

TDR

Annual Report 2018



Building the science
of solutions



World Health
Organization



For research on
diseases of poverty

UNICEF • UNDP • World Bank • WHO



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Vision

The health and well-being of people burdened by infectious diseases of poverty is improved through research and innovation.

Mission

To support effective and innovative global health research, through strengthening the research capacity of disease-affected countries, and promoting the translation of evidence into interventions that reduce the burden of infectious diseases and build resilience in the most vulnerable populations.

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Dr Soumya Swaminathan

TDR Special Programme Coordinator
Chief Scientist, World Health Organization

This annual report follows the recent unveiling of WHO's transformation plan, which includes the creation of a new Science Division that I have been appointed to lead. As a division with a cross-cutting mandate relevant to all levels of the Organization, the Science Division was established to perform two essential functions:

- 1) Ensure WHO anticipates and stays on top of the latest scientific developments and identify opportunities to harness those developments to improve global health; and
- 2) Ensure the excellence, relevance and efficacy of WHO's core technical functions, including norms and standards and research.

As WHO's first Chief Scientist, I am now developing this new division—which for the first time brings TDR together with the UNDP/UNFPA/UNICEF/WHO/World Bank Special Programme of Research, Development and Research Training in Human Reproduction, the Alliance for Health Policy and Systems Research, as well as newly created departments of Research for Health, Norms and Standards and Digital Health—to provide support for the goals of WHO's 13th General Programme of Work and the health-related Sustainable Development Goals.

In my experience as a researcher working on tuberculosis in India and as a former Coordinator at TDR, I have been a strong champion of research on diseases of poverty. With the creation of this new Science Division, WHO is placing new weight on harnessing the power of science and research to achieve universal health coverage through improved access, delivery and innovation of health solutions to those who need them most. TDR will play a crucial role in the Science Division, given its long and successful history in improving the health and well-being of people burdened by infectious diseases of poverty.

I would like to take this opportunity to thank Dr Ren Minghui, who has served as Special Programme Coordinator for TDR over the last three years. TDR has built great working relationships with the communicable diseases control programmes over the years, and we will work to ensure continued close collaboration. Dr Ren remains Assistant Director-General of the newly combined Communicable and Noncommunicable Diseases Cluster and is enthusiastic to continue his engagement with TDR.



Dr Modest Mulenga

Joint Coordinating Board Chair

I have been following closely the work of TDR in the past year through two sessions of the Standing Committee which provides for a closer look into the current work of TDR and is a valuable opportunity to engage more closely with the co-sponsors, Chair of STAC as well as the representatives of the resource contributors and diseases endemic countries.

The implementation of TDR's 2018-2023 Strategy is progressing at full steam. I am very pleased with the progress and would like to call your attention to some highlights:

- **Research for implementation to tackle infectious diseases of poverty**
 - The U.S. Food and Drug Administration's approval of moxidectin for the treatment of river blindness will likely improve the health of millions of people in sub-Saharan Africa and speed up the elimination of this debilitating disease. The results of TDR-supported research in Bangladesh and Nepal on kala-azar active case detection and improved vector management have been taken up by the national elimination control programmes of both countries and incorporated into updated national guidelines.
 - TDR has been supporting six research teams spanning 13 countries in Latin America, South-East Asia, Africa and the Western Pacific regions investigating drivers of persistent malaria transmission. This has involved innovative methods such as the use of drones to map mosquito breeding sites in the Amazon jungle. The research teams are now developing new, multisectoral approaches to tackling persistent malaria tailored to local contexts. In some countries, such as Peru and Benin, ministries of health are already collaborating with the researchers in this regard.
- **Strengthening research capacity and promoting gender equality in health research:** A crowdsourcing challenge that aimed to boost the number of female applicants for TDR's Clinical Research and Development Fellowship (CRDF) elicited 311 proposals from 65 countries, many from the TDR Global community. All submitted suggestions were reviewed by TDR, and several were incorporated into the 2019 CRDF call for applications, including a new nomination process, featuring profiles of women who have gone through the programme, as well as enlisting previous fellows as mentors for potential applicants. These efforts have contributed to the number of female applicants quadrupling, compared with the previous year.

Across the Programme, I am pleased with how TDR is actively engaging with health initiatives at global, regional, country and community levels. It is also commendable that TDR continues to show that the research it supports makes an impact toward improving the health and well-being of people burdened by infectious diseases of poverty, so no-one is left behind.



Dr John Reeder

TDR Director

The year 2018 kicked off the current TDR Strategy (2018-2023), and significant achievements were made in **research for implementation, strengthening research capacity and global engagement**. These achievements are contributing to disease control and elimination, improved access to health care, and better outbreak detection and response globally, thereby supporting WHO's triple billion goals and the SDG targets.

In 2018, 15 new or improved solutions, tools, and implementation strategies were developed in collaboration with country institutions and WHO disease control programmes. These tools are aligned with the needs and priorities of disease endemic countries, to support translation of evidence to policy and practice.

As a prime example of our research for implementation, we were proud to announce in June 2018 that the United States Food and Drug Administration approved moxidectin as the first new treatment for river blindness in 30 years. This is the result of decades of research and development led by TDR, which has been committed to eliminating this neglected disease that affects 200 million people in Africa. We continue to work with our partner Medicines Development for Global Health to gather additional data to help countries decide whether to incorporate this new drug into river blindness guidelines and policies.

To strengthen research capacity, in collaboration with the seven universities in our postgraduate training scheme, TDR has funded 178 master's students in the field of implementation research since 2015. We have also expanded training of researchers through TDR's six regional training centres, our Implementation Research Toolkit and our Massive Open Online Course on Implementation Research.

As part of our approach to engaging with the global health community, we co-authored a report with partners including PATH and Malaria No More UK that highlights a shortfall in investments in research for implementation required to improve access to products combatting malaria. We also launched a crowdsourcing challenge to identify creative ways of boosting women's participation in the TDR Clinical Research and Development Fellowship.

We are increasingly expanding our reach through our support for networks such as the Social Innovation for Health Initiative, regional TB control networks in Africa, and research training partnerships. Through all of our activities, we remain focused on improving the health of the most vulnerable people through research and innovation, so all people can benefit from improved access to health solutions.

Our contributors

TDR is able to conduct its work thanks to the commitment and support from a variety of funders. These include our long-term core contributors from national governments and international institutions, as well as designated funding for specific projects within our current priorities.

Core contributors providing overall Programme support*



Contributors who provided support to specific projects in 2018*

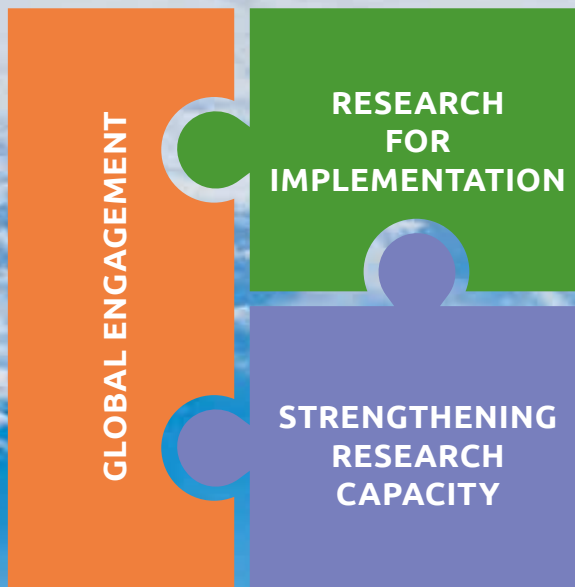


* listed in order of level of contribution

2018 Highlights

Opposite are highlights from 2018 that demonstrate the impact of research supported by TDR to improve the health and well-being of people burdened by infectious diseases of poverty. This body of research is leading to new solutions for implementation and improved access to existing health solutions.

This is the result of TDR's core structure of research for implementation, Strengthening research capacity and global engagement acting in an integrated manner.

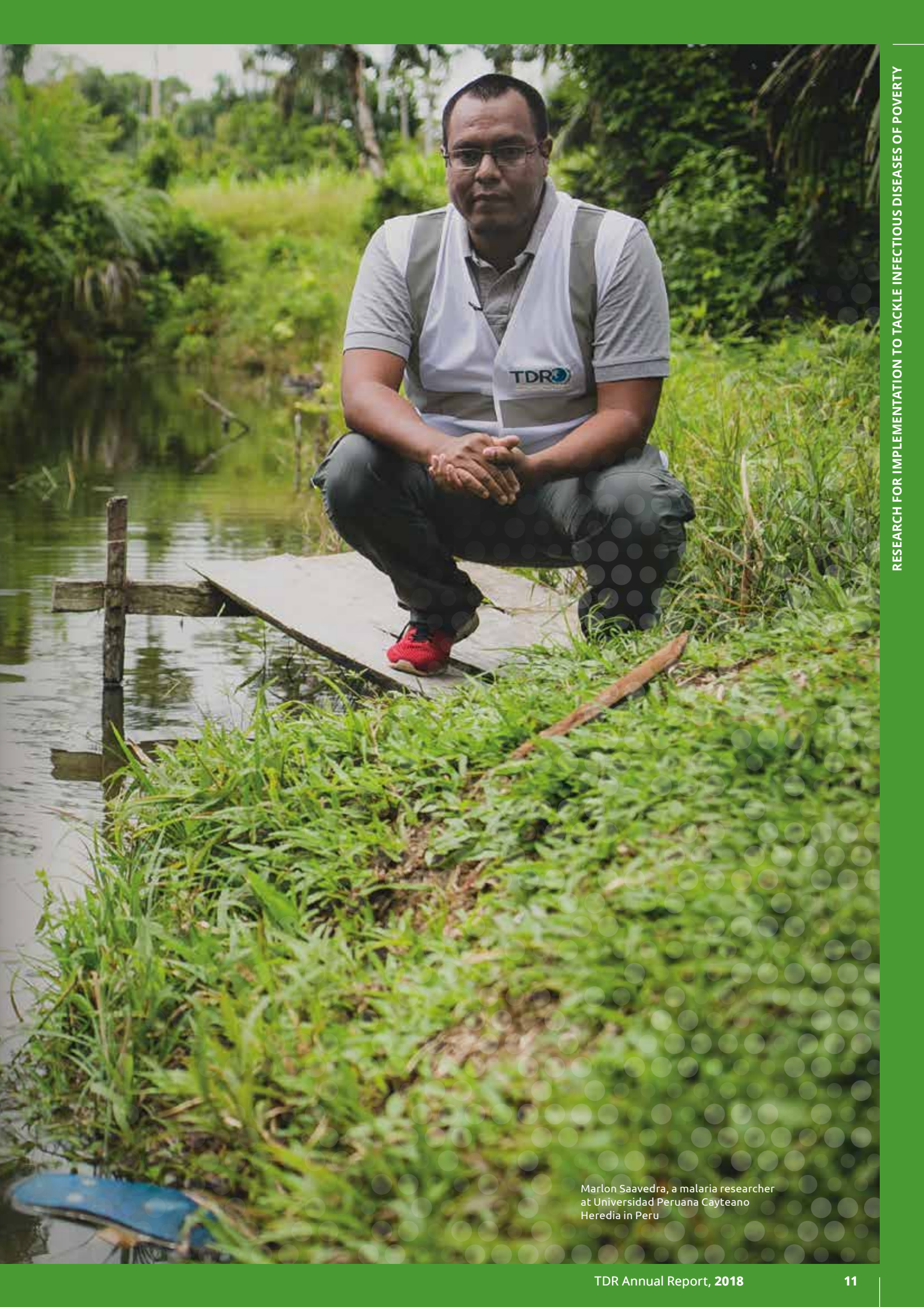




Research for implementation to tackle infectious diseases of poverty

Contents

- Research for 'last mile' disease elimination
- Research to control vector-borne diseases



Marlon Saavedra, a malaria researcher at Universidad Peruana Cayetano Heredia in Peru

Research for 'last mile' disease elimination

Research is crucial to inform the development of tools and strategies for elimination campaigns. Equally critical is research for strategies and tools to implement during the 'last-mile' phase, given that the cost per case of prevention, diagnosis and treatment increases as prevalence of infection declines. Lack of tools and strategies tailored to local contexts for the 'last-mile' phase compromises all previous achievements and investments, and carries health, economic, societal and political costs.

TDR-supported research provided or contributed to the tools and strategies currently being implemented for the control and elimination of visceral leishmaniasis and onchocerciasis. TDR is now focusing on these 'last-mile' challenges to establish strategies for sustainable elimination. The research programmes below present some common features, but each has a distinctive approach driven by disease-specific characteristics.

2018 Highlights

| | | |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| 2 countries | 1 FDA approval | 11 countries |
| incorporate TDR-supported research into kala-azar elimination guidelines | for moxidectin as the first new treatment for river blindness in 30 years | form the Central African Regional Network for TB control (CARN-TB) to strengthen TB research |

Elimination of kala-azar in the Indian sub-continent

Visceral leishmaniasis, also known as kala-azar – Hindi for 'black fever' – is a tropical, parasitic disease transmitted through bites from certain types of sandfly. Kala-azar is characterized by fever, weight loss, swelling of the liver and spleen, anaemia, and immune-system deficiencies. If the disease isn't treated, the fatality rate can be as high as 100% within two years.

In 2005, Bangladesh, India and Nepal signed a memorandum of understanding on elimination of kala-azar in their countries. Targeting elimination was possible in large part because TDR research, conducted in collaboration with countries and with public-private partnerships, resulted in the development and qualification for large-scale use of rapid diagnostic tests (rK39) and new drugs (e.g. liposomal amphotericin B, miltefosine, and paromomycin).

Planning and executing the research in collaboration with national control and research institutions has been key to ensuring the uptake of successful strategies into policy and practice to reach and maintain the visceral leishmaniasis elimination target. These efforts have contributed to a sharp reduction of cases.

Nepal is now filing for certification of elimination, and Bangladesh reached the target in 2017.

The challenge:

Following this success, investments in new approaches are required to ensure elimination is sustained.

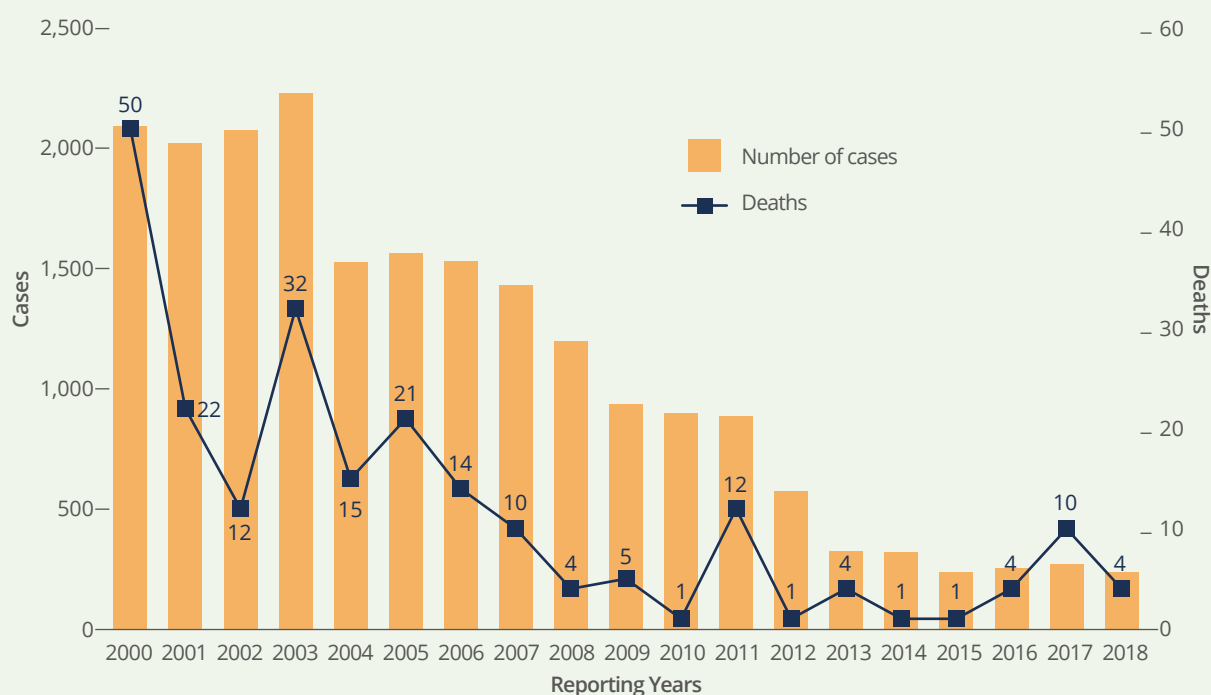
TDR's approach: Supporting research to prevent resurgence of the disease

To prevent resurgence of the disease, which would compromise current and previous efforts, TDR is continuing to support research that addresses i) active case detection; ii) vector control and reduction of transmission; and iii) translation of research into policy. Below is a summary of this research being led by the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) and the Public Health and Infectious Disease Research Center (PHIDReC) in Nepal.



Patient with kala-azar in Bangladesh

Fig. 1: Decline of kala-azar incidence in Nepal



Source: Nepal Ministry of Health and Population

| Research objective | Countries | Main research findings |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Identifying effective strategies for vector control during maintenance phase of VL elimination when indoor residual spraying is abandoned | Bangladesh, Nepal | Vector control with insecticidal paint and wall lining had the most pronounced effect in reducing vector densities for up to 12 months or even longer |
| Identifying risk factors for vector breeding and VL transmission | Nepal | Housing conditions (e.g. old bamboo walls or use of animal charcoal for plastering walls) are a major risk factor |
| Identifying strategies for case finding in maintenance phase | Bangladesh, Nepal | Speedy detection of new cases in low-endemicity areas should be a focus, and search for secondary cases and vector control can be done by the community |
| Analyze insecticide resistance in field-collected <i>P. argentipes</i> sandflies | Bangladesh, Nepal | Continued susceptibility to pyrethroids observed, and annual evaluation of resistance levels is recommended for national programmes |

Translating research to policy

The results of TDR-supported research regarding combined fever camps for active case detection, as well as the findings on improved vector management, have been taken up by national control programmes in Bangladesh and Nepal and incorporated into their elimination guidelines.



Note: This guideline document is being updated for 2019

Elimination of river blindness in Africa

Onchocerciasis (also known as river blindness) is caused by the parasitic worm *Onchocerca volvulus*, transmitted between humans by black flies. Infection can lead to severe itching, disfiguring skin conditions and visual impairment, including blindness. Currently, an estimated 205 million people live in areas where the parasite is transmitted. More than 99% live in 28 African countries.

The significant public health and socio-economic impact of onchocerciasis motivated initiation of three control programmes, including the Onchocerciasis Control Programme in West Africa (OCP, 1974-2002) and the African Programme for Onchocerciasis Control for the remaining endemic countries (APOC, 1995-2015). Since 2016, the WHO Extended Special Programme for Elimination of Neglected Tropical Diseases (ESPEN) has provided countries with some of the support previously provided by APOC.

The challenge:

Elimination of onchocerciasis by 2020 is now targeted in some African countries and in 80% of African endemic countries by 2025. The principal onchocerciasis control strategy in Africa is community-directed treatment with ivermectin (CDTI).

TDR's approach:

A number of funders are investing heavily in supporting country activities for onchocerciasis elimination. TDR is now supporting research that targets issues not addressed by others, notably:

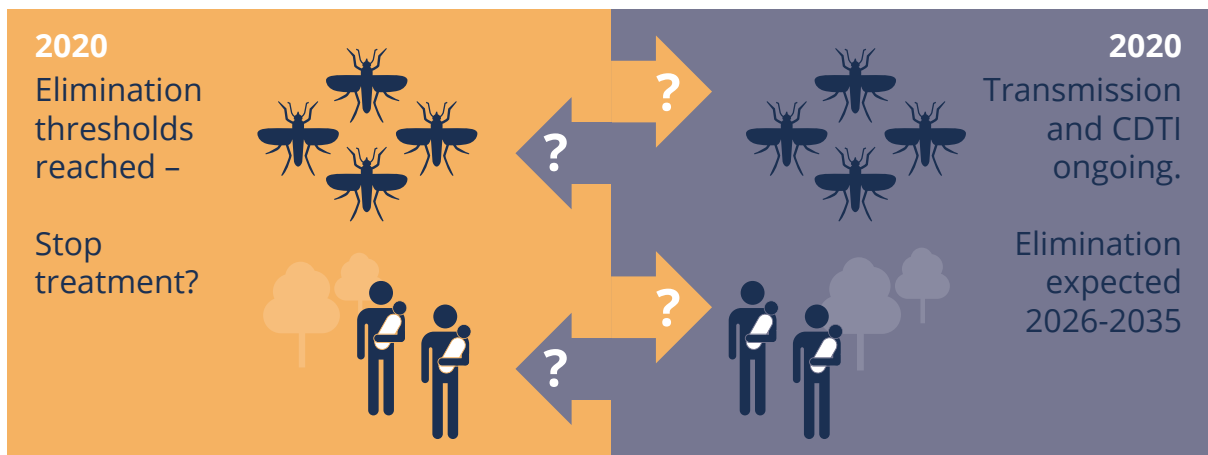
- Research for new tools to address uneven progress towards elimination
- Research to address sub-optimal response to ivermectin
- Research for alternatives to ivermectin to accelerate progress in areas lagging behind

Research for new tools to address uneven progress towards elimination

The 2016 WHO *Guidelines for stopping mass drug administration and verifying elimination of human onchocerciasis* provides criteria for stopping CDTI, but does not address how to define areas where CDTI can be stopped when transmission is ongoing in a neighboring area.

TDR is managing research to determine whether neighboring areas share a parasite population due to vector and/or human migration. This has included population genomics research to quantify the level of interbreeding between parasites from different locations to demarcate transmission zones. This research will provide national programmes with tools they need to determine whether they can stop CDTI treatment when transmission is ongoing in a neighboring area (fig.2).

Fig. 2



Research to address sub-optimal response to ivermectin

In some areas with long-term CDTI, there is concern that 'suboptimal response' (SOR) to ivermectin will prevent elimination. Identification of SOR currently requires counting the parasites in skin snips taken before and several times after treatment with ivermectin – a laborious, time- and resource-consuming method that is not suitable for routine surveillance.

TDR is managing research into genetic markers of *O. volvulus* response to ivermectin. Validation of the genetic markers identified to date would pave the way for development of a tool for countries to monitor SOR prevalence and decide on alternative intervention strategies. The transmission models being developed with TDR support will allow modelling of the extent and speed with which SOR parasites can spread.

Research for alternatives to ivermectin to accelerate progress in areas lagging behind

Before its closure, the WHO African Programme for Onchocerciasis Control had stressed the need for alternative treatment strategies in areas posing particular challenges for elimination. One such strategy is mass drug administration with more effective drugs, including moxidectin.

Research on moxidectin was initiated by TDR in the late 1990s. The development of moxidectin was transferred in 2014 to the not-for-profit biopharmaceutical company Medicines Development for Global Health (MDGH), which raised funds from the Global Health Investment Fund (GHIF) to complete the work needed to meet the requirements for a new drug application to the FDA.

Findings from a large phase 3 clinical study conducted in the Democratic Republic of the Congo, Ghana and Liberia, published in the *Lancet* and managed by TDR, showed that moxidectin is superior to ivermectin in suppressing the presence of parasites (microfilariae) in the skin with a similar safety profile. The microfilariae cause the disease and are the reservoir for transmission.

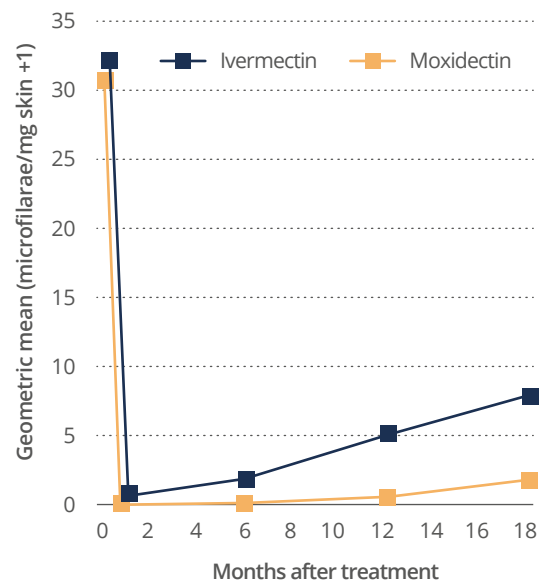


Fig. 3 Geometric mean (95% CI) of skin microfilarial density for all participants treated

On 13 June 2018, the United States Food and Drug Administration (FDA) approved moxidectin as the first new treatment for river blindness in 30 years.

TDR is now providing its scientific and implementation expertise and fundraising support to MDGH for the additional studies required to identify a safe paediatric dose and gather large-scale safety data. Together with the data already available, the results of these studies will allow WHO and countries to decide whether to incorporate moxidectin in guidelines and policies.

“The FDA registration is a real achievement, but we still have a number of steps to go until African countries can use moxidectin to accelerate elimination of this disabling disease – and we are counting on TDR and the river blindness research and control communities to work with us.”

– Mark Sullivan, Founder and Managing Director of Medicines Development for Global Health



Approved adult dosing: 4 x 2mg tablets
Photo: Medicines Development for Global Health

What's in a... 'Debossed Code'?

by Medicines Development for Global Health



Dr Kwablah Awadzi and Dr Annette Kuesel
Photo: Annette Kuesel

Have you ever taken a tablet and wondered exactly what the strange combination of letters and numbers stamped on the surface of the pill means? Just like with the license or number plate on a car, there often isn't any hidden meaning behind the code. It's simply a unique identifier that makes each tablet readily identifiable by health care providers and patients. But in many countries, it is possible to designate your own plates with letters or numbers that are personally meaningful.

We wanted to do this with moxidectin, the first new treatment for river blindness in 30 years.

When we reached the point in the manufacturing process to choose the identifier code for moxidectin tablets, we chose to imprint (deboss) the letters AKKA onto every single tablet. The meaning is very important to us: these are the combined initials of two people who have been absolutely central to the development of moxidectin for the fight against river blindness, also known as onchocerciasis.

The AK is for Dr Annette Kuesel from TDR, the Special Programme for Research and Training in Tropical Diseases. She has been the only constant for moxidectin during its clinical development life.

That we even got to this point is almost entirely due to her tenacity and passion. She will provide her expertise and experience for further trials of moxidectin needed to ensure that WHO and the countries affected by river blindness have all the data they need to decide whether, where and how to use moxidectin for the elimination of this disease.

The other initials -KA- belong to the late Dr Kwablah Awadzi (13 June 1939-16 March 2011). Dr Awadzi was a monumental figure in the fight against river blindness throughout his life. He founded the Onchocerciasis Chemotherapy Research Center (OCRC) in Ghana and dedicated his life to researching more effective treatments and to training the next generation of African clinical researchers. This included clinical and community studies of ivermectin, the drug currently used by onchocerciasis endemic countries to treat tens of millions of people each year. He and his team established the methods used in the clinical trials of moxidectin in people with river blindness. Millions of Africans have benefitted from programmes and principles championed by him, and his legacy spreads far and wide.

Dr Awadzi was a dear friend and mentor to Dr Kuesel, her twin, who always sensed across thousands of kilometres when she needed a taste of his wonderful brand of humor. Dr Awadzi designed and led the first study of moxidectin in people with river blindness and was instrumental in designing the pivotal study and helping Dr Kuesel and the investigators in Ghana, Liberia and the Democratic Republic of the Congo to conduct it.

Dr Awadzi passed away suddenly on 16 March 2011. On what would have been his 79th birthday, 13 June 2018, the FDA approved moxidectin for the treatment of river blindness in people aged 12 and above.

Imprinting AKKA is our small way of honouring the legacy of these two heroes who have dedicated their lives to improving human health.

Strengthening country-led research to end the global TB epidemic

'Intensified research and innovation' is the third pillar of WHO's End TB Strategy, and TDR has been contributing expertise in research for implementation to optimize the impact of innovations for tackling TB. Research plays a critical role in saving the lives of millions suffering and dying from this preventable and curable disease.

The challenge

The most recent Global TB Report reported the alarming figure that over a third of people with TB do not access quality care. And only one in four people with multidrug-resistant TB are diagnosed and put on treatment. Clearly, there are access barriers to diagnostics and treatment that need to be studied to optimize control programmes.

TDR's approach: Improving research for TB control through a regional network approach

In recent years, TDR has supported a number of initiatives in line with this thinking. In June 2015, TDR started to pilot a regional approach bringing together 16 West African countries to form the West African Regional Network for TB control (WARN-TB). The objective has been to boost TB research in the sub-region. The success of this network spurred the replication of this approach for 11 countries in Central Africa (CARN-TB) in April 2018.

Since then, TDR has been training and supporting the national TB programme teams to enhance research in close collaboration with the WHO

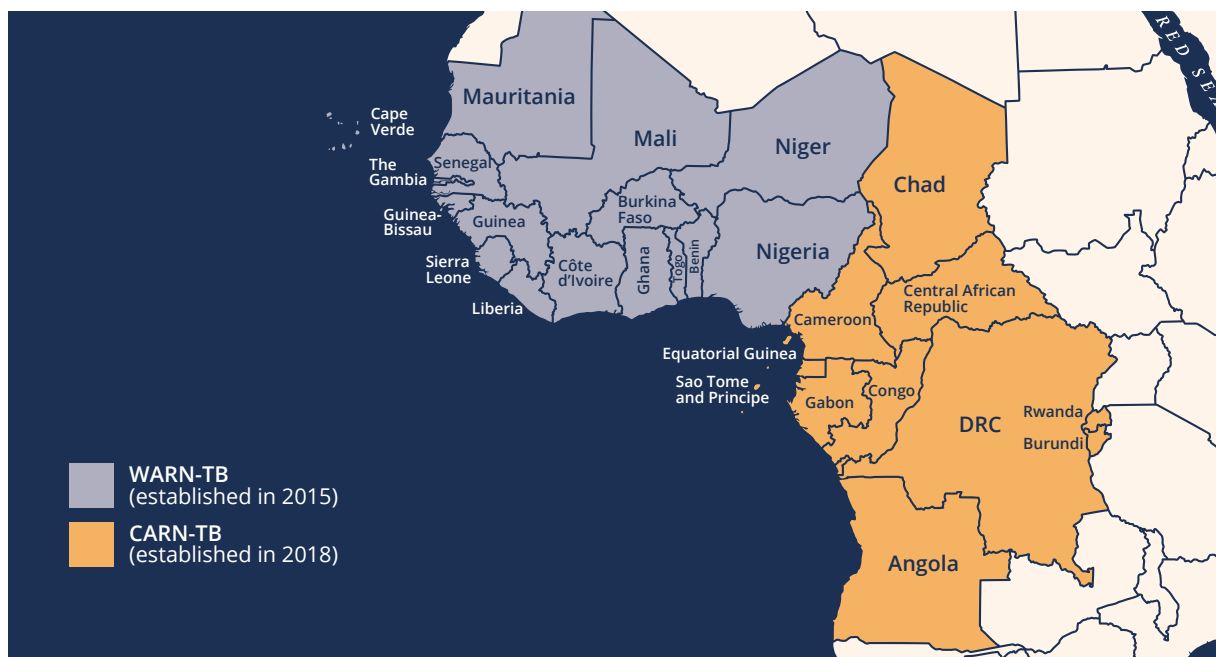
Regional Office for Africa and the Global TB Programme; the West African Health Organization; The Global Fund; The International Union Against Tuberculosis and Lung Disease; the Damien Foundation; and European and African universities and research institutions.

Together, WARN-TB and CARN-TB:

- Support the development of national TB research agendas
- Strengthen research capacities of national TB programme officers
- Improve implementation and operation of multi-country and regional programmes

In December 2018, TDR and the Global TB Programme collaborated with the WARN-TB and CARN-TB networks to investigate the costs faced by patients and households affected by TB. Such costs can create financial barriers to accessing TB services and increase the risk of treatment failure. Participants from 24 countries developed protocols for national surveys and data collection tools on TB patient costs, in line with the methodology developed by the Global TB Programme.

"Intensification of research and innovation is not only one of the key pillars of the End TB Strategy, it's what we need to save the millions suffering and dying from TB," said Dr Tereza Kasaeva, Director of WHO's Global TB Programme.





“ Together with TDR, we are calling for all partners to support countries in rapidly putting innovations into practice, and to share data from operational research to enable updates of policies and guidelines.”

– Dr Tereza Kasaeva, Director of WHO's Global TB Programme

Research to control vector-borne diseases

Half of the world's neglected tropical diseases are vector-borne diseases (VBDs) which, together with malaria, account for 17% of the global burden on health. Moreover, for most of these diseases, only limited tools are available, either for prevention or control. TDR's Vectors, Environment and Society team supports **research for implementation** to improve the health and well-being of the most vulnerable populations affected by vector-borne diseases. This includes investigations of environmental and climate change factors, research that enables optimization of vector control strategies adapted to the local context of disease transmission, and development of innovative community-based interventions.

2018 Highlights

| | | |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| 1 smartphone app | 6 research teams | 1 proof-of-concept |
| developed to help Maasai farmers avoid sleeping sickness | developing plans to implement and deploy optimized malaria control approaches adapted to the local context of transmission | achieved through pilot study on innovative mosquito birth control strategy to target dengue |

Increasing resilience under climate change conditions in Africa

The Challenge:

Climate change is predicted to have a profound effect on the intensity and distribution of certain vector-borne diseases in Africa, particularly in dryland areas. These conditions are changing fast in Africa. There is a need to better understand what is likely to happen where, and how to help communities adapt to changing climatic conditions.



TDR's approach:

TDR's work on vector-borne diseases and climate change has focused on generating evidence to enable the development of innovative strategies to reduce VBD-related human and animal vulnerability and to increase resilience of African populations to VBD-related health threats. In addition, this work aims to broaden and extend knowledge, research capacity, collaboration and policy advice products that can be used throughout Africa and other regions. Aligned with and responding to the Libreville Declaration on Health and Environment in Africa (2008),¹ this portfolio is also expected to contribute to WHO's Global Vector Control Response (2017–2030),² the UN Sustainable Development Goals (particularly SDG 3 on health as well as SDG 13 on climate action), and the Strategic Plan of Action to Scale Up Joint Health and Environment Interventions (2019–2029).³

The TDR research initiative on VBDs and climate change in collaboration with Canada's International Development Research Centre (IDRC) has worked to **optimize resources and technical expertise** in this area. The initiative focuses on addressing the need for **transdisciplinary, multisectoral approaches** (including EcoHealth and OneHealth) to develop actionable strategies that address environmental and climate change effects on health.

Since 2012, this initiative has produced more than 150 publications, including 27 in 2018.

¹ This publication is available at: <https://www.afro.who.int/sites/default/files/2017-06/declibrevilleDeclaration.pdf>

² This publication is available at: <https://www.who.int/vector-control/publications/global-control-response/en/>

³ A draft document is available at: https://uploads-ssl.webflow.com/5c126141f1d7e3bf9534554e/5c126141f1d7e34a213458a8_IMCHE_3_CP4-Draft%20OUTCOME%20DOCUMENT1_EN.pdf

Some examples are highlighted below.

Fig. 4: TDR's climate-related research projects on vector-borne diseases

| Project title | VBDs/countries | Principal Investigator | Select 2018 publications |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Social, environmental and climate change impact of VBDs in arid areas of Southern Africa | Malaria and Schistosomiasis/Botswana, South Africa, Zimbabwe | Moses Chimbari, College of Health Sciences, University of Kwazulu-Natal (UKN), Durban, South Africa | Effects of environmental temperature on production of <i>Schistosoma haematobium</i> cercariae. <i>PLoS Negl Trop Dis</i> ,12(8). |
| Early warning systems for improved human health and resilience to climate sensitive vector-borne diseases in Kenya | Malaria and Rift Valley Fever (RVF)/Kenya | Benson Estambale, Jaramogi Oginga Odinga University of Science and Technology (JOOUST), Bondo, Kenya | Sensitivity of vegetation to climate variability and its implications for malaria risk in Baringo, Kenya. <i>PLOS One</i> , 13(7). |
| Predicting vulnerability and improving resilience of the Maasai Communities to vector-borne infections: an EcoHealth approach in the Maasai Steppe ecosystem | African trypanosomiasis/ Tanzania | Paul Gwakisa, Nelson Mandela African Institute of Science and Technology (NMAIST), Arusha, Tanzania | Data and tools to integrate climate and environmental information into public health. <i>Infect Dis Pov</i> , 7:126 |
| Human African trypanosomiasis, alleviating the effects of climate change through understanding the human-vector-parasite interactions | African trypanosomiasis/ Tanzania, Zimbabwe | John Hargrove, South African Centre of Excellence in Epidemiological Modelling and Analysis (SACEMA), University of Stellenbosch, South Africa | Geostatistical models using remotely-sensed data predict savanna tsetse decline across the interface between protected and unprotected areas in Serengeti, Tanzania. <i>J Appl Ecol</i> , 55(4). |
| Vulnerability and resilience to malaria and schistosomiasis in northern and southern fringes of the Sahelian belt in the context of climate change | Malaria and schistosomiasis/Côte d'Ivoire, Mauritania | Brama Kone, Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Abidjan | Impact of climate variability on the transmission risk of malaria in northern Côte d'Ivoire. <i>PLoS One</i> , 13(6). |

The Strategic Action Plan to Scale Up Health and Environment Interventions in Africa (2019-2029) was adopted by African health and environment ministers during the Third Inter-Ministerial Conference on Health and Environment (IMCHE3) held in Libreville, Gabon, 6-9 November 2018. Jointly organized by WHO, UNEP and the Government of Gabon, the overarching objective of IMCHE3 was to catalyse action by stimulating policies and investments on the joint contribution of the health and environment sectors towards the achievement of the UN SDGs and Agenda 2063.

The action plan identifies clear priorities to strengthen critical joint health and environment services in Africa. It also calls upon WHO, UNEP

and other partners to facilitate capacity building technical assistance for the development and implementation of national plans for joint action, to facilitate the mobilization of domestic and external resources and support the development of national business cases for investment in priority health and environment interventions.

New knowledge and evidence generated from the research projects above supported by TDR will enable African health officials to better predict and respond to emerging health threats linked to climate change and improve the effectiveness of health and environment interventions.



Seyayi Lendarkash uses the mapping software on his mobile phone



SPOTLIGHT

Mapping the location of tsetse flies helps Maasai community avoid sleeping sickness

Seyayi Lendarkash is a Maasai cattle rancher in Emboret village, in north-eastern Tanzania. He lives in an area where tsetse flies that transmit sleeping sickness to people and animals are abundant, devastating livestock that serve as the primary source of food and income for his community.

Over the last few years, Lendarkash has witnessed first-hand the impact of sleeping sickness. Last year, more than 90% of his herd comprising of hundreds of cattle were infected. The disease can lead to frequent cases of miscarriage and infertility among infected cows, reduced growth rates, significant drops in milk production as well as deaths. Sleeping sickness also weakens the animal's immune system, making the cattle susceptible to a range of other infections, exacerbating the problem.

However, there is now hope. He is now able to use his mobile phone to predict the location of the deadly tsetse flies that carry the disease, helping him save his ranching business.

This is the result of four years of work led by Paul Gwakisa at Sokoine University of Agriculture in Tanzania and Pietro Ceccato at Columbia University's International Research Institute for Climate and Society. With support from TDR,

they have been working to harness climate and environmental data sets derived from satellites to reduce infection risk of sleeping sickness.

Gwakisa and Ceccato developed a mapping platform using Google Earth that shows changes in vegetation and water bodies at high resolution. These images can then be compared with changes in tsetse fly locations. Using this platform viewable on smartphones, members of the Maasai community are able to identify grazing and drinking areas free from infected tsetse flies. This is especially critical during the dry season, when drinking holes are scarce.

Dr Moses Ole Neselle, a scientist from the local community, was a vital team member, who led community engagement and data collection process, which involved trapping flies and looking for the presence of parasites that cause the deadly sleeping sickness.

“ This TDR project has enhanced our awareness of sleeping sickness and how climate change is driving infection dynamics in my community.”

– Seyay Lendarkash, Maasai cattle rancher



Understanding residual malaria transmission to optimize control strategies

TDR has been strengthening coordination with WHO’s Global Malaria Programme, which identified research on persistent malaria transmission as a gap that could be addressed by TDR.

The challenge:

Malaria transmission can persist even after core malaria measures have been implemented. These measures include:



Long-lasting insecticidal nets (LLIN)



Indoor residual spraying (IRS)

This may be due to a combination of mosquito and human behaviors such as:



Mosquitoes feeding before people go to bed and after waking up



Human activity away from protected houses and LLINs



Mosquitoes feeding outdoors

Research is thus needed to better understand the magnitude of persistent or residual malaria transmission in different epidemiological settings, and secondly to identify the main factors driving that transmission. This will then inform the development and optimization of tools and strategies to address ongoing malaria in low- to high-transmission areas.

TDR’s approach:

TDR is supporting six research projects covering 13 countries in Africa, South-East Asia, Latin America and the Western Pacific regions that are providing the baseline evidence of persistent or residual malaria in selected settings and of the impact of insecticide resistance on LLINs efficacy. Overleaf is a selection of research findings thus far on the drivers of transmission.



Selection of research findings on the drivers of residual malaria transmission



1 Viet Nam Malaria transmission has moved from villages to farm huts and forests, with secondary vectors such as *An. maculatus*. In Thailand, availability of bednets is low in these areas. In Viet Nam, some people forget to use bednets after drinking or don't want to use them in hot weather. Distribution of insecticide-treated hammock nets and conical nets may be alternative strategies

2 Peru In homes, wall materials such as palm leaves and straw were linked with higher prevalence of *P. vivax* malaria parasite. Homes near water bodies where mosquitoes breed were also found to have higher incidence of malaria. This suggests that malaria control strategies should involve the housing sector, especially given limited resources for deployment of insecticide spraying and bednets in remote areas. Research on the use of drones to map mosquito breeding sites were published in *PLoS Neglected Tropical Diseases*.⁴



4 *PLoS Negl Trop Dis* 13(1):e0007105

3 Brazil Ponds used for commercial fish farming are major mosquito breeding sites. Fish ponds in a rural study site had significantly higher incidence of mosquitoes compared with those in urban study sites.

4 Papua New Guinea Bathing activities at dawn in the river, where mosquitoes are found, may be a driver of malaria transmission.

5 Burkina Faso Mosquitoes are changing their behavior: they are avoiding homes sprayed with insecticides and moving to abandoned structures that aren't sprayed. Human behavior is also a factor: some people are being bitten when they are outdoors during the peak biting times in the late evening.

6 Tanzania Insecticide resistance and human behavior are also part of the problem, but a new mosquito vector is emerging: *An. funestus*.

7 Cameroon, Ethiopia, Kenya Use of bednets is high, but malaria transmission persists due to activities, such as drinking, that keep people outside in the evening.

8 Mali Resistance to pyrethroid insecticides used for LLINs is widespread and increasing, but mosquitoes are fully susceptible to IRS using organophosphate insecticides. Consequently, malaria control with LLINs+IRS is much more efficient than LLINs alone.

9 Benin Most people don't erect bednets properly, and people spend a lot of time in the evening outdoors when mosquitoes are active. Insecticide resistance also calls for the use of different classes of insecticides.

The countries are now developing plans to implement and deploy new integrated control approaches adapted to the local context of transmission. These will include multisectoral approaches involving sectors such as agriculture and housing as well as community engagement strategies.

“We know that the tools for tackling malaria can work. But the research is showing that we need to better engage communities to change their behavior to improve the effectiveness of these tools,” said Dr Tokponnon T. Filémon, Head of Integrated Vector Control at the National Malaria Control Programme of Benin’s Ministry of Health. “Communities don’t feel involved. We need to make it clear that this fight is not against them but is FOR them.”

+ The TDR value-add:

- TDR is supporting research to understand local barriers to malaria control to develop optimized, context-specific solutions for implementation.
- TDR is developing and facilitating a global network of researchers collectively tackling residual malaria, sharing observations and exchanging lessons learned from each of their countries and communities.



“The research is showing that we need to better engage communities...to improve the effectiveness of these tools.”

– Dr Tokponnon T. Filémon, Head of Integrated Vector Control at the National Malaria Control Programme of Benin’s Ministry of Health



The six research teams during a workshop in Iquitos, Peru

Socio-ecological strategies to control vector-borne diseases in South-East Asia

The challenge:

Complex social and ecological factors such as human behavior and cultural practices as well as climate change and other environmental drivers play a major role in shaping disease transmission and influencing the effectiveness of control strategies.

TDR's approach:

TDR is supporting research that is generating a positive, transformative impact on health outcomes for populations challenged by vector-borne diseases (VBDs) through community-centered environmental health services within

the context of an ever-changing environment and complex socio-ecological systems.

Specifically, we aim to achieve:

- Implementation of multisectoral adaptive VBD control strategies that address social and ecological drivers of disease emergence
- Sustainable public health solutions fostering community ownership, participation and empowerment
- Alternative, effective and sustainable vector control strategies



SPOTLIGHT



Schoolchildren controlling dengue using guppy fish in Cambodia: A multisectoral, socially innovative approach to mosquito management

Mr Thouk Seng, the director of an elementary school in Kampong Cham, in central Cambodia, is part of a unique project. He and his students are growing guppy fish in large clay pots in his classroom. Not only are the fish being studied as part of a science class; they are also being deployed as eager predators of mosquito larvae, to control the transmission of dengue in the community.

In recent years, Kampong Cham, a city abounding with jars, pots, discarded tins, old tires and other water containers ideal for mosquitoes to breed in, has seen a steady rise in dengue, with about 3 percent of the population affected each year. Despite efforts to combat mosquitoes through insecticides and window screens in homes, they are not enough to compensate for the widespread use of these exposed water-filled containers.

TDR is supporting the School Dengue Project, led by Malaria Consortium in collaboration with ministries of education and health and other partners. This project, begun in June 2018, is investigating the benefits of two disease-specific interventions: 1) integrated vector management (IVM) reduction procedures; and 2) the communication for behavioral impact (COMBI) health education approach.

Community engagement is a critical component of the project. Teachers conduct classroom

demonstrations and biology projects on mosquito behavior, guppy rearing and setting up guppy banks. Parent-teacher discussion forums have also been conducted to raise community awareness of the project and for the development of culturally appropriate education materials for schools and families. Community knowledge, attitudes and practices (KAP) surveys related to dengue and other vector-borne diseases have been completed and are currently being analysed.

Fully operational guppy banks have been established in three community health centers, and more will be set up in 2019. Teachers and students will begin distributing the guppies to households in the community, and entomological surveys and household satisfaction surveys and interviews will be conducted. A costing study, mid-term reviews to assess progress, gaps and challenges, as well as an impact evaluation by an independent review panel are also planned.



School children are a key part of the plan



The guppy bank

The School Guppy Project is designed to be a sustainable, multisectoral, socially innovative, low-cost public health solution fostering community ownership, participation and empowerment. Stakeholders that have participated in the project include the National Malaria and Dengue Control Programme; Ministry of Health; Ministry of Education; Bournemouth University; the Global Health Asia Institute; the Institute of Tropical Medicine, Belgium; the Institut Pasteur, Cambodia; the Malaria Consortium; the



Guppies

Cambodia Provincial Health Department; and the Cambodian National Center for Parasitology, Entomology and Malaria Control.

+ The TDR value-add:

The School Dengue Project exemplifies TDR's expertise in multi-disciplinary, multisectoral approaches to research and community engagement to develop locally relevant solutions to infectious diseases.





Optimizing vector birth control and socio-ecological strategies for the prevention of dengue, chikungunya and Zika in Thailand

The challenge:

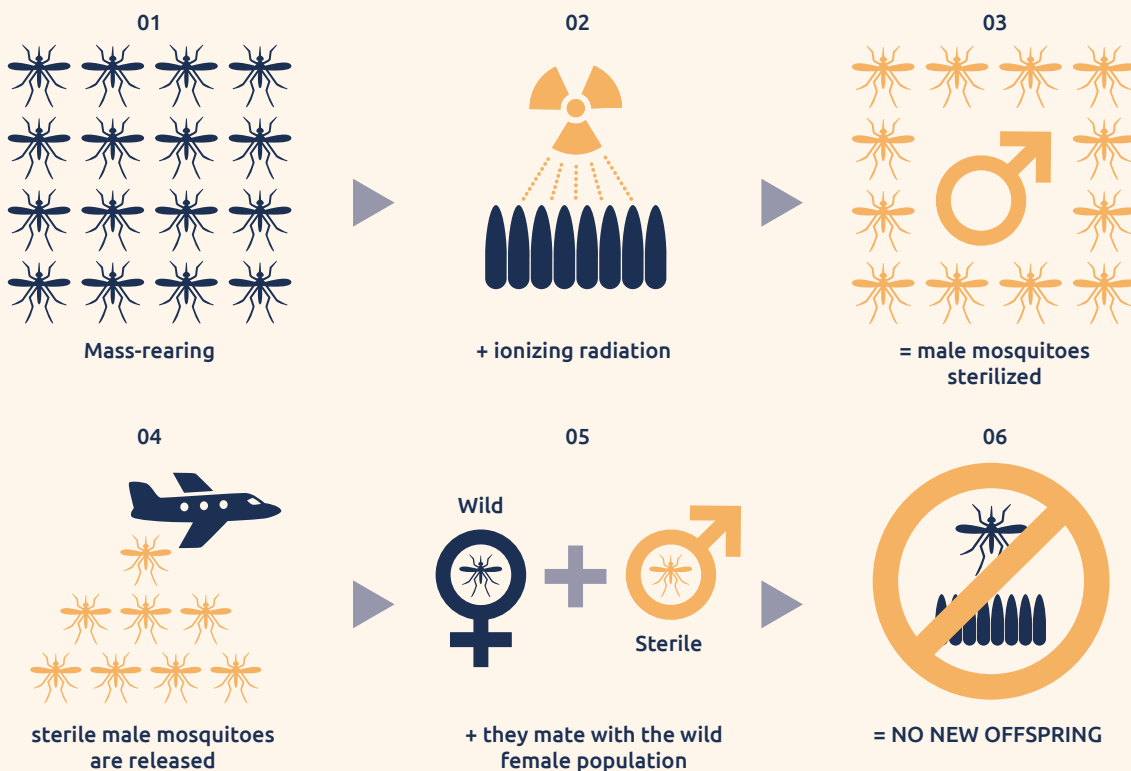
Controlling the major mosquito vectors, *Aedes aegypti*, by reducing their populations is currently the only measure used to reduce risk and incidence of vector-borne diseases such as dengue, chikungunya and Zika. So far, chemical insecticides have been the major approach in vector control operations, but due to an increasing trend in insecticide resistance in mosquito vectors, as well as the residual effects of chemical insecticides on the environment, there is an urgent need for alternative and effective vector control methods. In addition, due to the complexity of disease emergence, transdisciplinary and socio-ecological strategies are needed to successfully implement such an alternative approach.

TDR's approach:

An innovative vector birth control strategy using the sterile insect technique (SIT) and the Wolbachia-induced incompatibility approach was successfully developed and applied in a small-scale operation in Thailand. In this project, an attempt was made to apply transdisciplinary, socio-ecological strategies to implement this innovative vector control tool in Bangkok.



Fig. 6: The Sterile Insect Technique (SIT)

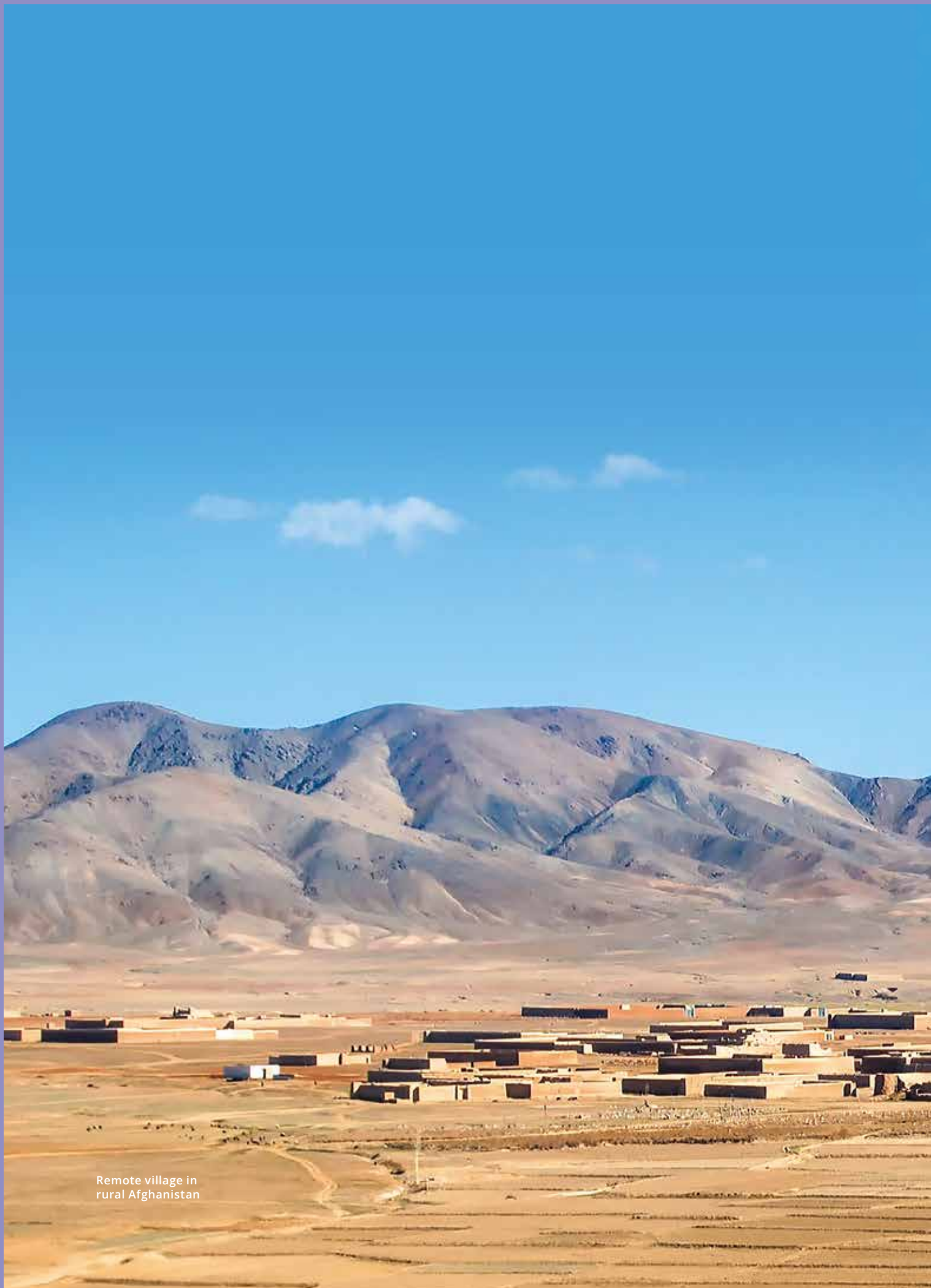


Results so far:

- **Proof-of-concept:** significant reduction of natural populations of *Aedes aegypti* in a village in the Pleang Yao District, eastern Thailand.
- **Lessons learned:** baseline data on sterility and mating competitiveness of irradiated male mosquitoes is needed; site selection and spatial mapping of study areas are important for conducting field trials; community and public engagement are key to the success of a pilot trial; tools for monitoring mosquito populations are important for project evaluation; mosquito mass-rearing facility is needed to scale up the programme.
- **Further research is needed:** to determine the impact of the mosquito SIT programme on dengue incidence and transmission patterns, with a new project implementation site: urban Bangkok.



Mosquito breeding



Remote village in rural Afghanistan

Strengthening research capacity for implementation

Contents

- Postgraduate training scheme
- Regional Training Centres
- Structured Operational Research and Training Initiative (SORT IT)
- Clinical Research and Development Fellowship
- Research capacity strengthening tools
- Access and Delivery Partnership



Strengthening research capacity

Research capacity strengthening activities are at the heart of the TDR Strategy 2018-2023, with a focus on researchers in low- and middle-income countries (LMICs). In recent years, we have been increasingly partnering with universities and training institutions in low- and middle-income countries to build institutional capacity as well.

2018 Highlights

| | | |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| 178 master's students | 65% of peer-reviewed papers | 1585 participants |
| trained or in training through postgraduate training scheme focused on implementation research (cumulative from 2015) | published by SORT IT operational research fellows have shown an impact on policy and practice | enroll in global Massive Open Online Course (MOOC) on implementation research |

Postgraduate training scheme: Building the capacity of the next generation of health researchers

The postgraduate training scheme provides a full academic scholarship in collaboration with seven universities in low- and middle-income countries. Students obtain master's degrees focused on implementation research on malaria, TB, and neglected tropical diseases.

Postgraduate training scheme locations

- 1 American University of Beirut (Lebanon)
- 2 Universitas Gadjah Mada (Indonesia)
- 3 BRAC University (Bangladesh)
- 4 Universidad de Antioquia (Colombia)
- 5 University of Ghana (Ghana)
- 6 University of the Witwatersrand (South Africa)
- 7 University of Zambia (Zambia)



Seven TDR-supported Masters degree students with WHO Director-General Dr Tedros Adhanom Ghebreyesus, who told the students he was fortunate to receive TDR support early in his career, too.



Results

Since 2015, 178 master's students have been or are being supported through the training scheme.



A Family Health House facility in Afghanistan



SPOTLIGHT

Dr Muhammad Homayoon Manochehr *Translating evidence to policy in Afghanistan to improve health care access in remote areas*

Host training institution:

- American University of Beirut, Master of Public Health programme

Highlights during MPH programme:

- Research project on TB control among migrant workers and Syrian refugees in Lebanon (publication forthcoming)
- Developed manual for collection, analysis and use of TB Data for Health Workers in Afghanistan

Post-training highlights:

- Now Senior Advisor for General Directorate of Policy and Planning at Afghanistan Ministry of Public Health
- Developed policy brief that contributed to expansion of health services of Family Health Houses (clinics in remote, underserved areas) as well as inclusion of HIV/TB/malaria care, in addition to maternal and child health services.

As a senior advisor in the directorate of policy and planning at Afghanistan's Ministry of Public Health, Dr Muhammad Manochehr spends much of his time developing policy recommendations drawing on research evidence to address gaps in health services in his country. He cites the skills he acquired through TDR's postgraduate training programme as key to being able to perform his current job.

“The American University of Beirut was particularly appealing, given that public health is taught in a context where conflict and forced migration are pervasive, as in Afghanistan.”

Prior to this training, Manochehr worked in Afghanistan's national tuberculosis (TB) control programme as head of monitoring and evaluation and surveillance. There, he noticed the TB case notification rate rising, but had limited tools to address the problem in an effective way.

"I wanted to make a difference, but I didn't have the skills to analyse the data or to conduct research that would help improve the programme," he said.

This was the primary motivation for him to pursue a master's in public health from the American University of Beirut, one of seven universities TDR partners with to strengthen research capacity of scientists in low- and middle-income countries burdened with infectious diseases of poverty. The American University of Beirut was particularly appealing for Manochehr, given that public health is taught in a context where conflict and forced migration are pervasive, as in Afghanistan.

Research on TB control among refugees and migrant workers

During his master's programme in 2018, Manochehr particularly appreciated the coursework on statistical analysis of data and design and analysis of epidemiological studies. As part of the programme, he applied these skills to a research project on TB control in Lebanon, focusing on migrant workers and Syrian refugees.

There he found that there was a low notification rate of TB cases as many undocumented Syrian refugees and migrant workers were afraid of being deported if they sought medical care. The research led to the conclusion that community-based awareness programmes would be necessary to inform migrant workers that a TB diagnosis would not lead to deportation and that employers should also be educated on the treatment process.

Making a difference at home

Upon returning to Afghanistan, Manochehr was well equipped to take on the role of policy adviser at the Ministry of Public Health. One of his key

responsibilities is developing evidence-based policies, policy briefs and plans of action. This includes a policy brief on expanding coverage of health services to underserved, remote areas in Afghanistan.

Currently, about 10% of the population live in such remote areas, more than two hours walking distance from the nearest health facility. To address this issue, the health ministry, in collaboration with UNPFA, introduced and piloted the Family Health House (FHH) model in 2009.

The focus of these facilities has been to provide maternal and child health services. Midwives and health workers are on call at all hours to provide skilled birth attendance, family planning services, basic health care and referrals.

Manochehr's policy brief highlighted an external evaluation of the Family Health House model, which showed it is more cost effective compared with other models of health care delivery. This allowed him to recommend the expansion of Family Health Houses to cover all 10% of the underserved population.

Analysis of data from the Health Management Information System also suggested the need for HIV, TB and malaria care, prompting The Global Fund to support this expansion of services in 35 Family Health Houses, which began in May 2019.

“ Given my background in TB control programmes, I felt it was very important to include these additional services. It is very rewarding to see that this policy brief has made an impact.”

– Dr Muhammad Homayoon Manochehr



The American University of Beirut

Regional Training Centres: Fostering learning and collaboration within and across regions

TDR supports a network of six Regional Training Centres (RTCs), one in each WHO region, to conduct and disseminate a wide range of training courses on good health research practices and implementation research (IR). As regional training hubs, the RTCs use train-the-trainer workshops to address region-specific needs and foster learning and collaboration within and across regions.

TDR has also collaborated with RTCs to develop and offer a continuum of short training courses in implementation research:

- Massive Open Online Course on IR
- Basic principles in IR
- Ethics in IR
- IR Toolkit

Regional training centre locations

- 1 Centro Internacional de Entrenamiento e Investigaciones Médicas (**Colombia**)
- 2 University of Ghana (**Ghana**)
- 3 Astana Medical University (**Kazakhstan**)
- 4 Institut Pasteur of Tunis (**Tunisia**)
- 5 Universitas Gadjah Mada (**Indonesia**)
- 6 Research Institute for Tropical Medicine (**Philippines**)

Results:

- In 2018, 982 scientists (66% women) have been trained in good health research practices and 1,156 (57% women) in implementation research.
- Short training courses in good health research practices have been institutionalized in 20 countries in five regions:
 - **Americas:** Bolivia, Ecuador, Guatemala, Honduras, Jamaica, Peru
 - **South-East Asia:** India, Myanmar, Nepal
 - **Europe:** Armenia, Azerbaijan, Belarus, Georgia, Kazan state of Russia, Kyrgyzstan, Tajikistan, Uzbekistan, Ukraine
 - **Africa:** Mozambique
 - **Eastern Mediterranean:** Lebanon

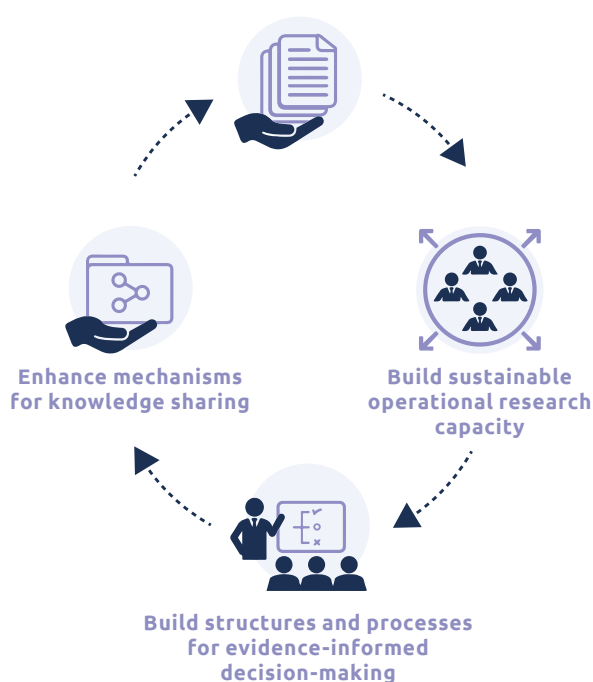


Structured Operational Research and Training Initiative: Building sustainable operational research capacity to improve public health

SORT IT is a global partnership that builds operational research capacity to generate and use evidence to improve performance of disease control programmes. Participants undergo training to conduct operational research on topics such as multidrug-resistant tuberculosis, malaria, HIV/AIDS, neglected tropical diseases, maternal and child health, outbreaks and emergencies, antimicrobial resistance and noncommunicable diseases.

The SORT IT Objectives

SORT IT supports countries and institutions to:



“SORT IT is contributing to the global effort to fight antimicrobial resistance through developing operational research capacity that can be used to monitor country-level progress in real time.”

– Marc Sprenger, Director, WHO Antimicrobial Resistance Secretariat

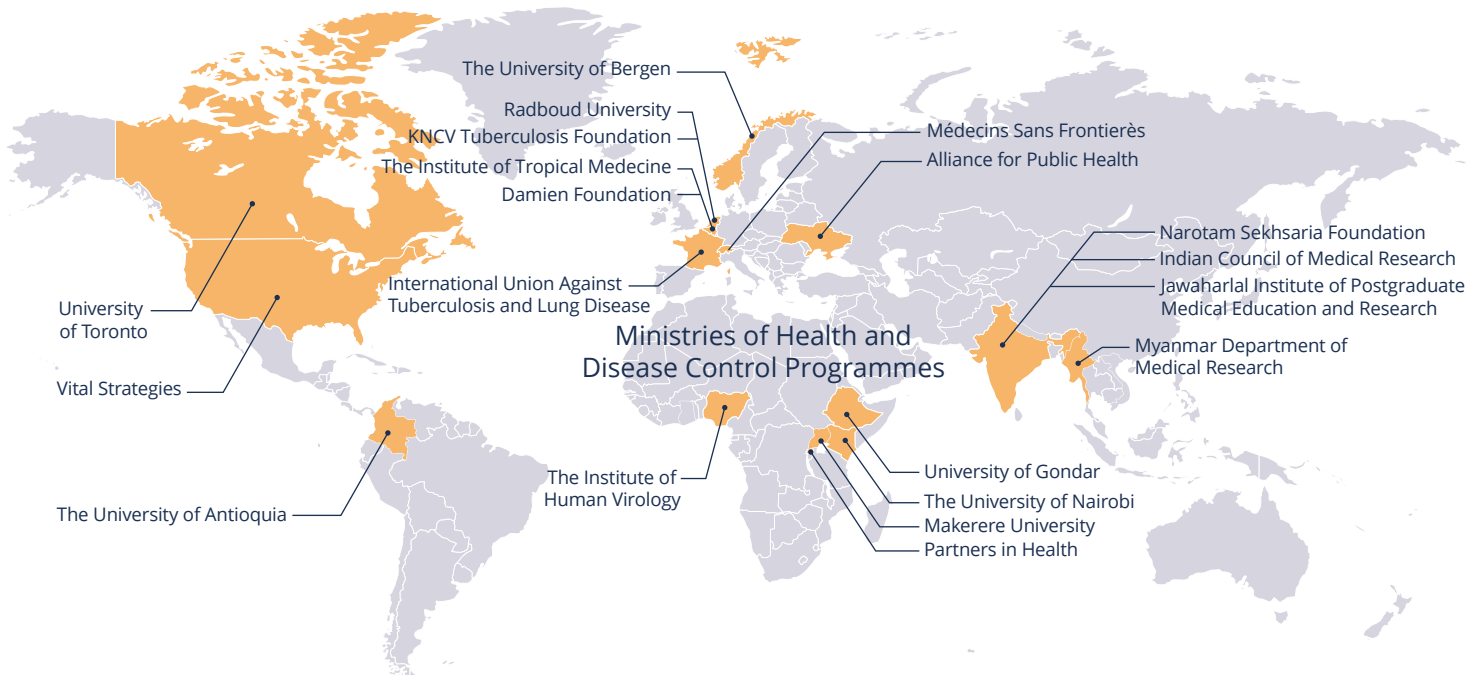
Results:

- 800 participants from 90 countries over 8 years
- 65% of peer-reviewed papers published by SORT IT participants have shown an impact on policy and practice

Progress against Monitoring and Evaluation Targets

| Performance Indicator | Target | Progress (as of Dec. 2018) |
|---------------------------------------------------|--------|----------------------------|
| Participants' satisfaction scores | 80% | 100% |
| Participants completing all course milestones | 80% | 92% |
| Papers published within 18 months of submission | 80% | 93% |
| Papers assessed for impact on policy and practice | 80% | 91% |

The Partners



IMPACT STORY

Influence of the 2014-2015 Ebola outbreak on the vaccination of children in rural Guinea

Camara B S et al. *Public Health Action*. 2017;7(2):161-167

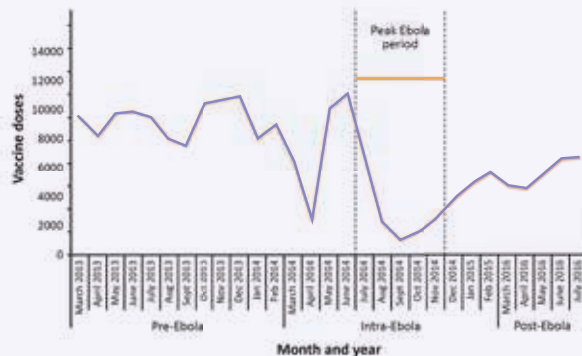
Study Finding:

Vaccine administration declined significantly during the outbreak, and the decline persisted into the post-Ebola period (See fig.7).

Impact:

- Ministry of Health conducted mass community awareness and education campaigns on vaccination.
- A safety net of vaccine stocks was introduced as a stop-gap measure for future outbreaks.

Fig. 7: Trends in vaccine administration for children before, during and after the 2014-2015 Ebola outbreak, Macenta district, Guinea.



Adapted from *Public Health Action*. 2017;7(2): 161-167

Clinical Research and Development Fellowship (CRDF): Building capacity to conduct clinical trials in low- and middle-income countries

Complementing our training programmes on research for implementation, TDR also supports the Clinical Research and Development Fellowship (CRDF), which trains early- to mid-career researchers in low- middle-income countries on how to conduct clinical trials. Participants are placed for 12 months in

pharmaceutical companies, product development partnerships, or research organizations and receive a reintegration grant at their home institution. The fellowship is jointly implemented by TDR and the European & Developing Countries Clinical Trials Partnership (EDCTP).

Host institutions include:

| PDPs | | Location |
|--------------------------|----------------------------------------------|------------------------|
| 1 | European Vaccine Initiative | Germany |
| 2 | FIND | Switzerland |
| 3 | Infectious Disease Research Institute (IDRI) | USA |
| 4 | International Vaccine Institute | South Korea |
| Pharmaceutical Companies | | Location |
| 5 | GSK Biologicals | Belgium |
| Research Institutions | | Location |
| 6 | Institute of Health | Luxembourg |
| 7 | IDDO/WWARN | UK, Australia, Lao PDR |
| 8 | FIOCRUZ | Brazil |
| 9 | Institute Pasteur | Viet Nam |
| 10 | STPH | Switzerland |



Results:

- In 2018, 18 fellows were selected from Burkina Faso, Ethiopia, Ghana, Guinea, Kenya, Liberia, Mali, Senegal, Argentina, Bangladesh and Nepal.
- Bill & Melinda Gates Foundation has renewed support for the fellowship through 2022



SPOTLIGHT

Dr Atinuke Olaleye: Bringing the CRDF experience home to Nigeria

Mentoring organization:

- *GlaxoSmithKline (Belgium)*

Post-fellowship highlights:

- *Appointed Director of Centre for Advanced Medical Research and Biotechnology (CAMRAB) at Babcock University in Nigeria*
- *Currently leading project on parasite resistance to malaria chemoprevention in pregnancy as principal investigator*
- *Organized clinical research capacity building workshop at Babcock University*

As a university lecturer and specialist obstetrician-gynecologist, my interest in research was stimulated by my desire to improve the lives of women in my society. In addition to my medical degree, I also obtained a master's degree in public health (MPH) to enable me to address women's health issues using public health strategies. I applied for the TDR Clinical Research and Development Fellowship because of my interest in conducting clinical research in infectious diseases affecting maternal and child health.

Testing the RTS,S malaria vaccine

For the 12-month fellowship, I was placed in GlaxoSmithKline Plc's vaccines research centre

in Belgium, where I worked with the clinical R&D team in malaria vaccine development. I was involved in a phase IIb multi-centre clinical trial to evaluate the efficacy, safety and immunogenicity of the RTS,S vaccine in a fractional dose schedule, where I gained competence in clinical trials operations and study implementation. My supervisor (Dr Opokua Ofori-Anyinam) was of immense help in clarifying my professional and career goals and has become a life mentor to me.

However, my experience with the Fellowship went beyond mere acquisition of competencies. I believe it was a defining moment for my career, as it opened my mind to a world of endless possibilities. The TDR Fellowship has enabled me to become a strong leader of a multi-disciplinary team. This is evidenced by the rapidity with which I was able to set up a clinical trial site in my home institution (Babcock University Teaching Hospital, Nigeria) and establish the foundational requirements for an advanced biotechnology laboratory. Thus, I have been able to accomplish in six months what would usually take years.

New appointment as research centre director

Following the completion of my fellowship in March 2018, I returned to my home institution and had a seamless re-integration into clinical, research and academic activities. I was promoted to Senior



Dr Atinuke Olaleye (centre) at a research training workshop she organized at Babcock University following her fellowship

Lecturer and was also appointed Director of the university's Centre for Advanced Medical Research and Biotechnology (CAMRAB). The experience gained through working with the different members of the project team in GlaxoSmithKline (GSK) during the TDR Fellowship has been of immense help in managing my own team now.

I visited clinical trial sites during the GSK Monitor/ Investigator meetings in Ghana and Kenya, and this afforded me the opportunity to see first-hand how clinical trial sites are set up in Africa, and how their processes are organized to ensure operational efficiency and effectiveness. It also provided networking opportunities with experienced trialists (project managers, investigators, operations, laboratory and monitors) whom I can call upon to help set up my site in Nigeria.

Building clinical research capacity at home

To pass on the skills gained from the TDR Clinical Research and Development Fellowship in my home institution, I am also focusing on building capacity in clinical research, as there is a significant unmet need for skills and competencies in this aspect. With the TDR reintegration grant, I am organizing face-to-face training workshops on the fundamentals of clinical research and networking for research partnerships for early-stage investigators in my institution. The first workshop took place on 11 October 2018, with collaboration from my institution and industry partners.

An unexpected output from the TDR Fellowship is my admission into a doctoral programme at the University of Antwerp, Belgium. This opportunity will further strengthen my research skills and position me for a long-term career in the field of research.

Leaving my family and job for a year to pursue the TDR Fellowship was a difficult decision, but it was worth it! I am extremely grateful to TDR for providing this opportunity, as the tiny seed sown is already producing fruit.

“ The experience gained through working with the different members of the project team in GlaxoSmithKline during the TDR Fellowship has been of immense help in managing my own team now.”

– Dr Atinuke Olaleye

Research capacity strengthening tools

Massive Open Online Course (MOOC) on Implementation Research



This online training course was developed for public health researchers and decision-makers, disease control programme managers, academics and others, and focuses on how to design and demonstrate robust IR projects to improve control of infectious diseases of poverty and generate better health outcomes.

This first worldwide MOOC session focused on infectious diseases of poverty and was officially launched in May 2018. 1585 participants enrolled from 106 different countries.

Most of the participants were public health researchers (46.5%), followed by public health officers (35%) or both public health researchers and officers (4%). Among the 1,585 enrolled participants, 560 (35%) completed the course and received a certificate. This high rate of completion compared with that of other MOOCs (8–9%), strongly indicates that the MOOC on IR corresponds to a real need.

Following this MOOC, TDR received requests focusing on the use of course contents for developing training programmes on IR from:

- The Caribbean Public Health Agency (CARPHA) for developing and conducting IR courses related to the prevention of noncommunicable diseases and establishing a community of practice research working group;
- The Institute of Public Health and the Institute of Clinical Translational Science (both at the University of Washington in Saint Louis, Missouri) for adapting, implementing and disseminating evidence-based interventions for ethnic minority populations; and

- The Hunter New England Population Health (HNEPH), New Lambton, Australia, for developing training in IR for public health officers in Papua New Guinea.

Implementation Research Toolkit

This toolkit provides deeper learning on implementation research. It is designed to help researchers identify system bottlenecks and the stakeholders to be involved in the process, formulate appropriate research questions, conduct the research and develop a plan for implementing the study results.

The toolkit was developed under the aegis of the Access and Delivery Partnership (ADP) and has been updated to be more comprehensive and accessible. It is designed to build on the MOOC on Implementation Research.

The TDR Implementation Research Toolkit is available online in English and French and comprises the following seven modules:



In the first six months following its launch, on the website, there were 2019 unique users of the online version, from 26 countries (18 from LMICs) and 3742 unique sessions.

Access and Delivery Partnership

The Access and Delivery Partnership (ADP) is supporting countries to strengthen health systems to ensure effective access to, and delivery of new health technologies for TB, malaria and neglected tropical diseases. Led by UNDP, ADP is a collaboration with WHO, TDR and PATH, with funding from the Government of Japan. ADP partners draw on their unique areas of expertise to help countries be better equipped to ensure health technologies such as medicines, vaccines and diagnostic tools reach those in need. ADP focus countries are Ghana, India, Indonesia, Malawi, Senegal, Tanzania and Thailand.

Expertise in implementation research and drug safety monitoring

TDR brings its expertise in two areas to the partnership: implementation research and drug safety monitoring. TDR's Implementation Research Toolkit is a key resource used in capacity building activities and is designed to help identify system bottlenecks that block access and delivery and relevant stakeholders, formulate appropriate


research questions, conduct the research and develop a plan for implementing the study results.

Since its launch in 2014, over 200 researchers, academics, disease control programme managers, policy-makers, health administrators, communication specialists and journalists have used the toolkit to guide their research.

TDR has also worked with ADP focus countries to strengthen their safety monitoring, which has contributed to increased reporting rates. For example, in Tanzania, following training in facilities across 20 districts targeting more than 500 healthcare workers, the national reporting rate of adverse drug reactions doubled. And in Indonesia, TDR has supported the establishment of systems for active safety monitoring for new TB drugs.

For more information on all of our capacity building activities and resources, please visit: <https://www.who.int/tdr/capacity/strengthening/en/>



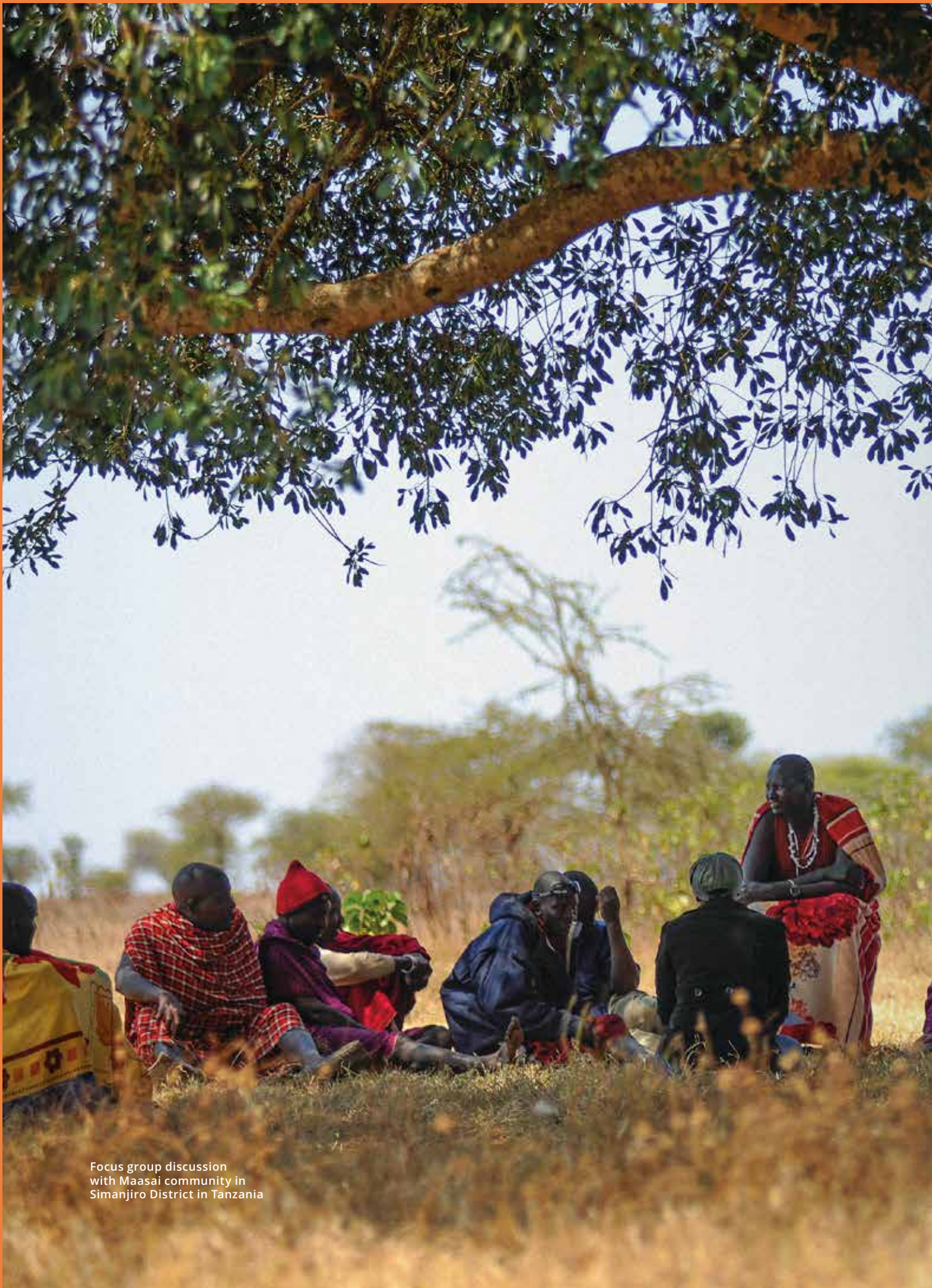
 TDR's participation in ADP has greatly enhanced our capacity to address implementation challenges and strengthen safety monitoring systems."

– Tenu Avafia, Team Leader at UNDP on Human Rights, Key Populations, Health Technology Innovation and Access.



THE ACCESS AND
DELIVERY PARTNERSHIP





Focus group discussion
with Maasai community in
Simanjiro District in Tanzania

Global engagement: Promoting innovative and inclusive approaches to research

Contents

- Social Innovation in Health Initiative: transforming health care delivery so no-one is left behind
- Shaping the research agenda
- Supporting translation of evidence to policy
- TDR Global: Leveraging a global network to catalyse collaboration and capacity building

Global engagement

An essential part of TDR's work is to engage with the global health community to promote and facilitate the role of research for development and to advocate for the use of high-quality evidence to inform policy. TDR is at the interface between research and health care delivery and is embedded within the UN family through its co-sponsors (Unicef, UNDP, the World Bank and WHO). This unique positioning allows TDR to create a bridge from local communities to the World Health Assembly to enable the broadest possible scope of dialogue and debate across the spectrum of health research – from priority setting to evidence-based policy-making at local, national, regional and global levels.

This global engagement includes promoting a broad range of community-based social innovations that are transforming health care delivery, shaping the research agenda, supporting the translation of evidence to policy, and leveraging a global network of more than 7,000 scientists and experts who have been associated with TDR.

2018 Highlights

12 new social innovation case studies published by SIHI country research hubs



New report highlights the lack of research for implementation in malaria



Crowdsourcing challenge contributes to quadrupling of female applicants for Clinical Research and Development Fellowship



Social Innovation in Health Initiative: transforming health care delivery so no-one is left behind

The Social Innovation in Health Initiative (SIHI) is an informal network of individuals and institutions sharing a common goal to advance social innovation in health, through **research**, **capacity building** and **advocacy**, to accelerate Universal Health Coverage and meet the Sustainable Development Goals. Since 2014, SIHI has identified and studied more than 40 community-based social innovations across 17 countries that are transforming health care delivery to improve access so no-one is left behind.

TDR collaborates with SIHI partners, which include grassroots innovators, Ministries of

Health, funding agencies and academic institutions. For the full list of partners, please visit: <https://socialinnovationinhealth.org/about/what-is-sihi/>

Growing role of SIHI country hubs

SIHI country hubs play a leadership role in identifying, showcasing and studying local community-engaged and citizen-led social innovations in health. To date more than 200 social innovations have been identified in LMICs and 40 case studies have been conducted. SIHI country hubs provide a platform to convene social innovators, government and community

representatives, researchers and other stakeholders in order to create an enabling environment for social innovation to thrive. They build capacity and embed research in social innovations to enhance their effectiveness and

identify the mechanisms to replicate or scale them up. Importantly, they engage with key partners at country level to institutionalize social innovation in national systems. Some highlights of 2018 activities led by the country hubs are displayed below.



Embedding research in social innovation

On 30–31 May 2018, SIHI brought together its partners, social innovation organizations, academia, the ministries of health of Malawi and Uganda, and international agencies to advance the conversation on embedding research in social innovation. The workshop was held in Blantyre, Malawi, with 46 participants from 11 countries.

Innovators shared their stories and inputs on working with government and other stakeholders. Contributions from participants will be used to inform the development of **research guidance on social innovation**. The intended vision of the guidance is to aid all social innovation actors by embedding research in their efforts towards achieving sustainability and informing policy towards UHC.



Photo: Lindi van Niekerk, SIHI

SIHI Malawi Case Study: Chipatala Cha Pa Foni (CCPF) – Health Centre by Phone

In 2017 and 2018, the SIHI Malawi hub conducted two public open calls to identify locally driven community-based innovations and to support the creation of a culture of Malawians innovating for health. The call focus was on improving maternal and child health and improving health care delivery in Malawi. Forty-one submissions were received. Each submission was evaluated by an independent expert review panel. Chipatala Cha Pa Foni was one of three finalists chosen for in-depth case study research. This included site visits, data collection, and identification of key health system lessons.

Creator: Soyapi Mumba
(Malawian software developer)

Implementers: A multisectoral partnership between VillageReach (CSO-NGO), the Malawi Ministry of Health, Airtel and donors

The Challenge

Progress towards universal health coverage in Malawi is being limited due to geographic, health system and information access barriers faced by 84% of Malawians residing in rural areas. Human resources at health facilities are insufficient or insufficiently trained, resulting in long waiting times, poor quality of care and a lack of privacy.

The Innovation

mHealth service delivery with two components:

- A toll-free hotline, staffed by qualified nurses, who provide clients with health information and advice and refer clients displaying 'danger signs' to a health facility.
- A 'Tips and Reminders' mobile messaging service that provides regular text or voice messages on reproductive, maternal, and newborn health topics and nutrition.

The Impact

The most recent independent evaluation (conducted in 2018) found that, compared with non-users, CCPF users were more likely to:

- understand family planning
- plan pregnancy and know their estimated date of delivery and start antenatal care early
- understand contraceptive use and existence of post-exposure prophylaxis
- vaccinate children
- provide insecticide-treated bednet to children under 5 years
- provide children under 5 years with five meals a day and understand the importance of diversifying diet in all six food groups.

This evidence of impact has prompted Malawi Ministry of Health to finance and integrate the innovation into the health system. By the end of 2018, the service, which now operates 24 hours a day, 7 days a week, was rolled out to all 28 districts in Malawi. From 1 July 2019, CCPF will be fully owned and managed by the Ministry of Health, becoming one of the first government-run national health hotlines in Africa.

More information is available from *Scaling up a health and nutrition hotline in Malawi: the benefits of multisectoral collaboration* (BMJ 2018;363:k4590).



IMPACT STORY

A mother accesses antenatal care thanks to Health Centre by Phone excerpted from the VillageReach website

Ellena Sosteni is a 31-one-year-old mother of five who lives in a rural village in the Balaka district of Malawi. With the nearest health facility several kilometres away, Ellena and her family must walk about two hours to access basic health care services.

While visiting a village clinic, Ellena learned about Chipatala Cha Pa Foni (CCPF), or Health Centre by Phone, from a community health worker. CCPF creates a critical link between the health center and remote communities, increasing access to health information and care where it's needed most.

Upon finding out she was pregnant, Ellena called CCPF where she received advice on the importance of antenatal care, proper nutrition and the effects of hormonal changes during pregnancy.

In rural communities like Balaka, where getting to a health centre is difficult, people often delay seeking care. For pregnant women, this can mean a delay in critical antenatal care and access to preventive measures that are important to the health of both mother and baby.

Ellena is very grateful for CCPF because it helped her to start antenatal care within the recommended first trimester, care that she did

not receive during her previous four pregnancies. During her first visit, she underwent an HIV test and received iron supplements, important preventive care measures, especially in the early months of pregnancy.



Ellena Sosteni and her family at their home in Kwitanda, Malawi, with Patience Tchongwe (far right), CCPF Hotline Supervisor. (Photo: VillageReach)

Ellena is now a CCPF advocate in her area, sharing the information she learns through CCPF and encouraging others to sign up. Through her phone, five more women have registered for CCPF Tips and Reminders Service for their children.

Shaping the research agenda

Highlighting the threat of a ‘second valley of death’ that would keep developed malaria products from reaching those most in need.



TDR worked with a number of partners to analyze funding for malaria R&D, focusing on research for implementation. The resulting report, “Bridging the gaps in malaria R&D: An analysis of funding—from basic research and product development to research for implementation” highlights a shortfall in investments in research required to improve access to products. Research for implementation comprised only 16% of total average annual malaria R&D investments of US\$673 million.

“ We now face a ‘second valley of death’—not enough resources to move products through development, all the way to impact.”

– David C. Kaslow, MD, Vice President of Essential Medicines at PATH

The timing of this report could not be more critical. Progress against malaria has recently flatlined, and in some areas, malaria cases are on the rise. This is a threat to more than a decade of progress and investments in the global fight against malaria—and to the lives and livelihoods of millions of people. Valuable tools have been developed, and more are on the way, but lagging behind are the systems to ensure that they are implemented, used appropriately, and easily accessible to everyone in need.

The report includes six case studies on research for implementation:

Case study 1: Drug packaging increases access to malaria treatment

Case study 2: Reducing deaths with bednets

Case study 3: Two approaches to managing fever, a symptom shared by three diseases—malaria, pneumonia, and diarrhea

Case study 4: Ensuring appropriate health care use during malaria vaccine introduction

Case study 5: Reaching malaria elimination through strengthened national research capacity

Case study 6: Increasing access to new insecticidal products

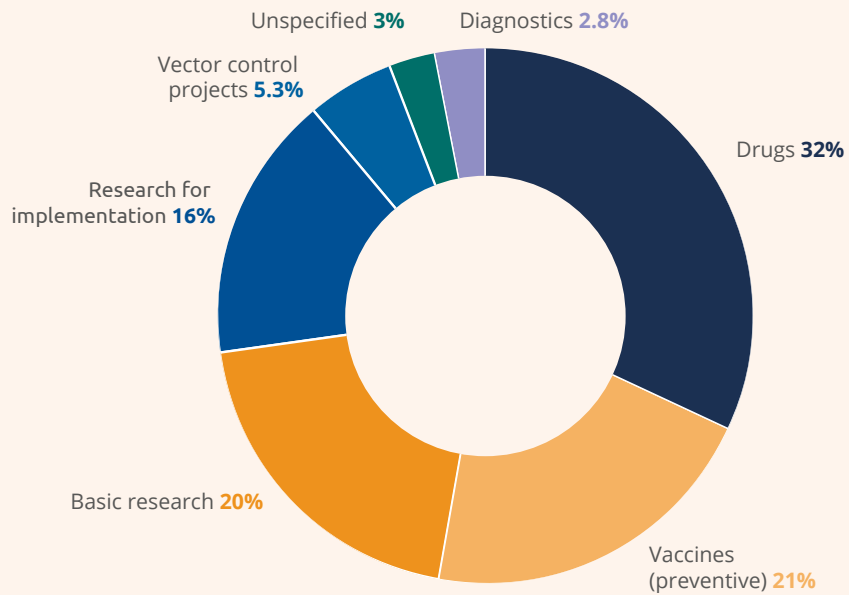
Fig. 8: Lack of investments in implementation research: funding allocations for malaria R&D 2014-2016

Total of US\$5600-700 million per year since 2010

Drug R&D received largest share of funding, at 32%

Vaccines and basic research received about equal shares, at 21% and 20% respectively

Research for implementation made up only 16% of the total malaria R&D pie.



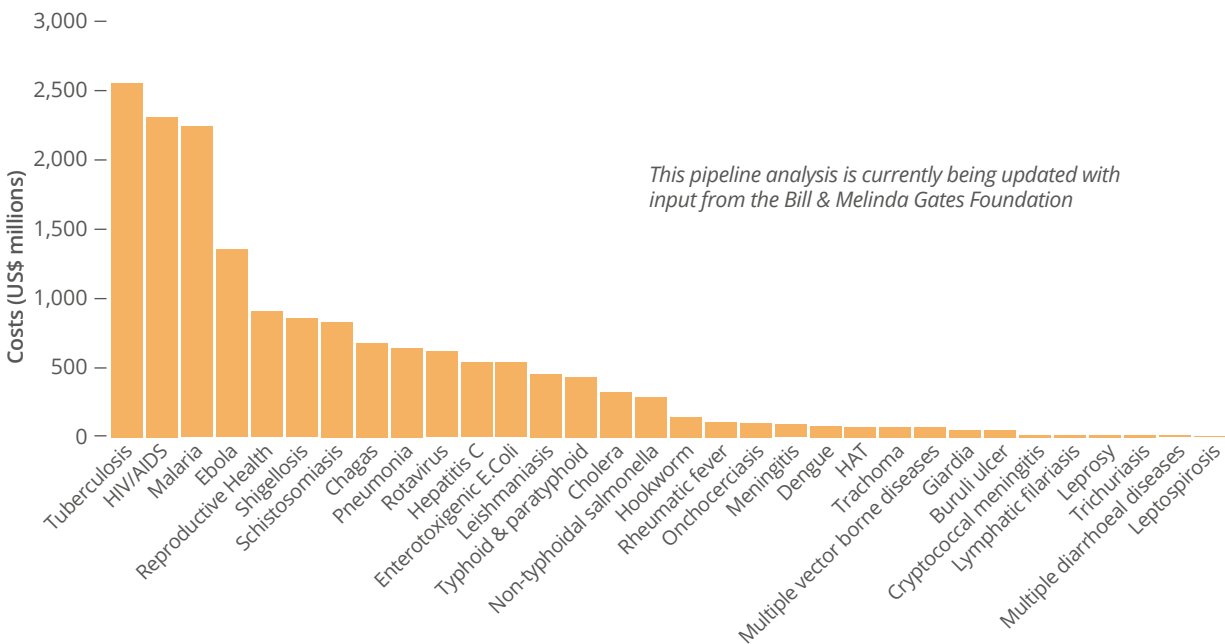
Filling information gaps to mobilize resources for neglected diseases

TDR developed the **Portfolio-to-Impact** tool for health product portfolio analysis to highlight the need to increase product development activity for neglected diseases. The tool was used by Duke University and Policy Cures Research to develop the first complete analysis of the HIV, TB, malaria and NTD pipeline using data from 2017: ‘Developing new health technologies for neglected diseases: a pipeline portfolio review and cost model.’

Funding for neglected disease product development fell from 2009-2015, other than a brief injection of Ebola funding. One impediment to mobilizing resources is a lack of information on product candidates, the estimated costs to move them through the pipeline, and the likelihood of specific launches. This study aimed to help fill these information gaps.

The study found that over the next 5 years, total estimated costs to move current candidates through the pipeline and develop 18 key missing products would be around US\$4.5 billion per year (for low complexity products) or US\$5.8 billion per year (for high complexity products).

Fig. 9: Costs to move candidate products through pipeline, by disease



Supporting translation of evidence to policy

Malawi Knowledge Translation Platform's policy briefs lead to new guidelines integrating hypertension screening in HIV clinics.

Forty-five-year-old Leonard Banda was feeling shortness of breath and suffering from ongoing headaches, but he thought these were side effects of the HIV treatment he was taking. "I did not know that those were signs of high blood pressure until I was screened. I could have died," he recounts.



Leonard Banda
Photo: Dignitas International/Theresa Chapulapula

Banda is one of many who have been helped by a new national policy put into place in Malawi that calls for all HIV patients to be screened for hypertension. The Malawi Knowledge Translation Platform (KTPMalawi), supported by TDR, provided global and local evidence in support of this new policy.

TDR, the Malawi Ministry of Health and Dignitas International provided equal amounts of funding and technical support to establish the Malawi Knowledge Translation Platform (KTPMalawi). National policy-makers and researchers were brought together with community members and other stakeholders to find, assess, analyse and synthesize global and local evidence through a process developed by WHO's Evidence-informed Policy Network (EVIPNet).

The process identified HIV and hypertension as two major, related problems to address. Almost one-third of adults in Malawi between the ages of 25 and 64 have hypertension, and 95% don't take their medication or are simply unaware that they have this health problem. The burden of hypertension among people living with HIV appears to be at least as high as the general population and is a common reason for admission to a medical facility.

Dr Damson Kathyola, who leads the department of research within the Ministry of Health dedicated to policy issues, was asked, "What is the scientific evidence on how best to provide integrated delivery of services for these patients?" Dr Kathyola, his small team and in-country researchers collaborated with healthcare providers to explore policy options.

“If our Minister of Health is going to present something, we must use evidence that is well synthesized.”

– Dr Damson Kathyola, who leads the department of research within the Ministry of Health dedicated to policy issues

Global and local evidence was assessed and discussed among Community of Practice members, leading to a full evidence brief that described the health system problem, global and local evidence for and against policy options to address the problem, and strategies to implement the options. The evidence brief was used to convene a national policy dialogue with representatives from across government, academia and civil society.

This led to the Ministry of Health adopting new HIV guidelines that, for the first time, require hypertension screening at 740 HIV clinics. This outcome is clear motivation to continue efforts to translate evidence to policy. "We're ready to be a clearing house of research evidence for the country," says Dr Kathyola.

TDR Global: Leveraging a global network to catalyse collaboration and capacity building

TDR Global is a community of passionate scientists and experts who have been working with TDR to support global research efforts on infectious diseases of poverty. TDR Global members are TDR grantees, experts and researchers, TDR staff, TDR co-sponsors and supporters. The aim of TDR Global is to catalyze local collaborative actions for research on infectious diseases of poverty by creating an environment of interaction, networking and sharing.

Mapping TDR Global Members

A new TDR policy was adopted in 2017 to ensure that grantees complete their profile before they can receive payment of new grants. Completed and current profiles facilitate community engagement and mobilization activities. Out of the 7,245 members registered in the database, 2,813 (66% men, 31% women and 3% unknown) have contact details with active emails.

Showcasing TDR Champions

The profiling of TDR Champions has become a regular part of TDR eNews publications. To date, the 46 unique and in-depth profile stories have been developed, demonstrating the impact TDR has had on the lives of its grantees. The profile stories also promote the work of the spotlighted individual, which further encourages collaborative and/or mentorship relationships.



Professor Lenore Manderson

A medical anthropology career serving those most in need

Dr Razia Fatima, Pakistan

A champion for operational research to End TB in Pakistan

Dr Modest Mulenga, Zambia

A life of malaria research in Zambia and beyond

Dr Clara Agutu, Kenya

Increasing access to needed treatments in Kenya

More TDR Global profiles are available at: <https://www.who.int/tdr/capacity/alumni/en/>



Leveraging the TDR Global community to crowdsource ideas to boost gender equality in health research

In May 2018, TDR launched an open call to identify obstacles and solicit suggestions for enhancing women's participation in the TDR Career Research and Development Fellowship (CRDF scheme). The percentage of women awarded fellowships has been only 22% for the three calls for applications during the last four years. TDR has identified that this imbalance does not take place during the selection process, but rather earlier in the application stage when too few women apply.

Following the web-based call for proposals, which was also shared with the TDR Global community, a total of 311 entries were received from 65 countries. The country submitting the most entries was Nigeria, followed by Uganda, Egypt, Kenya, India, China, Cameroon, Bangladesh, Brazil and Nepal. A panel of experts reviewed and judged the submissions according to pre-determined criteria. Six selected finalists were supported to present their ideas at the Women Leaders in Global Health Conference in London in November 2018.

This crowdsourcing contest, a joint initiative by TDR's Research Capacity Strengthening and Research for Implementation teams, served to test the *Crowdsourcing in health and health research: A practical guide*, developed by Social Entrepreneurship to Spur Health (SESH) in collaboration with SIHI.

Helen Anyasi, a medical doctor in Nigeria and mother of two, highlighted that when considering whether or not to pursue a master's degree three years ago, she found it difficult to make her choice. "The decision to undertake any career opportunity is always measured by how it will affect my family," Anyasi said. "This poses a huge barrier among women who want to undertake these kinds of opportunities. Family responsibilities are still mainly considered the woman's domain, even in progressive societies."

Grace Gabagaya, a medical doctor in Uganda, suggested supporting women by developing a mentoring programme as well as sharing profiles of women scientists that show how they balance careers with personal life. Other proposals included installing a nomination process that would encourage qualified women to apply, as well as providing support for childcare and education during the fellowship period.

All submitted suggestions were reviewed by TDR, and several were incorporated into the **2019 CRDF call for applications**, including the nomination process, featuring profiles of women who have gone through the programme, as well as enlisting previous fellows as 'ambassadors' who made themselves available to answer questions from potential applicants. As a result, the number of female applicants increased in absolute numbers from 11 in 2016-2017 to 48 in 2018.

For more information on TDR Global, please visit: <https://www.who.int/tdr/partnerships/tdr-global/en/>



Dr Dionicia Gamboa, a TDR-supported principal investigator at Universidad Peruana Cayetano Heredia



Governance, financials and performance

Contents

- Governance and management
- Financial performance summary
- Performance overview
- Contributions table

Governance and management

TDR is co-sponsored by UNICEF, UNDP, the World Bank and WHO, and it is through these international, multilateral organizations that TDR has such an extensive reach and support. WHO acts as the executing agency of the Programme and provides close ties with its departments for a continuous loop of research informing policy and policy informing research, which in turn supports planning and priority setting at international, regional and national levels.

TDR's overall management responsibility is ensured by the TDR Special Programme Coordinator, Dr Soumya Swaminathan, who heads WHO's Science Division as Chief Scientist. Day-to-day management is provided by the TDR Director. Thirty full-time staff and additional project-specific short-term staff come from all regions of the world.

TDR's top governing body is its Joint Coordinating Board (JCB), which includes a mix of representatives from developed and developing countries (see figure 10). A Standing Committee composed of representatives from the four co-sponsoring agencies, the Chair and the Vice-Chair of the JCB, the Chair of the Scientific and Technical Advisory Committee (STAC), one representative from the JCB resource contributors group (a JCB member under paragraph 2.2.1 of the TDR Memorandum of Understanding-MOU), and one representative from a disease endemic country (which may be a

JCB member under any paragraph of the TDR MOU), provides guidance and oversight on an ongoing basis.

Programmatic and technical review comes from STAC, which includes up to 15 internationally recognized scientists.

Members serve in their personal capacities to represent a range of research disciplines.

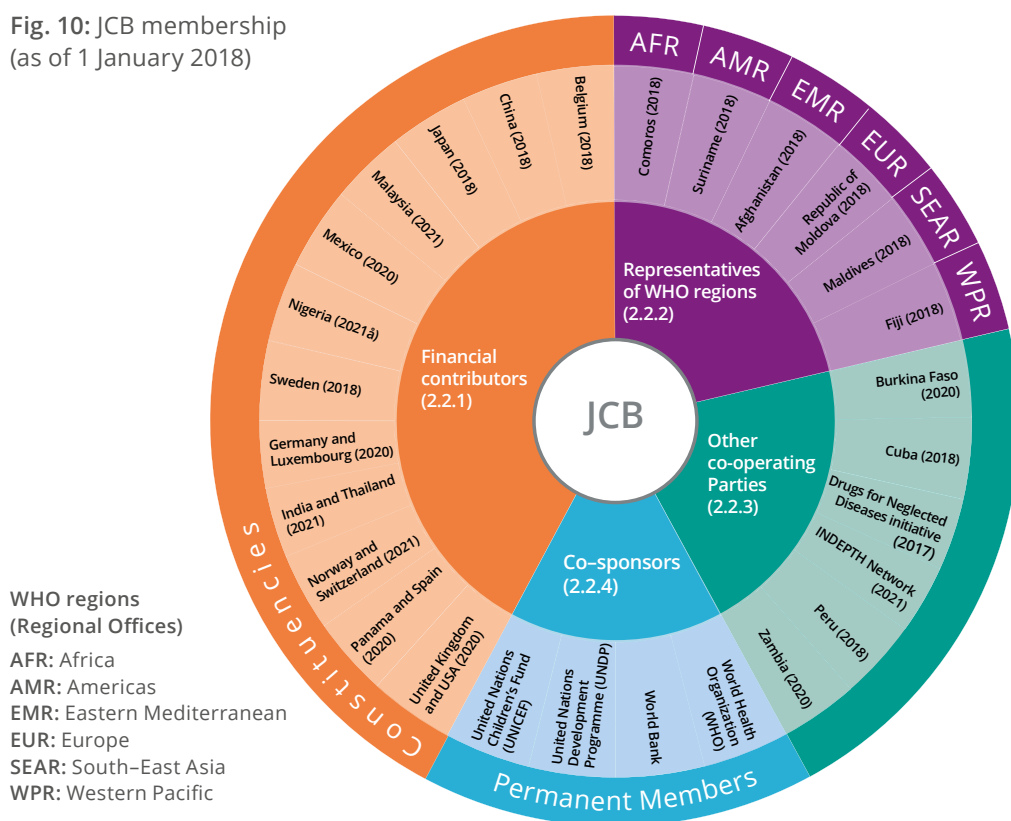
Joint Coordinating Board

The Board comprises 28 members: 12 members selected by the resource contributors to the Programme (including five constituencies of two or more governments sharing one seat); six government representatives chosen by the six regional committees of WHO; six members representing other cooperating parties selected by the JCB itself; and the four co-sponsoring agencies.



TDR Director John Reeder and STAC Chair Charles Mgone, center, with 2018 STAC members

Fig. 10: JCB membership (as of 1 January 2018)



| Membership of the Scientific and Technical Advisory Committee (STAC) | | |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| (Chair) Professor Charles MGONE | Vice-Chancellor, Hubert Kairuki Memorial University, Dar es Salaam, Tanzania | 2014-2019 |
| Dr Ayat ABUAGLA | Trinity Centre for Global Health, Trinity College Dublin, The University of Dublin, Dublin, Ireland | 2017-2018 |
| Professor Maria Teresa BEJARANO | Gender, Reproductive Rights & Sustainable Development Advisor, Gender, Human Rights and Culture Branch, Technical Division, United Nations Population Fund (UNFPA), New York, USA | 2016-2019 |
| Professor Afif BEN SALAH | Full Professor of Community Medicine, College of Medicine and Medical Sciences, Department of Community and Family Medicine, Arabian Gulf University, Manama, Kingdom of Bahrain | 2018-2019 |
| Dr Graeme BILBE | Research and Development Director, Drugs for Neglected Diseases initiative (DNDi), Geneva, Switzerland | 2014-2019 |
| Professor Moses BOCKARIE | Director of South-South Cooperation and Head of Africa Office, European & Developing Countries Clinical Trials Partnership (EDCTP), Medical Research Council, Tygerberg, Cape Town, South Africa | 2014-2018 |
| Professor Claudia CHAMAS | Researcher, Centre for Technological Development in Health, Oswaldo Cruz Foundation (Fiocruz), Rio de Janeiro, Brazil | 2016-2019 |
| Professor Sónia DIAS | Associate Professor, International Public Health, Institute of Hygiene and Tropical Medicine, Lisbon, Portugal | 2016-2019 |
| Dr Sara Irène EYANGO | Directeur Scientifique, Centre Pasteur du Cameroun, Laboratoire National de Référence et de Santé Publique, Ministère de la Santé Publique, Yaoundé, Cameroon | 2016-2019 |
| Professor Simon HALES | Research Associate Professor: Environmental Epidemiology, University of Otago, Otago, New Zealand | 2018-2019 |
| Dr Subhash HIRA | Professor of Public Health and Senior Advisor, Public Health Foundation of India, New Delhi, India | 2017-2018 |
| Dr Shagufta PERVEEN | Senior Instructor, Health System and Policy Research Group, Department of Community Health Sciences, The Aga Khan University, Karachi, Pakistan | 2018-2019 |
| Dr Sonia ROMERO GORSKI | Facultad de Humanidades y Ciencias de la Educación, Instituto de Antropología, Montevideo, Uruguay | 2018-2019 |
| Professor Bertie SQUIRE | Professor of Clinical Tropical Medicine, Liverpool School of Tropical Medicine (LSTM) □ Consultant Physician, Tropical & Infectious Disease Unit, Royal Liverpool University Hospital, Centre for Applied Health Research and Delivery, Liverpool, United Kingdom | 2017-2018 |
| Professor Xiao-Nong ZHOU | Director, National Institute of Parasitic Diseases, Chinese Center for Disease Control and Prevention, Shanghai, People's Republic of China | 2014-2019 |

Financial performance summary

Initiating the implementation of the TDR Strategy 2018-2023 and moving towards the US\$ 50 million budget scenario.

Implementation of the TDR Strategy 2018-2023 was initiated in January 2018 and early results have been shared in the TDR Financial Report and TDR Results Report 2018.

In June 2017, the TDR JCB approved two Programme budget and workplan scenarios for the biennium 2018-2019, a lower scenario at US\$ 40 million and a higher one at US\$ 50 million. The two-scenario model was developed to help manage the uncertainty of funding and allow a conservative but confident start to implementation.

Implementation of the lower (US\$ 40 million) budget scenario began in January 2018 with 41% implementation achieved by the end of the year.

Revenue received for 2018 was US\$ 22.1 million. Funds available for the biennium are currently forecast at US\$ 46.5 million. TDR moved towards implementation of the US\$ 50 million scenario in January 2019.

TDR continues to strengthen fundraising efforts among both new and existing donors, focusing on the priorities of the 2018-23 strategy towards SDGs.

Fig. 1: Implementation of US\$ 40 million budget in 2018

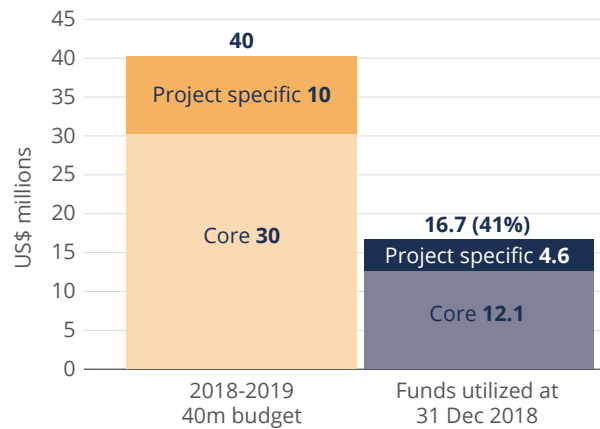


Fig. 2: Core revenue in 2018

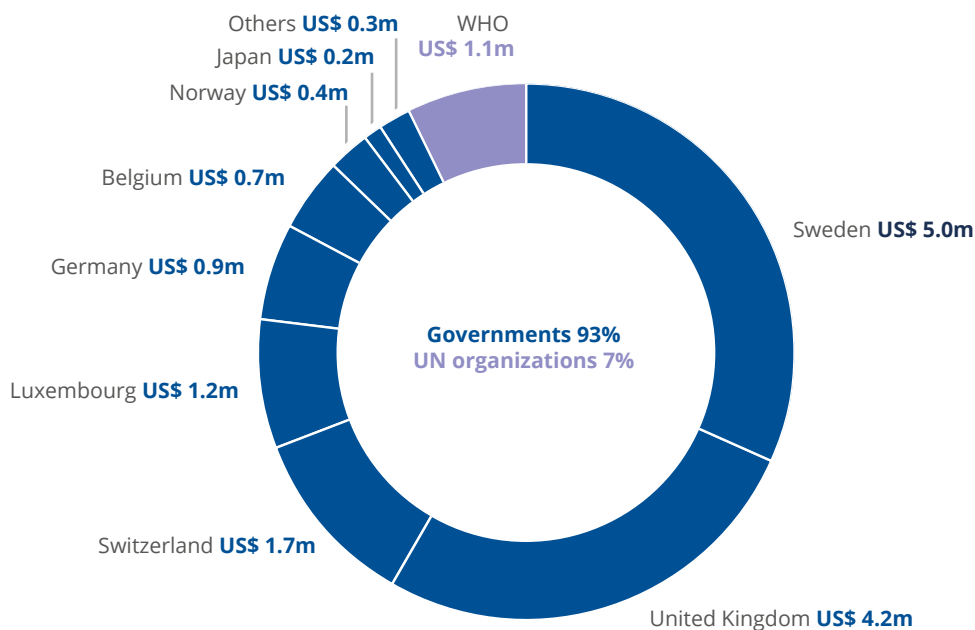


Fig. 3: Project specific revenue in 2018

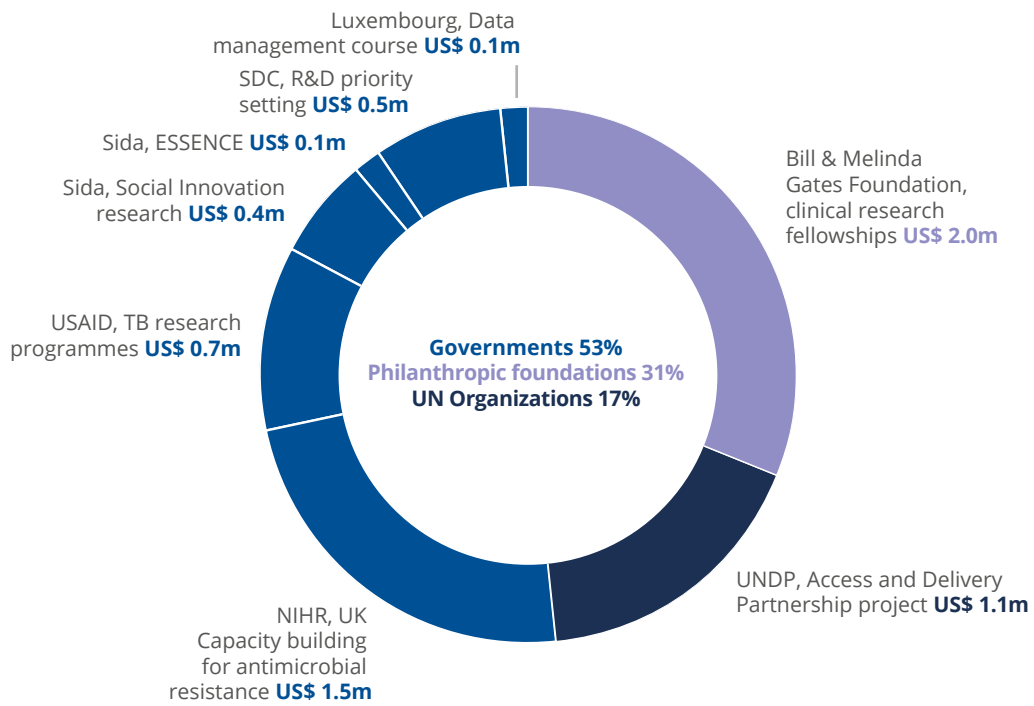
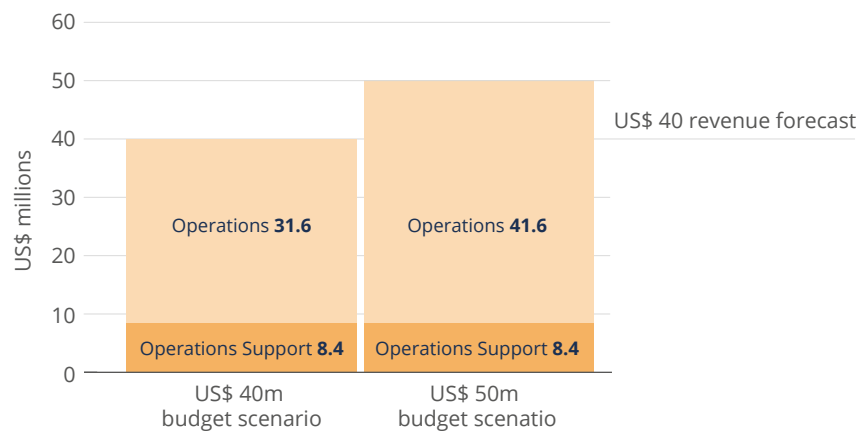


Fig. 4: 2020-21 budget scenarios and revenue forecast



Performance overview

TDR uses its Performance Framework to measure progress in the implementation of its vision and strategic plan and guide continuous performance improvement.

Key performance indicators (see following table) have been developed in consultation with TDR stakeholders. These help assess not only what TDR does (TDR achievements and its contribution to changes in countries) but also how it does it (application of core values and management performance). Measurements are compiled in the annual TDR Results Reports: www.who.int/tdr/publications/about-tdr.

The year 2018 is the first of the current TDR Strategy (2018-2023), and already important contributions were made in technical achievements, which are likely to result in advancements in disease control and

elimination, improved access to health care, and better outbreak detection and response globally, in support of WHO's triple billion goals and the SDG targets.

The 2018 performance measurements confirmed that TDR's sustained efforts towards gender and socio-economic equity succeeded, as four record high numbers were reached: the proportion of women among recipients of grants and contracts increased to 47%; 44% of first authors of TDR-supported publications were women; 57% of expert advisers were women; and 83% of grants and contracts went to institutions and individuals from low- and middle-income countries.

Technical expected results



| Expected results | Key performance indicators | Baseline (2017) | Target (2023) | Progress (2018 contribution) | Frequency of measurement |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Technical expected results | | | | | |
| Impact: Countries generating and using the research evidence they need to leave no-one behind when acting to reduce the burden of infectious diseases of poverty. <i>SDG3-Good health and wellbeing</i> <i>SDG4-Quality education</i> <i>SDG5-Gender equality</i> <i>SDG6-Clean water and sanitation</i> <i>SDG9-Industry, innovation and infrastructure</i> <i>SDG10-Reduce inequalities</i> <i>SDG11-Sustainable cities and communities</i> <i>SDG13-Climate action</i> <i>SDG17-Partnerships for the goals</i> | i. SDG3-Goal 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases. | | | Evaluation demonstrating the link between outcomes and the progress made towards achieving the relevant SDG goals | |
| | ii. SDG 3-Goal 3.8: Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all. | | | | |
| | iii. SDG3-Goal 3.b: Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines (...) | | | | |
| | iv. SDG3-Goal 3.d: Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks. | | | | |
| | v. SDG13-Goal 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries | | | | |
| | vi. SDG9-Goal 9.5: Enhance scientific research, (...) encouraging innovation and substantially increasing the number of research and development workers per 1 million people (...) | | | | |
| | Outcome: Infectious disease knowledge, solutions and implementation strategies translated into policy and practice in disease endemic countries (DECs) ¹ | 1. Number and evidence when innovative knowledge or new/improved solutions/tools developed with TDR support are applied in disease endemic countries | 0 | | 100 |
| 2. Number and evidence when tools and reports are used to inform policy and/or practice of global/regional stakeholders or major funding agencies | | 0 | 20 | 3 (+3) | Measured annually, cumulative over 6 years |
| 3. Evidence demonstrating the benefits of research on gender, on equity or on vulnerable groups, including people with disabilities, used to inform policy and/or practice | | N/A | N/A | Evidence provided | Measured annually |
| Research outputs: High quality intervention and implementation research evidence produced in response to global and country needs | 4. Number and evidence of innovative knowledge, new/improved solutions or implementation strategies developed in response to requests from WHO control programmes and/or diseases endemic countries and engaging disease endemic country stakeholders | 0 | 25 | 15 (+15) 100% | Measured annually, cumulative over 6 years |
| | 5. Number of research data sets/platforms that are i) open access or ii) with an access permission level | 1 | 10 | 1 (0) | Measured annually, cumulative over 6 years |
| Capacity strengthening outputs: Enhanced research and knowledge transfer capacity within disease endemic countries | 6. Number and evidence of DEC institutions and networks demonstrating expanded scope of activities or increased funding from alternative sources, or that have influenced research agenda, policy and practice, as a result of or related to TDR support ² | 0 | 5 | 4 (+4) | Measured annually, cumulative over 6 years |
| | 7. Number of TDR grantees/trainees per year, and proportion demonstrating career progression and/or increased scientific productivity, disaggregated by gender | 79 (2017) 85% (2014) | 150 ≥80% | 287 (+287) | Measured on cohorts 3-5 years after training ended |

¹ DEC: low- and middle-income countries where neglected diseases are prevalent/endemic
² TDR support may include financial, in-kind, facilitation and/or expert types of support

| Expected results | Key performance indicators | Baseline (2017) | Target (2023) | Progress (2018 contribution) | Frequency of measurement |
|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------|-----------------------------------------------------------------|--------------------------------------------|
| Technical expected results (continued) | | | | | |
| Global engagement outputs: Key stakeholders engaged in harmonizing agenda and practices and in new initiatives | 8. Number and evidence of research-related agendas, recommendations and practices agreed by stakeholders at global, regional or country level and facilitated by TDR | 0 | 6 | 3 (+3) | Measured annually, cumulative over 6 years |
| | 9. Evidence of stakeholder engagement in TDR joint initiatives aligned with TDR strategic objectives | N/A | N/A | Evidence provided | Measured annually |
| Application of core values | | | | | |
| Equity: Social and economic equity: | 10. Proportion of TDR grants/contracts awarded to institutions or individuals in DEC's (total count and total amount) | 62% (count) 74% (amount) | 75% DEC | 58% DEC (count) 83% DEC (amount) | Measured annually |
| | 11. Proportion of experts from DEC's on TDR external advisory committees | 78% | >60% | 68% | Measured annually |
| | 12. Proportion of peer-reviewed publications supported by TDR with authors from DEC institutions (first author, last author) | FA: 73% LA: 56% | ≥67% | FA: 73% LA: 60% | Measured annually |
| | 13. Number of peer-reviewed publications supported by TDR and percentage published in open/free access | 200 88% | ≥150/year 100% | 222 81% | Measured annually |
| Gender equity: | 14. Proportion of women among grantees/contract recipients (total count and total amount) | 40% (count) 29% (amount) | 50% | 47% (count) 45% (amount) | Measured annually |
| | 15. Proportion of women on TDR external advisory committees | 50% | 50% | 57% | Measured annually |
| | 16. Proportion of women authors of peer-reviewed publications supported by TDR (first author, last author) | FA: 38% LA: 24% | 50% | FA: 44% LA: 28% | Measured annually |
| | 17. Number and proportion of peer-reviewed publications explicitly considering: gender and women issues, vulnerable groups or people with disabilities | N/A | 80% | Total: 57% Gender: 5% Vulnerable: 43% Disabilities: 9% | Measured annually |
| Effective multisectoral partnerships | 18. Resources leveraged as direct contributions (co-funding, services or in-kind) to TDR projects (examples) | \$ 1:1 (\$ TDR : \$ partners) People 1:30 (TDR : in the field) | < \$ 2:1 | To be measured end of biennium | Measured at the end of biennium |
| Value-for-money | 19. Evidence demonstrating value-for-money, cost savings and/or enhanced efficiency or effectiveness | N/A | N/A | To be measured end of biennium | Measured at the end of biennium |
| Quality of work | 20. Proportion of project reports evaluated as satisfactory by external advisory committees | 100% | ≥80% | 100% | Measured annually |
| Sustainability of outcomes | 21. Number of effective public health tools and strategies developed which have been in use for at least two years | 0 | 40 | To be measured end of biennium | Measured at the end of biennium |

Management performance

| | | | | | |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------|-------|--------------------------------|---------------------------------|
| Effective resource mobilization | 22. Percentage of approved biennial budget successfully funded | 87.9% (US\$ 39.5/45M) | ≥100% | To be measured end of biennium | Measured at the end of biennium |
| | 23. Percentage of income received from multi-year, unconditional donor agreements | 17.3% (US\$ 6.8M/39.5M) | 70% | To be measured end of biennium | Measured at the end of biennium |
| Effective management | 24. Percentage of staff workplans and performance reviews (including personal development plans) completed on time | 89% | ≥90% | 100% | Measured annually |
| | 25. Proportion of expected results on track | 89% | ≥90% | 100% | Measured annually |
| | 26. Proportion of significant risk management action plans that are on track | 100% | ≥80% | 100% | Measured annually |

Contributions table

TDR 2018 revenue

| Contributor | |
|-----------------------------------------------------------|----------------------|
| Core contributors | Amount (US\$) |
| Sweden ³ | 5 037 631 |
| United Kingdom of Great Britain and Northern Ireland (UK) | 4 246 657 |
| Switzerland | 1 654 965 |
| Luxembourg | 1 157 407 |
| World Health Organization | 1 100 000 |
| Germany | 875 798 |
| Belgium | 707 547 |
| Norway | 357 270 |
| Japan | 200 000 |
| Thailand | 93 291 |
| China | 55 000 |
| India | 55 000 |
| Malaysia | 25 000 |
| Mexico | 20 000 |
| Panama | 7 000 |
| Turkey | 5 000 |
| Miscellaneous | 1 009 |
| Subtotal | 15 598 577 |
| Contributors providing specific project funding | Amount (US\$) |
| Bill & Melinda Gates Foundation | 1 968 153 |
| National Institute of Health Research (NIHR), UK | 1 494 204 |
| United Nations Development Programme (UNDP) | 1 061 400 |
| U.S. Agency for International Development (USAID) | 697 175 |
| Sweden | 546 249 |
| Swiss Development Cooperation Agency (SDC/DDC) | 508 048 |
| Luxembourg | 115 741 |
| Other | 65 830 |
| Subtotal | 6 456 799 |
| Total contributions | 22 055 376 |

³ The contribution from the Government of Sweden reflects the 2018 portion of their 2018-2019 funding agreement.





TDR  **For research on
diseases of poverty**
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The Special Programme for Research and Training in Tropical Diseases (TDR) is an independent global programme of scientific collaboration established in 1975. It has a twin mission to improve existing and develop new approaches for preventing, diagnosing, treating, and controlling neglected infectious diseases, and to strengthen the capacity of developing endemic countries to undertake this research and implement the new and improved approaches. TDR is sponsored by the following organizations:

