TDR Results 2018 Report

Measuring for improvement

World Health Organization

TDR For research on diseases of poverty
UNICEF • UNDP • World Bank • WHO

TDR/STRA/18.3

TDR Results

2018 Report

1. Summary

TDR works with partners in disease endemic countries to generate essential knowledge and evidence for the prevention and control of infectious diseases of poverty, and to facilitate translation of evidence to policy and improved health care in countries. TDR's approach leads to strengthening health systems and research systems in these countries, ultimately reducing the burden of infectious diseases of poverty.

The year 2018 kicked off the current TDR strategy (2018-2023), and significant achievements were made in research for implementation, research capacity strengthening 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 Strategic Development Goal (SDG) targets.

For example, the United States 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. And an improved Early Warning and Response System (EWARS) tool has increased country capacity to detect and respond to outbreaks of dengue fever, potentially expanding to Zika, Chikungunya and other vector-borne diseases.

In 2018, TDR developed 15 new or improved solutions, tools and implementation strategies in collaboration with country institutions and/or 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.

To strengthen research capacity, in collaboration with the seven universities in our postgraduate training scheme, TDR funded 50 new master's students in the field of implementation research in 2018. Through WHO's regional offices, we funded 58 new small grants, further consolidating the critical mass of country-based researchers who can identify and solve priority issues in their countries and regions. We also expanded training of researchers in the regions through TDR's regional training centres, which trained almost 1000 researchers in short courses, and we expanded the training reach through our Massive Open Online Course on Implementation Research to approximately 1600 researchers.

As part of our approach to engaging with the global health community, we helped establish the Central African Regional Network for TB control (CARN-TB), bringing together 11 countries that are actively collaborating to improve prioritization and management of tuberculosis. We also created a community of practice on the topic of the impact of climate change on health and expanded jointly managed databases on drug safety in pregnancy and on drug-resistant tuberculosis. In addition, we expanded the role of social innovation hubs in countries in support of improved access to health care delivery.

The 2018 performance measurements also confirmed that TDR's sustained efforts towards improving gender and socio-economic equity are yielding results: 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.

The external audit of 2018 confirmed the soundness of TDR's internal controls and the appropriateness of our management processes and decisions.

2. Expected results and overview of progress on key performance indicators

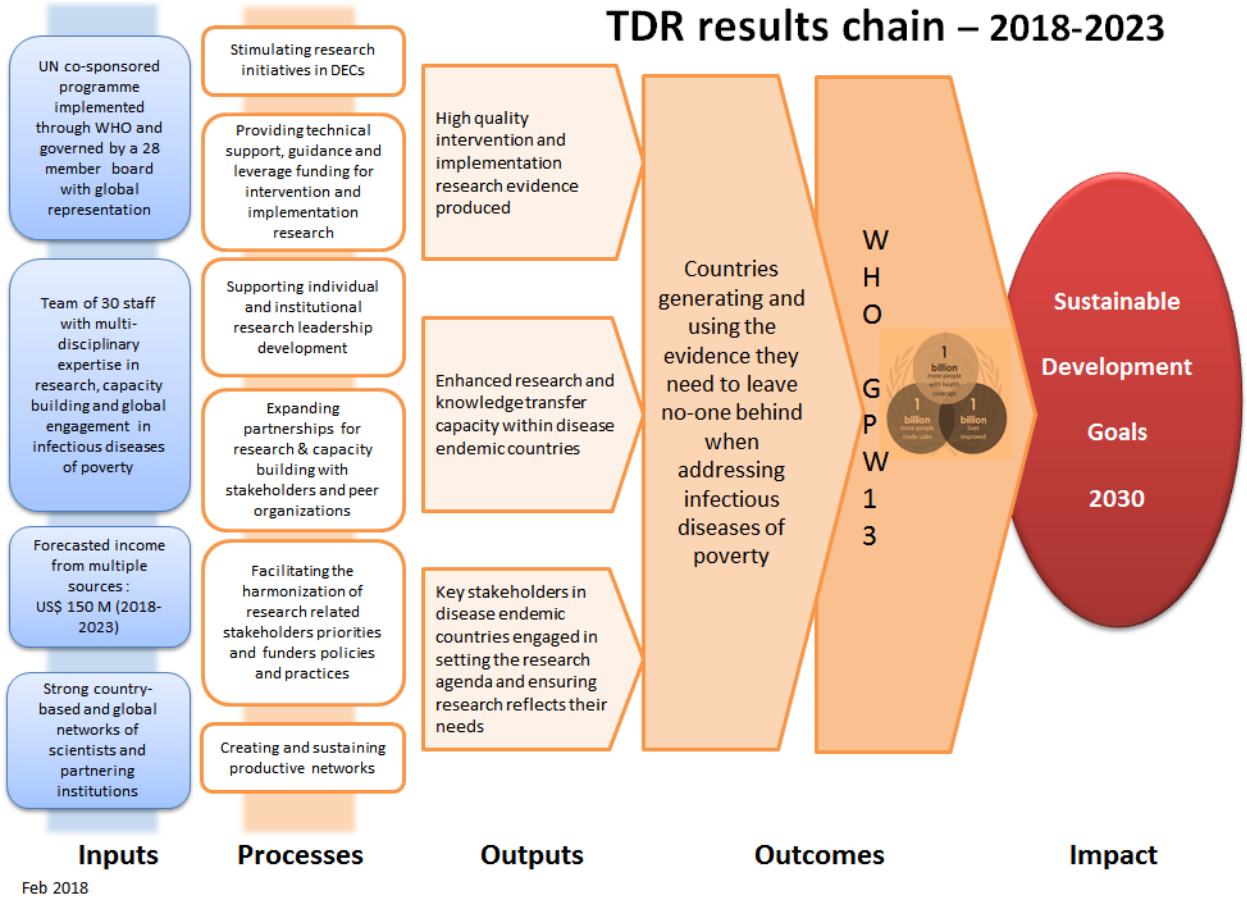
The 2018 Results Report measures a set of performance indicators against targets, in line with TDR's 2018-2023 Strategy and an updated Performance Framework, for planning, monitoring and evaluation. The report shows progress made on various performance indicators related to three overarching categories: technical expected results, application of organizational core values and managerial performance. Ultimately, TDR's outputs and outcomes contribute to health impact, measured through the achievement of Strategic Development Goal targets and the World Health Organization's (WHO) Thirteenth General Programme of Work (GPW13) triple billion targets.

Given the adoption of the Sustainable Development Goals by the global community in 2016, TDR developed its 2018-2023 strategy to showcase the Programme's unique contribution, through research, capacity strengthening and global engagement, to improved health, quality education, enhanced partnerships and other relevant SDG targets guiding international development work over the next 15 years. The updated TDR Performance Framework (2018-2023) (including a revised set of indicators), aligning with TDR's 2018-2023 strategy, WHO's Thirteenth General Programme of Work 2019-2023 strategic objectives and with the SDG targets, has been in place since 2018.

As shown in the diagram below, TDR aims for a global impact to reduce the burden of infectious diseases of poverty. TDR's contribution is made possible by the overall outcome of the Programme, which is the translation of new knowledge, solutions and tools into policy and practice in disease endemic countries. These in turn are the result of three feeder outputs that support and complement each other, with the sustainability of research outputs being enhanced by the engagement of stakeholders and by the capacity built in countries.

Aligned with TDR's Strategy, the Performance Framework further demonstrates TDR's focus on health impact and value for money throughout the whole results chain, from using resources economically to building efficient processes, to quality of outputs and to partnering to enhance the sustainability of outcomes.

Figure 1 - TDR results chain



TDR's work is contributing to the research accelerator of the Global action plan for healthy lives and well-being for all[1] that aims to speed up progress towards the targets of SDG3 through a three-pronged approach: align, accelerate and account.

An overview of the progress made on each of TDR's key performance indicators is presented in the monitoring and evaluation matrix (see Table 1), with further details being provided in the body of this report.

[1] See https://www.who.int/sdg/global-action-plan

Table 1- TDR's key performance indicators matrix 2018-2023

Expected results	Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*	Frequency of measurement
Technical expected results					
<u>Impact:</u> **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.** *SDG3-Good health and wellbeing* *SDG4-Quality education* *SDG5-Gender equality* *SDG6-Clean water and sanitation* *SDG9-Industry, innovation and infrastructure* *SDG10-Reduce inequalities* *SDG11-Sustainable cities and communities* *SDG13-Climate action* *SDG17-Partnerships for the goals*	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 (…)				

Expected results	Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*	Frequency of measurement
Outcome: **Infectious disease knowledge, solutions and implementation strategies translated into policy and practice in disease endemic countries**[2]	1. Number and evidence when innovative knowledge or new/improved solutions/tools developed with TDR support are applied in disease endemic countries	0	100	21 *(+21)*	Measured annually, cumulative over 6 years
	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[3]	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

[2] DEC: low- and middle-income countries where neglected diseases are prevalent / endemic

[3] TDR support may include financial, in-kind, facilitation and/or expert types of support

Expected results	Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*	Frequency of measurement
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 DECs (total count and total amount)	74% (amount) 62% (count)	75% DEC	83% DEC (amount) 58% DEC (count)	Measured annually
	11. Proportion of experts from DECs 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
Gender equity:	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
	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

Expected results	Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*	Frequency of measurement
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 plan) completed on time	89%	≥90%	100%	Measured annually
	25. Proportion of expected results on track	89%	≥80%	100%	Measured annually
	26. Proportion of significant risk management action plans that are on track	100%	≥80%	100%	Measured annually

3. Achieving TDR's scientific and technical objectives

The indicators covering TDR's achievement of expected results measure the outcome level as well as the outputs generated which, once translated into policy and practice, will have an impact on the burden of disease in countries, thus directly contributing to the Sustainable Development Goal targets and to WHO's GPW13 triple billion objectives. Achievements are reported in the technical teams' annual reports and measured against biennial targets approved by the Joint Coordinating Board in the year preceding each WHO biennium (e.g. approved in 2017 for the biennium 2018-2019).

3.1 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

TDR's Strategy 2018-2023 shows how activities and results are expected to contribute to the SDGs, particularly to SDG3, but also to others. The outcomes we plan to achieve are aligned with the strategic plans of our co-sponsors: UNICEF, UNDP, the World Bank and WHO, all of which aim to advance sustainable development work, as illustrated in TDR's results chain. WHO's GPW13 prioritizes targets agreed at global level, with three areas taking centre stage: advancing universal health coverage, addressing health emergencies and promoting healthier populations. TDR's expected results contribute, either jointly or individually, to all these strategic objectives.

The SDG indicators, together with baseline measures and targets, are being measured by WHO and other UN family agencies. Contributions that TDR outcomes are making towards achievement of SDG and GPW13 targets are being assessed through external review of the Programme (every 5 or 6 years), and through evaluation of the strategic work areas of TDR, or of specific long-term projects, as appropriate.

3.2 Outcome: Infectious disease knowledge, solutions and implementation strategies translated into policy and practice in disease endemic countries

TDR works with partners in disease endemic countries (DECs) to generate essential knowledge and evidence for the prevention and control of infectious diseases of poverty, and to facilitate translation of the solutions into policy and improved health care in countries. TDR's approach leads to strengthening health systems operations and research systems in these countries, ultimately reducing the burden of infectious diseases of poverty.

This is done through three key mechanisms – the generation of new evidence and knowledge products, strengthening capacity in disease endemic countries to conduct good quality research, and building close working relationships with key policy-makers and programme staff to ensure the country priorities are guiding research, and thus the translation of new knowledge into effective disease control efforts is facilitated.

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contribution 2018)*
1. Number and evidence when innovative knowledge or new/improved solutions/tools developed with TDR support are applied in disease endemic countries	0	100	21 *(+21)*
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)*
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

Indicator 1 - Number and evidence when innovative knowledge or new/improved solutions/tools developed with TDR support are applied in disease endemic countries

Several new tools, solutions and strategies generated with TDR support began being used by countries in 2018. There were 21 instances when countries applied or utilized this new knowledge. Below is a list including the respective countries. Other tools have not yet reached implementation stage; their use will be reported on in future reports.

- ✓ **Increased operational research (OR) capacity in LMICs orienting towards the SDGs, Universal Health Coverage (UHC) and gender equity:** The Structured Operational Research and Training Initiative (SORT IT) programme coordinated by TDR and implemented with partners was scaled up to 90 project countries, with former alumni leading 11 of the 12 courses in 2018. Following advice from the Scientific Working Group, franchising and reorientation have been ongoing. Franchising is being fostered through the development of: standardization tools, online resources (rosters, video lectures); databases and frameworks for ensuring quality and accountability; increased collaboration (with academic institutions, nongovernmental organizations-NGOs, WHO departments); and promoting country-level funding (Global Fund to Fight AIDS, Tuberculosis and Malaria in Pakistan, PEPFAR in Ukraine and ministries of health in Kenya and the People's Republic of China). In Colombia, Kenya and Pakistan, SORT IT alumni secured independent funds, including from the Global Fund. These may serve as examples for expansion to other countries. SORT IT is also progressively re-orienting towards the SDGs by embracing thematic areas (disease specific and health systems) such as key populations, neglected tropical diseases, migrants and refugees, water and sanitation, adolescent male circumcision, antimicrobial resistance and the effects of Ebola on health systems recovery. In 2018, an "e-SORT IT" and more complex study designs, including mixed methods and qualitative research, were completed. High outputs were maintained. By October 2018, 534 papers were submitted, 432 (81%) published[4] in 42 journals (impact factor 0.4-19), in five languages with 68% reporting an effect on policy and practice. In 2018, individuals from LMICs constituted 98% of first authors, 48% of publications had a woman as first author and 81% of last authors were from LMICs. (Colombia, Kenya, Pakistan, Ukraine)
- ✓ **Applying innovative information technologies to SORT IT:** Armenia has completed a pioneering SORT IT using educational technology (**e-SORT IT with online video lectures**), thereby cutting facilitator and participant travel costs by 75%. The same team is now developing a 100% certified distance-learning SORT IT course, supported by TDR. This will serve as a complementary option, for promising candidates who do not manage to get selected to highly competitive SORT IT courses.

[4] See full list here https://www.who.int/tdr/capacity/strengthening/sort/All-SORT-IT-publications-Jan2019.pdf

Two complex study designs (mixed methods and qualitative research) were completed. The 2018 SORT IT initiative in Kenya used data sourced from a mobile web-based platform with integrated mechanisms for data validation. This **use of digital technology allowed successful course completion in a reduced timeframe of five months** (less than half). The course was done in collaboration with the University of Nairobi and the Ministry of Health, with the alumni successfully completing a national SORT IT course and publishing 13 papers. This initiative was entirely run by Kenyan SORT IT alumni, highlighting national capacity. (Armenia, Kenya)

- ✓ **Uptake of implementation research courses sustainably in regions:** Implementation Research (IR) courses have been institutionalised across seven universities and all students received relevant training in IR. For example, in early 2018, the University of Gadjah Mada submitted IR modules for TropEd accreditation to facilitate broader international recognition and credit transfer (ECTS). An implementation research course has been accredited, with students starting to attend the course in October 2018.[5] Both the American University of Beirut, Lebanon, and the University of Antioquia, Colombia, have integrated the IR course in their master's programme. (Indonesia, Lebanon)

- ✓ **Recognition and leverage in strengthening country capacity for implementation research:** TDR-supported scheme at BRAC University, Bangladesh, has contributed to the development of the Centre of Excellence for Science of Implementation and Scale-Up (SISU), which was established in 2016 in collaboration with UNICEF and the James P. Grant School of Public Health, with the patronage of the Implementation Monitoring and Evaluation Division, Ministry of Planning, the People's Republic of Bangladesh. Similarly, there has been increased recognition of training offered by the Faculty of Public Health at the University of Zambia, which resulted in an upgrade from a faculty to a school for public health in 2018. (Bangladesh, Zambia)

- ✓ **A TDR-supported approach to enhance country research capacity to support the EndTB strategy has been adopted by countries:** The regional model launched in West Africa in 2015 through the West-African Regional Network for TB control (WARN-TB) has successfully mobilized contributions by a range of partners (such as WHO/GTB, the Global Fund, USAID, the West African Health Organisation, Action Damien) to enhance country research capacities in this region, which has translated to around US$ 2.6 million being leveraged in 2018 for regional activities. Some implementation research project results have already changed in-country policies. Results were also shared within the network and adopted by other national TB programmes (NTPs) in the region to be piloted in their country in 2019. Based on successful experience in West Africa, the Central Africa Regional Network for TB control (CARN-TB) was established. It will replicate and build on the WARN-TB model for a step-wise approach to strengthen TB control through country-led research.[6] (Burkina Faso, Ghana, Guinea, Senegal)

- ✓ **The Philippines have institutionalized social innovation in their health research system:** The four new Social Innovation in Health Initiative (SIHI) hubs supported by TDR have made some major steps towards institutionalizing social innovation in national health systems. Early achievement in the Philippines is very encouraging: the Philippines Health Research Council for Development and the Department of Health have launched the annual Castillo Award to identify, promote and study social innovation in the Philippines. [7] [8] (the Philippines)

- ✓ **Strengthened country capacity to conduct research during major epidemics utilized:** a training workshop in Kinshasa, Democratic Republic of the Congo (DRC), allowed strengthening the capacity of Institut National de Recherche Biomedicale (INRB) to conduct clinical research during a major epidemic in response to the ongoing Ebola Virus Disease (EVD) outbreak in Eastern DRC.

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5 Details can be accessed through this link: http://www.troped.org/courses/SPT--FullRecord.php?ResourceId=268

6 See https://www.who.int/tdr/news/2018/eliminating-barriers-tb-diagnosis/en/

7 See https://www.who.int/tdr/news/2018/philippines-impact-of-social-innovation-in-health/en/

8 Watch https://www.youtube.com/watch?v=JQpbgktYeEg

The workshop involved field staff who are currently implementing the MEURI protocols, to enhance their knowledge and understanding of best practice in the conduct of clinical research, e.g. Good Clinical Practice, ethics and consent, data management and adverse events reporting. This training laid the early foundations for clinical trials training capacities at INRB. (Democratic Republic of the Congo)

- ✓ **Knowledge translation platform in Malawi piloted:** TDR supported the development of a knowledge translation platform within the Ministry of Health in Malawi, with the support of Canadian NGO Dignitas International. Six policy briefs were created, which the government used to create a pilot scheme in three health districts to integrate screening for hypertension into HIV clinics. (Malawi)

- ✓ **A number of SORT IT research studies resulted in changes in policy and practice in countries.** TDR-coordinated SORT IT activities result in 50 to 60 publications each year. As part of an inbuilt metrics system, there is a systematic assessment 18 months later to determine whether or not these resulted in policy and practice changes. Each year, 55-70% of all studies have shown to have had an impact on policy and practice. Some examples of these are provided below.[9]

    - Alikhanova et al. did the first national survey of anti-tuberculosis drug resistance in Azerbaijan and demonstrated a clear need for third line anti-tuberculosis medicines. The results of the study contributed to a new policy decision by the Ministry of Health. Based on the results, the Ministry of Health took a **decision to procure TB medicines which were not used before in the country**, such as bedaquiline, linezolid, imipenem, cilastatin, etc. [10] (Azerbaijan)

    - A study by Atia et al. in Sudan generated evidence to influence **changes in the national management protocol for visceral leishmaniasis (VL) and monitoring of adverse events** of the first-line VL treatment regimen. The first-line for visceral leishmaniasis treatment (sodium stibogluconate/paromomycin) came under focus and the new national protocol addressed the study recommendations in terms of use of this regimen for relapse and in elderly patients. The VL programme added a pharmaco-vigilance component in the new VL patient card to monitor this regimen. Use of new drugs like miltefosine and amphotericin-B is now promoted.[11] (Sudan)

    - A country-wide evaluation of decentralized TB clinics in Armenia showed that some clinics performed very poorly in terms of TB case notifications and treatment success, which contributed to a major policy decision. The research evaluated TB outpatient services in decentralized facilities and confirmed that 12 outpatient services have no efficiency in terms of TB detection and treatment. As a result, these 12 **TB outpatient services were optimized and merged with the nearest TB outpatient services, improving the financial and service delivery capacity** of the joint TB outpatient services.[12] (Armenia)

    - Three papers from the India SORT IT course generated evidence to support the shift from two sputum samples to one during follow-up sputum microscopy among drug-susceptible TB patients. There has been a **national policy change to switch to one specimen from two specimens during follow-up sputum microscopy**. (India)

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9 See https://www.tandfonline.com/doi/full/10.1080/16549716.2018.1500762

10 See Alikhanova N, Akhundova I, Seyfaddinova M, et al., First national survey of anti-tuberculosis drug resistance in Azerbaijan and risk factors analysis. Public Health Action. 2014;4:S17–23

11 See Atia AM, Mumina A, Tayler-Smith K, et al. Sodium stibogluconate and paromomycin for treating visceral leishmaniasis under routine conditions in eastern Sudan. Trop Med Int Health. 2015; 20:1674–1684

12 See Davtyan K, Zachariah R, Davtyan H, et al., Performance of decentralised facilities in tuberculosis case notification and treatment success in Armenia. Public Health Action. 2014;4:S13–6.

Indicator 2 - Number and evidence when tools and reports are used to inform policy and/or practice of global/regional stakeholders or major funding agencies

- ✓ **Moxidectin for the treatment of onchocerciasis:** TDR was instrumental in the evaluation of moxidectin for river blindness over nearly two decades of research and collaboration with academic groups, industry, investigators and public health professionals in disease endemic countries. In June 2018, the United States Food and Drug Administration (U.S. FDA) approved moxidectin for treatment of onchocerciasis in patients 12 years and older. The pivotal efficacy and safety data had been acquired during TDR-managed studies between 2006 and 2012 in the Democratic Republic of Congo, Ghana and Liberia. The new drug application to the U.S. FDA was prepared and submitted by the not-for-profit organization Medicines Development for Global Health (MDGH), to which WHO had licensed all data at its disposal. The registration in the United States is a critical milestone towards the availability of moxidectin for onchocerciasis control and elimination programmes in Africa, possibly improving the health outcomes of millions of people afflicted with or at risk of river blindness.[13] (Global)
- ✓ **Innovative use of U.S. FDA Priority Review Voucher:** While approving moxidectin for the treatment of onchocerciasis, the U.S. FDA also awarded Medicines Development for Global Health a Priority Review Voucher (PRV). The voucher mechanism, aimed at fostering drug development for neglected diseases, allowed MDGH to leverage a US$ 13 million investment from the Global Health Investment Fund (GHIF). The funds were used to complete manufacturing and development activities, as well as to write the dossier for submission to the FDA. Furthermore, proceeds from the PRV sale will stay in the neglected diseases sector, supporting access to moxidectin through subsidies and funding further research and development (R&D) on moxidectin and other products for NTDs. MDGH is a not-for-profit biopharmaceutical company which was founded in 2005 to tackle health inequity by developing and registering medicines for neglected diseases. TDR licensed all data at its disposal to MDGH to complete the work on a new drug application to the U.S. FDA. The moxidectin story illustrates how partners motivated not by profit but by public good can use the PRV programme, designed around the market forces motivating the for-profit sector, to meet its intended objectives. To do this, certain elements must converge: public funds and public health priority setting, not-for-profit drug development and regulatory know-how, and commitment to invest PRV gains into furthering affordable access and additional R&D for NTDs.[14] (Global)
- ✓ **TDR's new tool for health product portfolio analysis utilized by global research funders.** Using data from 2017, the Portfolio-to-Impact tool was used by Duke University and Policy Cures Research to develop the first complete analysis of the HIV, TB, malaria and NTD pipeline. The tool was developed to estimate minimum funding needs to accelerate health product development from late stage preclinical study to phase III clinical trials, and to visualize potential product launches over time. This addresses the persistent need to increase R&D activities for product development in the diseases where TDR has its main focus.[15] (Duke University and Policy Cures Research)

Indicator 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

As a result of a specific TDR training activity, 2018 saw strengthened capacities for gender-based analysis in research on vector-borne diseases and climate change research. Beneficiaries of the research course comprised participants from **Ghana, Ivory Coast and Zimbabwe**, including public health practitioners, researchers and malaria control programme staff, which led to **strengthened capacities to inform and design gender-sensitive interventions to prevent and control VBDs in those three countries**.

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13 See https://www.who.int/tdr/news/2018/moxidectin-approved-as-treatment-for-river-blindness/en/

14 See https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0006837

15 See https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6139376/

3.3 Research outputs: High quality intervention and implementation research evidence produced in response to global and country needs

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
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%
5. Number of research data sets/platforms that are i) open access or ii) with an access permission level	1	10	1 *(0)*

Indicator 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

In 2018, the following research outputs were delivered at the request of WHO control programmes and/or diseases endemic countries, engaging DEC stakeholders:

- ✓ **New knowledge informing visceral leishmaniasis (VL) elimination efforts in the Indian Subcontinent:** A previous study in Bangladesh and Nepal showed the efficacy of sandfly control in and around houses of a recently detected VL case using durable wall lining and insecticide-treated bednets and, for an even longer duration, applying insecticide-treated paint. Based on these findings, two new studies have been conducted testing the rapid response to newly detected VL cases (index cases) in their villages of origin which apply the pilot-tested extended fever-camp approach which includes the search for visceral leishmaniasis and post kala azar dermal leishmaniasis, malaria, tuberculosis and leprosy and conducting vector control. Per camp, 0.5 new cases were detected. Vector control with insecticidal paint in Nepal and wall lining in Bangladesh had the most pronounced effect in reducing vector densities for up to 12 months and even longer. This approach seems to be promising for the maintenance phase of VL elimination when Indoor Residual Spraying (IRS) is abandoned.

- ✓ **Creation of four country hubs for social innovation research:** SIHI country hubs have been launched in 2018 in Colombia, Malawi, the Philippines and Uganda, and they play a leadership role in advancing social innovation in health through research, advocacy and capacity strengthening. They engage in a process to identify, showcase and study local community-engaged and citizen-led social innovations in health. To date, more than 200 social innovations have been identified in low- and middle-income countries 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 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 them or scale them up. Importantly, they engage with key partners at country level to institutionalize social innovation in national systems.

- ✓ **Practical guide for crowdsourcing to engage communities in research**. Social Entrepreneurship to Spur Health (SESH), which is the SIHI China country hub, has conducted several crowdsourcing contests, and in 2018 SESH collaborated with SIHI to develop Crowdsourcing in health and health research: A practical guide. The guide was tested in collaboration with TDR Global, the community of TDR affiliated experts, as part of its mobilization initiative for gender equity in health research. Launched at the 22nd International AIDS Conference in Amsterdam, the guide provides practical advice on designing, implementing and evaluating crowdsourcing activities for innovation and health.[16]

- ✓ **New generation Early Warning and Response System (EWARS) tool developed:** User input and recommendations, collected through user surveys, were incorporated into the second-generation, called EWARS-R, which uses the free R-software. New calculations with the updated tool, as well as recent surveillance data and a combination of signals, resulted in higher sensitivities and positive predictive values of alarm signals compared to the first generation EWARS.[17] With the help of partners, the open access "R" software was transferred to dashboards 1 and 2, which make the EWARS system much more user-friendly. Password-protected Dashboard 1 is designed for the central level in each country (usually the ministry of health) and allows the calibration of different alarm indicators in order to identify those with the highest sensitivity and PPV-values. Dashboard 2 is designed for the district level, where threshold levels and alarm indicators are fixed and the district officer needs only to input weekly data on cases and alarm indicators (climatic, entomological and serological information) in order to see the level of outbreak warning (none, initial, early, late alarm). The adoption by countries is facilitated by the web publication of the updated version of the training handbook. The updated EWARS tool was presented for the first time at a bi-regional training workshop for the South-East Asian and Western Pacific regions in Sri Lanka, with participation from eight countries as well as WHO headquarters and South-East Asia Regional Office staff, and the WHO Representatives from India and Sri Lanka. The EWARS tool was then successfully tested for predicting chikungunya outbreaks in Colombia.

- ✓ **C-reactive protein (CRP) validate as a marker of bacterial infection in febrile patients in Africa.** Data analysis on stored samples from a cohort of febrile patients in Africa was finalized and presented. The new knowledge gathered shows that CRP is moderately sensitive for bacterial zoonoses and highly sensitive for identifying blood stream infections. Based on these results, further operational studies would be needed to assess the safety and clinical utility of CRP for the management of non-malaria febrile illness at first-level health facilities in sub-Saharan Africa.

- ✓ **Innovative approaches for safety monitoring in the context of mass drug administration (MDA).** The data analysis and study report for the two studies initiated in Ghana and Tanzania in 2016 to evaluate the use of mHealth tools to improve the efficiency of safety monitoring in the context of MDA for NTDs have been completed. It shows that mHealth tools can greatly improve adverse event reporting.

- ✓ The analysis of **insecticide resistance in field-collected Phlebotomus argentipes sandflies** in Bangladesh and Nepal showed their continued susceptibility to pyrethroids and recommended annual evaluation of resistance levels by national programmes.

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16 See http://www.seshglobal.org/CrowdsourcingPracticalGuide

17 See https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0196811

- ✓ Two field studies in Nepal were conducted showing: (1) that **women community volunteers** can cope with their current workload only because of the support of their husbands and other family members and that their potential **role in active case detection** can only be accomplished if communication with the district health office is improved; and (2) that housing conditions (such as old bamboo walls or use of animal charcoal for plastering walls) are a **risk factor for vector breeding and VL transmission**.

- ✓ **Decision support processes and tools to increase population resilience to climate change were developed.** Several methodologies were developed using remote sensing to monitor climate variability, environmental conditions and their impact on the dynamics of VBDs. The research initiative also demonstrated how remotely sensed data can be accessed, analysed and how they can be integrated into research and decision-making processes for mapping risks, creating Early Warning Systems (EWS) and evaluating the impact of disease control measures. The **generic (non-disease specific) tools developed** include**:**

    - **A Climate Data Library as an integrated knowledge system**, organized as a library with a collection of both locally and remotely held datasets for earth observations on:
        - Precipitation – sourced from the Global Precipitation Climatology Project, Climate Prediction Center Merged Analysis Precipitation, CPC MORPHing technique, Tropical Rainfall Measurement Mission, Global Precipitation Measurement, African Rainfall Estimate, Enhancing National Climate Services [ENACTS] and Climate Hazards Group Infrared Precipitation with Station
        - Temperature and Land-surface Temperature – sourced from MODIS (Moderate Resolution Imaging Spectroradiometer) and ENACTS
        - Vegetation – sourced from Global NDVI (Normalized Difference Vegetation Index) and Terra MODIS NDVI
        - Water bodies and inundation products – sourced from Terra MODIS and Landsat reflectance channels, remote-sensing observations from multiple satellite sources (ERS [European Remote-Sensing Satellite] scatterometer, QuikSCAT [Quick Scatterometer], SSM/I [Special Sensor Microwave/Imager] and AMSR-E [Advanced Microwave Scanning Radiometer – Earth Observing System]) and Inundation fraction products
        - Others – sourced from a menu of maps and analysis used to monitor current global and regional climate as well as archived/historical data (from NASA, NOAA, CRU-UEA, WMO, ECMWF and GISS)
    - **Online map rooms** that provide easy access to point-and-click map-based user interfaces which are built in to the Climate Data Library infrastructure, particularly suited to areas where internet access is slow and where downloading very large, remotely-sensed data images can be difficult.
    - **Data analysis tools** – time-series analysis for climate trends and anomalies
    - **An algorithm for use within the Google Earth Engine** that will allow communities, researchers and public health practitioners to access Google's high-performance computing resources to produce systematic data products or deploy interactive applications without needing to be an expert in application development, web programming or HTML (e.g. integrating trypanosomiasis data with LANDSAT 8 satellite images of water bodies in the Maasai villages in Simanjiro District, northern Tanzania)

- **Smartphone applications** developed for:
  - integrating satellite images on precipitation, temperature and water bodies with local data on habitats of tsetse flies and occurrence of cattle trypanosomiasis. This application allowed the Maasai community and local officials to access high spatial resolution images and extract time-series analysis for mapping the risk of trypanosomiasis in the Maasai villages
  - collecting health data (geo-referenced with pictures of the environment, data in vector breeding sites, data from socio-economic and health surveys, etc.). This application is based on Open Data Kit (ODK) and can create decision-support for researchers, communities and public health practitioners to build multimedia-rich customized mapping tools.

✓ **Malaria-specific tools aimed at increasing population resilience to climate change were developed.**

- Use of ecological **mapping of Anopheles arabiensis larval habitats for larval control** programmes. Indicators like floods and diversified breeding sites and their contribution to prolonged and prolific larval breeding, 'short' aquatic vegetation, turbidity and water conductivity can be useful as early warning indices for predicting larval numbers.
- Use of **malaria outbreak prediction tools** based on data interactions between climate variables and malaria for predicting outbreaks and for the design of preparedness interventions. This made use of clinical malaria transmission patterns and its temporal relationship with climate (rainfall, flood discharge and extent, mean minimum and mean average temperatures) which correlated with the incidence of clinical malaria cases.
- **Vector dynamics tool** can be applied to inform more effective implementation of indoor residual spraying strategies in malaria elimination programmes.
- A **tool to monitor malaria trends and association with climate variables in Zimbabwe** determined that the period of high malaria risk is associated with precipitation and temperature at 1-4 months prior to the seasonal cycle. Intensifying malaria control efforts over this period will likely contribute to lowering the seasonal malaria incidence.
- **Malaria hotspots mapping tool under changing climate conditions** is useful in mounting focused interventions for example within Baringo County, Kenya, also including integrated mosquito control and chemotherapy for infected individuals.
- **Malaria risk mapping tool**, which incorporates the seasonal and year-to-year association (period covered 2004-2015) between climatic factors (rainfall and temperature) and vegetation cover, and its implications for malaria risks as utilized in Baringo County, is useful for planning malaria control.
- **Framework for malaria control for communities in Baringo County** based on trends and local knowledge on malaria can be used to minimize impact and enhance uptake of appropriate malaria management mechanisms.

- ✓ **Schistosomiasis-specific tools aimed at increasing population resilience to climate change were developed.**
  - o **Maximum Entropy (Maxent) modelling tool** for the spatial and seasonal distribution of suitable habitats for Bulinus globosus and Biomphalaria pfeifferi snail species (intermediate hosts for Schistosoma haematobium and S mansoni, respectively) was determined as a robust model for snail habitat suitability and can be useful in informing the development of a vector control and management strategy for schistosomiasis.
  - o **A community-based malaria early warning system model** was developed using the community indigenous knowledge systems (IKS) indicators (insects, plant phenology, animals, weather and cosmological characteristics).

- ✓ **Trypanosomiasis-specific tools aimed at increasing population resilience to climate change were developed.**
  - o **Mapping and analysis tool**, which showed that trypanosome prevalence is dependent on fly availability and that temperature drives both tsetse fly relative abundance and trypanosome prevalence are important for designing community-wide vector and disease control interventions and planning sustainable regimes to reduce the burden of trypanosomiasis in endemic pastoral areas, such as the Maasai Steppe in northern Tanzania.
  - o A **mathematical model for the transmission of Trypanosoma brucei rhodesiense** by tsetse vectors to a multi-host population through application of insecticides to cattle either over the whole body or to restricted areas of the body known to be favoured tsetse feeding sites. The restricted application technique results in improved cost-effectiveness, providing a cheap, safe, and environmentally friendly and farmer-based strategy for the control of vectors and T b rhodesiense in humans.
  - o **Insecticide-treated screens**, called targets, that simulate hosts can be one of the most economical and effective methods of tsetse control.
  - o Mapping the potential benefits from bovine trypanosomiasis control and **analysing the costs of different approaches** (five intervention techniques: trypanocides, targets, insecticide-treated cattle, aerial spraying and the release of sterile males) can be used by decision-makers and planners to define strategies, assist in prioritising areas for intervention, and help choose between intervention techniques and approaches.
  - o **Geostatistical models to predict local-scale spatial variation in the abundance of tsetse vectors** of human and animal African trypanosomes. This approach allows vector control managers to identify sites predicted to have relatively high tsetse abundance, and therefore to design and implement improved surveillance strategies.

- ✓ **First step in promoting a systematic approach to mapping externally funded activities to strengthen research capacity**. TDR's Research Capacity Strengthening unit collaborated with the European and Developing Countries Clinical Trials Partnership (EDCTP) to map externally funded international postgraduate training at institutions in sub-Saharan Africa. The paper[18] on the joint TDR and EDCTP mapping was published and circulated to all agencies initially contacted at the start of the mapping exercise to stimulate a discussion on how the big external funders of research capacity strengthening activities can collaborate in putting this sort of mapping on a systematic footing.

[18] See https://rdcu.be/3Q5D

- ✓ **A digital application for core competencies in clinical research** has been developed for TDR by The Global Health Network and was built upon the finalized TDR framework. This includes a competency wheel[19] that visually represents the framework with 50 competencies as well as a competency dictionary which provides details on each competency[20]. These two core documents are supported by practical implementation tools to support assessment and follow-up of an individual's competencies[21]. A competency radar could be used to grade individuals on each of the areas of the competency defined. The tool provides a mechanism for a research team member to record and track their research skills and experience, so gathering further points as they gain experience. Here they are awarded a membership level and required to go through a career review process and update their points each year. This is an audited and highly robust system that provides ongoing recognition for research staff. In addition, guidance has been developed on how to pilot test and use the framework in practice[22]. The TDR framework for core competencies in clinical research is now widely used by fellows to develop and monitor their training plan, in close collaboration with the training and home institutions.

- ✓ **Innovative tools have been piloted to engage with the TDR Global community** and facilitate collaboration and mobilization around topics of interest. The first TDR Talks took place, as did the first TDR Global live webinars, problem-solving workshops and crowdsourcing contests – all of which meant identifying appropriate tools to be used in the future to engage the TDR Global community.

Indicator 5 - Number of research data sets/platforms that are i) open access or ii) with an access permission level

Safety first: TDR brings safety to the fore as an essential element of evidence-based decision-making. Three initiatives continued from previous years:

- ✓ database for countries to share **safety data on drug exposures during pregnancy** (in collaboration with the WHO HIV Department) (Closed access)

- ✓ database on **novel treatments for multidrug-resistant TB** (in collaboration with the WHO Global TB Programme) (Closed access)

- ✓ the **TB-Platform for Aggregation of Clinical TB Studies** (TB-PACTS) is a partnership among the institutions providing data: TDR, the TB Alliance, and St. George's School of Medicine, University of London; with the platform developed by the Critical Path Institute (C-Path). The platform contains fully anonymized, patient-level data from the REMoxTB, RIFAQUIN, and OFLOTUB clinical trials which can be accessed and analysed in aggregate or filtered and viewed as individual records. The platform is equipped to host data from additional studies in the future. The data is available to external researchers through approval of their request by a review committee. (Gated access)

These will generate evidence of drug safety in routine use that is needed to support treatment guidelines.

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19 See https://globalhealthtrials.tghn.org/competencywheel/

20 See https://globalhealthtrials.tghn.org/site_media/media/medialibrary/2016/11/TDR_Framework_Competency_Dictionary.pdf

21 See https://globalhealthtrials.tghn.org/competencyradar/

22 See https://globalhealthtrials.tghn.org/site_media/media/medialibrary/2016/11/TDR_Framework_User_Guide.pdf

3.4 Capacity strengthening outputs: Enhanced research and knowledge transfer capacity within disease endemic countries

The generation of new research evidence comes as a result of research and capacity strengthening projects and grants, as well as convening and priority setting activities that TDR funds.

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
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 or related to TDR support	0	5	4 *(+4)*
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)*

Indicator 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 or related to TDR support

- ✓ **The Central African Regional Network for TB control (CARN-TB) was established** in March 2018. Its board is constituted by the NTP managers of the 11 NTPs of the Central African region (Angola, Burundi, Cameroon, Chad, Central Africa Republic, the Republic of the Congo, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, Rwanda and Sao Tome and Principe). There are three co-chairs: one from a francophone African country (Cameroon), one from a Lusophone country (Angola) and one from civil Society (Pont-Santé). A regional workshop was organized in collaboration with WHO/GTB on strengthening the capacities of the TB surveillance system of the 11 countries. Programmatic data was safeguarded in the DHIS2-TB module developed by WHO/GTB. NTP staff (two per country) were trained in analysing their TB data, defining TB control gaps and TB research priorities.
- ✓ **A community of practice on the topic of the impact of climate change on health** was expanded in 2018. Shared knowledge methodologies and successes are listed below:
  - o A web-based knowledge-sharing platform, VBD-environment.org, was launched in July 2015 and continues to be supported; at least 100 researchers and public health practitioners are part of this network
  - o Participation and/or organization of several capacity building workshops and scientific fora
  - o Advanced academic degrees for 59 students (MSc, PhD and postdoctoral programmes)
  - o Communities actively contributed to the research process and participated in capacity building activities for increased population resilience to VBDs and climate change
- ✓ As part of networking, and to reach more participants in the South-East Asia region, the **Gadjah Mada University collaborated with the Institute of Public Health, Bengaluru** (India), to facilitate the **on-line version of the Good Health Research Practices (GHRP) and the TDR toolkit in implementation research**, and with the Faculty of Postgraduate Medicine to implement Good Clinical Practice (GCP) and GHRP training courses in Bhutan. The Gadjah Mada University also developed a **partnership with the BP Koirala Institute of Health Sciences** and the **Nepal Medical**

College, following a training they organized in 2017 in Nepal for early career researchers with a support from the re-entry grant of a TDR-CRDF from Nepal. The Gadjah Mada University was also selected as a WHO-Human Reproduction Programme (HRP) Alliance hub in January 2018, and organized a short training course in IR.

- ✓ All TDR Clinical Research and Development Fellowship (CRDF) fellows are enrolled in a professional membership scheme through The Global Health Network. This network is part of an online continuing professional development scheme for clinical trialists working in global health and is supported by the Bill & Melinda Gates Foundation. The aim is to address the lack of recognition of clinical research as a profession and to encourage **career development and training opportunities for all types and levels of researchers and clinical research staff in LMICs**. The professional membership scheme is available via the Global Health Trials website. Users post profiles through which their development and skills acquisition are measured and tracked to capture advancement throughout their career. It currently has 2345 members.

Indicator 7 - Number of TDR grantees/trainees per year, and proportion demonstrating career progression and/or increased scientific productivity, disaggregated by gender

In 2018, TDR added 108 trainees: 50 students entered the postgraduate training scheme on implementation research at the seven universities funded by TDR in regions, while 58 researchers received small grants through WHO regional offices.

A survey of former recipients of long-term training grants will be carried out in 2019 and 2020 to provide information on the trainees' career development. The questionnaire will also include aspects such as TDR's role in the researchers' career progression, and implications of gender on career development.

In addition, TDR awarded 189 contracts and grants in 2018, for a total (grantees and trainees) of 287.

3.5 Global engagement outputs: Key stakeholders engaged in harmonizing agenda and practices and in new initiatives

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
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)*
9. Evidence of stakeholder engagement in TDR joint initiatives aligned with TDR strategic objectives	N/A	N/A	Evidence provided

Indicator 8 - Number and evidence of research-related agendas, recommendations and practices agreed by stakeholders at global, regional or country level and facilitated by TDR

- ✓ TDR developed a **new tool for health product portfolio analysis**. This tool addresses the persistent need to increase R&D activities for product development in the diseases where TDR has its main focus. Using data from 2017, the Portfolio-to-Impact tool was used by Duke University and Policy Cures Research to develop the first complete analysis of the HIV, TB, malaria and NTD pipeline. Two papers were published on the Gates Open Research platform with combined views of more than 6500 and a download total of more than 750.
- ✓ TDR worked with a number of partners to undertake an **analysis of funding from basic research and product development to research for implementation** with a focus on malaria R&D. Bridging the gaps in malaria R&D: An analysis of funding—from basic research and product development to research for implementation.

- ✓ Building on the previous policy work with the Global Fund to promote implementation research in countries receiving Global Fund grants, TDR was represented on the WHO – Global Fund advisory group and contributed to the development of the **Strategic Framework for Collaboration between the Global Fund and WHO**. The framework **recognizes the role of implementation research** and provides a firm basis for ongoing work in TDR to promote funding of SORT IT activities on malaria and TB in countries as part of their Global Fund grants.

Indicator 9 - Evidence of stakeholder engagement in TDR joint initiatives aligned with TDR strategic objectives

- ✓ **Sharing research data for impact:** TDR works with the Infectious Diseases Data Observatory (IDDO) and members of the research community to develop infrastructure and surrounding governance mechanisms to enable the efficient and ethical sharing of research data. Building on their experience with malaria data, the collaboration with IDDO has now meant there are also data sharing platforms for visceral leishmaniasis, Ebola virus disease, schistosomiasis and helminth disease platforms (this is now live).

4. Application of core values

4.1 Socio-economic and gender equity

TDR is a Research Fairness Initiative reporting organization and has been externally evaluated as an organization that can use the RFI logo, demonstrating its fairness in:

- Opportunities: involvement of all stakeholders in our work to ensure impact at country level
- Processes: measures our commitment to equity in how our programmes are implemented
- Benefits: fairness in the sharing of costs and outcomes in our research and seeking to apply best practices in our research collaborations and partnerships

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
10. Proportion of TDR grants/contracts awarded to institutions or individuals in DECs (total count and total amount)	62% (count) 74% (amount)	75% DEC	58% DEC (count) 83% DEC (amount)
11. Proportion of experts from DECs on TDR external advisory committees	78%	>60%	68%
12. Proportion of peer-reviewed publications supported by TDR with authors from DEC institutions (first author, last author, 5 authors)	FA: 73% LA: 56%	≥67%	FA: 73% LA: 60%
13. Number of peer-reviewed publications supported by TDR and percentage published in open/free access	200 88%	≥150/year 100%	222 81%
14. Proportion of women among grantees/contract recipients (total count and total amount)	40% (count) 29% (amount)	50%	47% (count) 45% (amount)
15. Proportion of women on TDR external advisory committees	50%	50%	57%
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%
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%

Indicator 10 - Proportion of TDR grants/contracts awarded to institutions or individuals in DECs (total count and total amount)

In 2018, the total dollar amount of grants and contracts awarded to institutions and researchers in DECs (US$ 6.4 million) was 83% of the total, above the target of 75%. When measuring the number of grants and contracts awarded to institutions and researchers in DECs, the proportion was 58% of the total.

Figure 2 - GRANTS/CONTRACTS: proportion awarded to disease endemic countries (% count) in 2018

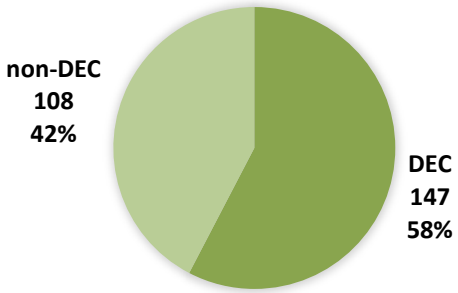


Figure 3 - GRANTS/CONTRACTS: proportion awarded to disease endemic countries (% amount) in 2018

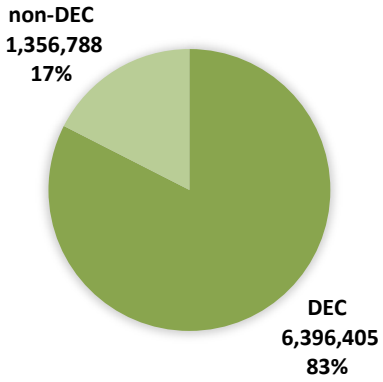
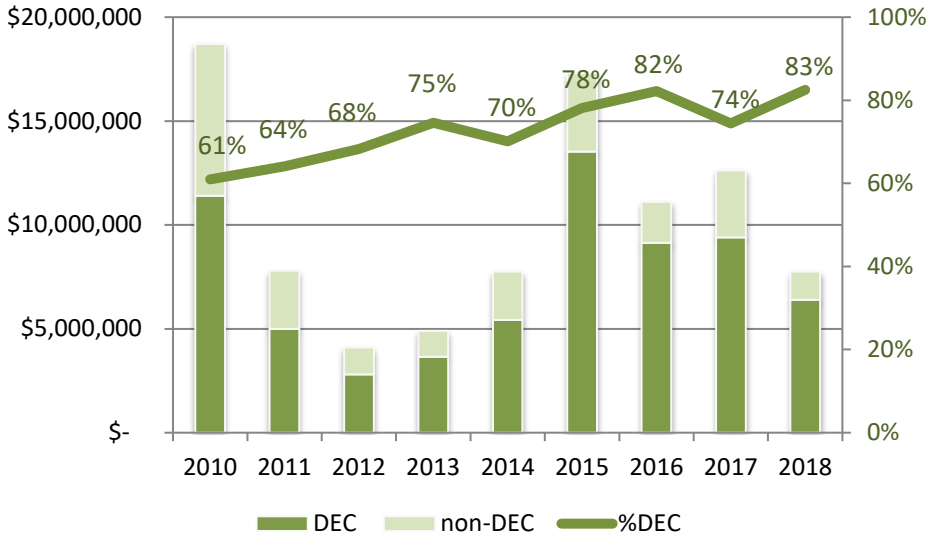


Figure 4 - GRANTS/CONTRACTS: yearly progress in amounts awarded to DECs



Indicator 11 - Proportion of experts from DECs on TDR external advisory committees

In 2018, the proportion of TDR advisers originating from low- and middle-income disease endemic countries was 68%, remaining well above the target of 60%.

Figure 5 - EQUITY: Proportion of advisors from low- and middle-income disease endemic countries, 2018

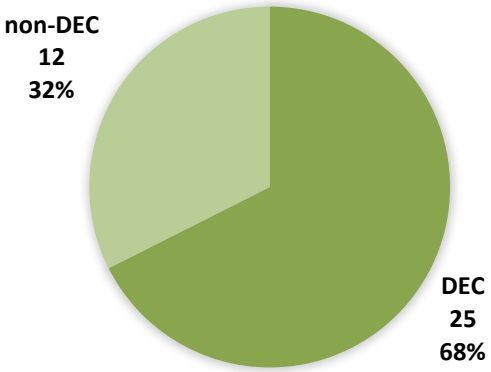
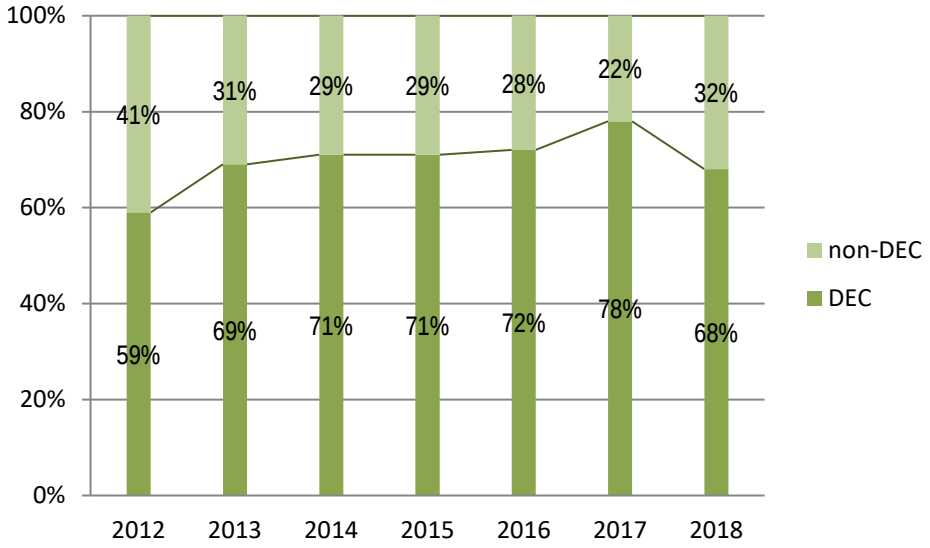


Figure 6 - EQUITY: Proportion of advisors from low- and middle-income disease endemic countries, 2012-2018



Indicator 12 - Proportion of peer-reviewed publications supported by TDR with authors from DEC institutions (first author, last author)

There were 222 TDR-supported peer-reviewed publications in 2018. Among the authors of these publications, the proportion of first authors from DECs was 73%, at the same level as the two previous years and remaining well above the 67% target.

Figure 7 - EQUITY: Proportion of first authors from DECs, yearly progress 2008-2018

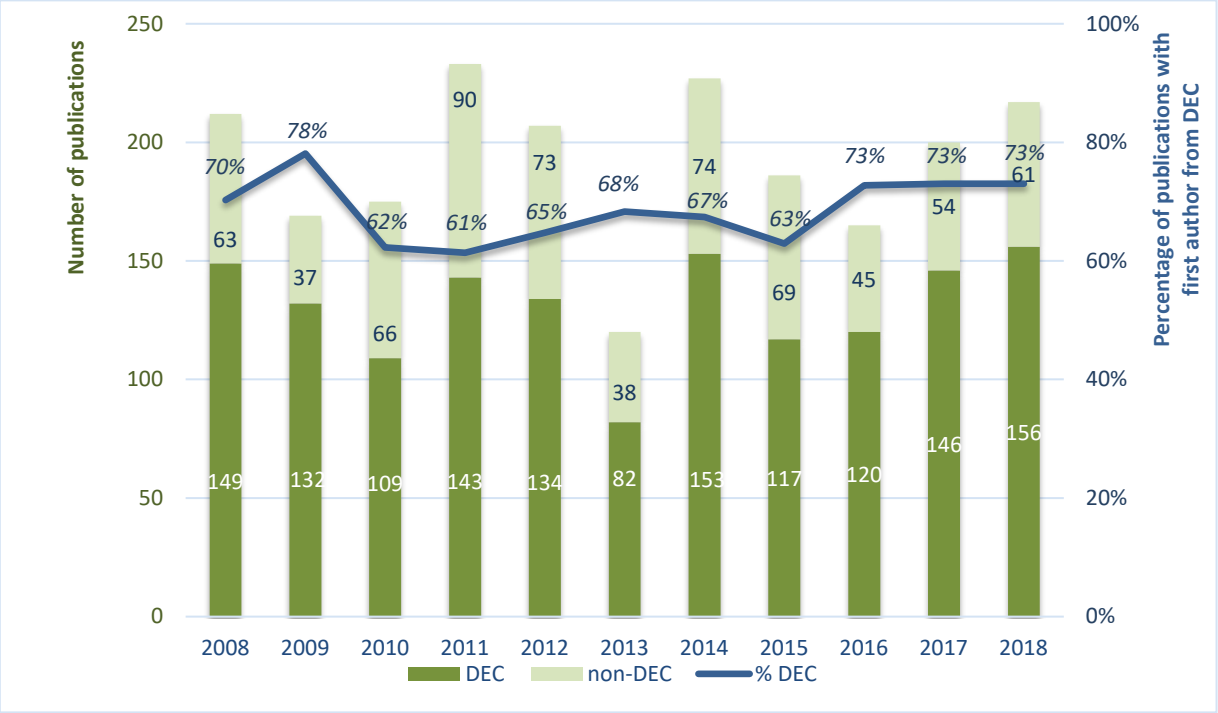
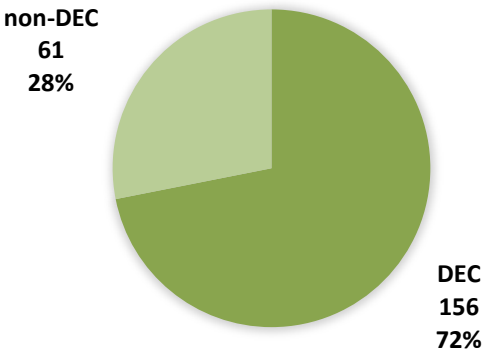
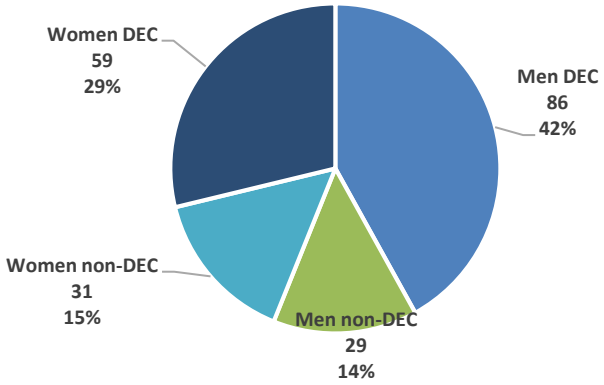


Figure 8 - EQUITY: Proportion of first authors from DECs, 2018



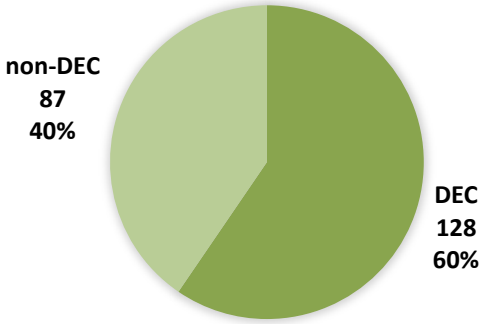
The graph below shows the relative distribution of first authors by gender and country of origin (women, men, DEC, non-DEC) in 2018.

Figure 9 - EQUITY: Distribution of first authors by gender and DECs, 2018



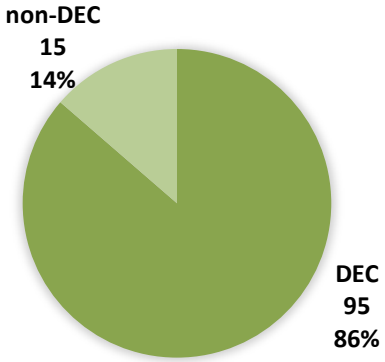
For the first time we measured the proportion of last authors from DECs, which was 60% in 2018. The baseline established in 2017 was 56%, so 2018 showed an increase from baseline. We will keep tracking this indicator for the duration of the current strategy.

Figure 10 - EQUITY: Proportion of last authors from DECs, 2018



Also, for the first time we measured (on a 10% random sample of the entire number of publications) the proportion of authors from DECs among all authors of a publication. For this, we took a random sample of 10% of all the publications, and we checked the country of the first four authors plus the last author. The result (on a sample of 22 publications and 110 authors) showed that 86% of the authors sampled were from DECs. This was an increase compared to the baseline established in 2017 (74%).

Figure 11 - EQUITY: Proportion authors from DECs among all authors, 2018 (sample = 22 publications, 110 authors)



Indicator 13 - Number of peer-reviewed publications supported by TDR and percentage published in open/free access

The number of peer-reviewed publications supported by TDR in 2018 was 222. This is an increase from the previous year (200).

Some key publications that came out with TDR support in 2018 are listed below. Although it is difficult to foresee which publications will end up having a higher impact on policy and practice globally and/or at country level, we chose the following for their potential to represent models that others may follow, and to be road openers in onchocerciasis elimination and outbreak response respectively.

- Opoku, N. O., Bakajika, D. K., Kanza, E. M., Howard, H., Mambandu, G. L., Nyathirombo, A., Nigo, M. M., Kasonia, K., Masembe, S. L., Mumbere, M., Kataliko, K., Larbelee, J. P., Kpawor, M., Bolay, K. M., Bolay, F., Asare, S., Attah, S. K., Olipoh, G., Vaillant, M., Halleux, C. M. & Kuesel, A. C. (2018) Single dose moxidectin versus ivermectin for Onchocerca volvulus infection in Ghana, Liberia, and the Democratic Republic of the Congo: a randomised, controlled, double-blind phase 3 trial. *Lancet*, 392(10154), 1207-1216[23]

  The article presents the results of the clinical research conducted in countries where river blindness is endemic, and which proved that moxidectin can be a powerful tool in the control and elimination of this invalidating disease. The clinical evidence provided by TDR-led clinical trials was essential for **U.S. FDA's approval of moxidectin as a treatment against onchocerciasis** in 2018. The article received positive appraisal from experts in the field.[24]

- Olliaro PL, Kuesel AC, Halleux CM, Sullivan M, Reeder JC. Creative use of the Priority Review Voucher by public and not-for-profit actors delivers the first new FDA-approved treatment for river blindness in 20 years. PLoS NTD, 12: e0006837, 2018 [25]

  A creative and productive way of using the U.S. FDA Priority Review Voucher was agreed and implemented by TDR and Medicines Development for Global Health (MDGH), which may open the way for other organizations to use this model to fund the development of drugs for neglected diseases. The U.S. FDA Priority Review Voucher mechanism was used to fundraise US$ 13 million to complete manufacturing and development activities required for the approval of moxidectin. This story illustrates how **partners motivated not by profit but by public good can use the Priority Review Voucher mechanism**, designed around the market forces motivating the for-profit sector, to meet its intended objectives.

- Hussain-Alkhateeb, L., Kroeger, A., Olliaro, P., Rocklov, J., Sewe, M. O., Tejeda, G., Benitez, D., Gill, B., Hakim, S. L., Carvalho, R. G., Bowman, L. & Petzold, M. (2018) Early warning and response system (EWARS) for dengue outbreaks: Recent advancements towards widespread applications in critical settings. *Plos One*, 13(5), 14. [26]

  This publication highlights the improved early warning and response system (EWARS-R) that is aimed at **strengthening countries' capacity to detect and respond to outbreaks of infectious diseases with epidemic potential**. The tool was tested in three dengue endemic countries for ten months, its sensitivity and positive predicted value further increased through the addition of the free R software. Expanding and adapting EWARS to Aedes borne diseases and adding satellite meteorological data are likely to widen its potential impact on outbreak detection and response in countries.

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23 See https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6172290/
24 See https://www.sciencedirect.com/science/article/pii/S0140673618301016?via%3Dihub
25 See https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0006837
26 See https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0196811

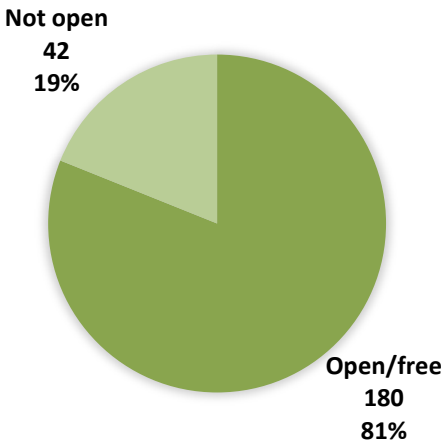
- Terry RF, Yamey G, Miyazaki-Krause R, Gunn A, Reeder JC. Funding global health product R&D: the portfolio-to-impact model (P2I), a new tool for modelling the impact of different research portfolios. Gates Open Research, 2:24, 2018. [27]

  Portfolio-to-Impact (P2I), the **new decision support tool that TDR developed for health product portfolio analysis**, addresses the persistent need to increase R&D activities for product development in the diseases where TDR has its main focus. At the same time, other organizations working in the field of neglected diseases or other health and biomedical research fields can use the tool for their strategic planning. 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. Two papers were published on the Gates Open Research platform with combined views of more than 6500 and a download total of more than 750.

The complete list of publications supported by TDR in 2018 is attached in Annex 1. It provides the names of the author(s), the publication title and the peer-reviewed journal where it appears.

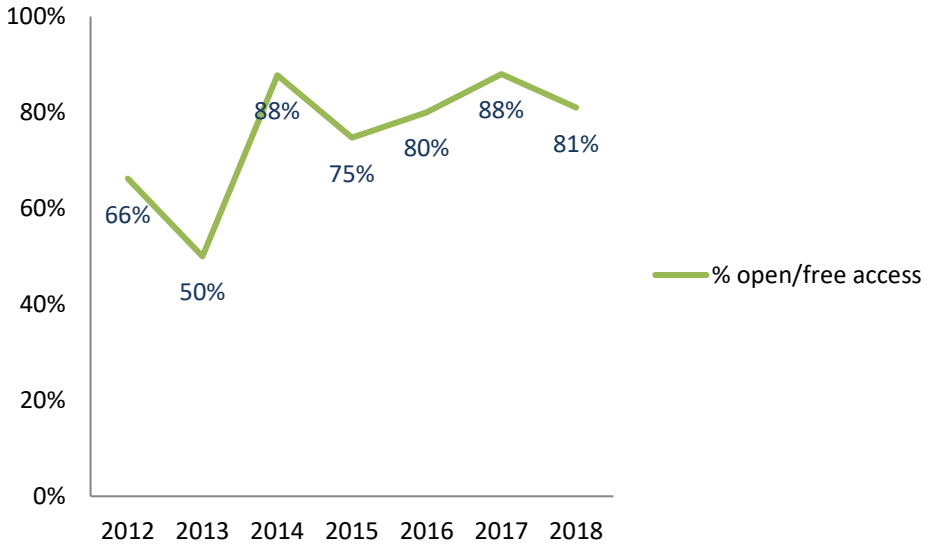
In 2018, 81% of TDR-supported publications were published in open or free access. In order to promote and enhance the translation of research into practice, free access to research publications is key. To measure the extent to which TDR-supported publications responded to the open access concept, the percentage of publications electronically accessible (full text) via Web of Science were counted. In general, users can access articles free of charge either because they are published in an open access journal (such as PLoS or BioMed Central journals) or they are stored in a free access repository (such as PubMed Central) at the request of one of the research funders. Other scenarios that guarantee free access are TDR-funded journal supplements or special agreements between authors and publishers to make the access to a specific article free of charge for the reader.

Figure 12 – EQUITY: Proportion of publications in open/free access, 2018



[27] See https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6139376/

Figure 13 – EQUITY: Proportion of publications in open/free access, yearly progress 2012-2018



Indicator 14 - Proportion of women among grantees/contract recipients (total count and total amount)

In 2018, 45% of the amount allocated to contracts or grants was awarded to women (approximately US$ 3.5 million out of a total US$ 7.6 million), an increase from 29% in 2017 and double the proportion in 2012 (22%). In the number of contracts or grants, the proportion awarded to women also rose to the highest ever at 47% (120 out of 255), increasing from 40% in 2019. These measurements show a clear increase and confirm the continuing trend started in 2012, driven by the goal of bringing the proportion of women researchers as close as possible to 50%.

Figure 14 – GENDER: Proportion of grants and contracts awarded to women (% count), 2018

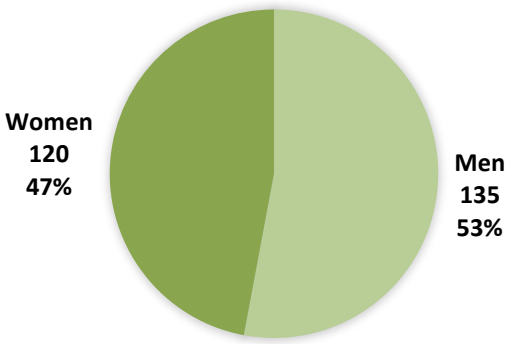


Figure 15 – GENDER: Proportion of grants and contracts awarded to women (% amount), 2018

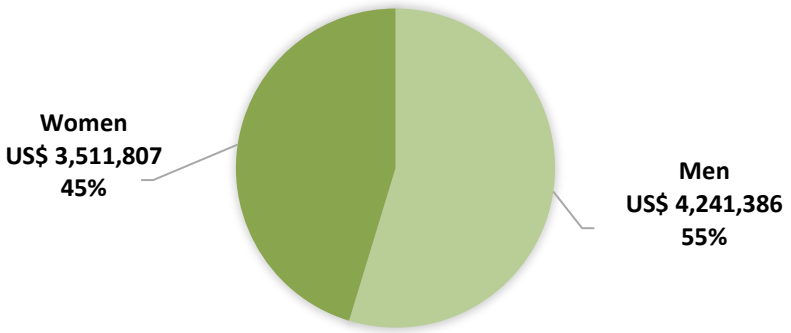
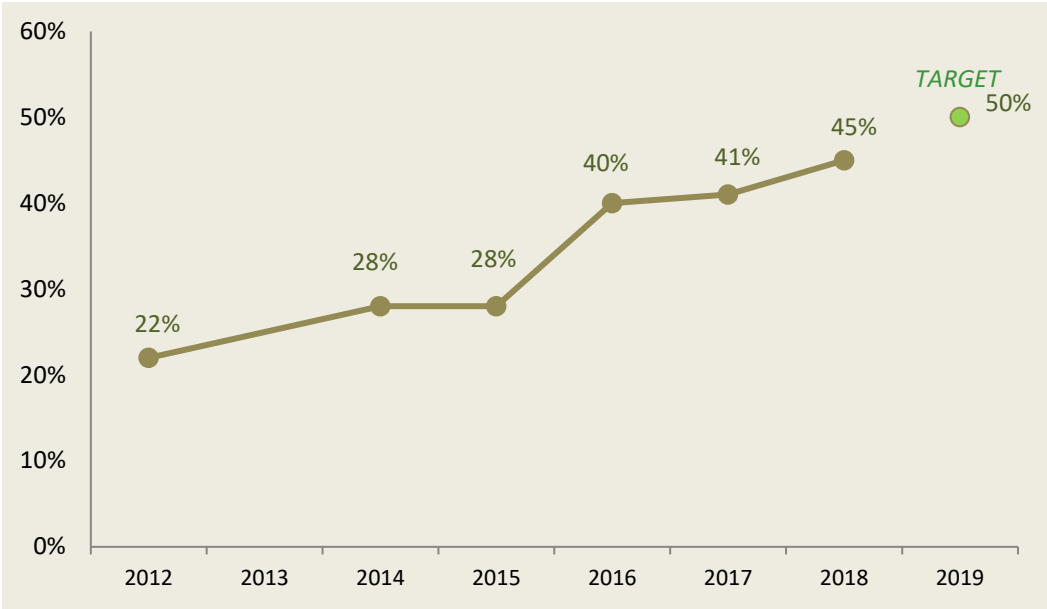
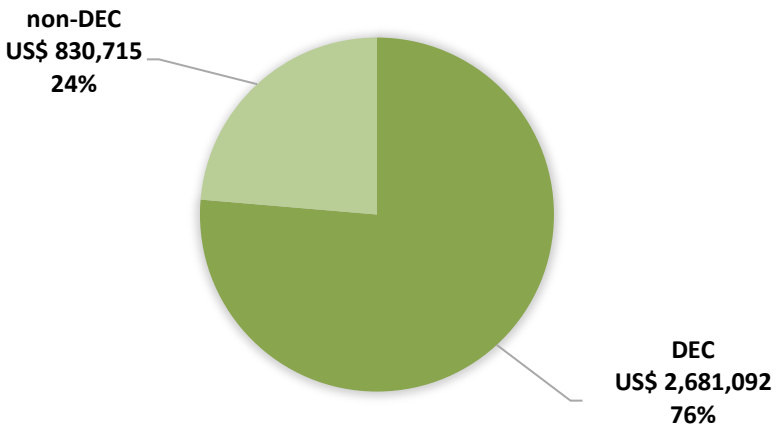


Figure 16 – GENDER: Proportion of grants and contracts awarded to women, yearly progress 2012-2018 (% amount)



We measured for the first time the proportion of grants and contracts awarded to women from DECs in 2018, which showed that 76% of women grantees were from a DEC, compared to 24% from a non-DEC.

Figure 17 – GENDER: Proportion of grants and contracts awarded to women among grantees from DEC (% amount), 2018



Indicator 15 - Proportion of women on TDR external advisory committees

In 2018, women made up 57% of the membership of external advisory groups to TDR. Compared to 2017 (50%), the proportion of women has increased. This result reflects our continuing drive to involve women in higher advisory roles with TDR, and the general effort by TDR towards gender equity. The trend from 2012 to 2018 shows the result of this effort, with the proportion of women doubled from 28% to 57%.

Figure 18 - EQUITY: gender distribution of external expert advisors, 2018

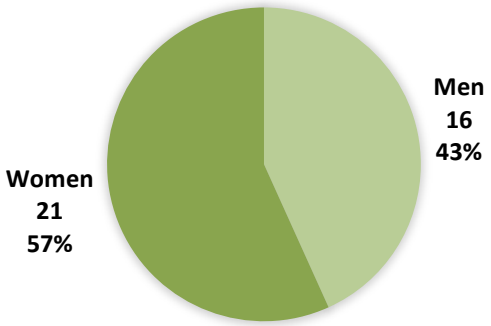
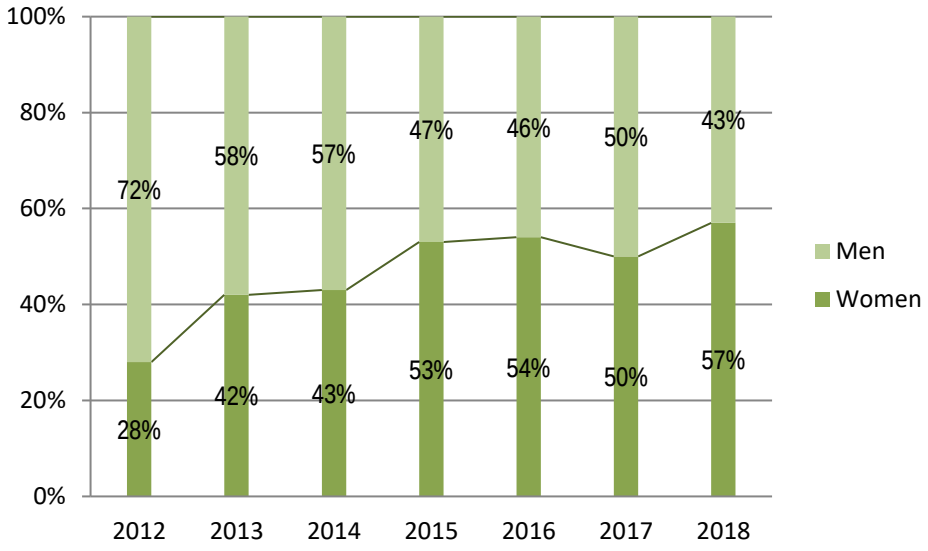


Figure 19 - EQUITY: yearly gender distribution of external expert advisors, 2012-2018



Indicator 16 - Proportion of women authors of peer-reviewed publications supported by TDR (first author, last author)

In 2018, 44% of first authors of TDR-supported publications were women. Compared to 2017 (38%), the result has improved.

Figure 20 - TDR-SUPPORTED PUBLICATIONS: gender distribution of first authors, 2018

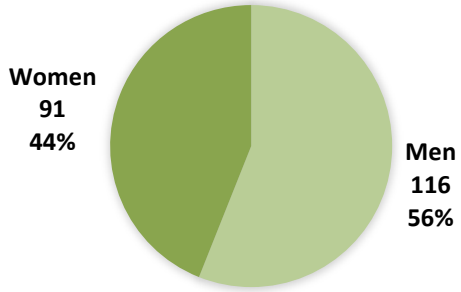
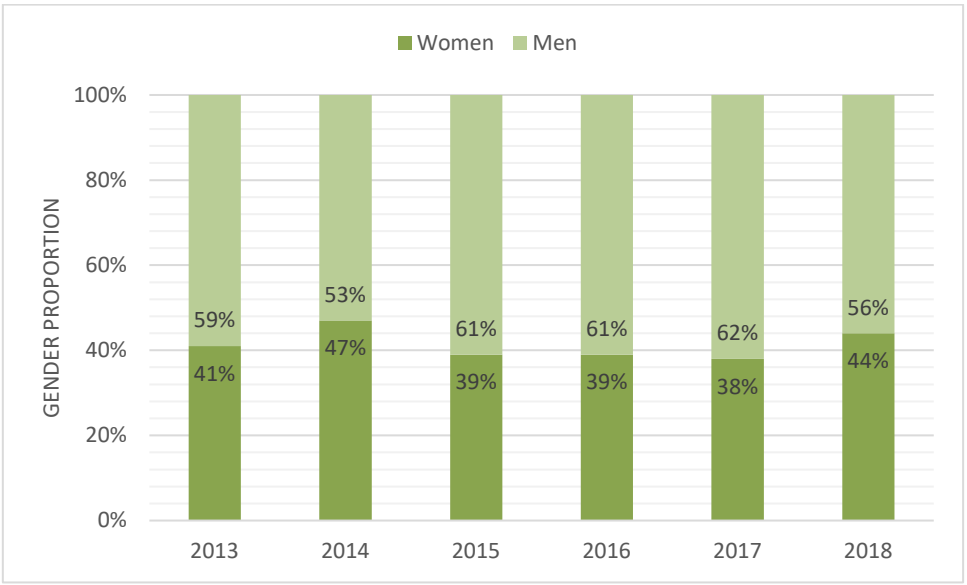
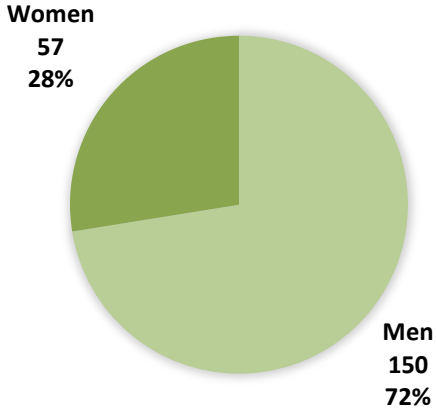


Figure 21 - TDR-SUPPORTED PUBLICATIONS: gender distribution of first authors year-to-year



In 2018, 28% of first authors of TDR-supported publications were women. Compared to the baseline measured in 2017 (24%), the proportion has improved.

Figure 22 - TDR-SUPPORTED PUBLICATIONS: gender distribution of last authors, 2018



Indicator 17 - Number and proportion of peer-reviewed publications explicitly considering: gender and women issues, vulnerable groups or people with disabilities

Out of a total of 222 peer-reviewed publications supported by TDR in 2018, we identified:

- 12 articles that addressed the topic of gender, from engaging women researchers, to maternal and postnatal health care, to male migrant health issues, family planning, etc.
- 96 articles related to research of capacity strengthening in the context of vulnerable populations (pregnant women, neonates, severe chronic diseases such as leprosy, multi-drug resistant tuberculosis or HIV/TB coinfection, torture survivors, patients with catastrophic healthcare costs, patients in palliative care, mobile and migrant populations, children under five, patients facing stigma, conflict-affected populations, etc.)
- 19 publications that addressed populations with disabilities (people suffering from river blindness, leprosy, kala-azar disease, filariasis, Buruli ulcer, sleeping sickness, cardiac Chagas disease, palliative care, etc.).

4.2 Effective multisectoral partnerships

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
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

Indicator 18 - Resources leveraged as direct contributions (co-funding, services or in-kind) to TDR projects (examples)

This indicator is measured at the end of the biennium.

4.3 Value for money

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
19. Evidence demonstrating value-for-money, cost savings and/or enhanced efficiency or effectiveness	N/A	N/A	To be measured end of biennium

Indicator 19 - Evidence demonstrating value-for-money, cost savings and/or enhanced efficiency or effectiveness

This indicator is measured and reported at the end of the biennium.

4.4 Quality of work

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
20. Proportion of project reports evaluated as satisfactory by external advisory committees	100%	>80%	100%

Indicator 20 - Proportion of project reports evaluated as satisfactory by external advisory committees

In 2018, all project reports were found satisfactory by external advisory committees.

4.5 Sustainability of outcomes

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
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

Indicator 21 - Number of effective public health tools and strategies developed which have been in use for at least two years

This indicator is measured and reported at the end of the biennium.

5. Management performance

5.1 Effective resource mobilization

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
22. Percentage of approved biennial budget successfully funded	*87.9% (US$ 39.5/45M)*	≥100%	To be measured end of biennium
23. Percentage of income received from multi-year, unconditional donor agreements	*17.3% (US$ 6.8M/39.5 M)*	70%	To be measured end of biennium

Indicator 22 - Percentage of approved biennial budget successfully funded

This indicator is measured and reported at the end of the biennium.

Indicator 23 - Percentage of income received from multi-year, unconditional donor agreements

This indicator is measured and reported at the end of the biennium.

5.2 Effective management

Key performance indicators	Baseline (2017)	Target (2023)	Progress *(contrib. 2018)*
24. Percentage of staff workplans and performance reviews (including personal development plan) completed on time	89%	≥90%	100%
25. Proportion of expected results on track	89%	≥80%	100%
26. Proportion of significant risk management action plans that are on track	100%	≥80%	100%

Indicator 24 - Percentage of staff workplans and performance reviews (including personal development plan) completed on time

All staff workplans and performance reviews were done on time.

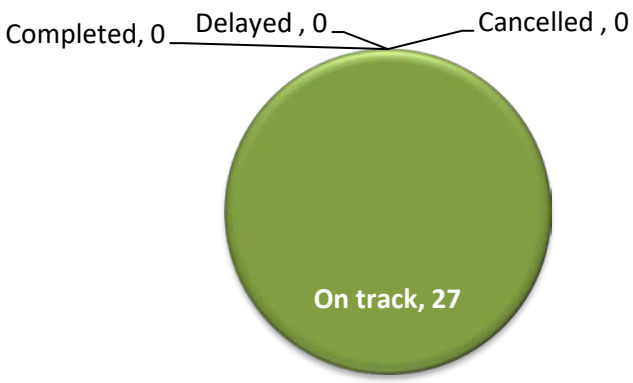
Indicator 25 - Proportion of expected results on track

At 31 December 2018, all the Expected Results in TDR's portfolio were on track, none were delayed.

- 27 on track
- 0 completed
- 0 delayed
- 0 cancelled

The detailed list is available in Annex 2.

Figure 23 - Status of expected results as at 31 December 2018



Indicator 26 - Proportion of significant risk management action plans that are on track

The proportion was 100%, consisten with 2017 numbers. However, some risks have components that are outside TDR's control, and the fact that actions plans are on track does not mean the risks are totally under control.

6. Lessons learned

In 2018, we learned lessons from a variety of directions. The external audit of TDR, conducted by the Republic of the Philippines' Commission on Audit, confirmed the soundness of TDR's management processes and internal controls in place since the 2011 reorganization, TDR's compliance with the rules and regulations of WHO, the correctness of TDR's self-assessment and reporting, and provided recommendations supporting TDR's continuous improvement process.

The audit commended TDR's strong risk management process overseen by TDR's governance and that is also reported through WHO's administrative processes. In response to one of the audit recommendations, TDR revised the wording of the Programme-level risks to more clearly include the root cause and make the statements more self-explanatory, which appears reflected in the 2018 Risk Management Report.

The audit also confirmed the appropriateness of TDR's fundraising approach and noted that, in the context of the WHO transformation initiative, the core work of TDR continues to be supported by programme funding from long-term contributors, thus clarity may be needed on TDR's part in WHO's redesigned resource mobilization process. TDR will, therefore, continue to liaise with the WHO resource mobilization team to ensure that the organization-wide changes would not negatively impact TDR's income.

Continuous monitoring of the income forecast allowed TDR's management to anticipate a funding gap and develop a rigorous contingency plan when a couple of contributors had unexpectedly reduced their contributions in late 2017. The plan was appreciated by TDR's governance and attracted additional support from our two major donors to address the situation and bring the funding back to a level that would allow operations activities to be carried out as per the approved budget and workplan.

The dual budget and workplan scenario model that TDR has adopted since 2012 proved particularly useful in 2018. Implementation started at the lower, US$ 40 million budget scenario level. As a result of an increase in forecasted funds, the decision to scale up activities towards the higher budget scenario (US$ 50 million) for undesignated funds was easy, as the plans had already been approved by the JCB in 2017.

In the area of project and grant management, TDR issued a request for proposals for an electronic system that would provide project, grant and portfolio management support, aspects that WHO's IT infrastructure does not provide and that had previously been recommended by audits and evaluations. The selection process is ongoing, and a new system is expected to be developed and rolled out by mid-2020. This is expected to greatly improve the controls on planning, monitoring, reporting, and relations with principal investigators and research teams from countries, making all these steps more efficient and transparent.

The year 2018 also represented a time to work together with our colleagues in WHO to align TDR's contributions with WHO's Thirteenth General Programme of Work, through contributions made to WHO outcomes, outputs, global goods, country support plans, and further to contribute as accelerator to the targets of the Global Action Plan towards SDG3. The WHO transformation and restructuring goes in parallel with TDR's readjustment in support of the strategy 2018-2023, approved by the JCB and that had been on hold pending WHO restructuring.

7. Annexes

Annex 1. List of TDR-supported peer-reviewed publications 2018

(Retrieved from Web of Science on 7 January 2019; the list also includes SORT IT publications not indexed by the Web of Science)

1. Acquatella, H., Asch, F. M., Barbosa, M. M., Barros, M., Bern, C., Cavalcante, J. L., Correa, L. E. E., Lima, J., Marcus, R., Marin-Neto, J. Migliore, R., Milei, J., Morillo, C. A., Nunes, M. C. P., Vieira, M. L. C. & Viotti, R. (2018) Recommendations for Multimodality Cardiac Imaging in Patients with Chagas Disease: A Report from the American Society of Echocardiography in Collaboration With the InterAmerican Association of Echocardiography (ECOSIAC) and the Cardiovascular Imaging Department of the Brazilian Society of Cardiology (DIC-SBC). *Journal of the American Society of Echocardiography*, 31(1), 3-25.
2. Ahorlu, C. S. K., Okyere, D. & Ampadu, E. (2018) Implementing active community-based surveillance-response system for Buruli ulcer early case detection and management in Ghana. *Plos Neglected Tropical Diseases*, 12(9), 12.
3. Alarcon, V., Alarcon-Arrascue, E., Mendoza-Ticona, A., Obregon, G., Cornejo, J., Vargas, D., De los Rios, J., Moore, D. A. J. & Heldal, E. (2018) Programmatic management of patients with pre-extensively drug-resistant tuberculosis in Peru, 2011-2014. *International Journal of Tuberculosis and Lung Disease*, 22(10), 1220-+.
4. Amadi, J. A., Olago, D. O., Ong'amo, G. O., Oriaso, S. O., Nanyingi, M., Nyamongo, I. K. & Estambale, B. B. A. (2018a) Sensitivity of vegetation to climate variability and its implications for malaria risk in Baringo, Kenya. *Plos One*, 13(7), 20.
5. Amadi, J. A., Olago, D. O., Ong'amo, G. O., Oriaso, S. O., Nyamongo, I. K. & Estambale, B. B. A. (2018b) "We don't want our clothes to smell smoke": changing malaria control practices and opportunities for integrated community-based management in Baringo Kenya. *Bmc Public Health*, 18, 14.
6. Amadi, J. A., Ong'amo, G. O., Olago, D. O., Oriaso, S. O., Nyamongo, I. K. & Estambale, B. B. A. (2018c) Mapping potential Anopheles gambiae s.l. larval distribution using remotely sensed climatic and environmental variables in Baringo, Kenya. *Medical and Veterinary Entomology*, 32(4), 417-426.
7. Anand T, Kishore J, Isaakidis P, Gupte HA, Kaur G, Kumari S, Jha D, Grover S. Integrating screening for non-communicable diseases and their risk factors in routine tuberculosis care in Delhi, India: A mixed-methods study. PLoS One. 2018;13(8):e0202256.
8. Antieme Combo Georges Togo, Ousmane Kodio, Bassirou Diarra, Moumine Sanogo, Gagni Coulibaly, Sidy Bane, Fatimata Diallo, Anou M. Somboro, Aissata B. Cisse, Bocar Baya, Drissa Goita, Seydou Diabate, Bourahima Kone, Yeya dit Sadio Sarro, Mamoudou Maiga, Yacouba Toloba, Michael Belson, Susan Orsega, Sounkalo Dao, Robert Leo Murphy, Sophia Siddiqui, Seydou Doumbia, Souleymane Diallo. (2018). The Most Frequent Mycobacterium tuberculosis Complex Families in Mali (2006–2016) Based on Spoligotyping. http://www.ijmyco.org January 2, 2018, IP: 196.200.54.106].
9. Arsenijevic J, Burtscher D, Ponthieu A, Severy N, Contenta A, Moissaing S, Argenziano S, Zamatto F, Zachariah R, Ali E et al: "I feel like I am less than other people": Health-related vulnerabilities of male migrants travelling alone on their journey to Europe. Soc Sci Med 2018, 209:86-94
10. Ashraf R, Naureen F, Noor A, Ilyas J, Fatima R, Yaqoob A, et al. Does Cash Incentive Effect TB Case Notification by Public Private Mix-General Practitioners Model in Pakistan? Journal of Tuberculosis Research. 2018;06:166–74
11. Aung ZZ, Oo MM, Tripathy J, Kyaw NTT, Hone S, Oo HN, Majumdar SS. Are death and loss to follow-up still high in people living with HIV on ART after national scale-up and earlier treatment initiation? A large cohort study in government hospital-based setting, Myanmar: 2013-2016. PLoS One. 2018;13(9):e0204550.
12. Avong, Y. K., Jatau, B., Gurumnaan, R., Danat, N., Okuma, J., Usman, I., Mordi, D., Ukpabi, B., Kayode, G. A., Dutt, S., El-Tayeb, O., Afolabi, B., Ambrose, I., Agbaji, O., Osakwe, A., Ibrahim, A., Cigar, C., Nosiri, H., Avong, E. B., Adekanmbi, V., Uthman, O., Abimiku, A., Oni, Y. O., Mensah, C. O., Dakum, P., Mberu, K. E. & Ogundahunsi, O. A. T. (2018) Addressing the under-reporting of adverse drug reactions in public health programs controlling HIV/AIDS, Tuberculosis and Malaria: A prospective cohort study. *Plos One*, 13(8), 14.
13. Aye S, Majumdar SS, Oo MM, Tripathy JP, Satyanarayana S, Kyaw NTT, Kyaw KWY, Oo NL, Thein S, Thu MK, Soe KT, Aung ST. Evaluation of a tuberculosis active case finding project in peri-urban areas, Myanmar: 2014-2016. International Society for Infectious Diseases. 2018; ePub.
14. Azizi, S. C., Chongwe, G., Chipukuma, H., Jacobs, C., Zgambo, J. & Michelo, C. (2018) Uptake of intermittent preventive treatment for malaria during pregnancy with Sulphadoxine-Pyrimethamine (IPTp-SP) among postpartum women in Zomba District, Malawi: a cross-sectional study. *Bmc Pregnancy and Childbirth*, 18, 13.
15. Awolola Taiwo Samson , Adedapo Adeogun, Abiodun K. Olakiigbe, Tolulope Oyeniyi, Yetunde Adeola Olukosi, Hilary Okoh, Tolulope Arowolo, Joel Akila, Adedayo Oduola, Chioma N. Amajoh. (2018) Pyrethroids resistance intensity and resistance mechanisms in Anopheles gambiae from malaria vector surveillance sites in Nigeria. *Plos One*, 13(12), 13.

16. Bamou, R., Mbakop, L. R., Kopya, E., Ndo, C., Awono-Ambene, P., Tchuinkam, T., Rono, M. K., Mwangangi, J. & Antonio-Nkondjio, C. (2018) Changes in malaria vector bionomics and transmission patterns in the equatorial forest region of Cameroon between 2000 and 2017. *Parasites & Vectors*, 11, 13.

17. Banda, C. G., Dzinjalamala, F., Mukaka, M., Mallewa, J., Maiden, V., Terlouw, D. J., Lalloo, D. G., Khoo, S. H. & Mwapasa, V. (2018) Impact of Efavirenz-, Ritonavir-Boosted Lopinavir-, and Nevirapine-Based Antiretroviral Regimens on the Pharmacokinetics of Lumefantrine and Safety of Artemether-Lumefantrine in Plasmodium falciparum-Negative HIV-Infected Malawian Adults Stabilized on Antiretroviral Therapy. *Antimicrobial Agents and Chemotherapy*, 62(11), 11.

18. Banjara MR, Das ML, Gurung CK, Singh VK, Joshi AB, Matlashewski G, Kroeger A, Olliaro P. Integrating Case Detection of Visceral Leishmaniasis and Other Febrile Illness with Vector Control in the Post-Elimination Phase in Nepal. Am J Trop Med Hyg. 2018 Nov 12

19. Bareng, A. P., Espino, F. E., Chaijaroenkul, W. & Na-Bangchang, K. (2018) Molecular monitoring of dihydrofolatereductase(dhfr) and dihydropteroatesynthetase (dhps) associated with sulfadoxine-pyrimethamine resistance in Plasmodium vivax isolates of Palawan, Philippines. *Acta Tropica*, 180, 81-87.

20. Bezerra, C. S. E., de Souza, R. D. M., Barezani,Gurtler, RRamos, A. N. & Diotaiuti, L. (2018) Triatoma brasiliensis Neiva, 1911: food sources and diversity of Trypanosoma cruzi in wild and artificial environments of the semiarid region of Ceara, northeastern Brazil. *Parasites & Vectors*, 11, 14.

21. Birhanu, Z., Yihdego, Y. Y. E. & Yewhalaw, D. (2018) Quantifying malaria endemicity in Ethiopia through combined application of classical methods and enzyme-linked immunosorbent assay: an initial step for countries with low transmission initiating elimination programme. *Malaria Journal*, 17, 14.

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Annex 2. Progress on the TDR's current portfolio of expected results Status update as at 31 December 2018

ER Title	*ER Status 31 Dec 2018*
Country preparedness for disease outbreaks	On track
Country resilience to the threat of drug-resistant infections	On track
Directions for development and accelerated access to new tools and strategies	On track
Maximized utilization of data for public health decision making	On track
Maximized utilisation of safety information for public health decision making	On track
Strategies to achieve and sustain disease elimination	On track
Optimized approaches for effective delivery and impact assessment of public health interventions	On track
Translating new & traditional knowledge into healthy environmentally sustainable housing for poor communities	On track
Population health vulnerabilities to VBDs: increasing resilience under climate change conditions in Africa	On track
Evaluation and improvement of malaria control policies through study of LLINs and IRS efficacy, and of the burden and causes of residual malaria	On track
Environmental prevention and control of vector-borne diseases and infectious diseases in South-East Asia	On track
Developed, pilot-tested and replicated an innovative training course for capacity building on gender-based analysis in vector-borne disease research and potential others infectious diseases of poverty	On track
Evaluation and improvement of malaria control policies through study of the impact of insecticide resistance on LLINs and IRS efficacy, and preliminary analysis of the burden and causes of residual malaria.	On track
Multi-Sectoral Approach (MSA) for Prevention and Control of Malaria and Emerging Arboviral Diseases	On track
Urban health interventions for the prevention and control of vector-borne and other infectious diseases of poverty, and new vector control technologies to prevent and control emerging arboviruses	On track
Strategies to promote gender-responsive health interventions on prevention and control of VBDs and other infectious diseases of poverty	On track
WHO Regional Office collaboration and small grants	On track
Targeted research training grants in low-and middle-income countries	On track
UNDP structured capacity building in implementation research to improve access and delivery of health technologies in LMICs	On track
Advanced training in Clinical Product Development (Career Development Fellowship grants)	On track
Advancing social innovation in health care delivery through research, capacity strengthening and advocacy	On track
Strategic support to WHO regional activities: the regional training centres	On track
Knowledge Management shaping the research agenda	On track
Capacity strengthening to bring research evidence into policy (R&D Funding)	On track
Collaborative networks and Global Health Initiatives (GHIs) – ESSENCE	On track
TDR Global - the community of former trainees, grantees and experts	On track

Annex 3. TDR 2018 revenue

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.

CONTRIBUTOR	
Core contributors	**Amount (US$)**
Sweden	5 037 631
United Kingdom of Great Britain and Northern Ireland (UK)	4 246 657
Switzerland	1 654 965
Luxembourg	1 157 407
World Health Organization	1 100 000
Germany	875 798
Belgium	707 547
Norway	357 270
Japan	200 000
Thailand	93 291
China	55 000
India	55 000
Malaysia	25 000
Mexico	20 000
Panama	7 000
Turkey	5 000
Miscellaneous	1 009
Sub-total	15 598 577
Contributors providing specific project funding	**Amount (US$)**
Bill & Melinda Gates Foundation	1 968 153
National Institute for 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
Sub-total	6 456 799
TOTAL CONTRIBUTIONS	**22 055 376**

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

Thank you to our core contributors who provided **overall Programme** support in 2018

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** Listed in order of level of contribution*