidence beyond the life of the programme; expanded scope and use of routine programme data; and communities of practice through North-South and South-South collaborations.

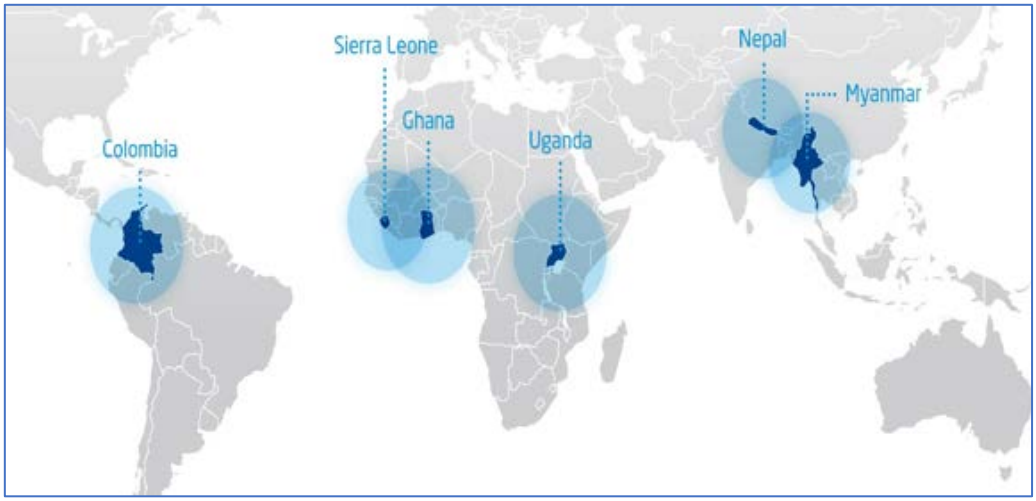


Figure 1. The six target countries of the AMR-SORT IT project

Overall summary of progress in 2020

During the first year of the project (2019), full implementation mode included 36 research studies in Ghana, Myanmar, Nepal, Sierra Leone and Uganda. Using a One Health approach, communities of practice were built with 24 partner institutions and six WHO country offices. All performance targets were exceeded.

During the second year (2020), high-level engagement and endorsement was established for 24 more AMR projects in Myanmar and Sierra Leone. TDR also joined forces with the WHO regional offices for

Africa, the Americas and South-East Asia to complement ongoing SORT IT studies with a grants scheme that is supporting 13 prospective studies on tackling AMR.

The unprecedented COVID-19 pandemic resulted in 97 (73%) of the 132 SORT IT participants and facilitators being deployed to the front lines of the pandemic response. This has required rescheduling of some SORT IT activities.

Overview of specific activities and achievements

The ***value for money*** of this project has continued due to TDR's established convening power, global engagement capacity and use of SORT IT know-how built up over the past decade. To promote *effectiveness* and *impact*, the programme continues to engage early with those who are expected to use the results of the research. Participant selections have promoted *equity* and LMIC first authorship. Some of the specifics of these aspects are covered in greater detail below.

Coordination, stakeholder engagement and national embedding of new projects

In 2020, engagement and endorsement at high-level of the national AMR committees was established for 24 new AMR national projects in Myanmar and Sierra Leone, while Colombia and Ecuador are currently receiving applications for 12 more projects. In Sierra Leone, a pre-mentoring workshop was pioneered lasting four days with members of the One Health platform, and this boosted the proportion of innovative projects from the environmental and agricultural sectors to 50% of the total projects (from 19%). Taking place several months prior to the start of research studies, this process allowed ample time for validation of data sources and further buy-in by those expected to use the results. Moving forward, it is expected that this approach will be embedded and harmonized into all SORT IT research.

The new pre-mentoring process strengthens the role of SORT IT as a catalyst within the entire evidence cycle: stakeholder engagement in defining the most relevant and appropriate research, implementation of research, knowledge management, research uptake and impact assessment.

Support to WHO country offices and national AMR committees

The AMR project includes additional financial support to WHO country offices to strengthen the AMR response where it has been lacking, e.g. for quarterly meetings of technical working groups and human resources (appointments of a SORT IT technical officer and research fellow).

SORT IT officers and fellows have now been designated in countries and are contributing to a wide range of strategic activities. The following are some examples of their wider contributions to tackling AMR in Ghana, Nepal and Sierra Leone:

- *Working with the media:* Media training to equip media practitioners on factual AMR reporting and building working relationships.
- *Bringing in the private sector:* Workshops to engage the private sector on rational antibiotic use involving poultry farmers, animal feed millers, over-the-counter medicine sellers and policy-makers.
- *Acting early and where it counts:* Antibiotic awareness and infection prevention campaigns in schools and communities.
- *What gets measured gets done:* Technical support for global AMR country assessment surveys, improving data for the Global AMR Surveillance System (GLASS), and strengthening surveillance on antibiotic consumption and resistance development in human and animal health, including the ESBL (extended spectrum beta-lactamase) Tricyclic project.

Support to WHO country offices and One Health committees is improving strategic planning and implementation of AMR plans.




Pictures: of AMR awareness and engagement campaigns (left to right) with the private sector, in communities and schools (Ghana).

Implementation of ongoing studies and SORT IT curriculum appraisal

There are 36 ongoing research projects in Ghana, Myanmar, Nepal, Sierra Leone and Uganda where data collection was fully under way when the COVID-19 pandemic struck. Obligatory travel restrictions, lockdowns, quarantine and redeployment of SORT IT participants and facilitators meant that research activities had to be paused in many settings. These are continuing, albeit at a slower pace, and will be fully re-established as soon as the COVID-19 situation improves. The period of lockdown allowed for an appraisal of the SORT IT curriculum for AMR. Modifications were made to the timetable and the content of lectures.

The small grants scheme for prospective research studies

TDR joined forces with WHO regional offices for Africa, the Americas, Europe and South-East Asia to complement ongoing SORT IT studies with a *Small Grants Scheme* for 13 new prospective research studies to tackle AMR. Examples of research topics include: antibiotic resistance in poultry and dairy farming, antibiotic consumption patterns, health care associated infections, knowledge on rational use of antibiotics and resistance patterns in specific bacteria (*Staphylococcus aureus* and *Neisseria gonorrhoeae).*

Although delayed by the COVID-19 pandemic, there are now 49 research projects in implementation mode which includes 13 prospective studies.

AMR–SORT IT officers and fellows lead health systems strengthening for COVID-19

The skills gained through SORT IT to tackle AMR are proving useful for the national COVID-19 response. SORT IT officers and fellows have shown leadership in COVID-19 preparedness and response activities

and their involvement complements and is synergistic to AMR activities, thereby strengthening health systems; for example, in improving health worker safety and infection, prevention and control. Here are some specific examples from all target countries:

- *Finding the cases early:* Technical, operational and training support to improve epidemiological surveillance, case investigation and contact tracing for COVID-19.
- *Improving diagnostic capacity:* Technical and procurement support to improve country-wide laboratory testing capacity for COVID-19.
- *Informing communities effectively:* Combating misinformation by training and monitoring the media, rumour tracking and management.
- *Keeping health facilities safe and saving lives:* Health facility assessments for infection, prevention and control compliance.
- *Protecting health workers:* Local production of alcohol-based hand-rub solutions and face masks.

By using SORT IT skills and being on the cutting edge of the COVID-19 response, SORT IT is strengthening health systems, which is also having a synergistic effect in tackling AMR.

Pictures *(left to right) Alcohol-based hand rub production in a hospital (Sierra Leone); media messaging on facemask use; risk communication with media (Nepal); verification of test results for COVID-19 (Nepal)*

Building communities of practice and global collaborations

Through TDR's convening power, 24 SORT IT partners from 24 countries were mobilized to engage with AMR–SORT IT activities thereby boosting North-South and South-South partnerships.

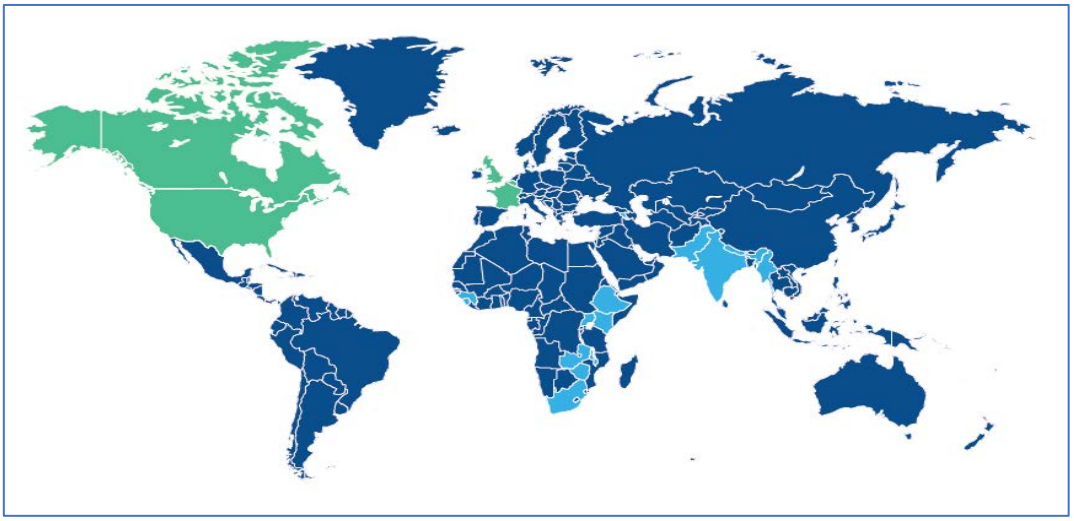


Figure 2. South-South and North-South collaborating institutions targeting AMR

In light blue: South-South collaboration in AMR (18 institutions): Academic Model Providing Access to Healthcare (AMPATH) (Kenya); Bahir Dar University (Ethiopia); Lighthouse Trust (Malawi); Damien Foundation (Nepal); Department of Medical Research (Myanmar); B.P. Koirala Institute of Health Sciences (Nepal); Bangalore Medical College and Research Institute (India); Ministries of Health (Pakistan, Sierra Leone, Uganda, Zimbabwe); National Centre for Training and Research in Rural Health (Guinea); School of Public Health (Nepal); Stellenbosch University (South Africa); Sustainable Health Systems (Sierra Leone); Tuberculosis Research and Prevention Center NGO (Armenia); and Zambart (Zambia).

In light green: North-South collaboration in AMR: (6 institutions): Institute of Tropical Medicine (Belgium); International Union Against Tuberculosis and Lung Disease (France); Médecins Sans Frontières (Luxembourg); Public Health England (United Kingdom); University of Toronto (Canada); and University of Washington (USA).

SORT IT research topics and data overview

Examples of research categories and topics:

1. *Strengthening surveillance and monitoring:* data quality from AMR surveillance sites (Nepal); Antibiotic resistance patterns and outcomes in neonates and children (Myanmar, Nepal).
2. *Reducing incidence of infection:* Infection prevention and control in health facilities (Myanmar, Sierra Leone, Uganda); Health care-associated infections with invasive devices and surgery (Nepal).
3. *Optimizing antimicrobial use:* Country-wide antibiotic consumption (Myanmar, Nepal, Sierra Leone, Uganda); Surgical antibiotic prophylaxis: how rational? (Nepal).
4. *Sustainable investments (AMR burden, diagnostics):* Burden of Methicillin resistant Staphylococcus aureus in health facilities (Myanmar); Blood cultures for febrile illnesses at AMR surveillance sites (Uganda).
5. *One Health:* Data quality for antibiotic use in animal husbandry (Ghana, Sierra Leone); antibiotic residues in meat and milk at shops (Nepal).

Note: Fifty-three per cent of studies focus on strengthening surveillance and monitoring data. This is vital to "feel the pulse" of the AMR situation in countries. Good surveillance data can create more effective and informative projects.

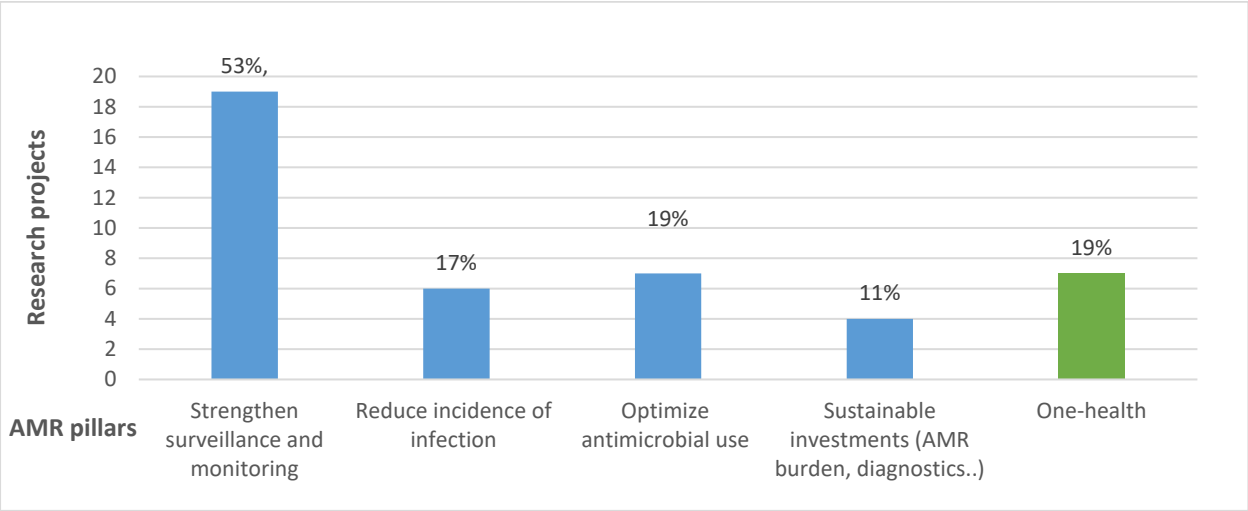


Figure 3. Research focus across AMR pillars

"SORT IT is contributing to the global AMR effort by developing operational research capacity that helps monitor country-level progress in real time," said Marc Sprenger, Former Director, WHO AMR Secretariat.

Table 2. Tracking progress in relation to targets for year 2 (2019–2020)

Indicator	Target	Progress	Status
Projects planned and initiated			
• Participants / research projects under way	42	36	COVID-19 delays
Manuscripts/ publications			
• First author from a LMIC country	80%	100%	Exceeded
• Female first author	30%	47%	Exceeded
• Government co-authors included	50%	69%	Exceeded
Training performance			
• Milestone completion (modules)	80%	100 %	Exceeded
• Participant satisfaction score (modules)	80%	90%	Exceeded
Collaborative partnerships and know-how			
• Southern institutions involved (south-south)	30%	75%	Exceeded
• SORT IT alumni as mentors	30%	70%	Exceeded

Challenges and solutions

The COVID-19 pandemic slows the pace of SORT IT activities

The unprecedented COVID-19 pandemic resulted in obligatory travel restrictions, lockdown, quarantine and redeployment of SORT IT participants and facilitators (frontline workers) to the response. An online survey was conducted involving all SORT IT participants from five target countries, 24 partner institutions and WHO country offices. The aim was to use an evidence-informed approach to assess the potential rescheduling needs of SORT IT modules.

For the 132 (of 133) individuals involved with AMR–SORT IT activities, 97 (73%) are currently on the front lines of the COVID-19 response. Sixty-three per cent (63%) expressed that there will be delays in implementing their research, the reasons being travel restrictions, quarantine, lockdowns and host government bans on gatherings.

The great majority (68%) of participants, facilitators and WHO country office staff, felt that SORT IT can now play a vital role in tackling the impact of COVID-19 on AMR. For example, irrational use of antibiotics and chloroquine, over-the counter sales and use of antibiotics due to lockdown, etc.

Proposed solution: SORT IT activities and modules through 2021 and 2022 had to be rescheduled and a submission for a no-cost extension is envisaged. This will need further discussions with the funder, and the Department of Health and Social Care (DHSC), United Kingdom.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

SORT IT is a Global partnership based initiative and building North-South and South-South partnerships is part of the modus-operandi of SORT IT. Collaboration has been established with six WHO country offices and 24 institutions which has boosted TDR's global engagement. Details covered above.

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. Initiatives are under way to try to leverage more funds from the same donor for a phase 2 and also from others.

Gender aspects and vulnerable populations:

Of 60 research projects that are under way or to be started, 47% of the principal investigators are women. The aim is to reach 50% or more. The AMR target countries are all LMICs with high AMR burden. 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 targets vulnerable populations.

Training:

The core focus of SORT IT is "research implementation coupled with capacity building" and it involves an integrated approach to "training of trainees" and a "training of trainers" so as to empower both participants and facilitators.

Number of advanced degrees:

Six operational research fellows have started work in 2020 and are reinforcing research activities at country level.

S**trengthened institutions or networks**:

Through the AMR project, the SORT IT partnership is strengthened with new funding, new institutional partners, new facilitators and new alumni. Implementing partners include 6 WHO country offices and 24 SORT IT partners (disease control programmes, academia and NGOs).

Publications:

No publications as yet as the programme was in its launch phase when COVID-19 hit. In 2020, 36 research projects are under implementation in Nepal, Myanmar, Ghana, Sierra Leone and Uganda and 24 more projects have been selected in Myanmar and Sierra-Leone. The findings from these projects will be written up for publication in peer-reviewed journals.

Related news:

Operation research on the frontline to fight AMR:

https://www.who.int/tdr/news/2019/or-on-frontline-to-fight-amr/en/.

See also the TDR website: https://www.who.int/tdr/capacity/strengthening/sort/en/.

Results dissemination and uptake: Roughly 70% of SORT IT studies report an impact on policy and/or practice and it is estimated that the uptake would be similar for AMR.

Plans for 2021 and beyond

- Given COVID-19-related delays, the principal focus will be to catch up on the effective implementation of the AMR–SORT IT programme in Asia, Africa and Latin America (US$ 10 million grant).
- Request a no-cost extension of six months into 2022 to the DHSC to ensure that all deliverables are met.
- Use the gains of the first phase of the AMR–SORT IT to request a second phase of funding from DHSC. The second phase would focus on assessing the impact of studies conducted in the first phase and further building "critical masses" of researchers. *(Train, Embed, Retain and Enable,* as conceptualized in the WHO General Programme of Work).
- TDR surveys have revealed that SORT IT can now play a vital role in tackling the impact of COVID-19 on AMR. If opportunity and funding allow, this challenge will tackle the irrational use of antibiotics and chloroquine, over-the counter sales and use of antibiotics due to lockdowns.
- Use current success to enhance TDR visibility and catalytic funding.

EVALUATION OF PRACTICAL APPROACHES TO IMPROVE TARGETED TREATMENT AND REDUCE DRUG MISUSE AND RISK OF RESISTANCE

1) Evaluation of C-reactive protein (CRP) as a biomarker for bacterial infection or marker of severity in dengue; and

(2) Identification of microbiological causes of invasive infection in young infants

Febrile illnesses lacking proper diagnosis are leading to suboptimal case management and unnecessary overuse of antimicrobials, raising the risk of antimicrobial resistance (AMR). There is therefore a need to obtain better evidence on causal agents of fever and assess effectiveness and feasibility of point-of-care markers to guide the use of antibiotics and medical management in general at field level.

Progress in 2020

CRP as a biomarker for bacterial infection or marker of severity in dengue: This work was completed in 2019, study results published this year.

Microbiological causes of invasive infection in young infants in rural Africa: This work was completed in 2019, publication being finalized.

Contributions towards TDR key performance indicators

Publications:

Vuong NL, Le Duyen HT, Lam PK, Tam DTH, Vinh Chau NV, Van Kinh N, Chanpheaktra N, Lum LCS, Pleités E, Jones NK, Simmons CP, Rosenberger K, Jaenisch T, Halleux C, Olliaro PL, Wills B, Yacoub S. C-reactive protein as a potential biomarker for disease progression in dengue: a multi-country observational study. BMC Med. 2020 Feb 17;18(1):35. doi: 10.1186/s12916-020-1496-1. PMID: 32063229; PMCID: PMC7025413.

Althaus T, Lubell Y, Maro VP, Mmbaga BT, Lwezaula B, Halleux C, Biggs HM, Galloway RL, Stoddard RA, Perniciaro JL, Nicholson WL, Doyle K, Olliaro P, Crump JA, Rubach MP. Sensitivity of C-reactive protein for the identification of patients with laboratory-confirmed bacterial infections in northern Tanzania. Trop Med Int Health. 2020 Mar;25(3):291-300. doi: 10.1111/tmi.13358. Epub 2020 Jan 6. PMID: 31808588; PMCID: PMC7265697.

Plans for 2021–2022

Subject to availability of funds:

- Research to evaluate the use of CRP in decision-making in primary health-care settings (impact of the use on CRP in decisional algorithm in Africa).

ER 1.3.3: Population health vulnerabilities to vector-borne diseases (VBDs): Increasing resilience under climate change conditions in Africa (Operationalizing One Health and the application of a scorecard/metrics-based system)

The overall goal of this Expected Result is to generate evidence to enable development of innovative strategies to reduce VBD-related human vulnerability and to increase resilience of African populations to VBD-related health threats. In addition, it aims to broaden and extend knowledge, research capacity, collaboration and policy advice products that can be used throughout Africa and other regions.

During previous years (from 2013), and through the TDR-IDRC Research Initiative on Vector Borne Diseases and Climate Change, this Expected Result had delivered on the following: 1) identification and characterization of potential impact on vector borne diseases (VBD) of complex socioecological conditions of water systems in Africa; 2) assessment of VBD risks under various environmental exposure conditions and vulnerability context; 3) decision support processes and tools for health impact assessment and management; and 4) a network and community of practice with capacity built to better manage climate and environment-related health risks. For the current biennium (2020–2021), this Expected Result addresses an extraordinary opportunity to build on the outputs of the TDR-IDRC Research Initiative as the basis for operationalizing the One Health approach (see Figure 4). This opportunity has now become even more urgent and a critical need with the emergence of COVID-19, the re-emergence of Ebola and other zoonotic and VBD threats. For example, the social and economic dislocations COVID-19 has catalysed can be expected to increase health risks by increasing the vulnerability of many already vulnerable populations well beyond the pandemic period.

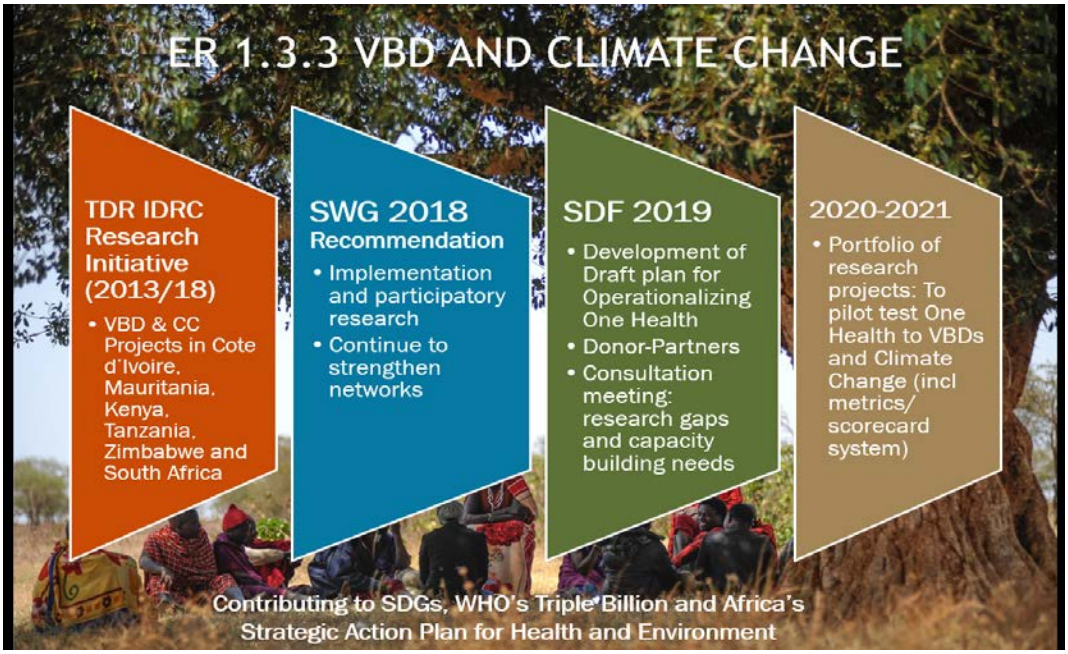


Figure 4. Expected Result – Evolution of ER 1.1.3. Vector borne diseases and climate change

Human health is intimately linked to the state of the environment, including the effects of climate change. IMP SWG members highlighted the importance of the interrelationship between health and climate and acknowledged that research in this area remains highly topical.

One of the approaches that could prove to be valuable in the implementation of joint interventions in health and environment is the One Health approach. This would ensure that human, animal, and environmental health concerns are addressed in an integrated, multisectoral and holistic manner, and provide a more comprehensive understanding of the problems and potential solutions than would otherwise be possible with siloed approaches by the stakeholders concerned (researchers, public health practitioners, environment, agricultural sectors, communities and other relevant partners). At the same time, the One Health approach is quite complex and its practical implementation and operationalization not straightforward. Therefore, the stakeholders concerned will benefit from capacity building on the One Health approach to build resilience against VBDs under climate change conditions.

Operationalizing One Health encompasses a set of tools, currently under development through ER 1.3.3, that combines well-documented, evidence-based principles and practices that specifically address the problem of population vulnerabilities to VBDs in the context of climate change. It is widely agreed among international development agencies, medical and public health scientists that One Health can contribute significantly to global health in this regard. Yet the challenge is how to extend One Health operationalization efforts that are focused on organizational requirements, on elaboration of specific methods including performance metrics (through a scorecard) that reflect the interdependence of human health and ecosystem health. Thus, for operationalizing One Health, established methods are being combined from the environmental and health fields using analytical systems, planning and organizational approaches to form the basis of risk mitigation and management against emerging zoonotic diseases, climate variability and extreme weather events. The One Health scorecard system is critical to measuring success and evaluating performance of the One Health plan through performance indicators for collectively developing a metrics standard that incorporates variances of specific settings for a harmonized evaluation (see Figure 5).

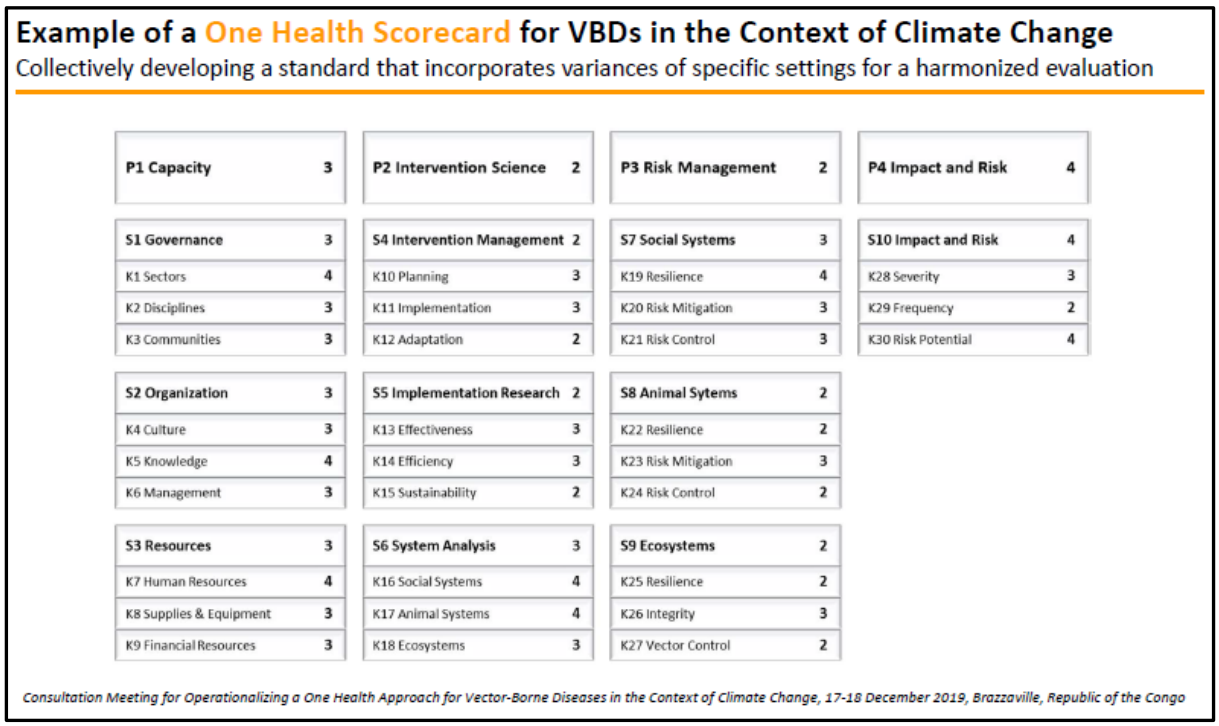


Figure 5. Expected Result 1.3.3 – Example of a One Health scorecard

A significant advance toward accomplishing this was to employ implementation science in the design of a framework/draft plan and associated provisional metrics and indicators, which was presented and discussed during the One Health Consultation Meeting held in Brazzaville, Congo, last December 2019 (see Figure 6). Participated in by the IMP SWG (represented by Dr Mario Henry Rodriguez, who also chaired the meeting), key researchers from the TDR-IDRC network, representatives from the ministries responsible for health and environment, and partners/collaborators [AFRO, Fondation Mérieux, UNEP, OIE-Africa, FAO-Africa, Pan Africa Mosquito Control Association (PAMCA), the Brazzaville meeting acknowledged the value of the TDR-IDRC research initiative for laying the foundation for more holistic, locally adaptable health systems capable of VBD and climate change risk management, envisioned for the One Health approach. The refinement of the framework/draft plan from the meeting is expected to result in an essential policy and management tool that currently does not exist for operationalizing One Health.

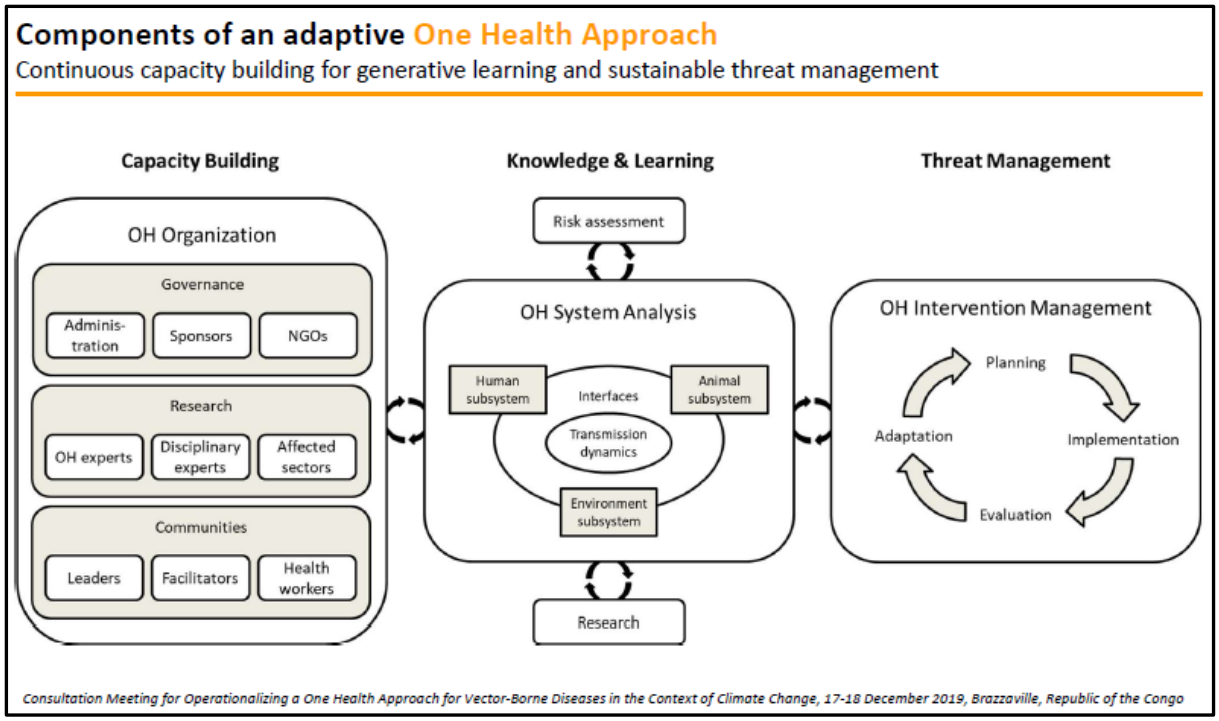


Figure 6. Expected Result 1.3.3 – Components of an adaptive One Health approach

The main recommendation from the Brazzaville meeting was a Call to Action to implement the draft plan to fully develop the One Health operationalization system using the extensive experience and data outputs from the TDR-IDRC Africa Initiative. Aligned with the Libreville Strategic Action Plan to Scale Up Health and Environment Interventions in Africa (2019–2029), this scorecard and performance metrics system is envisioned to assist in mitigating the impacts of VBD health consequences for the most vulnerable populations. It was further recommended to implement the Draft Plan on a pilot scale based on the Initiative's projects in Côte d'Ivoire, Kenya, Tanzania and South Africa to facilitate increased integrated coverage of health, agricultural and environment interventions for primary prevention of VBDs while integrating ecosystems preservation in Africa.

Progress in 2020

The following activities have been completed and undertaken:

- Consultation Meeting for Operationalizing a One Health Approach for VBDs in the context of Climate Change, 17-18 December 2019, Brazzaville, Republic of Congo (see Figure 7).
- *Organization:* Jointly organized and funded by TDR with Fondation Mérieux; participants included TDR partners and collaborators, the IMP SWG, researchers, public health practitioners, ministry representatives from public health and environment, other stakeholders.
- *Objectives:* 1) To discuss how research products from the TDR-IDRC Research Initiative on VBDs and Climate Change can be aligned with and contribute to the Strategic Action Plan (SAP) to Scale up Health and Environment Interventions in Africa (Libreville, 2019–2029); and 2) To discuss and provide input into a Draft Plan that will guide the implementation of One Health.

Figure 7. Expected Result 1.3.3 – Group photo from the Consultation Meeting

- *Brief:* 1) Participants were informed of the new Libreville Strategic Action Plan and discussed how future work can be aligned with and contribute to the SAP; 2) The Draft Plan was discussed, providing input to Operationalizing One Health; 3) A workshop was conducted on country scenario-setting for the application of the One Health scorecard/metrics system; and 4) Research and capacity building needs were identified for the implementation of One Health.
- *Recommendations from the meeting:* 1) Revise Draft Plan for One Health with input from participants; 2) Call to Action to pilot test the Draft Plan including the metrics-based assessment tool; 3) Request TDR and partners to support the testing of the Draft Plan through funding and technical support for country projects and activities for 2020–2021.
- *Engagement with partners:* TDR is engaged with the following partners:
  - Fondation Mérieux
  - UNEP
  - OIE-Africa (World Organization for Animal Health)
  - FAO-Africa (Food and Agriculture Organization)
  - PAMCA (Pan Africa Mosquito Control Association)
- *Collaboration:* Established collaboration with Global Health Group International (led by Professor Bruce Wilcox at the ASEAN Institute for Health Development, Mahidol University, Thailand) for technical support for the delivery of products relevant to Operationalizing One Health. Further examples are:
  - Completion of a Master Plan and Guidance Document for use by research projects in the development of their workplans.
  - Development of an interactive web-based collaboration platform for knowledge sharing and to maximize communications and information exchange.
  - Planning and organization of a "writeshop"[2] for African principal investigators to assist in development of workplans to help facilitate TDR's engagement with technical and policy personnel with AFRO, WHO country office in Africa, UNEP, OIE-Africa, FAO-Africa, Fondation Mérieux and PAMCA.
  - To assist TDR in providing guidance to countries (researchers, policy-makers and other

[2] This is an intensive workshop for creating a complete publication or written knowledge product.

relevant stakeholders) to lay the foundation and tools necessary for translation and uptake of One Health strategies and strengthened capacity for integrating human, animal and ecosystem health.
  - Preparation of a publication and research dissemination plan.

- Participation at the 26th Tripartite Annual Executive Meeting on One Health, WHO Headquarters, Geneva, 12–13 February 2020
  - The objective of the meeting was to discuss critical issues at a political and strategic level, review progress and address bottlenecks.
  - TDR presented its One Health research portfolio in the session on One Health Research as part of information sharing among partners and with an interest in strengthening collaborative research activities on specific topics and methodologies.
  - The One Health research portfolio on antimicrobial resistance was presented, as well as projects on VBDs and climate change.

- Participation of TDR in the Virtual 2nd Meeting of the Interagency Liaison Group on Biodiversity and Health, 4–6 May 2020
  - This meeting was hosted by the WHO Department of Environment, Climate Change and Health and explored topics related to the Convention on Biological Diversity (CBD).
  - Participation contributed to: the finalized guidance for mainstreaming **biodiversity for nutrition and health**; the WHO **Q&A on climate and health** and **post-COVID-19 recovery**; and the WHO **Q&A on biodiversity, health and infectious diseases.**
  - The joint WHO-CBD work programme on biodiversity and health was discussed and how to leverage alignment in the context of COVID-19.
  - TDR contributed towards the preparation of a Draft Global Plan of Action on Biodiversity and Health, including the addition of key elements of the biodiversity-inclusive One Health Guidance.

- Completion of a Virtual Writeshop with principal investigators (from Côte d'Ivoire, Kenya, South Africa and Tanzania) on 8, 16, 22 and 29 July 2020
  - The aim was to develop workplans for pilot testing the Draft Plan for One Health, including the use of the scorecard/metrics system.
  - Proposals were then submitted to TDR by 1 August 2020. Contracts were then processed, with projects starting by the 1st week of September 2020 for a duration of one year. Please see summaries of the four projects below. also Figures 8 through 11.

Proposed Pathway/Logic Model Projects (four)

Project 1. From an EcoHealth research project to operationalizing the One Health approach in West Africa (Côte d'Ivoire and Mauritania)

Principal Investigator: Dr Brama KONE, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire (CSRS), Abidjan, Côte d'Ivoire

- *Main objective:* To operationalize a One Health approach through the assessment of capacity-building needs among stakeholders, activities and outcomes of knowledge and learning process and risk management strategies.
- *Specific objectives:*
  - To analyse the actors (governance, organizations) and resources, capacity-building activities and their outcomes, employing socio-ecological systems analytical methods and stakeholder analysis.

- To assess the effectiveness of the principles of an EcoHealth approach in the implementation of One Health intervention science and risk management scorecard components.
- To investigate how the previous project results and experience with malaria and schistosomiasis interventions, and the role of public versus private health facilities could guide interventions to improve health systems disease risk management capacity, and considering a One Health approach, taking as an example the zoonotic disease COVID-19 pandemic management.

Project 2. Operationalizing the One Health Initiative for Malaria and Rift Valley Fever Project in Kenya

Principal Investigator: Professor Benson B.A. ESTAMBALE, Research, Innovation and Outreach, Jaramogi Oginga Odinga University of Science and Technology, Bondo, Kenya

- *Main objective:* To contribute to the operationalization of a One Health Research protocol for Implementation Research
- *Specific objectives:*
  - To synthesize the existing project data based on a One Health approach and guided by the tenets of social-ecological systems framework (SESF).
  - To build the capacity of the project team on the One Health approach to climate-sensitive VBD research.
  - To publish synthesized research papers based on the One Health approach which incorporates findings from the project.

Project 3. One Health Operationalization in Tanzania

Principal Investigator: Professor Paul S. GWAKISA, The Genome Science Centre and Department of Veterinary Microbiology and Parasitology, Faculty of Veterinary Medicine, Sokoine University of Agriculture, Morogoro, Tanzania

- *Specific objectives:*
  - To build capacity for transdisciplinary research for operationalizing One Health at different levels (community level/extension workers/postgraduates and young researchers).
  - To work closely with all stakeholders and develop a framework for addressing key One Health-based community needs using a theory of change approach (e.g. the human-livestock-wildlife interface and zoonotic diseases).
  - To collaboratively develop a metrics-based assessment of a One Health scorecard.

Project 4. Operationalizing One Health in Ingwavuma Community: Developing Transdisciplinary Methodology (South Africa)

Principal Investigator: Professor Moses J. CHIMBARI, College of Health Sciences, University of Kwazulu-Natal, Durban, South Africa

- *Main objective:* To address capacity development, knowledge, learning and threat management for operationalizing One Health in South Africa.
- *Specific objectives:*
  - To enhance and develop capacity at different levels for operationalizing One Health.
  - To co-develop a theory of change with stakeholders to easily identify priority areas for research and intervention.
  - To identify hurdles to full empowerment of communities through a co-development of an M&E framework.

RES. QUEST.	SPEC. OBJ.	INPUTS	METHODS / ACTIVITIES	OUTPUTS	SOURCE OF VERIFICATION	OUTCOMES
HOW TO CREATE STANDARDIZED (REPEATABLE) AND MEASURABLE TRANSDISCIPLINARY METHODOLOGY / APPROACH, INCLUDING ONEHEALTH TO TACKLE ZOONOTIC AND OTHER SOCIO-ENVIRONMENTAL DISEASES, DRAWING ON THE ENDED ECOHEALTH RESEARCH PROJECTS?	SO1	- MTV-CC Project dissertations (Masters and PhDs), reports, publications and other documents (previous Ecohealth project implemented in Korhogo) - Other literature - MTV-CC project team members	- Project dissertations (Masters and PhDs), reports, publications and other documents review - Other literature review - Paper writing workshop - Participation to thematic working groups	- Proof of concept validating the OneHealth scorecard capacity building component from the MTV-CC project	- Project reports - Scientific publications Workshops' reports	- ONE HEALTH OPERATIONALIZED FOR VBD CONTROL & PREVENTION IN THE CONTEXT OF CLIMATE CHANGE - BROADER APPLICATION OF THE ONE HEALTH OPERATIONALIZATION TO ZOONOSES AND OTHER EMERGING/RE-EMERGING INFECTIONS (INCLUDING COVID 19)
	SO2	- Project dissertations (Masters and PhDs), reports, publications and other documents (previous Ecohealth project implemented in Korhogo) - Other literature - MTV-CC project team members	- Project dissertations (Masters and PhDs), reports, publications and other documents review - Other literature review - Paper writing workshop - Participation to thematic working groups	- Proof of concept validating the OneHealth scorecard intervention science and risk management components from the MTV-CC project	- Project reports - Scientific publications Workshops' reports	
	SO3	- MTV-CC project Stakeholders - Project dissertations (Masters and PhDs), reports, publications and other documents (previous Ecohealth project implemented in Korhogo) - Other literature - MTV-CC project team members	- Remote/face to face interviews with community leaders and key informants from private and public health centers and health system (District health actors) in the management of Malaria, schistosomiasis and Covid-19 pandemic - Literature review - Paper writing workshop - Result dissemination workshop - Participation to thematic working groups	- Impact of the MTV-CC project on diseases management at community and Health system levels - Lessons from Covid-19 management - Proof of concept validating the OneHealth scorecard impact and risk components from the MTV-CC project	- Project reports - Workshops' reports - Scientific publications	
	SO4	- MTV-CC project Stakeholders - Recorded videos during MTV-CC project implementation - Other projects leaders/team members from the ongoing initiative	- Video recording with researchers and other project stakeholders in Côte d'Ivoire and Mauritania on project implementation process and lessons learned for operationalizing OneHealth scorecard	- Video documentary	Video	

Figure 8. Proposed Pathway/Logic Model for Project 1

Note: The EcoHealth Research Project to Operationalizing One Health Approach in West Africa (Côte d'Ivoire and Mauritania).

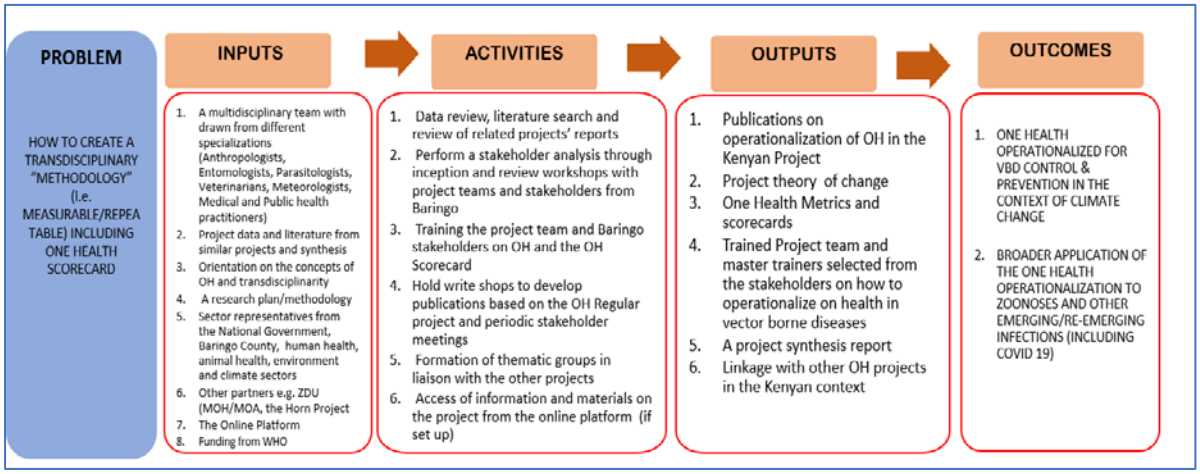


Figure 9. Proposed Pathway/Logic Model for Project 2

Note: Operationalizing One Health Initiative for Malaria and Rift Valley Fever Project in Kenya

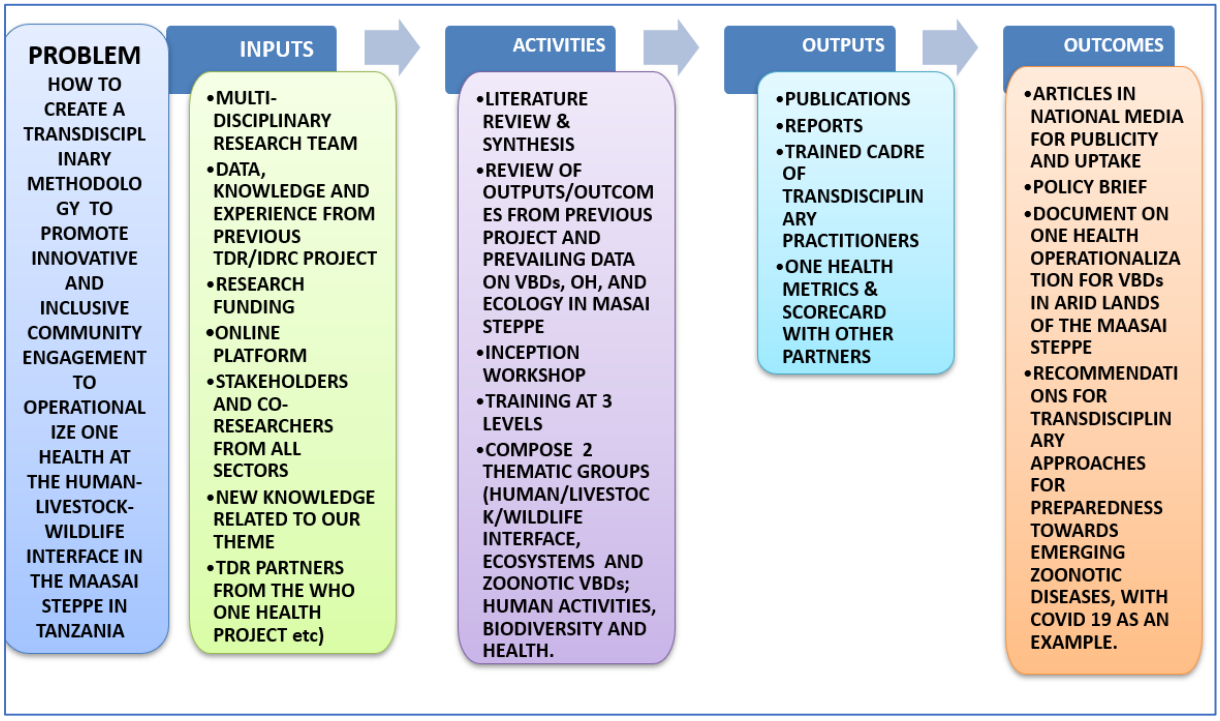


Figure 10. Proposed Pathway/Logic Model for Project 3

Note: One Health Operationalization in Tanzania

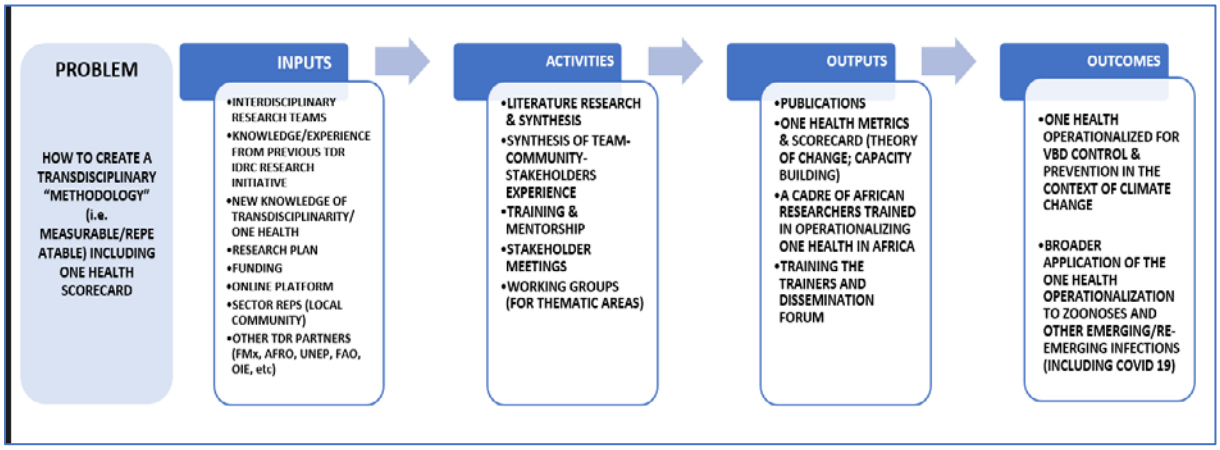


Figure 11. Proposed Pathway/Logic Model for Project 4

Note: Operationalizing One Health in Ingwavuma Community: Developing Transdisciplinary Methodology (South Africa)

A scientific session at the recent virtual World One Health Congress 2020, 30 Oct–3 Nov 2020. The title of the session was *A Metrics-Based Evaluation of One Health: Toward Control of VBDs in the context of Climate Change in Africa*. This session brought together six scientist-leads (from Bangkok, Germany, Côte d'Ivoire, Kenya, South Africa and Tanzania) to further articulate the fundamentals of One Health and to draw insights into the conduct of integrative research using One Health transdisciplinary systems approaches including pilot testing a scorecard/metrics-based evaluation for its operationalization.

For more information on this scientific session, please refer to https://www.fondation-merieux.org/en/events/6th-world-one-health-congress-2020-virtual-event/. For more information on the One Health scorecard, please refer to https://onehealthscorecard.org/. (See Figure 12 below.)

Special Partner Session Co-organized by The Special Programme for Research and Training in Tropical Diseases, WHO, and Fondation Merieux: A Metrics-Based Evaluation of One Health: Toward Control of Vector Borne Diseases in the Context of Climate Change

TITLE:
Special Partner Session Co-organized by The Special Programme for Research and Training in Tropical Diseases, WHO, and Fondation Merieux: A Metrics-Based Evaluation of One Health: Toward Control of Vector Borne Diseases in the Context of Climate Change

TIME:
Monday 2 November, 10:00 - 12:00 CET

TRACK:
Special Partner Sessions

CHAIRS:
Bernadette Ramirez, World Health Organization
Valentina Picot, Fondation Mérieux

PROGRAMME:

1. Fundamentals of One Health: The operational challenge to intervention design and implementation
   Bruce Alexander Wilcox, Global Health Group International, Thailand
2. Capacity building for a metrics-based evaluation of One Health
   Carsten Richter, Global Health Group International, Germany
3. Panel discussion: Toward building competencies for operationalizing One Health
   Moses John Chimbari, University of KwaZulu-Natal, South Africa
4. Panel discussion: Toward building competencies for operationalizing One Health
   Benson B.A. Estambale, Jaramogi Oginga Odinga University of Science and Technology, Kenya
5. Panel discussion: Toward building competencies for operationalizing One Health
   Paul Simon Gwakisa, Sokoine University of Agriculture, Tanzania
6. Panel discussion: Toward building competencies for operationalizing One Health
   Brama Kone, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire & University Peleforo Gon Coulibaly of Korhogo, RCI, Côte d'Ivoire

Figure 12. Special partner session

Aside from the scientific session on One Health at the virtual World One Health Congress 2020 (mentioned above), TDR also participated in another scientific session, *Addressing zoonotic diseases at the animal-human-ecosystem interface: responding to threats,* as part of the Science Policy Interface (Global Health Security) – see Figure 13 below.

Addressing zoonotic diseases at the animal-human-ecosystem interface: responding to threats

TITLE:
Addressing zoonotic diseases at the animal-human-ecosystem interface: responding to threats

TIME:
Saturday 31 October, 10:00 - 12:00 CET

TRACKS:
Science Policy Interface, Global Health Security

CHAIRS:
Bernadette Ramirez, World Health Organization
Ab Osterhaus, RIZ, University of Veterinary Medicine, Hannover, Germany and chair One Health Platform

PROGRAMME:

1. The One Health EJP network of European public organisations aims at reinforcing cross-sector preparedness
   Hein Imberechts, Sciensano, the Belgian Institute for Health
2. Integrating climate and environment public dataset in surveillance for early warning
   Maria Grazia Dente, National Centre for Global Health, Istituto Superiore di Sanità, Italy
3. Improvement of One Health collaboration at the national level for early warning, risk-assessment and control of emerging zoonotic diseases
   Catharina Maassen, National Institute for Public Health and the Environment, The Netherlands
4. Beavers, Brexit and birch trees: what do the next 10 years have in store for wildlife and how will it impact the UK's epidemiological landscape?
   Flavie Vial, Animal and Plant Health Agency, United Kingdom

Figure 13. Addressing zoonotic diseases at the animal-human-ecosystem interface

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Building on previous projects from ER 1.3.3, TDR's unit on IR is best positioned for research and capacity building toward operationalizing an integrated, multisectoral and holistic One Health approach for the control of VBDs in the context of climate change. Through TDR's convening and facilitation role, various partners and stakeholders from different sectors are brought together for the One Health approach which is envisioned as a novel, essential policy and management tool (including a metrics/scorecard system) for the control of VBDs at a time of changing environment/climate conditions in Africa.

TDR is engaged with the following partners:

AFRO; Fondation Mérieux; UNEP; OIE-Africa (World Organization for Animal Health); FAO-Africa (Food and Agriculture Organization); PAMCA (Pan Africa Mosquito Control Association).

Plans for 2021–2023

2021:

For 2021, the following are the planned activities that will be implemented:

- Complete the pilot testing of the One Health operationalization plan through the country projects.
- Refine the One Health Scorecard and Metrics.
- Continue support to countries to strengthen operational and technical capacity for integrating human, animal and ecosystem health among key partners and stakeholders.
- Research uptake and dissemination of new knowledge, learnings and policy briefs from the projects (for example, a research uptake symposium is proposed at the EcoHealth Conference in Durban, South Africa, in June 2021).
- Publications in peer reviewed journals.

2022–2023:

The proposed plans for this biennium include the following:

- A call for proposals to scale up the implementation and application of the One Health metrics/scorecard in Africa.
- Technical and funding support for a portfolio of projects in Africa.
- Mentoring and capacity building through a training course on Operationalizing One Health.

▪ Workstream: Research for Implementation

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

STRUCTURED OPERATIONAL RESEARCH AND TRAINING INITIATIVE (SORT IT)

Many public health programmes in LMICs are "data rich but information poor". Too often, data that is relevant for improving public health is left unused on shelves or electronic servers.

SORT IT seeks to change this paradigm by making countries and institutions "data rich, information rich and action rich," thereby improving health care delivery and outcomes. SORT IT is a global partnership-based initiative coordinated by TDR and implemented with over 50 partners, and is now aligned to SDG 17 *Strengthen the means of implementation and revitalize the global partnership for sustainable development*, generating high-quality, timely and disaggregated data for informed decision-making.

Mission: Support countries and institutions to generate and utilize evidence for informed decision-making in public health.

How? Strong engagement with WHO country offices, national decision-makers and SORT IT partners in the "evidence to action cycle" championed by TDR and addressing country priorities.

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

Uniqueness: An adaptable and output-based programme that targets front-line workers and decision-makers. It is gender balanced, LMIC-focused and has performance targets and metrics for accountability and tracking of progress.

The SORT IT approach: SORT IT targets front-line health workers (implementers) and decision-makers with little or no research experience. Through "learning by doing" the approach simultaneously combines research training with research implementation, thereby empowering participants with skills to conduct research. Training of trainers is also built in and similarly empowers mentors. The model has inbuilt metrics and performance targets for accountability, learning by doing and continued improvements.

The SORT IT cycle runs over 10–12 months with four training modules run sequentially: Module 1 – Protocol writing; Module 2 – Quality assured data capture and analysis); Module 3 – Manuscript writing for publication; and Module 4 – Knowledge management and dissemination for research uptake. More information on SORT IT is available at

https://www.who.int/tdr/capacity/strengthening/sort/en/.

SORT IT relevance and recognition: The SORT IT model is adaptable to various geographic contexts, languages, thematic areas and research methodology. It is thus relevant to achieving the SDGs and UHC. Any given SORT IT programme offers a unique opportunity to intersect with and contribute to six to eight SDG goals at the same time. For example, a SORT IT on AMR addresses SDG 12 (focused on AMR), SDG 3 (good health), SDG 4 (quality education), SDG 5 (gender equity), SDG 6 (safe water and sanitation), SDG 9 (research and innovation), SDG 15 (healthier environments), and SDG 17 (partnerships).

Progress in 2020

TDR now leads the global SORT IT partnership which has become stronger than ever before, expanded to 93 countries and in line with IMP SWG recommendations, and has re-oriented its compass to SDG 17 covering partnerships, and achieving UHC. It continues to be efficiently franchised and has evolved from a "training course" to a "programme" of evidence generation and utilization. Franchised expansion continues.

Close collaboration has been established with WHO country offices and over 50 implementing partners.

With the un-precedented COVID-19 pandemic, SORT IT demonstrated its front-line role as SORT IT trainees are responding to the pandemic in 85 countries where investment in people and in research training has significantly contributed to building health system resilience for tackling pandemics.

These achievements have reinforced TDR's coordination role, widened TDR partnerships and elevated TDR's role to new levels of strength and international recognition.

The ***value for money*** of SORT IT has continued due to TDR's established convening power, global engagement capacity and the use of SORT IT know-how that has been built over the past decade. To promote *effectiveness* and *impact*, TDR continues to engage early with those who are expected to use the results of the research. Participant selection criteria for enrolling in SORT IT programmes have promoted *equity* and LMIC first authorship.

In 2020, progress continued in three areas recommended by the Scientific Working Group:

- transition SORT IT to improve upstream data collection, downstream use of evidence for decision-making and data sharing;
- provide focus on niche areas with designated funding, such as antimicrobial resistance, while promoting global engagement, intersectoral approaches and South-South-partnerships;
- set benchmarks for "quality of implementation research" evidence; and
- transition to improving upstream data collection and downstream use of evidence for decision-making.

A collaborative approach with WHO country offices and stakeholders is used to ensure early engagement in the planning and implementation phases and to ensure their buy-in. Additional leverage from SORT IT partners and trained alumni enhances effectiveness and impact.

In terms of capacity building, the perspective is to: "TRAIN, EMBED, RETAIN and ENABLE" which is in line with WHO's General Programme of Work (GPW-13). The SORT IT cycle is summarized in Figure 14 below.

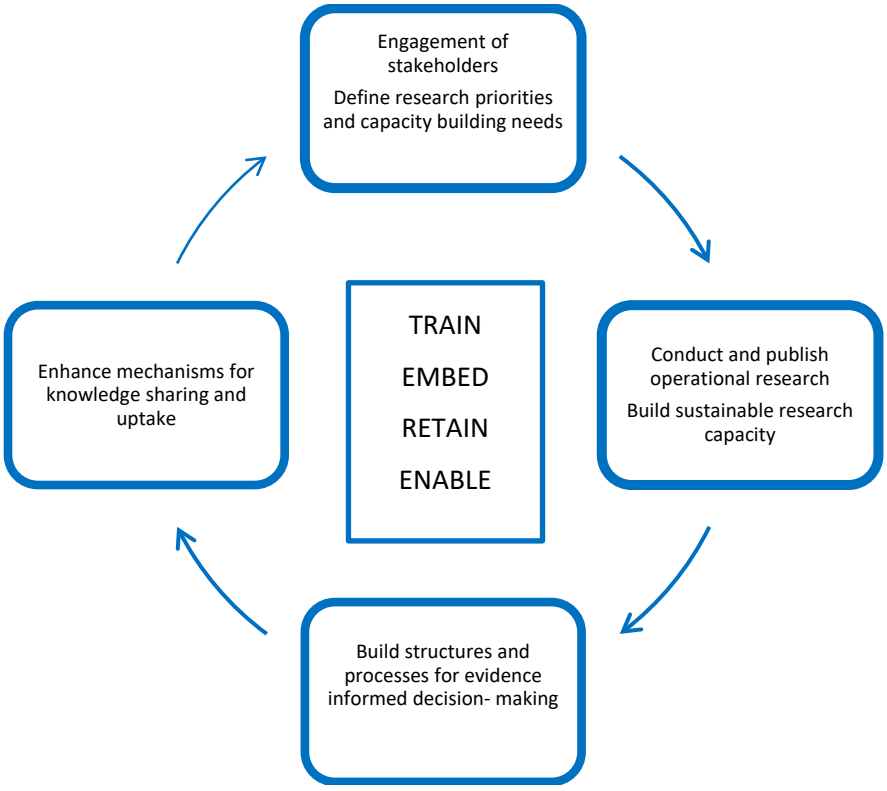


Figure 14. Expected Result 1.1.7 – The SORT IT cycle

In terms of SORT IT expansion, by July 2020, through a franchised approach, SORT IT was scaled up to 93 countries with 619 cumulative publications (98% LMIC first authors, 60% last authors and LMIC 48% women). The SORT IT partnership now includes over 50 implementing institutions, has trained over 925 participants with 70% of projects reporting an impact on policy and practice.

In 2020, there were 75 publications in which LMIC authors constituted 98% of first authors (48% women) and 92% of last authors (up from 61% in 2017). Fifty percent (50%) of SORT IT alumni (n-411) continued running new research projects independently which is evidence that sustainable capacity was built.

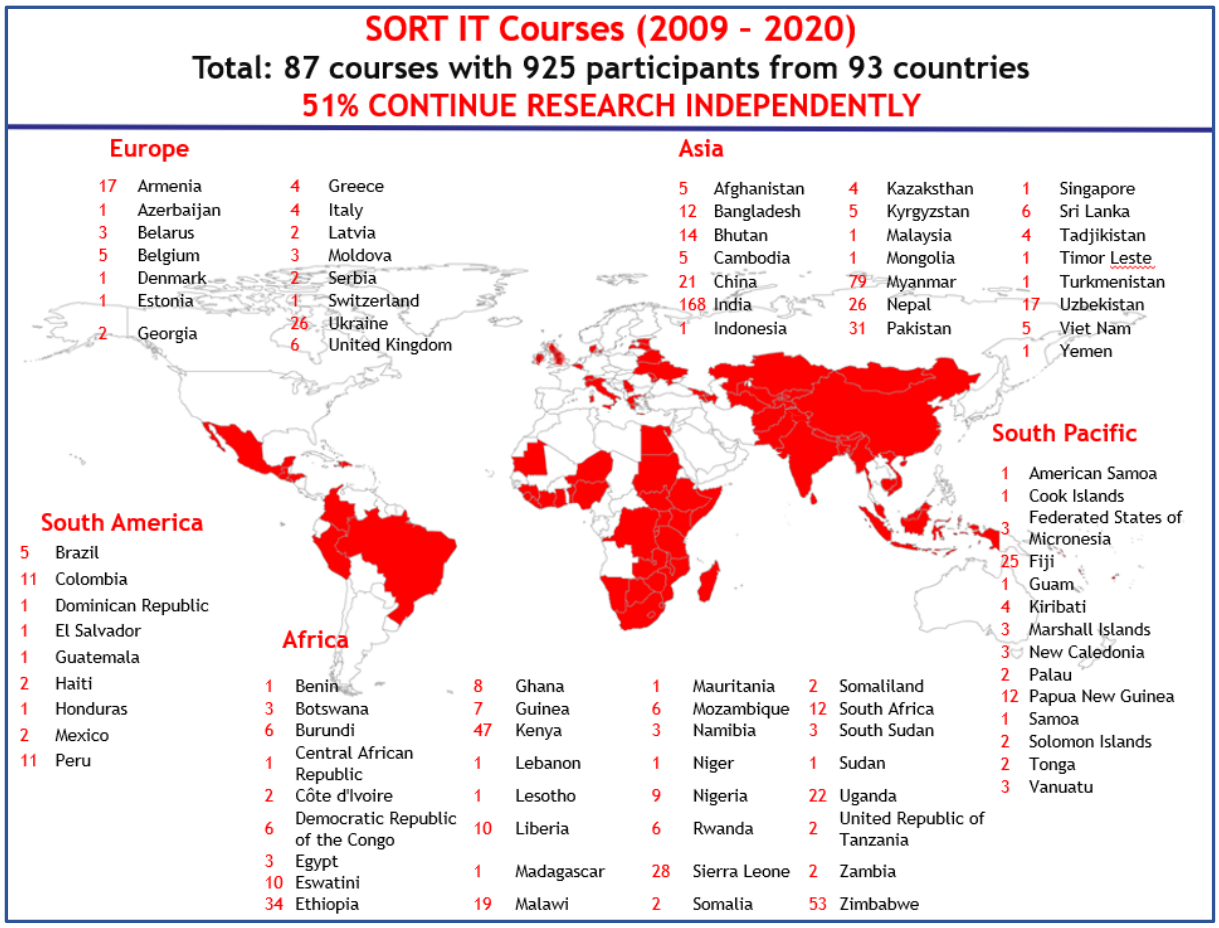


Figure 15. Expected Result 1.1.7 – Geographic scale up of SORT IT projects (2009–2020)

SORT IT has redirected its compass to embrace AMR and other UHC themes including NTDs, snake bites and marginalized populations. The main thrust is on tackling AMR (US$ 10 million) by building sustainable operational research capacity to generate and utilize evidence on the emergence, spread and health impact of AMR.

The AMR project started in 2019 and moved into full implementation mode with 36 research studies under way in Ghana, Myanmar, Nepal, Sierra Leone and Uganda. High-level engagement and endorsement was established for 24 more AMR projects in Myanmar and Sierra Leone. Using the One Health approach, new communities of practice were built with 24 partner institutions and six WHO country offices. All performance targets were exceeded.

TDR also joined forces with the WHO regional offices for Africa, the Americas and South-East Asia to complement ongoing SORT IT studies with a grants scheme that is supporting 13 prospective studies on AMR. More information on the SORT IT AMR project is given under ER 1.1.4.

In 2020, TDR started two “catalytic SORT IT initiatives” linked to the SDGs and UHC. The first is on **Ending TB/MDR-TB in “marginalized populations**” through operational research, capacity building and evidence-informed decision-making in East Europe and Central Asia (*Find. Treat. All*). This programme was led by SORT IT alumni in Armenia and Ukraine and involved six countries, six national TB programmes and four NGOs from Armenia, Georgia, Kyrgyzstan, Moldova, Tajikistan and Ukraine. The objective was to develop “local research projects aimed at providing local solutions with local ownership”.

The research themes included: optimized TB case finding in marginalized populations, digital technology for TB care, adjunctive interventions, shorter multidrug-resistant tuberculosis (MDRTB) regimens, TB/HIV integration and data quality.

The findings from this second research cycle continue to make an impact. The box below gives two examples of innovative research on marginalized populations that is having an impact. For example, the evidence continues to be used by the Alliance for Public Health in Ukraine to optimize current programmes of GFATM and by the US President's Emergency Plan For AIDS Relief (PEPFAR) in 14 EECA countries. It is also informing the implementation of the roadmap for the Tuberculosis Action Plan for the WHO European region.

A dissemination symposium took place at The Union's *World Lung Health Conference* in October 2020. The experience typified how SORT IT collaboration can lead to a community of practice that strengthens regional efforts to use operational research to improve public health.

Examples of innovative research on marginalized populations and UHC

Breaking the paradigm: Optimized Case Finding (OCF) multiplies tuberculosis detection among key populations in Ukraine. The index TB cases from marginalized populations are empowered to refer up to eight close contacts within their social networks for TB investigations. The TB case detection rate was 3930/100,000 with OCF – 3.6 times more effective than routine household case finding and 66 times higher than passive case finding.

People who inject drugs and have tuberculosis: Opioid Substitution Therapy (OST) improves treatment outcomes in Ukraine. Involving over 100 implementing NGOs offering TB/HIV services this study showed that TB treatment success improved significantly with OST (61%) than without (42%) and can contribute to achieving the WHO Initiative "*Find.Treat.All.* #End TB".

The second catalytic SORT IT initiative was on tackling **neglected tropical diseases** and **snake bites** in Ethiopia (a UHC target country). Following a "call for action on NTDs" led by TDR and 19 partners in the BMJ https://gh.bmj.com/content/4/1/e001334.long the outputs of ten research studies were published in 2020 in the *Journal of Infection in Developing Countries.* https://www.jidc.org/index.php/journal/issue/view/177

This pioneering initiative on NTDs was hosted by the Ethiopian Public Health Institute and had the full buy-in of the WHO country office and the WHO-NTD department. It involved over 20 institutions (and seven national universities). As Ethiopia is one of the WHO pilot countries for UHC, it is planned to collaborate with the Africa CDC and develop a hub for NTDs in the African region. SORT IT has aligned its compass to niche areas of UHC such as AMR, NTDs and marginalized populations, with the NTD motto: "lift the burden and leave no one behind".

The COVID-19 pandemic and development of a virtual SORT IT platform (digital technology in health care)

The COVID-19 pandemic response is placing unprecedented demand on skilled health workers. TDR conducted cross-sectional surveys to assess the role of TDR and SORT IT alumni in tackling COVID-19. Two important publications stemmed from this initiative:

- *Strengthening the core health research capacity of national health systems helps build country resilience to epidemics: a cross-sectional survey* [https://f1000research.com/articles/9-583/v2]; and
- *Investing in Operational Research Capacity Building for Front-Line Health Workers Strengthens Countries' Resilience to Tackling the COVID-19 Pandemic* [https://www.mdpi.com/2414-6366/5/3/118].

The evidence showed that over 77% of trainees in 85 countries in Africa, Asia, Europe, the South Pacific and the Americas were involved with the COVID-19 pandemic response.

The key message is that investing in people and in research training ahead of public health emergencies strengthens health system resilience for tackling pandemics. It also helps the integration of research within health systems.

Due to the COVID-19 pandemic and associated travel restrictions, quarantine and ban on international gatherings, all face-to-face SORT IT modules were postponed. To mitigate the effect of this unfavourable and unexpected situation, TDR and an NGO partner in Armenia, the Tuberculosis Research and Prevention Center (TB-RPC), developed a SORT IT virtual platform which was used to finalize the SORT IT workshop on marginalized populations involving individuals from 11 countries. Although the gold standard is the in-person, face-to-face approach, this virtual platform provides an alternative at a time when the evolution of the COVID-19 pandemic remains unpredictable.

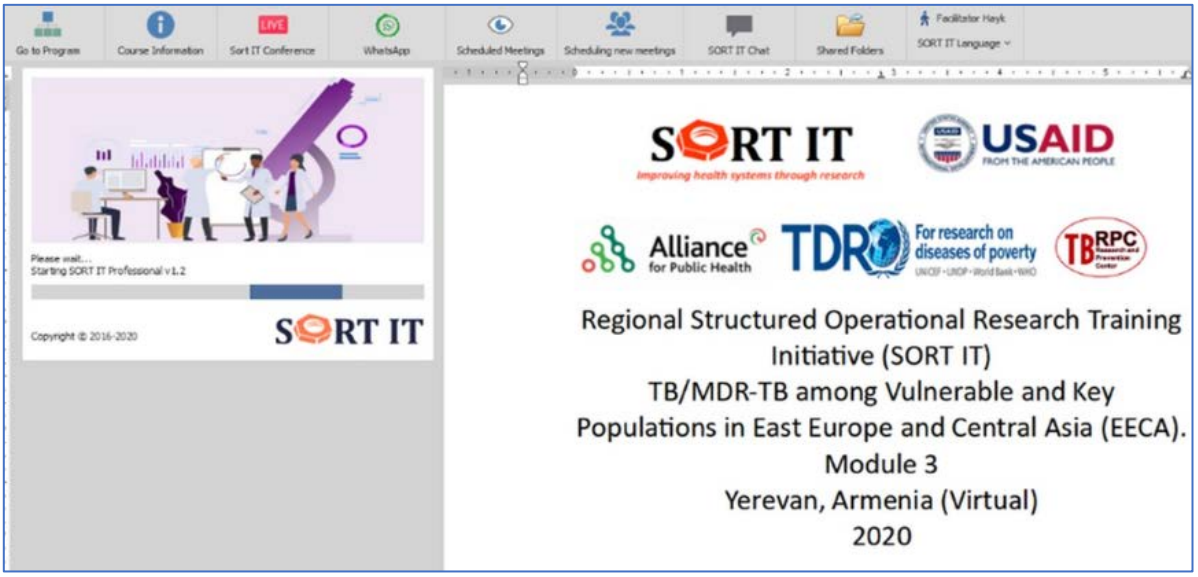


Figure 16. Expected Result 1.1.7 – Screen shot of the virtual SORT IT platform

About 77% of SORT IT alumni in 85 countries are on the front-lines of the COVID-19 pandemic response. In light of COVID-19, a SORT IT virtual platform was developed to provide an alternative means of continuing training.

Setting benchmarks for "Quality of Implementation Research" evidence

SORT IT has established benchmarks for quality of operational research capacity building and generated evidence. The first benchmark is the systematic monitoring and reporting of SORT IT performance standards for all TDR registered SORT IT courses. Table 3 shows the progress against these targets.

Table 3. Expected Result 1.1.7 – Progress against SORT IT monitoring and evaluation targets

Performance Indicator	Target	Progress (as of August 2020)
Participant satisfaction scores per SORT IT module	80%	99%
Participants completing all course milestones	80%	91%
Papers published within 18 months of submission	80%	93%
Papers assessed for impact on policy and practice	80%	90%

Note: n-42 completed courses.

The second benchmark is an independent assessment of the quality of reporting according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE checklist). A total of 392 publications involving 72 countries, 50 journals, 28 publishers and 24 disease domains were included. Publications involved North-South and South-South collaboration, 87% in 90% respectively. The majority (89%) were in immediate open access journals. Eighty-eight (88%) of publications achieved a STROBE reporting score of >85% (excellent), 10%) achieved a score of 76–85% (good) and 1% a score of 65–75% (fair). None were deemed as being unsatisfactory (less than 65%).

This study involved the largest dataset of observational studies ever assessed for quality of reporting and shows that SORT IT is generating high-quality, evidence-informed decision-making in public health. The study will be a yardstick for future audits ensuring vigilance, while SORT IT is being franchised in efforts towards achieving UHC.

Benchmarks for quality of operational research have been set and this is useful to ensure that evidence generated from SORT IT can be used for evidence-informed decision-making in public health.

Remaining challenges

- Addressing the demand for SORT IT in Francophone Africa.
- Helping countries to sustain operational research through improved use of Global Fund grants and embedding operational research within strategic plans and academic curricula.
- Finding new ways to address the exorbitant cost of open access publications.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Twenty-four SORT IT partners were brought on board through the AMR programme, including academic institutions, nongovernmental organizations (NGOs), various WHO departments and ministries of health. EURO and WHO offices in six countries now collaborate with TDR.

Estimated leverage created by this project:

In 2020, US$ 120 000 for three SORT IT programmes was co-financed by other partners.

Gender aspects and vulnerable populations:

In 2020, 50% of trainees were women. In 2020, TDR supported SORT IT courses focused on vulnerable and key populations (involving six EECA countries) and neglected tropical diseases (in Ethiopia).

Training:

The core focus of SORT IT is research for implementation coupled with capacity building. In 2020, there were three SORT IT courses with 23 participants. These courses were run in Ethiopia, South Africa and virtually from Armenia.

Number of advanced degrees:

In 2020, through TDR collaboration with universities, four SORT IT research fellows from Armenia, Egypt, Ethiopia and Iran were enrolled in PhD programmes.

Strengthened institutions or networks:

The SORT IT partnership now includes over 50 implementing partners and a network of 925 alumni and 260 mentors. Partners include WHO country offices, disease control programmes, academia and NGOs.

Publications:

In 2020, there were 75 publications. LMIC authors constituted 98% of first authors (48% women) and 92% of last authors. Cumulatively since 2009, there has been 619 publications by the SORT IT partnership in 50 journals (impact factor 0.4–19) and in five languages (English, Russian, Spanish, Portuguese and French).

Related news:

Special SORT IT supplement: Neglected Tropical Diseases: responding to calls for action from the front lines in Ethiopia – https://www.jidc.org/index.php/journal/issue/view/177

Neglected tropical diseases and the sustainable development goals: an urgent call for action from the front line – https://gh.bmj.com/content/4/1/e001334.long

COVID-19: Strengthening the core health research capacity of national health systems helps build country resilience to epidemics: a cross-sectional survey – https://f1000research.com/articles/9-583/v2

COVID-19: Investing in Operational Research Capacity Building for Front-Line Health Workers Strengthens Countries' Resilience to Tackling the COVID-19 Pandemic – https://www.mdpi.com/2414-6366/5/3/118. See also the updated TDR website: https://www.who.int/tdr/capacity/strengthening/sort/en/

Results dissemination and uptake:

Roughly 70% of SORT IT studies report an impact on policy and/or practice.

Plans for 2021–2022

- Given the delays incurred due to the COVID-19 pandemic, the principal focus will be to catch up on the effective implementation of the AMR–SORT IT programme in Asia, Africa and Latin America (US$ 10 million grant).
- In close collaboration with WHO country offices, "catalytic initiatives" will be supported linked to UHC and to enhance TDR leadership, visibility and funding. The focus will be to create new hubs for operational research on marginalized and key populations in the EECA region and Ethiopia (in collaboration with the Africa CDC).
- Bridging the Francophone gap for SORT IT will be supported by WHO country officers and leveraged with SORT IT partner initiatives. This effort will link new Francophone initiatives with ongoing regional initiatives in Ethiopia.
- Along with implementing partners, franchising for expansion of SORT IT for UHC will continue, while maintaining quality standards.

ER 1.1.8: Maximized utilization of safety information for public health decision-making

TDR actively promotes safety evaluation, working with countries to improve systems to monitor and effectively use drug safety data to strengthen evidence informing treatment guidelines and improve patient outcomes. A major limitation of current efforts to ramp up access to medicines is the lack of monitoring programmes of similar scale to evaluate potential safety issues. In many disease-endemic countries, safety monitoring systems are still weak, and under-reporting is a persistent problem.

In addition, when existing, the data collected is often not optimally used and sharing and pooling of data needs to be promoted to improve understanding of risks related to medications. This is a multi-pronged programme aimed at piloting ways to generate new evidence on the safety of therapeutic interventions.

TDR works with countries to improve country capacity for safety monitoring and to pilot implementation research through new approaches to embed safety monitoring in public health systems.

In parallel, TDR works with other WHO programmes to set up data sharing initiatives and central databases. In collaboration with WHO HIVAIDS, a pregnancy drug safety database was developed which pools country data issued from national or local pregnancy exposure registries to document risks to mothers and their babies following drug exposures during pregnancy. On a similar project, TDR works with the WHO–GTB to develop a global database to pool and consolidate safety information on medications used to treat MDR-TB in different countries, called the global aDSM database. More recently TDR also collaborated with WHO–HIV/AIDS to set up a new database for antiretroviral (ARV) toxicity monitoring.

This Expected Result has been only slightly evolving over time, but remains a key, distinctive area of work for TDR. This Expected Result had three main area of works in 2020–21 biennium:

- The central databases for safety data (central database for pregnancy exposure registries, global aDSM database for TB drugs, and central ARV database);
- Strategies to improve safety monitoring in public health programmes and optimize acquisition and analysis of safety data; and
- Capacity building for safety monitoring in scope of the ADP project focusing on building capacity to facilitate access and delivery of new health technologies for TB, malaria and NTDs.

This work is funded by core funding and designated funds from the UNDP for the Access and Delivery Partnership (ADP) project.

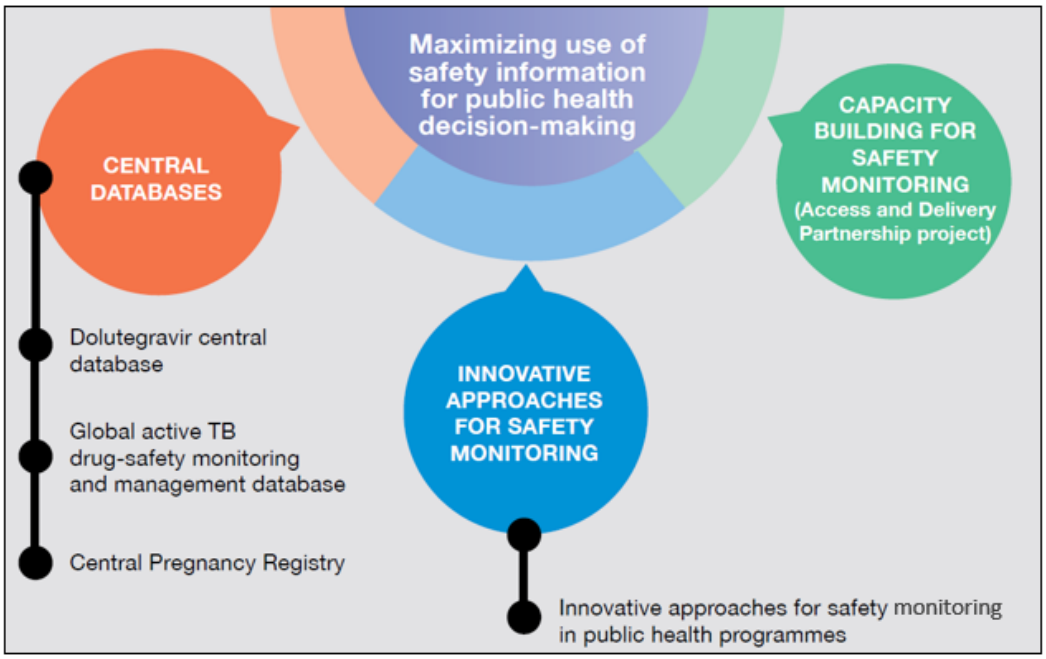


Figure 17. Expected Result 1.1.8 – Overview of utilization of safety information projects

Progress in 2020

1. Central databases for safety data

Central database for pregnancy exposure registries

Advocacy and work continued to formalize data transfer agreements and proceed to data transfer; and networking with countries has been strengthened. As part of the advocacy work, TDR prepared a scientific poster on the objectives and characteristics of the WHO central databases and how countries can practically contribute their data. This was presented at the 10th international francophone e-conference on HIV/hepatitis, AFRAVIH 2020 (8–11 November 2020), targeting francophone countries in Africa. In addition, TDR collaborates with the WHO–HIV/AIDS department and IMPAACT (International maternal, paediatric, and adolescent AIDS clinical trials) for the development of an action framework for strengthening epidemiological surveillance of HIV drug safety during pregnancy. This started as the participation in the conference "Approaches to enhance and accelerate study of new drugs for HIV and associated infections in pregnant women", December 8–9, 2020. Participation in the working group will last until mid–2021. This will hopefully help promote the use of a pregnancy exposure registry as one of the data sources available to study drug safety in pregnant women. Even though a registry is a prospective observational cohort of randomly selected pregnant women with frequent limitations such as loss to follow up, low level of enrolment, and low statistical power, the current knowledge gap on ARV drug safety in pregnancy justifies that such an alternative type of data source is used for pharmacovigilance activities.

Global aDSM database for TB drugs (for active TB drugs safety monitoring and management)

The WHO central database for safety monitoring of anti-TB drugs, facilitates data sharing and pooling of safety data issued from national or local databases developed in the scope of aDSM, and hence enhances the detection of new signals and informs future updates of global policies on the use of anti-TB drugs. aDSM should also provide information about rare and as yet unrecognized adverse effects and drug–drug interactions. This database is designed to pool country data on Serious Adverse Events (SAEs) presented by patients treated with new anti-TB drugs for MDR TB.

The project was initiated after WHO–GTB identified an urgent need for additional data on the safety of new TB drugs and is being implemented in collaboration with GTB. Initially funded by TDR (in 2017), the technical management of the central database by an external supplier is now funded since the last biennium by Global TB, while TDR provides technical expertise and overview of the project.

Additional data was obtained in the first semester of 2020. A review of the data was commissioned in collaboration with WHO–GTB and WHO–PV (the funding department). Data from 1380 cases from 16 countries were extracted from the central database in July 2020 and analysed, including all SAE cases from the aDSM database. Non SAEs event were not included based on a recommendation from WHO–PV. Results of the analysis were presented at the WHO Advisory Committee on Safety of Medicinal Products annual meeting (October 2020), and the database usefulness was flagged by participants during the meeting. The final report should be available Q1 2021.

Central database for the safety monitoring of dolutegravir and antiretrovirals in the general population

Discussion and guidance has been provided to different groups in order to facilitate data sharing. Several groups have indicated interest in participating in the data sharing efforts initiated by TDR, mainly from groups following up cohorts of HIV patients, but no additional formal agreement has been signed.

In the last one to two years, there have been more and more discussions about potential flags that some ARVs taken in the long term could be associated with specific toxicity (in particular, a potential effect of some ARVs on weight gain, metabolism of lipids and carbohydrates). There was a gap in drug toxicity monitoring and TDR led the development of a specific ARV central database, funded by WHO–HIV/AIDS. A data transfer agreement was signed with Eswatini and Uganda at the end of 2020 and data are expected in early 2021. TDR continues providing the technical overview of the data transfer process, linking up with the external programmer currently using the central database and advocating for data sharing.

In the future, as WHO–PV has expressed interest in maintaining this database, it is felt that this would no longer constitute a niche for TDR. The process of handover to the WHO–PV department of the central databases for pregnancy drug safety surveillance, the aDSM, and ARV safety monitoring are planned to start early 2021.

2. Innovative approaches to safety monitoring at community level:

Based on the lessons learned from previous TDR research in the field, new proposals for research to strengthen pharmacovigilance in public health programmes were selected with focus on:

- Approaches that have the potential to be sustainable and being scaled up.
- Link with national control pharmacovigilance centre.

New research projects

Table 4. Expected Result 1.1.8 – Two proposals selected for funding

Institution	Country	Project title
FDA Philippines	Philippines	Understanding and improving underreporting of ADR in Philippines
Global Health Uganda Ltd (GHU)	Uganda	Pilot-testing of a patient-centred peer support intervention using digital tool to promote the detection, reporting and management of adverse drug reactions among people living with HIV in Uganda

WHO–PV was involved in the review of proposal and final selection. The two proposals identified are very promising in terms of identifying strategies and tools that could be applied much more broadly in the future in other LMICs. They intend to test/evaluate new e-health tools that have been developed recently and are supported by WHO and are likely to be deployed in several countries, so the studies will help make sure the tools are implemented in the best way possible to serve public health needs.

Full research protocols were prepared in the last quarter of 2020 and submitted to their national ethics committees in December 2020. Implementation is expected to start early 2021.

3. Capacity building for safety monitoring (UNDP Access and Delivery Partnership project)

Different capacity-building activities were organized or funded under the scope of the Access and Delivery Partnership (ADP) project in Burkina Faso, Ghana, Malawi and Senegal.

The activities in each country focus on priorities identified following discussion with the national pharmacovigilance centres and national control programmes (mainly, TB, malaria and NTDs) to ensure that the activities to strengthen capacities will support access to safe drugs.

The current funding is to March 2021, with discussions ongoing to extend the project for another two years.

Remaining challenges

Though data sharing is an accepted principle, agreements and formalization of this take considerable time.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

WHO control programmes at HQ: in particular, WHO–HIV and WHO's Global TB Programme.

- Countries involved in safety data collection which are contributing data to the central databases.
- UNDP, WHO (strengthening regulatory capacity) and PATH are partners of the ADP projects.

Estimated leverage created by this project:

US$ 100 000 (in-kind from countries and other collaborators participating to projects, in particular for data collection).

Gender aspects and vulnerable populations:

The project on pregnancy exposure registry specifically targets needs and gaps in knowledge with reference to women's health.

Strengthened institutions or networks:

Institutions within the MoHs in target countries were supported with capacity for safety monitoring through the ADP project.

Results dissemination and uptake:

Presentation at congresses and conferences, use of evidence generated by the central databases as part of the review of evidence for treatment guidelines.

Plans for 2021–2022

For 2021:

- Databases: Continuation of data sharing efforts, acquisition of additional data and analysis of data and handover to WHO–PV.
- Completion of studies on safety in public health, initiation of new studies to strengthen pharmacovigilance in countries.
- ADP: Support for capacity strengthening in ADP target countries will continue, including expansion to new countries (workplan to be developed in Q1–2021).

ER 1.2.1: Strategies to achieve and sustain disease elimination

The IMP SWG identified research for such strategies as big-ticket items for TDR to focus on. Currently, there are two projects within this ER:

- Visceral leishmaniasis (VL) elimination in the Indian subcontinent – aka KEP (kala-azar elimination programme); and
- Onchocerciasis Elimination in Africa.

For both diseases, TDR-managed research was critical for availability of the tools and strategies that have allowed VL in the Indian subcontinent and onchocerciasis in Africa now being considered for elimination.

VISCERAL LEISHMANIASIS ELIMINATION IN THE INDIAN SUBCONTINENT

This is a country-led, long-term project that aims to generate an evidence base for approaches and interventions to be deployed throughout the different phases of VL elimination programmes and ensures policy uptake and rollout.

Since 2005, TDR has been working with research institutions and control programmes in the Indian subcontinent to conduct research that informs policy and practice for the elimination target of one case of VL per 10,000 inhabitants. One of the longest and most successful implementation research programmes at TDR, these efforts have contributed to a sharp reduction of cases. However, further investments and new approaches are required to ensure elimination is sustained. Resurgence of the disease could mean loss of all the gains and waste of all the efforts made so far to control the spread of the disease.

To address this, work is under way at the level of i) active case detection; ii) vector control and reduction of transmission; and iii) research policy interface.

- End of September 2019, the annual TDR expert meeting on VL took place to discuss priority research in the context of VL elimination from the Indian subcontinent. Key priorities were identified, which include:
  - integration of surveillance and case finding into other programmes (e.g. leprosy or TB programme, polio campaign, etc.);
  - improvement of follow-up compliance and patient retention (e.g. role of innovative, e-tools to strengthen follow up, etc.);
  - case investigation and identification of (new) foci of infection;
  - role of co-infection as a risk factor; and
  - understanding of hot spots (why certain areas remain as hot spots despite extensive vector control and surveillance).

Progress in 2020

- Two studies are ongoing (one is near ending) in Nepal and Bangladesh looking at community-based surveillance of infected VL vectors with active case search by village health workers and a community-based vector control approach.
- The study to evaluate the use of the rK39 diagnostic test in febrile populations presenting in secondary-level health centres in Bangladesh and India is nearing completion and should provide insight into what could be the best diagnostic tool for the elimination phase.
- A protocol for a study on prevalence of HIV/VL co-infection in Bangladesh has been submitted to ethics committees for review and the protocol is being modified to accommodate feedback.
- The protocol writing workshop, where new protocols for 2021 studies will be developed, was further delayed due to the COVID-19 situation. It was held virtually in a series of meetings between late September and November 2020 and three common study protocols have been developed with projects to be carried out in both Nepal and Bangladesh.
- Publications of research results (see below).

Table 5. List of studies ongoing in July 2020

Country	Title	Status	Short summary
Nepal	Research Support for the Consolidation and Maintenance Phase of the Visceral Leishmaniasis Elimination Programme in Nepal	Ongoing (Ending)	***General objective:*** To identify evidence-based interventions that will ensure the sustainable, cost-effective achievements of the VL elimination goal as part of the national communicable diseases control programmes. ***Specific objectives:*** 1. Develop and test a vector surveillance system (including vector infection rates) that engages community for the early identification of new VL foci and monitoring of ongoing VL transmission. 2. Analyse the management system (with emphasis on the district level) to identify opportunities for active surveillance and early response to new foci as well as to other fever diseases. 3. Assess the integration of community-based vector control in active case detection packages to VL and other fever diseases (such as malaria, dengue, Lymphatic Filariasis, Chikungunya). 4. Identify settlement characteristics and housing conditions as potential risk factors for VL transmission and other diseases.
Bangladesh	Research Support for the Consolidation and Maintenance Phase of the Visceral Leishmaniasis Elimination Programme in Bangladesh	Ended	***General objective:*** To identify evidence-based interventions that will ensure sustainable achievements of the VL elimination goal as part of the national communicable diseases control programmes. ***Specific objectives:*** 1. Develop and test a sand fly surveillance system involving community people and frontline health workers in sand fly collection and separation using sticky trap and their transportation to a central lab for molecular detection of Leishmania donovani (LD) infection. 2. Analyse the district level health management system to identify opportunities for its sensitization about NKEP activities particularly for active surveillance and early response to re-emerging / new foci as well as to other fever diseases. 3. Assess the integration of community-based vector control in relation to re-emerging / new VL foci.

Country	Title	Status	Short summary
Bangladesh	Embedding diagnostics for Visceral Leishmaniasis into the secondary health care system in Bangladesh.	Ongoing (Ending)	***Primary objective:*** • Test the performance of diagnostic tests (rK39, Ag-ELISA, qPCR) for VL on patients with acute febrile illness ***Secondary objectives:*** 1. Evaluation of disease (VL) conversion in patients with samples positive for VL markers (rK39, ELISA or qPCR). 2. Establishment of diagnostic algorithm for VL in secondary health care settings to include clinical signs and symptoms, and diagnostic tests.
India	Embedding diagnostics and surveillance of Visceral Leishmaniasis into non-specialized VL centres in the health care system in India	Ongoing (Ending)	
Bangladesh	Determination of HIV seroprevalence in the Visceral leishmaniasis patients of Bangladesh	Submitted to EC	***Principal objective:*** To determine the seroprevalence of HIV infection among the VL patients in Bangladesh. Specific objectives: 1. Determination of the seroprevalence of HIV infection in the new VL cases and relapse VL patients. 2. Determination of the seroprevalence of HIV infection in PKDL patients.

Table 6. Gender and data sharing aspects

GENDER RELATED ITEMS	CURRENT STATUS/ANSWERS
Research projects:	
Project has data collected and is planning to include sex and age disaggregated data.	Yes, in all data for VL research projects.
Project has/is planning to include other social stratifiers/variables such as ethnicity, geographical location, migration status, sexual orientation etc.	Only when specifically part of the research question, not as a general rule.
Number of operational and/or implementation research projects that ensure a gender sensitive approach (i.e. that explicitly acknowledge gender dimensions).	Some of the research components, in particular when referring to community involvement have specifically considered the role of female community workers (as they are the focal point for VL surveillance in the communities).
Research teams:	
Project has at least 50% of women within the research teams.	NO. Unfortunately, the gender balance is completely off, there are only males in the research team, and VL meeting participants from the Indian subcontinent are usually mainly male. Only one study has a woman as PI (study on HIV seroprevalence in Bangladesh). We have limited power on this as the only few groups working on VL are male. We keep encouraging them to engage women researchers. We could put it as a requirement that the groups we support include female co-investigators but this may not guarantee effective involvement on its own.
Specify number of PI that are men/women/other within each project.	Four men, one woman. (Please see above)

Contributions towards TDR key performance indicators

Partnerships and collaborations:

WHO–NTD VL global programme, countries offices, MoH in endemic countries and researchers.

Estimated leverage created by this project:

In-kind contributions and direct investments into research in the three countries are difficult to assess in monetary terms. There has been direct financial support from meeting participants (about 30% of the meeting budgets).

Gender aspects and vulnerable populations:

Data on study participant, sex disaggregated pending

Principal Investigators: Four men, one woman.

Strengthened institutions or networks:

The research generates evidence that helps countries to decide on the best interventions for VL control and elimination.

Publications:

Olliaro PL, Coulibaly JT, Garba A, Halleux C, Keiser J, King CH, Mutapi F, N'Goran EK, Raso G, Scherrer AU, Sousa-Figueiredo JC, Stete K, Utzinger J, Vaillant MT. Efficacy and safety of single-dose 40 mg/kg oral praziquantel in the treatment of schistosomiasis in preschool-age versus school-age children: An individual participant data meta-analysis. PLoS Negl Trop Dis. 2020 Jun 22;14(6):e0008277. doi: 10.1371/journal.pntd.0008277. PMID: 32569275; PMCID: PMC7360067.

Mondal D. et al., "A comparative study of sandfly control interventions with insecticidal wall paint, insecticidal durable wall lining, insecticide-impregnated bednets and indoor residual spraying with insecticide in Bangladesh" (submitted)

Banjara M. et al., "Response to Visceral Leishmaniasis Cases through Active Case Detection and Vector Control in Low Endemic Non-program Districts of Nepal" (submitted)

Singh-Phulgenda et al., "Serious adverse events and mortality following treatment of Visceral Leishmaniasis: A systematic review and meta-analysis" (submitted)

Results dissemination and uptake:

Data to be published and presented at conference. MoHs are part of the research priority meetings and are informed regularly of the research in order to facilitate research uptake.

Plans for 2021–2023

- Completion of ongoing studies.
- Initiation of two to four new studies for the post-elimination phase for the most suitable interventions in low VL/PKDL-endemicity areas. The aim will be to better understand the epidemiological situation underlying detection of new cases in areas where there were no reports before; integration of VL into ongoing programmes; improved detection of new cases and follow up of cases after treatment; and vector and disease surveillance. The projects to be supported will be selected based on the priority identified with countries.
- The VL experts meeting will be held later in 2021 with participation of national programme managers and academics to review achievements and define research needs.
- Study reports and related publications from currently ongoing studies will be completed.
- Preparatory work will be conducted to explore opportunities for applying the lessons learned in the Indian subcontinent to the Eastern African regional focus, which currently contributes to 50% of the global number of reported cases annually.

ONCHOCERCIASIS ELIMINATION IN AFRICA

Progress in 2020

The focus continues to be on two major elements:

Research on tools for elimination programmes to support decisions to stop ivermectin mass drug administration

- This includes tools to i) delineate parasite transmission zones and estimate risks of recurrence should the criteria to stop ivermectin mass drug administration be met in only one part of the transmission zone; and ii) monitor the adult worm population by estimating the minimum number of reproductively active females. As a correlate, these tools would also allow to identify the origin of any resurgence (continuing low-level transmission undetected during evaluation for stopping MDA vs. parasites imported via human or vector migration).
- Research funded to apply knowledge and methodologies previously developed for parasites in West Africa (Côte d'Ivoire, Ghana, Mali) and Central Africa (Cameroon, Congo-Brazzaville) to Eastern Africa (Ethiopia, northeast Democratic Republic of the Congo, and Sudan) has been expanded to include identification of vector population genetic markers. This expansion was based on pilot data obtained by a student from the Ghanaian collaborators working on his PhD in the laboratory of the Australian collaborator.
- Furthermore, Ghanaian and Australian researchers are now collaborating on testing the utility of combining population genetics with epidemiological and entomological data for delineating transmission zones and supporting country decisions on when and where to stop mass drug administration.
- Progress on all funded projects has been impacted by lock-downs and travel restrictions due to COVID-19 and no-cost extensions into 2021 have been put in place.

Research to support adoption of moxidectin in onchocerciasis elimination guidelines and policies

- The 2018 approval of moxidectin for treatment of ≥12 year old individuals infected with *O. volvulus* is a necessary but insufficient prerequisite for adoption of moxidectin in onchocerciasis elimination guidelines and policies. Protocols for three studies have been completed, including adaptation to conduct these during the pandemic:
  - a pharmacokinetic and safety study to identify a moxidectin dose for 4-11 year old children to be conducted in Ghana
  - a 12500 participant double-blind study on the safety of moxidectin compared to ivermectin in individuals with any level of infection (including undetectable levels) in the Democratic Republic of the Congo (DRC) and other sites under selection
  - a 1000 participant double-blind study evaluating the parasitological efficacy and safety of annual or biannual treatment for two years with moxidectin compared to ivermectin in DRC have been completed including adaptation to conduct during the COVID-19 pandemic.

The protocols have received ethics committee (country, WHO) and regulatory approval in the Democratic Republic of the Congo, the paediatric protocol is pending final approval following ethics committee (institutional, national, WHO) and regulatory review.

The tablet formulation currently approved by the US–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. A successful grant application was submitted for the development of a paediatric moxidectin formulation.

Medicines Development for Global Health (MDGH), the regulatory sponsor of moxidectin, completed an additional post-marketing commitment (rat) pre-postnatal study and submitted the results to the US–FDA. Furthermore, MDGH commissioned a review of all reproductive toxicity related studies. The review is

planned to be converted into an open access publication. For information on provisions relating to pregnancy in the planned studies, see section on "Gender aspects and vulnerable populations" below.

Remaining challenges

- Expansion to parasites and vectors from more areas in Africa to confirm the feasibility of a pan-African panel of genetic markers vs a requirement for regional/subregional panels and establishment of related panels, development and selection of methodologies suitable for increased collaboration of laboratories without specialized equipment, selection of a 'platform' for large scale use.
  Implementation, completion and analysis of studies described above, additional data on the safety of moxidectin in 4-11 year old children, a study/studies to assess safety of moxidectin in *Loa loa* co-infected individuals (the first one is in preparation by another organization), collaboration with different WHO units towards coordination of progress towards registration in African countries and decisions on inclusion of moxidectin in guidelines and Essential Medicines List.

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, Democratic Republic of the Congo; Medicines Development for Global Health, UK and Australia; Division Provinciale de la Santé, 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.

Estimated leverage created by this project:

An NIH grant of US$ 3.488 million to La Trobe University, Australia and their US collaborator. The funded work will contribute to ER 1.2.1 objective of development of tools for elimination programmes to support decisions to stop ivermectin mass drug administration.

An EDCTP grant of €2.834 million (US$ 3.358 million) for the development of a paediatric formulation of moxidectin to a consortium including: MDGH, UK and Australia; Luxembourg Institute of Health; University of Health and Allied Sciences, Ghana; Centre for Research on Filariasis and other Tropical Diseases, Yaoundé, Cameroon; University Hospital Bonn, Germany; University of Strathclyde, UK.

Gender aspects and vulnerable populations:

The paediatric pharmacokinetic and safety study in children will also provide the data required as a basis for recommendations regarding treatment of breast-feeding women. Until such data are available, breast-feeding and pregnant women will be excluded from the moxidectin studies. Women becoming pregnant during the studies, despite commitment to contraceptives, will be followed to delivery and their infants followed up to one year of age in Ghana and DRC. Provided they consent, this follow up will also be performed for women who became pregnant within three months of their partner receiving moxidectin.

Training:

One PhD student from Ghana in Australia.

Publications:

Chesnais CB, Pion SD, Boullé C, Gardon J, Gardon-Wendel N, Fokom-Domgue J, Kamgno J, Boussinesq M. Individual risk of post-ivermectin serious adverse events in subjects infected with *Loa loa*. EClinicalMedicine 28, 100582. https://doi.org/10.1016/j.eclinm.2020.100582 (publication of new analysis of data acquired with TDR funding within a predecessor of the current Expected Result for onchocerciasis elimination).

Related news:

https://www.latrobe.edu.au/news/articles/2020/release/la-trobe-researcher-makes-global-impact

Plans for 2021–2023

- Implementation of activities delayed due to COVID-19 lockdowns. Expansion to parasites and vectors from more areas in Africa to assess the feasibility of a pan-African marker panel vs the requirement for regional/subregional panels and establishment of related panels.
- Implementation of studies of moxidectin, initiation of WHO cross-functional team to reduce barriers between initial registration by a stringent regulatory authority to LMIC policies on their use.

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

Collaborative models to create regional dynamics, synergize all partner efforts and enhance the conduct of operational and implementation research addressing national and regional research priorities.

In order to improve the delivery of interventions, OR/IR embedded within country control programme activities is a key driver for: i) assessing the quality and effectiveness of a 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 at scale successful strategies.

In WHO's End TB Strategy, endorsed by the World Health Assembly in May 2014, the role of research is distinctly recognized as a key driver for improving TB control and is the third pillar of the strategy. Tuberculosis is the first worldwide single infectious agent killer, despite the availability of effective treatments. Embedded operational/implementation TB research within national TB programme activities is needed in countries to identify more efficient ways of using existing tools for controlling TB and facilitating the implementation at scale of new tools.

While TB is the initial focus, some activities are conducted with the malaria programmes of the WCA region for the improvement of the effectiveness of SMC. TDR activities are conducted at national, regional and global levels (see below for more details).

Activities related to tuberculosis control

At regional level: The West and Central African Regional Networks for TB control (WARN-TB and CARN-TB)

A collaborative model was adopted in West and Central Africa (WCA) to create a regional dynamic, synergize all partner efforts and enhance the conduct of operational and implementation research addressing national and regional research priorities. The WCA region is composed of a series of small countries (except Nigeria and the Democratic Republic of the Congo) facing similar challenges and thus eligible to similar solutions. These regions were selected when taking into consideration the TB burden, the country needs, and international support already received that is far less compared to the support provided to countries of the eastern and southern African subregions.

It was decided, as an initial starting point, to focus the support on West Africa and, if successful, extend the initiative to Central Africa. The following phases were defined for enhancing TB research:

Phase 1: Creating an enabling environment at regional and national level with: i) the establishment of a regional network; ii) the establishment of national TB task force for research in each countries; and iii) the strengthening of the national TB surveillance systems.

Phase 2: Helping countries for the development of their TB research plan with the development of standard procedures for the development of this plan and its integration in the national strategic plans of the countries.

Phase 3: Facilitating countries' implementation of their TB research plan through the development and the delivery of a "learning by doing" training programme for strengthening OR/IR research NTP capacities and conducting at least one research project considered as a priority by the NTP of each country.

Phase 4: Sharing the lessons learned through WCA regional workshops, the development of a sharing platform (website) and the use of the social media (Facebook, WhatsApp group).

The West African Regional Network for TB control (WARN-TB) composed of the National TB programmes of the 16 West African countries[3] was established with TDR support in June 2015 and regional funding secured for its functioning for 2018–2019 (WAHO and Global Fund funding). The Central African Regional Network for TB control (CARN-TB) was established in March 2018. It is composed of 11 countries.[4] The activities of both networks are coordinated by a unique secretariat hosted by the National TB programme of Benin (See activities conducted with the WARN-TB and CARN-TB in the section Progress in 2020).

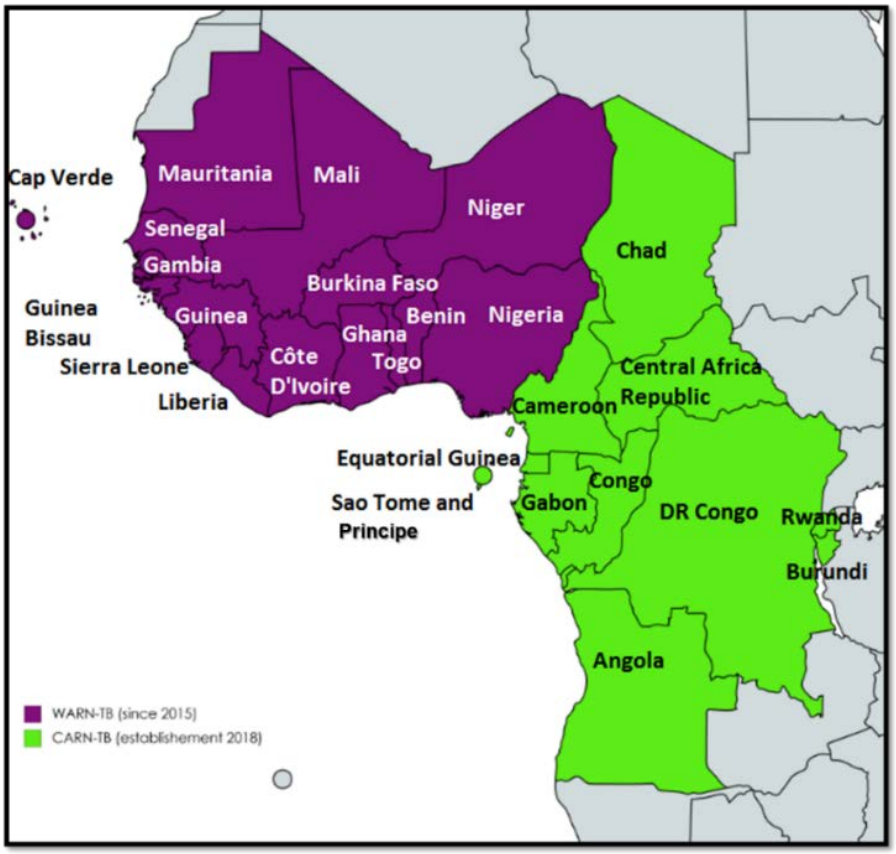


Figure 18. WARN-TB and CARN-TB countries

At global level, TDR started new activities to facilitate the conduct of OR/IR projects using generic research tools. Experience of collaboration with national TB programmes has shown that even if country programmes have the capacity to develop high quality research protocols (either themselves or in partnership with local research institutions), they don't often have enough time and personnel to focus on this work and to develop the study documents in a timely manner. This is a real barrier for the NTPs to conduct more OR/IR projects.

It is therefore proposed to develop research materials (generic protocol, data collection tool, key study

[3] Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sierra Leone, Senegal, and Togo. This network has two co-chairs (Guinea and Ghana) and an executive secretariat hosted by the NTP of Benin.

[4] Angola, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo (DRC), Gabon, Guinea-Bissau, Rwanda, São Tomé and Principe. This network has three co-chairs (NTP Cameroon, NTP Angola and a representative of civil society of DRC) and an executive secretariat hosted by the NTP of Benin.

procedures) that can be used by the NTPs and can easily be adapted to their country context for conducting OR projects.

In addition, for the same problem investigated by several countries, this initiative, if adopted and used by country programmes, will allow them to apply a more standardized methodology. Similar data could be collected (at least for the key variables) and this would ease data sharing if countries were willing to collaborate on this. This can be particularly useful for informing updates of TB guidelines.

Progress made in 2020

The following activities were conducted in 2020.

1. Strengthening the capacities of WCA countries for conducting OR/IR projects addressing TB control priorities

- The contact with the NTPs was essentially virtual this year, but nevertheless active support was provided to the countries for the conduct of their OR/IR projects.
- For the WARN-TB countries, all except Cabo Verde are actively involved in TB research. The following research projects are being conducted and supported by TDR:
  - Guinea Bissau, Ghana, Togo, Mali and Burkina Faso: all countries worked together to develop a unique protocol and data collection tool using the methods and results of the RAFAscreen[5] project that was conducted in Benin, Guinea and Senegal. This research project aims to assess the feasibility, acceptability and cost of implementing a new **TB screening strategy in HIV patients and introducing latent TB infection (LTBi) treatment in HIV patients.**
  - Nigeria: Assessment of the feasibility, acceptability and cost of implementing **TB screening strategy in Out Patient Clinics.**
  - Gambia: Assessment of the feasibility, acceptability and cost of implementing **TB screening strategy for diabetic patients**.
  - Mauritania and Niger: Evaluation of the barriers for **screening and managing TB** in Nomadic populations.
  - Senegal: Assessment of the feasibility, acceptability and cost of implementing **TB screening strategy in Children i**ntegrated in national nutritional campaigns.
  - Côte d'Ivoire: Assessment of the feasibility, acceptability and cost of implementing **TB screening strategy in children** integrated in national vaccination campaigns.
  - Guinea: Assessment of the feasibility, acceptability and cost of implementing a **TB screening strategy** in collaboration with private pharmacist.
- All these research projects are finalized or are about to be finalized. For 2021, the objective is to communicate the study results within the WARN-TB/CARN-TB network, in international congresses and in peer-reviewed journals. TDR and The Union are investigating the possibility to have a special series on research projects evaluating TB screening strategies and translation of the papers in French (funded by The Union). All mentors supporting the NTPs are actively involved to get a first draft of the papers by the end of Q1 2021.
- For the CARN-TB countries, all countries have defined their TB research priorities. The following research projects are currently being conducted:
  - The NTPs of Chad, Congo, Gabon, Equatorial Guinea and São Tomé and Principe worked together

[5] More information on this project is available at https://www.solthis.org/fr/projet/rafascreen/.

on a similar research protocol to define the patients and health system factors that explain the high percentage of patients lost to follow-up in their respective TB programmes.

- The NTP of the Democratic Republic of the Congo worked on the introduction of a Short all oral regimen for the treatment of patients suffering from MDR-TB.
- The NTP of Burundi: evaluation of the feasibility, acceptability and effectiveness of an active case finding strategy among contacts of MDR-TB patients.
- The NTP of Angola: OR to understand the factors explaining the low percentage of TB patients screened for HIV in Angola.
- The NTP of Cameroon: OR to understand the gap between the number of patients diagnosed with MDR-TB and the number of patients put on MDR-TB treatment every year and the barriers to the initiation of MDR-TB treatment in Cameroon.
- The NTP of Central African Republic: IR to evaluate the feasibility, acceptability and effectiveness of systematic clinical and bacteriological/molecular TB screening in HIV patients (research protocol similar to the one used by the WARN-TB countries).

- In February 2021, the last module of the OR/IR training programme that was started in 2019 with the CARN-TB countries will be conducted. This is a module on communicating study results (feedback to the community, oral communication in scientific congress, scientific papers and policy brief). It will be conducted virtually.
- All regional activities to strengthen the national TB surveillance systems in collaboration with WHO–GTB are ongoing. A key achievement is the finalization of the module tracker of the DHIS2-TB[6] (allowing TB and MDR-TB case-based data entry). Six countries of the WCA region piloted it in Q4 2020. Feedback to the other countries will be given early 2021 for the scale-up of its use in 2021 in the WCA region. This surveillance system will allow more precise routine data analysis to better inform the NTPs on TB control gaps and to take corrective actions at subnational, national and subregional levels. Additional training on routine data analysis will be organized in 2021 in collaboration with GTB.
- Since the end of 2019, in collaboration with McGill University, *Action Contre la Faim* and WHO–GTB, TDR has been leading the development of a TB costing tool to facilitate the integration of a health economic component within implementation research projects. The English version of this tool will be available in Q1 2021, as well as a version translated into French.

- The use of this tool will be piloted in March 2021 with the conduct of a virtual one week workshop. Countries of the WARN-TB and CARN-TB networks will be invited to participate. A call will be launched in January 2021 to select countries willing to integrate a health economic component into research studies that they are currently conducting or plan to conduct. Health economists from the region will facilitate the workshop.

  If successful, the workshop will be proposed to other countries/regions. TDR will work with WHO regional country offices to plan this) and it will also be proposed that facilitators use the materials in order to propose this type of training in their own universities in the region.

[6] More information is available at: https://www.who.int/tb/features_archive/New-digital-platform-analysis-of-TB-data/en/.

2. WARN-TB and CARN-TB Secretariat and the COVID-19 response

The secretariat of the two networks is unique and is hosted by the National TB programme of Benin. In 2019, it was strengthened with hiring a person full time in charge of the secretariat, developing a WARN-TB /CARN-TB website (http://warn-carn-tb.org/en/home/), preparing regular newsletters and setting up WhatsApp groups to facilitate communication between the NTPs. During the COVID epidemics, ties between all NTPs were even more strengthened.

Learning from the disruption caused by the Ebola epidemics, several NTPs have appealed to the secretariat of the WARN-TB and CARN-TB and TDR to develop/establish a consistent and regional response to mitigate the impact of COVID on TB control in West and Central Africa. Various regional activities have been discussed including the need to estimate the impact of the COVID-19 epidemic on TB care and control in the region and to evaluate the implementation of strategies to minimize its impact.

The conduct of regional webinars (every two weeks from April 2020 until July 2020 and every month since then) was decided to propose a "window" where the NTP coordinators and their NTO staff have the opportunities to discuss their challenges and share their solutions. NTPs shared their contingency plans (placed on the intranet of the website) and support was provided remotely by the Secretariat and by the strongest countries to the weakest to develop and make provisions for their contingency plan to minimize the impact of COVID-19 on TB services.

A situation analysis was conducted early April that indicated varying levels of disruption to TB services. With the involvement of the Global Drug Facility (GDF), drug procurement issues were discussed to avoid stock-out for the countries at risk.

In addition, these regional webinars gave the opportunity for the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and WHO–GTB to communicate with the networks on various TB programmatic aspects/recommendations and discuss their implementation in the context of COVID-19 pandemic. The attendance and participation of NTP coordinators, their staff and partners has been excellent, showing that these types of meetings can be organized successfully and can facilitate the diffusion of information and recommendations through discussions.

In addition, a research project funded through a grant provided via TDR's Strategic Development Fund (SDF) with co-funding and collaboration in partnership with the Access and Delivery Partnership Project (ADP), the Damien Foundation, WHO–GTB and The Union was initiated in April 2020. The project has two key objectives: i) to support national TB programmes (NTPs) throughout West and Central Africa to conduct implementation research (IR) on strategies to mitigate the impact of COVID-19 on TB control efforts; ii) to measure the impact of COVID-19 in terms of epidemiological and process indicators using a common mixed methods methodology.

Support for IR studies to mitigate the impact of COVID-19 on TB services

In early May 2020, a call for letters of interest was distributed throughout the West and Central African Regional Network for TB control (WARN-TB/CARN-TB), resulting in 20 submissions from NTPs and their research partners in the region. After a competitive evaluation, 11 submissions were selected. Selected proposals will implement a variety of new and innovative approaches to ensure continuity of TB services during the time of COVID-19 (see Figure 19 below). Funded projects include the application of digital technologies to help overcome issues of access in light of quarantine-related restrictions on movements, including virtual teleconsultations with patients, using social media to conduct routine supervisory visits

among TB facilities and using digital adherence technologies to promote treatment adherence. Studies will also explore ways to further decentralize TB services into the community, thereby reducing requirements for travel, as well as trialling new screening algorithms to enhance detection of TB among those with respiratory symptoms and suspected of COVID-19 infection.

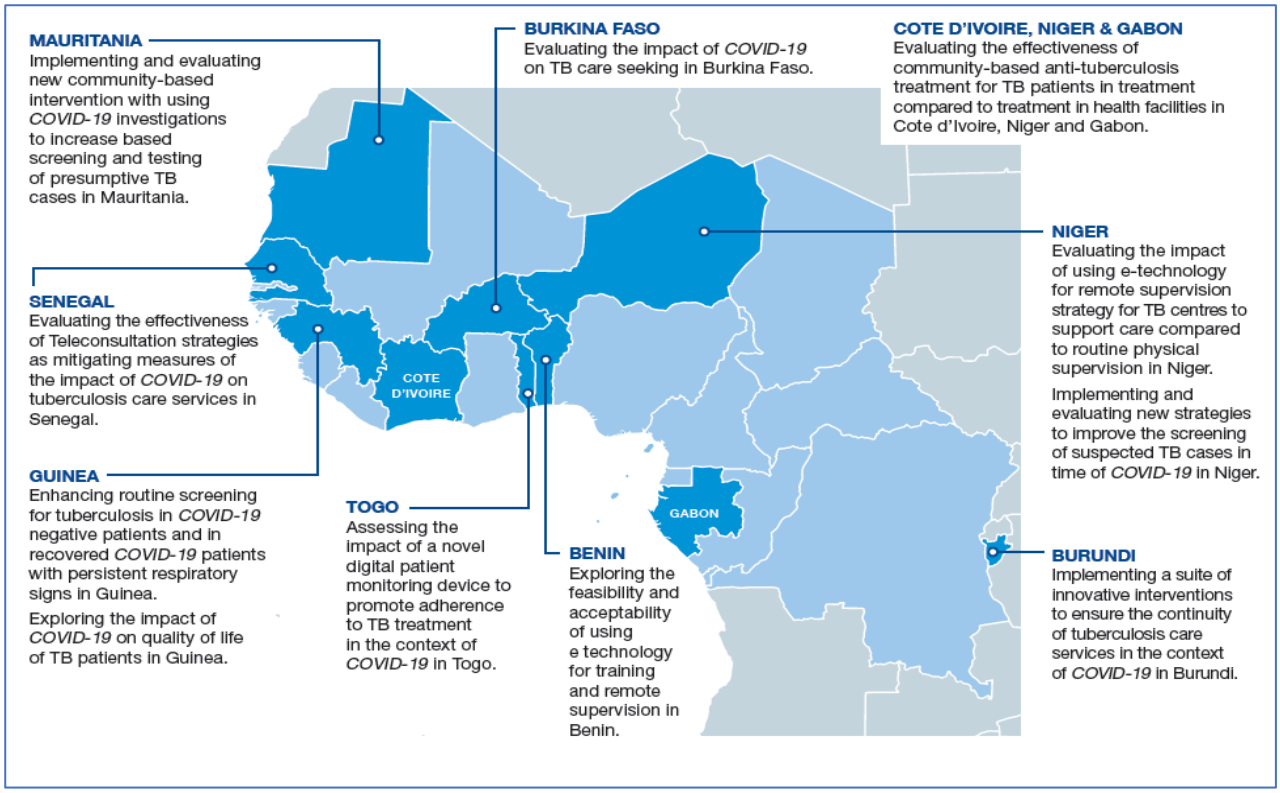


Figure 19. Overview of IR/OR projects conducted under the SDF grant

Ongoing technical support and mentorship is being provided to grantees during the research period by TDR, ADP, The Union and Damien Foundation, with studies expected to be finalized mid–2021.

Evaluating the impact of COVID-19 on TB services in West and Central Africa

Under the second objective of this SDF project, a guidance document is currently being developed by TDR, in collaboration with WHO–GTB and a pool of M&E NTP staff of the WARN and CARN networks. The aim is for them to assist NTPs to assess the impact of COVID-19 on TB services through a common impact assessment methodology that will assess impact across a range of different epidemiological and process indicators. It will also facilitate the identification and implementation of appropriate mitigation strategies to ensure the continued functionality of TB services during periods of disruption. The guidance document identifies core activities undertaken by TB programmes to detect possible points of disruption due to COVID-19. For each possible disruption, an indicator has been developed to enable the measurement and monitoring of the potential impact of COVID-19, along with a proposed methodology for data collection.

The findings of this assessment, combined with the lessons that emerge from the IR projects described above, will be used to inform the development of national and regional contingency plans that can be enacted by NTPs in similar future scenarios.

3. Improving TB diagnostics

The **Diagnosis of Multidrug-resistant tuberculosis in Africa (DIAMA)** project was launched in June 2017. The project is led by the Benin NTP. Collaborators are: TDR; the Institute of Tropical Medicine (ITM), Belgium; and the NTPs of eight African countries (Cameroon, the Democratic Republic of the Congo, Ethiopia, Guinea, Mali, Nigeria, Rwanda, and Senegal). It is funded by the EDCTP for five years.

The project explores the feasibility and accuracy of diagnosing TB resistance to first- and second-line drugs through a novel molecular multiplex assay developed by GenoScreen (phase 1). The project is also developing and setting up alternative culture-free approaches for the monitoring of patient response to rifampicin-resistant TB treatment (phase 2). Collaboration with FIND was established to contribute to the validation of a second-line drug sensitivity molecular test (Xpert second-line). As part of this project, the Molbio Diagnostics resistance molecular platform is also being tested in Benin and Rwanda.

The recruitment of patients is finished. For all baseline strains, phenotypic tests, Xpert test second-line (on stored samples and fresh samples), *deeplex*® and whole genome sequencing (WGS) (the gold standard) are performed.

Xpert second-line data as well as WGS and phenotypic results were shared end of September 2020 in order to inform WHO–GTB guidelines for the endorsement of Xpert second line. *Deeplex* results will be shared in 2021 for the same purpose.

4. Implementation Research for Digital Technologies and TB (IR4DTB): A toolkit for evaluating the implementation and scale up of digital innovations across the TB continuum of care

This is the continuation of a project started in 2019 in close collaboration with WHO–GTB. The toolkit aims to generate new evidence to bridge the knowledge gaps on the optimal application of digital technologies for TB and to inform future WHO guidance on their use. The toolkit is designed for TB programme managers and other decision-makers interested in trialling, evaluating and/or scaling up digital technologies under routine programmatic conditions to accelerate efforts to end TB (see Figure 20). In 2020, the writing, editing and peer-review of the I4RDTB toolkit was completed. The following provides an overview of the development process and progress of IR4DTB to date:

An adaptation of the original IR toolkit, developed by TDR in 2014 with support from ADP, was conducted in order to tailor content specifically to IR studies that evaluate the use of digital technologies within TB programming. The IR4DTB provides guidance on how to design and conduct IR studies to assess outcomes such as feasibility, acceptability, coverage and implementation cost of digital technology strategies or interventions to enhance TB control efforts. The final toolkit contains six modules that address the key components of the IR process. See Figure 21, the modules are available at https://ir4dtb.org.

Figure 20. Overview of IR4DTB modules

Figure 21. IR4DTB website

Case studies from BRICS countries[7] and examples from the published literature have been used to illustrate key concepts and reinforce learning. A workshop was scheduled for May 2020 in China where the final toolkit would be piloted among participants from nine countries within the BRICS and WHO–WPRO regions and organized by the China National TB programme. In anticipation of this workshop, a massive online open course (MOOC) on IR was organized for participants to provide foundational IR knowledge. Due to the COVID-19 pandemic, however, the workshop was postponed and organized in November 2020 in a hybrid format, where participants (from China only) received a mix of recorded and real-time virtual lectures from TDR and WHO staff and other external experts. Remote facilitation was also provided to teams to support the development of a comprehensive IR proposal using the IR4DTB microsite as a guide. In 2021, support will continue to be provided to at least three country teams who developed interesting projects that could be conducted in 2021 with domestic funding.

The following presents three project summaries implemented under this Expected Result.

5. Facilitating the implementation of all oral shorter regimen for MDR-TB patients

This is a continuation of a project started in 2019. This is a collaborative effort led by TDR with key partners involved in MDR-TB treatment and care: the Global Drug-resistant TB Initiative (GDI), the Damien Foundation, The Union, Médecins Sans Frontières, KNCV–Tuberculose Fonds (Netherlands), McGill University, LSHTM, the Sentinel Project, Harvard University, the GFATM, USAID, all WHO regional offices and WHO–GTB.

The objective of this initiative is: i) to develop a generic tool (protocol, data collection tools, study procedures) for the conduct of OR led by national TB programmes for the use of all oral shorter-treatment regimens; and ii) to provide technical assistance to a set of national TB programmes or country teams in Africa, Latin America and Asia for the conduct of these OR projects.

The generic protocol was approved by the WHO's Ethics Review Committee. It was subsequently translated in French, Spanish and Portuguese. An information sheet which summarizes the main features of the project was developed to promote the initiative. A dedicated web page was set up on the TDR website to host all materials related to ShORRT (https://www.who.int/tdr/research/tb_hiv/shorrt/en/).

[7] The BRICS countries are: Brazil, Russia, India, China, and South Africa.

The development of generic operational research packages, such as ShORRT, are proving valuable tools to steward the implementation of new interventions, such as the uptake of new drug regimens. For example, with using this tool and adapting it to their context the Cambodia ShORRT study in Cambodia only took four months from the planning of the study to its launch. Because of the COVID-19 situation, country support was provided remotely with using virtual platforms.

Initiatives such as ShORRT clearly answer the needs of many countries, as demonstrated by the increasing number of countries joining ShORRT. To date, TDR is supporting 25 countries which are using this tool (see Figure 22 below) and ten countries in the WHO–EURO region used the research package to develop their multi-country operational research study. This initiative also answers WHO's needs to provide considerable visibility to TDR and position it as a leader in this area of work.

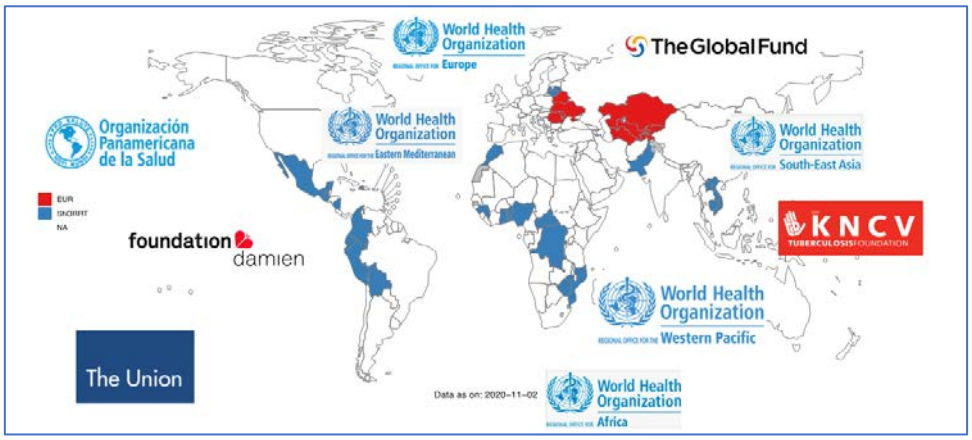


Figure 22. Countries using the ShORRT research package and partners (by the end of Dec 2020)

6. Research toolkit to support the local calibration of computer-assisted detection (CAD) technology within the context of TB screening

This project has been initiated as a corollary to forthcoming WHO guidance for active TB screening, in which computer-assisted detection (CAD) technologies will be recommended as an accessory to enhanced screening efforts. CAD products use artificial intelligence (AI) to analyse digital chest X-rays for the presence of abnormalities suggestive of TB. CAD products are designed to produce an abnormality score (typically out of 1–100) which, when referenced against a set threshold, can be used to signal probable TB cases and trigger further TB testing (see Figure 23). CAD thresholds must be calibrated to local contexts and intended use cases, as well as some decision-making around acceptable costs and losses.

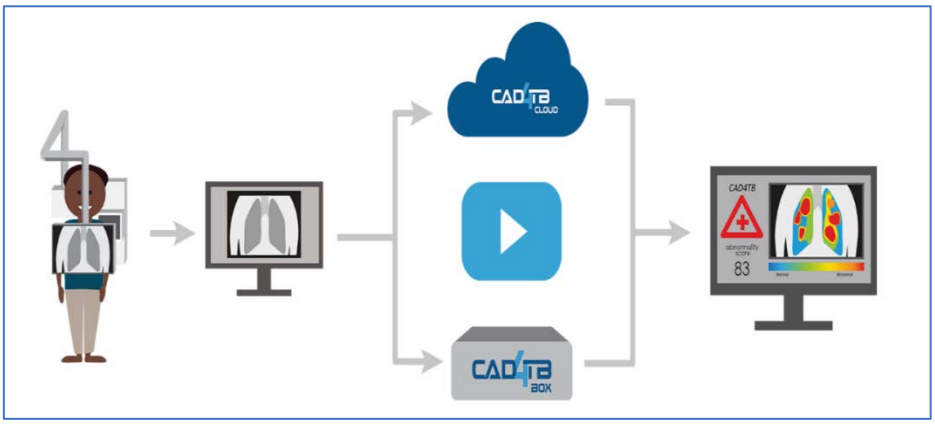


Figure 23. Graphic depicting the operation of CAD

In this project, TDR is developing a research toolkit designed for use by NTPs who have already decided to utilize CAD to support TB screening efforts. The toolkit will guide users through the process of calibrating CAD in order to determine appropriate thresholds based on local contexts and use cases. Specifically, the research will determine the performance of a particular CAD technology (in terms of sensitivity and specificity) across a range of possible thresholds when compared to a gold-reference standard (i.e., microbiological testing).

The toolkit will be composed of three parts:

- **Part A is a generic protocol** that describes the proposed research methods for collecting data needed to determine appropriate CAD thresholds.
- **Part B is an online tool** designed to support data analysis. This tool will use the data collected in Part A to produce estimates of sensitivity and specificity across a range of CAD thresholds, along with an ROC curve for the CAD technology. The tool will also produce cost calculations to illustrate the cost implications of various thresholds (for example, the number and cost of unnecessary follow on, confirmatory testing conducted among false positive cases). The data and outcomes produced by this tool will also be used to inform future guidance by WHO and partners on the scaled-up use of CAD.
- **Part C is a guide** to help users to interpret the outcomes produced in part B and apply calibration results to local contexts.

The toolkit and online tool are expected to be made available by the end of Q1 2021.

7. Ensuring the compliance of TB surveys with the Good Clinical Practice principles

National population-based surveys of the prevalence of pulmonary TB disease in adults are the best way to directly measure the burden of TB disease in countries that do not yet have routine surveillance data that meet quality and coverage standards. In a meeting of the Task Force in April 2016, progress to date and the future direction of NTPS were discussed. In several surveys, the quality of laboratory work (culture testing) and data management (for tens of thousands of participants interviewed and screened in the community) were the two major challenges faced. To address and mitigate such challenges in future surveys, one of the major recommendations was to develop guidance on how to apply Good Clinical Practices (GCP) and Good Data Management Practices (GDMP) in the context of NTPSs.

TDR was asked by WHO–GTB to help them to develop guidance for the implementation of TB surveys (population and facility-based TB surveys) in compliance with GCPs in order to ensure the rights of the participants and survey data credibility (i.e. that surveys are conducted in an ethical manner and that the outcomes reported are comprehensive and accurate).

This project is funded by WHO–GTB and has three objectives corresponding to steps over a one-year period:

1. To provide training on GCPs and GDMPs to a core group of consultants who are providing technical assistance for the design, implementation, analysis and reporting of NTPs, NDRSs and NPCSs.
2. To develop a guide on how to apply GCPs and GDMPs in the context of NTPs, NDRSs and NPCSs, including i) standard procedures; ii) checklists to assess compliance with relevant GCP and GDMP principles; and iii) specific training material that can be used (and integrated into a broader training package if appropriate) at the beginning of each type of survey.
3. To train a pool of consultants on the content of the guide.

The training (1) was conducted in September 2019. A draft version of the guidance document and all standard operating procedures (SOPs) and tools were shared with WHO–GTB at the end of August 2020. A two-day virtual training of a pool of consultants to use this guidance document will be organized in March 2021.

Activities related to malaria

GENERAL OVERALL OBJECTIVES AND SCOPE OF THE PROJECT

Malaria remains a major public health problem in sub-Saharan Africa. WHO announced that the gains made in malaria control efforts in the 15 years prior to 2015 have not been sustained since 2015. The previous steady decline in the global number of malaria deaths has reached a plateau, and the number of cases is increasing. The majority of malaria deaths occur in ten sub-Saharan African countries, many of these are countries where malaria is highly seasonal (see Figure 24).

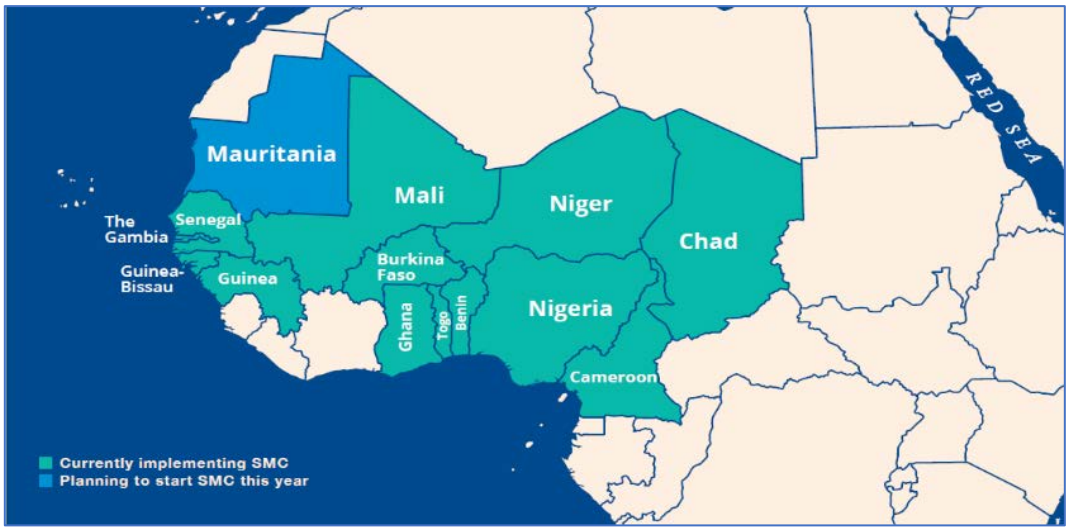


Figure 24. Eleven sub-Saharan countries with highly seasonal malaria

Following a 2012 WHO recommendation, 13 sub-Saharan African countries[8] with high seasonal malaria transmission have adopted and integrated SMC into their policy documents and strategic plans. The total number of children who received SMC (at least one treatment) was estimated to be 15.7 million in 2018. SMC has been shown to substantially reduce cases and deaths due to malaria, however although countries have been quick to adopt SMC, fewer than 50% of eligible children had access to it in 2018. There is a need to optimize delivery of SMC in order to close these gaps.

In 2019, funding from EDCTP was leveraged (€2.5 M) to conduct the OPT–SMC project in collaboration with Medicines for Malaria Venture (MMV), LSHTM, the University of Thies (leading the project) and the 13 NMPs implementing SMC.

The approach that is followed is similar to one used with the national TB programme in the West African region as part of the WARN-TB activities:

- Strengthening of the West and Central African SMC malaria network (WARN-SMC).
- Strengthening the malaria surveillance system to monitor SMC activities (with WHO–GMP).
- Strengthening the capacities of the NMPs to understand their programmatic data and define malaria control gaps and research priorities for optimizing SMC effectiveness.
- Strengthening of NMP capacities for conducting IR/OR projects addressing research priorities for improving SMC effectiveness.

[8] Burkina Faso, Cameroon, Chad, The Gambia, Ghana, Guinea, Guinea Bissau, Mali, Mauritania, Niger, Nigeria, Senegal and Togo.

Progress made in 2020

OPT–SMC project

The OPT–SMC project was launched in February 2020 during the annual SMC meeting (meeting with all NMP coordinators, the SMC focal person, and institutional partners: WHO–GMP, the President's Malaria Initiative (PMI), CRS, Malaria Consortium, MMV, and LSHTM).

https://www.who.int/tdr/research/malaria/OPT-SMC-Fact-Sheet-EN.pdf

During that meeting, barriers to effectively implement SMC were discussed and ranked by the NMPs in order to keep, for each country, the three most important reasons that should trigger priority actions. Countries developed letters of intent for conducting research projects that address priority problems. For each country, a budget of around US$ 50 000 is proposed for the conduct of one or two research projects. Since February 2020, countries are remotely supported to develop their research project in order to conduct it in 2020 or the summer of 2021.

Response to the COVID-19 pandemic

The OPT–SMC virtual meeting discussed the disruption in SMC planning and SMC delivery with the countries and partners. Documenting these disruptions and measuring their impact on SMC delivery and performance was identified as a priority in order to learn from this episode and inform future contingency plans for similar global health emergencies.

TDR led the development of a tool to assess the impact of COVID-19 on SMC delivery (process indicators) and SMC impact (effectiveness indicators: e.g. coverage indicators). This was done in collaboration with OPT–SMC partners and WHO–GMP. It was also shared with all SMC partners during a working group meeting.

A systematic approach was used to look at all SMC activities[9] and to the conduct of a risk assessment. Based on this, indicators and the methods that could be followed for measuring the consequences of COVID-19 pandemic on SMC delivery were identified. All countries will be supported in using this assessment tool. Early 2021, all information will be summarized to inform an SMC meeting with NMPs and partners to discuss the lessons learned.

In March 2021, a summary report per country and an overall assessment will be completed and circulated among OPT–SMC partners.

In early 2021 this summary will be discussed in an OPT–SMC meeting as well as the lessons learned in order to get better prepared if similar events were to occur in the future.

Measures to mitigate the impact of COVID-19 on SMC

SMC involves door-to-door distribution of antimalarials once a month to over 20 million children in 13 countries, by thousands of drug distributors in each country. Training and supervision of SMC delivery on this scale is a huge undertaking and ensuring quality of drug administration on such a scale is a major challenge.

In March 2020, in discussion with NMPs, it was realized that because of COVID-19 and travel restrictions there would be problems for delivering face-to-face training as was usually done in the past. With the involvement of a couple of NMPs, training videos were developed to serve as training material for the drug distributors. These videos were put on YouTube to be fully accessible and translated into French, Portuguese and the local languages, e.g. Hausa, Wolof, etc. (see video available at

[9] As listed in the *Seasonal Malaria Chemoprevention with Sulfadoxine-Pyrimethamine plus Amodiaquine in children – A Field Guide,* and in the RBM Partnership document: *Adapting Seasonal Malaria Chemoprevention in the Context of COVID-19: Operational Guidelines* (April 2020).

https://www.who.int/tdr/research/malaria/en/). Partners funding SMC delivery (GFATM, CRS) are particularly interested in the use of the videos to complement training material, if well-accepted by the drug distributors. It could be a good vehicle for the training of the 200,000 SMC drug distributors in the future. This would reduce the cost of this intervention and help to harmonize messages and practices.

Remaining challenges

For both TB and malaria research activities, the COVID-19 pandemic has slowed down the conduct of some activities, but measures were taken to mitigate the impact relatively quickly. Face-to-face regional meetings were converted into virtual ones but one-to-one interactions that were occurring in parallel of these regional meetings and technical support occurring during workgroup activities had to be replaced by one-to-one Zoom calls. With 27 countries supported in the WARN/CARN-TB project, 23 countries with ShORRT, 13 countries with OPT–SMC, one-to-one Zoom calls were and are time consuming.

The volume of activities for this Expected Result has grown compared to previous years and even more so in 2020 due to the COVID-19 pandemic. Two full-time consultants were hired to provide support for the two new projects mentioned previously (MDR-TB ShORRT all oral treatment OR project, and the IR-toolkit for TB digital health solutions). The two consultants are also involved in other projects of this Expected Result (support to countries for the conduct of TB research project aiming at mitigating the impact of COVID-19, development of CAD protocol, and the GCP guidance for TB survey). Funding will need to be sought to maintain TDR contribution/support for all these activities in 2021.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

WHO Global TB programme; WHO regional offices; WHO Department for West and Central Africa; WHO Health Information Systems; GFTAM; The Union; Damien foundation; West African Health Organization (WAHO); Expertise France; Agency for International Development (USAID); LSHTM; McGill University; Action contre la Faim, France; Institut de Recherche pour le Développement, France; Université de Reims, Faculté de Médecine, France; Université Abomey Calavi, Benin; Université Cheikh Anta Diop and Université of Thies, Senegal; Institut de Santé Publique et Centre Muraz, Burkina Faso; Université Gamal Abdel Nasse, Faculté de Médecine, Guinea Conakry; NTPs of the WARN and CARN-TB countries; NTPs of Bolivia, Cambodia, Colombia, Ecuador, Guatemala, Haiti, Lao, Mexico, Mozambique, Nicaragua, Pakistan, Peru, Vietnam, Zimbabwe; FIND (DIAMA project); Genoscreen, France; MOLBIO Diagnostics, India; Institute of Tropical Medicine of Antwerp, Belgium; National Reference Laboratory, Rwanda; Jimma University, Ethiopia

Estimated leverage created by this project:

Raised: MDR-TB (GTB US$ 500 000); USAID (US$ 700 000), e-health (US$ 100 000), TB survey and GCPs (US$ 200 000)

Gender aspects and vulnerable populations:

All TB patients are vulnerable.

Training:

One key component of WARN/CARN-TB activities is to strengthen research capacities of the National TB programmes of these two networks through the conduct of the OR/IR project: a “learning by doing” activities with guidance of mentors / experts in research methods, statistics, social science and health economics and short courses on key aspects of operational/implementation research (protocol development, conduct, analysis and translation of the research findings into policy).

Strengthened institutions or networks:

Strengthening of the national TB programmes of the West and Central African regions and south-south collaborations beyond research activities. Strengthening of OR of all NTPs supported for the conduct of the ShORRT research protocol.

Publications and related news:

TDR | ShORRT research package (who.int)

TDR | Cambodia launches operational research on all-oral shorter drug regimens for patients with drug-resistant TB (CAM-ShORRT) (who.int)

TDR | Facilitating operational research to improve access to new treatment regimens for drug-resistant TB (who.int)

TDR | TDR and WHO launch ShORRT, an operational research package to assess all-oral shorter MDR/RR-TB treatment regimens

TDR | The ShORRT operational research initiative a year on: spotlight on Nigeria (who.int)

Implementation research for digital technologies and TB (IR4DTB) TDR | Research for scale-up of digital technologies to End TB (who.int) and WHO–TDR Fact Sheet N01 FINAL v2

OPT–SMC: Implementation research to optimize delivery and effectiveness of Seasonal Malaria Chemoprevention – TDR | Malaria research (who.int) and WHO–TDR | Fact Sheet N02 v3-LOW

Plans for 2021–2023

At regional level

For TB control

- Publication of all TB screening studies results (special issue in discussion with the UNION).
- Piloting of the TB costing tool (WS in collaboration with McGill – WHO collaborative centre).
- Evaluation of the impact of the WARN-TB and CARN-TB activities on TB control in the region.

For malaria control

- To continue to support the WCA countries through the OPT–SMC project.
- To develop a research tool with research protocols for the conduct of SMC coverage surveys , SMC impact assessment, SMC safety monitoring, SMC drug resistance surveys using all the materials that were used by countries in different research projects (such as ACCESS) and that could be made available for all in a generic format.

At global level

- Support to countries to implement ShORRT (WHO AFRO, SEARO, WPRO and PAHO regions).

If funding permits it, further development of generic research protocols: implementation of LTBi new recommendations.

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

Main goals and Expected Results include:

- **Strengthening research capacities and providing innovative tools** to generate evidence that informs the design and implementation of gender-responsive health interventions to control and prevent VBDs. In addition, it will result in knowledge, strengthened research capacity, policy advice and research products that can be used within and beyond the broad research community. This portfolio is also expected to contribute to WHO's Thirteenth General Programme of Work 2019−2023, WHO's Global Vector Control Response (2017–2030) and the SDGs (2015–2030).
- **Strengthening the capacity of researchers working on infectious diseases of poverty** on how to incorporate an intersectional gender approach. TDR has developed a toolkit to incorporate intersectional gender analysis into research on infectious diseases of poverty. The objectives of this document are to: i) strengthen the research capacity of disease-affected countries in intersectional gender approaches; ii) understand and address barriers to effective and quality implementation of health interventions oriented to prevent and control infectious diseases; and iii) explore solutions for equal access to quality health care.

Great progress has been made towards combatting infectious diseases of poverty. However, considerable public health challenges remain, including gender and intersecting inequalities that affect health conditions associated with infectious diseases. This Expected Result focuses on gender intersecting inequalities that influence differentials in vulnerability to, and the impact of, health conditions associated with infectious diseases in LMICs.

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. Through this Expected Result, research teams in LMICs use an intersectional gender lens. This approach enables to better understand and consequently more effectively intervene in the prevention and control of infectious diseases, as it 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 health care. 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.

Progress in 2020

TDR Intersectional Gender Research Strategy

TDR launched in June 2020 its strategy on intersectional gender research (see Figure 25), as a pathway to more inclusive and effective response to infectious diseases. A global campaign, including in social media and with newly designed accompanying audio-visual materials, was developed to facilitate its dissemination and publication.

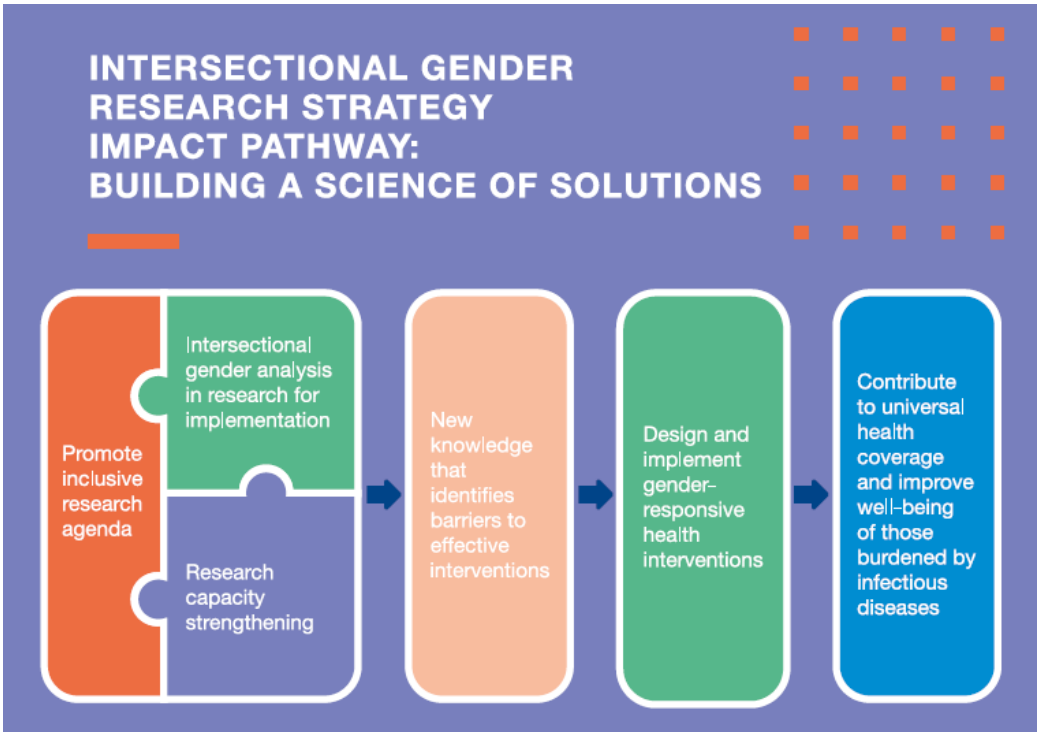


Figure 25. Intersectional Gender Research Strategy Impact Pathway

Recognizing the importance of highlighting the need to understand how gender power relations intersect with other social variables to create differences in health needs and experiences, TDR published a new strategy for intersectional gender research coinciding with TDR's annual meeting of the JCB. The initial plan was to launch it during the 2020 World Health Assembly, however, due to COVID-19 and the focus of this year's WHO Assembly, it was decided that June 2020 was a more strategic and appropriate moment for its launch and dissemination.

Gender norms, roles and relations are all known to influence people's susceptibility to different health conditions, particularly those associated with infectious diseases in LMICs. Sex and gender are key drivers of health outcomes, including through delivery and access to health products and services for the prevention and control of infectious diseases. The new strategy aims at strengthening TDR's research programmes to address these issues and emphasize gender as an entry point into a deeper intersectional analysis. Gender has always been a critical area for TDR and this is a step forward in shaping TDR's work alongside the TDR strategy for 2018–2023.

Outlining TDR's gender research strategic vision, the strategy document will guide how TDR's work is implemented, from research capacity strengthening to evidence generation and promotion of an inclusive research agenda. It emphasizes the importance of analysing different drivers of inequalities that affect the health of women, and men, and people who do not necessarily fit into these binary identities.

The strategy was developed by TDR in 2019 following an initial global expert consultation at the first *TDR Expert Group Meeting on Gender and Intersectionality in Research on Infectious Diseases of Poverty*, held in Geneva, Switzerland, in November 2018, in which TDR and WHO staff also participated. This strategy is intended to be a living document, periodically reviewed and updated. As well as guiding TDR's work it is hoped that the strategy will inspire research partners in their efforts to combat infectious diseases of poverty.

The document advocates and promotes a research agenda and an organizational culture guided by the principles of diversity, inclusivity and equality. This strategy has also been disseminated globally across WHO regions and Regional Training Centres.

TDR's intersectional gender analysis toolkit

Scientists, including those focusing on implementation research, would benefit from adequately considering sex and gender intersecting social dimensions within their research programmes by strengthening both the practice and science of implementation, and by contributing to improved health outcomes and reduction of gender and health inequalities. For this purpose, the TDR Toolkit on Intersectional Gender Analysis in Research of Infectious Diseases of Poverty (see Figure 26) has been developed and its piloting started in December 2019 at country level with the development of research protocols in Nepal and Uganda (final ethics approvals received in 2020), in collaboration with institutions of the Rings Network (Makerere University School of Women and Gender Studies and HERD International).

The following resulting case studies with an intersectional lens are expected to be submitted to a peer review journal in 2021, as it may not be possible to have final research results in 2020 due to COVID-19 pandemic:

- **Two research teams** (from Nepal and Uganda) developed research protocols in 2019, and in 2020 will apply an intersectional gender lens and follow guidance from the TDR toolkit to generate research case studies focusing on schistosomiasis and tuberculosis (TB) in Uganda and lymphatic filariasis (LF) and tuberculosis in Nepal (research activities slightly delayed due to COVID-19 pandemic). This work will serve to pilot the above-mentioned toolkit and assess feasibility of its implementation in the real world. The toolkit, which followed a global consultation and peer review process in 2019, was launched in September 2020 both as a print and an interactive web version.
- **Four research case studies** will be generated. Three infectious diseases have been identified for inclusion in the case studies, schistosomiasis, LF and TB. Within each case study, the toolkit will be used to develop specific research questions and identify key social stratifiers to explore how they intersect with gender dimensions to influence vulnerability to illness, exposure to pathogens, response to illness, treatment received and discrimination and/or unequal access to health care. The research generated from the case studies in Nepal and Uganda will allow a path to be set for strengthened evidence on how gender intersects with other social stratifiers in patient treatment, insights on access and care and how these influence infectious disease perception, and understanding and awareness, among others.

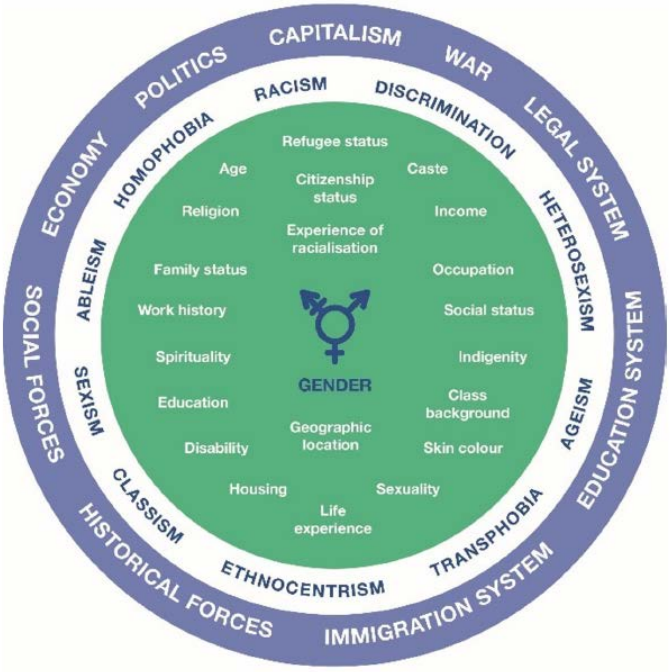


Figure 26. Gender intersectionality, socioeconomic characteristics and health services

Source: TDR Toolkit: Incorporating intersectional gender analysis into research on infectious diseases of poverty, forthcoming; adapted from Intersectionality Wheel (Simpson, 2009).

Expansion of this Expected Result to generate evidence to strengthen intersectionality and gender research efforts in infectious disease prevention and control

In addition, and in line with IMP SWG recommendations and vision included in TDR's intersectional gender research strategy, this Expected Result aims at generating evidence on gender intersecting inequalities in infectious disease epidemiology, prevention and control, as well as gender and intersectionality applied in infectious disease implementation research processes. For this purpose, TDR has launched a research call to invite institutions to submit proposals from single or multiple contexts that span the translational research spectrum and are of any methodological underpinning. Teams should address gender, sex, and their intersections with associated inequities in infectious diseases. The evidence generated will inform TDR's research and programmes, which in turn may also influence future implementation research, policy and practice.

In the context of infectious diseases, the call suggests that research studies may focus on (not an exhaustive list and team may suggest related topics):

- Exploring how social and gender-related dynamics influence if, why and how implementation strategies on infectious diseases work.
- Studying the intersection of sex and gender with other social stratifiers to understand marginalization and disadvantage in access to health services and interventions.
- Research on the intersection of gender and other axes of inequality in delivery and access to prevention and control approaches and products to prevent and control infectious diseases.
- Considering ways in which underlying gender power relations can be challenged and progressively changed during the research process.
- How to optimize health interventions in structural violence conditions where the most vulnerable people live with a high burden of infectious diseases.
- Research studies that apply an intersectional gender lens to assess the risk of disease exposure and the intersection with social determinants of infectious diseases and comorbidities.
- Research studies that address sex- or gender-associated health or social outcomes of infectious diseases, including the ways in which gender and other axes of inequality shape individual or household-level indicators of well-being.
- Studies that address gender dimensions and apply an intersectional lens in infectious disease programme delivery, including mass drug administration coverage, infectious disease control interventions, utilization of water and sanitation resources, and access to disease management services for morbidity, disability, or mental health services.
- Evidence on the influence of gender dynamics/gender power relations, gender intersecting inequalities, culturally dominant constructions of masculinity and femininity in shaping people's health and health seeking behaviours across population subgroups.
- How gender norms, roles and relations intersect with other axes of inequality (e.g. sex, age, social class, ethnicity, gender identity, geographic location, refugee status, disability, etc.) to determine unique circumstances of disadvantage and/or privilege in access to health care and treatment of infectious diseases.
- Evidence of the extent to which COVID-19 affects women, men, trans women, trans men and people with non-binary gender identities, in terms of benefiting from health interventions and access to care and treatment of infectious diseases.

Strengthened research capacities in intersectional gender analysis and institutionalizing gender-based analysis of VBD training

The GBA course at The University of The Witwatersrand run from the 1st September 2020 – 18th October 2020. Sixty-four participants that met eligibility criteria from West Africa, East Africa, Southern Africa and Central Africa were accepted to take the course, following a call for applications with over 250 applicants expressing interest. A total of 76 letters were sent to successful applicants with a request to complete a

biographical data form so that they could be enrolled on the course at Wits University. Sixty-nine participants completed the forms and were enrolled onto the course. Five of the enrolled participants never started the course. Fifty-four participants successfully completed the course. Of those enrolled, 78% completed the course and are eligible to receive certificates. Participants were based in 14 different countries, representing West, East, Central and Southern Africa. The majority were men (63%) and over a third had a Master's degree (38.9%). A third were currently working as researchers, 22.2% were academics and 13% worked in laboratories as medical scientists.

In addition, the course will run in its entirety as one of the approved courses for the Bachelor of Health Sciences Honours in Public Health Honours programme. The Wits School of Public Health is initiating a new degree programme starting in 2021. This is a one-year full-time programme for students wanting to pursue postgraduate studies in public health. The "Gender-based analysis of infectious diseases and climate change" was approved as one of the courses which students can take as part of the new Honours programme. It will run with slight modifications online using all five modules. The first cohort of students were selected with offers made to 15 students. Orientation for the programme was scheduled for 20–22 January 2021, during which students will have the opportunity to select courses. The academic programme starts in February 2021 and the GBA online module is scheduled for 5–30 April 2021.

UNDP Access and Delivery Partnership project

TDR and UNDP in collaboration with The Liverpool School of Tropical Medicine, under the umbrella of the Access and Delivery Partnership (ADP) project, developed a discussion paper, *The Gender Dimensions of Neglected Tropical Diseases*, which was also launched during the ASTMH Conference in November 2019, followed by a webinar to raise awareness during World NTD Day in January 2020. The discussion paper is accessible at the following link: https://www.who.int/tdr/diseases-topics/gender/en/

Remaining Challenges

Obtaining local ethics approvals for research studies at country level and WHO headquarters takes time and may delay the research process. Adequate planning has been ensured to minimize this risk as much as possible. Apart from this, and in relation to other TDR projects beyond the gender research portfolio, conducting a deep retroactive gender analysis may not be possible for existing projects that: i) did not budget for it; ii) which do not have the adequate human resources; and iii) did not consider gender at the initial stages of their research design.

COVID-19 delayed slightly some of the data collection activities at country level; however, projects in Nepal and Uganda are still expected to be finalized within this biennium.

Contributions toward TDR key performance indicators

Partnerships and collaborations:

Makerere University, HERD International

Gender aspects and vulnerable populations:

The project description above highlights the specific focus on gender and other intersecting axes of inequality. PI's of both Institutions are women.

Publications:

Ozano K, Dean L, Yoshimura M, MacPherson E, Linou N, Otmani Del Barrio M, Halleux CM, Ogundahunsi O, Theobald S. A call to action for universal health coverage: Why we need to address gender inequities in the neglected tropical diseases community. PLoS Negl Trop Dis. 2020 Mar 12;14(3):e0007786. doi: 10.1371/journal.pntd.0007786. PMID: 32163416; PMCID: PMC7067373.

Results dissemination and uptake:

The toolkit will be disseminated widely across countries and research institutions in LMICs.

Plans for 2021–2023

A subsequent research call launched in 2020 will expand this area of work in 2021–2023 to generate further evidence on how gender intersects with other axes of inequality that shape health conditions and access to treatment and care. Research teams have been selected for this purpose to conduct studies in Kenya, Malawi, South Africa and Bhutan.

▪ Workstream: Research for Innovation

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

TDR, through its convening power and expertise, provides a directional perspective and adapted methodologies for the development and assessment of new interventions and tools to achieve programme objectives for poverty-related diseases, including technical advice to external organizations as well as to WHO programmes and departments.

Progress in 2020

Drug development for onchocerciasis (Drugs for Neglected Diseases *initiative*, DND*i*): TDR staff continue to provide expertise and network in support of DND*i* activities as and when requested. This includes a database for case reporting and clinical trial data and a discussion forum on off-label use of drugs for indications with either no or insufficient approved treatments (CURE ID). CURE ID was initiated by the US Food and Drug Administration (US–FDA) and the US National Institute of Health (NIH). TDR is also working with WHO–NTD, WHO–GTB, WHO–GMP, WHO–PQT and other departments to obtain global expert input into the deployment of this tool. The original across indications expert meeting was replaced by virtual meetings for selected indications. The CURE ID application was adapted for COVID-19.

TDR collaborations with individual WHO departments:

- WHO–NTD: i) Onchocerciasis subgroup of the NTD Diagnostic Technical Advisory Group for development of Target Product Profiles (WHO–NTD); ii) Member of the Steering group for the development of the WHO standard guidelines on the treatment of visceral leishmaniasis in HIV co-infected persons; iii) Member of WHO Task Force on Criteria for the Elimination of Leprosy (TFCEL); and iv) WHO network for HAT Elimination – Human African Trypanosomiasis Elimination Technical Advisory Group, Ad hoc working group on widened use of acoziborole.

- WHO/MHP/RPQ/REG/PVG:[10] Selection panel for the *Global network for international epidemiological vaccine safety studies*.
- WHO/UHL/IVB:[11] Selection panel for *Support for data management systems and statistical analysis* for the RTS,S Malaria Vaccine Implementation Programme.
- WHO–GTB: Development of guidance on implementation of Good Clinical Practices (GCPs) and Good Data Management Practices (GDMPs) in the context of national surveys of the burden of TB disease.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

DND*i*, US–FDA, NIH (USA)

Publications:

Olliaro PL, Coulibaly JT, Garba A, Halleux C, Keiser J, King CH, Mutapi F, N'Goran EK, Raso G, Scherrer AU, Sousa-Figueiredo JC, Stete K, Utzinger J, Vaillant MT. Efficacy and safety of single-dose 40 mg/kg oral praziquantel in the treatment of schistosomiasis in preschool-age versus school-age children: An individual participant data meta-analysis. PLoS Negl Trop Dis. 2020 Jun 22;14(6):e0008277. doi: 10.1371/journal.pntd.0008277. PMID: 32569275; PMCID: PMC7360067.

Plans for 2021–2023

- Continue collaborations and development of generic protocol where needed.

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

In 2019, evidence briefs for policy were prepared in collaboration with policy-makers (ministries of health) from three LMICs: Brazil, Burkina Faso and Colombia and published in 2020. The briefs are accessible at: https://www.equiperenard.org/verdas-en and https://www.equiperenard.org/verdas-fr. The briefs draw on earlier publication of a series of scoping reviews in the following areas:

- field validation and implementation of rapid diagnostic tests for vector-borne and other infectious diseases of poverty in urban areas;
- surveillance systems for VBDs in urban settings;
- impact, economic evaluation and sustainability of integrated vector management in urban settings;
- transmission dynamics, vector capacity and co-infection;
- containment measures of emerging and re-emerging vector-borne and other infectious diseases of poverty in urban settings; and
- interventions for VBDs focused on housing and hygiene in urban areas.

This project under this Expected Result was finalized last year and following the IMP SWG 2019 recommendations and the current COVID-19 pandemic situation. In 2020 a new call for proposals was launched inviting institutions working on public health, urban health, implementation research and infectious disease prevention and control, to submit individual or collaborative proposals where two or more

[10] Division of Medicines and Health Products (MHP); Department of Regulation and Prequalification (RPQ), Regulation and Safety (REG), Pharmacovigilance (PVG).

[11] Universal Health Coverage and the Life Course (UHL). Department of Immunization, Vaccines and Biologicals (IVB).

institutions are forming a consortium, to explore social and gender dynamics in urban health contexts.

The call responds to the need to recognize that urban health is influenced by several factors, including governance, population features, urban planning, socioeconomic development and health services, among others. All of these factors in turn have major implications for social and environmental determinants of health. The existence of small and medium towns, and the growth of urban slums, including non-notified slums that often lack reliable and safe piped water, adequate solid waste management and other basic services, can render large populations in towns and cities at risk of infectious diseases that can be exacerbated even more under environmental threats such as climate variability and change.

VBDs alone cause more than one million deaths each year. The risk of infection is particularly high in towns and cities where vectors proliferate and contact with human beings is high. 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. 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 policies and to promote inclusive, equitable and sustainable urban health services. Understanding the social dynamics, including the gender dynamics that take place in the urban context, is needed to address bottlenecks in the implementation of effective interventions and strategies, 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 experiences of disease.

The overall objective of this work is 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 2020

In 2020, following the IMP SWG recommendations and the current COVID-19 pandemic, this Expected Result will also explore social and gender dynamics influencing urban health and prevention and control of infectious diseases. A 2020 call for proposals was launched inviting institutions to conduct literature reviews and/or research gap analyses on social determinants of urban health, and to the extent possible also explore evidence on how social and gender dynamics in a COVID-19 context affect the prevention and control of infectious diseases of poverty. TDR is working with research teams in India and Bangladesh for this purpose and the literature reviews are expected to be completed and published by end of 2021.

ER 1.3.14: Testing of innovative strategies for vector control

Background

VBDs 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 Expected Result is to work with all partners to test innovative vector control technologies.

One of these alternative technologies is the "Sterile Insect Technique" (SIT) (see Figure 27), which is a method of pest control using area-wide releases of sterile males to mate with wild females to reduce the production of offspring. This technique has been successfully implemented in agriculture against numerous insects since

about 60 years, with no side effects and having an environmentally safe impact. As a first step, a joint collaboration was established between the Department of Nuclear Sciences and Applications (NA), the Department of Technical Cooperation (TC) of the International Atomic Energy Agency (IAEA), and the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR), in partnership with the WHO–NTD, to develop activities on providing guidance to countries and testing SIT against *Aedes* mosquitoes, vectors of arboviral diseases.

This innovative SIT technology is almost ready to go into the field since it is already used in agriculture against pests. Other innovative technologies to control vectors, such as Genetically Modified Mosquitoes (GMMs) and use of pheromones for sexual confusion, can eventually be tested through this Expected Result, according to the requests of the supporting Members States.

Objectives

This Expected Result aims to provide countries and stakeholders up-to-date guidance on how to test new vector control technologies through different materials such as a guidance document, training materials, a workshop and in-site evaluations. Research activities under the best standards of quality and ethics will also be implemented through to test into field conditions the entomological outcomes and the epidemiological outcomes of new vector control technologies. The importance of developing necessary and adequate indicators to evaluate the impact of the 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.

The final objective is to provide to the countries and the WHO operational programmes (in particular the Global Malaria Programme and WHO–NTD, but not limited to) the required support to make new recommendations and policies on innovative vector control technologies and allow full deployment of new validated vector control tools.

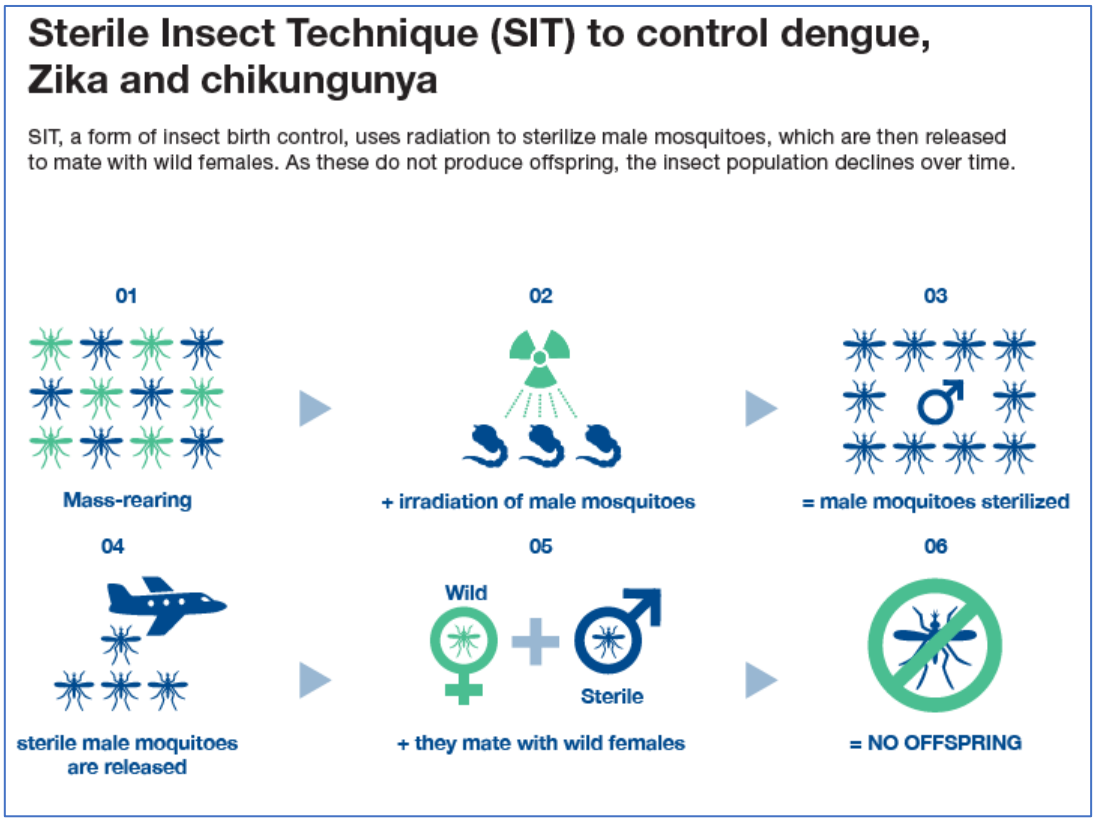


Figure 27. Sterile Insect Technique

Outputs and outcomes

Phase 1: January 2019 to February 2020: Development and production of a guidance document for countries on how to test SIT against *Aedes* mosquitoes, vectors of arboviral diseases.

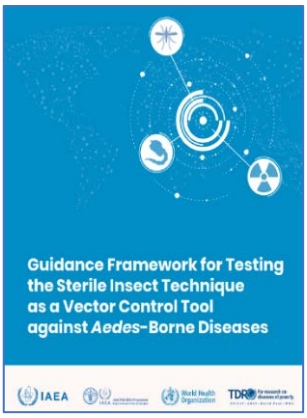
Phase 2: July 2019 to February 2020: Resource mobilization and release of an open call for proposals to select consortiums to test SIT against *Aedes* in different countries, including LMICs. Establishment of an ad hoc review committee and selection of the best scored research consortium(s).

Phase 3: March 2020 to December 2021: Update of proposals to align them with the guidance framework and harmonize between the consortiums, building of a Special Project Team to help and follow the projects and raising of contracts. Start of the projects in the field.

Phase 4: January 2022 to December 2023: Continuation of field tests, epidemiological evaluation and if satisfactory implementation of the results and policy recommendations and deployment of this new vector control technology at the country level.

Progress in 2020

Phase 1 – The Guidance Framework Document



This is a joint AIEA/TDR/WHO document, entitled ***Guidance Framework for Testing the Sterile Insect Technique as a Vector Control Tool against Aedes-Borne Diseases***. It was announced at a press briefing in November 2019 and released in April 2020, and can be found at the following link: https://www.who.int/tdr/publications/year/2020/guidance-framework-for-testing-SIT/en/

Phase 2 – Open call for proposals for testing SIT against Aedes mosquitoes

In July 2019, an open Call was released to select consortiums of institutions, vector control agencies and public health systems working on innovative vector control approaches, in particular on testing the Sterile Insect Technique (SIT), submitting collaborative proposals to: i) test SIT technology against mosquito vectors of diseases with epidemiological evaluation of the outcomes; and ii) better understand physiological processes associated with the technology. The proposals should target the following species: *Aedes aegypti* and *Ae. albopictus*.

The call was to support the development of a new strategic activity for the Vectors, Environment and Society (VES) Unit of TDR, in collaboration with IAEA, and will be co-managed with the FAO-IAEA Insect Pest Control Laboratory (IPCL), in line with the Global Vector Control Response (GVCR) approved by the WHA70 in May 2017 (Resolution WHA 70.16), and in partnership with WHO–NTD. The proposals were required to have at least two to three institutions, at least one of them based in an LMIC. Four multi-country proposals were selected based on an open transparent selection process. See Table 7 below for the selection list.

Table 7. Applications selected following the IAEA/TDR Call for field testing of SIT

Application	WHO Region(s)	Countries included
1	EUR/AMR	Italy – Mexico – Switzerland
2	WPR	Chili (Pascua Islands) – Cook Islands – French Polynesia
3	SEAR/WPR	Thailand – Philippines – Indonesia
4	AMR	Brazil – Cuba – French American Territories

Plans for 2021–2023

Phase 3 – The field testing of SIT

To follow and support the field testing of SIT, an ad hoc Committee will be established in partnership with AIEA and WHO–NTD. The experts to be included in this Committee have already been discussed with the partners and an overview is included in the box below.

The field testing of SIT is currently on hold due to the COVID-19 situation because of the cancellation of different meetings with the potential funders. It was also necessary to cancel the workshops as research teams were unable to start any new field work. The initial timelines of the project will be delayed, but since this project will benefit from designated funding, it is expected that the project can be completed between the current and next biennium. The new timelines are as follows:

First round for two proposals, the one with the highest scoring and the one selected by IAEA

- Update of proposals and contracts between mid and end 2021
- Field work between June 2021 and May 2023.

Second round for the two remaining proposals according to availability of the teams and funding

- Update of proposals and contracts by end 2021 and mid-2022.
- Field work for the second round of proposals between January 2022 and December 2023.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

Collaboration and a Memorandum of Understanding was developed and signed with the IAEA and with the joint IAEA/FAO Team. The activities will be undertaken in partnership with WHO–NTD and the WHO Regional Offices, as well as several countries.

Estimated leverage created by this project:

This Expected Result will be funded essentially through designated funds, and given the current COVID-19 situation, will eventually be funded directly by the partnering agencies, The IAEA Technical Department will commit an initial funding for an amount to be determined, over the two biennia to support one or more of the selected proposals. 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 to be estimated.

Gender aspects and vulnerable populations:

Gender aspects were taken into account in the selection process and although the Principal Investigators of the projects receiving the higher scoring are 75% males, all consortiums are showing parity among the investigators. This new vector control technology will be deployed in priority areas where the most affected populations are the poorest and the most vulnerable.

Training:

A first training material was produced with the guidance document. Several training workshops and activities are planned through this activity and an evaluation of capacity building and strengthening of the participating institutions is already planned with the IAEA partners.

Publications:

Guidance Framework for Testing the Sterile Insect Technique as a Vector Control Tool against Aedes-Borne Diseases is available at

https://www.who.int/tdr/publications/year/2020/guidance-framework-for-testing-SIT/en/.

▪ Workstream: Research for Integrated Approaches

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

Background

VBDs, including malaria and emerging arboviral diseases, account for about one quarter of all infectious diseases. Although there has been significant progress for the control of malaria in the last decade (malaria morbidity and mortality) this progress now seems to have stalled in the last four years. Malaria and 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 fatalities. 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 the vector-host-pathogen relationship where natural conditions, human societies and vector parameters are dynamically interacting. Further, the Global Vector Control Response (GVCR) 2017–2030, which was approved at the World Health Assembly in 2017 by more than 190 Member States considers the intra- and intersectoral approach as one of the four pillars[12] to achieve efficient vector and VBD control.

Objectives

The rationale of this Expected Result is to work with all partners to better understand how to implement an efficient multisectoral approach (MSA) for preventing and controlling VBDs since although MSA has been widely used and recommended, the theoretical baselines and the "*how to*" are missing. This Expected Result will also work on developing tools, frameworks and guidance on MSAs, as well as test the approaches with case studies in field conditions.

This activity is building up on the Multisectoral Action Framework for Malaria (MAFM) developed by the Roll Back Malaria (RBM) Partnership and the UNDP. A concept note was issued by the Swiss Tropical Public Health (STPH) Institute and the Swiss Development Cooperation (SDC) entitled, *Leveraging the Sustainable Development Goals to intensify transdisciplinary and multisectoral collaboration in the global malaria response*". In this context, a collaboration on MSAs for the prevention and control of malaria and emerging arboviral diseases was started between the SDC, the STPH, the Canadian International Development and Research Centre (IDRC), and the VES/TDR Unit, to build a multi-disciplinary approach with supporting commissioned reviews on specific items related to MSAs against VBDs, and the development of a guidance document.

Following these first steps, a collaboration was established with the WHO–WASH intervention group and supported by funding from Sida to strengthen countries' capacity on MSAs against VBDs with a focus on safe water, sanitation and hygiene. The overall objectives of the collaboration are to reduce WASH-related diseases of poverty as per WHO–WASH strategy, with a primary focus on VBDs, as per TDR strategy. This project will also be relevant for other issues related to UHC and human well-being as well, and thus the capacity built from this work will benefit a broad spectrum of health-related topics.

Output: The different steps of the Expected Results are shown in Figure 28.

[12] These four pillars are: i) strengthening inter- and intra-sectoral action and collaboration; ii) engaging and mobilizing communities; iii) enhancing vector surveillance and monitoring and evaluation of interventions; and iv) scaling up and integrating tools and approaches (WHO. *Global Vector Control Response (GVCR) 2017–2030*, Geneva. 2017).

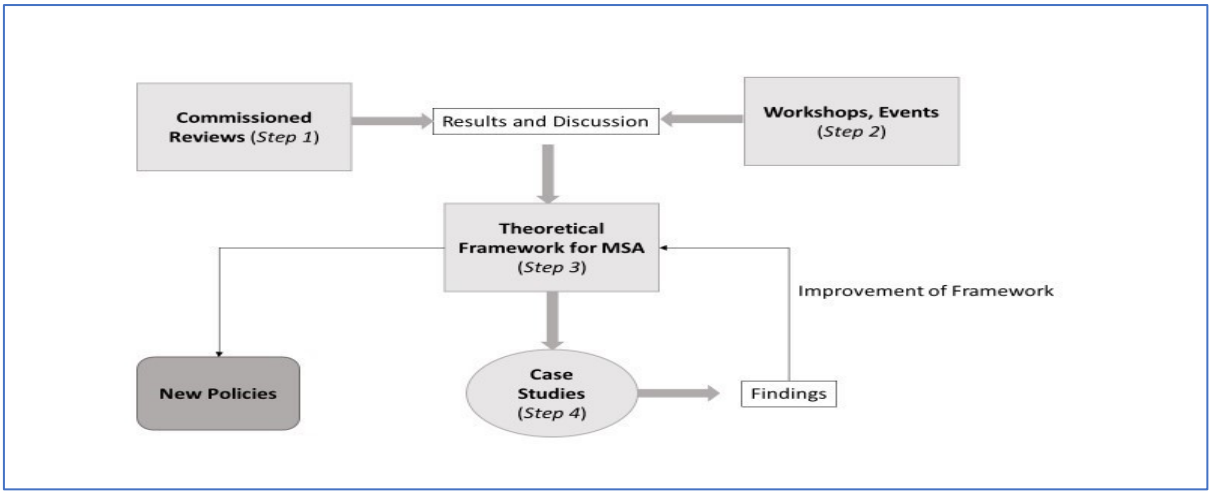


Figure 28. Steps of the project on MSAs for prevention and control against VBDs

Note: Steps 1 to 3 already achieved and step 4 started during the 2020–2021 biennium

Progress in 2020

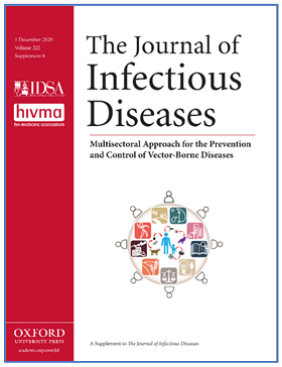
Step 1. The commissioned reviews

A call was launched in January 2017 to support five commissioned reviews on specific topics related to multisectoral approaches for the prevention and control of VBDs. The overall objective of the call was to support a landscape analysis that would identify the knowledge gaps in the understanding of transmission patterns and ecology of the mosquito vectors of VBDs. The commissioned reviews were mandated to investigate current knowledge and experiences on the different topics. The following reviews were completed:

- *Review 1*: Impact of the industrial sector on VBDs, with the example of the gold mining activities that are disrupting the malaria ecosystems in Africa and the Americas.
- *Review 2*: Using dengue virus as a proxy to describe and assess the individual and combined impact of vector control strategies including within the eco-bio-social approach.
- *Review* 3: Impact of human mobility (either from individual or population) caused by economic, civil unrest or war reasons, displacement of temporary workers, and other population movements, on the emergence of arboviral outbreaks.
- *Review 4*: Role of the different stakeholders into a multisectoral intervention on insecticide treated nets distribution on mobile populations in South-East Asia.
- *Review 5*: This review examined how stakeholders are working together to achieve the implementation of a global multisectoral strategy.
- *Review 6*: Scoping review of intersectoral collaborations for the prevention and control of VBDs.

Results of four of the reviews (Review 1, 3, 4 and 6) were published in a *Supplement of the Journal of Infectious Diseases* in October 2020 (https://academic.oup.com/jid/issue/222/Supplement_8), while Reviews 1 and 5 yielded two separated publications which were published previously.

Step 2. Workshops and events



- *TDR-SDC-IDRC-Swiss TPH Workshop on Multisectoral Approaches for Prevention and Control of Vector-Borne Diseases: Current knowledge and Research Gaps and Priorities*, Starling Hotel, Geneva, Switzerland, 26–28 June 2017.
- *Geneva Health Forum 2018*: Parallel Session on *Global health security – Towards multisectoral collaborations to confront the increasing threat of vector-borne diseases*, 11 April 2018.
- *67th annual meeting of the American Society of Tropical Medicine and Hygiene (ASTMH)*, New Orleans, Louisiana, USA 2018: Poster presentation on *Multisectoral approaches to prevent and control malaria and arboviral diseases*, 31 October 2018.
- TDR-CARPHA-IPK Workshop on Multi-Sectoral Approaches for Prevention and Control of Vector-Borne Diseases in the Caribbean: Current Practices and Future Development. Pedro Kourí Institute (IPK) side event of 16th International Dengue, Zika and Current Emergent Arboviruses Course, Havana, Cuba, 16 August 2019.

Step 3. Development of a Guidance Framework for Implementation of the Multisectoral Approaches

This document was produced following one of the main recommendations from the reviews and the exchanges with the stakeholders. The document starts with two introductory chapters on VBD basics and multisectoral approaches. The determinants of VBDs are described and grouped into four categories: i) pathogen- and vector-related; ii) environmental and agroecological; iii) economic and social; and iv) health system-related determinants. Chapters 3 and 4 present the conceptual framework and its components. The conceptual framework is named *BET,* referring to "Base", "Energy" and "Technical" elements, and includes seven components: pillars, dimensions, levels, resources, sectors, domains and enablers (see Figure 29).

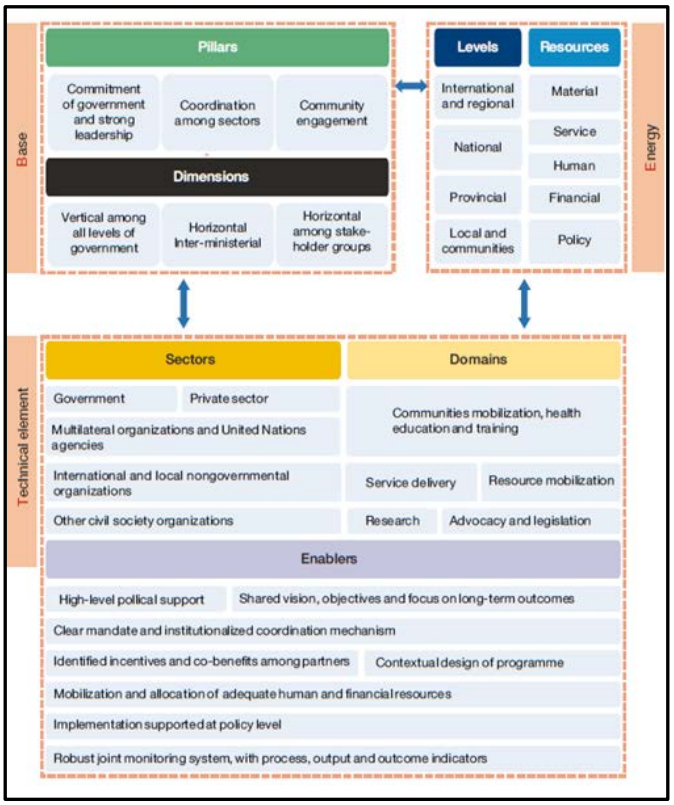
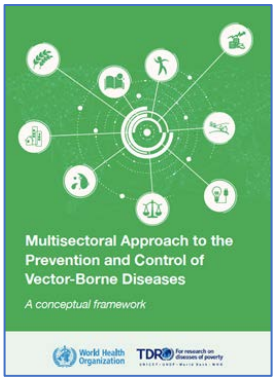


Figure 29. The BET conceptual framework of an MSA for the prevention and control of VBDs



These components envelop the ingredients to include in a customized and tailored MSA. Chapter 5 outlines the coordination pathway from step 1 to step 6. In Chapter 6 on "Sectoral Guidance", a sectoral pathway is intended to assist government ministries to plan and initiate their work according to an MSA from defining the vision to sectoral M&E, including important steps such as aligning MSA activities with the sector's existing activities. A non-exhaustive list of key sectors is included, along with health: environment, water and sanitation, agriculture and aquaculture, energy, housing, education and research, finance and legislature. The last conclusive chapter of the guidance document highlights the need for an M&E system of these approaches and of the interventions.

This publication was released online in April 2020, after passing through the standard internal and external review processes, as well as editing and WHO clearance. It can be found at the following link:

https://www.who.int/tdr/publications/year/2020/mca-for-prevention-and-control-of-vbds/en/

Step 4. The case studies within a specific partnership with the Water and Sanitation Sector (WHO–WASH)

The objectives of the case studies are to:

- Help countries deploy MSAs through capacity-building activities, guidance documents, networking and workshops.
- Refine and promote TDR's research for impact on multisectoral action for health, with a focus on priority research relevant to WASH. Harness TDR's comparative advantage in research and training on diseases of poverty and increasing the impact of WHO–WASH work through joint convening of WASH and health sectors.
- Support health system strengthening to better address infectious diseases of poverty in general, and VBDs in particular, by supporting joint efforts focused specifically on WASH services in health-care facilities and building capacity of health and WASH workers.

To achieve these objectives two work packages have been developed. This collaboration between WHO-WASH and the Sida funding group (US$ 830 000) includes several deliverables as summarized below:

- **Work package 1 (WP1):** Strengthening the prevention and control of diseases of poverty through multisectoral collaboration, based on the latest TDR's research findings and WHO–WASH norms.
  - **Deliverable 1** – Publication of an updated TDR document on multisectoral action for health, with addition of special WASH focus and dissemination at key global and regional events.
  - **Deliverable 2** – Development of a training package supporting multisectoral actions to strengthen WASH-related disease control and prevention efforts.
  - **Deliverable 3** – Build country capacity on multisectoral actions through: i) support to selected countries in the development of research for implementation of multisectoral activities to prevent and control WASH-related infectious diseases with a focus on VBDs; ii) conducting two regional training workshops convened by WHO regional and country offices and with partners; and iii) online courses and/or platforms (e.g. webinars and others).
  - **Deliverable 4 –** Document lessons learnt from initial training, refine approaches and identify and plan actions and research priorities for Phase 2.
- **Work Package 2 (WP2):** Strengthening health systems to better address infectious diseases of poverty in general and VBDs in particular through improved WASH in health care facilities and enhanced capacity to manage WASH services and engage in good hygiene practices.
  - **Deliverable 1** – Report on WASH in Health Care Facility: Action and Progress towards achieving universal access [WHO Global Good].
  - **Deliverable 2** – Presentation of the findings of the report to the countries and discussion on tools and activities.

- **Deliverable 3** – Report and guide to support costing and investments in WASH in health-care facilities.

The activities related to WP1 have started and are on track. For deliverable 1, a consultant has been recruited to develop the specific WASH chapter in collaboration with a WASH team, and the chapter was drafted. The chapter is drafted for the WASH section of the guidance document. It aims to provide a more comprehensive guide on the linkage between WASH and VBDs, how to engage WASH stakeholders, and what are the collaborative activities for VBD prevention and control. Common metrics and indicators were developed for joint M&E. A joint advocacy process was discussed with steps and examples of campaigns and events where WASH and VBD could be introduced. New sections were added to highlight the importance of the intersection between WASH and VBDs in humanitarian situations and climate change, with key areas for actions recommended. For deliverable 2, the consultant is working closely with the WASH group to develop the training package.

- The East Africa regional WASH-NTD learning and exchange series was conducted between 20 October–15 December 2020 online. The consultant has participated in all the training sessions, joined discussion on different steps of doing multisectoral approaches with a focus on WASH and NTDs and disseminated the guidance document with the participants from East Africa (approximately 40).
- The WASH team is leading the development of another training workshop in PAHO on the same topic. The workshop strategy materials were shared with TDR and input was provided.
- A workshop is planned in June 2021 to report progress on the case studies, share experience and build capacity in researchers on MSA with a focus on WASH. Organization of the workshop is ongoing. Support was received from China CDC to co-organize the workshop. The development of workshop materials including the training package of a one-day MSA-WASH training is ongoing.

For deliverable 3, an ad hoc review committee was established, and two proposals for case studies have been received, reviewed and approved and are in the process of being contracted. A call for application was launched in August 2020 to select two more case studies on MSAs and arboviral diseases. The outcome of the selection process has been approved.

Plan for 2021–2023

The activities related to WP2, which include "*the strengthening of health systems to better address infectious diseases of poverty in general and VBDs in particular through improved WASH in Health Care Facilities (HCF) and enhanced capacity to manage WASH services and engage in good hygiene practices*" are under the responsibility of the WHO WASH Team, in collaboration with TDR. Deliverable 1 within WP2 was the report on WASH in HCF. The other deliverables (2 and 3) are planned for the 2021. The report on WASH in HCF, to which TDR had the opportunity to contribute, was released at the end of 2019 and can be found at the following link: https://www.who.int/water_sanitation_health/publications/wash-in-health-care-facilities-global-report/en/.

Within the same Expected Result, a proposal in response to the call for application from the UN Peace and Development Trust Fund to support MSA case studies on malaria was submitted in collaboration with WHO–GMP and China CDC and successfully evaluated. This new activity described in the abstract below will start in early 2021 and will receive designated funds for a total amount of US$ 390 000.

***Abstract*:** The overall goal is to explore and validate the application of innovative surveillance and response, as well as multisectoral approaches to reduce malaria burden in different settings of Africa. The project will have two components, both of which align well with the national strategic plans (NSPs) for malaria of the countries: component 1) innovative surveillance, namely Malaria Reactive Community-based Testing and Response Approach (1-7 mRCT) – adopted from the Chinese 1-3-7 surveillance and response experience; and component 2) a multisectoral approach in coordination and implementation to reduce the malaria burden. The project will be implemented in selected districts and villages of four countries (Burkina Faso, Senegal,

Tanzania and Zambia). The National Malaria Control Programmes (NMCPs) will coordinate the execution of the project with technical support of local institutions; set up health teams for weekly testing and treatment campaigns in selected communities with high transmission, customized to the local contexts. Upon successful verification of the approaches, the NMCPs could incorporate the approach into their national policies for wider scaling-up in their high burden districts. The NMCPs will identify local institutions that will help and partner in implementing the project on the ground. WHO, TDR and China's National Institute of Parasitic Diseases (NIPD) will support the countries in training, designing, implementation and M&E of the project. The NIPD and WHO will also facilitate experience-sharing, documentation of the findings, transfer of skills attained and inform national policies.

Contributions towards TDR key performance indicators

Partnerships and collaborations:

The initial partnership was with the Swiss Agency for Development and Cooperation (SDC), the Canadian International Development Research Centre (IDRC) and the Swiss Tropical and Public Health Institute (STPH). A new partnership was established in 2019 with the WHO–WASH group and Sida. A supplementary partnership was established on MSA in Malaria with GMP/WHO and China CDC.

Estimated leverage created by this project:

This Expected Result has been and remains funded essentially through Designated Funds (DFs), which represent about 75% of the funding received for this ER. The DFs also have different origin for different activities and collaboration. If the findings and the collaboration provides satisfactory outcomes, further funding is expected. The activities from this project have already leveraged funding from the institutions supporting the commissioned reviews and the events. Further funding will be leveraged through the case studies.

Gender aspects and vulnerable populations:

Gender aspects were taken into account in the selection process of the commissioned reviews, as well in the case studies, with currently three out five (about 37%) of principal investigators being women.

Further, these MSA approaches will be deployed in priority areas where the most affected populations are the poorest ones and the more vulnerable.

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. Inter-sectoral 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 Expected Result is implemented with stakeholders and countries, as well as other operational departments from WHO 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

Budget and financial implementation

Table 8. Approved Programme Budget 2020-2021 and funds utilized (preliminary results)

Expected result	Research for Implementation	Revised planned costs (February 2021)			Implementation at 31 December 2020			Implementation rate at 31 December 2020		
		UD	DF	Total	UD	DF	Total	UD	DF	Total
	Research for policy									
1.1.1	Country preparedness for disease outbreaks	150 000	0	150 000	53 456	0	53 456	36%		36%
1.1.4	Country resilience to the threat of drug-resistant infections	0	4 500 000	4 500 000	0	1 246 038	1 246 038		28%	28%
1.3.3	Vector-borne diseases and increasing resilience under climate change conditions	500 000	0	500 000	343 232	0	343 232	69%		69%
	Research for implementation	0	0							
1.1.7	Maximized utilization of data for public health decision-making	210 000	315 000	525 000	63 483	154 742	218 225	30%	49%	42%
1.1.8	Maximized utilization of safety information for public health decision-making	220 000	740 000	960 000	125 327	294 934	420 262	57%	40%	44%
1.2.1	Strategies to achieve and sustain disease elimination	760 000	3 500	763 500	51 781	0	51 781	7%	0%	7%
1.2.6	Optimized approaches for effective delivery and impact assessment of public health interventions	917 500	1 323 000	2 240 500	153 640	622 439	776 079	17%	47%	35%
1.3.12	Strategies to promote gender-responsive health interventions on prevention and control of infectious diseases of poverty	400 000	0	400 000	63 114	0	63 114	16%		16%
	Research for innovation	0	0							
1.1.5	Directions for development and accelerated access to new tools and strategies	110 000	0	110 000	5 182	0	5 182	5%		5%
1.3.10	Urban health interventions for vector-borne and other infectious diseases of poverty	150 000	0	150 000	2 500	0	2 500	2%		2%
1.3.14	Testing of innovative strategies for vector control	300 000	400 000	700 000	14 400	0	14 400	5%	0%	2%
	Research for integrated approaches	0	0							
1.3.11	Multisectoral approach for malaria and emerging arboviral diseases	400 000	1 000 000	1 400 000	164 581	2 497	167 078	41%	0%	12%
	Re-encumbrances			0	151 524	0	151 524			
	Total	**4 117 500**	**8 281 500**	**12 399 000**	**1 192 221**	**2 320 650**	**3 512 871**	**29%**	**28%**	**28%**

Table 9. Proposed Programme Budget 2022-2023

Expected result	Research for Implementation	$40 million scenario			$50 million scenario		
		UD	DF	Total	UD	DF	Total
	Research for policy						
1.1.1	Country preparedness for disease outbreaks	150 000	0	150 000	200 000	0	200 000
1.1.4	Country resilience to the threat of drug-resistant infections	200 000	3 400 000	3 600 000	400 000	4 500 000	4 900 000
1.3.3	Vector-borne diseases and increasing resilience under climate change conditions	400 000	0	400 000	600 000	0	600 000
	Research for implementation						
1.1.7	Maximized utilization of data for public health decision-making	250 000	400 000	650 000	600 000	600 000	1 200 000
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	740 000	200 000	940 000	1 200 000	300 000	1 500 000
1.2.6	Optimized approaches for effective delivery and impact assessment of public health interventions	600 000	500 000	1 100 000	1 100 000	700 000	1 800 000
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	100 000	600 000
	Research for innovation						
1.1.5	Directions for development and accelerated access to new tools and strategies	160 000	0	160 000	280 000	0	280 000
1.3.10	Urban health interventions for vector-borne and other infectious diseases of poverty	150 000	0	150 000	250 000	0	250 000
1.3.14	Testing of innovative strategies for vector control	100 000	600 000	700 000	300 000	800 000	1 100 000
	Research for integrated approaches						
1.3.11	Multisectoral approach for malaria and emerging arboviral diseases	200 000	200 000	400 000	300 000	300 000	600 000
	Total	**3 250 000**	**5 400 000**	**8 650 000**	**5 730 000**	**7 300 000**	**13 030 000**

Projects and activities funded

Project ID	Principal investigator	Supplier name / Institution	Project title	Funding in US$	Disease or research topic (ER)	Supplier country
B80314	Maria Da Luz de Lima Mendonc	Instituto Nacional de Saude Publica, Cabo Verde	Entomologic surveillance for Arboviral disease - Cap-Verde	12 207	Arboviruses (ER 1.1.1)	Cabo Verde
B80315	Mawlouth Diallo	Institut Pasteur de Dakar	Entomologic surveillance for Arboviral disease - Senegal	12 211	Arboviruses (ER 1.1.1)	Senegal
B80320	Bollahi Mohamed Abdalla	Institut National de Recherche en Santé Publique (INRSP)	Entomologic surveillance for Arboviral disease - Mauritania	12 408	Arboviruses (ER 1.1.1)	Mauritania
C00038	Bruce Wilcox	Global Health Group International Co, Ltd.	Operationalizing One Health	142 462	Vector Borne Diseases (ER 1.3.3)	Thailand
P20-00007	Lauren Maxwell	University of Heidelberg - Department of Tropical Hygiene and Public Health	Creation of a COVID-19 Data Platform and Repository/Registry tracking sheet	13 560	Database (ER 1.1.4)	Germany
P20-00008	Alisa Denisiuk	Denisiuk, Alisa	Provide research assistance for the creation of a COVID-19 Data Platform and Repository/Registry tracking sheet	7 000	Database (ER 1.1.4)	Germany
B80098	Nancy Saravia	CIDEIM	Database cutaneous leishmaniasis treatment in special populations	625	Cutaneous Leishmaniasis (ER 1.1.7)	Colombia
B80248	Brice Bicaba	Institut National de Santé Publique (INSP)	Pilot evaluation of the use of measles/rubella surveillance specimens for sentinel surveillance of Zika and other arboviral infections	29 998	Arboviral diseases (ER 1.1.1, Re-Enc)	Burkina Faso
2020/1016742	Anthony Harries	Harries, Anthony	Senior Knowledge Management trainer: provide technical support and training to participants on SORT IT Courses (Sierra Leone and Nepal) on antimicrobial resistance (AMR)	25 000	Antimicrobial resistance (ER 1.1.4)	United Kingdom

Project ID	Principal investigator	Supplier name / Institution	Project title	Funding in US$	Disease or research topic (ER)	Supplier country
2020/1030250	Selma Dar Berger	Dar Berger, Selma	Technical support for conducting a "Survey to inform rescheduling of upcoming SORT IT courses on Antimicrobial Resistance due to COVID-19"	3 000	Antimicrobial resistance (ER 1.1.4)	France
B80168	Selma Dar Berger	The Union	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries (2020)	179 000	Antimicrobial resistance (ER 1.1.4)	France
B80173	Debra Donckel	Médecins Sans Frontières	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries (2020)	51 000	Antimicrobial resistance (ER 1.1.4)	Luxembourg
B80174	Maria Zolfo	Institute of Tropical Medicine Antwerp	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries (2020)	59 250	Antimicrobial resistance (ER 1.1.4)	Belgium
B80196	Karapet Datvyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries	33 250	Antimicrobial resistance (ER 1.1.4)	Armenia
B80197	Alexandre Delamo	Centre de Formation Et de Recherche en Sante Rurale de Maferinyah	Providing senior technical expertise for implementing the Structured Operational Research and Training Initiative (SORT IT) on antimicrobial resistance in Low- and Middle-Income Countries (2020)	47 250	Antimicrobial resistance (ER 1.1.4)	Guinea

Project ID	Principal investigator	Supplier name / Institution	Project title	Funding in US$	Disease or research topic (ER)	Supplier country
B80252	Katrina Hann	Sustainable Health Systems	Providing operational research data and software support for participants from Sierra Leone selected for the Structured Operational Research and Training Initiative (SORT IT) courses on antimicrobial resistance	5 000	Antimicrobial resistance (ER 1.1.4)	Sierra Leone
C00017	Selma Dar Berger	The Union	Databases, metrics and archives on the Global SORT IT activities and performance standards: courses, participants, facilitators, milestones, outcomes, publications, impact and other relevant materials	32 000	Antimicrobial resistance (ER 1.1.4)	France
C00016	Selma Dar Berger	The Union	Antimicrobial resistance: Independent review of ethics considerations for analysis of routine programme data from SORT IT training courses	21 000	Antimicrobial resistance (ER 1.1.4)	France
B80316	Jean Louis Ndiaye	UFR Santé / Université de Thiès	Monitoring Seasonal Malaria Chemoprevention and Intermittent Prevention Treatment in pregnant women efficacy through Ante Natal Clinics in South-east Senegal	34 144	Malaria chemoprevention (ER 1.1.4)	Senegal
B80245	Jan Singlovic	Singlovic, Jan	Data Management for analysis of data from study on microbiological causes of invasive infections in young African	1 500	Innovation (ER 1.1.5)	Czechia
2020/1012012	Katherine Tayler-Smith	Tayler-Smith, Katherine Jayne	Literature search, categorization and archiving of scientific publications for supporting SORT IT module 3 (manuscript writing) of operational research studies to accelerate Universal Health Coverage (UHC) for vulnerable and key populations	5 200	SORT IT (ER 1.1.7)	South Africa
2020/1015485	Selma Dar Berger	The Union	Independent review of ethics considerations for analysis of routine programme data from SORT IT training programme on Neglected Tropical Diseases (NTDs)	5 000	SORT IT (ER 1.1.7)	France

Project ID	Principal investigator	Supplier name / Institution	Project title	Funding in US$	Disease or research topic (ER)	Supplier country
2020/1030541	Katherine Jayne Tayler-Smith	Tayler-Smith, Katherine Jayne	Literature review to: i) assess utility and influence of viewpoints/perspective articles published from SORT IT courses (2009-2020); and ii) prepare literature for module 3 of the SORT IT on Neglected Tropical Diseases in Ethiopia	10 400	SORT IT (ER 1.1.7)	South Africa
B80305	Olga Denisiuk	Denisiuk, Olga	Technical and managerial support for conducting a SORT IT programme	15 000	SORT IT (ER 1.1.7)	Ukraine
B80306	Karapet Datvyan	Tuberkulozi Hetazotutyunneri Yev Kankhargelman Kentron	Implementing module 3 of the SORT IT programme entitled “Ending TB/ MDR-TB in “vulnerable populations” through operational research capacity building and evidence-informed decision in Eastern Europe and Central Asia (EECA)	30 295	SORT IT (ER 1.1.7)	Armenia
B80307	Hayk Davtyan	Davtyan,Hayk	Technical and managerial support for conducting a SORT IT programme	15 000	SORT IT (ER 1.1.7)	Armenia
C00005	Stefanie Rust	Rust, Stefanie	Data analysis support on assessing reporting quality and additional TDR indicators of 392 SORT IT publications from 50 completed SORT IT courses (2009-2018)	2 400	SORT IT (ER 1.1.7)	Germany
C00009	Selma Dar Berger	The Union	Tuberculosis in Eastern Europe and Central Asia: Independent review of ethics considerations for analysis of routine programme data	4 500	SORT IT (ER 1.1.7)	France
2020/1029125	Jan Singlovic	Singlovic, Jan	Preparation of dataset for data analysis for the global aDSM database	9 000	Tuberculosis drug safety (ER 1.1.8)	Czechia
B80319	Michel Vaillant	LIH - Luxembourg Institute of Health	Quality control of mapping and curation of datasets for the global aDSM database	3 283	Tuberculosis Drug safety (ER 1.1.8, Re-Enc)	Luxembourg

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B80175	Bakary Konate	Programme National de Lutte Contre la Tuberculose (PNLT) du Mali	West African National Tuberculosis Network-research capacity strengthening	1 947	Tuberculosis (ER 1.2.6, Re-Enc)	Mali
B80179	Victor F. Gomes	Programa Nacional de Luta Contra a Lepra e Tuberculose	Guinea Bissau – Research capacity strengthening (WARN-TB activities)	1 947	Tuberculosis (ER 1.2.6, Re-Enc)	Guinea-Bissau
B80186	Adama Marie Bangoura	Programme National d'appui aux Communes de Convergence (PNACC)	Research capacity strengthening (WARN-TB activities) - Guinea	1 962	Tuberculosis (ER 1.2.6, Re-Enc)	Guinea
B80187	Anoumou Yaotsè Dagnra	PNLT-Togo	Research capacity strengthening (WARN-TB activities) - Togo	1 945	Tuberculosis (ER 1.2.6, Re-Enc)	Togo
B80188	Adjima Combary	Programme National de Lutte Contre la Tuberculose (PLNT)	Research capacity strengthening (WARN-TB activities) -Burkina Faso	1 947	Tuberculosis (ER 1.2.6, Re-Enc)	Burkina Faso
B80189	Marie Sarr	Programme National de Lutte Contre la Tuberculose (PLNT)	Research capacity strengthening (WARN-TB activities) - Senegal	1 950	Tuberculosis (ER 1.2.6, Re-Enc)	Senegal
B80208	Jacquemin Kouakou	Programme National de Lutte Contre la Tuberculose (PLNT)	Research capacity strengthening (WARN-TB activities) - Cote d'Ivoire	1 805	Tuberculosis (ER 1.2.6, Re-Enc)	Cote d'Ivoire
B80214	Yaw Adusi-Poku	National Tuberculosis Programme	Research capacity strengthening (WARN-TB activities) - Ghana	1 888	Tuberculosis (ER 1.2.6, Re-Enc)	Ghana
B80215	Kebba D Sanneh	National Health Development Project	Research capacity strengthening (WARN-TB activities) - Gambia	1 992	Tuberculosis (ER 1.2.6, Re-Enc)	Gambia
B80234	Dissou Affolabi	Programme National Contre la Tuberculose	Research capacity strengthening (WARN-TB activities) - Benin	1 938	Tuberculosis (ER 1.2.6, Re-Enc)	Benin

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B80242	Ahmed Tidjane Anne	Programme Nationale de Lutte Contre la Tuberculose et la Lèpre	Research capacity strengthening (WARN-TB activities) - Mauritania	1 963	Tuberculosis (ER 1.2.6, Re-Enc)	Mauritania
B80260	Dissou Affolabi	Programme National Contre la Tuberculose	West African National Tuberculosis Network	6 418	Tuberculosis (ER 1.2.6, Re-Enc)	Benin
B80303	Mourtala Mohamed	Programme National de Lutte Contre la Tuberculose (PLNT)	Research capacity strengthening (WARN-TB activities) - Niger	9 765	Tuberculosis (ER 1.2.6, Re-Enc)	Niger
2020/1038244	Qingxia Zhong	Zhong, Qingxia	Management of collaborative activities on multisectoral approaches (MSA) for the prevention and control of infectious diseases with the WHO WASH group	51 010	Multisectoral approaches on vector-borne diseases (ER 1.3.11)	Switzerland
B80110	Qingxia Zhong	Zhong, Qingxia	Management of collaborative activities on multisectoral approaches (MSA) for the prevention and control of infectious diseases with the WHO WASH group	48 000	Multisectoral approaches on vector-borne diseases (ER 1.3.11)	Switzerland
B80328	Tiago Divino	Elkanodata, Sl	Layout design and editing for: Multisectoral Approaches for Prevention and Control of Vector-Borne Diseases: A Conceptual Framework and Layout design of WHO TDR technical report (SIT)	8 000	Multisectoral approaches on vector-borne diseases (ER 1.3.11)	Spain
B80328	Tiago Divino	Elkanodata, Sl	Layout design and editing for: Multisectoral Approaches for Prevention and Control of Vector-Borne Diseases	11 000	Multisectoral approaches on vector-borne diseases (ER 1.3.11)	Spain
C00044	Robert Jones	Chariot Innovations Ltd	Hosting at the Global Vector Hub an online directory of courses on medical entomology, developed through a TDR activity	20 104	Innovative Vector Control (Courses on Medical Entomology) (ER 1.3.14)	United Kingdom

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B80288	N/A	Oxford University Press	Publication of a Supplement of the Journal of Infectious Diseases on MSA reviews	26 200	Multisectoral approaches on vector-borne diseases (ER 1.3.11)	United Kingdom
B80290	N/A	Oxford University Press	Publication of a Supplement of the Journal of Infectious Diseases on MSA reviews (Costed extension to PO)	11 850	Multisectoral approaches on vector-borne diseases (ER 1.3.11)	United Kingdom
C00002	N/A	Elisabeth Heseltine	Editing of Multisectoral Approaches for Prevention and Control of Vector-Borne Diseases: A Conceptual Framework	5 460	Multisectoral approaches on vector-borne diseases (ER 1.3.11)	France
B80328	Tiago Divino	Elkanodata, Sl	Layout design and editing for: Guidance Framework for Testing the Sterile Insect Technique as a Vector Control Tool against Aedes-Borne Diseases	8 000	Innovative Vector Control (Sterile Insect Technique) (ER 1.3.14)	Spain
B80290	Cary Kimpton	Oxford University Press	Publication of a Supplement of the Journal of Infectious Diseases: Research for Action on Persistent and Residual Malaria (Costed extension to PO202442746)	4 435	Residual Malaria (ER 1.3.6) , Re-Enc	United Kingdom
2020/1046703	Marie Eve Raguenaud	Raguenaud, Marie-Eve	Support to projects and activities of the Research for Implementation Unit (IMP)	10 800	(ER 2.1.6)	France
B80236	Vanessa Veronese	Veronese, Vanessa Clare	Strengthening evidence and implementation of digital innovations at critical stages of the TB patient pathway	14 000	Tuberculosis (ER 1.2.6)	France
B80236	Vanessa Veronese	Veronese, Vanessa Clare	Strengthening evidence and implementation of digital innovations at critical stages of the TB patient pathway	24 446	Tuberculosis (ER 1.2.6)	France

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C00045	Ratchanekorn Wutirat	Inis Communication Ltd	Design and development of interactive website for the Implementation Research for Digital technologies and TB toolkit	11 069	Tuberculosis (ER 1.2.6)	United Kingdom
2020/1012858	N/A	Kamara, Ibrahim Franklin	APW Contract for AMR Operational Research Fellow NOC - Dr Ibrahim F Kamara for the 17th March 2020 to 16th March 2021	32 675	Fellows (ER 1.1.4)	Sierra Leone
2020/1016279	Kultumi Minah	Lintel Sierra Leone Limited (Africell)	APW for the provision of Africell Mifi internet services for COVID-19 for Output-Program as per IDSR Unit	2 723	Fellows (ER 1.1.4)	Sierra Leone
2020/1027066	Gerald Mboowa	Mboowa, Gerald	APW to facilitate Antimicrobial Resistance – Structured Operational Research Training Initiative (AMR – SORT IT) Principal Investigator (PI) to get institutional ethical clearance for operational research	3 141	Fellows (ER 1.1.4)	Uganda
2020/1027072	Juliet Namaugambe Kitutu	Kitutu, Juliet Namugambe	APW to facilitate Antimicrobial Resistance – Structured Operational Research Training Initiative (AMR – SORT IT) Principal Investigator (PI) to get institutional ethical clearance	3 201	Fellows (ER 1.1.4)	Uganda
2020/1039236	Marc Sam Opollo	Opollo, Marc Sam	APW to facilitate Antimicrobial Resistance – Structured Operational Research Training Initiative (AMR – SORT IT) Principal Investigator (PI) to get institutional ethical clearance	2 957	Fellows (ER 1.1.4)	Uganda
2020/983974	Shreya Shrestha	Shrestha, Shreya	IMA support to NPHL to strengthen the tailored SORT IT capacity building regional/national modules, Influenza Preparedness (PIP) Programme and the Antimicrobial Resistance Surveillance for GLASS, Ms Shreya Shrestha, 12 Jan to 12 Jul 2020	3 712	Fellows (ER 1.1.4)	Nepal

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2020/995249	Godfred Saviour Kudjo Azaglo	Godfred Saviour Kudjo Azaglo	Support the conduct of Antimicrobial Resistance Monitoring in Ambient Air - A case study in Accra, between 17 February and 23 March 2020	2 279	Fellows (ER 1.1.4)	Ghana
B80224	Doctor Varalakshmi Elango	Elango, Varalakshmi	Development of guidance to apply GCP/GDMP principles in the context of National TB surveys and training on its content	18 718	Tuberculosis (ER 1.2.6)	India
B80246	Jennifer Kealy	Kealy, Jennifer Ann	GCP and GDMP compliance of TB surveys	20 614	Tuberculosis (ER 1.2.6)	Switzerland
2020/1007784	N/A	Robert Taylor Communications Ltd	Provide editing services	10 931	Gender (ER 1.3.12)	United Kingdom
2020/982689	Vicente Pau Cuervo	Elkanodata, Sl	Provide layout services	5 273	Gender (ER 1.3.12)	Spain
2020/994185	N/A	Munoz Martin, Jaime	Provide graphic design support	3 308	Gender (ER 1.3.12)	Spain
B80159	Phyllis Dako-Gyeke	University of Ghana	Coordination, Administration and institutionalization of the gender-based analysis course in vector-borne diseases and climate change research	3 630	Gender (ER 1.3.12)	Ghana
B80160	Nicola Christofides	University of the Witwatersrand Faculty of Health Sciences	Coordination, Administration and institutionalization of the gender-based analysis course in vector-borne diseases and climate change research	5 120	Gender (ER 1.3.12)	South Africa
B80217	Sarah Ssali	Makerere University School of Women and Gender Studies	Pilot TDR toolkit on intersectional gender analysis	46 085	Gender (ER 1.3.12)	Uganda
B80217	Chandani Kharel	Herd International Private Limited	Pilot TDR toolkit on intersectional gender analysis in research on infectious diseases of poverty through generation of intersectionality case studies (Tuberculosis and Lymphatic Filariasis)	21 878	Gender (ER 1.3.12)	Nepal

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2020/1016548	Thomas Scalway	Lushomo	Support for communications activities with the development and management of a specific website, research communication briefs, collating photo libraries, videos and support for research communication activities	28 800	Shared between Multisectoral approaches on vector-borne diseases (ER 1.3.11) & Innovative Vector Control (Sterile Insect Technique) (ER 1.3.14)	South Africa
B80299	Benjamin Seydou Sombie	Groupe de Recherche Action en Sante (Gras)	In-house Good Data management practices courses	1 982	Lux DM training (ER 1.2.6)	Burkina Faso
C00042	Nines Lima Parra	La Cooperativa Humanitaria	Impact of COVID-19 pandemic on the delivery and effectiveness of SMC	23 191	Malaria OR/IR (ER 1.2.6)	Spain
2020/1049715	Federico Carroli	Ocean Translations S.R.L.	WARN-TB - Capacity Building for conducting OR/IR projects	613	Tuberculosis (ER 1.2.6)	Argentina
B80193	Debora Pedrazzoli	Pedrazzoli, Debora	Technical assistance and development of generic tools for the conduct of country led TB implementation research	48 000	Tuberculosis (ER 1.2.6)	United Kingdom
B80236	Vanessa Veronese	Veronese, Vanessa Clare	Strengthening evidence and implementation of digital innovations at critical stages of the TB patient pathway	49 000	Tuberculosis (ER 1.2.6)	France
C00006	Tan Eang Mao	National Centre for Tuberculosis and Leprosy (CENAT)	Research capacity strengthening for improving MDR-TB treatment and care – Cambodia	15 693	Tuberculosis (ER 1.2.6)	Cambodia
C00024	Amadou Seck	Gie West and Centre African Bioinformatics (GIE WCA BIOINF)	Implementing and supporting the data collection system of the ShORRT research package	24 000	Tuberculosis (ER 1.2.6)	Senegal
C00046	Nhung Viet Nguyen	Benh Vien Phoi Trung Uong	Research capacity strengthening for improving MDR-TB treatment and care	17 103	Tuberculosis (ER 1.2.6)	Viet Nam

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C00047	Yaw Adusi-Poku	National Tuberculosis Control Programme	Research capacity strengthening for improving MDR-TB treatment and care	15 000	Tuberculosis (ER 1.2.6)	Ghana
P20-00017	Doctor Jonathon Campbell	Campbell, Jonathon	MDR/RR-TB implementation Research Package	7 000	Tuberculosis (ER 1.2.6)	Canada
B80267	Professor Warwick Grant	La Trobe University	Utility of Vector Population Genetics for Delineating O volvulus transmission zones: Population Genetic Component	2 119	Onchocerciasis (ER 1.2.1)	Australia
B80269	Daniel Boakye	Noguchi Memorial Institute for Medical Research	Utility of Vector Population Genetics for Delineating O volvulus transmission: Entomological Component	2 594	Onchocerciasis (ER 1.2.1)	Ghana
B80296	Professor Warwick Grant	La Trobe University	Population genetic simulations for tools for onchocerciasis control programmes to determine transmission zones: Part 1 Simulations for Ghana	5 787	Onchocerciasis (ER 1.2.1)	Australia
B80297	Kwadwo Frempong	Noguchi Memorial Institute for Medical Research	Population genetic simulations for tools for onchocerciasis control programmes to determine transmission zones: Part 2 Ghana Epidemiological and entomological data	3 773	Onchocerciasis (ER 1.2.1)	Ghana
B80149	Professor Warwick Grant	La Trobe University	Genetic Markers to Delineate Parasite Transmission Zones Part A	5 164	Onchocerciasis and lymphatic filariasis (ER 1.2.1)	Australia
B80153	Professor Warwick Grant	La Trobe University	Genetic Markers to Delineate Parasite Transmission Zones Part B	2 707	Onchocerciasis and lymphatic filariasis (ER 1.2.1)	Australia
B80244	Martine Guillerm	Guillerm, Martine Marguerite Jeanne	APW for Support to laboratory data review and data analysis for the study on neonates infections	9 491	Optimized method (ER 1.1.5)	France

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2020/1007232	James Densem	Biomedical Computing Limited	Programming for importation of datasets into the central pregnancy registry	21 600	Safety (ER 1.1.8)	United Kingdom
2020/1008253	George Sabblah	Food and Drugs Authority, Ghana	Evaluation of the Med Safety App in Ghana	22 640	Safety (ER 1.1.8)	Ghana
2020/1008278	George Sabblah	Food and Drugs Authority, Ghana	Promotion of Patient Safety in Ghana: Development of information and advocacy material	22 800	Safety (ER 1.1.8)	Ghana
2020/1026262	Professor Yerim Mbagnick Diop	Direction de la Pharmacie et du Médicament (DPM)	Pharmacovigilance active au Senegal	24 214	Safety (ER 1.1.8)	Senegal
2020/1036286	N/A	Cape Coast Teaching Hospital	Proposal for the development of an Evidence-based Antibiotics Protocol for the Cape Coast Teaching Hospital using repeated Point Prevalence Surveys and Cumulative Antibiogram data	14 995	Small Grants (ER 1.1.4)	Ghana
2020/1036640	Paul E. Okello	Joint Clinical Research Centre	One health approach to identify local drivers of antimicrobial drug resistance in peri-urban Kampala, Uganda	15 000	Small Grants (ER 1.1.4)	Uganda
2020/1037452	Charles Kato	Makerere University	Bacteriophage-based control of transmission and emergency of carbapenem resistant pathotypes of Escherichia coli and Klebsiella pneumoniae in Uganda	15 000	Small Grants (ER 1.1.4)	Uganda
2020/1038264	Henry Wamani	Makerere University School of Public Health	Research Proposal "Antimicrobial Consumption by ATC/DDD Methodology for Human and Veterinary Antimicrobials for the Year 2018/2019 using Medicine Imports and Local Manufacture Data at the Uganda National Drug Authority"	15 000	Small Grants (ER 1.1.4)	Uganda

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2020/1039983	N/A	Makerere University	Antibiotic resistance Knowledge of people and AMR profile in Staphylococcus aureus population at the livestock-human-wildlife interface in Lake Mburo National Park, Uganda	15 000	Small Grants (ER 1.1.4)	Uganda
2020/1056725	Doctor Jonathon Campbell	Campbell, Jonathon	WARN-TB and CARN-TB- Capacity Building for conducting OR/IR projects	14 000	Tuberculosis (ER 1.2.6)	Canada
2020/1046838	Doctor Dieynaba Sophie N'Diaye	N'Diaye, Dieynaba Sophie	WARN-TB and CARN-TB- Capacity Building for conducting OR/IR projects	17 604	Tuberculosis (ER 1.2.6)	France
2020/1048251	Isidore Traore	Traore, Isidore Tiandiogo	WARN-TB and CARN-TB- Capacity Building for conducting OR/IR projects	15 750	Tuberculosis (ER 1.2.6)	Burkina Faso
2020/1048274	Doctor Desire Lucien Dahourou	Dahourou, Desire Lucien	WARN-TB and CARN-TB- Capacity Building for conducting OR/IR projects	22 750	Tuberculosis (ER 1.2.6)	Burkina Faso
2020/1053706	Vincent Mbassa	Programme National de Lutte Contre la Tuberculose	Research capacity strengthening (CARN-TB activities) - Cameroon	10 102	Tuberculosis (ER 1.2.6)	Cameroon
2020/1056742	Doctor Nimer Ortuno-Gutierrez	Ortuno-Gutierrez, Nimer	WARN-TB and CARN-TB- Capacity Building for conducting OR/IR projects	14 000	Tuberculosis (ER 1.2.6)	Belgium
B80069	Jean-Louis Ndiaye	Ndiaye, Jean-Louis Abdourahim	Capacity Building of the National TB programmes of the WARN-TB for conducting OR/IR projects	2 921	Tuberculosis (ER 1.2.6)	Senegal
B80073	Doctor Mathilde Savy	Savy, Mathilde	Capacity Building of the National TB programmes of the WARN-TB for conducting OR/IR projects	8 763	Tuberculosis (ER 1.2.6)	France
B80075	Professor Paul Milligan	Milligan, Paul	Capacity Building of the National TB programmes of the WARN-TB for conducting OR/IR projects	8 933	Tuberculosis (ER 1.2.6)	United Kingdom

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B80090	Doctor Nadia M.L. Fanou Kloubou	Fanou Kloubou, Nadia M.L.	Capacity Building of the National TB programmes of the CARN-TB for conducting OR/IR projects	2 925	Tuberculosis (ER 1.2.6)	Benin
B80150	C. H. Traore	Traore, Check Asken Hugues	Support to National TB programmes of the WARN-TB and CARN-TB countries for OR/IR activities	12 000	Tuberculosis (ER 1.2.6)	Burkina Faso
B80193	Debora Pedrazzoli	Pedrazzoli, Debora	Technical assistance and development of generic tools for the conduct of country led TB implementation research	56 000	Tuberculosis (ER 1.2.6)	United Kingdom
B80206	Obioma Chijioke Akaniro	National Tuberculosis, Leprosy and Buruli Ulcer Control Programme	Research capacity strengthening (WARN-TB activities) – Nigeria	9 513	Tuberculosis (ER 1.2.6)	Nigeria
B80213	Oumar Abdelhadi	Programme National de Lutte Contre la Tuberculose	Research capacity strengthening (CARN-TB activities) - Chad	955	Tuberculosis (ER 1.2.6)	Chad
B80221	Hermenegilde Nzimenya	Programme National Intègre Lèpre et Tuberculose (PNILT)	Research capacity strengthening (CARN-TB activities) - Burundi	5 000	Tuberculosis (ER 1.2.6)	Burundi
B80234	Dissou Affolabi	Programme National Contre la Tuberculose	Support to the secretariat of the WARN and CARN-TB	12 361	Tuberculosis (ER 1.2.6)	Benin
B80292	Bandeira Swasilanne	Centro Nacional de Endemias (CNE)	Research capacity strengthening (CARN-TB activities) - Sao Tome & Principe	7 173	Tuberculosis (ER 1.2.6)	Sao Tome and Principe
B80293	Stredice Manguinga	Direction Centrale des Affaires Financières du Ministre de la Sante	Research capacity strengthening (CARN-TB activities) - Gabon	10 102	Tuberculosis (ER 1.2.6)	Gabon
B80294	Policarpio Ricar Ncogo Ada	Programa Nacional de Lucha Contra la Tuberculosis	Research capacity strengthening (CARN-TB activities) - Equatorial Guinea	5 201	Tuberculosis (ER 1.2.6)	Equatorial Guinea

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B80321	N/A	Ocean Translations S.R.L.	Spanish translation- ShORRT Checklist	1 793	Tuberculosis (ER 1.2.6)	Argentina
B80325	Dissou Affolabi	Programme National Contre la Tuberculose	Annual meeting of the West and Central Africa for TB control Networks (WARN-TB & CARN-TB)	34 690	Tuberculosis (ER 1.2.6)	Benin
C00018	Doctor Dieynaba Sophie N'diaye	N'diaye, Dieynaba Sophie	Support to the National TB programmes of Senegal for an OR project	8 400	Tuberculosis (ER 1.2.6)	France
C00018	Doctor Dieynaba Sophie N'diaye	N'diaye, Dieynaba Sophie	WARN-TB and CARN-TB- Capacity Building for conducting OR/IR projects	15 400	Tuberculosis (ER 1.2.6)	France
C00019	Doctor Marie-Eve Raguenaud	Raguenaud, Marie-Eve	Support to the NTP of Vietnam for an OR project on Mental Health screening in TB patients	6 000	Tuberculosis (ER 1.2.6)	France
C00040	Maria Hoole	Because Stories	COMMUNICATION ON WARN and CARN-TB activities	3 661	Tuberculosis (ER 1.2.6)	South Africa
C00041	Adebola Lawanson	National Tuberculosis and Leprosy Control Programme	Research capacity strengthening (ShORRT) - Nigeria	20 822	Tuberculosis (ER 1.2.6)	Nigeria
C00043	Doctor Check Asken Hugues Traore	Traore, Check Asken Hugues	Technical assistance for the Operational & implementation research activities for the WARN-TB & CARN-TB	48 000	Tuberculosis (ER 1.2.6)	Burkina Faso
C00039	Janet Neubecker	Neubecker, Janet	EDITING of the Implementation Research toolkit for Digital Technologies and TB	3 213	Tuberculosis (ER 1.2.6)	Switzerland
B80262	Maria Zolfo	Institute of Tropical Medicine Antwerp	Implementing a second cycle of the Structured Operational Research and Training Initiative (SORT IT) on Neglected Tropical Diseases in Ethiopia	34 768	SORT-IT (ER 1.1.7)	Belgium

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B80304	Klepikov	International Charitable Foundation Alliance for Public Health	Rapid Implementation of a SORT IT programme for ending TB/MDR - TB and HIV/TB in "vulnerable and key populations" through operational research capacity building in Eastern Europe and Central Asia (EECA)	75 852	SORT-IT (ER 1.1.7)	Ukraine
2020/1011569	Samantha Akakpo	Akakpo, Samantha	Technical support for management of projects related to building capacity for safety monitoring	13 500	UNDP (ER 1.1.8)	Switzerland
2020/1027326	Professor Yerim Mbagnick Diop	Direction de la Pharmacie et du Médicament (DPM)	Mise en place d'une surveillance active des évènements indésirables dans les centres de traitement du COVID-19, en tant que renforcement des capacités de pharmacovigilance au Sénégal	23 412	UNDP (ER 1.1.8)	Senegal
2020/1040624	Adjima Combary	Programme National de Lutte Contre la Tuberculose (PLNT)	Burkina Faso Support to NTP activities for mitigating the impact of COVID-19 on TB activities	15 000	UNDP (ER 1.1.8)	Burkina Faso
2020/1040645	Barnabe Gning	Programme National de Lutte Contre la Tuberculose (PLNT)	Senegal - Support to NTP activities for mitigating the impact of COVID-19 on TB activities	15 000	UNDP (ER 1.1.8)	Senegal
2020/1041005	Dissou Affolabi	Programme National Contre la Tuberculose	Benin- Support to NTP activities for mitigating the impact of COVID-19 on TB activities	15 000	UNDP (ER 1.1.8)	Benin
2020/1053185	Aminata Nacoulma	Agence Nationale de Regulation Pharmaceutique (ANRP)	Strengthening the capacities in pharmacovigilance of heath care providers of the army in Burkina Faso	21 728	UNDP (ER 1.1.8)	Burkina Faso
B80143	Professor Rachida Soulaymani	Rabat WHO Collaborating Centre for Strengthening Pharmacovigilance	Evaluation of national pharmacovigilance systems	984	UNDP (ER 1.1.8)	Morocco

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B80147	Professor Rachida Soulaymani	Rabat Collaborating Centre for Strengthening Pharmacovigilance Practices (Rabat CC)	Pharmacovigilance Training in the Scope of Strengthening of Safety Monitoring Systems	1 948	UNDP (ER 1.1.8)	Morocco
B80302	Moses Chisale	Pharmacy Medicines and Poisons Board	Strengthening capacity in monitoring and response to safety issues associated with new health technologies in Malawi	18 944	UNDP (ER 1.1.8)	Malawi
B80327	Samantha Akakpo	Akakpo, Samantha	Technical support for projects related to drug safety monitoring	4 500	UNDP (ER 1.1.8)	Switzerland
C00015	Professor Yérim Mbagnick Diop	Direction de la Pharmacie et du Médicament (DPM)	Plan d'action pour une pharmacovigilance consolidée au Sénégal	52 662	UNDP 2019-20 68944 (ER 1.1.8)	Senegal
B80300	Cecilia Sambakunsi	Pharmacy Medicines and Poisons Board	Strengthening capacity in monitoring and response to safety issues associated with new health technologies in Malawi	918	UNDP (ER 1.1.8)	Malawi
2020/1046102	Professor Moses Chimbari	University of Kwazulu-Natal	Operationalizing One Health in Ingwavuma Community, South Africa (Technical support and expertise for piloting the Draft Plan for Operationalizing One Health for Vector Borne Diseases in the Context of Climate Change in Africa) - 12 months	50 000	Vector borne diseases (ER 1.3.3)	South Africa
2020/1047496	Professor Benson Estambale	Jaramogi Oginga Odinga University of Science and Technology	Operationalizing the One Health Approach (Technical support and expertise for piloting the Draft Plan for Operationalizing One Health for Vector Borne Diseases in the Context of Climate Change in Africa) - 12 months	50 000	Vector borne diseases (ER 1.3.3)	Kenya

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2020/1047505	Professor Brama Kone	Centre Suisse de Recherches Scientifiques (CSRS)	From an EcoHealth research project to operationalizing One Health approach in West Africa (Technical support and expertise for piloting the Draft Plan for Operationalizing One Health for Vector Borne Diseases in the Context of Climate Change in Africa) - 12 months	50 000	Vector borne diseases (ER 1.3.3)	Cote d'Ivoire
2020/1047514	Professor Paul Gwakisa	Sokoine University of Agriculture	Operationalizing One Health in Maasai communities in Simanjiro, Tanzania: Building capacity for transdisciplinary research (Technical support and expertise for piloting the Draft Plan for Operationalizing One Health for Vector Borne Diseases in the Context of Climate Change in Africa) - 12 months	50 000	Vector borne diseases (ER 1.3.3)	Tanzania, United Republic of
B80309	Emily Adams	Liverpool School of Tropical Medicine	Technical Support for Studies on Visceral Leishmaniasis Diagnosis in Secondary Health Structures	366	Visceral Leishmaniasis (ER 1.2.1)	United Kingdom
B80311	Faria Hossain	Icddr,B (International Centre for Diarrhoeal Disease Research)	Review of HIV seroprevalence in VL patients in Bangladesh	1 250	Visceral Leishmaniasis (ER 1.2.1)	Bangladesh
C00013	Dinesh Mondal	Icddr,B (International Centre for Diarrhoeal Disease Research)	Data Entry and Analysis for Visceral Leishmaniasis Study in Bangladesh	4 928	Visceral Leishmaniasis (ER 1.2.1)	Bangladesh
C00036	Winfried Kern	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	Visceral Leishmaniasis (ER 1.2.1)	Germany
C00037	Emily Adams	Liverpool School of Tropical Medicine	Technical support for studies on VL diagnosis in secondary health structures	5 625	Visceral Leishmaniasis (ER 1.2.1)	United Kingdom

Project ID	Principal investigator	Supplier name / Institution	Project title	Funding in US$	Disease or research topic (ER)	Supplier country
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	26 600	Visceral Leishmaniasis (ER 1.2.1)	Nepal

TDR funding in 2020

Contributor	
Core contributions	**Amount (US$)**
Sweden	3 845 004
United Kingdom of Great Britain and Northern Ireland	3 807 268
Switzerland	1 821 192
World Health Organization	1 800 000
Germany	1 361 036
Luxembourg	1 294 118
Belgium	707 547
Norway	339 482
Spain	119 474
China[1]	55 000
India	55 000
Thailand	48 123
Malaysia	25 000
Mexico	10 000
Miscellaneous	806
Subtotal	**15 289 050**

Contributors providing specific project funding	**Amount (US$)**
National Institute of Health Research (NIHR), United Kingdom	2 664 090
Bill & Melinda Gates Foundation	1 200 000
Sweden	836 737
United Nations Development Programme (UNDP)	650 000
World Health Organization	502 465
Luxembourg	400 813
Switzerland	173 342
Medicines Development for Global Health Limited (MDGH)	135 498
University of Oxford	67 122
Subtotal	**6 630 066**
Total contributions	21 919 116

[1] *The 2020 contribution from the Government of the People's Republic of China will be reported in 2021.*

Scientific Working Group recommendations from 2019 and actions taken

The Scientific Working Group (SWG) for Research for Implementation met on 17 and 18 October 2019. Specific recommendations were made for the different projects and summarized in brief here together with the actions taken:

Expected Result specific recommendations:

ER Short Title	Recommendations	Actions taken in response
1.1.1 Arboviruses – surveillance and preparedness	To conduct further clinical and operational research to evaluate application of the EWARS system under different settings and its effectiveness in triggering control activities.	As suggested by the SWG a call for proposal was prepared for conducting implementation research projects to evaluate application of the EWARS system under different settings and its effectiveness in triggering control activities. The call for proposal will be posted in September 2020 for a selection of three research projects end of October 2020.
1.3.10 Urban Health and VBD	While the SWG supported innovations and assessment of the effectiveness of interventions at a household level, community and higher-level factors also need to be considered. SWG recommends that Research for Implementation considers combining this project with the work on Gender to produce scoping reviews on gender and health at the household level. *Conclusion:* To complete this work by seeking synergies with other TDR RFI projects (such as Gender) to maximize the use of limited resources.	E.R. 1.3.10 addresses urban health interventions for the prevention and control of vector borne and other infectious diseases of poverty. This Expected Result will also explore social and gender dynamics influencing urban health and prevention and control of infectious diseases. In this sense, in 2020 a call for proposals was launched inviting institutions to conduct literature reviews and/or research gap analyses on social determinants of urban health, and to the extent possible also explore evidence on how social and gender dynamics in a COVID-19 context affect the prevention and control of infectious diseases of poverty.
1.1.7 SORT IT	• To engage proactively to work on the inclusion of gender training as part of SORT IT and in the identification of topics that enable gender analysis. • Integrate work with the planned Knowledge Management activities in TDR, including for advancing data sharing, policy-impact and gender-responsive research. To proceed next year to a detailed review to include the longer-term sustainability of SORT IT as an area of work for TDR.	In line with SWG recommendations, SORT IT has implemented the following: Re-oriented its compass to the SDG 17 and achieving UHC. SORT IT has transitioned to improving upstream data collection and downstream use of evidence for decision-making. Franchised expansion continues. TDR is focusing on niche areas: antimicrobial resistance, SDGs and UHC. • TDR also joined forces with the WHO regional offices for Africa, the Americas and South-East Asia to complement ongoing SORT IT studies with a Grants Scheme that is supporting 13 prospective studies on AMR. (ER 1.1.4.). • Assessed gender equity in authorship in all SORT IT publications and whether

ER Short Title	Recommendations	Actions taken in response
		gender-disaggregated analysis included to identify gender-based disparities in accessing health care • Gender dimension has also been included in SORT IT curriculum.
1.3.3 Climate change and VBDs	While the SWG recognizes the progress made, it re-emphasized the need for priority setting. One option would be to focus on operationalizing a One Health approach. The SWG emphasized the need for prioritization in the next phase.	The E.R. 1.3.3 now focuses on operationalizing a One Health approach. For the current biennium, the draft plan for operationalizing One Health (including the scorecard/metrics system) is being validated and pilot tested in five African countries: Côte d'Ivoire, Kenya, Mauritania, South Africa and Tanzania.
1.3.7	Since the projects are due to finish at the end of 2019, follow-up action needs to be taken to ensure objectives and deliverables of the two projects are achieved. *Conclusion:* The SWG recommended that RFI's role focus on providing technical support to the project teams to ensure that the objectives and deliverables of the two projects are achieved.	Research for Implementation continued to provide technical support to the projects on VBD and environmental approaches in the Greater Mekong subregion.
1.3.6 Residual malaria	To conclude this project and transition it into the multi-sectoral approaches project.	Project is concluded. Work on multisectoral approach in malaria is included in E.R. 1.3.11 (*Multisectoral approach to prevention and control of malaria and emerging arboviral diseases*).
1.3.14 Innovative vector control tools	The SWG recommends that these projects also address possible unwanted results after the release of sterile male mosquitos, such **as the consequences of any female mosquitoes also being released**, and testing under different ecological settings and transmission patterns. In addition, **niche replacement** of the treated mosquito population by another mosquito species ought to be considered. Although research projects will be conducted in areas with significant disease transmission, assessment of mass production and escalation to cover large areas (e.g. cities with more than one million inhabitants) and the evaluation of its cost-effectiveness, is recommended. The ministries of health and environmental agencies would need to be committed to this work if it is to be sustainable.	The supported research proposals for testing SIT will follow the Guidance Framework Document jointly issued by AIEA/TDR/WHO – **Guidance Framework for Testing the Sterile Insect Technique as a Vector Control Tool against Aedes-Borne Diseases** released in April 2020, which addresses all recommendations regarding the risk assessment in Chapter 2, as bolded below, and also the mosquito mass production in Chapter 3, the community engagement in Chapter 7 and the cost-effectiveness in Chapter 8. Protection-goal-related risk assessment and risk management for mosquito SIT are likely to include technical risks, such as radiation; entomological and **epidemiological risks**, such **as niche replacement by other vector species**, new or different disease transmission by alternative vectors, loss of immunity in the human population; and social risks, such as a complacent attitude towards vector control by communities. SIT facilities and operations also pose conventional environmental and health risks related to buildings, processing activities, waste,

ER Short Title	Recommendations	Actions taken in response
	To proceed with caution in testing the sterile insect technique, and to focus on research to address the substantial unresolved concerns about this intervention.	transport and worker safety. The recommendation to assess mass production to cover large areas such as cities with one million inhabitants is also addressed in one of the proposals which currently has the capacity to produce one million sterile males per day in Brazil. The selected SIT testing consortiums have already prepare their research proposals taking into account all recommendations included in the Guidance document and will go through the WHO Ethics Review Committee before any contract is made, as per WHO standards, ensuring all ethical concerns are addressed, either for human subjects and/or environmental effects.
1.2.6 Research for TB control	• Continue engagement in West and Central Africa as planned. • Develop a plan to track trends on TB case-finding, incidence and mortality data in order to explore potential effects of research strengthening activities in countries. • Consider bringing an intersectional gender analysis into the TB patient cost survey data analysis • Develop an explicit and detailed SMART plan for sustainability and ultimate TDR exit. • If resources permit, expand.	Work has continued on strengthening the capacities of WCA countries for conducting OR/IR projects addressing TB control priorities. A matrix to measure the impact of the WARN-TB and CARN-TB activities on TB control in the region is under development in collaboration with GTB and the WARN-TB/CARN-TB Secretariat. Results should be available for the end of the Biennium to take decision for next one.
1.1.4 and 1.2.1 Research for malaria control	• Support the work with countries to optimize delivery of Seasonal Malaria Chemoprevention. • If resources permit, expand.	The OPT–SMC project (funded by EDCTP) was launched in February 2020 during the annual SMC meeting (meeting with all NMP coordinators, SMC focal person, institutional partners – WHO GMP, PMI, CRS, Malaria Consortium, MMV and LSHTM. TDR led the development of a tool to assess the impact of COVID-19 on SMC delivery (process indicators) and SMC impact (effectiveness indicators: e.g. Coverage indicators). This was done in collaboration with OPT–SMC partners and GMP. Since February 2020, countries are remotely supported to develop their research project in order to conduct it in 2020 or the summer of 2021. (E.R. 1.2.6 in 2020).

ER Short Title	Recommendations	Actions taken in response
1.2.1 Onchocerciasis elimination	• Search TDR Global for external reviewers of research proposals. • Share information related to risk of moxidectin in pregnancy.	• TDR global has been migrated to a new platform with better search capabilities which may allow effective search for 'subject matter expert' to complement the SWG as ad-hoc reviewers of future proposals. • MDGH completed an additional rat pre-postnatal study and submitted the results to the US–FDA which will decide on any changes (beyond addition of these data) to the moxidectin labelling regarding safety in pregnancy. • MDGH commissioned an expert review of all reproductive toxicity related studies. The draft report concludes: "In conclusion, based on the available non-clinical toxicity data in standard laboratory species used for these evaluations (rodents, dogs and rabbits), the safety of moxidectin at multiples of the therapeutic dose in reproductively active males and females and when administered during pregnancy, has been established. In addition, safety studies at or above the human dose in cattle, sheep and deer have not demonstrated any concerns for the safe use of moxidectin". • The review is planned to be converted into an open access publication written for the lay public to provide a resource for generation of WHO guidelines. • As did the Phase 2 and 3 studies that informed US–FDA approval, the planned studies will include collecting information on the outcome of pregnancies and of the health during the first year of life of babies from pregnancies initiated during the first three months after moxidectin (and ivermectin) administration. These data will constitute the initial entries into a pregnancy registry. • TDR Global was moved to a new platform which will make searches for subject expert reviewers of potential new proposals a bit easier (search for 'genomics' yielded 515 names to be accessed individually).
1.2.1 Visceral Leishmaniasis elimination	Continue research to identify the most suitable interventions in low endemicity areas and consider tools that can facilitate research uptake and translation of evidence into practice. While it is appropriate that these are based on country priorities, it is important that pivotal knowledge gaps are addressed, such as: how best to transition effectively from a vertical programme to an integrated PHC model; how best to strengthen follow-up of VL patients post-treatment to	TDR investment continued, with focus on studies in Nepal and Bangladesh. The research includes evaluation of strategies for case finding, diagnosis, surveillance and vector control in the scope of last mile activities (maintenance phase of post elimination). TDR liaised with national control programmes, researchers in countries, WHO offices (three levels) and diverse stakeholders to make sure that research: 1) addresses key research priorities; 2) is useful to country and national control programme; and 3) does not duplicate, but rather complements, global research efforts.

ER Short Title	Recommendations	Actions taken in response
	ensure adequate assessment of the safety (and effectiveness), including in vulnerable populations (mobile and migrant populations, pregnant women); IR on the deployment of better diagnostic tools; and the impact of defining elimination as <1 case per 10,000 rather than zero local transmission, to ensure that elimination is sustained and the resurgence of disease prevented. TDR's network experience could facilitate cross-border coordination, including with India (Bhutan and Thailand, if appropriate) and data sharing (or at least an understanding of obstacles that need to be overcome for regional data sharing). A useful output would include a full package of training and standard operating procedures in order to facilitate research uptake and translation of evidence into practice, as requested by India. The appointment of a team leader should facilitate the adequate resourcing of this important work. If resources permit, expand.	The specific area of research suggested by the SWG in 2019 has been and will be taken into consideration when preparing the new studies. The preparation of a study on seroprevalence of HIV/VL co-infection in Bangladesh aims to better understand VL epidemiology in general but also the role of co-infection as a risk factor for the cases that still appear in particular. Standard operating procedures are prepared under the scope of the studies when new techniques are introduced, and staff from MoH are usually involved in the training implemented in the field in order to facilitate potential uptake of research. • The new unit head has experience in VL and a new consultant has been hired to support coordination of TDR VL work in countries. • Several studies are ongoing (2 studies in Nepal and Bangladesh on community-based vector control approach, one evaluating the use of the rK39 diagnostic test in febrile populations presenting in secondary-level health centres in Bangladesh and India; Others under ethics review or protocol development. • Previous studies have been published or submitted for publication: Benefit of wall painting vs indoor residual spraying (IRS) for vector control, variability of titers of rK39 in asymptomatic and PKDL cases and a literature review on safety of Ambisome. • Regarding expansion: applying the experience of VL implementation research in the Indian subcontinent in the next globally largest endemic region (Eastern Africa) being considered.
1.1.8 Use of safety data	• Continue engagement with countries to evaluate how best to embed safety monitoring in primary health care systems. Consider if artesunate-pyronaridine could provide an opportunity for strengthening and evaluating pharmacovigilance systems. • If resources permit, expand.	The central databases for safety data were implemented as pilot projects, to see feasibility, constraints, and benefits of such tools; the prospect was never for TDR to run such databases in the long term. Now after about four to five years of implementation, it is time to evaluate the project and identify those databases that are needed in the long term by the technical units to create a long-term sustainable alternative. Discussions have been initiated with WHO–PV regarding transfer to WHO for sustainability. Of note the central databases were flagged as WHO Global public health goods for the current biennium, highlighting their added value.

ER Short Title	Recommendations	Actions taken in response
1.3.11 Multisectoral approaches	• Focus the project on case studies on malaria and emerging arboviruses to enlighten both process and outcome measures and build in and/or develop a business model within the case studies. Plan the project with careful attention to endemic country engagement/participation and to M&E.	The recommendations were considered in the design and development of Case studies for both malaria and arboviral diseases. The building country capacity on multisectoral actions is included as deliverables of the work package conducted within this Expected Result, in collaboration with the WHO–WASH and funded by Sida through: i) support to selected countries in the development of research for implementation of multisectoral activities to prevent and control WASH-related infectious diseases with a focus on VBDs; ii) conducting two regional training workshops convened by WHO regional and country offices and with partners; and iii) online courses and/or platforms (e.g. webinars and others). The case studies are and will be selected based on early endemic country engagement into the proposals with the active participation of more than two different sectors into the proposals. The M&E of the MSA approaches will be further develop through a new chapter of the Framework document and testing within the case studies.
1.3.12 Gender	• Strengthen TDR/RFI's intersectional lens in research to foster values of diversity, inclusivity, equity and equality. • Build a shared understanding on what intersectional gender analysis is and is not so that everybody in RFI can consider what steps they can make towards greater equity in research topics and activities. • Think strategically about training in that area (e.g. consider the Intersectional Gender Analysis module within TDR's Implementation Research MOOC and include other relevant tools and resources on the TDR Gateway and other widely accessed platforms).	*TDR Intersectional Gender Research Strategy* was launched in June 2020 as a pathway to more inclusive, effective response to infectious diseases. The TDR intersectional gender analysis toolkit was piloted and launched at the end of September 2020 as soon as production clearance from WHO is granted. The Toolkit will be also available as an interactive web tool. Two research teams (from Nepal and Uganda) developed research protocols in 2019 and in 2020 to apply an intersectional gender lens and follow guidance from the TDR toolkit to generate research case studies focusing on schistosomiasis and tuberculosis (TB) in Uganda and lymphatic filariasis (LF) and tuberculosis in Nepal. In synergy with another ER within TDR's Global Engagement portfolio, in 2020 TDR developed collaboration with the UN University, International Institute for Global Health, to integrate an Implementation Research (IR) MOOC module on Gender and Intersectionality into their curriculum. The online gender-based analysis (GBA) course at The University of Witwatersrand (South Africa) ran from the 1st September 2020 – 18th October 2020. Sixty-four participants that met eligibility criteria from West Africa, East Africa, Southern Africa and Central Africa were accepted to take the course, following a call for applications with over 200 participants expressing interest.

Cross cutting recommendations

ER Short Title	Recommendations	Actions taken in response
Networking	The SWG recommends completing the definition of criteria for TDR engagement, participation and exit from networks.	This is work in progress.
SWG membership	The SWG recommends complementing the SWG memberships with a senior political/policy scientist and evaluate the possibility of bringing new and younger SWG ad hoc reviewers to broaden the base from which future SWG members may be sought.	Addressed – New SWG members added
Data sharing	Continue and deepen TDR's role in facilitating data sharing to advance public health in the global south and ensuring that data sharing does not widen inequality.	This is work in progress.
For projects ending:	Ensure objectives and deliverables of the projects are achieved.	This will be implemented routinely in the course of planning closure of projects. **ER 1.3.7.** Impact of socioecological systems and resilience-based strategies on the control of VBDs in the ASEAN region • Implementation of two research projects completed: o Impact of socio-ecological systems and resilience (SESR)-based strategies on dengue vector control in schools and neighbouring household communities in Cambodia. o Innovative vector birth control and socio-ecological strategies for the prevention of dengue, chikungunya and Zika disease in Thailand. • A research uptake meeting, to contribute to and facilitate the use of research evidence by policy-makers, practitioners, communities and other partners, was held last 5-6 November 2019, in Bangkok, Thailand. **Objectives of the meeting:** • To present synthesized research evidence and new knowledge from the TDR-supported research programme (in Cambodia and Thailand) and other similar projects within the ASEAN region (Indonesia, Singapore, Malaysia, Philippines, Viet Nam, Myanmar, Brunei and Laos PDR) that are in line with priorities of the Ministry of Health and Ministry of Environment and other relevant ministries, e.g. agriculture, education, etc) and which can inform policy and practice decisions.

ER Short Title	Recommendations	Actions taken in response
		• To provide a venue for engagement and dialogue between researchers and policy makers, as well as other relevant stakeholders (local governments, communities) in the ASEAN region on evidence-informed discussions for the control of VBDs using tools that promote a socioecological systems and resilience approach combined with integrated vector management and control. • To present socially-innovative, community-empowered health solutions/products that can contribute to sustainable vector borne disease control and prevention. • New knowledge from research now published in several peer reviewed papers. • Community and stakeholder feedback seminars conducted for both projects. • The Cambodia project was presented during a virtual JCB webinar (Technical Session), on 28 Oct 2020, 13.00 CET.

2020 Scientific Working Group recommendations

The Scientific Working Group for Research for Implementation met virtually from 12–16 October 2020. Specific recommendations were made for the different projects and are summarized in brief here:

High-level recommendations:

1. SWG noted opportunities to further optimize resources and enhance the impact of the IMP outputs, particularly as it relates to the broader activities under One Health and gender.

   SWG strongly recommends greater synergy between the teams, both conceptually and operationally, to optimize impact and leverage limited resources.

2. SWG outlined the importance of TDR compiling and profiling the critical mass of evidence generated on gender and infectious diseases of poverty, as well as beginning to develop the evidence on gender transformative solutions.

Specific recommendations made for the different projects are summarized in brief here:

- Arboviruses - surveillance and preparedness
  - To continue the project as planned.
- SORT IT
  - To continue with current franchising model while developing an understanding of whether this is a long-term project or if developing an exit strategy is more appropriate.
  - Critical and objective analysis and dissemination of the impact of the initiative will enhance its generalisability.
  - To better articulate women's empowerment and gender equality in reporting and to engage more meaningfully with gender mainstreaming.
- Climate change and VBDs
  - Continue as planned with focus on operationalizing a One Health approach. Training manual should be developed after completing the four research projects.
- Multisectoral approach
  - To continue as planned.
  - To undertake internal discussions to get concrete and mutually beneficial ideas of synergies with the other vector-borne disease expected results.
- Sterile insect technique
  - To pursue other funding opportunities due to uncertainties with IAEA funding.
  - To explore internal synergies for opportunities to advance this work.
- Safety
  - To develop a carefully structured and articulated transition that ensures that the safety databases will yield the greatest public health benefit.
  - To document the lessons learned from setting up the three databases to inform future similar efforts.
  - To maintain safety as a cross-cutting theme across the implementation research portfolio.

- Effective delivery of interventions
    - To continue implementation research for TB control and to report on intersectional gender analysis in the TB patient cost survey data analysis, sustainability plan and exit strategy.
    - To support the work with current partner countries to optimize delivery of Seasonal Malaria Chemoprevention.
- VL elimination
    - To develop a detailed SMART plan to sunset the activity on the Indian sub-continent before the end of 2025, with the exit to be achieved without a loss in the gains made from TDR's long-term investment and including negotiation with programmes in Bangladesh and Nepal.
    - To distil lessons from the Indian sub-continent for the Eastern Africa region, given the notable differences between the two contexts, and to consider including a synthesis of existing evidence to be conducted during the "preparatory phase" (first two years).
    - To include a timeline that delineates and includes preparation, implementation and development of an advance exit or transition strategy before further development into the Eastern African context.
- Onchocerciasis elimination
    - To continue as planned, with expansion, if possible, to address concerns (e.g. moxidectin resistance).
    - Succession planning for the project and review in 2021.
- Gender and infectious diseases
    - To explicitly articulate the institutional approach to mainstreaming gender in line with TDR's programmatic outputs.
    - To network with a number of the key global health gender initiatives to enhance dissemination and impact of TDR activities.
    - To undertake internal discussions and benefit from further synergies with other vector-borne disease expected results.
- Ethics and community engagement strategies
    - To undertake a mapping of existing initiatives on ethics in Africa and across WHO to assess key dilemmas and challenges, successes and failures, and to ensure that this effort identifies and focuses specifically on addressing clear gaps.