

The Comprehensive Multisectoral Action Framework



Malaria and Sustainable Development



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FIRST FOREWORD

Malaria impedes progress on sustainable development. Although it is entirely preventable and treatable, malaria continues to devastate families and communities around the world. More than 241 million malaria cases occurred worldwide in 2020 – and that is surely an undercount given the COVID-19-related disruptions. That is the same number of cases as 20 years ago. More than 625,000 people die from malaria every year. At the same time, there is cause for hope with the recent recommendation from WHO for the widespread use of the long-awaited malaria vaccine for children.

Everywhere, malaria is associated with poor socio-economic development, inequity and exploitation. These factors have dimensions that extend far beyond the health and any other individual sector, calling for a comprehensive multisectoral response. In most settings the root causes of malaria lie beyond the health sector’s reach - inequalities; housing; living conditions; climate; agriculture. Yet the collective global response to malaria has been traditionally rooted in a health care-based approach with relatively less focus on non-health sector interventions. The past few years of global COVID-19 pandemic, food insecurity and rising inflation have shown just how fragile health achievements might be without addressing the root causes. Comprehensive multisectoral action encompassing a developmental approach and guided by the Sustainable Development Goals is a necessary supplement to the health and commodity-based response and a strong catalyst to malaria elimination as well as to resilient population health improvements in general.

This Comprehensive Multisectoral Action Framework with the subtitle “Malaria and Sustainable Development” makes a clear case for restructuring the way countries and providers of funds think and address malaria – from being a concern of the health sector only, towards a comprehensive coordinated multi-pronged effort that harnesses action, commitment and expertise across all sectors. The Framework is aligned with the [UNDP Strategic Plan 2022-2025](#), the [UNDP HIV and Health Strategy 2022-2025](#) and the upcoming *WHO and UN-Habitat Global Response Framework to Malaria and Mosquito-transmitted Diseases in Urban Areas*.

The Framework places responsibility and accountability with existing local governance structures, is a guide for policymakers and practitioners and a stimulus for innovation. Although there has been encouraging progress over the past decade, addressing malaria must have a prominent place in the global, national and local development agendas if we are to eliminate this deadly disease, prevent the risk of resurgence, and ultimately help communities to thrive and markets to reach their full potential.

We expect that this Framework will contribute to realizing the vision of a world free of malaria. The response to malaria demands nothing less than our collective and sustained vigilance. We must act now to keep our 2030 malaria elimination targets within reach. Therefore, in addition to presenting a conceptual framework, the document also outlines a practical way forward.

Mandeep Dhaliwal
Director, HIV, Health and Development Group
United Nations Development Programme

Graham Alabaster
Chief Geneva Office
UNHabitat

SECOND FOREWORD

It gives us great pleasure to write a foreword for this landmark publication in support of comprehensive multi-sectoral action to combat malaria and other vector-borne diseases. We congratulate the UNDP, the author and all those who contributed to producing this framework at the request of the 2nd annual meeting of the RBM Partnership to End Malaria Multi-sectoral Working Group in 2019.

The malaria challenge is a highly-significant part of all the Sustainable Development Goals, going way beyond the health goal. As co-chairs of the RBM Partnership to End Malaria Working Group on multi-sectoral approaches, we are aware that managing and sustainably eliminating such disease, will increasingly rest with actors outside of the “formal” health sector, to address the social, economic, and environmental determinants that drive the epidemiology of malaria. This concept may well be understood in theory but translating the theory to practice, is where the challenge lies. We must move towards a more preventative and developmental approach. We are constantly reminded that the future holds the promise of vaccinations and other more advanced treatments, but in the interim, straight forward public health approaches, based on making malaria every body’s business, leaving no one behind for sustainable development, will continue to be essential.

The current COVID-19 pandemic has revealed inequalities, societal drivers, and shown that comprehensive multi-sectoral approaches are critical if we are to tackle both current and future epidemic, pandemic and endemic diseases. We know this publication will really help in this respect. The origins of the document and indeed its predecessor published in 2013 provided much needed guidance and wisdom for those of us who passionately care about malaria. Since then, much has been learned to help better understand, monitor and design interventions across sectors. We have also benefitted from the scientific research. The document is one of several tools which are placed at the disposal of those responsible, particularly at the local level, to assist them in improving interventions and monitoring effectiveness. It provides some good case studies, which we hope will stimulate local adaptation and replication.



The current COVID-19 pandemic has revealed inequalities, societal drivers, and shown that comprehensive multi-sectoral approaches are critical if we are to tackle both current and future epidemic, pandemic and endemic diseases. We know this publication will really help in this respect.

Therefore, the RBM Partnership to End Malaria Multi-sectoral Working Group has devoted its Workstream III, 'The Path-finder Endeavour' to identify partners, tools, path-finder countries and start rolling out the concepts and proposals of the framework in 10 to 15 countries covering different geographic, epidemiologic, and ecologic situations to 'try, learn and share'.

In conclusion, malaria although recognised as a major killer, particularly of the young under 5's, pregnant women, and the poor, still does not receive the attention or support it deserves. In the current climate of the COVID pandemic, we have already seen many lives lost as a result of resources being diverted. Let us not forget that malaria management has been one of the casualties and we must do all we can to protect the most vulnerable.

Peter Kwehangana Mbabazi

Co-chair RBM Multi-sectoral Working Group
Finance and Multisectoral Collaboration-Expert
National Malaria Control Division,
Ministry of Health, Uganda

Graham Alabaster

Co-Chair RBM Multi-sectoral Working Group
Chief Geneva Office UNHabitat

Konstantina Boutsika

Coordinator RBM Multi-sectoral Working Group
Swiss Tropical and Public Health Institute, Switzerland

PROCESS AND ACKNOWLEDGEMENTS

Author: Dr. Erik Blas (Public Health Expert, Copenhagen)

The original idea of developing the 2013 version of the Multisectoral Action Framework for Malaria was conceived by Rebeca Grynspan (former UN Under-Secretary-General and Associate Administrator of UNDP) and Dr Fatoumata Nafo-Traoré (former Executive Director, Roll Back Malaria Partnership) in 2012. The idea was based on mounting evidence suggesting that sustainable malaria control and elimination would require expanding the response to include socio-economic development in addition to the strategies already pursued, through expanding the breadth and depth of multisectoral participation.

By 2019, it was felt that the Framework needed updating to capture emerging needs and experiences, to align with the 2030 Agenda for Sustainable Development. It was decided to follow the Framework through to implementation with the addition of two accompanying products: a rapid appraisal tool and a roadmap to implementation via ‘pathfinding’ in 10 to 15 malaria-endemic countries.

The process of updating the Framework was overseen by Dr. Maisoon Elbukhari (UNDP, Geneva), Dudley Tarlton (UNDP Istanbul Regional Hub, Turkey), and Dr. Joshua Levens (RBM Partnership to End Malaria, Geneva). The work was supported by Fatima Bashir (UNDP, Geneva).

The process was long, faced many hurdles, and involved several steps. First, soliciting feedback, comments and suggestions on the 2013 version from all the 54 participants of the two meetings of the RBM Multisectoral Working Group (MSWG) plus a few more referred to by these. Second, participation in a meeting of the RBM Advocacy & Resource Mobilisation Partner Committee in Geneva (June 2019). Third, participation in a high burden to high impact (HBHI) workshop in Ghana (June 2019). Fourth, drafting of an update and sending it for review to all those who had responded in the first round plus nine UNDP country, regional and HQ staff. A total of 36 responded in the two rounds and their comments and suggestions were taken into account while preparing the penultimate draft by December 2019.

Further, the penultimate draft framework document was reviewed by a panel drawn from the membership of the MSWG.

- Dr. Ahmad Raeisi (Ministry of Health and Medical Education, Iran)
- Arnold Mmbando (Ifakara Health Institute, Tanzania)
- Justin McBeath (Bayer, United Kingdom)
- Luciano Tuseo (WHO Country Office, Cambodia)
- Mah Talat (The Indus Health Network, Pakistan)
- Peter Mbabazi (National Malaria Control Division, Ministry of Health, Uganda)
- Priyanie Amerasinghe (Consultative Group for International Agricultural Research, Sri Lanka)
- Dr. Raman Velayudhan (WHO/NTD, Geneva)
- Suzanne Van Hulle (Catholic Relief Services, United States)
- Zacharie Fotso Fokam (UNDP Country Office, Chad)

The final draft was reviewed by Dr. Luis D'Souza (UNDP, United States). Finally, the Framework was updated with the latest statistics on malaria cases, death and funding from the World Malaria Report 2021

The following contributed with inputs and review during the process:

Achim Reddig (BASF SE, Germany); Ahmad Raeisi (Tehran University/Ministry of Health and Medical Education, Islamic Republic of Iran); Alastair Robb (Senior Adviser, WHO Global Malaria Programme, Geneva); Anna McCartney-Melstad (Johns Hopkins Center for Communication Programs, United States); Arnold Mmbando (Ifakara Health Institute, Tanzania); Balla Kandeh (Ministry of Health and Social Welfare, The Gambia); Belynda Amankwa (Programme Specialist, UNDP, Ghana); Clement Keraf-Hinzoumbe (Malaria Adviser, UNDP, Chad); Douglas Webb (UNDP, United States); Dudley Tarlton (UNDP Istanbul Regional Hub, Turkey); Emmanuel Boadi (Project Coordinator/Manager, UNDP, Zimbabwe); Dr. Eunice Misiani (National Department of Health, South Africa); Harriet Akello Pasquale (National Malaria Control Programme Director, National Ministry of Health, Republic of South Sudan); Helen Prytherch (Swiss Tropical and Public Health Institute, Switzerland); Jens Byskov (Associate Professor Emeritus, University of Copenhagen/University of Zambia); Jo Lines (London School of Hygiene & Tropical Medicine, United Kingdom); Justin McBeath (Bayer, United Kingdom); Kausar S Khan (Community Engagement Centre; Indus Hospital Network, Karachi, Pakistan); Keziah Malm (National Malaria Control Programme, Ghana); Konstantina Boutsika (Swiss Tropical and Public Health Institute, Switzerland); Layla Hasler (Swiss Tropical and Public Health Institute, Switzerland); Mah Talat (The Indus Hospital, Pakistan); Manuel De Araújo (PhD, Mayor, Quelimane, Mozambique; Center for Mozambican and International Studies, Mozambique); Mark Hoppé (Syngenta, Switzerland); Nicole Valentine (Senior Technical Officer WHO/SDH, Geneva); Peter Kwehangana Mbabazi (National Malaria Control Programme, Ministry of Health, Uganda); Pierre Pratley (Senior Researcher, Royal Tropical Institute, The Netherlands); Priyanie Amerasinghe (International Water Management Institute, Sri Lanka); Rory Nefdt (Senior Adviser Health, Child and Community Health UNICEF, NY); Saleban Omar (UNDP, Regional Center for Africa, Addis Ababa, Ethiopia); Samuel Asiedu Agyei (Anglogold Ashanti Malaria Control Limited, Ghana); Samuel Okello (Kisumu City Board, Kenya); Ahmad Walid Sediqi (Malaria Programme Officer, UNDP/Global Fund Programme, Afghanistan); Steve Lindsay (Durham University, United Kingdom); Suzanne Van Hulle (Catholic Relief Services, United States); and Valentina Buj (UNICEF Global Malaria and Health Partnerships Adviser, United States).

The funding for the work was made available by UNDP and the Roll Back Malaria Partnership.

ABBREVIATIONS AND ACRONYMS

ACT	Artemisinin-based combination therapy
AIDS	Acquired immunodeficiency syndrome
ALMA	African Leaders Malaria Alliance
API	Annual parasite index
COVID-19	Coronavirus disease
DALY	Disability adjusted life-year
DDT	Dichlorodiphenyltrichloroethane
E8	Elimination 8, collaboration between eight countries in Southern Africa
GDP	Gross domestic product
GMP	WHO Global Malaria Programme
GMAP	Global Malaria Action Plan
GMS	Greater Mekong Subregion
GNI	Gross national income
GTS	WHO Global Technical Strategy for Malaria
HBHI	High burden to high impact
HDI	Human Development Index
HIV	Human immunodeficiency virus
IMAGE	Intervention with Microfinance for AIDS and Gender Equity
IOM	International Organization for Migration
IPTp	Intermittent preventive treatment in pregnancy
IRS	Indoor residual spraying
ITN	Insecticide-treated mosquito net
LLIH	Long-lasting insecticidal hammocks
LLIN	Long-lasting insecticidal nets
MAAM	Mass Action Against Malaria
MDAST	Malaria Decision Analysis Support Tool
MDG	Millennium Development Goal
MoH	Ministry of Health
MVP	Millennium Villages Project
NGO	Non-governmental organization
RBM	RBM Partnership to End Malaria
RBM MSWG	Roll Back Malaria Multisectoral Working Group
RDT	Rapid diagnostic test
ROI	Return on investment
SAGme	WHO Strategic Advisory Group on Malaria Eradication
SDG	Sustainable Development Goal
SES	Socio-economic status
TDR	Special Programme for Research and Training in Tropical Diseases
TReNDS	Thematic Research Network on Data and Statistics
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations Children’s Fund
UNS	Upper Nile State
WHO	World Health Organization
WMR	World Malaria Report (2018, 2019, 2020, 2021 = year published)

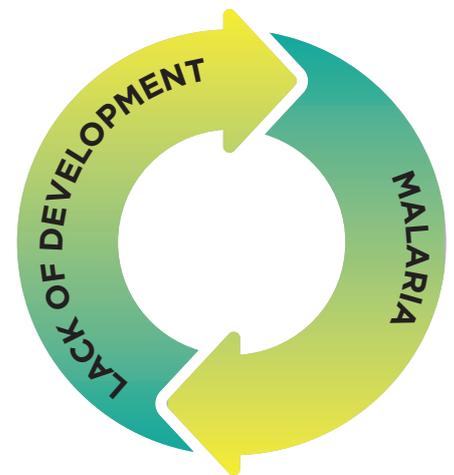
EXECUTIVE SUMMARY



Comprehensive multisectoral action for malaria complements conventional malaria interventions and selective sectoral actions.

In 2020, there were 241 million cases of malaria compared to 224 million five years ago and 241 million 20 years ago. In Africa alone, 11.6 million pregnant women were infected with malaria and as one consequence, 819,000 children were born with low birth weight. That is, from the very first minute of their lives, they were already behind because of malaria.

To make matters worse, malaria is hitting hardest those countries and population groups that are already struggling the most with other social and economic development challenges. Malaria is a highly inequitable disease, trapping countries and populations in a vicious cycle. The current COVID-19 pandemic will only contribute to accelerating the vicious cycle.



Conventional malaria programme interventions and selective sectoral actions have over the past 20 years contributed to reducing the global number of malaria deaths by 30 percent, but are now faced with several challenges. For example, the lowest-hanging malaria elimination fruits have mostly been harvested; the number of malaria cases in the worst-hit countries is now growing; the funding gap to what is needed to meet the milestones towards the 2030 goals for elimination is widening; and malaria is increasingly concentrated in the most disadvantaged countries and within countries in the most disadvantaged areas and population groups. This appears to have halted further progress.



The current COVID-19 pandemic will only contribute to accelerating the vicious cycle.

What is comprehensive multisectoral action against malaria?

Comprehensive multisectoral action takes place on a political and institutional canvas and is part of a family of approaches: whole-of-society, whole-of-government and health-in-all-policies. Multisectoral action against malaria does not mean that non-health sectors will finance malaria interventions, nor does it mean that the health sector should finance malaria interventions in other sectors. Comprehensive multisectoral action for malaria and for health and non-health actors entails five steps to become malaria-smart:

5 STEPS

TO BECOMING MALARIA-SMART

5. Socio-economic development for malaria and synergies with other sectors. Identify and collaborate on the sectoral potential and role in addressing those determinants of malaria where acting alone or concerted efforts by multiple sectors are required.

4. Malaria-reducing potentials. Review and scale up current activities that could be modified or added onto to have a malaria-reducing effect, i.e., do good.

3. Malaria-producing activities. Develop and promote operation, practices, procedures and production systems and the use of approaches that do not produce malaria, i.e., do no harm.

2. Clients and their families. Promote malaria-safe behaviours, prevention, protection and treatment, and if relevant provide support and means to do so.

1. Own staff and their families. Promote malaria-safe behaviours and provide support and means for prevention, protection and access to treatment.

**SUSTAINABLE
ELIMINATION**



This Comprehensive Multisectoral Action Framework (the Framework) is intended to guide countries, ministries, National Malaria Control Programmes, and non-health sectors – in coordination with global and regional funders and partners – on how to implement comprehensive multisectoral action against malaria. It is intended to help identify the entry points for the different sectors; help identify needed actions and policies to implement multisectoral action; and, leveraging on countries' momentum in achieving the Sustainable Development Goals, to help countries frame their malaria-elimination goals within their overarching Sustainable Development Goals.

The Framework, first published in 2013, analysed the determinants for the malaria situation and proposed a series of development actions to complement conventional malaria programmes to break and reverse the vicious cycle. However, the uptake of the proposals was somewhat limited. The 2022 refreshment of the Framework, while building on the same ideas and principles as the 2013 version, embraces that world leaders have since come together behind the 17 Sustainable Development Goals (SDG), including that they are *indivisible* and have the overriding themes to *leave no one behind* and *sustainability*.

The Framework has been updated and refined, drawing on new lessons learned and capturing some of the many new international initiatives. Two major changes compared to the 2013 version are:

- Link to the **2030 Agenda for Sustainable Development**, its 17 goals with indicators as a structure for comprehensive action and orchestrating co-benefits and integration into existing governance, businesses, programmes, funding streams, and management mechanisms for them to become malaria-smart while pursuing their primary sectoral objectives.
- Launch a **Pathfinder endeavour** for a *try, learn, share* roll-out in selected districts of 10 to 15 malaria-endemic countries. The endeavour will be guided by the Steering Group for Workstream III of the RBM Multisectoral Working Group.



The 2022 refreshment of the Framework, (...) embraces that world leaders have since come together behind the 17 Sustainable Development Goals (SDG), including that they are indivisible and have the overriding themes to leave no one behind and sustainability.

The Framework has as target readers malaria and development practitioners at country and international levels who are interested in learning about the links between malaria and development and eventually making a positive difference in their own work. A distinct target audience is the participants in the Pathfinder endeavour.

The Framework comes in four parts and an annex.



INTRODUCTION

Describes the current context of the Framework, including within the renewed high burden to high impact efforts of the Global Malaria Programme (WHO) and the RBM Partnership to End Malaria. It further addresses three key questions: What is malaria and why is it such a difficult disease? Why is malaria such an important disease? Why is it so difficult to sustain adequate responses?

Exemplified with the case of Sri Lanka – certified malaria-free in 2016 – it is demonstrated how the odds for malaria elimination are raised through social and economic development in particular with respect to SDGs 1, 4, 5, 6, 7, 8, and 11. Finally, it is illustrated how groupings of SDGs (political/institutional, economic, social, environment, and health) can have both positive and adverse links with malaria.



MAJOR DETERMINANTS

Analyses the determinants of malaria ranked in a five-level hierarchy: (1) society, (2) social environment, (3) physical environment, (4) population group, and (5) households and individuals. The analysis is illustrated with examples from Tajikistan, Thailand, the Republic of South Sudan, Pakistan, Lao PDR, Ghana, and Tanzania; as well as by the results of an equity study covering 30 endemic countries in sub-Saharan Africa.

Part Two summarizes the analysis in a determinants-matrix matching five important determinants for each level of the above hierarchy with 16 different sectors.



PROMISING ACTIONS

Starts by looking into three examples of multisectoral development action (Kenya, the Islamic Republic of Iran, and Brazil), how they have addressed the different levels of the determinants-hierarchy, and how they have impacted malaria. Then one line of the determinants-matrix (urban and peri-urban settings and infrastructures) is expanded to illustrate, sector by sector, the potential entry points, the action and what the co-benefits of concerted action (malaria, sectoral and SDG outcomes) are.

Part Three proposes several tools, including a five-step ladder to climb for sectors and individual actors to become malaria-smart, how to frame multisectoral action for malaria, coordination and management, and accountability and empowerment. A case box shows a leadership accountability score card with multisectoral elements from the Democratic Republic of the Congo. In another text box, it is shown how multisectoral action for malaria in the case of Uganda is organized and anchored in existing local governance structures. Further, a subset of the SDG indicators – two for each SDG – is proposed to be of interest for monitoring comprehensive multisectoral action for malaria. Finally, financing is addressed. Not so much as a request for dedicated funding for multisectoral malaria action – but to encourage public and private investors and actors as well as donors to ‘hedge’ their investments and activities by becoming malaria-smart.



WAY FORWARD

Despite enormous amounts of information available in the form of scientific publications and postings on the internet, there are still knowledge gaps in relation to comprehensive multisectoral action for malaria. This includes: better understanding of causality and thresholds; how to optimize application of new technologies to better share, analyse and use information across sectors – including for citizen participation and public accountability; what are the costs and benefits of doing things differently – and how are these distributed; how to make it all happen; and what works.

Part Four ends by describing the comprehensive multisectoral pathfinding endeavour to put the Framework into practice in some of the districts and places hardest hit by malaria while at the same time contributing to narrowing the global knowledge gaps.



EXAMPLES OF INTERVENTIONS ON DETERMINANTS THAT WILL IMPACT MALARIA

Provides for each of the 25 lines of the determinants-matrix in Part Two links and references for further information and examples. More than 150 such links and references are provided.

This Framework is further complemented by separate sector-specific advocacy briefs designed to provide the overall context for selected sectors and their connection to malaria transmission and elimination. The complementary briefs also provide lists of specific actions and entry points that can be taken by the sector to implement malaria-smart interventions.

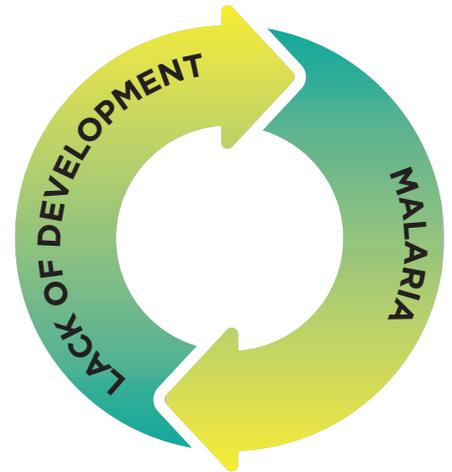


Part 01

INTRODUCTION

Current context of the Framework

Part One describes the current context of the Framework, including within the renewed ‘high burden to high impact’ efforts of the Global Malaria Programme (WHO) and the RBM Partnership to End Malaria. It further addresses three key issues: What is malaria and why is it such a difficult disease? Why is malaria such an important disease? Why is it so difficult to sustain adequate responses? The Framework argues that malaria is part of a vicious cycle and only by breaking or reversing this cycle can malaria be sustainably eliminated.



Exemplified with the case of Sri Lanka – certified malaria-free in 2016 – it is demonstrated how the odds for malaria elimination are raised through social and economic development in particular with respect to SDGs 1, 4, 5, 6, 7, 8, and 11. Finally, it is illustrated how groupings of SDGs (political/institutional, economic, social, environment, and health) can have adverse, respectively positive links with malaria.

Comprehensive multisectoral action for malaria complements conventional malaria interventions and selective sectoral responses. It supports societal integration to remove malaria as a roadblock for sustainable social and economic development and ensure that no one is left behind.

1. Background

1.1 The global context

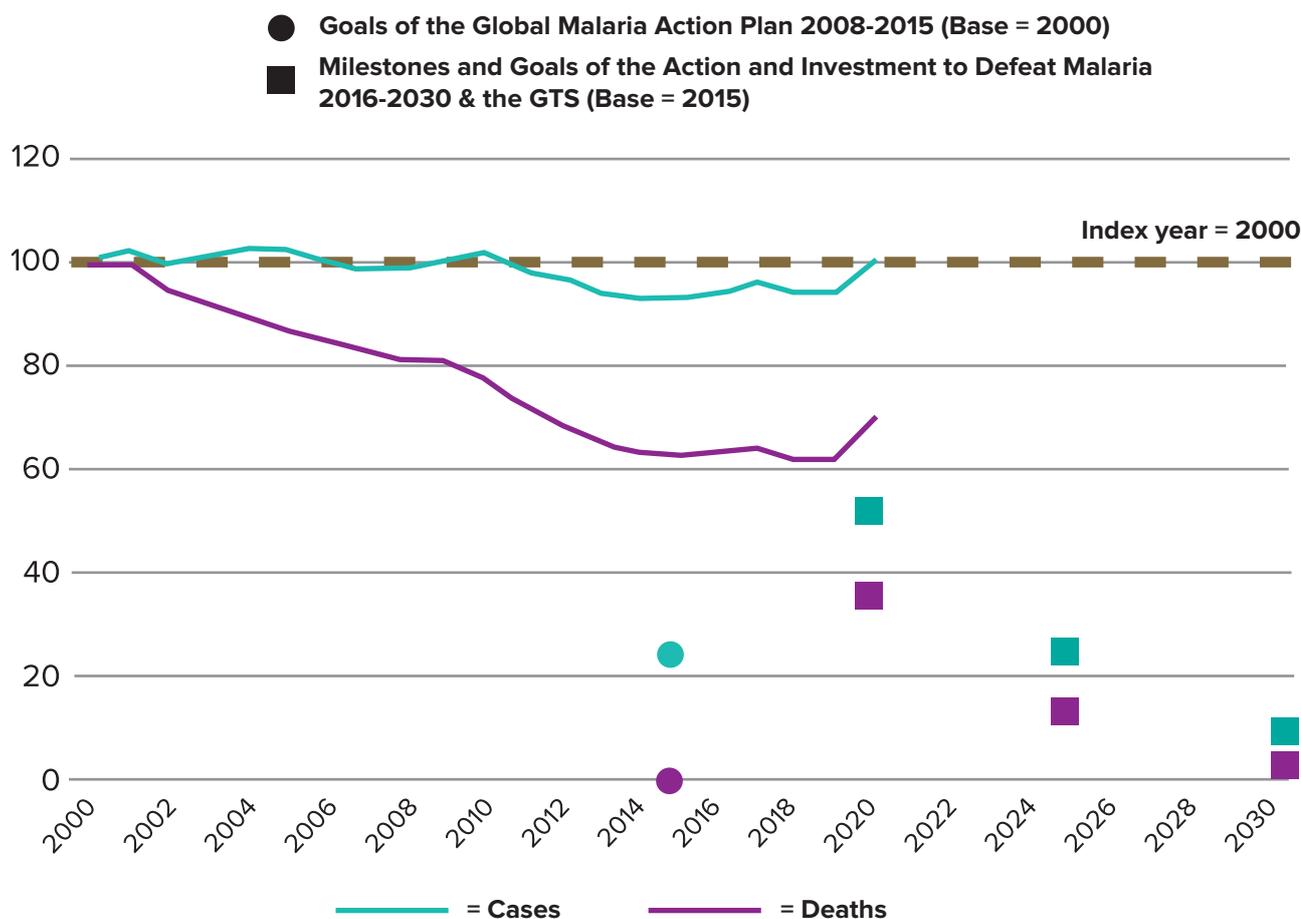
In 2020 there were an estimated 241 million malaria cases in 85 endemic countries. 95 percent of these cases were in the WHO African Region. 627,000 people died from malaria in 2020 (2). The World Malaria Report (WMR) 2018 foresaw that critical 2020 milestones of the WHO Global Technical Strategy for Malaria 2016-2030 (GTS) for reduction of malaria cases and deaths would not be met. Further, the report stated that the 10 highest-burden African countries saw an estimated 3.5 million more malaria cases in 2017 compared to the previous year (1).

Indeed, the WMR2021 confirmed that the 2020 milestones were not met. To the contrary, the plateaued situation that began around 2014 was followed by sharp increases in numbers of both malaria cases and deaths from 2019 to 2020 (**Figure 1.1**).



Comprehensive multisectoral action for malaria complements conventional malaria interventions and selective sectoral responses.

Figure 1.1: Global malaria cases, deaths, and goals 2000-2030¹



The WMR2021 explains these increases as partly caused by the service disruptions that most malaria endemic countries experienced due to the coronavirus disease (COVID-19) pandemic. Further, the report notes that the funding gap between the amount invested and the resources needed to pursue the GTS milestones has widened dramatically from US\$ 2.3 billion in 2018 to 2.6 billion in 2019 and 3.5 billion in 2020 (2).

From 2000 to 2010, the global number of malaria cases remained constant. Then until about 2014 there was a small decrease followed by another plateau before the number of cases rose sharply from 2019 to 2020. The total number of malaria cases in 2020 was 241 million, i.e., the same as in 2000. The annual global number of malaria deaths fell steadily from 2002 until 2010. Then it fell sharply until 2014 when a plateau was hit. This plateau remained up to 2019 when the number of malaria deaths also rose sharply. Clearly none of the 2010, 2015 and 2020 goals and milestones were met (Figure 1.1).

The WHO Strategic Advisory Group on Malaria Eradication (SAGme) said it clearly: “The world is not on track to meet the 2020 milestones that will lead us to lower case incidence and mortality by 90 percent from the 2015 level by 2030. Without massive concerted and coordinated action, we are unlikely to meet these targets.” (4)

¹ Over the years the WHO has used different methods for estimating malaria cases and deaths and thus different numbers are reported in different reports. However, figure 1.1 uses for the full time-period the numbers reported in WMR 2021 (table 3.1). Further, the goals of the Global Malaria Action Plan 2008-2015 for 2010 and 2015 were based on reducing the absolute numbers of malaria cases and death and using year 2000 as the baseline. The milestones and goals of the GTS 2016-2030 are based on reducing rates, i.e., of malaria cases incidence per 1000 persons and malaria mortality rate per 100,000 persons with 2015 as the baseline year. Figure 1.1 attempts to work it all together to illustrate the big picture.



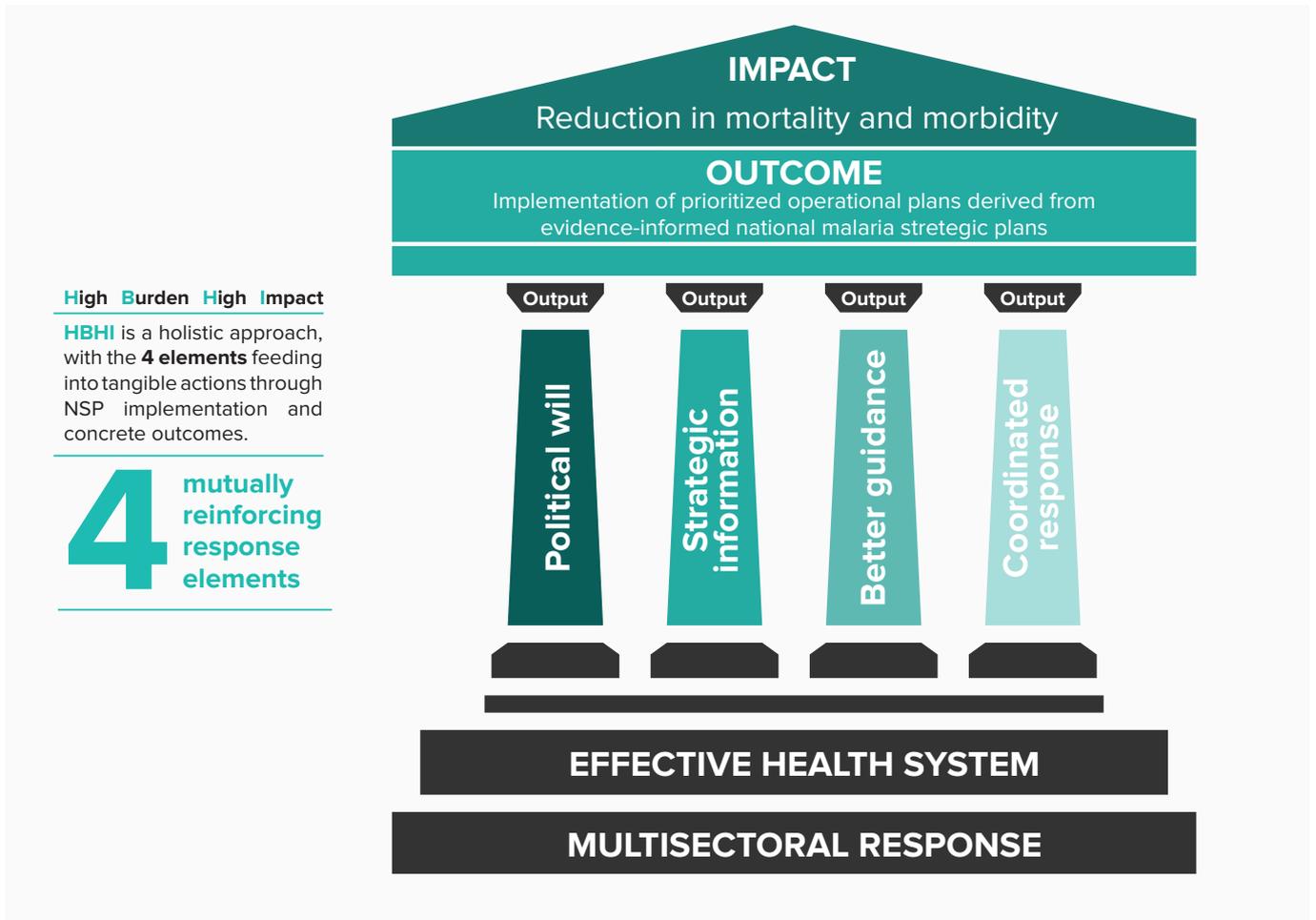
“Clearly, we need to change the course and improve how we combat malaria, particularly in those countries with the highest burden. The status quo will take us further off track and have significant negative socio-economic consequences beyond malaria.” (1)

Dr Tedros Adhanom Ghebreyesus, WHO Director-General

In May 2018, the WHO Director-General called on countries to take a more aggressive approach in their fight against malaria. In response to these calls, the WHO Global Malaria Programme and the RBM Partnership to End Malaria launched ‘high burden to high impact’ (HBHI) in October 2018, a country-led initiative designed to use increased funding in a smarter way (5).

HBHI (Figure 1.2) includes four pillars – political will, strategic information, better guidance and coordinated response – that all stand on a foundation of effective health systems and multisectoral responses.

Figure 1.2: The building blocks of the HBHI initiative



The HBHI initiative is now being rolled out in the 11 highest-burden countries, i.e. those with the largest number of cases,² with the goal of getting back on track to meet the GTS milestones for 2020.

Malaria is intricately linked to socio-economic development and inequity. The evidence is unequivocal. The burden of malaria is highest in the countries with the lowest human development. Within countries it is highest in the least-developed and poorest areas, and within populations among the most disadvantaged.

The Global Fund to Fight AIDS, Tuberculosis and Malaria has further stressed the need to attack the malaria elimination challenges from more than one angle. “There is no magic bullet against malaria.”³

1.2 What is malaria and why is it such a difficult disease?

Malaria transmission should be seen within social and physical contexts and as a tripartite chain: mosquitoes as the vector, the parasite as the aetiological agent, and humans as both the target and reservoir to continue the cycle of infections. All three parts of this triangle should be addressed in order to effectively control and eventually eliminate malaria as a public health problem (6;7).

Malaria is a collective name for the diseases produced by infection with any of the five Plasmodium parasites that can infect humans – *P. falciparum*, *P. vivax*, *P. malariae*, *P. ovale* and *P. knowlesi* – and transmitted by the bite of an infectious mosquito. *P. knowlesi* has increasingly been reported in Southeast Asia including Brunei, Cambodia, India, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam, Indonesian Borneo, and more recently Sumatra Island.⁴ In microscopy it is difficult to distinguish from other forms – something that frequently leads to failure to diagnose severe malaria with fatal outcomes. Furthermore, unlike the *Plasmodium falciparum* species, *P. knowlesi* has an animal reservoir: this zoonotic nature of infection hampers malaria elimination efforts (8).

To date, only the Anopheles genus of mosquitoes has been found to transmit the parasite that infects humans. About 60 species of mosquitoes transmit more or less effectively (9). The different vector and Plasmodium species’ distribution result in malaria occurring in a wide range of ecological situations and underlie the great variability and overall resilience of the transmission chain to social or ecological change and to malaria control efforts.

The most common symptom of malaria is a severe intermittent fever. Other symptoms that may arise in conjunction or separately include headache, lassitude, fatigue, diarrhoea, muscle and joint aches, chills, perspiration, anorexia, vomiting and worsening malaise. The non-specificity of symptoms (especially early signs which resemble many other causes of illness, especially viral illnesses) often leads to malaria being over-diagnosed based on symptoms alone, especially in endemic areas. Failure to adequately diagnose and treat malaria, especially in the case of infection with *P. falciparum*, may lead to severe complications and death.

2 United Republic of Tanzania, Uganda, Ghana, Mozambique, Democratic Republic of the Congo, Niger, Mali, Nigeria, Cameroon, Burkina Faso and India

3 <http://www.theglobalfund.org/en/blog/33545/>

4 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6291163/>

However, frequent repeated infections which are common in highly endemic settings can bring about partial immunity. Prolonged disease, malnutrition, especially severe anaemia, and other effects associated with being infected with the Plasmodium parasite not only increase the direct risk of death but also leave the person at higher risk for morbidity and mortality from other diseases. In very highly endemic areas – especially in Africa and Southeast Asia – children who survive beyond the age of five years will have developed a certain level of immunity. This immunity, however, can be lost as exposure decreases (e.g. when migrating to urban areas), and it is not fully protective. Everyone, therefore, remains at risk if they are not being protected, e.g. using a long-lasting insecticidal net (LLIN), indoor residual spraying (IRS), or getting rapid diagnosis and treatment after first onset of symptoms.

Where there are still high levels of immunity and subclinical infection, epidemics are less likely. However, when transmission has been reduced for some time, the community will have lost its immunity and epidemics may occur. Reintroduction of transmission in areas where it has been previously halted will probably lead to lethal epidemics if not properly addressed and controlled.

Resistance against insecticides and malaria drugs continues to evolve. Since 2010, a total of 68 countries have reported resistance to at least one class of insecticides, with 57 reporting resistance to two or more classes. However, many countries do not carry out adequate resistance monitoring and data is often not reported in a timely manner.⁵

Multiple resistance to the insecticides used in public health responses, including to dichlorodiphenyltrichloroethane (DDT) and pyrethroids, is a major concern in vector control initiatives in Asia and Africa, posing a threat to the effectiveness of IRS and insecticide-treated mosquito net (ITN)⁶ interventions.⁷ (10)

The first places to experience drug resistance in the 1950s were jungle gold mining areas with a high turnover of people, abundant money, and medicines that were accessible and abused (9). The parasite has been known to develop resistance to antimalarial drugs relatively quickly. It took 10 years for chloroquine, and four years for mefloquine. Artemisinin resistance has already been detected in the Greater Mekong Subregion (GMS) – one of the traditional epicentres of antimalarial resistance (11;11-13). If resistance is not quickly controlled or replacement products made readily available, it will pose severe risks to further progress towards malaria elimination, to public health, and to social and economic development. In the GMS, there is now at least one *P. falciparum* mutant resistant to each ACT partner drug and several have begun to show partial resistance to artesunate itself. If this resistance spreads to Africa, the result could be disastrous (13). The WMR2021 indicates that artemisinin resistance has already emerged in parts of Africa (2).

P. falciparum resistance to artemisinin has been detected in four countries in the GMS: Cambodia, Myanmar, Thailand and Vietnam. No alternative antimalarial medicine is currently available that offers the same level of efficacy and tolerability as ACTs and the emergence of artemisinin resistance is of great concern, particularly because resistance to other antimalarial medicine was also detected first in GMS, and subsequently spread elsewhere. The reason this sub-region has become one of the foci for drug resistance is suggested as a combination of loose regulation of antimalarials with

5 www.who.int/malaria/areas/vector_control/insecticide_resistance/en/

6 The terms insecticide-treated mosquito net (ITN) and long-lasting insecticidal nets (LLIN) are both used with the former used as a generic term

7 www.who.int/malaria/areas/vector_control/insecticide_resistance/en/

large proportions being counterfeit or sub-standard; misuse of the drugs and poor compliance by the patients; and high levels of population mobility (14), including transient non-immunes visiting forested areas where the extremely efficient *Anopheles dirus* can maintain malaria transmission at very low mosquito levels. This provides a dangerous mix for the development and spread of the drug-resistant parasite strains to other parts of the world.

Resistance to artemisinin-based therapies can, if widely spread, have catastrophic consequences for efforts to control and eliminate malaria. However, it is important to note that drug resistance may develop and spread anywhere. Just a single mutation, if surviving, may start a new lineage of resistance (15). Health systems – public, private, formal and informal – while shaped at societal level, are critical determinants for access, use, and the malaria outcomes for everyone as well as for building malaria drug resistance.

Strong **health care systems** with universal and easy access for all in need have long been known as prerequisite elements in overcoming malaria (9;16). Containment activities were initiated on the Cambodia-Thailand border in 2008 and are now being conducted in all four countries. The Global Plan for Artemisinin Resistance Containment⁸ was launched in 2001 and is a high-level plan of attack to protect ACT as an effective treatment for *Plasmodium falciparum* malaria and the Emergency Response to Artemisinin Resistance in the Greater Mekong Subregion (ERAR)⁹ was launched in 2013. It is a framework that identifies four priority areas for action to contain artemisinin resistance and move towards eliminating malaria: **1)** reach all at-risk groups with full coverage of quality interventions in priority areas; **2)** achieve tighter coordination and management of field operations; **3)** better information for artemisinin resistance containment; and **4)** strengthen regional oversight and support.

On 6 October 2021, WHO recommended that the **RTS,S malaria vaccine** be used for the prevention of *P. falciparum* malaria in children living in regions with moderate to high transmission. Pilots in three countries (Ghana, Malawi, and Kenya) showed that when included in routine childhood immunization, one life could be saved for every 200 vaccinated and a 40 percent reduction in malaria episodes (2). However, challenges remain with respect to financing, logistics and coverage of those most in need.

Figure 1.3: The vicious cycle



1.3 Why is malaria such an important disease?

Malaria is trapped in a vicious cycle: malaria leads to lack of development, and lack of development leads to malaria (Figure 1.3), thereby demanding a concurrent focus on the developmental factors and determinants of malaria.

Low socio-economic status roughly doubles the likelihood of clinical malaria or parasitaemia in children compared with children of higher socio-economic status within the same locality. The probability of dying from malaria in sub-Saharan countries is inversely related to the Human Development Index (HDI) for income and education (7). Since 2000, much of the progress in

8 <http://www.who.int/malaria/publications/atoz/9789241500838/en/index.html>

9 <http://www.who.int/malaria/publications/atoz/9789241505321/en/index.html>

reducing malaria incidence rates, especially in sub-Saharan Africa, owes the greatest impact to expanded access coverage of vector control interventions. In the absence of socio-economic development, failure to maintain insecticide and drug pressure against both vector and parasite can lead to milestones being missed and the disease bouncing back with dire consequences. This has been the case multiple times in the past and could happen again (17).

Because of the magnitude of the number of global cases and the scale of risk, malaria is considered an obstacle to economic development and simultaneously contributing to keeping countries and populations in poverty. In Africa alone, malaria-related illnesses and mortality were estimated by the Commission on Macroeconomics and Health to cost the African economy US\$12 billion per year and reduce economic growth by 1 percent per year in high-prevalence countries (18).

It is therefore not unusual to note the concern of business leaders about malaria. These concerns affect their investment decisions (19). Slow economic growth and inequality within and between countries contribute to lost opportunities, instability, and migration within and across countries.

The experience from countries that have significantly reduced malaria transmission shows that the relationship between malaria and socio-economic development is complex and varies by context. There is evidence of both lack-of-development-blocks-malaria-control and for malaria-blocks-development (9).

This makes it extremely difficult to make a comprehensive economic analysis on malaria. For example, a part analysis of marginal costs and cost savings suggests that the costs of the current elimination strategies will be substantially higher than the cost of control (20).

However, if the full social and economic benefits could be considered together with the amplification effect coming from social development, then the cost-benefit ratio for both control and elimination would no doubt increase. Also, most cost-benefit studies on social determinant interventions fail to capture the effects of these interventions on malaria and will thus understate the return on investment (21). Further, there are indications suggesting that once elimination begins to take hold, lower transmission combined with strong health systems and socio-economic factors are mutually reinforcing and potentially lower the costs of sustaining elimination (22). Finally, most development interventions are not primarily targeted at malaria and health, therefore the health benefits they produce are additional to their core focus, and the costs do not fall within the health sector (7).

1.4 Why is it so difficult to sustain an adequate response to malaria?

Malaria can and has indeed responded to energetic local and global campaigns. However it has often reappeared with added virulence once the campaign-style measures have been relaxed – bringing disillusion and discouragement for later and ongoing efforts (9). This, together with impeded progress, has repeatedly led to donor fatigue and difficulties sustaining adequate financing and consequently difficulties in sustaining programmatic efforts. The implementation of the Global Malaria Action Plan for a Malaria Free World 2000-2015 (23), which aimed to reduce global malaria death to near zero by 2015, reduce global malaria cases by 75 percent by end of 2015 (from 2000 levels), and eliminate malaria by the end of 2015 in 10 new countries (since 2008) and in the WHO Europe Region (24), faced such challenges and the overall reduction targets have not been met.

In the past nearly 100 years, there have been several attempts internationally to address malaria, including the Malaria Commission of the League of Nations in the 1920s, the global eradication campaigns of the 1950s and 1960s, the Ministerial Conference on Malaria in 1992 and the creation of the Roll Back Malaria movement and the Global Fund to Fight AIDS, Tuberculosis and Malaria at the turn of the millennium. There have been many high-level resolutions and political commitments made; and considerable amounts of money have been dedicated to and invested in malaria control with a marked effect on incidence rates and number of deaths (see, e.g., Figure 1.1 and Text Box 6.2).

It has long been recognized that malaria is a complex disease of poverty and that the vicious cycle (Figure 1.3) provides a strong amplifying force. However, programme targets have continued to be linked mainly to the application of technologies to either fight the vector or the parasite, with far less dedication to addressing the second part of the vicious cycle – lack of development. Although malaria transmission is affected by non-health sector-related factors that in many settings are the root cause of malaria, such as socio-economic development strategies, social and economic inequalities, living conditions, climate, agriculture and other occupational risks – the collective global response to malaria has been traditionally rooted in a health care-based approach with relatively less focus on non-health sector interventions.

Malaria elimination was achieved in many high-income countries in Europe and North America without malaria-specific interventions, but as a by-product of socio-economic development. The continued prevalence of the malaria vector without continued malaria transmission in many of these countries shows the robustness of the achievement (9;25). The 50 countries that successfully eliminated malaria between 1948 and the 2000s show striking similarities with the present-day malaria-eliminating countries. The average gross domestic product (GDP) per capita¹⁰ of the present malaria-eliminating countries is similar to the GDP per capita of the 50 countries when they eliminated malaria. Further, only 20 percent of the 50 countries had less than 0.5 physicians per 1,000 population at the time that they eliminated malaria. Of the present eliminating countries, this is the case for 21 percent (12).



Comprehensive multisectoral action encompassing a developmental approach and guided by the Sustainable Development Goals would supplement the health sector-based responses and be a strong catalyst to malaria elimination.

¹⁰ Purchasing-power parity in US\$ (2005)

This would be in line with the Global Technical Strategy for Malaria 2016-2030 which advocates for a health-in-all-policies approach for National Malaria Programmes, and encourages further collaboration with non-health sectors to target strategies that aim for poverty reduction, national development plans and regional development cooperation.¹¹

2. Comprehensive multisectoral causes and approach

2.1 Needs and opportunities for a comprehensive Framework

The Framework adds a comprehensive development dimension to malaria control and complements existing malaria-control strategies. It means making development work for malaria control and malaria control work for development. The opportunities and needs are echoed from those present in the 2030 Agenda for Sustainable Development (26), the Global Technical Strategy for Malaria 2016-2030 (27), the Action and Investment to Defeat Malaria 2016-2030 (28), the Global Vector Control Response 2017-2030 (29) and the Rio Political Declaration on Social Determinants of Health (30).

In an extensive analysis of the history of malaria and control efforts, the author RM Packard concludes: *“The history of malaria tells us that malaria cannot be understood or eliminated independently of changes in the societal forces that drive it. ... I argue that the array of biomedical weapons mobilized in the war against malaria needs to be joined with efforts to understand and improve the social and economic conditions that drive the epidemiology of the disease.”* (25)

Effectively treating individuals who are sick with malaria is a core business of the health sector. However, sustainably reducing the number of malaria cases in a society builds on a synergetic interplay between different spheres and sectors (**Figure 2.1**).

Figure 2.1: Synergetic impact of comprehensive multisectoral action for malaria.



¹¹ https://apps.who.int/iris/bitstream/handle/10665/176712/9789241564991_eng.pdf

Beyond health interventions, the choices made in politics, agriculture, building design, land and natural resource management, and infrastructure, among others, change the dynamics of malaria transmission.

Effectively and sustainably ending malaria requires development in the social, economic and physical environment in addition to development in the health sector (Figure 2.1). History has shown that dedicated malaria interventions alone are not sufficient. With reductions in coverage or interruptions in service, malaria quickly re-emerges – sometimes with devastating consequences. The re-emergence scenario is maintaining status quo in malaria control approaches.

Effective multisectoral action means that no development activity inadvertently promotes malaria transmission – rather, it aims to interrupt the transmission. Multisectoral action leverages existing resources and capacities to plan, design and manage policies and activities so that they benefit a broader range of socio-economic as well as malaria-specific objectives.

Multisectoral action is for the long haul, takes place on a political and institutional canvas and is part of a family of approaches: whole-of-society, whole-of-government and health-in-all-policies. Multisectoral action against malaria does not mean that non-health sectors will finance malaria interventions, nor does it mean that the health sector should finance malaria interventions in other sectors.

Orchestrated multisectoral action on malaria is needed to enhance and accelerate conventional malaria interventions. More importantly, it is needed to sustain achievements beyond 2030, i.e., beyond insecticides, prophylactic drugs, and malaria-specific disease-control programmes.

2.2 The case of Sri Lanka

The global malaria map shows that countries with indigenous cases form a ‘belt’ around the Equator (Figure 2.2).

Figure 2.2: Countries with indigenous cases in 2000 and their status in 2021 (2).



Those countries that have been certified malaria-free since 2000, or those approaching malaria-free status, are largely at the fringes of the belt. There is one noticeable exception though – the Democratic Socialist Republic of Sri Lanka (hereafter referred to as Sri Lanka), that was certified malaria-free in 2016.

On 5 September 2016, the same day as WHO certified Sri Lanka as malaria-free, the Lancet published a commentary, *‘Against the odds, Sri Lanka eliminates malaria’*, by the Sri Lankan Minister of Health and the WHO South-East Asia Regional Director (31).

The commentary describes how malaria transmission began to intensify in the 19th and 20th centuries as the opening of forested areas, plantation, irrigation, and agricultural projects were undertaken, first by the British colonial administration and later by the independent government. The commentary further describes how a turnaround began in 1999-2000 coinciding with increased malaria funding and interventions.

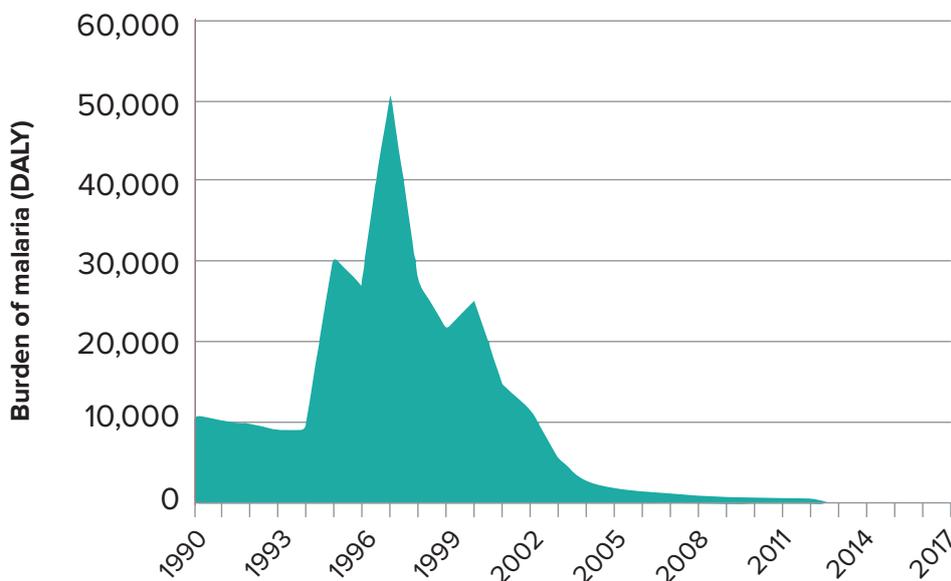


Figure 2.3: Burden of malaria in Sri Lanka (DALY)¹², all ages and both sexes.¹³

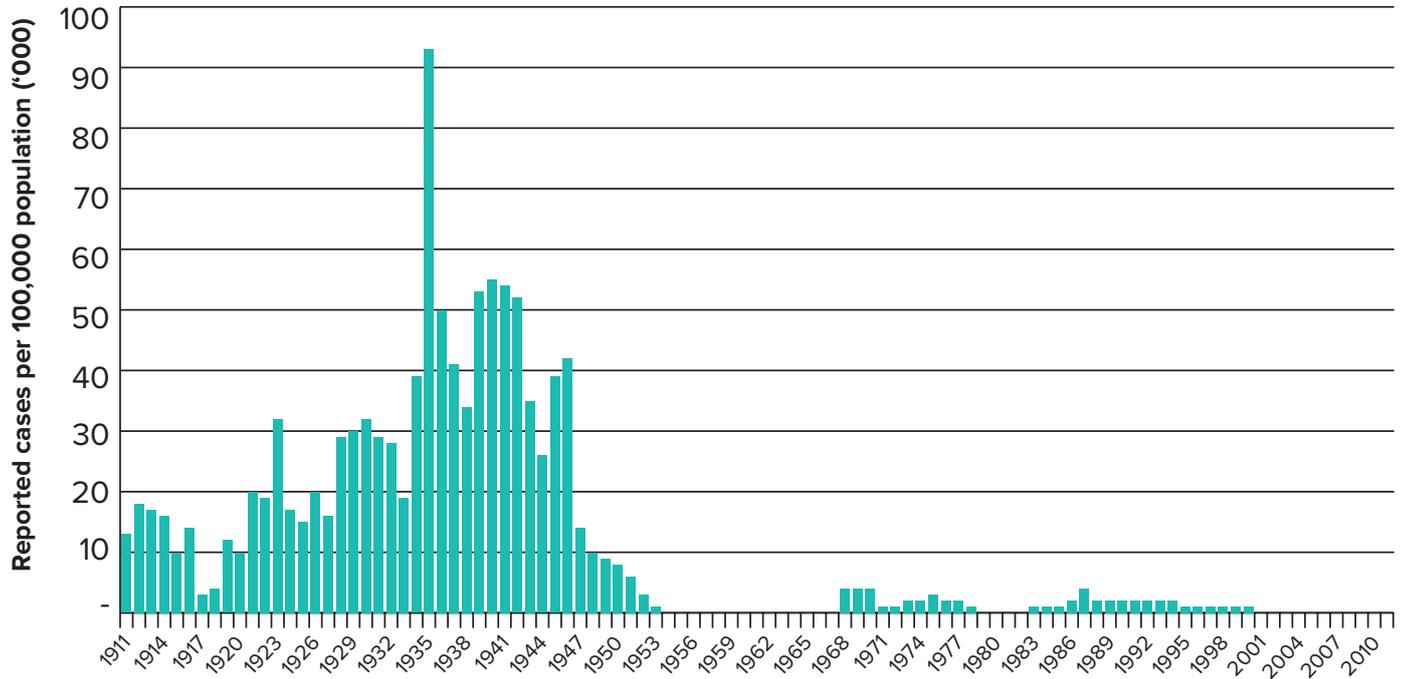
Figure 2.3 shows the immediate background for this turnaround, i.e., a surge in the burden of malaria peaking in 1997 and a rapid decline thereafter.

However, a longer-term analysis shows a massive presence of malaria during the entire first half of the 20th century with a devastating epidemic in 1935 – with about 5.5 million cases that year (32). After being largely eliminated during the 1950s and '60s, the latter part of the century saw five smaller epidemics that appear to gradually fade out (**Figure 2.4**).

¹² DALY = disability adjusted life-years lost. DALYs for a disease or health condition are calculated as the sum of the years of life lost (YLL) due to premature mortality in the population and the years lost due to disability (YLD) for people living with the health condition or its consequences.

¹³ <http://ghdx.healthdata.org/gbd-results-tool>

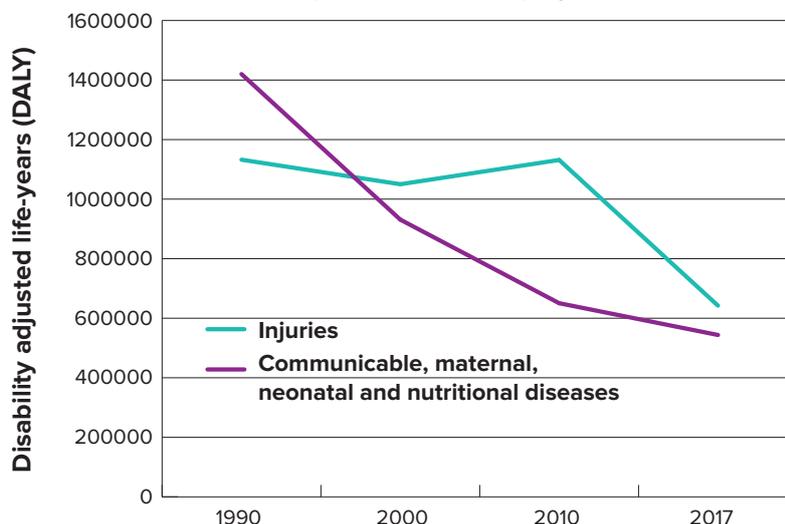
Figure 2.4 Sri Lanka, number of reported malaria cases per 100,000 population 1911-2011 (calculated based on visual reading from original graph (32) and historical population numbers).¹⁴



Due credit is to be given to the conventional malaria programme interventions for the remarkable achievement of near elimination in the 1960s and the certification of Sri Lanka as malaria-free in 2016. However, it must also be acknowledged that malaria transmission had originally intensified due to human activity. Further, it is important to consider that the context and thus the odds may have become more favourable since independence in February 1948.

For example, the same period (1990 to 2017), covered by Figure 2.3, saw a 62 percent decline (representing nearly a million DALYs) in the overall burden of communicable, maternal, neonatal and nutritional diseases, and a 43 percent reduction in injuries (Figure 2.5). This suggests that the reduction in malaria cases might not have been due to malaria-specific interventions alone.

Figure 2.5: Sri Lanka-Burden of Disease (BOD in DALYs) by cause – 1990-2017.¹⁵



¹⁴ <http://www.populstat.info/Asia/srilankc.htm> and <https://www.worldometers.info/world-population/sri-lanka-population/>
¹⁵ <http://ghdx.healthdata.org/gbd-results-tool>

Figure 2.6 shows the gross national income (GNI) per capita against the burden of malaria for 24 countries from across the ‘malaria belt’ (Figure 2.2). The relationship between income and the burden of malaria is clear. With Equatorial Guinea and Gabon as outliers, a lower burden of malaria will typically follow a higher level of income. The plot also suggests that there might be a threshold at around US\$5,000 per capita that should be passed to allow reductions in the malaria burden to take firm traction. This is commensurate with the common grouping of malaria among ‘diseases of poverty’ (33).

Figure 2.6: Gross national income per capita vs burden of malaria (rate, age-standardized) – 24 countries in the ‘malaria belt’ (2017).

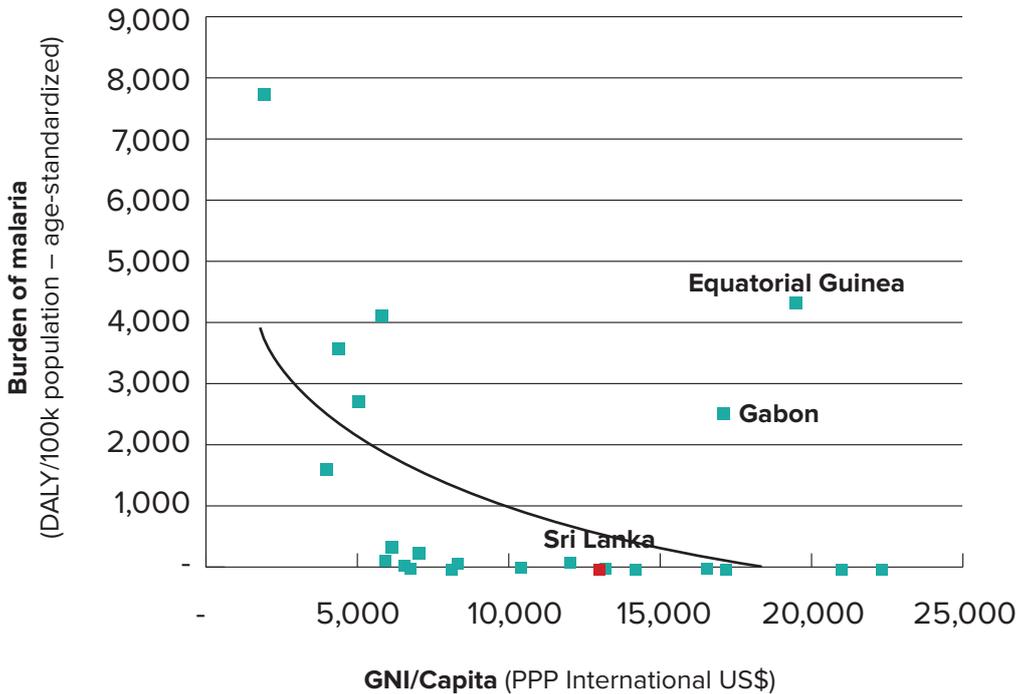
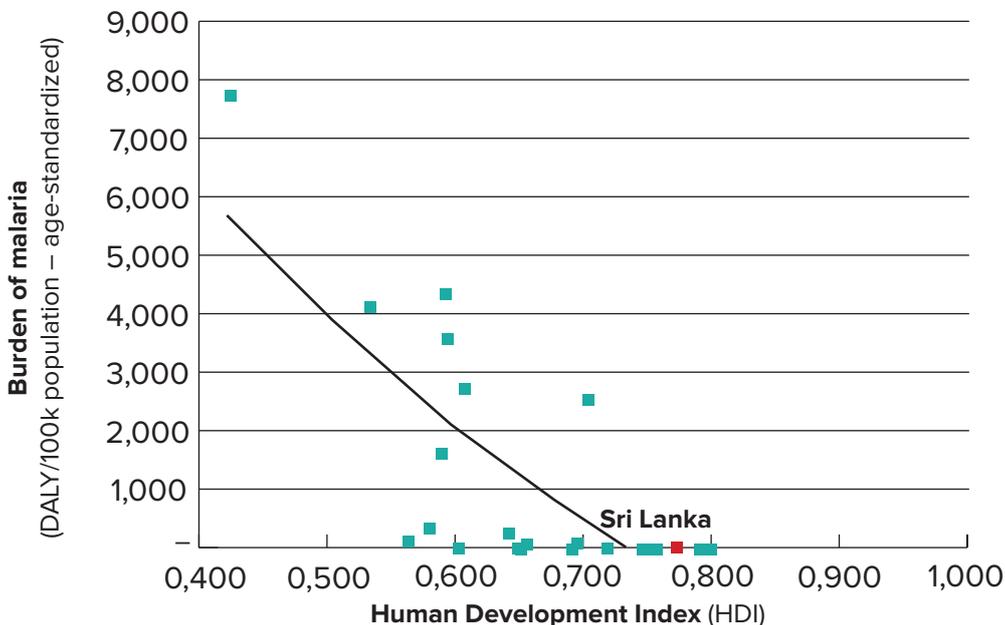


Figure 2.7: Human Development Index vs burden of malaria (rate, age-standardized) – 24 countries in the ‘malaria belt’ (2017).

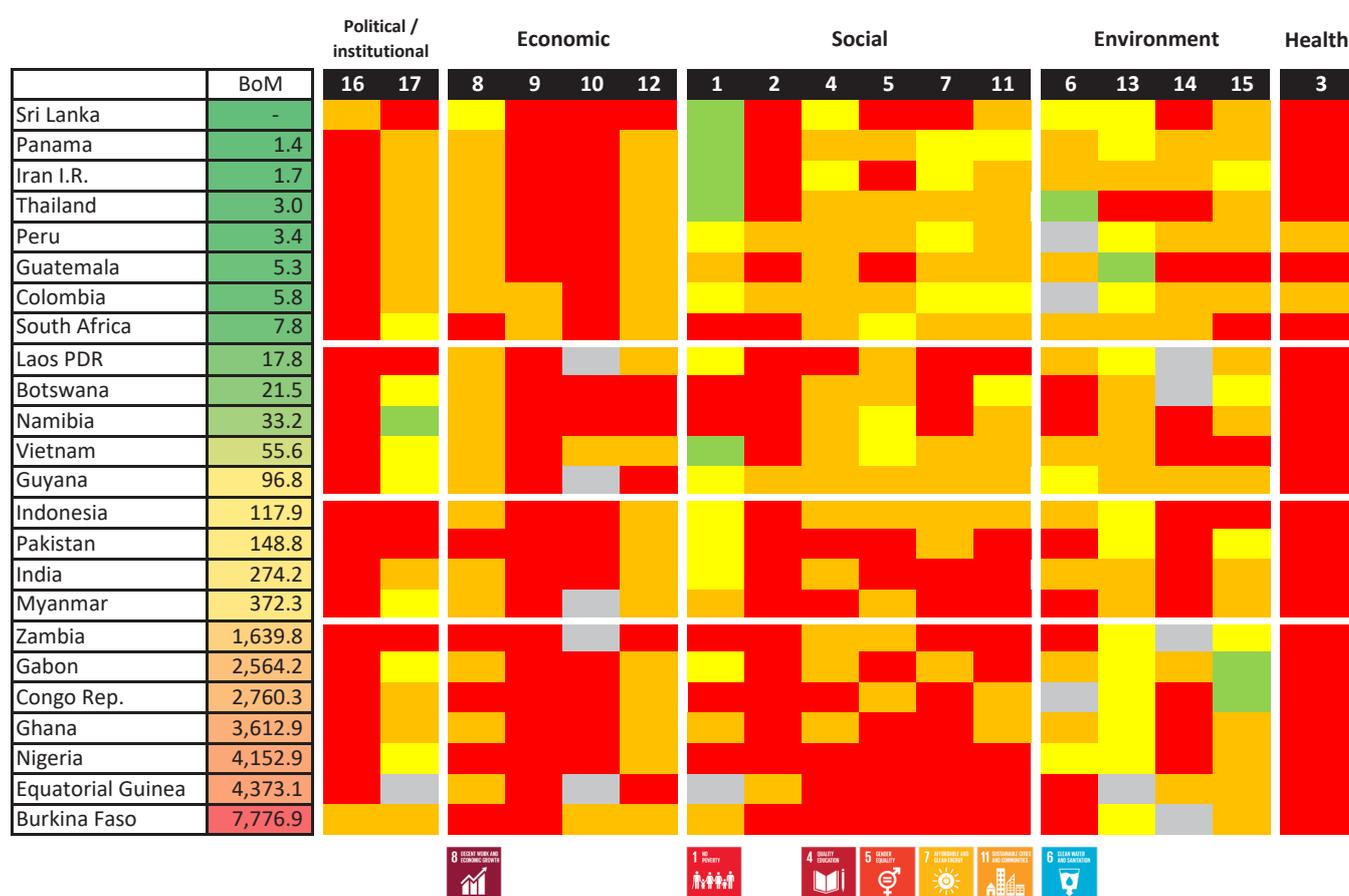


Likewise, a plot (Figure 2.7) of the same countries’ burden of malaria against their HDI also indicates a relationship – the higher the HDI, the lower the burden.

Those of the above countries that are nearer elimination have relatively higher GNI/capita and HDI compared with countries that have a comparatively longer way to go. Sri Lanka is in the middle of the GNI/capita range and at the top with respect to HDI. This could suggest that the odds for Sri Lanka to achieve malaria-free certification in 2016 might have been quite high. That is, elimination was not ‘against the odds’.

Figure 2.8 represents a more complex mapping of the same 24 countries as in figures 2.6 and 2.7, their malaria burden, and their Sustainable Development Goal (SDG) dashboards. The countries are ranked with Sri Lanka at the top and then according to increasing burden of malaria. The SDGs are arranged in five ‘groups’ corresponding to the five synergetic impact areas of Figure 2.1. The colour coding of the SDGs by individual country comes from the SDG Index and Dashboards Report 2018 – Global Responsibilities Implementing the Goals (34).

Figure 2.8: Burden of malaria – SDG dashboard for 24 countries in the ‘malaria belt’ – burden of malaria (DALY / 100 000 population, both sexes and age-standardized).¹⁶ The ‘traffic light’ colour scheme (green, yellow, orange, and red) illustrates how far a country is from achieving a particular SDG. Grey means that data was not available (34).



¹⁶ <http://ghdx.healthdata.org/gbd-results-tool>

There is considerable variation across countries and SDGs. However, looking at the ‘social group’ of goals, orange and red scores appear more dominant among the higher-burden countries than among lower-burden countries. Within the social group, the scores in SDG1 (No poverty), SDG4 (Quality education), SDG5 (Gender equality), SDG7 (Affordable and clean energy), and SDG11 (Sustainable cities and communities) indicate that targeted improvement in those might increase the odds of elimination and for conventional malaria interventions to succeed. Within the economic group, improvements in SDG8 (Decent work and economic growth) and within the environment group SDG6 (Clean water and sanitation) will likely have the same effect. It is noticeable that except for two countries (Peru and Colombia) all countries are ‘red’ for SDG3 (Health and well-being).

The economic and political crisis facing Sri Lanka in 2022 affects the daily lives of Sri Lankans as well as the country’s institutions. It will certainly challenge Sri Lanka’s malaria free status. Malaria cases might again be seen. However, the odds are good that any rise in cases will be relatively modest and transient (see also **Figure 2.4** and **Text Box 3.1**).

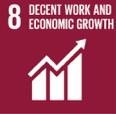
2.3 The Sustainable Development Goals

The 17 goals of the 2030 Agenda for Sustainable Development all have links to malaria. Malaria is not just in one of the goals – malaria is in all of them. On the one hand, successfully ending malaria depends on progress across all goals. On the other hand, ending or reducing the malaria burden will have an amplifying effect for the achievement of all goals by increasing human and social capital and decreasing the number of productive life-years lost to malaria deaths and illness.

A central tenet of the 2030 Agenda is ‘leaving no one behind’. This resonates with the fact that the hardest hit by malaria and the most difficult to reach are poor and marginalized population groups. **Table 2.1** provides selected illustrative examples of potential adverse and positive synergies between the various SDGs and malaria. Like in Figure 2.8, the 17 SDGs in Table 2.1 are clustered in five groups corresponding to Figure 2.1 and the common understanding of grouping of sectors. These and more linkages will be further explored in **Part Two**.



Table 2.1: Selected illustrative examples of links between major groups of SDGs and malaria

POLITICAL/INSTITUTIONAL	ADVERSE LINK	POSITIVE LINK
 	<p>Siloed and dysfunctional institutions are obstacles to effective collaboration across SDGs and thus contribute to an unfavourable context for progress on sustainable malaria elimination.</p>	<p>Collection and use of disaggregated statistics for transparent, accountable, and participatory decision-making will help identify places and populations of greater vulnerability, and act on the root causes of malaria.</p>
ECONOMIC	ADVERSE LINK	POSITIVE LINK
   	<p>Unbalanced economic growth can fuel a vicious process that deepens disadvantages of malaria high-burden areas, fuels rural-urban migration and generates urban slums with high malaria transmission and poor services.</p>	<p>Decent work and economic development through responsible production in malaria high-transmission areas incentivizes the creation of better housing, water, energy, and sanitation solutions that limit vector breeding sites and exposure to vectors.</p>
SOCIAL	ADVERSE LINK	POSITIVE LINK
     	<p>Poverty, hunger, low education and status of women and girls combined with lack of access to modern energy and clustering of disadvantage are what a persistent malaria burden is made of.</p>	<p>Gender equality, reduced poverty and better education open the door for better living and social conditions that build resilience against both malaria transmission and mortality.</p>
ENVIRONMENTAL	ADVERSE LINK	POSITIVE LINK
   	<p>The effects of climate change, human activity in the environment, and loss of biodiversity can increase the population and scope of malarial mosquitoes and thus increase the risks of malaria outbreaks.</p>	<p>Well-managed environmental resources that integrate vector management strategies reduce the risks associated with living and working in areas with historical, current, or potential future high transmission.</p>
HEALTH	ADVERSE LINK	POSITIVE LINK
	<p>All kinds of systemic barriers in access to and use of essential health care services in general result in late care-seeking and increase risk of severe malaria and death.</p>	<p>Ease of access to quality, non-discriminatory health services for disadvantaged population groups in high-transmission areas will improve malaria case management and reduce deaths.</p>



Part 02

MAJOR DETERMINANTS

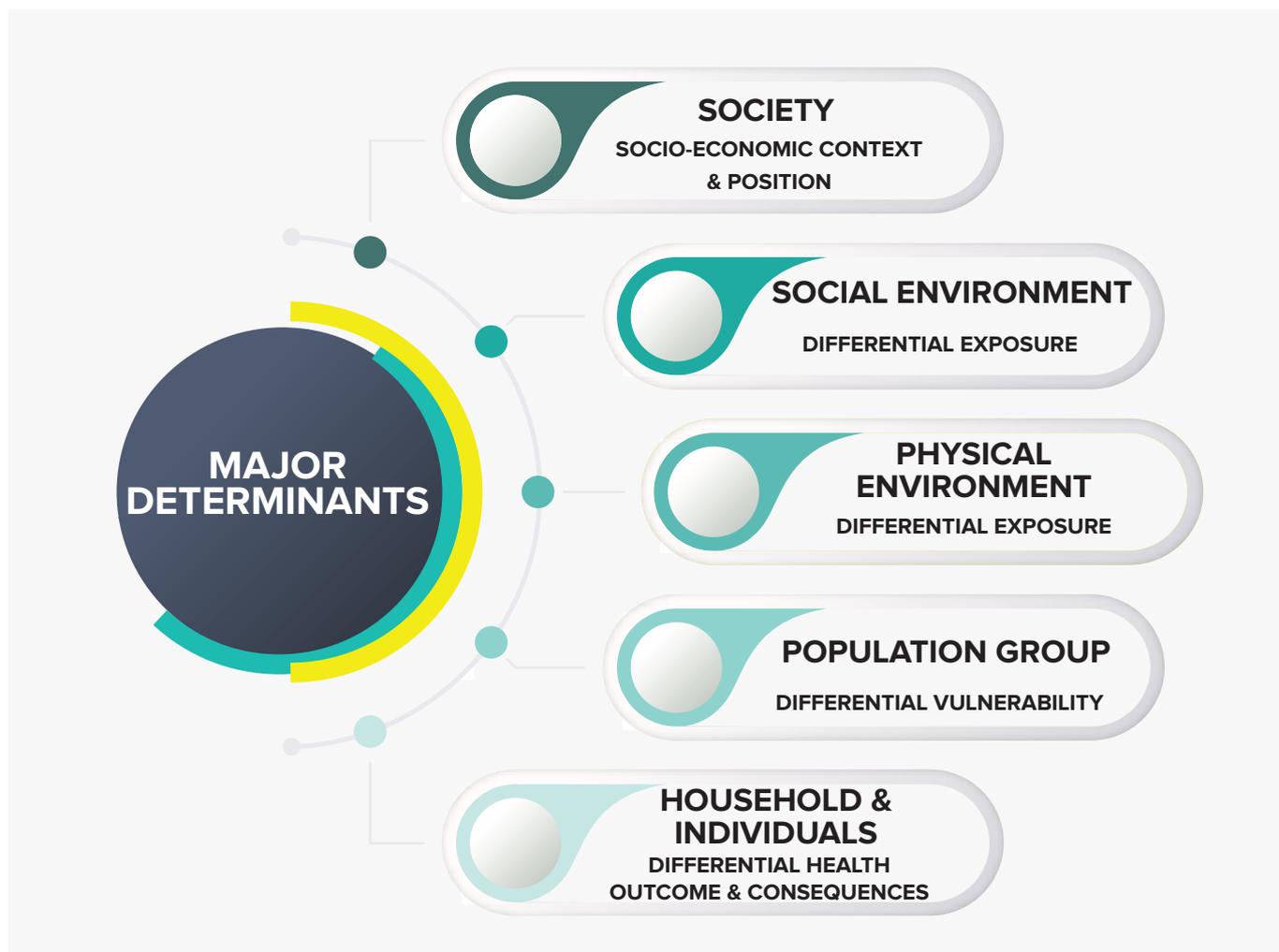
Identifying potential entry points
for action and corresponding
sectoral matches

Part Two will look deeper into what drives malaria with the aim to identify potential entry points for action and corresponding sectoral matches.

The analysis takes guidance from the analytical framework of the Priority Public Health Conditions Knowledge Network which was established as one of nine knowledge networks by WHO Commission on Social Determinants of Health (35), created by WHO in 2005 to provide recommendations on what can be done to promote population health and health equity. The analysis forms a five-level hierarchy, clustering determinants that shape malaria in any country with ‘society’ as the most upstream and ‘households and individuals’ as the most downstream.

The higher up interventions are applied, i.e., determinants are addressed, the more profound and sustainable the downstream impact will be, likely reaching beyond both malaria and health. Part Two is structured according to these five levels.

The aim is for each of the five levels to propose four to five determinants that are of particular importance to malaria and for each of these determinants to suggest in which sectors action could be taken (Table 8.1).



3. Society

How societies are developed and organized and how individuals are positioned within them exerts a powerful influence on the level and distribution of health in societies. Inequity dimensions include income, gender/sex, age, race, ethnicity, migratory status, disability and geographical location, or other characteristics relevant in national contexts. This is precisely why all monitoring statistics for the Sustainable Development Goals should be disaggregated along these dimensions (26;36). The relative importance of these factors is determined by the national and international contexts, which include governance, social policies, macroeconomic policies, public policies, culture and societal values (37). For example, the level of universal health coverage, access gaps between the general and the most disadvantaged populations, and degree of financial protection (SDG indicators 3.8.1 and 3.8.2) are results of political decisions, i.e., society level determinants with a considerable downstream effect for malaria and health.

There is a direct correlation between the probability of dying from malaria and socio-economic development in countries (7). The ability of countries to eliminate malaria or enter the elimination phase is intricately linked to their economic and health system development. Between 2000 and 2010, the malaria cases of the 34 malaria-eliminating countries decreased by 85 percent. These achievements have been driven by several factors, including more effective vector control and treatment, and the notable growth in GDP per capita, which increased by on average 3.5 percent per annum in the same period (11). This is further illustrated in Figures 2.6, 2.7 and 2.8 (in Section 2), which demonstrate a relationship between socio-economic development and countries approaching malaria elimination.

The historical relationship between socio-economic development and malaria elimination is well documented. The expansion of the malaria belt (see Figure 2.2) to the north beginning during the Roman Empire and its subsequent retreat during the 19th and 20th centuries is strongly associated with the development of economic and land-use patterns. This includes the agricultural production systems and their labour/capital intensiveness (25).

Endemic malaria disappeared from most of Northern Europe and North America with general social and economic development, including better housing, land drainage, modern capitalized production systems, less crowded housing, closed windows and a reduced tendency for people to live close to their livestock and not as a result of dedicated vector or chemo-prophylactic control (9;25). A historical study in Finland evaluated the long-term (1750-2008) significance of different factors assumed to affect malaria trends (malaria frequency per million people, temperature, animal husbandry, consolidation of land by redistribution and household size). The study showed that long-term changes, such as land consolidation and decreasing household size, had the strongest correlation with the decline and eventual eradication of malaria in the country (38).

The period immediately after the First World War witnessed malaria epidemics across Europe. However, these epidemics subsided or responded easily to control interventions, suggesting that it was strong health systems (i.e. for delivery of medications) and the improvement in overall socio-economic conditions rather than changing the vector ecology that were responsible for alleviating the problem of malaria (9).

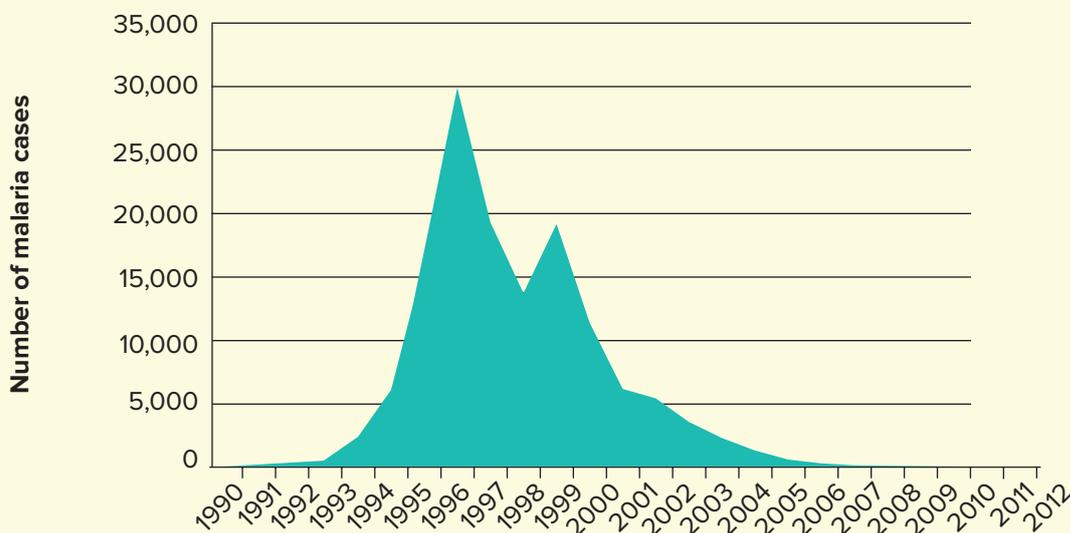
Transient resurgence of malaria in connection with war, population movements and associated disruptions have been seen in several places, including Spain, Italy, Tajikistan, Azerbaijan, and Armenia with quick return to the earlier situation once the societies had recovered (17) (Text Box 3.1). Current crises such as the one in Venezuela have triggered a dramatic increase in the number of malaria cases.¹⁷

Text Box 3.1

Tajikistan

Following many years of absence during the time of the Soviet Union, malaria returned in connection with the civil war that broke out in 1992 after the independence of Tajikistan in 1991. From fewer than 200 per year, the number of recorded cases peaked at almost 30,000 in 1997 when the civil war ended. During the war, 1.2 million or 16 percent of the total population were internally or externally displaced and infrastructures and services broke down.

After political stability returned, malaria responded quickly to control efforts and in 2012 only 33 cases were recorded. Of these, 18 were indigenous and the rest imported. The second peak in 2000 is explained as a more complete detection and recording of malaria cases following the expansion and reach of the diagnostic capacities in 1998-1999. The estimated numbers of both cases and death have been zero since 2015 (2). *Source: Tajikistan Ministry of Health/UNDP (2013)*



17 <https://medicalxpress.com/news/2019-07-malaria-surges-crisis-hit-venezuela.html>

Globalization, liberalization and deregulation have provided opportunities and posed challenges, including for malaria. Over the past more than one decade there has been better aid coordination and alignment, debt relief for the most indebted countries, global development initiatives and setting of global targets, such as the Millennium Development Goals (MDG) 2000-2015¹⁸ and the Sustainable Development Goals 2015-2030 (26). New global trade agreements and production patterns have contributed to economic growth, increased migration, and urbanization, while at the same time deepening inequities and lowering public revenues in many low-income countries. The latter is due to tariff reductions, free movement of capital, tax transfers, combined with the tax systems in many low-income countries having insufficient strength for exercising control and tax collection. Further, market-oriented health sector reforms in many low-income countries have led to deepening inequities in access to health services. Finally, the financial market liberalization has contributed to economic instability (39).

However, the current trends in nationalism and protectionism may potentially turn out to have adverse effects on poor malaria-endemic countries to develop socially and economically and thus sustain the context needed for approaching lasting elimination. Further, the 2015 Paris Agreement on climate change (40) poses two major challenges to the economic development of many malaria-endemic countries if not compensated. First, they will have to base the energy required for their development on sources other than fossil fuels, something that typically requires larger upfront investments. Second, the required phasing out of fossil fuels towards 2050 will dampen demand and prices – a concern that will affect several endemic countries in particular in Africa that just a few years ago saw oil and gas revenues as the solution to accelerate economic development.

These factors, together with a rapidly growing population, will require many African countries to prioritize and take tough decisions in order to diversify economies, and improve and expand infrastructures (41). This could be among the contributing explanations for the plateauing and possible decline in government allocations for malaria control programmes, seen since 2013. For example, ITN coverage across Africa has increased only marginally since 2015 and has been stagnant since 2016. IRS protection dropped by about 40 percent between 2010 and 2017 (1).

Population growth: Sub-Saharan Africa, due to a clustering of adverse socio-economic and environmental determinants, bears the greatest burden of malaria worldwide and is further undergoing profound demographic changes with fast-growing populations. These factors, coupled with insufficient access to health care, are considered leading causes underlying the high levels of malaria and malnutrition in countries such as, e.g., Niger (42).

The East African highlands are among the most densely populated regions in Africa and have the world's largest population growth rates as well as high rates of poverty. As there are few employment opportunities other than agriculture, this has created an unprecedented pressure on land and led to a more intensive land use with transformation of forests and swamps into farm- and grasslands, thereby increasing the areas harvested for food crops by more than 100 percent since the 1990s. These changes have contributed to the rising temperatures and optimized the survival of mosquitoes and transmission of parasites. While malaria has decreased since the mid-2000s, this is due to intensified interventions (ITN, IRS and treatment) and will require these to be sustained with external funding (43).

¹⁸ <https://www.un.org/millenniumgoals/>

Organization of societies and services: A considerable difference has been found between West and Central Africa and East and Southern Africa in the overall percentage of patients who seek care in the modern health care sector. Forty-three percent of reported fever cases resulted in visits to a formal health sector facility in West and Central Africa, compared to 63 percent in East and Southern Africa, which was also found the less inequitable in terms, e.g., of ante-natal care visits according to analysis of Demographic and Health Surveys data (16). This suggests that the ways societies and services are organized matter for how people seek care and will need to be taken into consideration when approaches to malaria control are considered.

4. Social environment

There is increasing evidence that people in disadvantaged positions are subject to differential exposure to a number of risk factors, including: human activity in the physical environment; natural and anthropogenic crises; unhealthy housing; working and other environment conditions; etc. thus potentially amplifying the negative effect of their socio-economic position (35).

The Strategic Framework for Malaria Social and Behavioural Change Communication 2018-2030 (44) acknowledges the importance of the social environment and norms that affect demand for malaria products and services and their appropriate use. However, beyond demand and use, the social environment contains several strong determinants of malaria, e.g. gender, migration, education, marginalization, and discrimination, etc. These are among the root causes for the persistence of malaria and the shape of countries' malaria profiles (see also Figure 2.6, 2.7 and 2.8).

Gender is a social construct that plays a huge role in malaria.¹⁹ The differential expectations and the roles of women, men, girls, and boys, what they learn, what they do, what they earn and own, and how they participate in decision-making are determined by social norms. This often means gender-differential exposures to malaria risks and ability to deal with malaria – and through that, varying degrees of malaria-resilient communities. A 2015 UNDP discussion paper highlights a number of gender issues in relation to malaria, including: gender-differentiated access to information, gendered dress norms, gendered division of labour, gendered sleeping arrangements and access to bed nets, gendered social and cultural norms, etc. However, the paper also stresses that there are still significant gaps in understanding how sex, gender roles and poverty intersect to create gender-specific vulnerabilities (45).

A comprehensive analysis across 16 public health conditions showed gender as the single most important determinant of health (35). Effectively addressing gender norms and gender inequality as root causes of malaria will have a large impact on the malaria burden and will be necessary for making real and sustained moves towards elimination. This is particularly true to be able to reach the hardest to reach and finally end malaria.

¹⁹ https://endmalaria.org/sites/default/files/RBM_Gender_Fact_Sheet_170915.pdf

Text Box 4.1

Gender-responsive programming

Despite the major role of gender as a determinant for populations' health, the potential for making communities more malaria-resilient, and the focus there has been on gender over the past several decades, there are surprisingly few examples of good practice studies on gender-responsive malaria programming (46).

The village of Mueang Na Wan in Northern Thailand had been characterized by repeated failures to prevent and control malaria. Despite several attempts and approaches, malaria kept coming back. The confidence in government agencies' ability to control malaria through biological measures and vertically administered strategies was low. There was further a lack of community cooperation – as outside programmes were perceived as invasive.

An intervention study was undertaken focusing on empowering village women and raising self-esteem and self-confidence. The intervention showed significantly positive results – not only on malaria preventive behaviours (destroying mosquito breeding grounds, increasing guppy fish in low running streams, cutting weeds along canals, covering shallow areas and arranging houses tidily, as well as increasing the use of ITNs), but also increasing efforts to raise family incomes (47).

Moreover, there is also evidence of the influence of women's empowerment as a determinant for health outcomes alongside wider developmental benefits. In rural South Africa, the cross-sectoral Intervention with Microfinance for AIDS and Gender Equity (IMAGE) project to empower women resulted in reduced levels of intimate partner violence, reduced HIV vulnerability, increased communication about sex and sexuality in households, and increased economic well-being (48).

In Pakistan, a large-scale programme (TAWANA) initiated by the Federal Ministry of Women and Development covered 29 districts and 4,035 government primary girls' schools. The programme focused on empowering local village women by giving them the opportunity to plan and manage a feeding programme and demonstrate how malnutrition could be reduced. Over just two years, malnutrition (wasting) was reduced by 45 percent and school enrolment increased by 40 percent. In addition, TAWANA had broader social and economic benefits; several of the village women who had been involved with the programme used their experience as a springboard into salaried jobs in the wider labour market. Further, some of the school committees set up by the programme developed into community-based organizations that mobilized villages around wider women's and girls' issues (49).

Migration and human mobility: Large-scale migrations (emergency and non-emergency), frequently results of society-level determinants, contribute to modifying the malaria map. A particular challenge occurs at the border between countries on track for elimination and countries in the control phase, such as in Southern Africa where the Elimination 8 (E8) collaboration has been set up between four eliminating countries (first-line) and four second-line countries to strengthen cross-border malaria control.²⁰ However, it is not only for neighbouring countries that malaria health security is a challenge. While China has successfully eliminated *P. falciparum* from large parts of the country, it is experiencing increasing rates of *P. falciparum* malaria imported by Chinese nationals returning from endemic countries (11). It is estimated that more than one million Chinese are residing in sub-Saharan Africa and the number is increasing.²¹ They often reside and work at development frontiers with high malaria transmission and regularly travel back and forth between high- and low-transmission areas.

Regardless of their social, political, economic, or environmental causes, population movements play an important and complex role in malaria epidemiology. When travelling from low- to high-transmission areas and having no acquired immunity, travellers are much more at risk compared to the permanent residents of the high-transmission location and those travelling in the opposite direction. This can lead to a sharp increase in morbidity and mortality among migrants across all age groups, as has been seen in large resettlement programmes in Ethiopia, Indonesia and Brazil (see also **Text Boxes 4.2 South Sudan** and 6.1 Sodom and Gomorrah). Those who travel from high- to low-transmission areas often carry infection and contribute to increased transmission at their destination.

A review by the Food and Agriculture Organization of available data from six African countries (Kenya, Malawi, Nigeria, Senegal, South Africa and Uganda) showed that a large share of households had at least one member who migrated, either internally or externally. Most internal migrants were from rural areas, most international migrants from urban areas. Migrants are predominantly males between 15 and 34 years old and from households with relatively higher education. Employment, education and family reasons are the main drivers for their migration (50).

The higher the number of migrants, the larger the impact. As regular or circular movements of migrants are more common than unidirectional migration, migrants infected with malaria can serve as a reservoir and seed local outbreaks or epidemics (15). This will consequently make it difficult for countries that are linked by human mobility patterns to eliminate malaria independently of each other. It can be shown that there are *P. falciparum* migration communities around the world with much more infection migration in the countries that the migrants move between than with the surrounding regions (51). It can further be shown that there is broad correspondence between these 'communities' and the malaria drug resistance patterns (15;52); once resistance emerges it can quickly spread along the migration lines.

²⁰ <https://malariaelimination8.org/sites/default/files/publications/challenge-preventing-cross-border-transmission.pdf>

²¹ Africa and China – More than minerals. The Economist. 23 March 2013.

Text Box 4.2

The Republic of South Sudan

(Returnees – example from 2013)

Since its independence in 2011, South Sudan has been characterised by a fragile humanitarian situation and socio-economic stress. An estimated 2.5 million South Sudanese have returned to their homeland, mainly from Sudan. The 2005 Comprehensive Peace Agreement anticipated free and spontaneous returns but escalating political tensions closed all but one entry point, leaving thousands of South Sudanese stranded in the Upper Nile State (UNS).

P. falciparum malaria is endemic in South Sudan, and South Sudanese grow up learning how best to prevent transmission. Conversely, returnees arriving from Khartoum, an area virtually free of malaria, have little knowledge of malaria transmission, prevention and treatment. This limited awareness combined with their relatively absent immunity increases their vulnerability. For returnees, adoption of malaria-safe practices such as ensuring children and pregnant women always sleep under ITNs and seeking early treatment has been minimal. If treatment is delayed, the illness can quickly develop into severe falciparum malaria resulting in dangerous complications and potentially death. Continuity of care remains a challenge especially as returnees reintegrate into communities already struggling with limited health and social services.

The IOM's four clinics provide emergency health services to over 19,000 stranded returnees and vulnerable host community members. In 2012, IOM treated 14,781 cases of *P. falciparum* malaria. Over a fifth of all morbidity cases documented during 2012 in UNS were the result of malaria.

Source: IOM, Mission in South Sudan (2013)



**“Elimination of malaria is possible
... but only when human mobility is
considered.”**

The International Organization for Migration (IOM)

The SDG dashboard of the 24 countries in the ‘malaria belt’ presented in Figure 2.8 shows that only one of the 13 countries with a malaria burden rate of less than 100 DALYs per 100,000 population is coloured red with respect to SDG4 Quality Education, while this is the case for six out of the 11 countries with more than 100 DALYs per 100,000 population. The relationship between **education and malaria** is widely acknowledged.^{22, 23} Much of the focus in relation to malaria has been on the downstream effects of education, principally the correct use of ITN and adherence to treatment. However, education also has upstream effects for malaria. In low-income countries, primary education is the largest contributor to national income growth – 10 additional percentage points in primary enrolment rate are associated with 0.2 to 0.3 percent in extra growth in GDP per capita per annum in real terms. A critical mass of individuals having completed primary education also has a decisive effect (53). This means that the ‘malaria effect’ of education may work not only at the population group and individual level – but also at the community and societal level. This corresponds well with the patterns depicted in Figures 2.6 and 2.7.

Marginalization and social exclusion: India has the largest number of malaria deaths outside of Africa. Half of these deaths occur among tribal groups although these constitute only 10 percent of the total population. Tribal groups thus bear a disproportional share of the malaria burden (54). Marginalization and social exclusion results in unequal access to resources, capabilities and rights, which leads to health inequalities (55). Social exclusion and discrimination based on gender, ethnicity, race, caste, religion, minority status, legal status, poverty and location affect those excluded and marginalized in where they live, what they can do, how they interact with the physical environment and the level of control they have over health-seeking behaviours. Exclusion can be grounded in laws, public policy or regulations and are often the results of social forces (56).

This not only affects the excluded and marginalized – it often also hampers countries’ overall ability to reduce health inequities in infectious diseases and beyond. Several countries are struggling with pockets of malaria that have not responded adequately to interventions (see also **Text Box 4.3**).

While the Global Fund encourages applicants to invest to reduce health inequities,²⁴ focus is mainly on the downstream access to services rather than the more upstream developmental root causes of the health and malaria inequities.



Marginalization and social exclusion result in unequal access to resources, capabilities and rights, which lead to health inequalities.

22 https://endmalaria.org/sites/default/files/RBM_Education_Fact_Sheet_170915.pdf

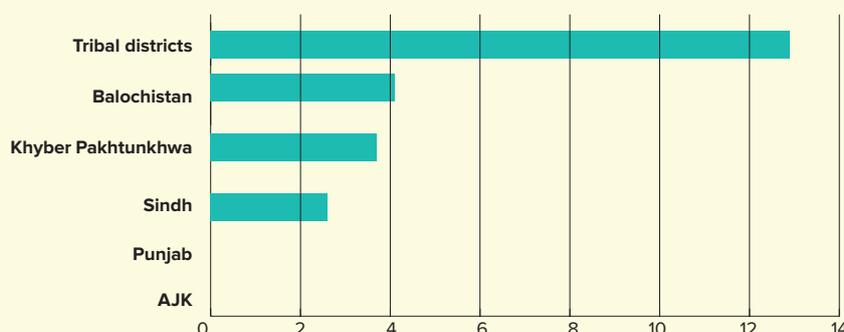
23 <https://www.malariafreefuture.org/content/education>

24 https://www.theglobalfund.org/media/5536/core_malariagenderhumanrights_technicalbrief_en.pdf

Text Box 4.3

Pakistan – a case of unevenly distributed malaria burden

In 2018, the annual parasite incidence (API) in Punjab, the largest and richest province, and the adjacent Azad Jammu and Kashmir (AJK) close to the capital Islamabad, was 0.0. In Sindh Province, the API was 2.6, in Khyber Pakhtunkhwa 3.7, Balochistan 4.1 and in the Tribal Districts it was 12.9 (57).



The ranking across the provinces in terms of how near they are to elimination is the inverse of the ranking of household per capita income. Punjab has the highest income, followed by Sindh, Khyber Pakhtunkhwa, and Balochistan (58). The below table is an early start of identifying the determinants that may underlie both the differences in household income and malaria burden.²⁵

GROUP OF SDGs	SINDH	KHYBER PAKHTUNKHWA	BALOCHISTAN	TRIBAL DISTRICTS
POLITICAL/INSTITUTIONAL				
 	Weak government institutions	Weak government institutions	Weak government institutions	Weak government institutions Instability and insecurity
ECONOMIC				
 	Economic inequality	Economic inequality	Economic inequality Lack of employment opportunities	Economic inequality Lack of employment opportunities

²⁵ Prepared in collaboration with Kausar S. Khan, Community Engagement Centre (CEC); Indus Hospital Network, Karachi - Pakistan

Text Box 4.3 (continued)

GROUP OF SDGs	SINDH	KHYBER PAKHTUNKHWA	BALUCHISTAN	TRIBAL DISTRICTS
SOCIAL				
     	Poverty	Poverty	Poverty/food insecurity Communities socially and physically isolated	Poverty/food insecurity Communities socially and physically isolated
ENVIRONMENTAL				
   	Frequent flooding	Most people rely on open shallow and unsafe sources of water ²⁶	Extremely hard hit by water scarcity – relying on ponds, 60% of land uncultivable ²⁷	Water governance and access is a particular concern ^{28, 29}
HEALTH				
	Poor access coverage	Poor access coverage	Very poor access and quality of services ³⁰	Very poor access and quality of services Severe difficulties filling positions ³¹

Text box prepared in collaboration with dr. Kausa S. Khan, the Indus Hospital Network, Pakistan

26 https://assets.publishing.service.gov.uk/media/5c6c2b4be5274a72be398f0a/502_Water_Sanitation_and_Hygiene_in_Pakistan.pdf
 27 <https://dailytimes.com.pk/250988/250988/>
 28 <https://www.iucn.org/fr/node/24945>
 29 <https://www.pk.undp.org/content/pakistan/en/home/ourwork/crisispreventionandrecovery/successstories/clean-water- quenches-thirst-in-fata.html>
 30 <https://www.thefridaytimes.com/health-and-healthcare-in-balochistan/>
 31 <https://www.dawn.com/news/print/1503187>

5. Physical environment

Malaria vector control has heavily relied on the killing of adult mosquitoes with chemical insecticides and reducing human biting rates either with ITN or IRS. However, according to a 2018 WHO report, resistance to the four commonly used insecticide classes – pyrethroids, organochlorines, carbamates and organophosphates – is now widespread in all major malaria vectors in the WHO regions of Africa, the Americas, Southeast Asia, the Eastern Mediterranean and the Western Pacific (59). With the key vector control tools possibly losing their potency, it makes sense to step up efforts to use and manage interactions with the environment, so it reduces rather than produces malaria. Important steps in the right direction are the update of the Global Vector Control Response 2017-2030 (60) and the Multisectoral Approach for the Prevention and Control of Vector-borne Diseases – A conceptual framework (61). The latter recognizes a wide range of determinants of vector-borne diseases: pathogen- and vector-related, environmental and agro-ecological, economic, social and health system-related.

The current rates of carbon emission will, if not effectively mitigated, lead to a much warmer world and more extreme weather events. Due to these **climate changes**, malaria might occur in places where it has not previously been seen and where there is no natural immunity. Further, climate change will alter social, economic and environmental determinants, such as poverty distribution, migration, agriculture, and nutrition – all of which have direct impacts on malaria. A World Bank report indicates that by 2050, climate change alone might expose some areas in South America, sub-Saharan Africa and China to a 50 percent higher malaria transmission probability rate (36;62). With climate change, the geographical distribution of mosquito-borne diseases seems to be expanding globally and especially in the African region (62;63). This means that new populations, health care and socio-economic systems are being exposed. Malaria is determined by a number of environmental factors which affect its distribution, seasonality and transmission intensity, including: (a) abundance of surface water, its chemical composition, pollution and vegetation, which determines the proliferation and density of the vector; (b) the atmospheric humidity and temperature, determining the longevity of the vector and the ability of the parasites to develop; and (c) the preference for human or animal blood, the form of human aggregation and the type of shelter, which determines the man-vector contact (9).

Malaria transmission is generally higher in rural than urban Africa and there are close links between malaria and agriculture depending on the intensity of farming, terracing, irrigation, drainage, etc. Good **agricultural practices** may reduce vector presence, and improved farming productivity may contribute to increased incomes, improved nutrition and social development and thus reduce vulnerability of the people living in the area. However, the use of certain production systems for certain produce, such as rice, bananas, fruits and vegetables, can be associated with increased malaria due to irrigation micro-water pools (64). However, there are also suggestions that specific crops themselves might be linked to mosquito ecology. For example, some studies from Ethiopia suggest that maize growing might contribute to malaria incidence as mosquito larvae feed on the pollen that falls into larval habitats with greater impact if the mosquito breeding season coincides with the time that the maize releases its pollen.³² (65)

³² https://cga-download.hmdc.harvard.edu/publish_web/Annual_Spring_Workshops/2012_Africa/presentations/Tony_Kiszewski.pdf

Urbanization with its profound socio-economic and landscape changes has contributed to reduced malaria transmission in many malaria-endemic countries. This trend could continue particularly if supported by increased levels of direct malaria control efforts (66). However, malaria still exists in African cities and in some cases at even higher levels in peri-urban areas compared to the nearby rural areas (67). Rural-urban migration, as mentioned earlier, greatly influences transmission rates and patterns, spreading infection within the household and community, especially if people do not use an ITN or their houses are not protected with IRS.

Generally, parasite infection rates increase from urban centres to rural settings. However, there are also examples of the opposite being true, especially where slums are concentrated in the urban centres. Urban malaria is highly focused. Adaptation of mosquito species to the urban environment, notably to heavily polluted breeding sites and more modest water volume requirements, have also been seen (67;68). The majority of urban and peri-urban breeding sites are artificial, including urban agriculture, drains and gutters, ditches, tyres and their tracks, leaking water pipes, domestic containers, water tanks and reservoirs, construction sites, swimming pools, canals, foundations, septic tanks, bathtubs, and dams. Further, certain commercial activities, such as car washing and brick making may create breeding sites.

Urban agriculture has over the past decade become more common in African towns and cities and while it often contributes to food security, nutrition and social development, it could proliferate vector breeding sites and thus potentially outweigh the social benefits (67).

Poor **quality of housing** with greater exposure to the outdoors, i.e. lack of window screens, absence of ceiling boards, and thatched roofs, increases the contact between the individual and the vector. Housing with greater exposure is more prevalent among those of lower socio-economic status (SES) (16;67;69) (see **Text Box 5.1**, Lao PDR).

One in three Africans does not have access to electricity. The African region lags behind all other regions in terms of electricity generation and household access. Expanding generation and access has obvious development prospects and is essential to achieving SDG7.1 – *By 2030, ensure universal access to affordable, reliable and modern energy services*. Energy production and distribution are of interest for investors, in particular through public-private-partnerships, and there are major drives in Africa, Asia and South America to extend electricity grids and to establish off-grid power sources, including based on solar energy (70). Universal access to affordable and reliable energy will help accelerate overall social and economic development and contribute to decreasing the development gap between rural and urban areas. Through that, electrification will probably help reduce malaria (see Figure 2.8, SDG7).

Despite the increasing number of electrification projects covering high malaria incidence areas, there is limited evidence on the causal relationship between electricity and malaria incidence (71). Studies from Uganda and Malawi show that households with access to electricity are more likely to experience malaria. The researchers explain this by electrical light attracting mosquitoes, and outdoor lighting encouraging lifestyles with increased exposure to the vectors (72;73). However, combining electrification with electrical mosquito trapping devices may have an immediate positive effect in controlling particularly indoor vector presence as shown in a study from Kenya (74). Further, from Iran it is reported that rural electrification in an extremely hot climate has led to the installation of fans and air conditioners in private homes, and changed sleeping practices from outdoors to indoors, thus reducing exposure to mosquito biting (see Text Box 9.2).

Change of land use may influence malaria transmission in a multitude of ways. It may reduce malaria breeding sites, for example through deforestation and urbanization, or create new ones, such as in mining and desert irrigation. It may open access to and expose ecosystems that are conducive to malaria transmission through road construction and concessions for timber logging. Sometimes the malaria impact is part of the primary ‘business model’. At other times, it is a side-effect caused by negligence, or poor or inadequate environmental management. Finally, some changes might lead to land degradation and eventual abandonment where nobody is accountable or interested. The poor are not only subject to the general effects, but being more dependent on their immediate environment, they are often caught up in inefficient or destructive production systems, becoming at the same time actors and victims of unfavourable land-use changes.

Large-scale economic development projects involving international lenders often require health³³ and environmental³⁴ impact assessments to be carried out. How such assessments actually impact the projects is equivocal (75). Further, such impact assessments rarely take ‘differential exposure’ into account, i.e., they are not health equity impact assessments.³⁵

On a smaller scale, where large institutional lenders are not involved, impact assessments may be entirely absent or national and local governments are unable to enforce adherence to established rules and regulations, if existing. Capital development projects provide both challenges and opportunities for malaria (Text Box 5.1: Lao PDR)



The current rates of carbon emission will, if not effectively mitigated, lead to a much warmer world and more extreme weather events. Due to these climate changes, malaria might occur in places where it has not previously been seen and where there is no natural immunity.

33 <http://www.who.int/hia/en/>

34 <https://wedocs.unep.org/handle/20.500.11822/26503>

35 <https://www.nccmt.ca/knowledge-repositories/search/146>

Text Box 5.1

Lao PDR

(Case from 2013)

Lao PDR experienced a rapid increase in its Human Development Index from 0.379 in 1990 to 0.543 in 2012. Over the past decade the annual economic growth has averaged 7 percent. This, combined with malaria control efforts such as ITN distribution, early diagnosis, treatment, and malaria education through village health workers, resulted in a reduction in incidence from 9.1 cases in 2002 to 3.5/1,000 population in 2010. The country was thus set to reach the 2.0 cases/1,000 target by 2015.

However, malaria outbreaks since December 2011 in the five southern provinces associated with large-scale private mining, hydropower, and intensive agricultural projects threaten progress made towards malaria elimination. The projects encroach on forest habitats and employ migrant workers from neighbouring countries with considerable drug resistance. Although at present there are no reliable estimates of the extent of the problem, changes in vector ecology are apparent; and an increased use of self-medication, substandard antimalarials and monotherapies. For the local population, the projects frequently mean moving from highland to lowland, loss of traditional occupations, more forest-based activities, or engagement with the development projects.

Conversely, some projects have also brought malaria benefits. For example, in connection with the construction of the Nam Theun 2 Hydroelectric Project, one of the largest recent development projects in Southeast Asia, a 450km² reservoir dam was created and 6,300 people in 1,310 households were resettled into 16 villages along the southern shore of the dam. They were provided with new wooden houses with corrugated iron sheet roofs, constructed to a considerably higher standard than the traditional houses in the area. The traditional houses are usually constructed from bamboo thatch with roofs made from thatch, wooden tiles, or corrugated iron sheets. A study conducted in 2010 found that the risk of mosquito house entry was more than twice as high in the traditional compared to the newly constructed resettlement houses (69).

Source: MoH/WHO (2013), Hiscox et al (69)

Sawyer and Sawyer (1992 cited in (68)) describe three phases of **breaking new land and forming settlement** and their links to malaria, using the case of rainforests in Brazil. *Phase one* (epidemic about three years) sees a rapid and dramatic increase in the annual malaria parasite index (API). The total cleared land is still low, the quality of housing poor, man-made transformations cause the proliferation of mosquito breeding sites, and settlers do not have the knowledge to protect themselves. The *second phase* (about five years) is characterized by a significant decrease in API. The cleared land increases, profits from agricultural production allow improvements of housing and personal care, and knowledge about malaria increases. The *third phase* (endemic) begins about eight years after the start of the settlement project and has lower API. Settlers are well established in their plots producing a variety of crops, living in better houses and able to protect themselves against malaria. Local infrastructure will also have improved, and there will be better organization of health care and community groups. Furthermore, with development, the mosquito breeding sites often become polluted, contributing to decreased risk of malaria (68). Similar phases as those described by Sawyer and Sawyer may also apply to other land-use changes and development projects that initially increase transmission, but eventually may lead to elimination or even eradication of malaria as social conditions reach a certain level of improvement. The length of the individual phases may vary depending on the nature of the change and the effort and sustainability of vector and parasite, as well as other social and environmental interventions.

Clearing of forestland for economic activity and settlement is closely linked to political and economic forces. The apparent sharp increase in the rate of deforestation in Brazil since 2018³⁶ reflects the explicit political platform during the election campaign of the new president to create more space and economic activity in rainforest areas. The effects for malaria – as described above by Sawyer and Sawyer – will likely show in coming years. For the indigenous people who lived in the forest being cleared, the effects may be sooner and more devastating.

6. Population group

Different population groups may have different vulnerabilities to a similar levels of social and physical environment exposures. Clustering of adverse determinants and disadvantages in some populations, such as social exclusion, low income, low education, malnutrition, irregular and cramped housing, poor sanitation, and limited access to health services, amplify their vulnerability and may be as important as the individual exposures themselves (see also **Text Box 6.1**). Coexistence of other health problems with shared determinants may further augment vulnerability (35).

36 <https://www.theguardian.com/world/2019/jul/03/brazil-amazon-rainforest-deforestation-environment>

Text Box 6.1

Sodom and Gomorrah, Accra

Sodom and Gomorrah is a slum area within Accra (76) in Ghana about 300m from the Korle Bu Teaching Hospital and even nearer to several smaller health facilities. It covers 146 hectares and houses an estimated 25,000 to 40,000 residents – mostly males. It is the world's largest digital dumping ground, where millions of electronic waste products from the West are crudely processed each year.³⁷

The nickname Sodom and Gomorrah indicates exclusion and moral distancing by the surrounding society. The name does not leave any doubt among the residents that they are 'the wrongs' and not a welcomed part of the city. The main health problems of the area are malaria and diarrhoeal diseases. However, despite the health problems and the proximity of health facilities, 71 percent of the respondents in a study reported never having visited a health facility. If in need, they would rather get medication from one of the two drug stores in the slum or from a herbalist.

Of those 71 percent not using health facilities, 61 percent were from the northern part of Ghana, 87 percent had no regular job or income, and 45 percent had no education. Eighty-five percent were not members of the National Health Insurance Scheme and 86 percent had no knowledge about symptoms. Nearly 80 percent did not find distance or transport to health facilities a problem. However, 45 percent claimed that staff attitudes were a problem.

Of all respondents, 68 percent knew that mosquito bites could cause malaria. However, their understanding of what caused the vector presence was very limited: choked gutters (6 percent), rubbish dumps (5.1 percent), open gutters (1.8 percent) and stagnant waters (1.3 percent).

The community of Sodom and Gomorrah has no piped water. Sanitation is generally poor. There are no well-constructed gutters or drainage systems to allow easy flow of water. The few open gutters are choked with debris, resulting in dirty stagnant ponds and flooding during the rainy season. People live in poor shacks primarily built or held together with old roofing sheets, plywood and/or cardboard. Houses are overcrowded and all-purpose.

The study from which the above has been extracted was published in 2016 and the situation may have changed since. However, the case remains illustrative of clustering of disadvantage.

³⁷ <https://www.theguardian.com/global-development-professionals-network/2014/apr/29/agboglobloshie-accra-ghana-largest-ewaste-dump>

Evidence about vulnerability to malaria and its consequences by population groups with lower socio-economic status (SES) is consistent. Children with low SES have double the risk of clinical malaria compared to those with higher SES within the same locality (7). Higher SES has been found to be significantly positively associated with ITN, intermittent preventive treatment in pregnancy (IPTp) and ACT coverage and use (77). Knowledge of malaria is positively associated with level of education and is higher among those who are skilled or professional than among the unemployed or unskilled category. Household income, men's level of education, and whether women have a cash income are strongly correlated with owning nets and usage of malaria prevention methods (16).

Text Box 6.1 describes Tanzania's massive catch-up / keep-up campaign to eliminate cost-barriers of access to ITN. However, in retrospect the effect on the number of malaria cases and deaths might have been limited.



Children with low socio-economic status (SES) have double the risk of clinical malaria compared to those with higher SES within the same locality.

Text Box 6.2

Tanzania – inequity and distribution of free ITNs

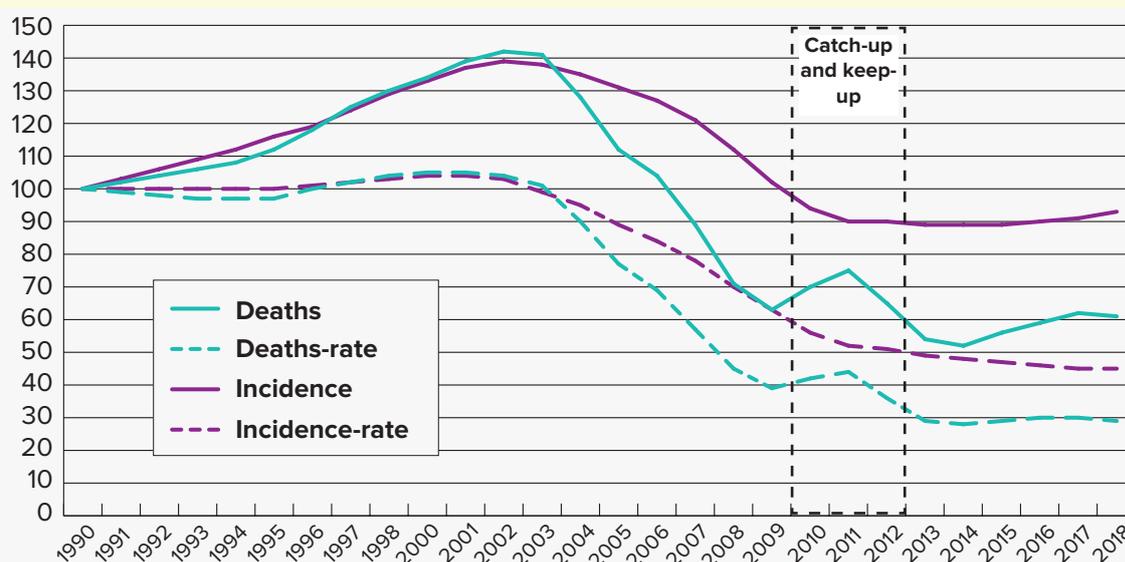
Malaria control in Tanzania since 2003 has focused on provision and use of LLINs, ACTs, IRS, and environmental management. The results between 2003 and about 2008 were impressive in terms of reducing both malaria cases and death (see graph below). To address the inequities in ITN use and reach the Abuja targets, Tanzania, with massive donor support, launched the Catch-Up and Keep-Up strategy in 2008, combining free distribution with voucher schemes and social marketing. The cost of the strategy was 20 times more than social marketing, equal to 15 percent of the government’s health budget. Consequently, the strategy depended upon unprecedented levels of donor inputs (78).

Between 2009 and 2011, the government distributed 27 million free nets to households through national campaigns. By 2011, it was estimated that 80 percent of all households had at least one net and that about 15 percent of the population at risk were protected by IRS. This reportedly reduced outpatient visits, hospital admissions and death due to malaria (79). Almost all the financing came from external sources and at the same time as the distributed LLINs are coming to the end of their useful life, the country is facing financial constraints. This affects the health sector, including the control of malaria, threatens the sustainability of the achievements and might lead to resurgence.

The Catch-Up and Keep-Up strategy, including the free vouchers, was then and has later been hailed (79;80). However, in retrospect and in the big picture, the malaria incidence curve for Tanzania flattened out during the 2009-2011 period and resembles that of the global picture (see Figure 1.1) and neighbouring Uganda (see Text Box 12.1). The free distribution might have lowered some barriers of access – but issues of acceptability and consumer adherence may have remained (see Section 7).

It is not clear whether the sudden sharp increase in malaria deaths during 2009-2011 has any direct or indirect relationship with rolling out the Catch-Up and Keep-Up strategy. The present situation is that Tanzania is likely to miss the 2020 global targets for both case and death reduction (see also Figure 1.1).

Malaria cases (incidence) and deaths, Tanzania 1990-2017 (Index year 1990 = 100).³⁸



38 <http://ghdx.healthdata.org/gbd-results-tool>

Low socio-economic status is associated with about double the risk of clinical malaria or parasitaemia compared to higher status. The households are not just more susceptible to disease but are also more vulnerable to the costs of disease, which might worsen the impoverishment (7).

With equal exposure, **women and men** are equally vulnerable to infections. The exception is pregnant women who are at greater risk of severe malaria though it varies according to transmission intensity in the given geographical area.³⁹ Pregnancy is also an important risk factor for malaria infection due to depressed immune status. Malaria in pregnancy affects more than 25 million women each year causing dire adverse outcomes including maternal anaemia, stillbirth, preterm birth, and low birth weight (81). However, depending on culture and societal contexts, women and men may have differential exposure and differential access to means of protection and treatment.⁴⁰

Further, being in an ethnic or political **minority position** typically means being marginalized, socially excluded, impoverished and driven to more remote areas and risky occupations, while having less access to malaria prevention and treatment, i.e., being left behind at the intersection of a number of unfavourable determinants (11;56). This often leads to development of mistrust in public services and influences norms and attitudes and frequently towards higher rates of infection (16). For example in Panama, 85 percent of the malaria cases occur in the indigenous population, while constituting only 10 percent of the country's population⁴¹ (see also Text Box 4.3 on Pakistan).

Crowded and flimsy shelters facilitate the transmission of malaria and other vector-borne diseases, potentially resulting in serious epidemics (9). Malaria risks are significantly higher among children who live near hydrographic networks, in sparsely built-up or irregularly built areas (82) and in peri-urban areas of low SES (67). The **zone of residence** (rural and urban) is an important determinant for the appropriate use of preventive methods. Expenditures on prevention and treatment increase with proximity to town centres compared to intermediate and outer zones despite increasing malaria incidence in the outer zones thus reflecting the gradient in income and availability of services (16). Development of severe malaria is less common among well-nourished children, possibly because a well-nourished individual is better able to mount an immune response and more capable of withstanding and clearing infection. Among children under five, 57.3 percent of malaria deaths have been found attributable to underweight, 20.1 percent to zinc and 19.5 percent to vitamin A deficiency (83). This suggests the importance of addressing both **food security and nutrition** in connection with malaria. Food insecurity, nutrition and malaria notably share upstream determinants (82).

While children with lower SES may initially have a higher level of immunity to malaria than children in higher SES groups (16), **unsustained campaigns** run the risk of replacing an endemic with an epidemic situation, as the collective immunity of the population will have decreased compared to the period prior to the interruption of transmission (9). Addressing the symptoms rather than the root causes of inequities in malaria may thus come with both high financial and moral costs.

The Human Development Report 2009, titled 'Human mobility and development', estimated almost a billion **migrants** – i.e., one in seven of the total global population. Of these, 214 million were international and 740 million internal migrants (84). By 2015, the number of international migrants had increased to 244 million, expected to reach 405 million by 2050 (85). Migrants, including internally

39 https://www.who.int/malaria/areas/high_risk_groups/pregnancy/en/

40 http://www.who.int/gender/documents/gender_health_malaria.pdf

41 <http://www.panamaamerica.com.pa/notas/1571220-mas-del-85-los-casos-malaria-panama-se-registran-poblaciones-indigenas>

displaced persons, refugees, returnees, and mobile populations, are a heterogeneous group with millions vulnerable to multiple health risks, poverty and exploitation, stigma, discrimination, social exclusion, language and cultural differences, separation from families and socio-cultural norms, administrative hurdles, and a legal status frequently restricting access to health and social services (86).

Some **occupations** are more exposed than others, including: rice farmers (while they work and sleep), highland migration labourers, forest workers and rubber tappers (16). As countries progress towards elimination, malaria tends to become increasingly **geographically and demographically focused** in population groups who share social, occupational, behavioural and geographical characteristics (11) – (see also Text Box 4.3). Exposure to malaria risk because of working practices (such as working through the night) is higher for the low-status occupational category. Low-paid, industrial, or unskilled workers living in common quarters as well as the unemployed have higher malaria incidence than the high-status category, such as those living in government or company housing with good workplace facilities. Higher incidence of malaria and lower use of preventive measures are seen among hospital workers and students of lower status than among those of higher status. Low-level workers are far less likely to use prevention methods such as repellents, antimalarials and mosquito mesh in rooms (16).

A study in Mwea division in Kenya showed that while villages with rice irrigation had significantly higher prevalence of the local malaria vector than those without irrigation, they also had much lower malaria *prevalence*. This **paddies paradox** reflects the trend that households with irrigation have higher incomes compared to those without (cited in (87)).

Large-scale operations that include infrastructure development projects, natural resource extraction (especially mining), plantations, breaking new settlement frontiers and the deployment of military are frequently associated with malaria epidemics. These can severely hamper the whole enterprise. Some of the most well-known examples of bringing workers into malaria risk areas include the construction of the Panama Canal and the establishment of the Malayan plantations. An example where malaria has been introduced into a previously malaria-free area by a workforce is the establishment of the banana plantations on the east coast of Mesoamerica (9).

Weakening of **village and community control**, of village ecosystems and irrigation systems, combined with increased population size and number of animals, as well as the migration of young people, all contribute to degradation of land, inadequate maintenance, weakening of social cohesion, changes in land tenure and use, proliferation of mosquito breeding sites and increase or resurgence of malaria transmission (9). This suggests that the observation of a direct link between general social development and malaria made at the societal level might also apply at the population and community level.

7. Households and Individuals

When an individual suffering from malaria or in need of preventive solutions interacts with the **health system** – public or private, formal or informal – the person may encounter difficulties in accessing or using the various services. This may result in differential outcomes depending on their social status – personal characteristics and service provider responses. Poor health outcomes may have several social and economic consequences for the individual and the household, including loss of earnings, impaired ability to work and learn, and social isolation or exclusion (35). Moreover, people at risk of malaria face the burden of paying for prevention and treatment. Poor malaria outcomes may also have upstream consequences in terms of, e.g., lower productivity of the labour force and education systems, and development of drug resistance.

At the household and personal level, **choices** will have to be made about the adoption of malaria-safe habits with respect to personal protection measures, home improvement, peri-domestic sanitation, chemoprophylaxis during pregnancy, and treatment (9). These different choices will come with some costs, and the household will have to weigh the costs against the perceived benefits and competing priorities as well as against their ability to invest the time and money required.

The level of **education** is a predictor of the type of help first sought when a child has a fever. Mothers with no formal education or primary education only are less likely to visit a health facility first, compared to mothers with secondary education (16). Further, research in Mali has shown malaria as the primary cause of school absences and further showed a direct correlation with lower educational achievement and cognitive performance (88). This has bearings not only for the individual but also on the general societal development and for increasing population vulnerability.

A **seven-step ladder** must be climbed to ensure a successful outcome from using health care services: *availability, accessibility, acceptability, and contact coverage* followed by *diagnostic accuracy, provider compliance and consumer adherence*. At each step there are barriers and options; and different choices will have to be made by the consumer as well as by the provider (35). The way health care systems are structured and operated can thus contribute to increasing health inequity and hinder successful malaria outcomes.

There is a large range of **treatment options** available to an individual in need: from none, self-treatment, or traditional treatment to a variety of formal and informal public and private pharmacies, clinics, and hospitals. Treatment-seeking behaviour and choice of treatment options differ between individuals of different SES, age, sex and zone of residence. Those of lower status are more likely to receive cheaper possibly inferior treatment or no treatment at all (16). The use of both private and government services increases with household wealth – despite the public nature of the latter. However, the variance across countries requires that any policy seeking to reform the health sector to better care for the poor needs to be informed by country-specific work (89).

Those in the poorest wealth quintiles are significantly more likely to seek care from traditional providers and use hospitals less frequently than those in higher quintiles. The poorest are more likely to use leftover drugs, purchase drugs without proper diagnosis and prescription, purchase counterfeit drugs, and sub-treat. Price and wealth are significant determinants of choice of treatment source (16).

Text Box 7.1

Equity of interventions – inequity of results

The Global Technical Strategy for Malaria 2016-2030 argues for universal access to malaria interventions – prevention, diagnosis, and treatment – as the path to elimination (27). But is it enough? What are the realities on the ground?

A study on malaria intervention coverage in 30 endemic countries of sub-Saharan Africa using data from the Demographic and Health Surveys revealed that intentions do not necessarily lead to the desired results (90).

The study found that scale-up of interventions improved access across the wealth continuum. Some efforts consistently prioritized the poorest; and expansions in control programmes generally narrowed the gaps in coverage between economic strata. However, gradients remain in countries where economic growth was slower in the poorest quintiles or where baseline inequality was larger.

But, despite progress in intervention coverage, malaria is consistently concentrated in the poorest, with a degree of inequality in burden far surpassing that expected given gradients in the distribution of interventions.

The study concludes that a lack of economic gradients in the distribution of malaria services does not translate to equity in coverage, nor can it be interpreted to imply equity in distribution of risk or disease burden.

In other words, availability and accessibility are just the first two steps of the seven-step ladder to climb for successful malaria outcomes.

When using health facilities, individuals of low SES are frequently met with **discrimination, complicated procedures, and adverse staff behaviours and practices**. For staff, this might be grounded in personal norms and attitudes, or institutional performance measurements, incentives or underpayment that do not favour dealing with disadvantaged people (35). For example, 45 percent of the residents in the Sodom and Gomorrah slum in Accra, Ghana, perceived problems with the available health facilities due to staff attitudes (Text Box 6.1).

An indication of differential treatment for malaria could be the inequity ratio in perception of service quality. In a study in Nigeria, the ‘most poor’ (Q1) quartile was considerably less satisfied with the quality of ‘diagnosis’ (Q1:Q4 = 0.8) and ‘information given’ (Q1:Q4 = 0.7) than the ‘least poor’ (Q4). Further, the least poor were more likely to be seen and have their medication prescribed by a doctor or a pharmacist than the most poor, who were mostly seen by lower level staff (91). The disadvantaged often do not get what they need or have the right to, e.g., fee exemptions and free malaria diagnosis or drugs (92). Patients, as a result, may turn to other service providers they find easier to interact with, such as unauthorized drug sellers – even if from a medical perspective this means receiving sub-standard or incomplete treatment.

As mentioned previously, *P. falciparum* resistance to artemisinin has been detected in four countries in the GMS – Cambodia, Myanmar, Thailand, and Vietnam. Artemisinin partial resistance is likely to have been involved in the spread of resistance to ACT partner drugs, and there are concerns that the same could happen in the WHO African Region (2).

The reason GMS has become one of the foci for drug resistance is related to providers, consumers, environment, and vector biology. This includes loose regulation of antimalarials with large proportions being counterfeit or sub-standard; poor provider compliance; misuse of the drugs; poor health care seeking and patient adherence; and high levels of population mobility (14), including transient non-immunes visiting forested areas where the extremely efficient *Anopheles dirus* can maintain malaria transmission at very low mosquito levels.

Resistance to artemisinin-based therapies can, if widely spread, have catastrophic consequences for efforts to control and eliminate malaria. However, it is important to note that drug resistance may develop and spread anywhere. Just a single mutation, if surviving, may potentially start a new lineage of resistance (15).

Health care provision systems – whether delivered through public, private, formal, or informal outlets – are shaped at societal level, but are critical factors at the household and individual level. They determine availability, access, use, provider compliance, patient adherence, and malaria care outcomes and consequences.

8. Sectoral matches

Based on the discussions in Part Two above, sectoral advantages and interests, **Table 8.1** proposes four to five important determinants for malaria at each of the five levels of analysis and matches these with different sectors to provide potential entry points for action. Within each sector, there will be several stakeholders or actors: government; public; private-for-profit; private-not-for-profit; non-governmental organizations; civil society, including consumers groups. Thus, ‘sector’ is used as an inclusive term.

Table 8.1: The Determinants Matrix – Potential entry points on determinants for malaria by level according to the analysis in Sections 3 to 7.

ANALYTICAL LEVEL AND MAJOR DETERMINANTS FOR MALARIA	SECTORAL MATCHES															
	Foreign affairs and int cooperation	Finance and economy	Food and agriculture	Trade, industry, etc.	Infrastructure, transport, works	Education	Social protection	Justice	Science and technology	Environment	Water and sanitation	Communication and information	Security (military and police)	Community development	Health	Public admin, incl. local government
SOCIETY																
Lack or neglect of disaggregated data for public discourse and policymaking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inequitable distribution of power and resources	✓	✓		✓				✓		✓		✓	✓			
Demographic change – population growth, family/ household size and structural population movements	✓			✓	✓	✓				✓	✓	✓	✓	✓		
Government’s ability to manage land, tax revenues and to regulate	✓	✓		✓				✓								✓
Organization of societies and services		✓			✓	✓	✓	✓		✓	✓			✓	✓	✓
SOCIAL ENVIRONMENT																
Gender norms	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Population movements		✓	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓
Education		✓	✓			✓	✓					✓		✓		✓
Marginalization and social exclusion	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓
PHYSICAL ENVIRONMENT																
Climate change	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change of land use	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓
Agricultural practices and production systems			✓		✓				✓	✓	✓			✓	✓	✓
Urban and peri-urban settings and infrastructures		✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓
Other economic activities and development projects	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓

**ANALYTICAL
LEVEL AND
MAJOR
DETERMINANTS
FOR MALARIA**

	SECTORAL MATCHES															
	Foreign affairs and int cooperation	Finance and economy	Food and agriculture	Trade, industry, etc.	Infrastructure, transport, works	Education	Social protection	Justice	Science and technology	Environment	Water and sanitation	Communication and information	Security (military and police)	Community development	Health	Public admin, incl. local government
POPULATION GROUP																
Clustering of adverse determinants and disadvantage	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Unsafe zones of residence, crowded and flimsy shelters		✓			✓	✓	✓	✓		✓	✓		✓	✓	✓	✓
Food security and nutrition		✓	✓	✓		✓	✓		✓	✓		✓		✓	✓	✓
Risky and indecent working conditions			✓	✓	✓		✓	✓				✓	✓	✓	✓	
Lack of village and community control		✓					✓	✓						✓		✓
HOUSEHOLDS AND INDIVIDUALS																
Choice and adoption of malaria-safe habits		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Awareness and knowledge						✓	✓					✓		✓	✓	
Access to and use of health care		✓				✓	✓					✓		✓	✓	✓
Provision of health care		✓						✓	✓					✓	✓	✓



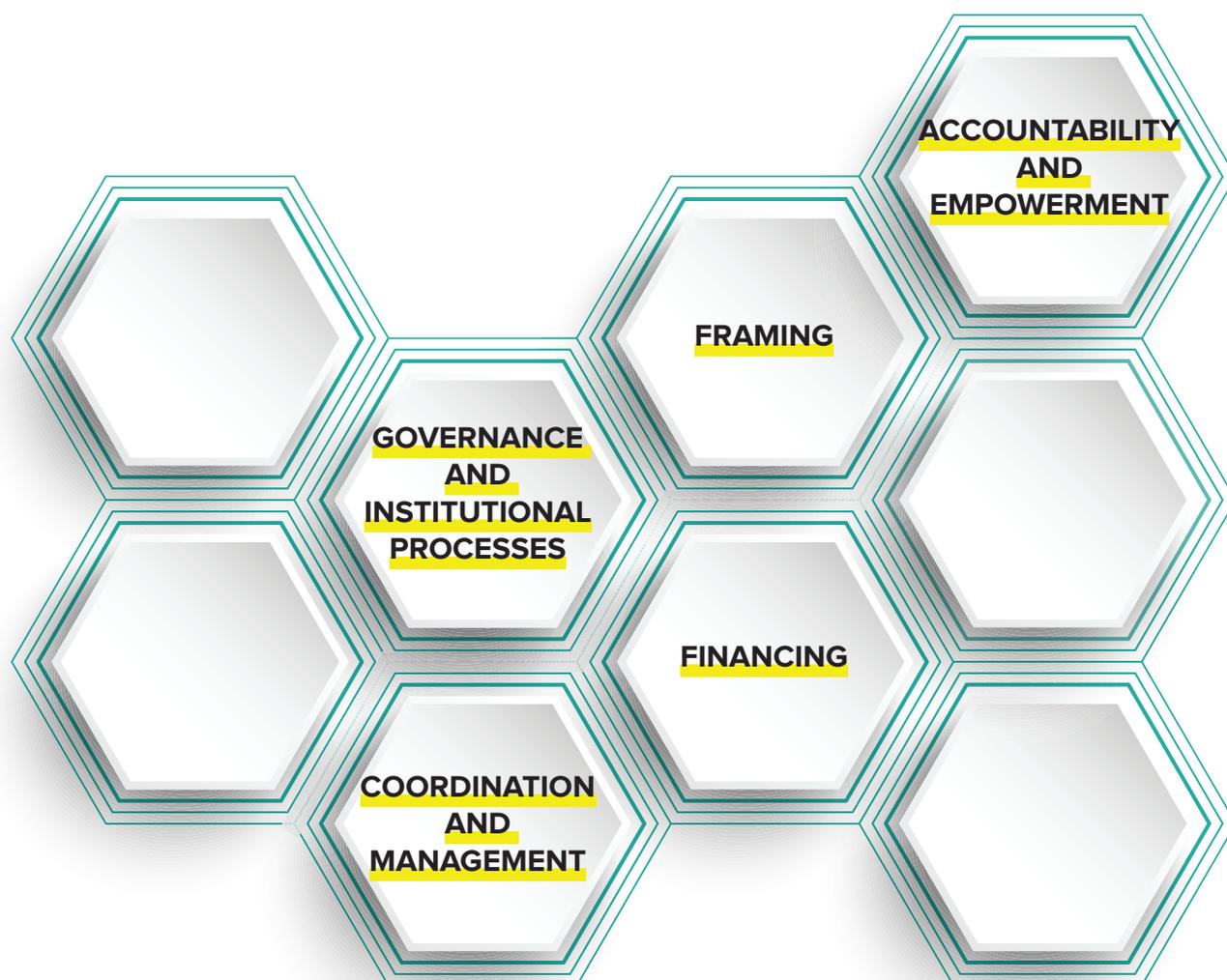
Part 03

PROMISING ACTIONS

Identifying promising actions to
a comprehensive multisectoral
approach

Part Three builds on the findings on determinants of malaria in Part Two to identify promising actions to a comprehensive multisectoral approach. Sustainable elimination of malaria requires effectively addressing the wide range of determinants as well as continuing dedicated vector and parasite control. Being ‘malaria-smart’ means taking actions in all relevant sectors, contributing to reducing rather than producing malaria, and achieving both sector-specific and malaria-specific outcomes. Incentives across sectors are thus recognised and reflected in operations.

The third part of the Framework will propose to integrate the promising action for multisectoral responses into existing and enhanced governance and institutional processes at national and sub-national levels. This section will describe principles and approaches, propose tools and a menu to plan concrete interventions. It will provide some examples of real-life achievements to illustrate the complexities. It will further link actions with sectors and the main associated SDGs, as well as the specific malaria outcomes. Finally, Part Three will briefly describe different types of financing streams and highlight that the major ones, i.e. for conventional malaria interventions and for other development and business activities, are at risk if they are not managed in a malaria-smart way.



Very few, if any, determinants of malaria are the sole responsibility of a single sector. Some require orchestrated action across multiple sectors (see Table 8.1). Therefore the 17 SDGs provide a practical framework for structuring the **comprehensive multisectoral and developmental approach** needed for the sustainable elimination of malaria. Most sectors will be required to act at multiple levels from policy to action, concerning their own employees, from global to local, and from society to household and individual.

Effectiveness and sustainability will intrinsically depend on concerted efforts of several actors. However different sectors, and different actors within a given sector, may have different entry points to and motivations in relation to the same determinant. Only if there is a positive and recognised relationship between action and benefit can an engaged and sustained effort be expected.

9. Examples of multisectoral action

The Millennium Villages Project (MVP) is an example of multisectoral development action carried out in 10 African countries representing different agro-ecological systems (Ethiopia, Kenya, Uganda, Rwanda, Malawi, Tanzania, Ghana, Mali, Nigeria, and Senegal). The multisectoral action includes empowerment and governance in each of the villages. This involves establishing committees from the village population on health, water and sanitation, education, fertilizer distribution, irrigation and water distribution and joint planning with the project by identifying needs and priorities. The villages also have roads constructed to connect to each other and to market, and electricity connected to the villages from the national grid. Thus, one action feeds another. An end-line evaluation of the project conducted in 2015 across all the project sites showed that the participating villages had significantly better results for 30 out of 40 outcomes than comparison villages (93). **Text Box 9.1** illustrates from one of the MVP demonstration sites the interventions implemented by each sector and their specific outcomes. It further highlights the key coordination and management issues, the malaria outcomes, and the relevant SDGs.

Text Box 9.1

Millennium Villages Project, Sauri, Kenya A demonstration project



The aim of the MVP was to provide proof-of-concept that an investment of US\$110 per capita per year on an accelerated timeframe of over five to 10 years in an integrated package of interventions to empower rural communities could lift them out of poverty and achieve the MDGs.

The table on the next page summarizes the interventions with respect to the Determinants Matrix levels 2, 3, 4 and 5 of Table 8.1, as well as the achievements accomplished with regard to the interrelated health outcomes of nutrition and malaria of the first MVP site after two years of operation.

Sector Intervention	Sector-specific outcomes	Coordination and management	Health/malaria outcomes
Agriculture <ul style="list-style-type: none"> • <i>Subsidized inputs:</i> hybrid maize seeds, basal and top-dressing fertilizer • <i>Training:</i> farming techniques, market diversification and non-farm income generation • 10% harvest surplus to community 	<ul style="list-style-type: none"> • Achieved food security • Increased agricultural production and productivity • Increased household income 	<ul style="list-style-type: none"> • Building local understanding of complementarity and dependency of action to achieve sector-specific outcomes • District government and decentralized district offices are key • Village sector committees and producer groups are essential for ensuring community participation and link with authorities 	Nutrition (for two-year-old): <ul style="list-style-type: none"> • Underweight reduced from 17% to 5% • Stunting reduced from 55% to 30% Malaria: <ul style="list-style-type: none"> • High-density parasitaemia prevalence among under-threes reduced by 92% • General high-density parasitaemia prevalence reduced by 86% • Non-zero parasitaemia prevalence reduced by 79% • Non-zero parasitaemia prevalence difference between those with income less than US\$1/day and those with more than US\$1/day disappeared
Education <ul style="list-style-type: none"> • Building renovation and construction, including kitchens and pit latrines • Removal of school fees • Secondment of teachers • Sanitary pads for girls • Provision of school meals (from the 10% harvest surplus) • Deworming in primary schools every four months 	School attendance increased from 76% to 93%		
Environment <ul style="list-style-type: none"> • Clearing of mosquito breeding sites • Indoor residual spraying 	Not available		
Health <ul style="list-style-type: none"> • Health clinic for every 5,000 people • Free health care service • Community health worker per 200 household – outreach • Free long-lasting insecticide-treated nets 	After an initial increase, the health service utilization stabilized at a lower level		

Conclusion: While marked progress was achieved in a fairly short period of time, it must be understood that poor rural communities will not be able to pay for their own health and educational services at the end of a five-year demonstration project. More donor and government money will be required for a foreseeable future. Further, for agriculture to become a sustainable vehicle for rural economic and social growth, investments in physical and logistics infrastructure needs to come forward together with ensuring economically viable sizes of land plots.

Source: Tozan et al (94)



Being 'malaria-smart' means taking actions in all relevant sectors, contributing to reducing rather than producing malaria, and achieving both sector-specific and malaria-specific outcomes. Incentives across sectors are thus recognised and reflected in operations.



THE COMPREHENSIVE MULTISECTORAL ACTION FRAMEWORK

While the Sauri case example (Text Box 9.1) provides a proof-of-principle, it also suggests that sustained outcomes, whether sector- or malaria-specific, will only be possible if societal determinants (level 1 in Table 8.1) are also successfully addressed. However, the MVP has also faced some criticism, including sustainability and scale-up of demonstration and ‘foreign’-induced projects.⁴²

It’s one thing to demonstrate, and another to show application in a more complex real-life situation, i.e., beyond the ‘demonstration project’. Such an example is provided by the National Malaria Control Programme of Iran. Here, in addition to intervening at determinant levels 2, 3, 4, and 5 (Table 8.1), the determinant of inequitable distribution of power and resources (level 1) is also addressed through preferential focus on malarial areas within the poverty alleviation and electrification programmes (**Text Box 9.2**).



Photo credit: © Heifer Lyell via Flickr

⁴² <https://oxfamblogs.org/fp2p/thumbs-up-or-thumbs-down-did-the-millennium-villages-project-work/>

Text Box 9.2

Multisectoral action in the Islamic Republic of Iran

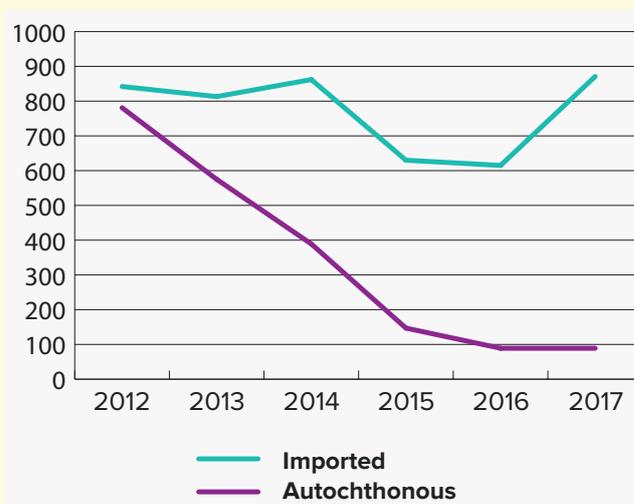


Iran has moved from pre- to elimination phase and malaria is now concentrated in the least developed provinces of Sistan & Baluchestan, Hormozgan, and the southern part of Kerman, with a combined 3.5 million people at risk. The area is bordering the Persian Gulf to the south and Pakistan to the east. The Pakistani side is also high transmission (see Text Box 4.3). Almost all financing for malaria comes from the government with a small part from the Global Fund. The risk of reintroduction of malaria with migrant workers from Pakistan and population movement within Iran is high. Urbanization with marginalized people and suburban slums, farming (bananas, rice, etc.), water storage and unprotected houses are important obstacles to malaria elimination. An in-depth assessment of social determinants of malaria was done in 2012 and multisectoral actions accelerated.

National and provincial poverty alleviation programmes aim to increase social and economic capacities of the malarial areas, and collaboration of all stakeholders towards malaria elimination is a pivotal element of the national strategic plan. In each province and district, there are multisectoral malaria elimination committees chaired by the respective governors. Members are the departments of education, energy, water supply, broadcasting, agriculture, and municipal and community-based Islamic councils. At the provincial level, the chancellor of the University of Medical Sciences is the secretary and at the district level, it is the chair of the district health centre. These committees integrate malaria elimination means and measures in all development projects and facilitate community involvement. In practice, however, much could still be done to make fuller use of all potential connections, for example in agriculture.

Schools teach malaria awareness as part of the curriculum from age 11 and the rural teachers are involved in community education through their students. The local broadcasting centres provide malaria information and education prepared by the provincial and district health centres during the malaria transmission seasons.

The energy department prioritizes connecting residences of malaria-endemic areas in their electrification projects. Summer temperatures, including at night, are extremely high and people tend to sleep outside and are thus exposed to mosquito bites. Eighty percent of the 4,800 villages of Sistan and Baluchistan had no electricity in 2005, and by 2013, this had been reduced to less than 10 percent. Electricity, in addition to other benefits, has allowed villagers to install fans and air conditioners, sleep inside – safe from mosquitoes. Elected local Islamic councils work with health staff to mobilize communities and households for safe water storage, including larviciding with *Bacillus thuringiensis* and peer-to-peer education to adopt malaria-smart practices and care-seeking behaviours. As illustrated, the results since 2012 have been impressive. *Sources: National Malaria Control Programme, Iran (28;95;96)*



Brazil went one step further upstream, addressing more determinants at levels 1 and 2, including using policy, legal and regulatory instruments for direct transfer of resources and ensuring that economic, social, and environmental developments were malaria-smart (**Text Box 9.3**). This required a strong role of the state and leadership by the central government in defining and using the instruments, while delegating and holding local authorities accountable for their implementation.

Text Box 9.3

Brazil



(Case from 2013)

The Amazon Region covers 50 percent of the country, 14 percent of the population and 99.7 percent of the reported malaria cases – most occurring in rural areas with poor infrastructure and low income. The annual number of cases was about 760,000 in 2000. According to the World Malaria Report 2021, this number had been reduced to 390,000 in 2010 and further to 132,000 in 2016 (2).

Strong anti-malaria efforts are ongoing in various sectors. Brasil Sem Miséria (Brazil Without Destitution) is a federal programme started in 2011 designed to bring people beyond absolute poverty. The programme also incorporated Bolsa Família, a highly effective conditional cash transfer programme that started in 2003. Nearly half of the municipalities targeted were also priorities for malaria control. Enterprises located in the Amazon region are subject to federally monitored licensing, according to which they, in collaboration with the municipal administrations, must control malaria in their areas of operation. Agrarian reforms were also bound by environmental laws and the Ministry of Agrarian Development was responsible for integrating malaria components following the state administration's instructions.

Further, regional development plans, including for areas of big enterprise operations, had strong malaria elements and are implemented under direction of the Chief of Staff of the President; Ministry of Planning, Budget and Management; Ministry of Agrarian Development; Minister of National Integration; and Ministry of Health. Finally, the Navy and Army provided diagnosis and treatment in areas with difficult access.

New collaborations on the drawing board in 2013 included: Minha Casa, Minha Vida (My House, My Life), a federal social programme in partnership with state and municipality administrations and non-profit organizations aiming to help people with few resources acquiring quality housing; the Ministries of Agriculture, Fishing and Social Development to make fish farming malaria-smart; FUNASA (National Health Foundation) and the Ministry of Cities to improve basic sanitation in municipalities; and tourism authorities to make the upcoming large public events malaria-smart.

Source: The National Malaria Control Programme, Brazil (2013)

Recent development in Brazil, however, shows that the sustainability of interventions at the societal level may also be susceptible to political change.^{43, 44} Social programmes have been defunded or stopped and the number of malaria cases jumped from the 132,000 in 2016 to 220,000 in 2017 (2).

10. Basis for multisectoral action

Effective action for a determinant, as proposed in Table 8.1, starts with identifying the promising entry points, moving on to defining the concrete action and desired malaria outcome, ending with establishing what the incentives of the action will be for the actor engaging, i.e., sectoral outcome or benefit. A clear lesson learned from the Priority Public Health Conditions Knowledge Network⁴⁵ (97) is that non-health sectors often see health as the responsibility of the health sector alone. If they get a sense of doing the work of the health sector, they are difficult to engage.

However, collaboration around combating malaria is still viable, if the following questions can be addressed:

- **Where can I contribute?**
- **What can I do?**
- **How can I show that I am making a difference?**
- **Why should I engage?**

Effective multisectoral action requires that the answers to all four of the above questions are clarified and known to each actor. Within each sector there will be several actors, such as government, international development agencies, NGOs, faith-based and civil society organizations as well as private for-profit firms. The specific incentives will vary across such actors.

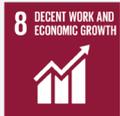
The advantage of a comprehensive multisectoral development approach to malaria is that the benefits of action potentially can materialize with respect to both malaria control and the core ‘businesses’ of the various actors as ‘co-benefits’. **Table 10.1** provides an illustrative example for how this could work for one determinant, i.e., Urban and peri-urban settings and infrastructures (level 3, line 4 of Table 8.1).

43 <https://www.theguardian.com/world/2019/jul/03/brazil-amazon-rainforest-deforestation-environment>

44 [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(19\)31801-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)31801-X/fulltext)

45 One of the nine knowledge networks of the Commission on Social Determinants of Health particularly focusing on public health programmes

Table 10.1: Illustrative example of comprehensive multisectoral malaria action for the determinant: Urban and peri-urban settings and infrastructures (see Table 8.1)

Sector Intervention	Entry point	Action	Malaria outcome	Sectoral and two SDG outcomes (other than SDG3)
Finance and economy	Planning and budget process	Earmark attention and resources to develop the most deprived areas	Malaria-resilient population	Increased equity and social and economic productivity  
		Use disaggregated data for planning and accountability		
Food and agriculture	Research and guidelines	Guidance for introduction of malaria-smart crops and water-saving production systems	Reduced vector load and vector/human contact	Increased productivity and economic development  
	Extension work	Increase efficiency, introduce improved and malaria-smart crops and production methods		
Trade, industry, etc.	Policy and incentives	Create local workplaces, increase efficiency, introduce improved production methods	Reduced vector load and vector / human contact	Increased productivity and economic development  
	Extension work	Reduce waste, water spillage and pollution, e.g., in pits used for car washing, brickmaking, rock quarries, construction, etc.		
Infrastructure, transport, works	Standards and planning	Norms and standards for housing, buildings, land use, and separate residential and productive areas	Reduced vector load and vector/human contact	Better-functioning urban and peri-urban settings and social and economic growth  
	Upgrade and maintenance	Upgrade urban electricity grid, drainage, clear drains of blocking garbage, plant eucalyptus to drain swampy areas and subsidize housing improvements		
Education	Enrolment and attendance	Target and adjust to needs of poor and disadvantaged areas, population groups, households and particularly girls	Increased malaria literacy and resilience	Improved equity and enrolment rates, achievement, and cognitive performance  
	Curriculum			

THE COMPREHENSIVE MULTISECTORAL ACTION FRAMEWORK

Sector Intervention	Entry point	Action	Malaria outcome	Sectoral and two SDG outcomes (other than SDG3)
Social protection	Policy for targeting	Identify clustering of disadvantage, its causes and mitigate in sustainable malaria-smart ways	Decreased population group vulnerability to malaria determinants	Greater equity, social stability, and community resilience  
	Town planning and land use	Influence town planning, zoning, and infrastructure development to improve current and avoid clustering		
Science and technology	Implementation research and citizen science	Real-life, real-time research with instant assessment, feedback and internalization of lessons learned from multisectoral action	More effective collaboration for sustained malaria elimination	Application of research and innovation to the good of society  
	Smartphone technologies	Devise platforms where citizens not only have access to mapping malaria determinants and progress – but also for participating and sharing	Increased malaria determinants knowledge, responsibility, and accountability	
Environment	Policy and standards	Develop norms and standards for inclusion in sectoral guidelines and procedures, including of water resources and water lands	Reduced vector load and risk of insecticide resistance	More sustainable environments  
	Extension work	On-site control of compliance with norms and standards including for pesticides and pollutants		
Water and sanitation	Planning	Adequate capacity and access to water and sanitation services	Reduced vector load and vector/human contact	Enhanced social development, more business, and less waste  
	Upgrade, maintenance	Quick repair of leaking clean- and waste-water pipes; and larval source management on oxidation ponds and treatment plants		

THE COMPREHENSIVE MULTISECTORAL ACTION FRAMEWORK

Sector Intervention	Entry point	Action	Malaria outcome	Sectoral and two SDG outcomes (other than SDG3)
Security	Enforcement and collaboration	Work with local authorities and communities to ensure law and order as well as compliance	Reduced vector load and vector/human contact and parasite load	Social growth  
Community development	Extension	Support the strengthening of community structures for empowerment, participation, responsibility, compliance, and self-control	Communities take active responsibility for reducing malaria risks	Social growth  
Health	Health service delivery	Reduce all barriers of access to quality PHC services, and discrimination and corruption within	Reduced parasite load and reduced risk of drug resistance	Improved equity  
	Health service quality	Regulate, train, control providers – public, formal private as well as informal private		
Local government	Policy and planning phase	Bring stakeholders together, review potential malaria impacts (harm and good), establish priorities for joint synergetic action, and use disaggregated data for policymaking and management	Reduced vector load and vector/human contact and parasite load	Social and economic growth  
	Implementing phase	Monitor and hold sectoral stakeholders accountable for the malaria impact of their activities		

The above (Table 10.1) is a generic example. In real life, it would of course be expanded and made specific to local context circumstances and actors.

If it is not possible to address all five levels and all determinants or involve all sectors of Table 8.1, just getting started will have a positive reinforcing effect on both malaria and social and economic development. The more relevant sectors and individual actors that come together nationally or locally, e.g., around specific determinants, such as the illustrative example in Table 10.1, the higher the synergetic effect is likely to be. Annex A provides a list of examples of possible actions to each of the determinants in Table 8.1 with links to where more information on the proposed actions can be found.

11. Five steps to becoming malaria-smart

A pragmatic way to get started on the road to sustainable elimination of malaria, responding to the four questions of Section 10 (*Where can I contribute? What can I do? How can I show that I am making a difference? Why should I engage?*) for all sectoral actors – public and private, commercial, and non-commercial – would be to go through the following five steps. It begins with the near and obvious.

1. Own staff and their families.

It is of obvious benefit to a sector and its actors that its staff and their families are free of malaria as this directly improves the productivity of the individual actor. The sectoral actors should promote malaria-safe behaviours and provide support and means for prevention, protection, and access to treatment for their staff.

2. Clients and their families.

It is also of obvious benefit to a sectoral actor if its clients (business relations, students, farmers, small-scale entrepreneurs, etc.) and their families are free of malaria as this will improve the overall sectoral productivity. The sectoral actors should promote malaria-safe behaviours, prevention, protection, and treatment, and if relevant provide support and means to do so.

3. Malaria-producing activities.

The sector should review its ways of operation, practices, procedures and production systems to identify those that are potentially contributing to sustaining or increasing: vector load, parasite transmission, or insecticide and drug resistance. The sector should develop and promote the use of approaches that do not produce malaria, i.e., **do no harm**.

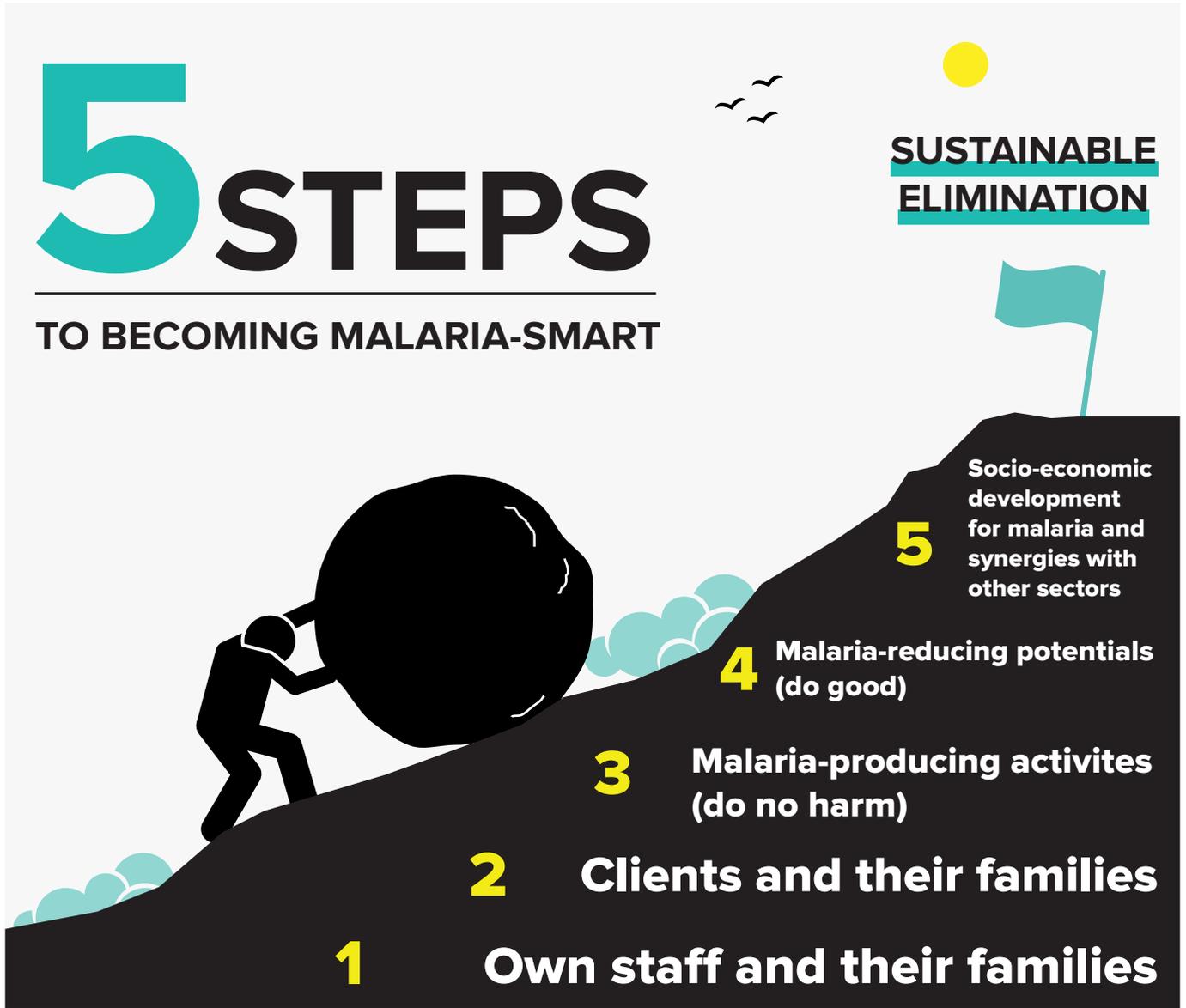
4. Malaria-reducing potentials.

The sector should review its current activities to identify those that could be modified or added to, to have a malaria-reducing effect. Each sector will have some comparative advantages with respect to malaria control that can be released with no or limited additional costs, i.e., **do good**.

5. Socio-economic development for malaria and synergies with other sectors.

The sector should review its potential and role in addressing those determinants of malaria where acting alone or in concerted efforts by multiple sectors are required. It should then actively engage nationally and locally in addressing the priority determinants, including defining indicators, and setting and reporting on targets.

Figure 11.1: Five steps for workplace, school, office, institution, organization, business, donor, investor, sector, district, and nation towards sustainable malaria elimination



Steps 1 and 2 are in the self-interest of any sectoral actor: public or private – commercial or not. The focus is on access, accept, contact and adherence – more than availability and provision (see Section 7). Steps 3 and 4 are about social responsibility. People have the right to be free from harm of others’ activities and expect them to have good intentions. However, sometimes this must be enforced by rules, regulations, enforcement, and public accountability.

12. Governance and institutional processes

Governments – national and sub-national – have the responsibility for real improvements to the lives of all their people in ways that are sustainable over time. This requires taking leadership, efficiently allocating resources, and stimulating coordinated action across sectors. To make comprehensive multisectoral action work, it will be important to lead, innovate, explore, develop, and test options and tools for more effectively harnessing the potentials of all relevant sectors and governance mechanisms for elimination of malaria. This means to embed responsibility and accountability for

sustainably ending malaria in existing local structures and to ensure that no one is left behind. The leadership role includes selling the idea of and need for multisectoral action, convincing, and bringing the sectoral actors onboard.

Governance and institutional processes for comprehensive multisectoral action for malaria have shared challenges and synergies with multisectoral approaches to other health and development issues. There are several global and regional processes and fora embracing malaria within a broader development perspective as well as processes and fora that are specific to malaria. The former includes the MDGs (98), the Abuja Declaration 2001 (99), the Libreville Declaration on Health and Environment in Africa (100), the 2030 Agenda for Sustainable Development (26), and Stronger Collaboration, Better Health – the 2019 joint action plan of 12 multilateral organizations (101) in which, e.g., the UNDP particularly focuses on removing barriers to health.⁴⁶

The processes particularly focusing on malaria include the launch of the Roll Back Malaria movement in 1998, the African Summit on Roll Back Malaria in 2000 (102), the Global Alliance for Alternatives to DDT established under the Stockholm Convention,⁴⁷ sub-regional collaborations such as Elimination 8 in Southern Africa,⁴⁸ the Asia Pacific Malaria Elimination Network (APMEN),⁴⁹ and the African Union’s Zero Malaria Starts with Me campaign (103) – to mention a few.

While an unprecedented level of international funding has become available since the launch of RBM and the Global Fund around 2000, this funding has been driving a focused range of interventions, i.e., LLIN, IRS and malaria treatment. It has been much more challenging to make the intersectoral and broader development link and work effectively at international, national, and sub-national levels. In recognition of this, the African Leaders Malaria Alliance (ALMA), during the Assembly of the African Union in 2010, called for strengthening decentralization and linkages with other health and development sectors, civil society and private entities (104).



The ALMA chair further emphasized this during the launch of the Zero Malaria Starts with Me campaign in 2018, stating: “*The success of this campaign will depend on partnerships and collaboration across sectors and amongst our population, for as government, we cannot win this fight against malaria alone.*” (103)

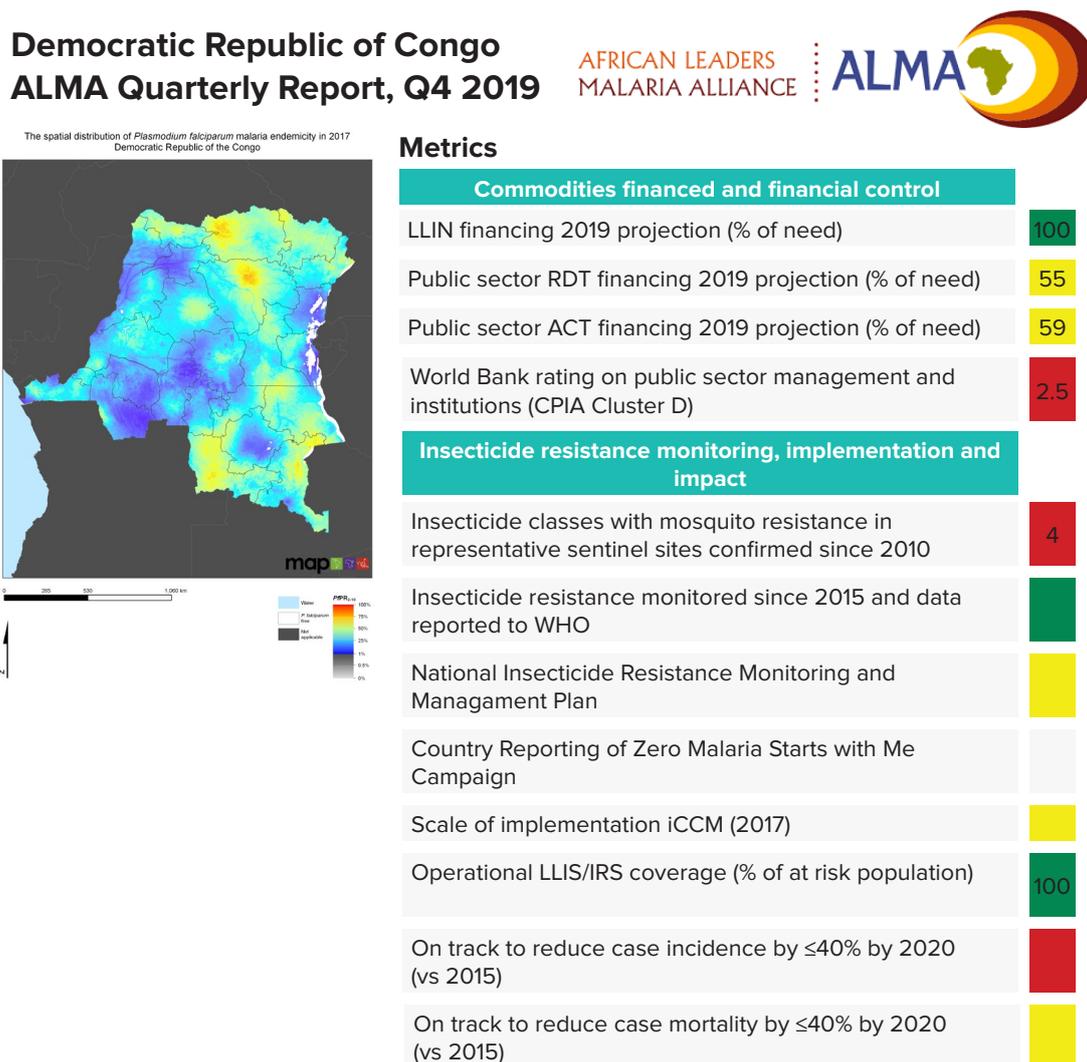
46 <https://www.undp.org/content/undp/en/home/librarypage/hiv-aids/universal-health-coverage-for-sustainable-development---issue-br.html>

47 <http://chm.pops.int/Implementation/DDT/GlobalAlliance/tabid/621/mctl/ViewDetails/EventModID/1421/EventID/136/xmid/6821/Default.aspx>

48 <http://tis.sadc.int/english/sarn/elimination-eight-e8/>

49 <http://apmen.org/>

Figure 12.1: ALMA Scorecard for Accountability and Action⁵⁰



The ALMA Scorecard for Accountability and Action (**Figure 12.1**) shows that the Democratic Republic of the Congo was not on track to meet the 2020 malaria incidence target, while the LLIN financing needs and the operational LLIN/IRS coverage of ‘at-risk populations’ are fully met. The scorecard also shows a very uneven distribution of malaria across the country and poor performance of public sector management and institutions. This calls for looking beyond the aggregates and the conventional malaria interventions, i.e., to drill down to local levels, address the underlying causes (determinants), and support local responsibility-taking, action, and public accountability.

With the picture painted by the ALMA scorecard for the Democratic Republic of the Congo, the role and responsibility of the ‘leader’ is to bring about change and improvement, to alert and involve those across sectors with the means and tools to make a difference, to facilitate and direct resource flows, and to instigate and demand both bureaucratic and public accountability for results. The latter means changing the red scores to yellow or green, the yellow to green, and to improve on the uneven distribution of malaria in the country.

⁵⁰ <https://alma2030.org/scorecard-tools/alma-scorecard/>

12.1 Framing

Malaria is trapped in the vicious cycle: it is both a cause and a result.

All SDGs connect to malaria and malaria reduction contributes to all SDGs. **Malaria is in all SDGs** and can thus be framed as an intrinsic part of development governance and may even be used as a common proxy-indicator of achievement (see also Text Box 9.1). Further, all governments have committed to the SDGs, including to acting, collecting data, and reporting on a wide range of indicators – and to leaving no one behind. Leveraging this global momentum to achieve the SDGs, it seems more than reasonable to frame malaria within the SDGs.



The estimated number of malaria deaths averted from 2000 to 2018 was about 3 million (3). However, about 241 million people still get infected each year, indicating no change in the global number of malaria cases since year 2000. Moreover 3.3 billion people remain at risk (2). Is this a success? *Yes and no.*

Yes, because due to effective health service interventions, fewer of those infected develop severe malaria and die. *No*, because there has been no serious dent made in the overall figure of malaria cases per year (incidence). The overall number of cases has continued to grow since 2014 (Figure 1.1).

Yes, because what appears as an unchanged malaria incidence masks the fact that the incidence rate (per population) has fallen in many countries as their populations have grown considerably (see **Text Box 12.1**). *No*, because nearly half of the world’s population remains at risk, i.e. those in the most disadvantaged regions, countries and population groups.

Against that backdrop, should malaria continue to be framed primarily as a medical problem for health programmes? *No*, it is a development challenge. Lip service is paid to multisectoral action in most declarations, strategies, and reports on malaria. Is it going to help if malaria programmes continue to ask other sectors to contribute with health service work, commodities, and money? *Probably not!*

The ask should rather be: **“Do no harm – do good.”** (Figure 11.1 Steps 3 and 4). That is, make sure your activities do not produce malaria by contributing to the population’s malaria risks; and ensure that your activities are designed and carried out so that they actively contribute to reducing the population’s risks of malaria. **Be malaria-smart!** That will help you, the country, the population, and each individual person.

12.2 Coordination and management

Framing and identifying promising entry points and actions alone will not be sufficient for coordinated multisectoral action. Experience from the PPHC case study research (97) has shown that there are also institutional issues posing challenges to coordinated joint action, including:

- **Differences in values bases** (e.g., whether social justice is an implicit or explicit goal or neither)
- **Differences in how challenges are viewed, and successes judged**
- **Different practical constraints to participating**
- **Different management cultures, disciplinary tools, and conventions** (language, evidence metrics, etc.)

These findings are similar to the results of a consultation with sectoral executives about implementing action on social determinants of health that grouped the challenges for multisectoral collaboration into: structural, cultural and language, process, and capacity and technical (105).

The experience from PPHC further showed that individual leadership capacities can greatly forward a collaborative agenda. However, too strong an identification with one single leader might eventually backfire. It is vitally important that leadership is quickly and solidly anchored and institutionalized. Otherwise the approach will blossom and wither with the rise and fall of the leader or the interest of the same (97;106).

Important leadership functions include carrying the vision torch and orchestrating the co-benefits. These two leadership functions could be carried out by two different institutions, e.g., the Ministry of Health/Malaria Control Programme Health and the Prime Minister's Office. In particular, the former will, in some cases, have to disrupt and expand the way it thinks and works to embrace the multisectoral approach as proposed in the Framework.

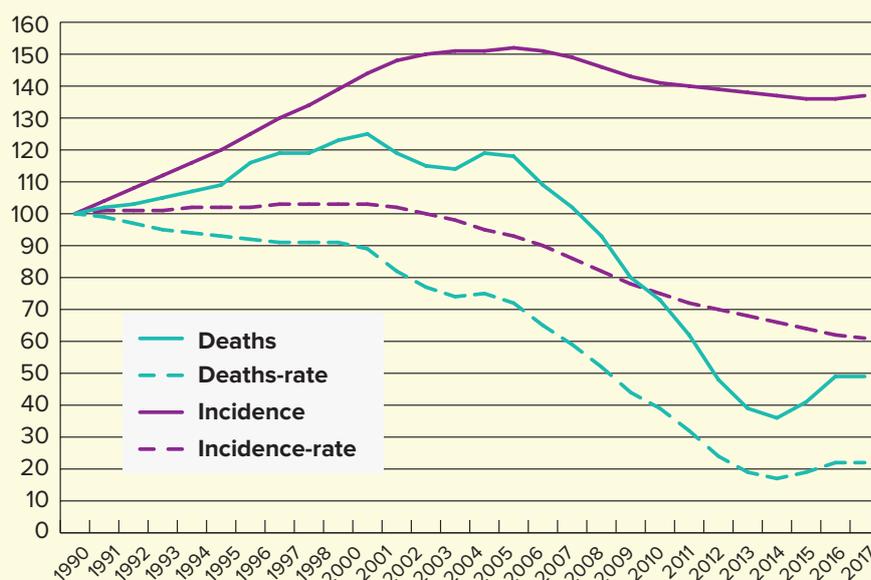
Text Box 12.1

Uganda multisectoral malaria governance in districts

History and context:

Uganda has a long history of multisectoral action, including for HIV/AIDS. Multisectoral action for malaria started in earnest with Mass Action Against Malaria (MAAM), launched by H.E President Yoweri Museveni in 2018 by publicly signing the statement ‘*A malaria free Uganda is my responsibility*’. The background for the MAAM was the persistent high numbers of malaria cases and a growing number of deaths (see graph). This led to the realization that the strategy pursued up to then needed to be complemented by comprehensive multisectoral action.

Malaria cases (incidence) and deaths, Uganda 1990-2017 (Index year: 1990 = 100)⁵¹



Mechanisms for coordination and accountability:

The multisectoral action on malaria in Uganda is based on five principles: inclusiveness; effective leadership; transparency; diversity; and evidence-based decision-making. The onuses for coordination and accountability in districts are on the elected constitutional government structures: Local council V (district level) and Local council III (sub-county level). Each sector must mainstream malaria into their Economic Development and Poverty Reduction Strategies: security; works and transport; agriculture; education; health; water and environment; justice/law and order; energy and mineral development; tourism, trade, and industry; lands, housing, and urban development; and social development. The different sectoral elements are then integrated into the District Development Plan by the local government with support of the National Malaria Control Division/MoH.

51 <http://ghdx.healthdata.org/gbd-results-tool>

Text Box 12.1 (continued)

Cross-sectoral accountability:

In addition to indicators for input, process, output and outcome, accountability for malaria and co-benefit impact is exercised through assessing the following parameters: reduced malaria burden; reduced burden on the health sector; intervention coverage by sectoral contributions; reduced school absenteeism; improved productivity; and increased per capita income. In addition, two indicators for each of the 17 SDGs are specifically monitored in relation to malaria.

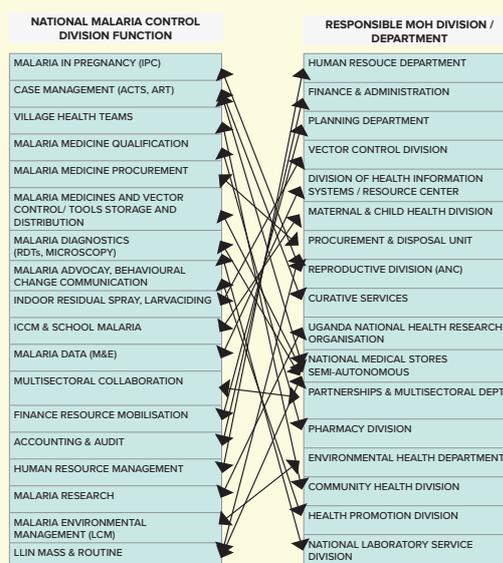
Accountability to the public/community: the Local councils III comprise members representing each parish whose members are elected by villages and communities. The Local councils III are in turn represented in the Local councils V. In this way accountability works both up and down.

Governance challenges:

Implementation of individual activities, including mass rallies and school programmes, have gone well. However, there remain challenges at the interfaces between sectoral actors and within sectors. The latter includes the health sector where malaria-related responsibilities are spread across a range of internal players, see diagram to the right.

Sources of information: Guidelines for Mainstreaming Malaria in the Multisectoral National and Districts Plans (2020)⁵² and personal communication from Peter Kwehangana Mbabazi (NMCD-MOH Uganda).

Intra-sectoral responsibilities and challenges



There is a long history of attempts for multisectoral committees, e.g., primary health care (PHC) and HIV/AIDS, but it is only recently that this is beginning to come into malaria (...) However, the question is: What will drive the approach – a unifying theme or self-interest?

52 <https://www.afro.who.int/publications/guidelines-mainstreaming-malaria-multisectoral-national-and-district-plans>



Photo credit: © Dominic Sansoni / World Bank

There is a long history of attempts for multisectoral committees, e.g., primary health care (PHC) and HIV/AIDS, but it is only recently that this is beginning to come into malaria (see Text Box 12.1). However, the question is: What will drive the approach – a unifying theme or self-interest?

Health For All (107) and the Commission on Social Determinants of Health (37) both had ‘*equity*’ as the unifying theme in their call for intersectoral collaboration, while the Commission on Macroeconomics and Health (18) had ‘*economic development*’ as the overriding theme. The challenge of ‘big themes’ is that they are often based on ideology and tend to divide when it comes to the details and when choices have to be made under resource constrained circumstances.

The work on the post-2015 development agenda was taken forward based on three core values: human rights, equality and sustainability (108;109). The resulting 2030 Agenda for Sustainable Development consolidates this into ‘*leave no one behind*’ and ‘*sustainability*’ (26). Given the analysis of the social and environmental determinants of malaria in Part Two, these values appear to constitute a suitable overriding theme for engaging the wide range of sectoral actors required for realizing the vision of a malaria-free world (28).

Self-interest or intrinsic interest according to the core purpose of each sector and actor is likely the strongest driver for individual action – but without identifying and orchestrating the co-benefits it will not necessarily yield the desired results for malaria. In summary, there could be three themes for driving comprehensive multisectoral action for malaria:

- **Overriding theme:** Leave no one behind and Sustainability
- **Action theme (vision):** A malaria-free world
- **Collaborative theme:** Co-benefits

The overriding theme is important for placing malaria not just as one⁵³ among the 232 SDG indicators,⁵⁴ but as a common proxy measure of collective success. Grounding malaria in the SDG framework also has the added advantage of the commitments to the 2030 Agenda, the coordinating, implementing, and monitoring mechanisms that are already in place in many countries – both central and local.

Several mechanisms and tools will be required to fully capitalize on the potential of a comprehensive multisectoral approach to malaria as well as coordinating implementation, for example:

Joint appraisal and consensus building, covering all the main determinants of malaria identified for a country. A lot of the information is already being collected for other purposes by different sectors and actors – including as part of the SDG reporting requirements. However, there will be a need for rapid appraisal and analytical tools to, e.g., map the key determinants for malaria in each country, identifying the common interests of different sectors, the expected impacts, etc. (See **Text Box 12.2**). The collection of the information would provide an opportunity for intersectoral dialogue, followed by consensus building, action, and continuous action analysis.

⁵³ SDG indicator 3.3.3 ‘Malaria incidence per 100,000 population’

⁵⁴ <https://unstats.un.org/sdgs/indicators/indicators-list/>

Text Box 12.2

Malaria Rapid Appraisal and Consensus Building

A lot of data on social and environmental determinants of malaria is already available in different databases and from different sources. However, the data is rarely systematically and comprehensively put together, analysed and used to inform decision-making at national, sub-national and local levels, including for identifying malaria determinants, their causes and consequences (11;110). Managers from outside the health sector often do not know what they can do to reduce the malaria burden and how much malaria affects their core 'business' (97). Managers from within the health sector often are not aware of the determinants that drive and shape population health and health inequities. Increasingly, data will become available as the 2030 Agenda – that has a specific sub-goal on data collection and disaggregation (SDG17:18) – is progressing (26;36).

However, data – even if plentiful – will always be incomplete. To move forward effectively engaging multiple sectors, a process leading to consensus about the problem, its root causes, and the necessary action will be required.

Rapid appraisals (111-114) analyse the level, geographic and population distribution of malaria; the social and economic impact of malaria, the adequacy and sustainability of current interventions and the risk and implications of eventual resurgence; and the key national and local determinants. The National Malaria Control Programmes and local malaria focal points together with a coordinating lead, e.g., Prime Minister's Office, Finance, Planning or Local Governments, should be able to undertake the appraisal through review of existing documentation and databases, and interviews with key sectoral informants.

Available tools – there are several tools already available to assess the impact of activities and decisions that might be combined and/or adapted to support the rapid assessment. These include e.g.: the Health Equity Impact Assessment Tool (HEIA),⁵⁵ Malaria Decision Analysis Support Tool (MDAST)⁵⁶ and Malaria Match Box.⁵⁷

Consensus – grounded in the findings of the rapid appraisal and, e.g., the scenarios generated by the MDAST to agree on whom among the stakeholders can and should do what – additionally or differently – about the identified determinants. The consensus-building process would bring together key leaders and senior managers from government, NGOs, business, and civil society at national or, e.g., district level. The process would be led by the Prime Minister's Office/local governments with the Malaria Control Programme as the Secretariat. Due to the expected incomplete information situation, a semi-Delphi approach might be needed (115).

55 <https://www.nccmt.ca/knowledge-repositories/search/146>

56 sites.duke.edu/mdast

57 https://endmalaria.org/sites/default/files/Malaria%20Matchbox_v4.pdf

Joint evaluation and learning – malaria is complex and so is effective multisectoral action on malaria. There will be a need for near real-time evaluation and continuous learning, addressing not only if an action takes place, but also what the effect is, and how and why the action works, or why it doesn't (see also Part Four).

Monitoring and accountability would include monitoring on success criteria (malaria outcomes) as well as the intrinsic interest, i.e., co-benefits (sectoral outcomes). An important role of the orchestrating leader is to hold sectors and actors accountable by measuring and providing feedback (praise and sanction).

Capacity building and cross-training would include both managers and staff of the different sectors involved in policy formulation and delivering the multiple intervention packages to appreciate the perspectives of the other sectors, and the inter-linkages and potential synergies between them.

Champions take an extraordinary interest in the adoption, implementation, and success of a cause, policy, programme, project, or product. He or she will typically try to push the idea through internal resistance to change and evangelize it throughout the organization. Sectoral malaria champions are needed from the onset of the process, when the approach and priorities for action are first considered. If there are no suitable champions, even the best-intended multisectoral change process risks stalling. This is even truer at the beginning when there are no good examples or role models to follow. Champions are just as needed at the international, national, and sub-national levels. Champions should be carefully identified and continuously nurtured.

Cross-sectoral assessment of major development initiatives to identify who the 'true' stakeholders are and to scrutinize the initiative's potential harms and goods in relation to malaria, and what can be done to optimize its malaria-smartness (see **Text Box 12.3**).

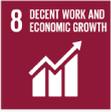


Sectoral malaria champions are needed from the onset of the process, when the approach and priorities for action are first considered.

Text Box 12.3

Double Africa's rice production by 2030

On 28 August 2019, the prime minister of Japan announced that the Japan International Cooperation Agency in collaboration with the Sasakawa Africa Association would work to double rice production in Africa to reach 50 million tons per year by 2030, contributing to feeding the growing populations. *“We want to shift the mindset of smallholder farmers from producing-to-eat to producing-to-sell,”* said the chairman of the Nippon Foundation, financing the Sasakawa Africa Association. There is no doubt that the initiative can contribute to increasing agricultural productivity, output, and profitability. However, what are the other potential effects on malaria determinants? Below is a quick analysis of potential effects based on the Inter Press Service announcement⁵⁸ alone:

POLITICAL/INSTITUTIONAL	POTENTIAL HARM	POTENTIAL GOOD
 	Sideline local government and ignore potential harm	Bring multiple sectoral stakeholders together, e.g., at district level
ECONOMIC	POTENTIAL HARM	POTENTIAL GOOD
   	Increase inequity due to buy-out of the most vulnerable farmers	Create local job opportunities for young people
SOCIAL	POTENTIAL HARM	POTENTIAL GOOD
     	Increase malnutrition due to shift from diversified to-eat-crops to a single to-sell-crops	Increase income for small-scale farmers allowing them to improve schooling, housing, etc.
ENVIRONMENTAL	POTENTIAL HARM	POTENTIAL GOOD
   	New breeding sites for mosquitoes and increase exposure to bites	More efficient and safer water management – control breeding sites
HEALTH	POTENTIAL HARM	POTENTIAL GOOD
	General increase in water- and vector-borne diseases	More resources in households reduce delays in care seeking

The above analysis is done based on incomplete information, including on local contexts. It illustrates, however, how a cross-sectoral assessment could be started. A large-scale project such as the proposed doubling of rice production through small-scale farmers provides opportunities as well as threats – not only to malaria, but also to the interests of other sectors. The aim is to mitigate the potential harms and amplify the potential goods (See also Text Box 9.1, The Millennium Villages Project).

58 <http://www.ipsnews.net/2019/08/ticad7-pm-shinzo-abe-says-japan-will-help-double-africas-rice-production-by-2030/>



“The history of malaria tells us that malaria cannot be understood or eliminated independently of changes in the societal forces that drive it. ... I argue that the array of biomedical weapons mobilized in the war against malaria needs to be joined with efforts to understand and improve the social and economic conditions that drive the epidemiology of the disease.”

RM Packard in an extensive analysis of the history of malaria and control efforts (25)

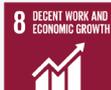
12.3 Accountability and empowerment

Malaria programmes (global, national and sub-national) should of course continue monitoring, mapping, and reporting on malaria incidence per 100,000 population (SDG Indicator 3.3.3) appropriately disaggregated by income, sex, age, race, ethnicity, migratory status, disability and geographic location and other characteristics in accordance with the Fundamental Principles of Official Statistics (36). Also, programmes should continue to monitor malaria cases, death, ITN/LLIN, IRS, IPTp, and case management, etc. – again appropriately disaggregated.

It may, however, also be useful for comprehensive multisectoral malaria action to monitor and use other indicators already being collected as part of the SDG monitoring framework and map these with the above malaria-specific indicators in order to help prioritize, identify malaria determinants, promising entry points for multisectoral action, and progress.

Table 12.1 below proposes a subset of the 232 SDG indicators that would be of particular interest to guide comprehensive multisectoral malaria action – two for each of the 17 SDGs – at national as well as sub-national levels.

Table 12.1: Selected SDG indicators for multisectoral malaria action (36) – grouped (Section 2).

SDG GROUP	INDICATOR
POLITICAL/ INSTITUTIONAL	 <p>16.6.2 Proportion of population satisfied with their last experience of public services 16.9.1 Proportion of children under five years of age whose births have been registered with a civil authority, by age</p>
	 <p>17.8.1 Proportion of individuals using the internet 17.18.1 Proportion of sustainable development indicators produced at the national level with full disaggregation when relevant to the target, in accordance with the Fundamental Principles of Official Statistics</p>
ECONOMIC	 <p>8.5.1 Average hourly earnings of female and male employees, by occupation, age and persons with disabilities 8.6.1 Proportion of youth (aged 15-24 years) not in education, employment or training</p>
	 <p>9.1.1 Proportion of the rural population who live within 2km of an all-season road 9.c.1 Proportion of population covered by a mobile network, by technology</p>
	 <p>10.1.1 Growth rates of household expenditure or income per capita among the bottom 40 percent of the population and the total population 10.3.1 Proportion of population reporting having personally felt discriminated against or harassed in the previous 12 months on the basis of a ground of discrimination prohibited under international human rights law</p>
	 <p>12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP 12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment</p>

SDG GROUP	INDICATOR
	<p>1.2.1 Proportion of population living below the national poverty line, by sex and age</p> <p>1.4.1 Proportion of population living in households with access to basic services</p>
	<p>2.2.2 Prevalence of malnutrition (weight for height $>+2$ or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under five years of age, by type (wasting and overweight)</p> <p>2.3.2 Average income of small-scale food producers, by sex and indigenous status</p>
	<p>4.1.1 Proportion of children and young people (a) in grades 2/3; (b) at the end of primary; and (c) at the end of lower secondary achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex</p> <p>4.a.1 Proportion of schools with access to (a) electricity; (b) the internet for pedagogical purposes; (c) computers for pedagogical purposes; (d) adapted infrastructure and materials for students with disabilities; (e) basic drinking water; (f) single-sex basic sanitation facilities; and (g) basic handwashing facilities (as per the WASH indicator definitions)</p>
	<p>5.3.1 Proportion of women aged 20-24 years who were married or in a union before age 15 and before age 18</p> <p>5.5.1 Proportion of seats held by women in (a) national parliaments and (b) local governments</p>
	<p>7.1.1 Proportion of population with access to electricity</p> <p>7.1.2 Proportion of population with primary reliance on clean fuels and technology</p>
	<p>11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing</p> <p>11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically</p>

SOCIAL

SDG GROUP	INDICATOR
ENVIRONMENTAL 	<p>6.6.1 Change in the extent of water-related ecosystems over time</p> <p>6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management</p>
	<p>13.1.3 Proportion of local governments that adopt and implement local disaster risk-reduction strategies in line with national disaster risk-reduction strategies</p> <p>13.3.1 Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary, and tertiary curricula</p>
	<p>14.5.1 Coverage of protected areas in relation to marine areas</p> <p>14.b.1 Degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries</p>
	<p>15.3.1 Proportion of land that is degraded over total land area</p> <p>15.9.1 Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020</p>
HEALTH 	<p>3.8.1 Coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases and service capacity and access, among the general and the most disadvantaged population)</p> <p>3.b.1 Proportion of the target population covered by all vaccines included in their national programme</p>



Photo credit: © UNDP Afghanistan

Including multisectorality and the development dimension into the global, national and sub-national malaria monitoring framework will help push for and encourage governments, donors and lenders to consider malaria in their non-health programming and funding streams and drive countries to plan and implement multisectoral action at national and sub-national levels.

A comprehensive multisectoral approach based on the determinants of malaria requires that accountability is broadened from the bureaucratic to the public arena. Relevant communities should be empowered, engaged, and assisted as needed to effectively take on their role and responsibility. Community inclusion in the analysis, decision-making regarding priorities and resources, doing and monitoring, as well as holding authorities and others accountable is a prerequisite (116). The processes and considerations described in Text Boxes 12.2 and 12.3 also apply to the community level. In addition, a community log, as described in **Text Box 12.4**, could be helpful in rooting and sustaining multisectoral action for malaria at the local level and holding authorities accountable.

Text Box 12.4

Community log

Not all data needs to be collected by statisticians, epidemiologists or administrators and aggregated to national or international levels. In fact, data for local action on malaria is better not aggregated and can quite well be collected by ordinary people. Ordinary people will better know the local determinants of malaria and will be able to follow how these evolve, are acted on or not. Having fresh community data will enhance local ownership, responsibility, and accountability. As access to technology widens, citizen science⁵⁹ is increasingly being explored and used in particular in the environmental sciences field (117;118).

Many malaria-affected communities already have access to computers and the internet, and use smartphones – and each day more are coming. Everywhere there are people, young and old, in or out of school, who are capable of, interested in and willing to take on active local malaria determinants surveillance and moderation and record the findings in a web- or social media-based community log. Such a log could show actual situations as well as changes over time in tabular or graphic formats or, e.g., singular or layered local maps – and trigger action, change and accountability.

Examples of what could be recorded in the community logs include: mosquito breeding sites, change of land use, malaria-smart versus non-smart farming, enterprises producing respectively reducing malaria, unprotected housing, malaria-risk practices, delivery on relevant sectoral plans and promises, etc. The primary user of the information of the log will be the community itself – for own action as well as to hold authorities accountable. However, e.g., district and municipal authorities and services could also feed into and use the information, e.g., for priority-setting and follow-up purposes.

59 <https://www.citizenscience.gov/#>

13. Financing

A review of 75 resurgences in 61 countries between 1930 and 2000 showed that 68 out of the 75 (91 percent) resurgences were attributed at least in part to weakening of malaria control programmes. Thirty-seven out of the 68 (54 percent) were due to funding shortages (17).

Malaria transmission can be suppressed by effective conventional control measures. However, in the absence of active intervention, malaria will quickly return to an intrinsic equilibrium determined by factors related to ecology, efficiency of mosquito vectors, and socio-economic characteristics. Given the potential severity of resurgence, engaging in but not continuing funding of conventional malaria control programmes may raise ethical concerns. Looking into the future from a vantage point of view, for a multisectoral approach to malaria that has added a development dimension to the conventional malaria control strategies, there are four main streams of financing in question:

1. Financing of conventional malaria interventions primarily for commodities, such as LLIN, IRS, diagnostics, prevention and treatment, etc.

2. Financing of business operations, services and development activities not primarily concerned with malaria.

3. Financing of coordination and capacity building of sectoral actors to be more malaria-smart in what they would already do to achieve their business objectives and deliver on the sustainable development goals.

4. Financing of malaria intervention costs incurred directly by the household and the individual, including the costs of the conventional interventions as well as interventions related to, e.g., improving housing and adoption of other malaria-smart practices in daily life.

Action and Investment to Defeat Malaria 2016-2030 for a Malaria-Free World (28) estimates that in order to achieve its 2030 elimination targets, a total of US\$101.8 billion is required for the conventional interventions, i.e., financing stream 1 above. The Global Technical Strategy for Malaria 2016-2030 (27) also specifies this amount. Compared to the 2015 annual spending of US\$2.7 billion and based on quantities of goods and their costs, the following is suggested:

- The annual investment will need to increase to an estimated total of US\$6.4 billion per year by 2020 to meet the first milestone of 40 percent reduction in malaria incidence and mortality rates.
- This should then be further increased to an annual investment of US\$7.7 billion by 2025 to meet the second milestone of a 75 percent reduction.
- To achieve the 90 percent reduction goal, the total annual malaria spending will need to reach an estimated US\$8.7 billion by 2030.

In other words, the required annual spending on goods to meet the 2030 goals is 3.2 times higher than the actual spending in 2015. Given that the 2020 milestones were missed, the resources required for meeting the 2025 and 2030 milestones might turn out to be much higher than originally estimated. Further, large amounts of funding will have to continue beyond 2030 to avoid malaria bouncing back.

THE COMPREHENSIVE MULTISECTORAL ACTION FRAMEWORK

The Global Technical Strategy has also estimated that about US\$673 million is needed annually until 2030 to fund malaria research and development.

The required investments are substantial and carry both financial and ethical risks if the intervention pressure and achievements cannot be both increased and maintained. Failure to sustain malaria elimination achievements will not only put the malaria investments in jeopardy; almost all other investments in malaria-endemic countries might also potentially be affected.

In 2017, Africa alone received US\$52.8 billion in official development assistance,⁶⁰ and the foreign direct investment inflows to the continent in 2018 amounted to US\$46 billion.⁶¹ Add to this the huge amounts of domestic resources invested by national and local governments and small- and larger-scale businesses – the total resources (financing stream 2 above) at stake or at risk are enormous. Sound advice would be to allocate some attention to hedge all investments by actively participating in multisectoral actions for malaria as described in this Framework.

Most high-burden and several other malaria-endemic countries, up to 2030, will need external support and investments, both bilateral and multilateral, to supplement domestic resources for their conventional malaria activities as well as for meeting their other development needs, including achieving the 2030 Sustainable Development Goals.

All providers of domestic as well as external investments and resources should – in their own interest – ensure that these are malaria-smart. This can, at the same time, both gear and hedge their investments.

Coordination and capacity building to make the comprehensive multisectoral action for malaria happen will require some resources (financing stream 3 above). How much, what is additional and where these additional costs eventually fall will be explored during the pathfinding endeavour (Part Four). The assumption is that the additional amounts will be extremely limited compared to the above amounts for conventional malaria control, official development assistance, foreign direct investment and domestic investments in social and economic development, as the approach is to integrate coordination and management into existing governance structures and processes as described in Sections 11 and 12.

60 <https://www.oecd.org/dac/financing-sustainable-development/development-finance-data/Africa-Development-Aid-at-a-Glance-2019.pdf>

61 <https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=2109>

Most high-burden and several other malaria-endemic countries, up to 2030, will need external support and investments, both bilateral and multilateral, to supplement domestic resources for their conventional malaria activities as well as for meeting their other development needs, including achieving the 2030 Sustainable Development Goals.





Part 04

WAY FORWARD

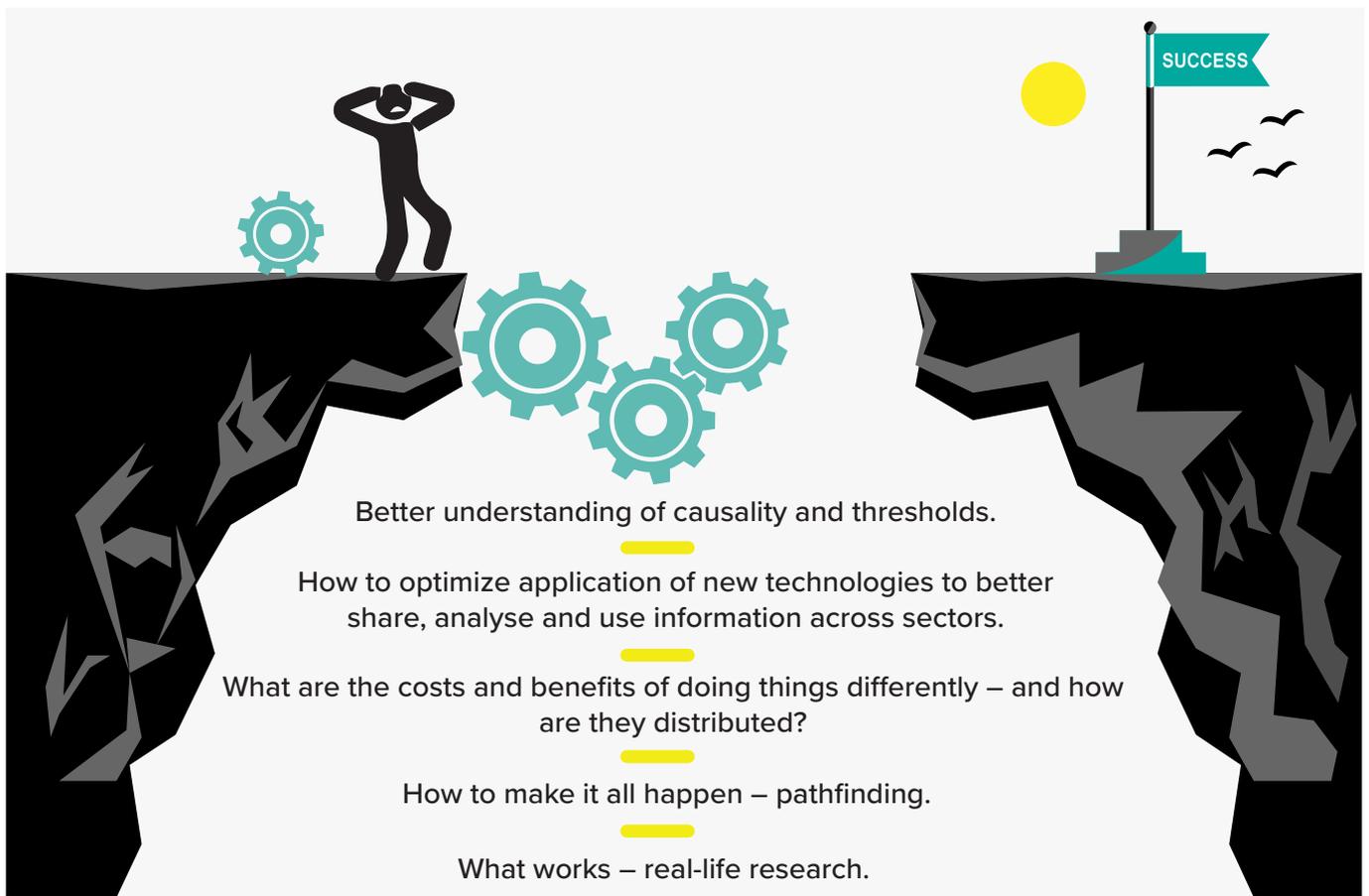
Identifying some of the issues surrounding knowledge and innovation around comprehensive multisectoral action for malaria and the SDGs, and proposes a pathfinding endeavour.

THE COMPREHENSIVE MULTISECTORAL ACTION FRAMEWORK

Part Four sketches out some of the issues surrounding knowledge and innovation around comprehensive multisectoral action for malaria and the SDGs – and proposes a pathfinding endeavour, both for exploring application of what is known and providing opportunities for finding out about what is not known.

There is a vast interest in and pool of data available on malaria. A MEDLINE search on the word ‘malaria’ provided links to 92,605 published scientific articles, while a Google internet search resulted in 59.6 million hits for ‘malaria’ – up from 66,714 and 32.2 million respectively from when the first version of the Multisectoral Action Framework for Malaria was prepared in 2013. This means there is an average of 12 new scientific publications and more than 12,000 postings on the internet about malaria each day – day after day, year after year. Yet there are gaps in knowledge and knowledge application.

There are now 100 years of international malaria programming, including 20 years of Roll Back Malaria experience, to draw on. Nevertheless, the RBM/UNDP Consultation held in July 2013, with participation of malaria programme people and experts from multiple sectors, as well as the consultations and work done in preparation of the 2022 refreshment of the Framework, found **important knowledge gaps** that need further exploration:



In its final report in September 2019, the Lancet Commission on Malaria Eradication expressed its enthusiasm about the potential to harness the data and information technology revolution to develop new generations of tools and techniques for collecting, analysing, and using data for decision-making, including at local and national levels. Furthermore, the Commission emphasized the importance of implementation research to find practical solutions to local problems and cautioned against the use of randomized or other formalized trials to answer operational questions. It recommended a pragmatic and iterative learning-while-doing approach (80).

14. Knowledge and innovation

14.1 Causality and thresholds

The WHO Strategic Advisory Group on Malaria Eradication (SAGme) in its 2019 report highlights as the first lesson learnt from history that “eradication strategies need to account for the hardest places from the outset to avoid failing before launching” (4). Like the analyses presented in Sections 1 to 3, the SAGme report highlights the importance of what it calls ‘megatrends’: anticipated big picture changes over the coming decades, including socio-economic developments. Another lesson SAGme draws from history is that “eradication cannot be promised too early in order to use it as a resource mobilization strategy or there is a risk of donor and political fatigue when goals are not reached on time”. The report further stresses that the role of communities is essential in pushing towards a malaria-free world.

There is a need to better understand causality and disentangle the confounded malaria- and development-related factors. For example, is low GNI the cause of high malaria burden, is high malaria burden the cause of low GNI – or are there other factors causing both low GNI and high malaria burden? Answers to such questions might help identify those multisectoral interventions that have the greatest chances for breaking the malaria vicious cycle (Figure 1.3) and thresholds for ‘take-off’ and sustainability (Figure 2.6 and 2.7). This might be done, e.g., through academic research, learning from history, outlier countries, e.g., countries that have done better in elimination than their economic indicators predicted – ‘*What did they do right?*’ (see also Section 2). Or, from action research, e.g., in connection with the pathfinding endeavour (Section 15).

14.2 New technologies

SDG17.18 and indicator 17.18.1 (“Proportion of sustainable development indicators produced at the national level with full disaggregation when relevant to the target, in accordance with the Fundamental Principles of Official Statistics”) (36) are fundamental to keeping the whole 2030 Agenda as well as the malaria-elimination agenda on track and ensuring that no one is left behind. But those left behind often do not figure in the official statistics. They might exist at the intersection of several disaggregation and inequity dimensions because of clustering of disadvantage (see, e.g., Text Box 4.3 – Pakistan, Text Box 6.1 – Sodom and Gomorrah, and Figure 12.1 DR Congo). Or they are not officially registered (see, e.g., SDG indicator 16.9.1 in Table 12.1); or they may not live where they are registered (internal and external migrants). Artificial intelligence, big data, satellite imaging and web analyses might help identify clustering of malaria and development determinants, disadvantage and missed or left behind populations, their causes and thus target multisectoral action.

The third pillar of the Global Technical Strategy 2016-2030 is to “Transform malaria surveillance into a core intervention”.⁶² Several groups are working on applying new information technologies specifically for malaria purposes. This includes, e.g., the Digital Solutions for Malaria Elimination Community of Practice,⁶³ the RBM Case Management Working Group,⁶⁴ the RBM Vector Control Working Group⁶⁵ and the RBM Seasonal Malaria Chemoprevention Working Group.⁶⁶

62 https://apps.who.int/iris/bitstream/handle/10665/176712/9789241564991_eng.pdf;jsessionid=6213E7539BEF756F16F6A9EDA4954545?sequence=1

63 <http://dsme.community/>

64 <https://endmalaria.org/our-work-working-groups/case-management>

65 <https://endmalaria.org/our-work-working-groups/vector-control>

66 <https://endmalaria.org/events/seasonal-malaria-chemoprevention-smc-review-and-planning-meeting-2019>

These digital technologies collectively support the development of robust data and surveillance systems that improve the decision-making processes at national and sub-national levels.

For multisectoral action for malaria, a challenge is the availability, accessibility, and compatibility of data. Often, data is owned by different sectors and organizations, exists in different formats, or is outdated, thus making timely spatial cross-analyses for action difficult. The Data for Now initiative officially launched in connection with the UN General Assembly in September 2019 aims at addressing such challenges (see **Text Box 14.1**).

Text Box 14.1

Data for Now: Accelerating progress through timely information

The Data for Now initiative is anchored by four operating partners: the Global Partnership for Sustainable Development Data, the World Bank, the United Nations Statistics Division and the Thematic Research Network on Data and Statistics (TReNDS) at the Sustainable Development Solutions Network.

The initiative is grounded in a realization of poor information sharing, data availability gaps, inadequate timelines and unmeasured people and geographies.

Three goals:

- Improve accessibility of methods
- Build technical coalitions and capacity
- Catalyse national data innovation partnerships

The initiative will work closely with National Statistical Offices and all relevant government agencies, so the use of new data sources, such as citizen-generated data, will complement official statistics from surveys, censuses, and administrative sources by providing information between survey or census rounds and helping to provide information on uncounted populations or understudied environmental issues. The aim will be to integrate new methods and sources into existing national statistical systems, and explicitly not to create a parallel data infrastructure at the country level.^{67, 68}

Countries around the world are signing on. The initiative is encouraging the use of open source data and tools, and collaboration and partnerships with major companies, e.g., Google, Alibaba and Vodaphone, that are already onboard.⁶⁹

67 <http://www.data4sdgs.org/index.php/initiatives/data-now>

68 http://www.data4sdgs.org/sites/default/files/2019-08/19Aug_Data%20For%20Now_Concept%20Note.pdf

69 <https://www.gislounge.com/geospatial-data-and-sustainable-development-goals/>

While such data might eventually become available at national and sub-national levels, it is also needed at the local and community levels for local decision-making and action without delays and without having to go around the national level. At the local and community level much of such information is tacit, i.e., people and local services (schools, health clinics, agricultural extension workers, etc.) know. However, the knowledge is often not brought together, analysed, and patterns established and appropriately acted on. Therefore innovators are encouraged to develop devices and applications to serve these purposes in a near real-time, e.g., through the use of social media and smartphones (see also Text Box 12.4 ‘Community log’) and collaborate through, e.g., the Data for Now initiative (see Text Box 14.1).

14.3 Costs and benefits

In a world that often thinks in terms of investments and returns, the question of the cost of sectors doing things differently (being malaria-smart) will be raised. It is expected that these costs in most cases will be marginal to the core operations of the sectors. However, little factual is known about these costs and the short- and long-term returns on investment for the individual sectoral actor. The theory is that investments in reducing the burden of malaria generate positive economic returns and at the aggregate level therefore in principle should be self-financing (18). Meeting the 2020, 2025, and 2030 milestones and goals are estimated by Action and Investment to Defeat Malaria 2016-2030 for a Malaria-free World to produce significant returns on investment (ROI) of respectively 28:1, 38:1, and 40:1 (28). With such impressive ROIs it should not be a problem to convince investors. *Why is it then so difficult?* (See also Section 13.)

One challenge might be that an investment made by one sector can end up as returns also for other sectors. Therefore, a comprehensive multisectoral view on both development and malaria is required. Researchers are encouraged to generate and explain evidence on ROI of conventional as well as multisectoral action where the malaria and other development outcomes are additional benefits to the sector-specific outcomes. This might, e.g., be done at sectoral, business, district, or municipality level in connection with the pathfinding endeavour (Section 15).

15. Finding the path

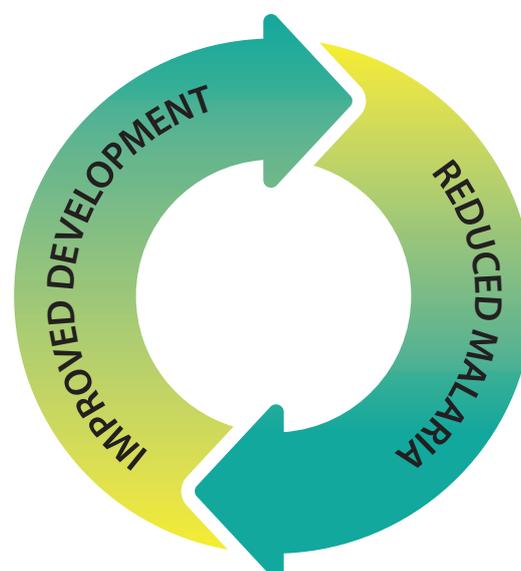
The key challenge with respect to comprehensive multisectoral action for malaria is how to make it happen in practice, i.e., in ways that release the synergistic potential of mutually enforcing benefits and so that the processes themselves become sustainable. The proposal of the 2013 action framework was:

“Try it – test it internationally, nationally, and locally through a pathfinder real-life approach as opposed to pilot or demonstration projects. An important element of such would be ‘learning cycles’ with near real-time digestion and sharing of experiences locally, nationally and internationally – taking advantage of the borderless information and communication technologies.”

This did not happen, mainly due to lack of attention and funding. The proposal of the 2022 Framework is similar: **try, learn, and share**. However, the additional proposal is to embark on a structured multisectoral action pathfinding endeavour for malaria and development with some dedicated catalytic funding, facilitation and learning support in order to accelerate the processes and generate a range of practical examples, tools and options.

15.1 Comprehensive multisectoral pathfinding

The basic idea of the comprehensive multisectoral pathfinding for malaria and development is to break the gridlock and **inverse the vicious cycle**, i.e.: improved development → reduced malaria → improved development, by zooming in on those elements of each SDG deemed to have the greatest impact on malaria – positive or negative – in particular concrete contexts (see, e.g., Table 12.1). The guiding principles will include first do no harm and second do good; identify co-benefits; and exploit the comparative advantage and intrinsic interest of each sector. The (reasonable) assumption is that **there is nothing to lose – only gain**.



Ten to 15 malaria-endemic countries are anticipated to participate in the pathfinding endeavour, i.e., not necessarily confined to, the current 11 high burden to high impact countries.

Countries to participate in the path-finding will be identified by the Path-finding Steering Group (Work Stream III of the RBM Multisectoral Working Group)⁷⁰ and the collaborating partners from among the below and grouped in up to four hubs [batches 1 to 4], with about four countries each based on convenience, e.g., availability of resources, language, and proximity:

- The 11 highest-burden countries (HBHI target countries).⁷¹
- Countries with high overall incidence rate other than the above. These will typically be smaller countries, i.e., counting less against the global aggregate and targets.
- Countries with a lower overall incidence rate – but with unequal distribution, e.g., having districts with a high incidence rate – i.e., pockets where malaria resists elimination.

For all participating countries it would be required that suitable champions for and commitment to the multisectoral action cause can be identified (see Sub-Section 12.2). The pathfinding will run over a period of two to three years to facilitate cross-learning while doing and innovating.

The roll-out is envisaged to focus primarily on the sub-national level, e.g., district and municipality, empowering local governments and communities and involving sectors and development partners, including UN agencies present at the locality. Emphasis will be on using already existing programmes funded from domestic and external sources in a **malaria-smart** manner (see Section 11) and to capitalize on the expected greater return on investment by lowering the malaria burden – in other words to get ‘more bang for the buck’.

⁷⁰ <https://endmalaria.org/our-work-working-groups/multisectoral-action>

⁷¹ The HBHI countries are: Burkina Faso, Cameroon, DRC, Ghana, Mali, Mozambique, Niger, Nigeria, Uganda, Tanzania and India

The districts to participate within each country will be appraised and selected using four criteria:

1. **The hardest districts** – in terms for malaria persistence and development challenges.
2. **The best people** – i.e., the strongest district pathfinder champions.
3. **The strongest local government commitment** – expressed in terms of a written statement.
4. **The widest diversity of contexts** – e.g., variety of underlying causes for malaria persistence.

The broad aim will be to explore (multiple) paths forward, i.e., learning by doing in different contexts to generate experiences and examples of comprehensive effective multisectoral action for malaria that can be replicated, adapted, and scaled up nationally as well as internationally.

15.2 What works – real-life research

Over the past decades there has been an increasing interest in effectiveness and thus focus on measuring the effect of development interventions. As mentioned at the beginning of this section, the amount of information on malaria is immense and increasing rapidly. Challenges in knowledge synthesis, translation, and application with respect to multisectoral malaria action include the complexity and that the causes of malaria persistence, as described in Section 3, very often are context-specific.

The CEDIL programme⁷² was established in 2017 to address some of these challenges with the objectives to develop and test innovative methods for evaluation, evidence synthesis and delivery of research uptake. Of particular relevance to the multisectoral pathfinding for malaria and development endeavour (Section 15.1) are: challenges with theory of change evaluation (119); and how to use evidence from one context to inform action in another (120).

The UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) has decades of experience in funding and guiding research and research capacity building, including in malaria-endemic countries. As a result, TDR has a huge network of local researchers. Further, TDR has recently published a conceptual framework for multisectoral approaches to prevention and control of vector-borne diseases (61). There is thus great potential for synergies with the pathfinding endeavour.



Finding out how and what works requires rolling up the sleeves and getting started. Not through establishing new high-level structures and not through randomized implementation trials, but by those present on the ground rethinking their approaches and businesses to *try, learn and share* with the common aim to accelerate malaria elimination and make the achievements more sustainable – while at the same time optimizing their individual objectives.

⁷² <https://cedilprogramme.org/cedil/>



Annex

EXAMPLES OF INTERVENTIONS ON DETERMINANTS

Bringing examples of actions at each of the five levels from ‘society’ to ‘household and individual’

This annex brings examples of actions at each of the five levels from ‘society’ to ‘household and individual’ for their respective main determinants (see Section 3) and one key SDG for each determinant in addition to SDG10 for the society level. However, note that many more SDGs might be relevant, see also Tables 8.1 and 10.1. The lists can never be exhaustive, nor can they be fully up to date. The annex is meant to inspire and generate ideas, and to provide initial references and links to where more information can be found.

SOCIETY

Lack or neglect of disaggregated data for population discourse and policy making



Potential interventions include: enhance capacity for high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics in national contexts (SDG17.18); empower and give voice to the voiceless and those at risk of being left behind (121;122); support and give space for civil society organizations to raise concerns of those left behind on the public agenda (123); encourage and finance research, quantitative and qualitative, to produce narratives (124); apply new technologies to source data from across sectors and non-traditional sources (see Text Box 12.4 ‘Community log’ and Section 14.2.)



Inequitable distribution of power and resources



Potential interventions include: implement the 0.7 percent of GNI target for official development assistance⁷³ of which 0.15 to 0.20 percent should be provided to least developed countries (SDG17.2); fulfil the 10 commitments in the Copenhagen Declaration on Social Development;⁷⁴ implement the Paris Declaration on Aid Effectiveness and the Accra Agenda for Action;⁷⁵ implement duty- and quota-free market access for all least developed countries (SDG 17.12); enhance representation and voice for developing countries in decision-making in international economic and financial institutions (SDG10.6); implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements (SDG10.a).



Demographic change – population growth, family/household size and structural population movements



Potential interventions include: accelerate achievement of universal access to reproductive health (SDG3.7 and 5.6) (125); ensure free, equitable and quality primary and secondary education to all girls and boys (SDG4.1); eradicate extreme poverty and hunger (SDG1 and 2); achieve sustainable economic growth, ensure full and productive employment and decent work for all, including women and young people (SDG8) (50); registration and titles to land;⁷⁶ achieve and sustain income growth of the bottom 40 percent of the population at a rate higher than the national average (SDG10.1); facilitate safe, regular and responsible migration and mobility of people (SDG10.7); see also table 10.1..



73 <http://www.oecd.org/dac/stats/the07odagnitarget-ahistory.htm>

74 <http://www.earthsummit2002.org/wssd/10commitments/10commitments.html>

75 <http://www.oecd.org/dac/effectiveness/parisdeclarationandaccraagendaforaction.htm>

76 <http://digitalcommons.wcl.american.edu/cgi/viewcontent.cgi?article=1358&context=auilr>

SOCIETY

Governments' ability to manage land and tax revenues and to regulate



Potential interventions include: pursue good governance;^{77, 78} develop effective, accountable and transparent institutions (SDG16.6) and ensure responsive, inclusive, participatory and representative decision-making at all levels (SDG16.7); strengthen developing countries' tax systems⁷⁹ and adopt fiscal, wage and social protection policies to achieve greater equality (SDG10.4); strengthen regulatory systems and governance in endemic countries⁸⁰ (126). Establish and enforce land policies and laws that protect the rights of smallholders and biodiversity^{81, 82} (127-129).



Organization of societies and services



Potential interventions include: fulfil the 10 commitments in the Copenhagen Declaration on Social Development;⁸³ implement the Paris Declaration on Aid Effectiveness and the Accra Agenda for Action;⁸⁴ implement the Rio Political Declaration on Social Determinants of Health (30); meet all the SDG targets (26); strengthen the capacity of civil society, the media, Parliament, local communities and the private sector to hold authorities accountable for better development results⁸⁵ (SDG 16.5-16.7); ensure the right for birth registration for all children (130); provide legal identity for all to allow access, e.g., to public services, and strengthen civil, vital registration and routine health information and other service systems to facilitate reliable analysis of causes of death⁸⁶ and use of health and other services (SDG16.9).



SOCIAL ENVIRONMENT

Gender norms



Potential interventions include: end all forms of discrimination against all women and girls (SDG5.1); ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life (SDG5.5); eliminate gender disparities in education (SDG4.4); empower women in community-based economic, social and health programmes, including malaria (45;46) (see also Text Box 4.1).

77 <http://www.unescap.org/pdd/prs/ProjectActivities/Ongoing/gg/governance.asp>

78 <https://www.worldbank.org/en/topic/governance/overview>

79 http://www.oecd-ilibrary.org/development/tax-and-development_9789264177581-en

80 <http://jacobsandassociates.com/pdfs/Regulatory%20Governance%20Jacobs%20Ladegaard%202010.pdf>

81 <http://documents.worldbank.org/curated/en/481511468782166641/pdf/multi-page.pdf>

82 <https://www.ohchr.org/EN/Issues/LandAndHR/Pages/LandandHumanRightsIndex.aspx>

83 <http://www.earthsummit2002.org/wssd/10commitments/10commitments.html>

84 <http://www.oecd.org/dac/effectiveness/parisdeclarationandaccraagendaforaction.htm>

85 <http://documents.worldbank.org/curated/en/2010/06/16442009/cambodia-project-enhance-capacity-social-accountability-pecsa>

86 <https://www.who.int/malaria/mpac/mpac-oct2017-proposed-erg-malaria-mortality-session9.pdf?ua=1>

SOCIAL ENVIRONMENT

Population movements



Potential interventions include: introduce rights-based, migrant-inclusive policies, including universal health coverage regardless of legal status, and build capacities of local authorities, key stakeholders and migrant communities (SDG10.7);⁸⁷ instigate malaria control measures (use of ITN, vector control and early diagnosis and treatment) quickly in emergencies and situations of breakdown of infrastructure;^{88, 89} identify high-volume transit and migration networks, apply interventions across areas, identify mobile communities and provide targeted information and health care to these communities⁽¹⁵⁾;⁹⁰ (see also Boxes 4.2 and 6.1).

Education



Potential interventions include: promote lifelong learning opportunities for all (SDG4); ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development (SDG4.7); make schools and learning institutions 'malaria-smart'⁹¹ (see also Text Boxes 9.1 and 9.2).

Marginalization and social exclusion



Potential interventions include: empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status (SDG10.2); ensure equal opportunities and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard (SDG10.3) (see also Section 4 and Text Box 4.3 and 6.1); leave no one behind (56); base strategies starting with the hardest-hit areas and populations (4); apply interventions that are acceptable and applicable to needs and circumstances (54).

PHYSICAL ENVIRONMENT

Climate change



Potential interventions include: promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing states, including focusing on women, youth and local and marginalized communities (SDG13.b); focus multisectoral action attention on areas that are becoming more malaria-prone due to rising temperatures, higher rainfall or flooding⁹² (62).

87 <http://www.iom.int/files/live/sites/iom/files/What-We-Do/docs/REPORT-14Aug2013-v3-FINAL-IOM-Global-Report-Population-Mobility-and-Malaria.pdf>

88 <http://www.malariaconsortium.org/pages/111.htm>

89 https://www.iom.int/sites/default/files/basic_page/mhd-infosheet-malaria-and-mobility-24042018.pdf

90 <http://www.malariaconsortium.org/news-centre/burmese-migrant-workers.htm>

91 <https://medium.com/usaaid-2030/a-malaria-smart-school-69758b93d431>

92 https://endmalaria.org/sites/default/files/RBM_Climate_Change_Fact-Sheet_170915.pdf

PHYSICAL ENVIRONMENT

Change of land use



Potential interventions include: ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services (SDG15.1); prevention of deforestation, reforestation of waterlogged ground with forest cash crops, e.g. eucalyptus to shade and drain (7); environmental modification (drainage, filling of swamps, borrow pits, pools and ponds, modification of river boundaries or other engineering approaches) (131); environmental manipulation (water management, intermittent irrigation, vegetation management) (131);⁹³ community participation and intersectoral cross-training (131); implement the recommendation of the Global Vector Control Response (29;114).

Agricultural practices and production systems



Potential interventions include: Potential interventions include: test practices and systems for 'malaria smartness' (see Text Boxes 9.1 and 12.3); ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature (SDG12.8); ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality (SDG2.4); water-management-based interventions;⁹⁴ think malaria and increase productivity and food security;^{95, 96} collaborate with agrichemical business to integrate better malaria control;⁹⁷ collaborate with farmers' field schools for integrating malaria with pest-management programmes;⁹⁸ apply intermittent wet/dry irrigation (132); increase distance between residential areas and crops/methods that increase malaria; improve farming productivity (133); implement the recommendation of the Global Vector Control Response (29;114).

Urban and peri-urban settings and infrastructures



Potential interventions include: support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning (SDG11.a); enhance capacity for participatory integrated and sustainable human settlement planning and management (SDG11.3); tailor existing tools for diagnosis, treatment and vector control to focused urban settings (134); preserve livelihoods for vulnerable populations, and build conditions for economic growth (134); involve the substantial private sector (134); community stakeholder participation (134); source reduction (use of larvicides, use of larvivorous fish, minor engineering, de-weeding, weekly dry day, cleaning of ditches, waste removal, legislative measures);⁹⁹ creation of dry-belts between breeding sites and settlements (131); implement the recommendation of the Global Vector Control Response (29;114).

93 <http://www.gbchealth.org/asset/linkages-between-malaria-and-agriculture/>

94 <http://www.iwmi.cgiar.org/issues/water-and-health/malaria-and-water-management/>

95 www.ifpri.org/sites/default/files/publications/oc69ch15.pdf

96 <http://www.gbchealth.org/asset/linkages-between-malaria-and-agriculture/>

97 http://www.croplife.org/public_health_and_vector_control

98 <http://www.fao.org/docrep/005/ac834e/ac834e06.htm>

99 <https://nvbdcp.gov.in/Doc/Guidelines%20for%20source%20reduction.pdf>

PHYSICAL ENVIRONMENT

Other economic activities and development projects



Potential interventions include: support economic development and human well-being, with a focus on affordable and equitable access for all (SDG9.1); increase access to information and communication technology (SDG9.c); conduct health¹⁰⁰ social,¹⁰¹ and environmental¹⁰² impact assessments and require documentable positive effect on equity and malaria before funding (135); strengthen the presence and capacity of national and local inspection, regulation and enforcement of compliance (75;100); form partnerships with private businesses and developers^{103, 104, 105} (19); implement the recommendation of the Global Vector Control Response (29;114)).

POPULATION GROUP

Clustering of adverse determinants and disadvantage



Potential interventions include: leave no one behind (56); start with the most affected population groups first (4); target development, poverty alleviation and nutrition programmes to poor communities with high malaria transmission¹⁰⁶ (see also Text Box 9.3); credit with education (combining micro-finance with education);¹⁰⁷ commercial loans for low-income groups (small and medium-size enterprises, smallholder farmers, and home loans).¹⁰⁸ Cash transfer conditional on health and education (136); integrate health, malaria and nutrition into school curriculum.^{109, 110}

Unsafe zones of residence, crowded and flimsy shelters



Potential interventions include: ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums (SDG11.1); establish or change national building codes/ inexpensive house models using better construction materials and sustaining financing initiatives (137); limit number of people sleeping in each house/room (137;138); close eaves (137;138); improve housing design and materials (69;131;137;138);¹¹¹ use mosquito repellent/ITN at night (137;138); community sensitization (131;137;139); (see also Table 8.1 and Text Boxes 5.1 and 9.3).

100 <http://www.who.int/hia/en/>

101 http://lsi.mckinsey.com/what_is_social_impact_assessment

102 <https://wedocs.unep.org/handle/20.500.11822/26503>

103 https://www.urc-chs.com/sites/default/files/ProjectFactSheet_Burma.pdf

104 <https://allafrica.com/download/resource/main/main/idatcs/00011012:690add3c64834fd5e266b865e6784c52.pdf>

105 <http://www.gbchealth.org/our-work/collective-actions/cama/>

106 <http://www.voanews.com/content/malaria-risk-spikes-for-worlds-poorest-children-study/1684911.html>

107 www.freedomfromhunger.org/credit-education

108 <http://sustainability.standardbank.com/socioeconomic-development-overview/>

109 [http://www.schoolsandhealth.org/Documents/Malaria%20control%20in%20schools%20in%20Mali%20\(English\).pdf](http://www.schoolsandhealth.org/Documents/Malaria%20control%20in%20schools%20in%20Mali%20(English).pdf)

110 <http://www.freshschools.org/Pages/default.aspx>

111 <http://www.malariaworld.org/blog/video-house-improvement-will-bring-malaria-elimination-africa-two-decades-forward>

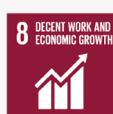
POPULATION GROUP

Food security and nutrition



Potential interventions include: ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round (SDG2.1); address the nutritional needs of adolescent girls, pregnant women and lactating women and older people (SDG2.2); integrate nutrition and malaria programmes;¹¹² provide vitamin A and zinc supplements in high-transmission areas/to high-risk population groups (140);¹¹³ provide conditional cash transfers to poor at-risk families conditional on nutritional actions; ¹¹⁴ leverage agriculture for improving nutrition and health;¹¹⁵ enhance women’s empowerment and community participation (49).

Risky and indecent working conditions



Potential interventions include: achieve full and productive employment and decent work for all women and men, including for young people and people with disabilities, and equal pay for work of equal value (SDG8.5); promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment (SDG8.8); identify and target at-risk groups (11); improve staff housing/quarters, including screens, fewer staff members sleeping per room (138); long-lasting insecticidal hammocks (LLIH) for workers who sleep outside or in makeshift accommodation (141;142); use of insecticide-treated clothes (ITC) (143); use of mosquito-repellent soap (144); improve employment and working conditions, and implement employer-based malaria control programmes, including awareness, prevention and treatment, and engaging workers, senior management and partners(145);^{116, 117, 118, 119} introduce IRS in prisons.¹²⁰

Lack of village and community control



Potential interventions include: ensure responsive, inclusive, participatory and representative decision-making at all levels (SDG16.7) and strengthen the participation of local communities (SDG6.b and 11.3), fundamentals (community participation, broadening partnership, building on experience, developing community-level interventions, improving links between the community and the district systems, strengthen district capacity for malaria community action, strengthen community self-monitoring and decision-making, effective communication strategy) (146); NGOs and governments work together to effectively reach community level.¹²¹

112 <http://www.action.org/blog/post/undernutrition-and-malaria-a-vicious-circle>

113 <http://www.news-medical.net/news/20090629/Vitamin-A-supplements-can-reduce-malaria-cases-in-children-by-one-third-study-finds.aspx>

114 <http://www.ifpri.org/book-765/ourwork/program/bolsa-alimenta-o>

115 <http://2020conference.ifpri.info/>

116 http://www.gbchealth.org/files/reports/GBC_Malaria_benchmarks_2-2011_final.pdf

117 <https://www.agrilinks.org/post/how-agricultural-extension-program-reduced-malaria-infections-uganda>

118 <https://gbchealth.org/wp-content/uploads/2018/10/2018-CAMA-case-studiesFINAL.pdf>

119 http://www.illovosugar.co.za/files/SOCIAL_IMPACT.pdf

120 <http://crofsblogs.typepad.com/h5n1/2013/03/uganda-prisons-adopt-residual-spraying-against-malaria.html>

121 https://ssir.org/articles/entry/how_ngos_can_work_with_governments_to_build_partnerships_that_will_scale

HOUSEHOLD AND INDIVIDUAL

Choice and adoption of malaria-safe habits



Potential interventions include: Potential interventions include: implement nationally appropriate social protection systems and measures for all, including floors, and achieve substantial coverage of the poor and vulnerable (SDG1.3); NGO housing projects with low-cost financing (147);¹²² commercial house improvement loans for low-income people,¹²³ social marketing of materials for making homes malaria-smart;¹²⁴ environmental management (148);¹²⁵ ITN distribution (149)¹²⁶ through commercial (149;150), social marketing (151;152), discount voucher (153),¹²⁷ or free (151;154); conditional cash transfer for changing behaviour;¹²⁸ community participation (114;146)¹²⁹ (see also Text Box 9.3).

Awareness and knowledge



Potential interventions include: significantly increase access to information and communication technology and provide universal and affordable access to the internet (SDG9.c); introduce dedicated multisectoral community-focused malaria awareness programmes;^{130, 131} improved use of community radio^{132, 133} to raise malaria awareness among staff and customers;¹³⁴ targeting information, education and communication through voucher system for ITN (155) (see also Text Boxes 9.2 and 12.4).

Access to and use of health care



Potential interventions include: 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 (SDG3.8); malaria-sensitive universal health coverage;¹³⁵ village health workers and community participation to perform rapid diagnostic test (RDT), treatment and referral;^{136, 137} delivery of subsidized ACT through private drug shops (156); public-private partnerships to improve access to quality malaria case services;¹³⁸ strategies to improve access to treatment at all levels of health care;¹³⁹ provide guidelines for improving patient adherence to treatment;¹⁴⁰ use of mobile phones to improve patient adherence and provider compliance (157).

122 <http://www.habitat.org/>

123 <http://sustainability.standardbank.com/socioeconomic-development-overview/>

124 <http://faculty.mu.edu.sa/public/uploads/1358239148.7214Kotler-Zaltman.pdf>

125 <http://www.fao.org/docrep/v5406e/v5406e02.htm>

126 https://www.researchgate.net/publication/324730049_Insecticide-treated_nets_mass_distribution_campaign_Benefits_and_lessons_in_Zambia

127 <https://malariajournal.biomedcentral.com/articles/10.1186/s12936-017-1902-0>

128 <https://basis.ucdavis.edu/publication/policy-brief-can-cash-transfers-bring-about-behavioral-change>

129 <http://www.coregroup.org/>

130 <http://www.modernghana.com/news/33064/1/malaria-awareness-programme-launched.html>

131 <http://www.malariaconsortium.org/news-centre/raising-awareness-of-malaria-in-southern-ethiopia.htm>

132 http://www.share4dev.info/telecentres/index.php?option=com_seyret&Itemid=85&task=videodirectlink&id=179&lang=en

133 <http://www.cmfd.org/what-we-do/docs-and-mags/malaria-toolkit-for-radios>

134 <http://www.malariafreefuture.org/standard-bank>

135 http://www.who.int/universal_health_coverage/en/

136 <http://www.mchip.net/node/1838>

137 <http://www.theguardian.com/global-development-professionals-network/2013/feb/12/malaria-control-prevention-africa-community-health-workers>

138 <https://www.psi.org/wp-content/uploads/2020/02/MalariaCare-Program-Brief.pdf>

139 <http://www.rollbackmalaria.org/mechanisms/cmwgWorkstream2.html>

140 <http://labspace.open.ac.uk/mod/oucontent/view.php?id=439266§ion=20.6>

HOUSEHOLD AND INDIVIDUAL

Provision of health care



Potential interventions include: substantially increase health financing and the recruitment, development, training, and retention of health workforce in developing countries (SDG3.c); using an integrated management of malaria curriculum to train multidisciplinary health staff (158); improve quality and reach of malaria care provision through private and community channels;¹⁴¹ transform the RDT market from a low-volume, high-margin market for poor-quality RDTs to one where customers have easy access to affordable, quality-assured RDTs;¹⁴² improve quality of malaria management by private general practitioners;¹⁴³ micro-franchise schemes to improve reach and quality of private providers;¹⁴⁴ improve services of medicine sellers (159).



Photo credit: © UNDP

141 <http://www.psi.org/our-work/healthy-lives/malaria>

142 <https://unitaid.org/project/creating-private-sector-market-quality-assured-rdts/#en>

143 <http://www.searo.who.int/myanmar/areas/malariaqualitymgnt/en/index.html>

144 <http://www.cfwshops.org/>

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Finding out how and what works requires rolling up the sleeves and getting started. Not through establishing new high-level structures and not through randomized implementation trials, but by those present on the ground rethinking their approaches and businesses to *try, learn and share* with the common aim to accelerate malaria elimination and make the achievements more sustainable – while at the same time optimizing their individual objectives.