# ACTION AND INVESTMENT TO DEFEAT MALARIA 2016-2030

For a Malaria-Free World

ROLL BACK MALARIA PARTNERSHIP

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# FOREWORD


This document comes at a critical juncture. This year marks the deadline for the Millennium Development Goals and is also our target date for forging a successor vision for people-centred sustainable development.

It has been 7 years since I first called for universal malaria prevention and treatment coverage. Today, malaria infection rates have been cut in half and 4.3 million lives have been saved. Fifty-five countries are on track to reach the World Health Assembly target of a 75% reduction in their malaria burden by 2015.

*Action and Investment to defeat Malaria 2016-2030 (AIM) – for a malaria-free world* complements WHO's *Global Technical Strategy for Malaria 2016-2030* and unites the global community for the achievement of the 2030 malaria goals. It positions the disease in the post-2015 era, and makes a powerful economic and humanitarian case for continued investment in the fight against malaria over the next 15 years.

Reaching our 2030 global malaria goals will not only save millions of lives, it will reduce poverty and create healthier, more equitable societies. Ensuring the continued reduction and elimination of malaria will generate benefits for entire economies, businesses, agriculture, education, health systems and households.

I congratulate the Roll Back Malaria Partnership for its leadership in looking ahead to the future. The strength and reach of this invaluable global health collaboration have channelled the collective contributions of engaged, passionate and active partners into powerful global advocacy to create a malaria-free world.

I commend this document to all those concerned about our common future. Transforming our understanding of the powerful return on investment of ending malaria deaths into dynamic and effective action on the ground will be essential to realizing the future we want, where all people enjoy the equality and dignity they deserve.

**Ban Ki-moon**
**United Nations Secretary General**

> “It has been 7 years since I first called for **universal malaria prevention and treatment** coverage. Today, malaria infection rates have been cut in half **and 4.3 million lives have been saved.**

# PREFACE

Developed by the Roll Back Malaria Partnership (RBM), the first *Global Malaria Action Plan (GMAP) – for a malaria-free world 2008-2015* was endorsed by world leaders and the malaria community during the Millennium Development Goals Malaria Summit, held in New York in 2008. GMAP became a valuable advocacy tool that provided the malaria community with a roadmap for progress, and an evidence-based strategy for delivering effective prevention and treatment. It also provided estimates of the annual funding required to reach the global targets of universal coverage through preventive interventions and universal access to effective treatment.

Since 2008, the world has become increasingly interconnected and complex. As countries have moved to further reduce and eliminate malaria, the disease has become more heterogeneous. This led WHO to initiate the development of the *Global Technical Strategy for Malaria 2016-2030*, which was endorsed by the World Health Assembly in May 2015. At the same time, RBM confirmed its commitment to global partnership, and the RBM Board decided to prepare a second-generation GMAP as a reference point for stakeholders in all sectors that are engaged in the fight against malaria. *Action and Investment to defeat Malaria 2016-2030 (AIM) – for a malaria-free world* and the WHO *Global Technical Strategy for Malaria 2016-2030* have been developed in a coordinated and simultaneous process. Both documents share the 2016-2030 timeline of the Sustainable Development Goals, and provide direction towards the 2030 malaria goals. The development of this document was informed by an extensive and wide-reaching consultative process that spanned countries with differing levels of transmission across all malaria-affected regions of the world. In particular, the process engaged non-health sectors at all levels, as well as those who live and work in remote, fragile or high-burden communities.

Now we invite you to read on, to see how AIM positions malaria as a wider issue for development, and for economic and health security. AIM builds the case for investment in malaria, and thus provides the global malaria community with a powerful advocacy tool. It also provides direction for action to mobilize resources; improve policy and governance; foster collaboration between countries and between sectors; increase the quality, availability and use of data and evidence; and strengthen and integrate malaria into health systems. It underscores how future progress will be contingent on new products and innovations, and calls upon us all to keep people at the centre of the response. Working in partnership with affected communities will increase the demand for malaria services wherever they are needed, and will allow the voices of the poorest to ring out loudly in the global call for a malaria-free world.

Dr Victor Makwenge Kaput
Chair of the RBM Board

Prof Graham V Brown
Vice-Chair of the RBM Board

Dr Fatoumata Nafo-Traoré
Executive Director of RBM

# EXECUTIVE SUMMARY

> AIM positions malaria in the wider health and development agenda.

Remarkable progress has been made in the global fight against malaria since the founding of the Roll Back Malaria Partnership in 1998. More than 4.3 million malaria deaths have been averted. Yet the gains are fragile and unevenly distributed; over 3 billion[a] people remained at risk of malaria infection in 2013, and the alarming global rise of resistance to drugs and insecticides makes it imperative and urgent that progress continue.

*Action and Investment to defeat Malaria 2016-2030 (AIM) – for a malaria-free world* builds on the success of the first *Global Malaria Action Plan – for a malaria-free world 2008-2015*, serving as both a clarion call and a guide for collective action for all those engaged in the fight against malaria. The result of an extensive consultative process, AIM complements the WHO *Global Technical Strategy for Malaria 2016-2030* by positioning malaria in the wider health and development agenda. It illustrates how reducing and eliminating malaria creates healthier, more equitable and prosperous societies, and promotes a broadly inclusive and multisectoral response.

AIM and the WHO *Global Technical Strategy for Malaria* share the time frame of the Sustainable Development Goals. AIM shows how the Sustainable Development Goals are inextricably linked to the achievement of a malaria-free world, and how the continued reduction and elimination of malaria will be central to the realization of this new development agenda. The global malaria community, WHO and the Roll Back Malaria Partnership all share the vision of a world free of malaria, and the ambitious yet feasible goals of reducing malaria mortality and incidence rates by 90%, and eliminating the disease in at least 35 more countries by 2030. To reach these goals, milestones for measuring progress have been set for 2020 and 2025.

Malaria prevention and treatment are among the most cost-effective public health interventions. The WHO *Global Technical Strategy for Malaria* has calculated the costs of achieving the 2030 malaria goals to be US$ 101.8 billion, with a further US$673 million needed each year to fund malaria research and development. Although these costs are high, the benefits will be even greater – more than 10 million lives will be saved and over US$ 4 trillion of additional economic output generated. These returns will bring greater productivity and growth, reduce household poverty, increase equity and women's empowerment, and make health systems stronger. The global return on making this investment will be 40:1, and increase to 60:1 for the sub-Saharan Africa region. By contrast, failure could see the disease resurge, with increased malaria deaths and lost opportunities for progress and development.

[a] Throughout the document the term 1 billion means 1000 million

AIM describes the current financial landscape for malaria, and outlines how the case for investment can be leveraged to mobilize additional resources to fight the disease. It recommends actions to increase domestic funding, explore innovative financing solutions, expand the base of traditional donors, target emerging economies, and increase private sector investment. AIM recognizes that, in the immediate term, external financing will need to be prioritized for countries with high malaria burdens and low starting levels of per capita income, and those in fragile situations or crisis. It also encourages countries to build on their national malaria strategic and operational plans, and develop a resource-mobilization strategy. In addition, AIM highlights the scope for further efficiencies, and stronger evidence on the returns of investing in malaria and the potential consequences of failing to do so.

Strong multisectoral and intercountry partnerships are needed to counter the threat of drug and insecticide resistance, ensure we reach the poor and marginalized who are disproportionally affected by malaria and, ultimately, achieve the 2030 malaria goals.

AIM demonstrates how reducing malaria contributes to the core economic, social and business goals of other sectors, with examples from the education, agriculture, housing and private sectors. It also reminds us that people are the essential voice in matters related to their health and well-being. Thus, the people who live in affected communities need to be at the centre of efforts to scale up the design and delivery of malaria services. The document calls for a long-term commitment to community engagement, and presents best practices for delivering malaria interventions to mobile and migrant populations, and those affected by humanitarian crises.

AIM shares two supporting elements with the WHO *Global Technical Strategy for Malaria*: strengthening the enabling environment (policies, data and health systems) and fostering innovation. Better health policies and developments in universal health coverage are key to facilitating access to quality health and malaria services. Stronger and more capable national regulatory authorities are needed to enforce the ban on monotherapies, counter the trade in fake and substandard drugs, and ensure that only quality antimalarial drugs and public health insecticides are used.


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> People in affected communities are central to the design and delivery of malaria services.

A rapidly responsive policy environment is also essential, to incentivize the necessary malaria research and product development, and bring new tools and technologies to market.

Quality data are critical for programme planning, implementation, monitoring and evaluation. AIM underscores the need for data from improved country health information systems, periodic surveys and surveillance to inform decision-making, trigger an active and appropriate response, assess the impact of interventions, and enable the efficient use of resources. Increasing access to reliable malaria information will strengthen transparency and foster greater accountability for progress towards the 2030 malaria goals.

Sustaining progress along the path to elimination needs to be seen in the context of the broader health system. AIM calls for action to strengthen health sector governance, optimize the use of resources across the public and private health sectors and at community level, and build more robust and responsive procurement and supply chain systems.

> “Strong multisectoral and intercountry partnerships will be essential for achieving the 2030 malaria goals.


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It demonstrates how investment in malaria programmes generates wider benefits for entire health systems. AIM stresses the need to expand human resource capacities at all levels as an integral part of health system strengthening, and to ensure the availability of malaria-specific skills and knowledge. National malaria programmes need sufficient capacity to support those working at local levels to customize their response to deliver malaria prevention, diagnosis and treatment; address emerging insecticide and drug resistance; and implement and monitor targeted vector-control interventions.

Achieving the 2030 malaria goals will require political commitment at the highest level. Heads of state are increasingly championing the fight against malaria. The establishment of the African Leader’s Malaria Alliance and the Asian Pacific Leader’s Malaria Alliance reflect a deepening level of political engagement. Successful partnerships will be critical to building and maintaining this political commitment.

Expanded partnerships hold the key to working within and across sectors, and to broader health sector collaboration in the fight against malaria. Partnership is also needed to ensure resource mobilization for malaria research, develop new products and delivery strategies, share the findings from implementation research, and strengthen the cycle of research to policy and practice. AIM includes a monitoring framework to track progress in areas appropriate to the document, including fostering multisectoral collaboration, and mobilizing sufficient resources to achieve the 2030 malaria goals. By combining our resources, knowledge and technologies, we can “go the last mile” and achieve our vision of a malaria-free world.

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INTRODUCTION

# 1. OVERVIEW OF ACHIEVEMENTS FROM 2000 TO 2015

The RBM Partnership was launched by WHO, the United Nations Children's Fund (UNICEF), the UN Development Program (UNDP) and the World Bank to provide a global framework for mobilizing resources and implementing coordinated action against malaria. The RBM Partnership comprises more than 500 partners, including malaria-endemic countries, their bilateral and multilateral development partners, the private sector, nongovernmental and community-based organizations, foundations, and research and academic institutions. RBM's strength lies in its ability to form effective global and international partnerships. Partners work together to scale up the delivery of malaria interventions at country level, coordinating their activities to avoid duplication and fragmentation, and to ensure optimal use of resources.

**Over recent years, tremendous progress has been made in reducing the burden of malaria and achieving elimination in a number of countries. Central to this change was the founding of the Roll Back Malaria (RBM) Partnership in 1998.** Declines in malaria have allowed most countries to make significant headway towards achieving their Millennium Development Goals (MDGs) and, in many cases, to actually reach those goals. Launched in 2008, the first *Global Malaria Action Plan (GMAP) – for a malaria-free world 2008-2015* served as a valuable guide for countries and partners to mobilize resources and achieve this success. With the end of the MDGs in 2015, and the transition to the era of the Sustainable Development Goals (SDGs) over the period to 2030, affected countries and their partners need to set new goals and targets. As part of this process, the malaria community has committed to the vision of a malaria-free world; that is, to eradicating human malaria from the globe.

Achieving the ambitious goals of further significant reductions in the burden of malaria and the eventual eradication of the disease will require more resources, particularly in the context of an expanded development agenda. Hence, the malaria community will need to expand its engagement beyond traditional partners to include other sectors that are both affected by malaria, and able to contribute to reducing and eliminating the disease. Adopting an approach that effectively engages other sectors within and outside health is therefore essential.

In anticipation of these changes, and building on the success of the first GMAP, the RBM Partnership has developed this document: *Action and Investment to defeat Malaria 2016-2030 (AIM) – for a malaria-free world*. At the same time, in a coordinated process, the WHO Global Malaria Programme has developed the WHO *Global Technical Strategy for Malaria 2016-2030*. The WHO *Global Technical Strategy for Malaria* lays out the ambitious goals and targets for 2030, whereas AIM describes the actions and investments that will be needed to achieve those goals. Both publications are intended to be living documents that will be updated as necessary to ensure their continued relevance to the dynamic nature of malaria, the evolving context of the response, new developments, innovations and overall progress. The extensive consultative process that informed the development of AIM is described in Appendix A.

**Since 2000, global malaria mortality rates have declined by 47% in all age groups, and by 53% in children under 5 years of age. This equates to an estimated 4.3 million malaria deaths averted (Figure 1). The 10 countries with the highest estimated malaria burden in 2000 accounted for 68% of malaria deaths averted from 2001 to 2013.[b] The *World Malaria Report 2014* shows that 55 countries are on track to reach the World Health Assembly target of a 75% reduction in the global malaria burden by the end of 2015.[1]** In 2014, two countries (Azerbaijan and Sri Lanka) reported zero indigenous malaria cases for the first time, 12 countries had maintained zero cases, and another four reported fewer than 10 local cases annually.

Overall, progress in reducing and eliminating malaria has been made possible by increased international and domestic financing, political commitment, strong country leadership, multisectoral partnerships, technical knowledge, effective execution by national programmes, the reach and flexibility of civil society organizations (CSOs) and faith-based organizations, and the contributions of research and academia. These factors have contributed to the scaling-up of a number of highly cost-effective interventions; in particular, long-lasting insecticide-treated nets (LLINs), indoor residual spraying (IRS), rapid diagnostic tests (RDTs), artemisinin-based combination therapies (ACTs) and intermittent preventive treatment in pregnancy (IPTp). In 2013, for example, almost half the population at risk in sub-Saharan Africa had access to one or more LLINs in their household. About 123 million people, almost 4% of the global population at risk of contracting malaria, was protected by IRS. Also, more than 319 million RDTs were purchased in 2013 and, in Africa, for the first time, the total number of diagnostic tests (RDTs plus microscopy) provided in the public sector exceeded the total number of ACTs distributed, indicating an encouraging shift away from presumptive treatment.[1]

Much of this progress has been made despite imperfect health systems. Indeed, malaria programmes have instigated many improvements – for example, in procurement and supply management, surveillance, and collaboration between public and private health providers – that have brought wider benefits to health systems. With sufficient resources and continuing commitment, this trend can continue. As countries move along the path to elimination, resource requirements, processes and services change, requiring national systems to adapt and improve, and to deepen their level of community engagement.

MALARIA DEATHS AVERTED, 2001-2013

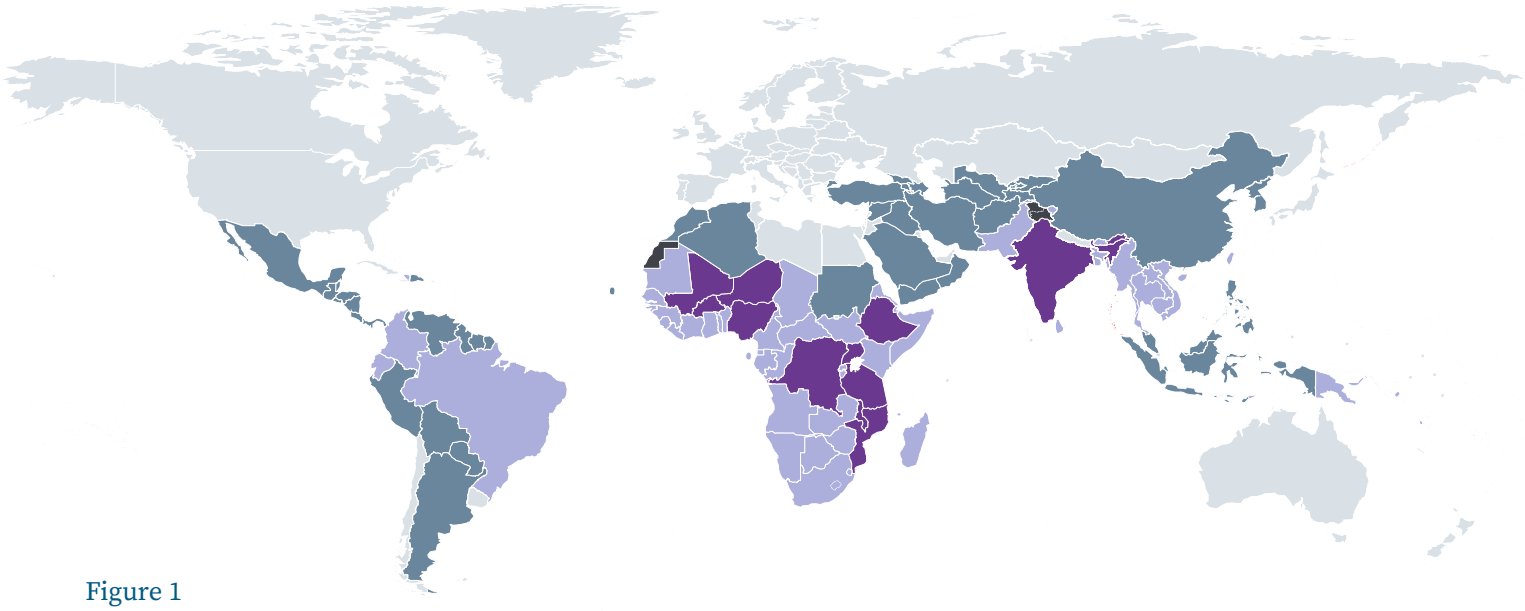



Figure 1

*Source: Map modified from World Malaria Report 2014, WHO*

[b] Countries include Burkina Faso, Democratic Republic of the Congo, Ethiopia, Malawi, Mali, Mozambique, Niger, Nigeria, the United Republic of Tanzania and Uganda.

# 2. OUTLOOK FOR PROGRESS FROM 2016 TO 2030

Building on the success of the MDGs, the UN Member States launched the Sustainable Development Agenda in 2015. **The SDGs have an overarching focus on reducing global inequities and ending poverty, and emphasize six essential elements: people, prosperity, dignity, justice, the planet and partnership.** They underscore the importance of political stability and democratic governance, and call on governments to promote and protect human rights, reform public administration, combat corruption, increase the free flow of information and use quality data to inform progress. Building more robust, representative and responsive institutions at national and local government level holds the key to greater community engagement and accountability for delivering basic services, including for health and malaria, to those who need them most.

> Malaria is both a major cause and a consequence of poverty and inequity.

## POSITIONING MALARIA IN THE BROADER DEVELOPMENT AGENDA

**The SDGs are inextricably linked to the achievement of a malaria-free world. Malaria reduction and elimination will contribute to, benefit from and be a measure of progress towards the SDGs.**

Optimizing the delivery of malaria interventions is essential for achieving universal health coverage, ensuring healthy lives and promoting well-being for those of all ages, particularly for vulnerable and marginalized populations. Scaling up malaria control contributes strongly to reducing child mortality and improving maternal health. This was implicitly recognized by the 178 governments and over 600 CSOs and private sector organizations that pledged to accelerate declines in preventable maternal, newborn and child deaths under the banner of "A Promise Renewed". Continued progress in the fight against malaria will be essential for advancing the UN Secretary-General's *Global Strategy for Women's and Children's Health* [2], and the Every Woman Every Child movement.[3]

Investments in human capital lead to healthier, more productive societies, which provide the attractive labour markets and stability that are sought by international investors, catalyse trade relations, drive structural transformation and generate economic growth.[4] Growth that is not inclusive threatens to make the world increasingly unequal, fragmented and confrontational.[5] Investing in malaria gives the poorest a better chance in life, breaking the cycle of disease and poverty, and thus allowing people to build sustainable livelihoods and share in the benefits of growth.

The explicit call of the SDGs to defeat malaria needs to be understood in the context of the drive to end poverty and reduce global inequities, because malaria is both a major cause and a consequence of global poverty and inequity. The burden of malaria is highest in the least developed areas and among the poorest members of society – particularly children, pregnant women and other vulnerable populations such as migrants, refugees and the displaced. Poverty forces people to live and work in substandard conditions, with a high level of exposure to malaria vectors, while lacking access to malaria prevention, health care and other basic services. Even within a single locality, children of lower socioeconomic status are twice as likely to contract malaria than those of higher status. The probability of dying from malaria is inversely related to income and education.[6]

# EXAMPLES OF POSITIVE SYNERGIES BETWEEN ADVANCES IN MALARIA AND PROGRESS TOWARDS THE SUSTAINABLE DEVELOPMENT GOALS

FIGURE 2 SHOWS THE POSITIVE TWO-WAY BENEFITS THAT WILL BE GENERATED BY PROGRESS TOWARDS THE SDGS AND THE 2030 MALARIA GOALS. MORE INFORMATION ON HOW FAILURE TO REDUCE AND ELIMINATE MALARIA WILL IMPEDE THE ACHIEVEMENT OF THE SDGS IS GIVEN IN APPENDIX B

17

**Goal 17: Partnership for the Goals.** The many **multisectoral partnerships** in place to reduce and eliminate malaria have a positive collateral effect, and also bring progress to other **domains of development.**[25]

1

**Goal 1: No Poverty.** Sustained investment in health and malaria unlocks the potential of human capital to **generate growth.** A 10% reduction in malaria has been associated with a 0.3% rise in annual GDP. At household level, **reducing malaria protects household income** from lost earnings and the costs of seeking care.[7]

10 16

**Goals 10, 16: Reduce inequality. Promote Peace and Justice.** A targeted response to malaria actively improves the health of the poorest, enabling vulnerable families to **break the vicious cycle of disease and poverty,** and helping to make sure that no one is left behind. Investing in malaria reduction contributes to the creation of more **cohesive, inclusive societies.** Stable countries are more likely to attract international investment and overseas development aid.[6]

13

**Goal 13: Climate Action.** Given that climate change is predicted to increase the range and intensity of malaria transmission, plans to **mitigate the effects of climate change** are likely to include an increased commitment to controlling and eliminating malaria, and vice versa.[24]

9 11 15

**Goals 9, 11, 15: Infrastructure, Sustainable Cities and Life on Land.** By ensuring that major construction and development projects do not introduce or increase malaria transmission, the benefits of progress can be reaped, while also **protecting human health and ecosystems. Well-planned infrastructure and improved housing** help reduce exposure to mosquitoes, and facilitate greater access to health and malaria services.[22,23]

Figure 2

Note: SDG 14 is not included in the diagram, because it is not relevant to malaria

## 2

**Goal 2: Zero Hunger.** Sustainable agricultural practices help reduce malaria. People who suffer less from malaria can work their fields more consistently, resulting in better harvests and **improved food security.**[8] Well-nourished people, especially children, are better able to fight malaria.[9]

## 3

**Goal 3: Good Health and Well-being.** The scale-up of malaria interventions **averted at least 670 million bouts of malaria illness and 4.3 million malaria deaths** between 2001 and 2013. Preventing malaria in pregnancy **reduces maternal mortality and gives newborns a far healthier start in life.** Lowering the burden of malaria makes a substantial contribution to **improvements in child health,** and thus often to a decline in fertility rates, and an associated increase in the investment that parents can make in their children.[10]

## 4

**Goal 4: Quality Education.** Reducing malaria enables children to **attend school regularly and learn more effectively.** This significantly improves their school performance, and later wage-earning capacity.[11] As a mother's or caregiver's level of education increases, so do the chances that their children will access malaria prevention and treatment services, and survive childhood.

## 5

**Goal 5: Gender Equality. Freeing women and school-age girls** from the burden of caring for family members when they fall sick with malaria increases their likelihood of completing school, entering and remaining in the workforce, and participating in public decision-making.[12,13]

## 6

**Goal 6: Clean Water and Sanitation. Drainage of standing water** leads to decreased mosquito breeding and a reduction in the rate of malaria transmission. It also improves water quality, generating further health benefits.[14,15,16]

## 7

**Goal 7: Affordable and Clean Energy.** In resource-constrained malaria endemic regions, **access to sustainable energy will stimulate prosperity** and increase the adoption of more sophisticated personal protection measures. It will also mean greater access to electric lighting and cooling, enabling people to increase time spent indoors, where vectors are more easily controlled through insecticides, bet nets and temperature. These developments are likely to result in a reduced burden of malaria.[17,18,19]

## 8 12

**Goals 8, 12: Decent Work, Economic Growth and Responsible Production.** Reducing malaria creates **healthier, more productive workforces** which can help to attract trade and commerce. When combined with pro-poor policies, these factors **drive job creation, inclusive growth and shared prosperity.** Enterprises that invest in their workers reduce the costs of doing business, increase their **competitiveness** and enhance their reputation.[20, 21]

## GALVANIZING WIDER ENGAGEMENT AND ACTION FOR MALARIA

The broadening development agenda provides an unprecedented opportunity to widen the circle of engagement, and intensify multisectoral and intercountry collaboration to defeat malaria. To seize this opportunity, in 2013 the RBM Board initiated the development of the second-generation GMAP, *Action and Investment to defeat Malaria 2016-2030 (AIM) – for a malaria-free world*. AIM calls for the global malaria community to stay the course and consolidate the tremendous work it has started, for the stronger engagement of non-health sectors, and for "smart integration" into existing health systems.[c] The document is intended to galvanize this broader audience to engage, act and help achieve the overall malaria vision, goals and milestones (all of which are shared with the WHO *Global Technical Strategy for Malaria*).

## GLOBAL TECHNICAL STRATEGY FOR MALARIA

Development of the WHO *Global Technical Strategy for Malaria* was also initiated in 2013. The strategy comprises three pillars:

- ensuring universal access to malaria prevention, diagnosis and treatment for all populations at risk;
- accelerating efforts towards elimination and attainment of malaria-free status; and
- transforming malaria surveillance into a core intervention.

The purpose of the strategy is to guide countries as they tailor their malaria programmes to address the heterogeneity of the disease at national and subnational level. The strategy highlights the importance of two "supporting elements" – the first is harnessing innovation and expanding research, and the second is strengthening the enabling environment. The latter underscores the fact that continued progress depends on strong political commitment, robust financing, increased multisectoral and intercountry collaboration, and greater engagement of the private sector. These elements are further developed in AIM. The World Health Assembly endorsed the WHO *Global Technical Strategy for Malaria 2016-2030* in May 2015.

The shared vision of the global malaria community is a world free of malaria. As part of this vision, ambitious yet feasible global targets for 2030 have been agreed, with milestones for measuring progress by 2020 and 2025, as shown in Table 1.

The goals and milestones shown in Table 1 are based on countries' current malaria targets (as stated in their national strategic plans), the historical rate of progress between 2000 and 2012, and intervention scenario analyses.[26,27] To reach the milestones, all countries will need to expand the delivery of existing interventions, tailor and combine existing and emerging interventions to fit local contexts, and improve the efficiency of their responses. Successfully meeting the 2030 targets will require continued innovations in tools and implementation approaches; hence, it is essential to maximize efforts in malaria research and development (R&D).

[c] Smart integration is when malaria programmes take advantage of wider health system infrastructure, staff or processes to maximize their reach, increase efficiencies and address the health needs of individuals more holistically. Adding the term "smart" underscores the importance of approaching integration strategically, to retain sufficient malaria-specific capacity and infrastructure for continued malaria programme performance.

## ACTION AND INVESTMENT TO DEFEAT MALARIA

AIM positions malaria in the broader development agenda, and shows why malaria is not only a health issue, but also a developmental, economic, political, security, environmental, agricultural, educational, biological and social issue.

AIM makes the global case for investing in malaria, and its content can be adapted to create regional or national cases for heads of state, ministers of finance and local government, investors, chief executive officers (CEOs) of industry and business, implementers, researchers, inventors, and bilateral and multinational financing and development agencies. It quantifies how investing in malaria reduces poverty and inequality, generates economic growth, strengthens national systems and gives an unprecedented return on investment. AIM gives the economics of malaria a human face, and shows how a small investment at household level can save lives, help build livelihoods and strengthen the resilience of entire communities. In addition, AIM calculates the cost of allowing malaria to resurge, and shows how the price of this failure will be paid in human lives.

By calling for an inclusive approach, AIM serves as a reference point for the stronger engagement of multisectoral stakeholders in the fight against malaria. Moreover, it underscores the importance of keeping people at the centre of the fight against malaria, and highlights the myriad ways in which communities are contributing to all aspects of the response.

AIM is aligned with the two supporting elements of the WHO *Global Technical Strategy for Malaria*: an enabling environment and innovation. It shows how multisectoral and intercountry partnerships, and a people-centred approach, are crucial to progress in both these areas.

AIM provides malaria advocates at all levels (global, regional, country and local) with a highly effective tool to mobilize collective action and resources. It makes the case for partnership, and provides direction for future actions in critical areas, to all constituencies, including stakeholders in the non-health sectors, the wider health sector and affected communities. The RBM Board adopted *Action and Investment to defeat Malaria 2016-2030 (AIM) – for a malaria-free world* in May 2015.

## TABLE 1: JOINT GOALS, MILESTONES AND TARGETS FOR 2016-2030

| Goals | Milestones | | Targets |
|---|---|---|---|
| | 2020 | 2025 | 2030 |
| 1. Reduce malaria mortality rates globally compared with 2015 | At least 40% | At least 75% | At least 90% |
| 2. Reduce malaria case incidence globally compared with 2015 | At least 40% | At least 75% | At least 90% |
| 3. Eliminate malaria from countries in which malaria was transmitted in 2015 | At least 10 countries | At least 20 countries | At least 35 countries |
| 4. Prevent re-establishment of malaria in all countries that are malaria-free | Re-establishment prevented | Re-establishment prevented | Re-establishment prevented |

## AIM COMPLEMENTS THE WHO *GLOBAL TECHNICAL STRATEGY FOR MALARIA*

- Areas of focus of *Action and Investment to defeat Malaria*
- Areas of focus of the WHO *Global Technical Strategy for Malaria*
- Vision, goals and areas of focus shared by both documents

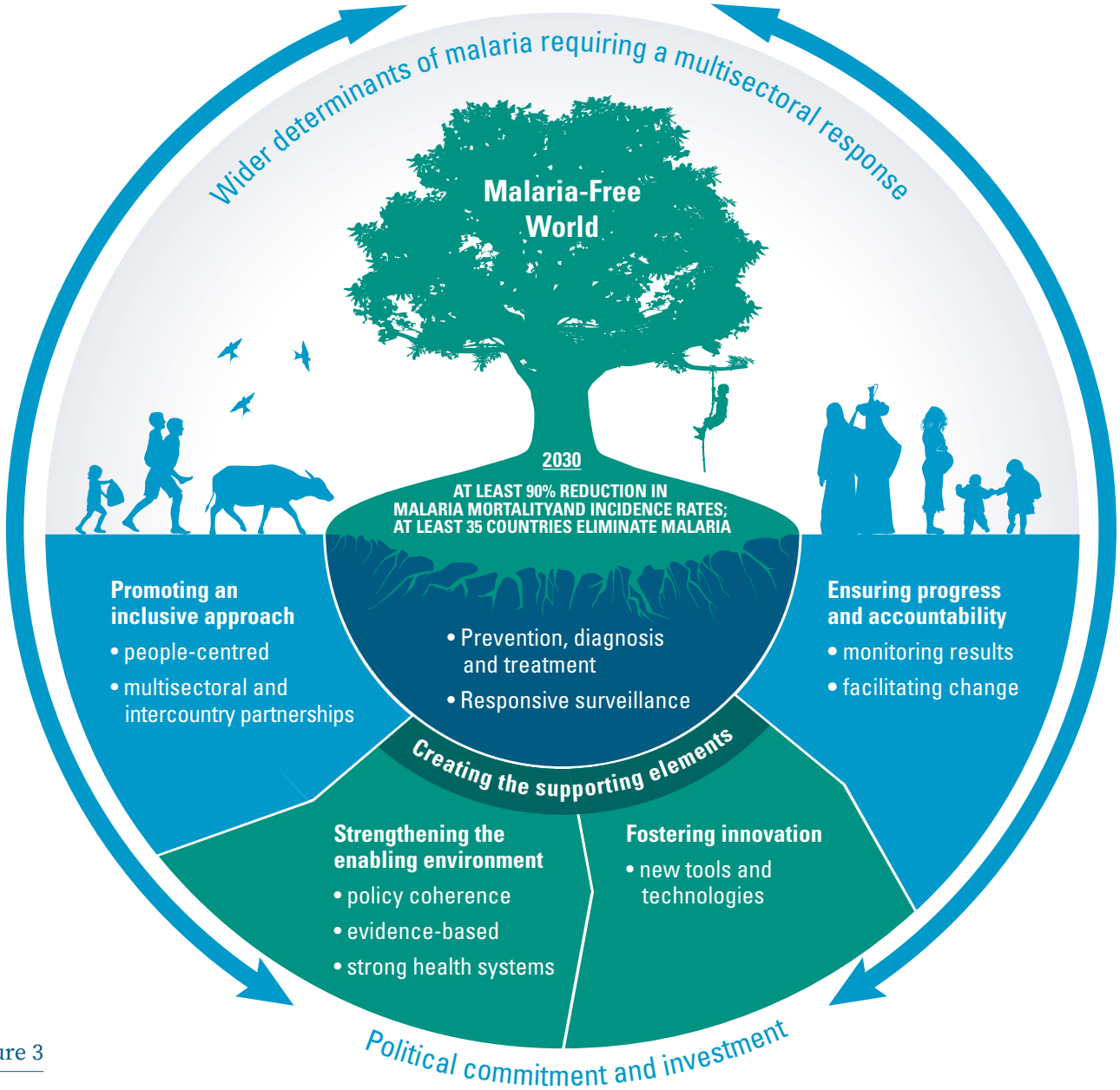



Figure 3

# STRUCTURE OF AIM

This chapter has summarized progress to date, positioned malaria in the broader development agenda, introduced the 2030 malaria goals, and shows how AIM complements the WHO *Global Technical Strategy for Malaria*. The chapters of the rest of AIM are described below. Each chapter contains priority actions and selected examples from the consultative development process. Some actions will result in quick wins or short-term impacts, whereas others will be long term and require stronger evidence, the engagement of new partners, or the crafting of innovative solutions before they can be implemented. "Creating the supporting elements" will be critical to continued progress in the fight against malaria. Given this importance, the enabling environment and innovation are topics that are addressed by both the WHO *Global Technical Strategy for Malaria* and AIM. To guide the reader and illustrate this commonality the chapters that deal with the supporting elements in both documents have been colour-coded green.

## BUILDING THE INVESTMENT

- Chapter 3: presents the global case for investing in malaria, and a cost-benefit analysis of achieving the 2030 malaria goals; it also calculates the potential costs of resurgence and failure.
- Chapter 4: outlines the current financial landscape, and provides priority actions for mobilizing resources for malaria.

## PROMOTING AN INCLUSIVE APPROACH

- Chapter 5: demonstrates the importance of multisectoral and intercountry partnerships for continued progress, and provides priority actions to strengthen both types of partnership.
- Chapter 6: shows the importance of keeping people at the centre of the response, and provides priority actions for undertaking more effective community engagement, improving social and behaviour communication change (SBCC), and bringing malaria interventions to vulnerable populations, including in emergencies.

## CREATING THE SUPPORTING ELEMENTS

- Chapter 7: further develops the enabling environment (policies, data and health systems) and provides priority actions for making policies "malaria smart", reinforcing the evidence to inform progress, and strengthening health systems.
- Chapter 8: highlights how achieving the 2030 malaria goals will depend on the development of new malaria drugs and other products; it also provides priority actions in malaria research and innovation.

## ENSURING ACCOUNTABILITY FOR PROGRESS

- Chapter 9: outlines the areas where partnership will be pivotal as the WHO *Global Technical Strategy for Malaria* and AIM are implemented, and provides a complementary framework for monitoring progress in the main areas of AIM, to strengthen accountability for achieving the 2030 malaria goals.

BUILDING THE INVESTMENT

# 3. MAKING THE CASE FOR INVESTMENT

**Malaria prevention and treatment are among the most cost-effective public health interventions. They provide a consistently high return on investment, beyond the direct benefits of better health.[28,29] Thus, investing in malaria control and elimination amounts to an unparalleled investment in productivity, progress and people-centred development.[30]**

The level of political commitment and financial investment required to sustain malaria control and elimination is high in the short term,[31] and may be challenging to achieve and maintain.[32] A systematic review showed that most resurgence events could be attributed, at least in part, to a weakening of malaria control programmes, generally because of a lack of resources.[32] Financial commitment and the relentless pursuit of elimination and eventual eradication are needed to counter the risk of resurgence, halt the constant need to develop new drugs and insecticides to counteract the development of resistance, and reap the long-term returns of ending malaria infections and deaths.

There is a strong case for making this investment. Beyond the financial return, it will generate unprecedented socioeconomic, development, humanitarian and equity benefits.[29] Stakeholders at all levels (global, regional, country, subnational and local) are crucial in leveraging the case for investment to advocate for and successfully mobilize the full range of resources needed to move countries along the path from control to elimination.

> Malaria – a "best buy" in global public health.

## CONSOLIDATING THE EVIDENCE ON THE COST-EFFECTIVENESS OF MALARIA INTERVENTIONS

**Since the launch of the first GMAP, much stronger evidence of the benefits of reducing malaria has been generated.** The cost-effectiveness of the main interventions used to control and eliminate malaria has been reconfirmed by extensive scientific studies carried out in sub-Saharan Africa, Asia and Latin America.[33–39] Estimates covering the time frame 2011-2014 found malaria control to be a "best buy" in global public health, costing only US$ 5-8 per case averted, and generating millions in savings.[28] The only public health intervention that is more cost-effective than malaria control is childhood immunization with vaccines included in the *Expanded Program on Immunization*.[40,41]

Evidence on the costs and cost-effectiveness of malaria elimination is less well developed.[31] It is likely that costs for elimination will initially be equal to, or higher than, those of a control programme, but will decrease as the focus progresses to the prevention of re-introduction.[42–44] The *8th Report of the Expert Committee on Malaria* suggested that the cost of a well-operated programme to consolidate and sustain elimination is only 65-75% that of operating an "all-out" malaria control programme.[45]

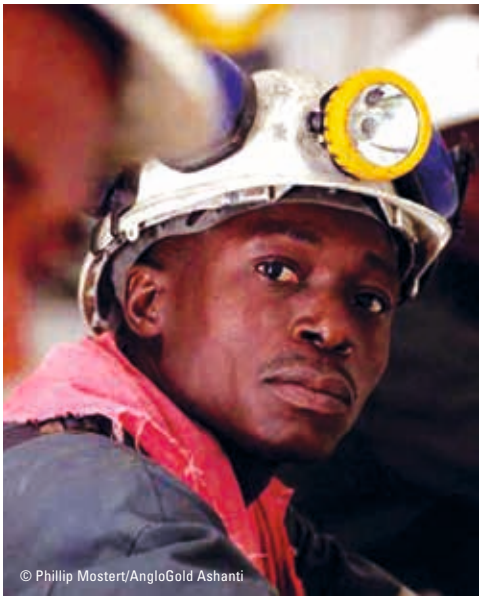
# QUANTIFYING THE RETURN ON INVESTMENT

## RETURNS IN ECONOMIC DEVELOPMENT, PRODUCTIVITY, AND GROWTH

**Research shows that malaria can negatively affect macroeconomic performance, and is a determinant of economic growth in the long term.** The growth rate of the gross domestic product (GDP) per capita in malaria-endemic countries is 0.25-1.3 percentage points lower than in countries without malaria.[7] Over a period of 25 years, GDP per capita growth in countries not affected by malaria was over five times higher than in countries affected by a heavy malaria burden.[46,47] An expenditure impact study suggested that, for every US$1 per capita investment in the fight against malaria in Africa, there was an increase in per capita GDP of US$6.75.[48]

### RETURN ON INVESTMENT (ROI)

An ROI analysis is a way to evaluate the efficiency of investments, taking into account all the resources invested and all the amounts gained through increased revenue, reduced costs, or both. To calculate ROI, the benefit (return) is divided by the cost, and the result is expressed as a percentage or a ratio.



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Suppressing malaria reduces worker absenteeism and increases productivity in key economic areas, such as agriculture, business and industry (including the extractive industries).[49–51,29] In economies that depend heavily on agriculture, reducing malaria increases the performance of intensive agricultural production, contributing to national food security and greater rural prosperity.[52] In sub-Saharan Africa, women make up 60-80% of food crop producers for household consumption and sale. Malaria undermines their labour output, interrupts the production cycle, and causes resources to be diverted from farm inputs. As the burden of malaria drops, women can engage in subsistence agriculture more effectively, increasing crop yields and making their households more food secure.[49,53,54]

Companies that invest in the health of their workers, and protect them from malaria and other diseases, reduce the costs of doing business and boost their competitiveness.[5] Reducing the burden of malaria also decreases inequality,[55] and contributes to the creation of more cohesive, stable societies, which can attract international investors and trade, and help to make growth more inclusive and sustainable.[5] Furthermore, eliminating malaria enables the safe movement of people across regional and country borders, which brings benefits for economic development zones and tourism.[56]

© David Jacobs

> “Suppressing malaria reduces worker absenteeism and increases productivity in key economic areas.

## RETURNS IN HOUSEHOLD PROSPERITY, EQUITY AND WOMEN'S EMPOWERMENT

**Malaria traps the most disadvantaged in a spiral of sickness, suffering and poverty. Reducing malaria makes a substantial contribution to global equity. It strengthens the resilience of entire communities by protecting household income from the costs of seeking care and from the loss of earnings due to the inability to work.[13]**

Each year, 44 million households worldwide, more than 150 million people, face health-care expenditures that are so high in relation to available income that they have a catastrophic effect on the household's financial well-being.[60]

Prevention, diagnosis and treatment of malaria is a significant source of these expenditures, even when there are no or only modest official charges for public sector primary health care.[61] In endemic countries, the poorest households are disproportionately affected by these costs, and a single episode of malaria can be enough to push one in three affected families into or further into poverty.[62,63] Preventing malaria reduces these costs, enabling households to invest more in food, housing, education, entrepreneurial initiatives or assets.

Reducing the burden of malaria allows people to engage in non-market activities such as parenting, house-keeping, caregiving and social relations, all of which generate additional benefits for societies.[64] In particular, it frees women from the burden of caring for sick family members, makes them much better able to engage in income generation, and empowers them to participate in public decision-making.[13]


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### HOUSEHOLD COSTS OF MALARIA

Approximately half of the world's population fights for survival on less than US$ 2.50 per day. Each case of malaria has been shown to cost households at least US$ 2.67 (range US$ 0.34-7.66) in direct out-of-pocket expenses. In adults, this leads to an average of 3.4 days (range 2-6 days) of lost productivity, at a minimum additional indirect cost of US$ 10.85. Mothers and other carers sacrifice a further 2-4 days each time a child or other family member contracts malaria, generating yet more indirect costs for households.[13,57–59]


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> When the work of caring for those with malaria drops, women can better engage in income generation and public decision-making.

An investment in malaria is an investment in the future. It helps children to avoid missing school, enhances their cognitive ability to learn, and increases the chances that they will go on to live healthy and productive lives.[11,65,66] An examination of the effects of malaria on female educational attainment in Paraguay and Sri Lanka found that every 10% decrease in malaria incidence leads to 0.1 years of additional schooling, and increases the chance of being literate by 1-2 percentage points.[29]


> Less malaria means children can attend school and grow up leading healthy, productive lives.


> Progress in preventing malaria reduces maternal mortality, and neonatal and child deaths.

Progress in preventing malaria also helps to reduce maternal mortality, and neonatal and child deaths. Malaria in pregnancy interventions can cut severe maternal anaemia by 38%, reduce low birth weight in neonates by 31%, and decrease neonatal mortality rates by as much as 61%. This enables mothers to stay well and thus be able to care for their baby and other children, and strongly increases the newborn's chances of survival.[67,68] Malaria interventions have slashed child mortality rates by as much as 20% in endemic countries.[69] Where children do not suffer repeatedly from malaria, they have a better response to immunizations, meaning their health is better protected and childhood immunizations are more cost-effective.[70]

Reductions in child mortality have been associated with declines in fertility rates.[71] As child deaths decline, parents often choose to have smaller families and to focus on supporting each child to realize its full potential. This investment in human capital is central to the creation of a more equitable world, and critical for improving health, household prosperity and sustainable development.[64]

## RETURNS FOR HEALTH SECURITY AND SYSTEMS

**Malaria strains public health systems, and absorbs much of the capacity of these systems. Reducing the burden of malaria enables public health systems to function more effectively, and to better respond to emerging health security threats.**

Effective malaria diagnosis and treatment with quality ACTs helps to foster trust in the public health sector, making it more likely that people will seek treatment for other illnesses; ultimately, this helps to stimulate demand for quality services.[72–74] Excluding malaria through effective diagnostic tests improves the chances that other life-threatening diseases will be detected.[75,76] The significant efforts being made to strengthen the use of quality ACTs and malaria reporting in the private health sector can contribute to improved public–private collaboration in health systems. This collaboration brings system-wide efficiency gains, increases the reach of health service delivery, and contributes to the drive for universal health coverage.[77,78]

Malaria can be the cause of up to 50% of hospital visits and admissions, and can account for 40% of public health spending in high-transmission settings.[79,80–83] Reducing this burden allows resources to be reallocated for the treatment of other diseases such as diarrhoea, anaemia, malnutrition, pneumonia, HIV/AIDS, tuberculosis and cardiovascular disease.[84,85]

It also frees capacity, which systems can then redirect to manage the drivers of resistance to antimalarial drugs and antimicrobial agents (both of which are active threats to health security). Malaria elimination requires nations to secure their borders, prevent threats and mitigate; these are also essential features of an effective regional and global health security architecture.[86]

Countries can use the surveillance and response systems and capacities that are needed to achieve and sustain elimination of malaria to develop and stress-test systems to identify, track and manage threats from other fast-moving infectious disease epidemics, such as Ebola, dengue or epidemic influenza.[87–89,86] Regardless of where a country is on the path to elimination of malaria, an effective malaria control programme can concurrently control other vector-borne diseases,[90,91] and laboratories or monitoring and evaluation capacity can be readily harnessed to analyse other health problems.[87,88]

Finally, the tasks of village malaria workers can be successfully expanded to include the management of other diseases, bringing wider benefits to the health of their communities.[92]

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> “Reducing the burden of malaria enables health systems to function more effectively.

## COSTS AND BENEFITS OF ACHIEVING THE 2030 MALARIA GOALS[d]

**Meeting the milestones and targets to achieve the 2030 malaria goals will require further scaling-up of proven interventions, strengthening of surveillance systems, and continued investment in R&D, to achieve the necessary innovation in tools and approaches.** The WHO *Global Technical Strategy for Malaria* includes calculations of the financial and economic costs of this acceleration towards the 2020 and 2025 milestones, and the 2030 targets.[26,27] The costs and benefits that this investment will generate are shown in Figure 4.

### COSTS AND BENEFITS OF MALARIA 2020 AND 2025 MILESTONES AND 2030 TARGETS

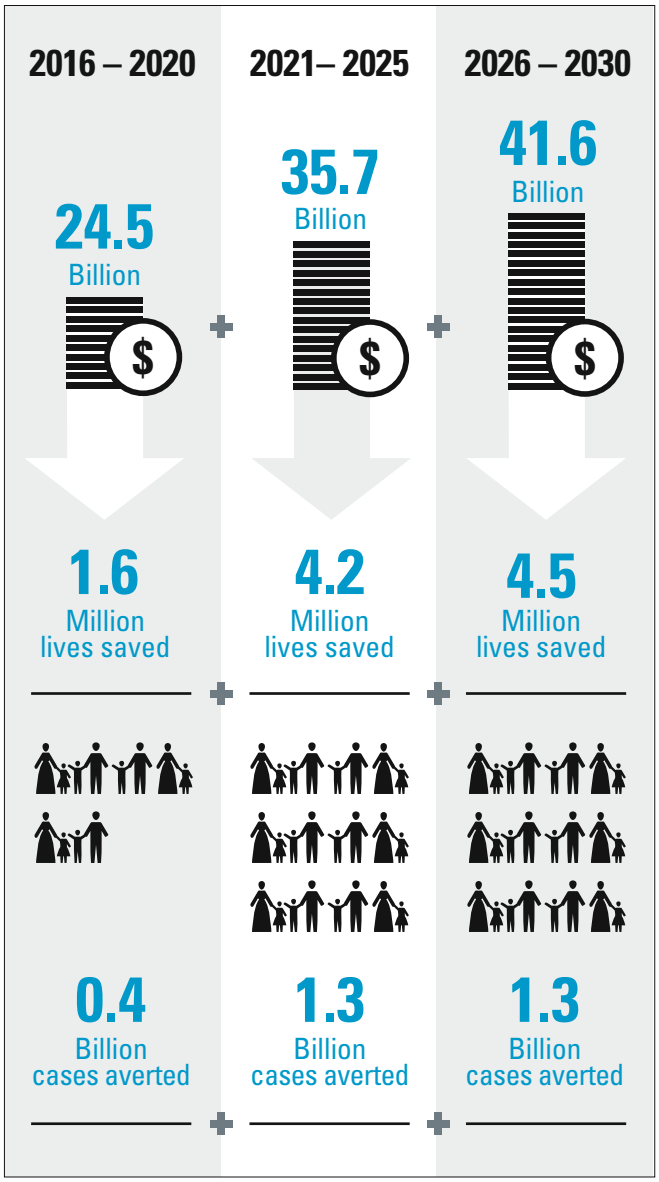
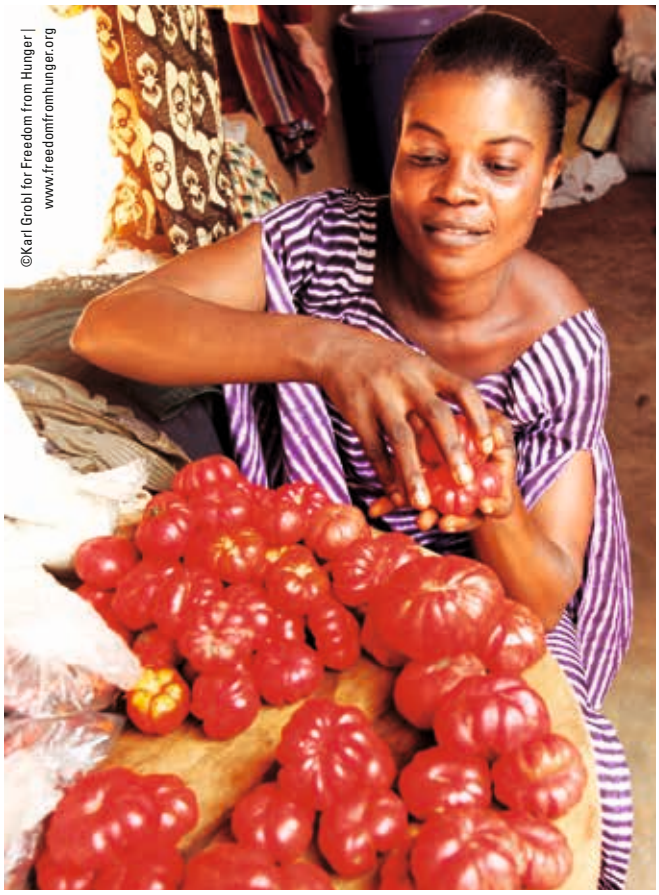



Figure 4

An additional US$ 673 million (range US$ 524-822 million) will be needed annually until 2030 to fund malaria R&D, ensure new developments and innovations, and contain the threat of drug and insecticide resistance. Appendix C provides a breakdown of this R&D cost.




These calculations highlight how the costs of achieving the 2020 and 2025 milestones and 2030 targets rise substantially with each of the 5-year intervals, especially from 2021. This is due to the high level of investment that is required to reach elimination, in particular for vector control, as well as the ongoing investment needed to prevent the re-introduction of malaria. Past expenditure analyses in four eliminating countries illustrate that the annual per capita costs are greatest at the start of a malaria elimination programme, and decrease substantially as the country moves towards preventing re-introduction. In Sri Lanka, the per capita expenditure in 1948-1949 was US$ 6.20 (at the 2013 rate) while the equivalent cost of the current programme to prevent re-introduction is US$ 2.22.[45]

**Even though the costs of achieving the joint 2030 goals are high, the returns on the investment will be unprecedented.** A cost-benefit analysis based on the costing methodology used in the WHO *Global Technical Strategy for Malaria* demonstrates that the benefits increase incrementally with the attainment of the 2020 and 2025 milestones, averting close to 3 billion malaria cases and saving more than 10 million lives by the time the 2030 targets are realized.[e,93] These benefits, shown in Figure 5, include household and health system cost savings, and macroeconomic savings from the economic output that will be generated if people not killed or incapacitated by malaria are able to enter and remain in the productive workforce.[29] As a result, over US$ 4 trillion of additional economic output would be generated across the 2016-2030 timeframe.

[d] Any changes to the costing figures in the WHO *Global Technical Strategy for Malaria* will affect ROI figures in Figure 5.

[e] A summary of the cost-benefit analysis methodology is provided in Appendix D

CUMULATIVE INVESTMENT RETURNS OF MALARIA 2020 AND 2025 MILESTONES AND 2030 TARGETS

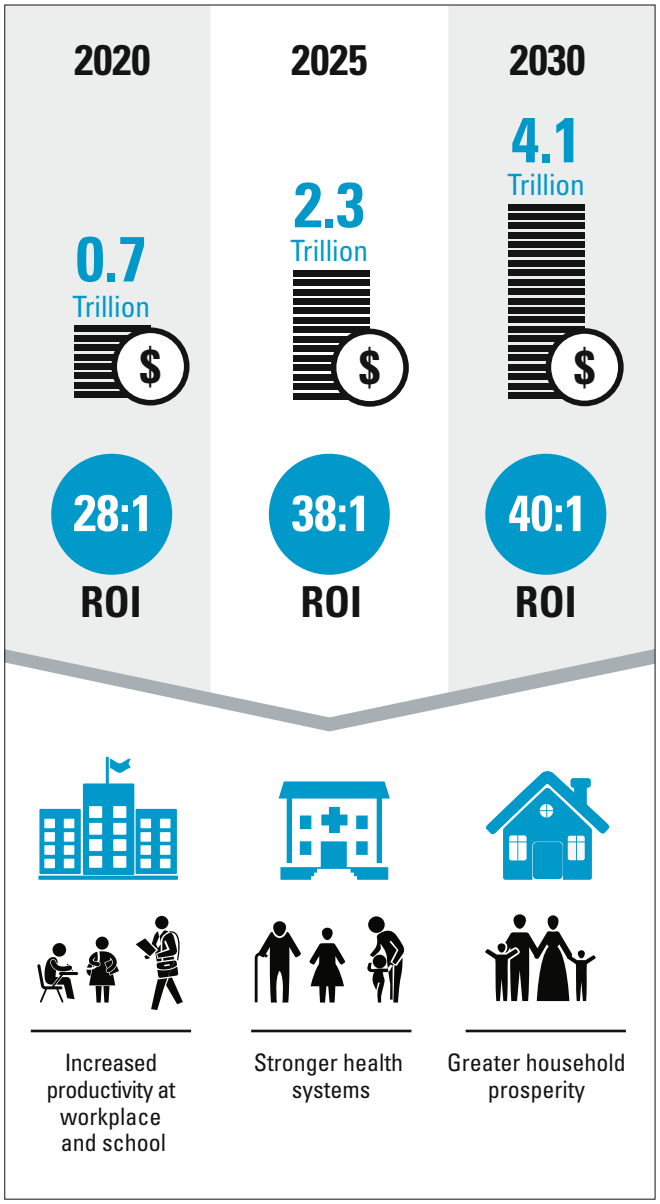



Figure 5

The results of this analysis suggest that the overall return on investing to achieve the 2030 malaria goals ranges from 28:1 to 40:1. Disaggregation by region shows that the ROI for sub-Saharan Africa will be 60:1. These findings are even higher than previous estimates and impressive by any measure. In particular, they underscore the transformative potential for growth that this investment could unlock for sub-Saharan Africa. A different cost-benefit assessment conducted on the goals and targets of the post-2015 development agenda also found robust evidence that the economic benefits of reversing the spread of malaria and reducing annual malaria deaths by 95% would be 15 times higher than the costs, an ROI that it classified as "phenomenal".[94]

The economic output of US$ 4 trillion also compares favorably with other findings. It has been hypothetically estimated that eliminating malaria globally could produce a net economic benefit of US$ 208.6 billion for the time frame 2013-2035.[29]

"The 60:1 return on investing to achieve the 2030 malaria goals in sub-Saharan Africa has the potential to unlock transformative and inclusive growth across the continent.


In a further development of this work, the figure was revised to the equivalent of US$ 269.3 billion for the time frame 2016-2030 for the African region alone – a figure that is roughly equivalent to 17% of the combined 2013 GDP of 47 sub-Saharan Africa countries.[95,96, f]

[f] The original calculation covered the timeframe 2013-2035, and gave a net present value of US$ 332 billion. This has been adjusted here to align with the 2016-2030 timeframe of AIM, to facilitate comparison.[95]

# CASE STUDIES: HOW A SMALL INVESTMENT IN MALARIA CAN BRING MAJOR RETURNS TO FAMILIES AROUND THE WORLD

## NIGERIA CASE STUDY

Ngozi Nwankwo is a widow who heads a household in a rural part of south-east Nigeria. She used to lose more than 20 days a year, either through having malaria herself or spending time looking after others who were sick with malaria. Mrs Nwankwo and her family depend on growing their own vegetables and crops, and they use the little money they have available to buy seeds. In the rainy season, she needs to plant her field. However, as this is also the time when there are more mosquitoes, the children often used to get ill, affecting Mrs Nwankwo's ability to work. Hence, her crops often had low yields and the household faced severe food security challenges.

After receiving bed nets and information on how to use them correctly, life has greatly improved for Mrs Nwankwo and her family. She has been healthy, and the children have rarely been ill with malaria. This has enabled her to tend her field more efficiently and to save money for some fertilizer. She now has much better harvests and can sometimes even sell some of her produce at the market.



> "As the burden of malaria drops, women can engage in subsistence agriculture more effectively, increasing crop yields and making their households more food secure.


## INDIA CASE STUDY

Madan Prakash and his wife Subiti live in a slum at a construction site in north-east India. Their home offers scant protection from the elements, and the family is bracing itself for the onset of the monsoon. The whole family, but particularly the children, suffer repeatedly from malaria. Madan goes early every morning to seek work at the construction site. As he is not always taken on as a day labourer, Subiti also has to go out every day to look for other ways to earn money or get food. Their eldest daughter Namrata had to drop out of the local school to care for her younger siblings.

When a local NGO came door-to-door in the slum, Madan and Subiti received two mosquito nets and assistance to hang them from the roof. The parents sleep under one, and the children under the other. Since having the nets, Madan and Subiti have not had malaria, enabling them to seek work more consistently and thus increase the household's income. They have managed to improve their home, and have saved a small amount of money so that they can travel to the hospital if their children need care. With the onset of the rains, one of the younger children became sick, but the overall frequency of illness has been reduced, allowing the children to regain their strength after each episode. Subiti hopes that they will soon be able to pay for child care for the youngest children, so that Namrata can resume her schooling.

# FAILURE AND THE IMPACT OF RESURGENCE

Despite the compelling case for investment in malaria, funding levels fall far short of the amount needed, and there is a risk that the current gains could unravel.

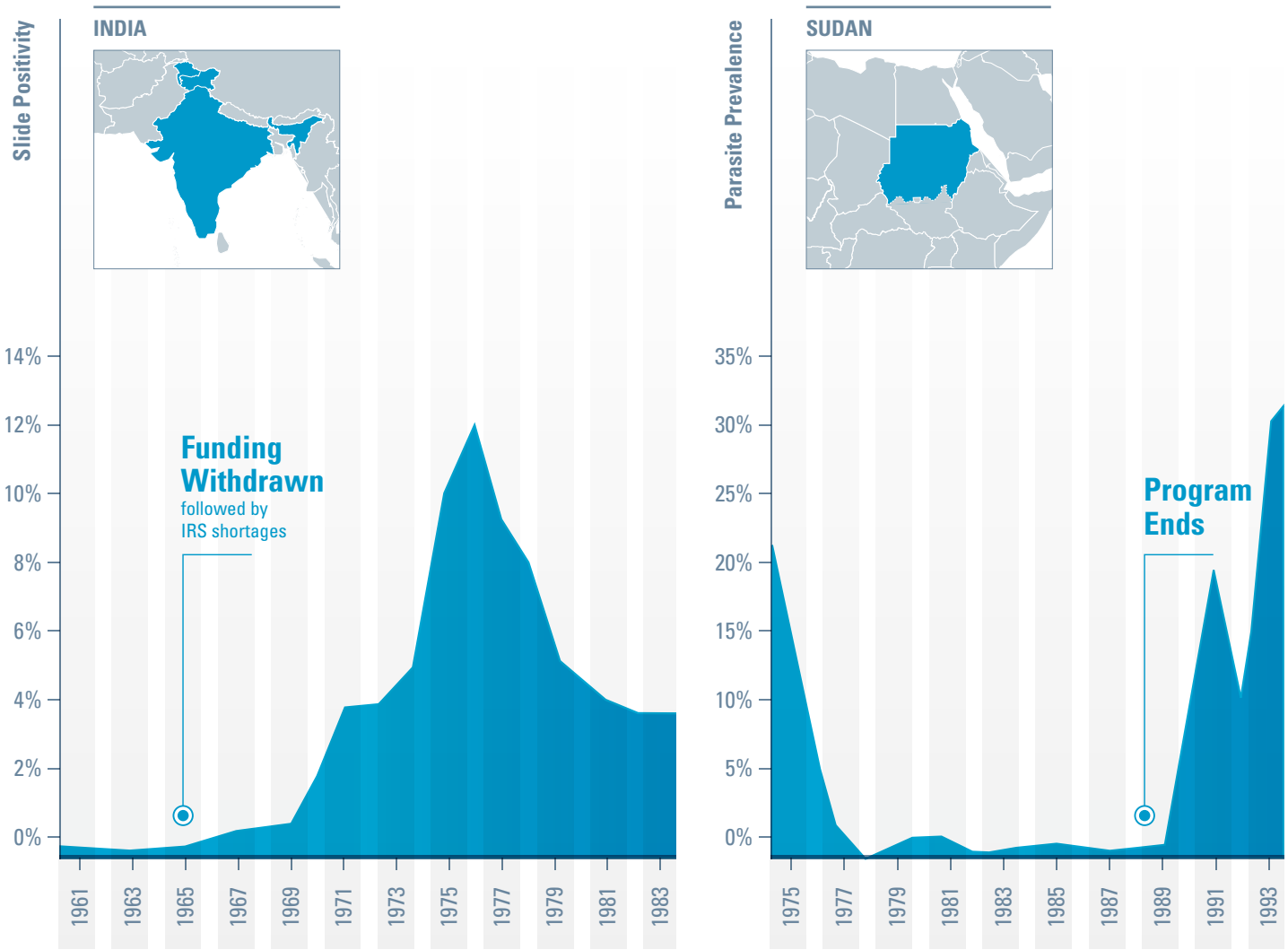
The cost of failing to achieve the 2020 and 2025 milestones and 2030 targets will be catastrophic, and will dwarf the amount needed to achieve those milestones and targets. If the coverage of malaria interventions drops, then dramatic resurgence will ensue. This can lead to even higher prevalence than at baseline (as illustrated in Figure 6) because, as the number of cases drops, people's acquired immunity to malaria declines, leaving them more vulnerable to clinical disease and severe illness.[32,97] Resurgence also increases the risk of drug and insecticide resistance, and leads to human sickness, suffering and death across all age groups.[98]

As countries move from high to low transmission of malaria, occasional epidemics or other setbacks may occur. This is normal, and should not to be taken as a sign of failure; however, it is important to implement an aggressive response to contain such problems.

## LEARNING FROM THE PAST

History provides a warning that the gains in malaria are fragile, and depend upon sufficient and sustained investment. Between the 1930s and 2000s, 75 episodes of resurgence were reported in 61 countries. Most of these resurgences were the consequence of weakened malaria control programmes, due mainly to a lack of resources.[32]

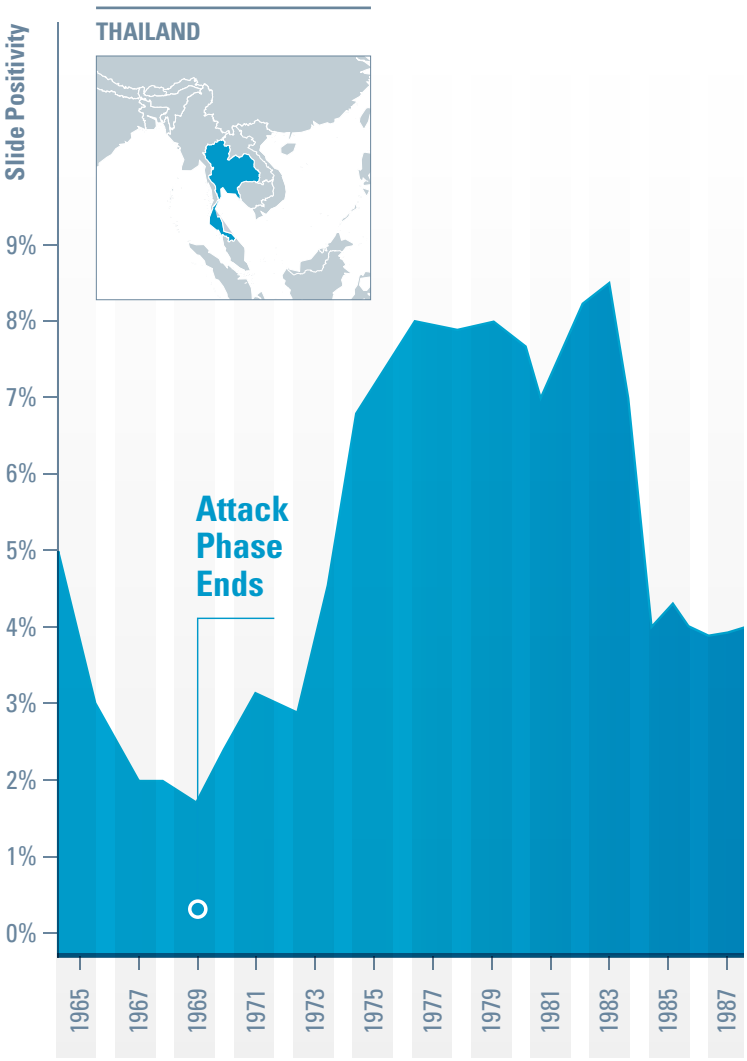
REMOVAL OF CONTROL MEASURES LEADS TO RESURGENCE, WITH PREVALENCE LEVELS FREQUENTLY HIGHER THAN BEFORE DUE TO DECLINE IN POPULATION IMMUNITY




*Historical examples from India, Sudan and Thailand. Source: Cohen et al., 2012[32]*

Figure 6

> The costs of failure will be catastrophic and dwarf the amount needed to achieve the 2030 malaria goals. These costs will be borne by economies, businesses and health systems, and could extend to countries that share borders with resurging countries.




The costs and losses of long-term failure and the associated economic burden will be borne by economies, businesses and health systems. They will potentially extend to countries that share borders with a resurging country, even if those countries have continued to invest in suppressing malaria. In particular, the brunt of these costs will be borne by households, with the poorest families paying the highest price. Such failure would fundamentally undermine the SDG of seeking to end extreme poverty by 2030. Above all, it would mark a failure to protect the unprecedented investment that has been made to date, and squander the current opportunity to free future generations from this ancient scourge.

# CALCULATING THE HUMANITARIAN AND ECONOMIC COSTS OF FAILURE

**Failure to secure sustained political and financial support for malaria control and elimination will lead to resurgence, which will erode the gains from the investments made to date, and generate even greater costs for countries and the global community.** Analysis shows the staggering costs that will result over the 2016-2030 timeframe if current malaria intervention coverage levels are allowed to revert to 2007 levels (i.e. before the first GMAP was launched) (Figure 7).

## HUMAN AND ECONOMIC COSTS OVER THE 2016-2030 TIMEFRAME IF CURRENT MALARIA INTERVENTION COVERAGE WERE TO REVERT TO 2007 LEVELS



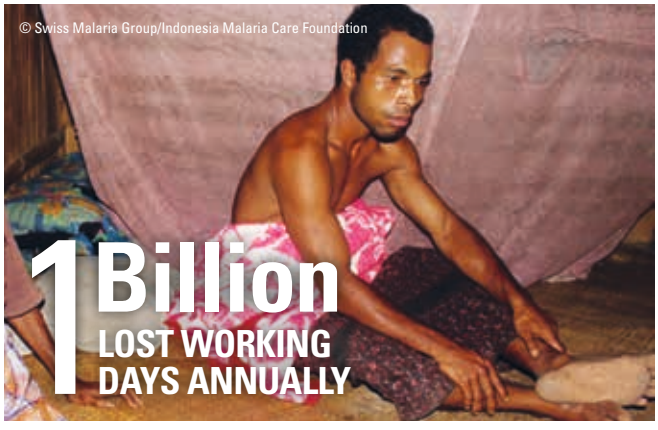






Figure 7

*Calculations based on levels of coverage with malaria interventions for 2016-2030 reverting to 2007 levels. The methodology is explained in Appendix D.*

BUILDING THE INVESTMENT

# 4. MOBILIZING RESOURCES

**Malaria financing has increased substantially since 2000, but continues to fall far short of the amounts required to achieve the 2030 malaria goals. However, there are good prospects for increasing investment in malaria through a mixture of domestic and external financing.**

> Since 1998, funding for malaria has increased substantially, reaching US$ 2.7 billion in 2013.

## CURRENT FINANCIAL LANDSCAPE

Since 1998, funding for malaria has increased substantially, reaching US$ 2.7 billion in 2013, and it is expected to rise to US$ 3.2 billion in 2016 (Figure 8). External resources (from donors) financed the largest part of the increased spending, rising dramatically from under US$ 100 million in 1998 to US$ 2.1 billion in 2013, and increasing by 43% per year between 2005 and 2009. Domestic funding of malaria programmes also increased, and accounted for one fifth of all funding (US$ 527 million, 20%) in 2013.

The Global Fund has provided the largest share of malaria funding (US$ 1 billion, 40% of the total). Donor governments are the greatest source of financing for the Global Fund, but the private sector and other nongovernment donors represent an increasingly important share of its cash contributions. The other main sources of malaria funding are the US Government's President's Malaria Initiative (PMI) (US$ 675 million, 26% of total funding in 2013), the UK Government (US$ 179 million, 7%) and the World Bank (US$ 71 million, 3%). Both the UK Government and the US Government also contribute through the Global Fund.

Different patterns emerge when the figures are further broken down to compare countries in the malaria control phase with those in the elimination or prevention of re-introduction phases. In 2013, external financing contributed 66% of all malaria expenditures in the control phase countries compared with only 7% in the elimination or prevention of re-introduction countries; the rest of the funding came from domestic sources (Appendix E).

In 2013, the main funder of R&D was the US National Institutes of Health (25%), followed by the Bill & Melinda Gates Foundation (22%), which is also a major funder of global health efforts and malaria beyond R&D. The third largest source of funding for malaria R&D is the pharmaceutical and biotechnology industry (15%), followed by the UK's Department for International Development (DFID) (5%) and the Wellcome Trust (5%).

## SOURCES OF FUNDS SPENT ON MALARIA SINCE 2005, AND PROJECTED FUNDING THROUGH 2016

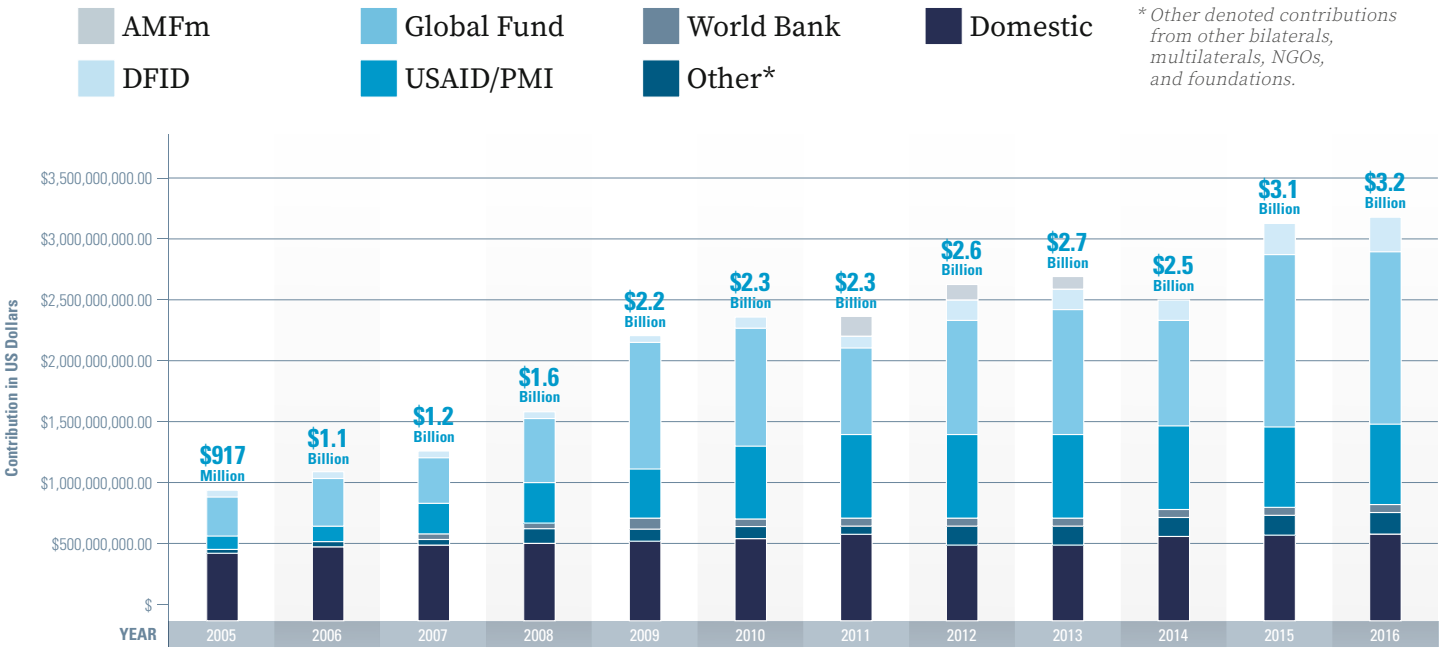



Figure 8

*AMFm, Affordable Medicines Facility-Malaria; DFID, UK Department for International Development; Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; PMI, US President's Malaria Initiative; USAID, United States Agency for International Development*

*Source: data on funding for malaria 2005-2013 are from the World Malaria Report 2014; data on projected funding through 2016 was provided by the WHO Global Malaria Programme.*

Impressive though the increases in malaria financing have been, the US$ 2.7 billion raised in 2013 falls far short of the required US$ 5.1 billion estimated in the first GMAP. It is also well below the even higher funding required to meet the 2020 milestones that will set us on course to achieve the 2030 malaria goals. To achieve those goals, the total financing needs to more than double.

The current situation is challenging; both the rate of increase and the proportion of development assistance for health allocated to malaria have declined since 2010, and funding for malaria R&D activities actually fell by 7% in 2013, to US$ 549 million.[99,100] Also, domestic financing for malaria has not increased at a similar pace to external funding in recent years, and has actually been in decline since its peak of US$ 598 million in 2011. The result is that too many health systems continue to rely heavily on direct out-of-pocket payments, the least equitable form of health financing, which also deters the poor and vulnerable from obtaining the necessary malaria services.

Despite these problems, the prospects for raising additional funds for malaria are good. **Economic growth in the past 20 years in low-income and middle-income countries has already generated fiscal headroom for growing public spending on health, and this increase in growth is expected to continue.**[101]

For example, two thirds of the countries in Africa have witnessed 10 or more years of uninterrupted economic growth, and this is expected to continue at an average rate of around 5% a year in sub-Saharan Africa, and at a higher rate in some of the countries in Asia and the Americas. This rate of growth alone would allow domestic expenditures on malaria to double between 2016 and 2030, even if countries maintained their level of allocation to health and the priority given to malaria in health in their national budgets. If countries were to increase their allocations to health and malaria simultaneously, spending could double in many countries (clearly, this would require strong political commitment).

> “Achieving the 2030 malaria goals will depend on the mobilization of higher levels of predictable and sustained funding.

# INCREASING THE INVESTMENT

**Achieving the 2030 malaria goals will depend on the mobilization of higher levels of predictable and sustained funding, and will require an exponential effort in an increasingly complex world.** Many major donors will struggle to maintain current levels of support unless the global economy improves. Commitments to development assistance are declining, even if the result has not yet been seen in terms of disbursements, while malaria-endemic countries have myriad health problems to deal with.[78,102] The need for solid resource mobilization strategies for malaria at all levels has never been greater, and the ever-present threat of resurgence makes it dangerous to reduce malaria funding even in low-transmission contexts.

As transmission decreases, the disease becomes less visible, creating a risk of funding withdrawal or even of a laissez-faire attitude emerging on the part of malaria programmes, policy-makers and communities. Funding for malaria needs to be decided as a function of current transmission intensity and the intrinsic potential for malaria transmission, which remains high even in areas that are close to elimination. Thus, the Global Fund's new allocations model considers both current and previous transmission rates (i.e. before scale-up of control), the latter being a proxy for a country's innate transmission potential.

Overall, increased domestic spending will need to be supported by increased external funding, particularly in countries with high malaria burdens and low starting levels of per capita income, and those in fragile situations or crisis.

## MOBILIZING ADDITIONAL DOMESTIC RESOURCES

**Many governments in countries with considerable burdens of disease still do not give high priority to health. A study of 46 low-income and middle-income countries showed that government health expenditure was less than 10% of overall government expenditure for more than half of these countries, and less than 5% in 10 of those countries.[103]** If those 10 countries moved to the target of 15% of government expenditure being allocated to health, public expenditures on malaria would triple, even if the share allocated to malaria did not increase. If those countries spending less than 10% moved to 15%, malaria expenditures would increase by at least 50%. If, at the same time, governments could be persuaded to give a higher priority to malaria in the health budget, the available funds would increase even more, particularly when combined with the strong predicted economic growth. This would require political commitment and changes in current behaviours. For example, African heads of state pledged to allocate 15% of their national budgets to health in 2001, yet in 2011, only six of the 55 African Union member states – Liberia, Madagascar, Malawi, Rwanda, Togo and Zambia – had met this target. Several countries are within reach of this target, but many others have actually reduced their allocations.[104]

Giving a higher priority to health and malaria is feasible, but it automatically means giving a lower priority to other things. WHO argues that all countries could raise additional money for health, at least some of which could be used for malaria control and elimination.[78]

To mobilize additional resources for health and malaria, particularly in low-income and middle-income countries, action is needed to increase revenue collection by broadening tax bases and improving tax administration. Such measures are already bearing fruit in several countries; for example, low-income countries as a group took such action between 1990 and 2011, and increased government revenue from 13 to 17% of GDP.[104]

### INDONESIA INCREASES TAX REVENUES BY ENCOURAGING COMPLIANCE

Indonesia's Directorate General of Taxation simplified the tax system to encourage voluntary compliance, in which taxpayers self-assess, then pay the tax on income declared. Positive results followed, with the tax yield rising from 9.9% to 11% of non-oil GDP in the 4 years after implementation. The additional tax revenues meant that overall government spending increased; and health spending rose faster than in other sectors.

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## RAISING REVENUE FOR MALARIA THROUGH INNOVATIVE FINANCING OPTIONS

**Introducing innovative options for revenue raising can substantially increase funding for health and malaria, while complementing activities to improve the efficiency of tax and revenue collection systems.** Some of the innovative options apply not only to endemic or eliminating countries, but also to traditional donors seeking to diversify their sources of funding. All of these options can present challenges, and implementing them requires healthy relationships with a broad group of stakeholders, political astuteness, and transparent, exploratory work to inform decision-making on whether, when and how to proceed.[105]

### To expand domestic financing for malaria, action is needed to:

- increase or channel a proportion of import or export duties or value added tax (VAT) to health or malaria; for example, Ghana funds its national health insurance scheme to a high degree through a 2.5% levy on VAT;
- analyse the potential for introducing mandatory solidarity levies on airline tickets, taxes on foreign currency transactions and on alcohol and tobacco or other products that are harmful to health (so-called "sin taxes"); for example, Egypt, Pakistan, Thailand and Viet Nam have successfully used sin taxes to help finance their health-care systems;[105]
- explore possibilities for introducing voluntary solidarity contributions made via mobile phones for either individuals or corporations;
- consider introducing tourist taxes in countries where tourism is an important sector, or adding a malaria component to hotel or airport departure taxes (such taxes may already be well accepted); and
- introduce diaspora bonds (the selling of government bonds to nationals living abroad) in countries with significant out-of-country populations; the revenue from bonds sales could be dedicated to health and, with the right messaging, it may be possible to earmark part of the funds for malaria.

### Useful resources:

- *World Health Report: Health systems financing. The path to universal coverage.*[78]
- *Lessons learned from working to increase domestic financing for malaria in Africa 2012-2014.*[105]

### To increase malaria financing through global and regional innovations, in collaboration with endemic and eliminating countries, action is needed to:

- further assess the potential of malaria bonds and pay-for-performance instruments, which may be a way of raising more funds for malaria programmes;
- promote the advantages of the Pledge Guarantee for Health (PGH), an innovative financing partnership established to increase the availability and predictability of funding from international donors for health commodities; in 2011, the Government of Zambia leveraged PGH to accelerate the delivery of 800 000 malaria bed nets, ahead of the peak rainy season, saving thousands of lives and potentially millions of local health dollars. The financing and procurement process took just 6 weeks, compared to the usual 33 weeks;[106,107]
- continue to refine and scale up the use of debt conversions deals, whereby developing country debts can be written off so long as the amount agreed is invested in health or malaria – the deals work bilaterally between a donor and a country, and the Global Fund has had some success with its Debt2Health mechanism;[108]
- leverage increased transparency in the dealings of multinational corporations, so that hosting countries receive a fairer share of tax receipts and royalties; in the extractive industries, this is being championed by the campaign group "Publish What you Pay" and by the Extractive Industries Transparency Initiative;[109,110]
- explore the potential to harness the power of social entrepreneurship to catalyse innovative ideas for reaching a larger audience in the fight against malaria – unlike traditional corporate businesses, social entrepreneurial ventures focus on maximizing gains in stocietal benefit. Increasingly, private and public agencies worldwide are allocating funding to help bring about innovations that can demonstrate their success and potential for replication to scale;[111] and
- foster regional partnerships to attract funding from governments that have an interest in contributing to improving health and suppressing malaria in their geographical vicinity.


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## REGIONAL FUNDING INITIATIVES

A Regional Trust Fund for Malaria and Other Communicable Disease has been set up by the Asian Development Bank (ADB). It is the first fund to emerge from ADB's new Health Financing Partnership Facility, which seeks to attract co-financing from regional economies, development partners, the private sector and foundations. ADB hosts the Asia Pacific Leader's Malaria Alliance Secretariat, and it will strengthen and support the Alliance's two task forces on sustaining financing for elimination, and ensuring quality and affordable malaria medicines and technologies.

The Global Fund has allocated US$ 10 million to the Eliminate Malaria in Central-America and Hispaniola Initiative (EMMIE, for its acronym in Spanish), to support 10 countries as they move towards elimination. Countries receive the requested funding once they have met their targets, in an attempt to catalyse progress towards elimination goals through increased regional cooperation and by rewarding performance.

## MAINTAINING AND EXPANDING THE BASE OF TRADITIONAL DONORS, AND TARGETING INVESTMENT FROM EMERGING ECONOMIES

To maintain and even increase the funding provided from traditional donors, while expanding the base of donors from countries that have yet to contribute, action is needed to:

- demonstrate the multisectoral impact of investing in malaria to bilateral and multilateral agencies, including the World Bank and regional development banks, which have a mandate to promote human and physical development in low-income and endemic countries;
- promote the importance of mainstreaming malaria into major development projects funded by the newly formed China-led Asian Infrastructure Investment Bank (AIDB), and the BRICS (Brazil, Russia, India, China and South Africa) Development Bank, as a way of tapping into these high-volume turnovers;
- position malaria in the broader agenda for health system strengthening and global health (e.g. by aligning with the Every Woman Every Child movement to leverage the World Bank's new Global Financing Facility);

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> Demonstrating the multisectoral impact of investing in malaria opens up new funding opportunities.

### TAKE ADVANTAGE OF NEW FUNDING SOURCES

In 2011, the government of Benin approached the World Bank's International Development Association (IDA) to solicit an additional US$ 32 million to fight malaria, because there was consensus that this would positively impact GDP. To trigger funding, the ministries of finance and health had to work in close collaboration. They built a compelling socioeconomic case for the investment, and the request was processed within 3 months.[112]

- take advantage of funding that is being made available to strengthen national systems for greater health security; critical to this agenda are malaria surveillance and outbreak responses, and surveillance for drug and insecticide resistance;
- build alliances between malaria programmes, ministries of health and relevant environmental and development partners (including the national meteorological agencies) as a way of securing access to adaptation funds, to manage climate-related risks to the success of malaria programme;
- continue to identify funding needs, and align them with available funds, including by supporting the Global Fund grant proposal process; and
- continue to determine the priorities of domestic agendas and their potential alignment with malaria mainstreaming and programming in the emerging economies such as the BRICS and MINT (Mexico, Indonesia, Nigeria and Turkey) countries, and the Gulf States.

## INCREASING PRIVATE SECTOR INVESTMENT

There is great potential to increase private sector investment in malaria. Many private sector companies and wealthy individuals living or operating in malaria-endemic countries are interested in such investment, but may not know how to convert that interest into meaningful contributions. At the same time, governments are making smart use of policies to tap into private sector wealth. For example, in India, companies are required by law to invest 2% of their profits in corporate social responsibility, a move that holds considerable promise for the country's malaria advocates.

To increase private sector investment, action is needed to:

- develop a corporate engagement strategy to leverage private sector led successes in malaria control, and bring more companies into the malaria space at all levels (global, regional and country); the engagement could take the form of sponsorship opportunities, such as funding, in-kind support or creation of innovative financing mechanisms (e.g. challenge grants or matching-gift mechanisms);
- advocate for the benefits of workplace programmes that provide malaria prevention and treatment to companies operating in endemic countries;
- engage more strongly with CSOs in donor countries and in malaria-endemic settings (e.g. Rotary and Lions clubs) to build on their interest in funding malaria control activities; and
- target high net-worth individuals in countries of all income levels, to encourage them to contribute to malaria financing.

## ENGAGING THE EXTRACTIVE INDUSTRIES

In Brazil, all enterprises operating in the Amazon region are legally obliged to fund programmes to prevent and control malaria in their areas of influence. These programmes are monitored by the Federal Government of Brazil, and implemented at the local level with the municipal health administration. Between 2007 and 2014, companies invested over US$ 40 million in improving local health services, malaria surveillance and control activities.

## DEVELOPING A RESOURCE MOBILIZATION STRATEGY

**The impressive case for investing in the fight against malaria, including the evidence of the benefits this investment generates for development and the wider health system, presents an opportunity for championing increased funding for malaria.**

Countries need to have an evidence-based national malaria strategic plan that is in line with the priorities laid out in their wider national health strategic plan. Both these documents should be based on wide-reaching consultation and consensus. A high-quality national malaria strategic plan provides malaria stakeholders in-country with an overall vision, high-level strategies and programmatic goals. This strategic plan requires an operational plan that outlines the main activities for achieving the goals, clear milestones, responsible parties and the required budget. National malaria strategic and operational plans need to be integrated into a country's health sector financing plans, and into the broader processes of prioritization and budgeting.

Taking these plans as the starting point, countries are also encouraged to develop a resource mobilization strategy that can be used by malaria programmes and their partners to argue for a greater share of existing funds for malaria, or for the appropriate share of any new funds that might become available. Developing this strategy requires solid preparatory work – including the analysis of any gaps in funding and the mapping of potential new funders. A resource mobilization strategy is a multipurpose document that can be used to attract international financing (e.g. by feeding into a Global Fund concept note), as well as to increase domestic funding from both public and private sources. The strategy should present the expected ROI, and explain how the return can be measured. It will need to be closely tailored to the epidemiological and socioeconomic context, to where the country is on the path to elimination, and to the interests of the potential funder that is being approached.


**Useful resource:**

- *RBM Advocacy for resource mobilization for malaria guide.*[112] *The guide has been designed for use with an accompanying package of Technical Assistance. For more information see: http://www.rollbackmalaria.org/resources/publications/2014*

## OPTIMIZING EFFICIENCIES AND STRENGTHENING TRANSPARENCY

**Raising additional funds is critical, but there is also a need for transparency and efficiency, particularly in the wake of the 2008 financial crisis. Ministries of finance and investors in both the public and private sector now stress the importance of ensuring and demonstrating greater "value for money" or the optimal use of resources to achieve intended results.** Value for money seeks to balance the "four Es" – economy, efficiency, effectiveness and equity – and it requires the use of value measures that are tailored to the context and investors.[113] For example, in low-transmission settings, investment needs to be measured in terms of cases and deaths averted compared to historical baselines, or the economic gains associated with the long-term avoidance of resurgence, rather than the costs per case (which may rise dramatically as case numbers fall). Vaccination against diseases such as measles, rubella, pertussis and diphtheria offer an encouraging precedent for this kind of continued investment in programmes, even in countries where these diseases are no longer present. Malaria elimination efforts would benefit substantially from a new campaign that frames commitment to malaria surveillance and response in the same light as immunization programmes.

Increasing value for money does not necessarily mean that the option with the lowest cost is best. In comparing alternative options, the health improvement and other benefits they generate need to be taken into account, as well as costs. Robust financial management must go hand in hand with efforts to improve value for money. Greater transparency of funding flows and accountability for results will help to tackle inefficiencies and corruption, and thus provide confidence to existing investors and spur additional investment.

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> "Greater accountability will increase confidence and spur additional investment.

## GENERATING STRONGER EVIDENCE ON THE RETURNS OF INVESTING IN MALARIA

As this chapter has made clear, there is now much evidence about the returns of investing in malaria. However, there is scope for this evidence to be consolidated and used more strategically, to show that malaria financing is being invested wisely and efficiently, and having an effect. In particular, there is a need for action to:

- strengthen methodologies for quantifying the improved health outcomes and system-wide benefits in other domains (e.g. agriculture and education), particularly with regard to the benefits accrued in elimination settings;
- improve the availability of national level data on the costs and benefits of investing in malaria; and
- continue to build evidence of the potential negative economic impact of malaria resurgence.

PROMOTING AN INCLUSIVE APPROACH

# 5. STRENGTHENING MULTISECTORAL AND INTERCOUNTRY COLLABORATION

The Sustainable Development Goals recognize that many of the challenges facing the global community transcend national borders, and it implicitly calls upon countries to work together for the global public good.[114] Continued progress in the fight against malaria will depend on the ability to work together, building inclusive partnerships within and across boundaries and sectors to address inequalities everywhere, and promote dignity and prosperity for all mankind.




## *POPULATION MOBILITY*

Population mobility is a rising phenomenon of globalization, and it is likely to increase exponentially. People move between countries and regions, and from rural to urban areas, in search of better opportunities, to escape disasters and unrest, or because they are displaced (e.g. by land redevelopments).

**Movement from areas of high malaria transmission can result in imported malaria cases and potential re-introduction of malaria into low-transmission or malaria-free areas, depending on whether or not competent malaria vectors are present.** Malaria-infected mosquitoes can also be inadvertently transported from malaria-endemic areas to malaria-free areas, causing unexpected outbreaks.[115] Mobile and migrant populations (MMPs) who frequently move in and out of endemic areas may have lost or not possess naturally acquired immunity, and thus be at risk of malaria. In addition, mobility may lead to poor adherence to treatment, which in turn may accelerate the development of resistance to anti-malaria drugs.[116] Reducing malaria in countries affected by political upheaval and humanitarian crises will be crucial for progress towards the SDGs. UNICEF has highlighted how 17 of the 20 countries with the world's highest under-5 mortality rates are those that are affected by violence or are in fragile situations;[117] in all 17 of these countries, malaria is a leading cause of mortality.[g]

[g] The countries are Angola, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Nigeria, Sierra Leone, Somalia, South Sudan and Togo.

## *THREAT OF DRUG AND INSECTICIDE RESISTANCE*

**In today's highly interdependent world, the spread of new and resurgent diseases (including major malaria epidemics) across increasingly porous borders[32,97] can threaten national and global health security by posing a risk to political stability, progress and investment.[118]** One of the most pressing global challenges is the growing problem of resistance to antimalarial drugs and insecticides.[32,97] For example, there is parasite resistance to artemisinin in the Greater Mekong subregion (Cambodia; the Lao People's Democratic Republic; Myanmar; Thailand; and Viet Nam).[1] Factors driving drug resistance include the widespread and indiscriminate use of ACTs for any fever, patients not completing the full course of treatment, the circulation of counterfeit and substandard drugs, and the continued use of oral monotherapies.[119]

Insecticide resistance directly undermines key intervention strategies such as treated nets, treated materials and IRS. Over two thirds of all endemic countries have reported resistance to at least one insecticide class in at least one vector species. Resistance to pyrethroids is most prevalent, and is increasing rapidly. If pyrethroids were to lose most of their efficacy, an estimated 55% of the benefits of vector control would be lost.[120] Levels of resistance to other classes of insecticides used in public health are also increasing, and cross-resistance within and between insecticide classes is prevalent. Reducing selection pressure and managing insecticide resistance requires the appropriate rotation of insecticide classes for IRS; the development and use of mosaic patterns of insecticide treatment; nets combining multiple insecticides and synergists; and the longer term development of new active ingredients with novel modes of action for use on nets and in IRS.[121]

### GLOBAL RESPONSE TO RESISTANCE

The global plans for artemisinin resistance and insecticide resistance management in malaria vectors were developed to mobilize global and local stakeholders to eliminate artemisinin resistance and address the threat of insecticide resistance, by ensuring the timely development of new and innovative vector-control tools and strategies.

## *SUSTAINABLE HABITATS*

**Environmental change has a tremendous impact on malaria transmission, making the disease a potential threat wherever there is a receptive environment.** Deforestation,[122] large-scale irrigation, urbanization,[123,124] the establishment of rubber plantations,[125,126] soil salinification,[127] and extractive activities can all affect the mix of vector species, their abundance, host choice, longevity and behaviour, which influence malaria transmission ecology.[128,129] It is expected that, by 2050, more than two thirds of the global population will live in urban centres. Urbanization can contribute to the reduction of malaria in endemic countries, because cities can bring benefits such as better housing, greater access to basic services and fewer breeding sites.[123] However, these benefits often remain elusive for the world's more than 800 million slum dwellers. There is a need for continued vigilance to the risk of resurgences in urban and periurban areas, where urban agriculture and microirrigation dams can be conducive to *Anopheles* vector populations.[130] Poor drainage; activities such as brick-making,[131–133] road building and construction;[134,135] and the proliferation of gardens and small-scale farming in urban areas can all inadvertently create mosquito breeding sites.[136–138]

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## FOOD SECURITY

**There is a growing need for sustainable agriculture to improve farming productivity and food security, especially in the face of population pressures.** When people, especially young children, are well-nourished, they are better able to mount an immune response and withstand malaria infection.[139] In endemic countries, malaria remains an important cause of stunted growth in children. The combination of malaria and malnutrition (including deficiencies of iron, zinc or vitamin A) is particularly deadly.[9] Agricultural practices, including intense farming, irrigation and drainage, need to be well managed if they are to avoid increasing vector breeding sites. Production systems for certain crops have been associated with increased incidence of malaria; such crops include irrigated rice, mature rubber plantations, sweet potato and other "ridge crops" where rainwater accumulates and provides larval habitats; and salad vegetables grown using micro-dams for irrigation.[140,141]

## CLIMATE CHANGE

**Weather and climate are major determinants of the geographical distribution, seasonality, year-to-year variability and longer term trends of malaria.** Periods of long-term drought can reduce transmission. Periods of high rainfall or warmer temperatures can result in increased malaria transmission, even in areas where control is strong. Natural climate variability – including the El Niño phenomena and other long-term cycles – are important not only in explaining trends in disease burden but also upsurges in cases, including epidemics.[142–144] The Intergovernmental Panel on Climate Change has concluded that changes in temperature and rainfall will affect the natural habitats of mosquitoes, changing the prevalence of the vector or prolonging transmission seasons (or both) in some areas, and potentially exposing new regions and populations to malaria and other vector-borne diseases.[142] In other locations, climate change will decrease transmission through changes in rainfall and temperatures.


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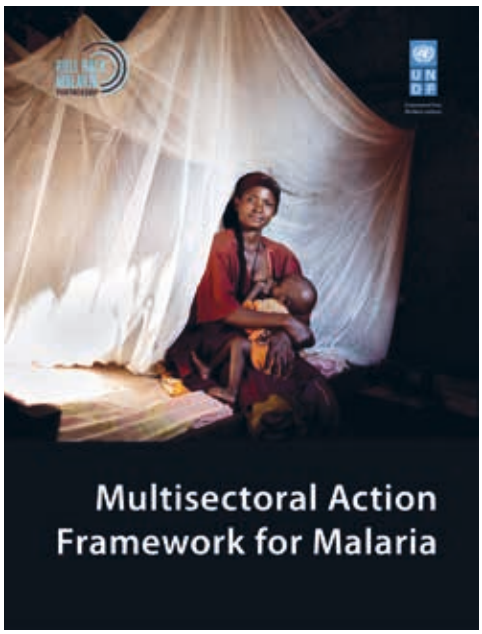
## STRENGTHENING THE ENGAGEMENT OF OTHER SECTORS IN THE FIGHT AGAINST MALARIA




UNDP, RBM and other partners developed the *Multisectoral Action Framework for Malaria* to consolidate the evidence on the many interfaces between the non-health sectors, malaria transmission and the possibilities for responding to the disease.[138] The framework builds on the body of knowledge that shows how endemic malaria disappeared from most of northern Europe and North America as general social and economic development took hold, including better and less crowded housing, improved land drainage and stronger health systems.[145]

**Political commitment and good governance are essential to facilitate the multisectoral engagement that will be needed to achieve the 2030 malaria goals.**

To strengthen the engagement of other sectors, action is needed to:

- demonstrate to heads of state, ministers of non-health sectors, business partners and other key stakeholders the importance of continuing to reduce and eliminate malaria for economic growth and development;
- ensure that reducing and eliminating malaria is integrated into regional and national development strategies;
- identify context-specific organizations or people with the power to convene stakeholders from a wide variety of sectors;
- familiarize potentially receptive "champions" in the non-health sectors with the evidence on the benefits of investing in malaria;
- jointly make use of the matrix provided in the *Multisectoral Action Framework for Malaria* (Figure 9) to examine the determinants of malaria from a societal, environmental, population and household perspective, and explore how different sectors are affected by or could influence the identified determinants;
- ensure that partners new to the malaria space receive technical guidance, and encourage them to work with stakeholders that are competent in the field of malaria;
- support the non-health sectors to address the malaria needs of their own staff and their families, as well as of their clients (e.g. students or farmers) or business partners;
- examine whether the operation, practices, procedures and production systems of a given sector may be contributing to sustaining or increasing vector abundance, parasite transmission, or insecticide or drug resistance, and develop strategies to mitigate any potentially adverse effects that are identified; and
- integrate the activities introduced by non-health sectors to reduce malaria in the routine activities and budgets of the sector concerned at all levels of operation.

### LEVERAGING THE AFRICAN AND ASIA PACIFIC LEADERS' MALARIA ALLIANCES

The African Leader's Malaria Alliance is a groundbreaking coalition of 49 Heads of State and Governments that was founded to ensure progress in malaria across the African continent.

The Asia Pacific Leader's Malaria Alliance was established at the East Asia Summit in 2013 and brings together 18 national Heads of State. Together, they committed to making the Asia Pacific malaria-free by 2030 in partnership with the United States, Japan, China, the Republic of Korea, India, Australia, and New Zealand.

> "The non-health sectors are critical to breaking the vicious cycle of malaria, low productivity and poverty.

## MATRIX SHOWING DETERMINANTS OF MALARIA AND POTENTIAL SECTOR MATCHES

| DETERMINANTS OF MALARIA | POTENTIAL SECTOR MATCHES | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FOREIGN AFFAIRS & INTERNATIONAL COOPERATION | FINANCE & ECONOMY | FOOD & AGRICULTURE | TRADE, INDUSTRY, ETC. | INFRASTRUCTURE, TRANSPORT & WORKS | EDUCATION | SOCIAL PROTECTION | JUSTICE | SCIENCE & TECHNOLOGY | ENVIRONMENT & CLIMATE | WATER & SANITATION | COMMUNICATION AND INFORMATION | SECURITY (MILITARY & POLICE) | COMMUNITY DEVELOPMENT | HEALTH | PUBLIC ADMINISTRATION, INCLUDING LOCAL GOVERNMENTS |
| **1. Society** | | | | | | | | | | | | | | | | |
| Inequitable distribution of power & resources across countries | √ | √ | | √ | | | | √ | | √ | | √ | √ | | | |
| Demographic change: population growth, family size & structural movements of people | | | √ | | | √ | √ | √ | | | | | √ | √ | √ | √ |
| Government's ability to regulate, manage land & tax revenues | √ | √ | | √ | | | | √ | | | | | | | √ | √ |
| Organization of societies & services | | √ | | | √ | √ | √ | √ | | √ | √ | √ | | √ | √ | √ |
| Social status & power: gender & ethnicity | | √ | | | √ | √ | √ | √ | | | | √ | √ | √ | √ | √ |
| **2. Environment** | | | | | | | | | | | | | | | | |
| Agricultural practice production systems | | | √ | | √ | | | | | √ | | √ | | | | |
| Urban or periurban settings & infrastructures | | √ | √ | √ | √ | √ | √ | | | √ | √ | | √ | √ | √ | √ |
| Housing | | | | | √ | √ | √ | | | √ | √ | | | √ | | √ |
| Land use & management | | | √ | √ | √ | | | √ | | √ | √ | √ | √ | √ | | √ |
| Economic development | | √ | √ | √ | √ | | | √ | √ | √ | | | √ | √ | √ | √ |
| **3. Population group** | | | | | | | | | | | | | | | | |
| Poverty & education | | √ | √ | √ | √ | √ | √ | √ | | | | √ | | √ | √ | √ |
| Population mobility | √ | | √ | √ | √ | √ | √ | √ | | | | | √ | √ | √ | √ |
| Nutrition | | √ | √ | √ | | √ | √ | | | | | | √ | | √ | √ |
| Occupation | | | √ | √ | √ | | √ | √ | | | | √ | √ | √ | √ | |
| Community control | | | | | | | √ | √ | | | | | | √ | | √ |
| **4. Household & individuals** | | | | | | | | | | | | | | | | |
| Choice & adoption of malaria-safe practice | | √ | √ | √ | √ | √ | √ | | | √ | √ | √ | √ | √ | √ | √ |
| Awareness & knowledge | | | | | | √ | √ | | | | | √ | | √ | √ | |
| Access to & use of health care | | √ | | | | √ | √ | | | | | √ | | √ | √ | √ |
| Provision of health care | | √ | | | | | | √ | √ | | | √ | | | √ | √ |

Figure 9

# CASE STUDY: MULTISECTORAL ACTION ON MALARIA IN THE ISLAMIC REPUBLIC OF IRAN

## IRAN CASE STUDY

Iran is in the process of eliminating malaria. An in-depth assessment using the *Multisectoral Action Framework for Malaria* resulted in malaria elimination being taken up in national and provincial poverty alleviation programmes. There are now multisectoral malaria elimination committees in each district, chaired by the respective governors. Members include departments of education, energy, water supply, broadcasting and agriculture, and municipal and community-based Islamic councils. These committees integrate means and measures to eliminate malaria in all development projects, and facilitate community involvement. During the malaria transmission seasons, local broadcasting centres provide malaria information prepared by the provincial health authorities. The energy department prioritizes the connection of malaria-endemic areas in its electrification projects. Elected local Islamic councils work with health staff to mobilize communities and households for safe water storage, including larviciding with *Bacillus thuringiensis* and supporting peer-to-peer education on malaria-safe practices.

*Source: National Malaria Programme, Iran*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## MAKING JOINT PROGRESS TOWARDS SECTOR AND MALARIA GOALS

**Reducing malaria contributes to the core economic, social and business goals of other sectors, and generates win-win situations.**

### Education sector

In Ghana, the Ministry of Education established a programme to provide all children with sufficient LLINs for their households, and cooperated with the national programme to teach the children how to use the nets properly. The children spread the key messages to the wider community. This led to a decrease in misconceptions about the cause of malaria, and an improvement in the uptake of LLINs throughout the community. It also achieved a 20% decrease in parasite prevalence in the children, enabling them to attend school more regularly and learn more effectively.[146]

### Agricultural sector

In desert areas of Peru, flooded rice paddies may provide up to 90% of available breeding surface for malaria vectors. In 2006, the General Directorate for Environmental Health/Ministry of Health spearheaded the introduction of intermittent rice irrigation (IRI). The results included favourable rice yields, a significant decrease in malaria and the need for insecticides, as well as considerable water savings. Subsequently, IRI has become the standard rice irrigation practice, bringing benefits for farmers and further reductions in the burden of malaria.[147,148]


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> “Reducing malaria contributes to the goals of other sectors, and generates win-win situations.

### Future perspectives – housing sector

A systematic review showed that, within villages in endemic areas around the world, people living in traditional houses were twice as likely to suffer from malaria as those living in modern houses, after adjusting for socioeconomic status.[149] Importantly, improved housing may even be protective in places with exceptionally high levels of malaria transmission.[150] In Africa, where consumer spending is expected to double over the next decade,[151] more than 144 million rural houses are set to be built by 2050. Closing the eaves, installing a ceiling, or screening doors and windows can all have a protective effect by preventing malaria mosquitoes from entering the house and biting people as they sleep.[19,22,23,152] Many of these features also have additional functional and aesthetic benefits that residents value.

Incorporating these features into housing standards, corporation and public housing programmes, microfinance initiatives for home improvements, and education on improved house designs presents the malaria community with a tremendous opportunity, while also bringing benefits to the housing sector.


## LEARNING THE LESSONS FROM INTEGRATED VECTOR MANAGEMENT

**Integrated vector management (IVM) takes a holistic and logical approach to malaria control, and employs a number of interventions that can be drawn from within or outside the health sector.** By involving other ministries (e.g. agriculture and housing), private companies, NGOs and the community in vector control, far greater impact can be achieved, with fewer resources.[153–155]

### MULTISECTORAL MALARIA CONTROL IN KHARTOUM, SUDAN

The mainstay of the Khartoum Malaria-Free Initiative (MFI) is control of the primary mosquito vector *Anopheles arabiensis*, which breeds mainly in irrigation canals and pools created by broken water pipes, water basins and storage tanks. The MFI collaborates with the Public Works Department to repair broken water pipes. The former is responsible for surveillance, reporting and transportation, while the latter provides the engineers and equipment. In addition, in collaboration with the Ministry of Agriculture and the Farmers Union, the regular drying of irrigated fields to reduce vector breeding has been made compulsory in both government and private irrigation schemes. Leakages from irrigation canals are repaired, and vegetation around canals cleared, in conjunction with the Irrigation Authority and the Ministry of Agriculture. There is strong community involvement in all these initiatives, as well as in mosquito larval control activities.

*Source: Government of Sudan in collaboration with the WHO Regional Office for the Eastern Mediterranean (EMRO).*[6]

**Useful resources:**

- *WHO Handbook for integrated vector management.*[155]
- *WHO Toolkit on integrated vector management in sub-Saharan Africa.*

## STRENGTHENING PRIVATE SECTOR ENGAGEMENT

**The private sector contributes to the malaria response in impressive and diverse ways. It drives innovation; shares its strategic, technical and logistical expertise; delivers malaria services; and facilitates access to corporate networks and clients.**[156] The private sector also provides funding or materials in kind, and invests through corporate social responsibility programmes and sustainable business practices. As part of the global movement to make international and national tax systems more transparent, private sector actors are increasingly demonstrating corporate citizenship, and publishing the amounts they pay to governments in the countries where they operate. Private sector leaders who are doing this are uniquely placed to request information on whether their tax revenues are being invested in providing basic services to citizens, and to call for more accountable government.[109,110] Some of the companies that produce malaria commodities as part of their core business have relocated their production processes to endemic countries, as a way of creating local jobs and fostering sustainability.[157,158]

In endemic areas, malaria can be responsible for high levels of workers sickness and absenteeism, at considerable cost.[49–51] Many companies have worked in partnership with national programmes to bring malaria and health services to their workers, their families and surrounding communities.[159–163] By also including academia in public-private partnerships, these endeavours can be accompanied by a research component to monitor and evaluate the impact; for example, annual parasite prevalence surveys have confirmed the effectiveness of such partnerships.[164–166,51] As they have grown in experience and expertise in the area, many of these companies have extended their role in malaria, such as by becoming an implementing partner for the Global Fund or a principal recipient of its funding.[167–169] More detailed guidance on how to strengthen the engagement of the private and other sectors can be found in the "Making partnerships work" box in Appendix F.

## EXPANDING INTERCOUNTRY AND REGIONAL PARTNERSHIPS

**Greater intercountry and regional collaboration is essential for joint operational action and the exchange of information about lessons learnt. Such collaboration is needed to reduce case importation between countries, achieve and sustain elimination, and secure country borders against other disease threats.** The malaria community has substantial experience of building successful regional partnerships. To reap the full benefits of regional partnerships, action is needed to:

- define the role of the partnership in the global development and health architecture, and establish clear, inclusive mechanisms for engaging with other stakeholders in the region;
- ensure that the mandate of the partnership is flexible, so it can be realigned and refocused as knowledge gaps emerge or are filled, new actors enter the landscape or engage in the malaria agenda, or countries identify emerging challenges or opportunities;
- establish a "whole of government" approach that links health and foreign affairs; the engagement of ministries of foreign affairs is pivotal to effective cross-border cooperation and the effective sharing of disease surveillance data either bilaterally or through a regional hub;
- work directly with regional trade and economic blocs to mobilize political and financial support; for example, in Africa, the ministers of health are working with the regional economic commissions to secure longer term financial commitment for malaria;
- create a network of regional experts able to provide quality technical assistance and support the countries involved to conform with normative WHO guidance and the International Health Regulations;[170]
- advocate for long-term political support and sustainable financing for the partnership from the countries involved; and
- ensure the partnership creates a space for intercountry collaboration to be implemented at all levels of government, including at local level.

### THE AMAZON MALARIA INITIATIVE (AMI)

AMI is an 11-country regional programme that started in the Amazon basin and extended to include countries in Central America. As malaria incidence dropped, countries faced increasing challenges to assure uninterrupted antimalarial drug availability and prevent expiration of stocks. With AMI support, the countries established a system for monitoring antimalarial stocks based on the use of readily available data on current and projected stocks. Once reported, the information is used for immediate decision-making, and triggers the redistribution of medications within the region, as well as the analysis of possible causes for stock-outs. Between 2009 and 2013, the system allowed for more than 50 exchanges of antimalarial drugs between countries or from the Pan American Health Organization's (PAHO's) Strategic Pool to countries. This meant that patients' access to medication remained constant, and drug wastage due to expiration was significantly reduced.[172]

> "Engaging ministries of foreign affairs is pivotal to effective cross-border collaboration.

## THE ELIMINATION 8 INITIATIVE (E8)

Established by the Southern African Development Community (SADC) ministers of health, the E8 is a coordinated effort across eight countries to achieve malaria elimination by 2020 in the southernmost four of these countries (Botswana, Namibia, South Africa and Swaziland), and to reduce incidence and eventually eliminate malaria from their northern neighbours (Angola, Mozambique, Zambia and Zimbabwe). The malaria transmission dynamics of these eight countries are highly interconnected, being linked through population movement and malaria ecologies. The E8 provides a platform for its members to collectively address the barriers to elimination that extend beyond the limits any state can control or mitigate alone. The E8 complements national efforts by working towards the following objectives:

- strengthen regional coordination in order to achieve elimination in each of the E8 member countries;
- elevate and maintain the regional elimination agenda at the highest political levels;
- promote policy harmonization, quality control and knowledge management to accelerate progress towards elimination;
- reduce cross-border malaria transmission through expanded access to early diagnosis and treatment in border districts; and
- secure resources to support the regional elimination plan and ensure long-term sustainable financing for the region's elimination ambitions.



## THE ASIA PACIFIC MALARIA ELIMINATION NETWORK (APMEN)

APMEN was established in 2008, and now brings 17 countries and a wide range of international malaria institutions together to support each other's efforts and achieve the long-term goal of eliminating malaria regionally. The network provides a collegial platform for sharing experience and knowledge on malaria elimination, and builds advocacy capacity and leadership for elimination. It has facilitated the establishment of technical working groups on *P. vivax*, vector control and surveillance. By bringing different partners together, it works to mobilize funding for elimination, and fine-tune elimination efforts involving private-public partnerships, community engagement, multisectoral work and cross-border activities.[171]



# 6. KEEPING PEOPLE AT THE CENTRE OF THE RESPONSE

**People are the essential voice in matters related to their health, living conditions and well-being.[173] To achieve the 2030 malaria goals, we need to put the people that live in affected communities at the centre of all efforts to scale up the design and delivery of malaria services. Far from being an optional "extra", people need to be our first point of reference when it comes to analysing the barriers to access, product or strategy design; piloting; implementation; feedback, learning and monitoring.**


Gender, society, culture and religion all influence the environments where people live, their options for earning a living, and (indirectly) their exposure to malaria and ability to access basic services.[174] Issues of stigma, language and legal status can further exacerbate these challenges for minority ethnic groups, migrants, refugees, the internally displaced and other vulnerable populations.[175] Poor people in poor countries tend to express particularly low levels of trust in public systems, and too often remain on the side-lines of the malaria response. At health facilities, it is the poorest who are the least likely to be seen or have their medication prescribed by qualified staff,[176] while their right to exemptions from the costs of diagnosis and drugs is often abused.[177]

Creating responsive public institutions that provide people with basic services is fundamental to the contract between governments and their citizens. There is growing evidence that if people receive quality care in the public sector, their trust in the state is likely to increase. Working to ensure that malaria interventions are adapted to highly diverse local needs and value systems holds enormous potential for increasing the demand for quality malaria services. Engendering trust not only helps to address inequities, it also contributes to wider social values and civic engagement, and increases accountability to the poor for the delivery of health and malaria services.[178,179]

# BEHAVIOUR CHANGE AND COMMUNITY ENGAGEMENT

The active engagement of community members will be central to the change processes that are needed to achieve the 2030 malaria goals. However, understanding people and their behaviour is a complex undertaking. People often make fast and automatic decisions, yet they are social animals too, influenced by social preferences, networks and identities. Previous experience also shapes the way people understand and act in the world. *The World Development Report 2015: Mind, society, and behavior*[180] shows how far our understanding of human behaviour has expanded in recent years. It delivers an eye-opening account of the hardship of living in poverty, and the difficulty of making everyday decisions when cognitive processes are distracted by the stress of basic survival. The report provides useful insights into how taking the right decisions for health and malaria could be made easier and more salient; facilitates a deeper diagnosis of the barriers to and drivers of change; and summarizes the latest evidence on the role of community engagement in supporting change. In particular, it emphasizes that community engagement requires a long-term commitment informed by in-depth knowledge of community structures and sociocultural norms, and an awareness of a community's previous experiences with government and other service providers.[180]

To engage communities more effectively, action is needed to:

- facilitate civil society involvement in malaria programmes, partnerships and health impact assessments, via seats on political advisory groups, country-coordinating mechanisms, private sector boards, coalitions and health facility governing committees, and ensure that the representation is balanced (e.g. in terms of gender and ethnicity);
- raise awareness about the purpose of civil society participation, and ensure that malaria stakeholders are familiar with best practices on how to engage communities (e.g. see www.ideo.org);
- strengthen the use of qualitative research methods and people-centred design, to more effectively involve people and communities in the co-diagnosis and design of malaria interventions and innovations;
- ensure that the results of malaria programmes and trials are always fed back to involved communities, and facilitate the sharing of grass-roots experiences between communities (e.g. local successes in malaria control, effective health facility governance and initiatives to enhance access);
- identify "voices" of those affected by malaria, and build coalitions to strengthen advocacy and mobilize people to join the fight to defeat the disease;
- create a space to better harness the energy and insight of small grass-roots organizations and their networks; and
- take advantage of social media as a potential channel for disseminating malaria messages and amplifying the voice of affected communities,[181,182] and leverage the *Advocacy for resource mobilization (ARM) for malaria guide*[112] for ideas on how to engage key influencers, such as business owners, athletes, musicians, and movie or TV celebrities in the movement for a malaria-free world.

## COMMUNITIES ARE A KEY HEALTH AND MALARIA RESOURCE

Experience with integrated community case management (iCCM), shows that community health workers facilitate access to timely and effective treatment for malaria, pneumonia and diarrhoea, and that the strategy is saving many lives – especially in children under 5 years of age. Community workers can form the "eyes and ears" of surveillance activities, as well as raising awareness of the importance of malaria-safe behavior, of harvesting and storing water safely, of good housing and of keeping the environments clean. They also help to mobilize communities to take part in clearing breeding sites, and other vector-control activities.

## STRENGTHENING SOCIAL AND BEHAVIOUR CHANGE COMMUNICATION

SBCC is a key component of influencing the decisions of individuals and social norms, and a tool to support effective community engagement. **SBCC needs to be rooted in deep audience insight and framed to compel, rather than simply broadcasting health education information messages. Exciting new areas are emerging around building grass-roots campaigns and movements to demand change, and facilitating collaborations and consortia that make the most of local research and creative talent, and private sector capabilities.** However, there are major gaps in understanding how best to target, package and deliver communication campaigns to effectively impact individual and community behaviours. To strengthen SBCC, action is needed to:

- ensure that communication strategies for national malaria programmes are context-appropriate, gender sensitive, result driven and based on the latest qualitative research techniques;
- invest in local (born and bred) capacity and capability to help build the SBCC research and creative market in affected countries;
- engage and influence local leaders, religious teachers and other trusted change agents, including parents who have lost children to malaria, to disseminate simple, clean, clear and consistent message to their wider communities and networks;
- continue to grow the body of evidence by capturing and sharing lessons learnt;
- leverage the *Malaria SBCC indicator reference guide* to improve monitoring of SBCC programmes, so that SBCC efforts can be held to similar evaluative standards as other interventions; and
- make use of the *Reporting guide for malaria communication evaluations* to disseminate the results of SBCC evaluations, and thus strengthen the body of evidence about what works.

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### OVERVIEW OF EVIDENCE THAT CAN INFORM SBCC IN THE FUTURE

- In the Greater Mekong subregion, the "positive deviance" approach has been used, whereby people who already demonstrate positive, preventive and care-seeking behaviours for malaria are identified and encouraged to share those behaviours with the rest of their community. This approach has been effective in increasing knowledge about malaria and improving health-seeking behaviours, such as consulting village malaria workers or visiting a health centre for malaria diagnosis and treatment. The approach has improved the use of malaria services in a variety of contexts (including public and private health facilities), and in specific population groups (including mobile and migrant workers).[183]
- Studies in Cameroon and Zambia have demonstrated that combining SBCC with vector-control programmes had a positive effect on use of bed nets.[184]
- Further evidence from Zambia suggests that malaria messaging increases awareness about the disease, and that community-level interpersonal communication contributes to positive changes in health behaviour.[185,186]
- Across a variety of cultural and country contexts, a "town-crier" approach, whereby individuals are identified by their communities to pass information through public announcements and interpersonal communication from traditional leaders to members of their respective communities, has proven to be an effective strategy for informing local communities about the delivery of LLINs, or the timing and importance of IRS or seasonal malaria chemotherapy.[187]

"

SBCC needs to be rooted in local talent and framed to compel.

# ENSURING NO ONE IS LEFT BEHIND

**Malaria disproportionally affects the most vulnerable members of society, including children and pregnant women in extreme poverty, marginalized ethnic groups, island communities, populations that are widely dispersed, and those who have been displaced within and across countries for whatever reason.** When people move, they often have to trade familiar habitats for ones that are largely unknown, and are often inherently unhealthy and precarious. This may be due to general poverty, sleeping outdoors, working at night, proximity to vector-breeding areas, poor-quality housing, and limited use of prevention measures. Refugees, internally displaced people and mobile migrant populations all face major obstacles when they try to access health care. These obstacles affect all stages in the migration process – at origin, in transit, at the destination or on eventual return to their home country.[175]

Although it is challenging for malaria programmes to "go the last mile" in seeking people needing treatment, it is important not to delay identifying and working to deliver malaria services to populations that health services often fail to reach.[116] Targeting the response helps to ensure that these vulnerable populations (i.e. those in which a reservoir of the parasite may still exist, or those that cross between high and low transmission areas) do not get "left behind". Targeting a response involves considering which interventions should be deployed, where, when and in which combinations. CSOs can lead the way in developing innovative approaches for accessing vulnerable populations, including in unstable, remote and deprived areas.

To ensure that no one gets left behind, action is needed to:

- promote broader access to quality disease surveillance and other data so that implementers can use that data to target interventions;


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- involve the targeted community in identifying needs, and in the design, implementation and monitoring of programmes, to increase the likelihood of success;
- take great care to avoid further stigmatizing these populations regarding their role in malaria transmission; and
- document, evaluate and share lessons learnt from pilot projects, to establish best practices and strengthen the body of evidence on what is most effective.


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## MOBILE AND MIGRANT POPULATIONS

Mobile and migrant populations are groups of people who travel to, through, within or from areas where malaria is present, thereby increasing their likelihood of being exposed to malaria vectors. MMPs specifically vulnerable to malaria include migrant workers, displaced persons, seasonal agricultural workers, nomadic peoples, those visiting family, tourists (including those from endemic countries), soldiers and military personnel, and communities in border regions.[175] An estimated 1 billion people – 232 million international and 740 million internal migrants – are on the move across various multidirectional migration pathways around the globe.[116]

## BEST PRACTICE EXAMPLES FOR EXTENDING SERVICES TO MOBILE AND MIGRANT POPULATIONS

To be able to reach MMPs, information is needed on where they are and what their patterns of movement are. Useful data may already exist or could be gathered from social networks,[188] mobile phone technology[189] or respondent-driven sampling,[190,191] for interdisciplinary and cross-sectoral analysis.[192] Once obtained, these insights can be used to develop implementations at possible points of interaction. For example, one programme in Cambodia found that taxi drivers were the main transporters of MMPs to border regions; hence, the programme trained the drivers to deliver health promotion messages to those crossing the border.[193]

Employers of migrant workers can play an important role in malaria control. For example, the Malaysian government has collaborated with operators of palm oil, rubber and acacia plantations in Sabah to distribute LLINs to migrant workers, and to ensure that febrile workers report to health facilities.[194]

Important efforts are also being made to expand the network of migrant-friendly health services. This involves training staff at public health facilities to recognize the particular health vulnerabilities of migrants, and to make it known that they will not ask patients for any form of identification or official papers.

Programmes themselves can seek to extend services in border regions and other areas where their reach has traditionally been limited. For example, Sri Lanka used mobile malaria clinics to carry out active case detection during the final stages of elimination;[195] a mobile laboratory is being used in Cambodia to bring real-time polymerase chain reaction (PCR) technology to remote areas;[196] and Myanmar is testing the use of volunteer mobile malaria workers.[197] Many countries have established malaria posts at border crossing points to deliver health promotion messages, or administer RDTs.[198]

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> We must make every effort to reach the most vulnerable families so that no-one is left behind.

# DELIVERING MALARIA SERVICES IN EMERGENCIES

**A growing number of disasters, emergencies and protracted humanitarian crises are occurring around the world. Such events can quickly disrupt the provision of health and other basic services, including the implementation of malaria control or elimination activities.** Moreover, the resulting volatility and the targeting of civilians in modern conflict can cause mass population movements. In 2014, the global number of refugees, asylum seekers and internally displaced people (IDPs) exceeded 50 million.[199] Sub-Saharan Africa continues to host the largest number of IDPs (12.5 million of the global 33.3 million)[200] and 3.4 million refugees,[199] but there has also been a dramatic increase in wars and population displacement in the Middle East and other regions.

Despite the challenges, progress in controlling malaria in crisis situations in sub-Saharan Africa has been important in the gains made since 2000. The United Nations High Commission for Refugees (UNHCR) and other agencies provide LLINs to refugees as part of a set of core relief items in response to emergencies in malaria-endemic countries. This may be difficult while people are on the move, but should be implemented as soon as people are settled. Particular efforts are needed to overcome the challenges of hanging LLINs in temporary shelters or facilitating their use by those who sleep outside to escape the heat of temporary shelters in refugee camps.[201] IRS may work well in refugee camps and other community-based settings in emergencies, but can be logistically and operationally challenging, and requires access to the household, which is not always possible in insecure settings. Alternative tools for protecting people living in camps, villages and towns in emergencies include the use of insecticide-treated plastic sheeting (ITPS) for shelter construction and other insecticide-treated materials.[202,203]

Campaigns to deliver any malaria prevention tools and commodities in all kinds of emergencies must be accompanied with targeted SBCC before, during and after the intervention, because misuse and resale of LLINs, ITPS and even IRS can be high among stressed communities in emergency settings, due to extreme poverty and desperation.[204]

With the tools available today, uncomplicated malaria case management can be effectively rolled out in emergency settings at community level.[205] Community-based treatment approaches can significantly improve access to life-saving treatment for communities living in remote and insecure areas, in ways that static health facilities alone cannot achieve. However, inpatient facilities remain essential for managing severe cases and for providing oversight of the community-based efforts. Support needs to focus on both these aspects in emergency settings, and practical solutions need to be found to facilitate the referral of severe cases from the community or primary health centre to a hospitalization unit.

Responsibility for ensuring that malaria prevention, diagnosis and treatment are available during emergencies often falls on NGO partners and UN agencies such as UNICEF, UNHCR and WHO, because national programmes and infrastructures may struggle to cope. Allocating sufficient funding and planning for procurement and supply of LLINs, RDTs and ACTs is essential, as is the integration of malaria diagnostics and treatment into primary health-care services, be it at the community or facility level.[206]

## ENHANCING DISASTER PREPAREDNESS

**In all settings, the impact of disasters, humanitarian crises and health security threats are strongly determined by the effectiveness of health systems and their capacity to respond.** To improve disaster preparedness, action is needed to:

- strengthen the guidance that is available for addressing malaria in emergencies in elimination settings – population displacement in such settings can contribute to the re-introduction of malaria in areas that had eliminated the disease, and to the massive and devastating epidemics that are the hallmarks of resurgence;
- build capacity at subnational and facility level for establishing emergency preparedness, and clarify contingencies for assuring the delivery of medical supplies; and
- prepare contingency plans, and allocate flexible funding and resources.


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**Useful resources:**

- *In 2013, WHO published the second edition of the Malaria control in humanitarian emergencies – an inter-agency field handbook,[204] which provides policy-makers, planners and field coordinators with practical advice on designing and implementing measures to reduce malaria morbidity and mortality in both human-made and natural disasters.*
- *The Sphere handbook: humanitarian charter and minimum standards in humanitarian response contains the most widely known and internationally recognized sets of common principles and universal minimum standards in life-saving areas of a humanitarian response.[208]*

# CASE STUDY: COMMUNITY-BASED MALARIA MANAGEMENT IN THE CENTRAL AFRICAN REPUBLIC 2008-2014

## CENTRAL AFRICAN REPUBLIC CASE STUDY

The Central African Republic has suffered conflict, mass population displacement and poverty for at least the past decade. Health infrastructure that was largely destroyed in the north-western conflict areas has not been rebuilt. Malaria is responsible for the overwhelming burden of disease, and less than 20% of the population in the north-west has access to health facilities. Since 2008, over 100 community volunteers have been trained and equipped to deliver health education and uncomplicated malaria case management services with RDTs and artemether-lumefantrin (AL) treatment.

In 2012, there were 55 319 consultations, of which over 80% were RDT confirmed and treated. Successful treatment with AL requires six doses over 3 days. An AL adherence study found that 82% of 460 patients were adherent – a figure that exceeds levels in many countries. The adherence rates were highest in communities where the malaria agents had been in action the longest. These results show that community-based RDT and treatment services can be feasible, accessible, acceptable, scalable and highly effective in the most challenging low-resource settings. This approach has now been incorporated into the Central African Republic's National Malaria Control Strategy, and is being duplicated by other NGOs in the country and beyond, with funding from the Global Fund.[207]


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CREATING THE SUPPORTING ELEMENTS

# 7. STRENGTHENING THE ENABLING ENVIRONMENT

Millions of people continue to lack sufficient access to malaria services, dying needlessly from a disease that can be prevented or treated at low cost. Efforts to improve access are frustrated by weaknesses at policy and institutional level, and lack of availability of reliable data to inform decision-making and target interventions. Health services still lack strong governance and capacity, and fail to deliver services to many people, especially the poor and marginalized. Along with increased commitment and funding, there is a need to strengthen policies and regulation, use evidence to deliver the appropriate response to malaria, and reach everyone in need, wherever they are. Essential components of an enabling environment, crucial for facilitating greater access to malaria services, include stronger health systems with greater capacity; better cooperation between public, private and faith-based health providers; and increased collaboration with communities and community health workers.


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## MAKING POLICIES "MALARIA SMART"

**Where progress has been made in the fight against malaria, it has been greatly facilitated by an enabling policy environment. Functional regulatory bodies, coherent policies, and community engagement are all essential elements for ensuring that policies are implemented and adhered to in a sustained manner.**

### MULTISECTORAL POLICIES

As more sectors engage, there is a greater need to ensure the coherence of national policies across different ministries. Decisions on major development projects such as dam construction, hydroelectric and resettlement schemes are taken by ministries of planning, finance, infrastructure, energy and water. Vector-control activities, such as land drainage regulations, may fall under the remit of environmental health agencies. Ministries of agriculture issue the permits that allow insecticides to be used for IRS. Animal health authorities may also need to be involved in policies designed to manage human health risks; for example, those related to *P. knowlesi* and possibly other zoonotic malaria infections.[209]

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To strengthen the multisectoral policy environment, action is needed to:

- conduct rapid policy analyses, as described in the WHO *Handbook for integrated vector management*[155] and the *Global Plan for Insecticide Resistance Management*, to assess the strengths and weaknesses of regional and national policy environments;
- take any identified gaps and inconsistencies as a basis for amending, rephrasing, withdrawing or creating policies in support of the fight against malaria;
- use civic by-laws as an entry point (e.g. to require companies and individuals involved in construction and demolition to take precautions to prevent conditions for vector breeding) – in India, compliance is a precondition for the issuing of occupancy certificates by municipal authorities;
- advocate for the introduction of occupational health regulations, as promoted by the International Labor Organization's *Decent work agenda*, to protect workers from injury and sickness, including malaria, during employment;[20]
- introduce tax policies to limit bureaucratic barriers to investment in malaria, incentivize private sector involvement, and reduce taxes and tariffs on health commodities; and
- link regional funding banks with independent agencies that conduct health impact assessments, to ensure that the assessments are carried out as part of the feasibility studies of any major new infrastructure development project (e.g. dams, mines, fossil fuel extraction or large-scale plantations). A detailed analysis of how a project might alter local vector ecology and malaria transmission throughout the life-cycle (i.e. construction, operation and closure) is essential for guiding appropriate mitigation measures. The epidemiological or entomological studies that are carried out as part of the baseline description or surveillance activities should be made publicly available, so that the ongoing impact and success of mitigation measures can be monitored transparently giving local communities a means to foster accountability.

> "Where progress has been made in the fight against malaria, it has been greatly facilitated by an enabling policy environment.

**Useful resource:**

- *Health impact assessment. International best practice principles* (IAIA, 2006).[210]

## THE HEALTH POLICY ENVIRONMENT

**To ensure progress towards the 2030 malaria goals, it is imperative that the policy environment facilitates people's access to quality health and malaria services.** To achieve this, action is needed to:

- promote the provision of universal health coverage, and consolidate social protection mechanisms so that people can access malaria diagnostics upon the onset of fever without having to pay;
- ensure that universal health coverage developments are genuinely inclusive of informal populations such as slum dwellers and undocumented migrants;


- strengthen mechanisms to exempt the poor from the payment of user fees for malaria services of any kind;
- implement the 2008 World Health Assembly (WHA61.17) Resolution on the Health of Migrants to identify specific health risks for migrants, promote intercountry agreements of reciprocal health care for migrants, and monitor migrants' health and access to health services (including for malaria prevention, diagnosis and treatment);
- ensure that processes are in place to refund nongovernment providers for services that national policies require them to provide free of charge;
- explore possibilities for national health insurance packages to include preventive tools such as LLINs; and
- find ways to channel out-of-pocket health payments so that people do not spend money on substandard medicines or services, but instead invest in forms of prepayment and pooling (e.g. health insurance contributions) that guarantee the purchase of quality products or services.

## THE MALARIA POLICY ENVIRONMENT

**A rapidly responsive policy environment is essential for ongoing malaria research and product development.** Lack of clear policies, slow review processes, and inefficiencies in approval and registration processes may remove the incentive for key sectors and constituencies to engage in malaria R&D. The costs of investing in the development of new tools and drugs are high, and every year of delay impacts heavily on the potential ROI, as well as failing to prevent illness and save lives.

For a responsive policy environment, action is needed to:

- align national malaria policies with the WHO *Global Technical Strategy for Malaria* and recommended WHO policies – this will also help to strengthen regional alignment, and facilitate intercountry collaboration and regional partnerships;
- explore possibilities for harmonizing regional policy-making (e.g. for the registration of malaria drugs, newly approved insecticides and insecticidal products such as LLINs and IRS commodities);
- ensure that swift action is taken to review and advise on new tools to reduce the "go to market" time;
- adapt global procurement policies to support variation at subnational level (e.g. in procuring new, more expensive LLINs with resistance-breaking properties when they become available);
- further promote the World Health Assembly resolution on monotherapies, enforce national legislation banning their sale and use, and prohibit inappropriate drug prescribing practices;
- strengthen national regulatory systems to sample and test for fake or substandard antimalarials and other drugs;
- raise awareness among health workers, traders and the general public of the damage that fake drugs can cause;
- strengthen national regulatory authorities to ensure that only quality public health pesticides are used, safely and judiciously, in both the public and private sector[211] – embedding a public health pesticide task force within the wider pest control or regulatory body can be an effective way of addressing public health pesticide registration, regulation and use; and
- support civil service reform to establish career paths for field-level entomology and environmental health or vector-control workers.[212]

# IMPROVING THE QUALITY AND USE OF DATA

**Quality data are essential for programme planning, implementation, monitoring and evaluation; evaluating and adopting new products and strategies; and assessing progress. Data are needed to characterize and track epidemiological changes, vector distributions and behaviours, drug and insecticide resistance, and the effectiveness and use of interventions.**

Routine country health information systems should be one of the main sources of data for public health decision-making, health sector and disease programme reviews, analysis and planning. Their functionality has been improving with the roll out of District Health Information Systems 2 (DHIS2).[213] Nonetheless, in 2012, in as many as 41 of the 99 countries with ongoing malaria transmission, health management information systems were not functioning optimally; they faced challenges in collecting and analysing data, and in using that data for timely decision-making and resource allocation.[214] Household surveys are an important complementary source of data and are uniquely placed to provide population-based data, including information on those who do not access health services. These surveys are essential for creating a profile of who is infected with malaria, has access to LLINs and receives treatment for malaria. However, as transmission declines, surveys become less precise at describing malaria transmission, and the need for routine surveillance increases.

## STRENGTHENING SURVEILLANCE SYSTEMS

As the WHO *Global Technical Strategy for Malaria* stresses, enhanced surveillance is essential to understanding the progress made on the path to elimination; identifying residual foci of infections; detecting, preparing for and responding to potential epidemics; supporting budgeting and planning; and increasing knowledge about emerging resistance to drugs and insecticides. There is a need for action to:

- improve parasite and vector-surveillance systems, and the capacity needed to drive the systems, as an integrated part of health system strengthening efforts;
- make surveillance systems inclusive and facilitate private sector, military and civil society providers' participation in national systems;
- strengthen the engagement of communities in the collection and use of surveillance data; and
- take full advantage of the potential of new technologies to feed surveillance systems with real- time data; for example, the Zanzibar Malaria Elimination Program developed the Coconut Surveillance program, a mobile application that builds on the Malaria Early Epidemic Detection System;[216,217] this system can identify outbreaks within 2 weeks of their onset.

> "Quality data are essential to inform decision-making and to trigger appropriate action.

## FIGHTING MALARIA WITH CLIMATE KNOWLEDGE

Botswana has established an early warning system that integrates a seasonal rainfall forecast with population and health surveillance information. The use of the seasonal rainfall forecasts has reduced the lead time by 4 months compared to previous epidemic warnings, and provides the time needed to mobilize resources and arrange an effective response.[215]

## USING DATA FOR DECISIONS AND ACTION

Obtaining information is not enough; data are only useful if they are used to inform decision-making, and to trigger an active and appropriate response. Data are needed to assess the impact of interventions, remove the effect of confounders such as climate (e.g. in the form of droughts), and enable the efficient use of resources. There is a need for action to:

- work closely with regional and local research institutions and technical partners to develop sustainable data architecture;
- build capacity at all levels to use and act on data;
- provide continuous feedback to those who collect and analyse data, so they are fully aware how the data are used;
- keep policy-makers continuously informed on progress, to reinforce the importance of continued investment;
- keep health workers and affected communities informed about the true local burden of malaria, to enable them to track progress and appropriate action;
- conduct data-quality audits to identify any inefficient use of data for planning and resource allocation in malaria programmes; and
- conduct periodic reviews and evaluations of malaria programmes.

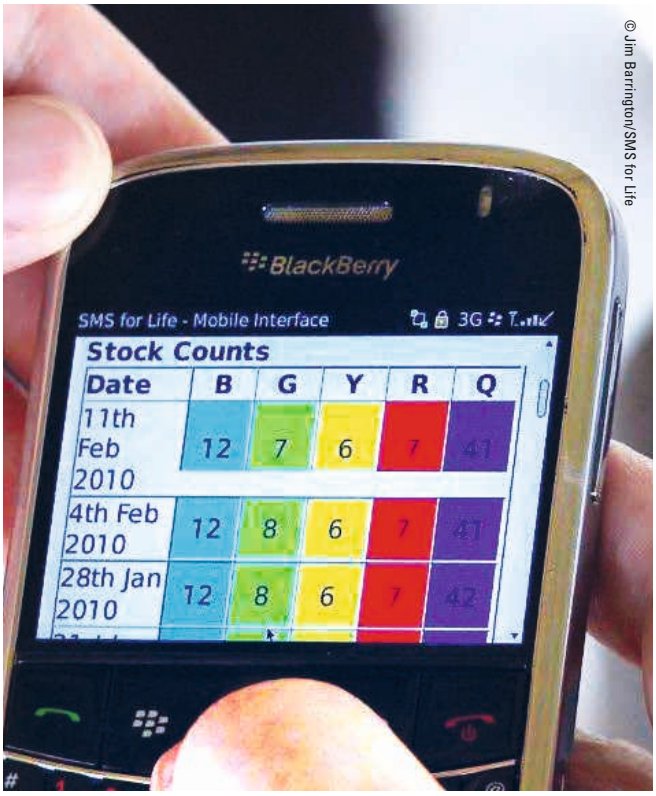
## INCREASING ACCESS TO INFORMATION

Data from large household survey programmes (e.g. the Demographic and Health Surveys, and the UNICEF Multiple Indicator Cluster Surveys) are publicly available. Open access to data in routine country systems and other sources has enormous unfulfilled potential to change how governments work, facilitate citizen empowerment, strengthen transparency and foster accountability. For example, the Open Data Initiative in Burkina Faso holds over 50 freely available government datasets, including ministry of health data on the number of malaria deaths and vaccination coverage across the country.[219] To increase access to information, action is needed to:

- establish platforms for sharing data, and push for a change of "mindset" around the exchange of data across ministries, sector, and countries;
- encourage efforts to make surveillance and other malaria data (e.g. public expenditure reviews) publically available in real time;
- support the efforts of civil society and watch dogs in demanding their right to data on progress in health and malaria (e.g. in monitoring outbreaks, interruptions of services or supply-chain failures); and
- link the results of risk mapping to media messages on the protective measures that specific communities at high risk of malaria can take.[89]

## HARNESSING DIGITAL TECHNOLOGY AND THE PRACTICALITIES OF POLICY DECISION-MAKING

Success in further reducing the burden of malaria depends on the intelligent use of epidemiological evidence to inform the response. Malaria programmes and researchers in countries across Africa are being supported to assemble and package malaria information for efficient national decision-making. Data on a range of topics are being assembled and layered, including data on malaria transmission and incidence, human settlement, health decision-making units, occurrence of vector species, seasonal rainfall metrics, health service location, and current versus past intervention coverage. The resulting information is being used to identify areas or populations with particular vulnerability, and to guide the choice and combination of interventions to control the disease and manage resistance. Sharing the mapped products across the region strengthens intercountry collaboration and lessons learnt. [218]



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## OPEN PLATFORMS FOR BETTER ACCOUNTABILITY

In response to the absence of reliable data in the water and sanitation sector, an open platform has been created to share easily understandable maps that show the density of clean water points and drainage systems. Building on UN-HABITAT's urban inequity surveys, the platform extends the benchmarking of service providers to include georeferencing. It is being used by consumers, service providers, policy-makers and donors to monitor the impact of interventions and strengthen accountability. The platform could be readily adapted to share data on malaria prevalence and intervention coverage with affected communities, enabling those communities to hold local government to account for progress in the provision of quality malaria services. [220]

# STRENGTHENING AND INTEGRATING INTO HEALTH SYSTEMS

**Sustaining progress along the path to elimination cannot be considered in isolation from the broader health system that enables or prevents people's access to health services. To facilitate progress towards the 2030 malaria goals, it will be necessary to leverage the current drive towards universal health coverage, optimize the use of resources across the public and private sectors and at community level, customize the response to local contexts, and integrate with existing health systems.**

## mTRAC – USING MOBILE PHONES TO TRACK SERVICE AVAILABILITY AND QUALITY

To complement health worker reporting, community members in Uganda are encouraged to report stock-outs or other problems via a free and anonymous SMS hotline. A dedicated team at the ministry of health reviews and responds to the anonymous SMS reports. Each report is categorized by district and issue area (e.g. stock-out, drug theft and fraud) and forwarded to an action centre. This includes the district health management team, and other institutions as needed (e.g. national medical stores). In addition, mTrac arranges a regular radio talk show focused on health issues of concern to communities, and provides a means to give feedback about the actions being taken based on the SMS reports received. The mTrac team also publishes regular articles in the national press, to highlight health issues of national interest, promote the SMS hotline and provide feedback on improvements.

Since its launch in 2011, there has been a steady increase in reporting rates in the districts where mTrac is being implemented, providing disaggregated, real-time data that was previously unavailable at the national level. There has also been a noticeable, steady decline in stock-out of ACTs from active facilities.

## ENHANCING HEALTH SECTOR GOVERNANCE

Health sector governance rests on the strategic vision set out for people's health, and whether that vision enshrines the values of solidarity, equity and social justice. Health systems that are well governed provide mechanisms for citizens to provide feedback on services. This can help to make services more responsive to people's needs, and thus to generate trust and stimulate greater demand. To strengthen health sector governance, action is needed to:

- ensure a high degree of participation and consensus building in the development, implementation and monitoring of national health and malaria plans and strategies;
- advocate for public agencies, including national drug and insecticide agencies, to disclose information (e.g. regarding procurements), as well as audits and financial statements;
- increase the transparency of user fees, and ensure that the prices of all services, including malaria diagnosis and treatment, are prominently displayed in all public health facilities; and
- work with communities to identify those who should be exempted from paying user fees for malaria and other health services.

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## BUILDING CAPACITY FOR MALARIA AT ALL LEVELS

Health systems in general, and malaria programmes in particular, have been plagued by capacity shortages for decades. Progress has been achieved through multipurpose health-care providers and community workers. Expanding human resource capacities at national, subnational, facility and community levels is an integral part of health system strengthening, and ensures the availability of malaria-specific skills and knowledge. It is crucial that national malaria programmes have sufficient capacity to support those working at local levels, so that those people can customize their response, manage insecticide resistance, implement and monitor targeted vector-control interventions, and deliver malaria diagnosis and treatment as specialized yet integrated services. The importance of this increases as the burden of malaria decreases, and the distribution of the disease becomes more heterogeneous. In such situations, capacity is needed to understand local transmission risk, and deploy targeted intervention packages to vulnerable populations or remote areas. To build capacity for malaria, action is needed to:

- assess human resource needs at all levels, and to chart progress in improving managerial, epidemiological, entomological, parasitological and clinical capacity;
- establish mechanisms and secure funding for sharing malaria expertise across regions and districts, and even with neighbouring countries;
- strengthen support and supervisory mechanisms, including the use of innovative training methods, to optimize the contribution that human resources can make at all levels; and
- ensure that any changes in national malaria strategies are rapidly integrated into the pre-service and ongoing training of all those involved in programme implementation.

> “Malaria-specific capacity is critical for a locally adapted response.

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## OPTIMIZING EFFICIENCIES AND IMPROVING THE QUALITY OF MALARIA INTERVENTIONS

Malaria programmes can spearhead improvements in quality for the benefit of the wider health system. Targeting the response to malaria at subnational and local level optimizes efficiencies and gives greater value for money. Action is needed to:

- stratify epidemiological data and link them with other relevant data (e.g. on socioeconomic status, location and access to malaria services), to better understand transmission risks and vulnerabilities, and customize local responses accordingly;
- ensure that vector-control strategies and insecticides are selected using entomological surveillance data, with special emphasis on insecticide resistance monitoring, as outlined in the *Global Plan for Insecticide Resistance Management*;
- target supplementary or complementary vector-control interventions to subnational areas with specific needs (e.g. high levels of outdoor transmission);
- raise health staff awareness of the benefits of quality-assured ACTs, and improve prescribing guidance, information, training and practice;
- disseminate public information to counter inappropriate consumer demand or expectations (e.g. the expectation that an ACT will be given, even if an RDT result is negative); and
- strengthen quality control mechanisms to ensure that malaria products on the market are of good quality and are used correctly.[221,222]

> “Malaria programmes can spearhead quality improvement in health systems.

## STRENGTHENING PROCUREMENT AND SUPPLY-CHAIN SYSTEMS

Malaria programmes can improve procurement and supply chains for the benefit of the entire health system. In control settings, malaria programmes need to manage large-scale distribution of commodities. In elimination settings, programmes must be able to respond quickly to outbreaks and target residual foci of infection, and have systems for redirecting supplies to areas in need.

Stock-outs of basic commodities are still much too common; they interfere with the efforts of health providers and community workers to deliver malaria services in areas where they are most needed. The consequences of stock-outs can kill. To strengthen the procurement and supply-chain systems, action is needed to:

- improve the monitoring and tracking of consumption data at all levels, to better inform procurement needs;
- map public and private sector supply chains and the areas they service, and negotiate agreements to cooperate where feasible;
- leverage cost-effective and adaptable technologies to facilitate improved forecasting, updates on expected deliveries, inventory management and early warnings of impending stock-outs, and establish systems for rapidly redirecting supplies to areas of need;
- structure supply chains for prevention commodities, so that households can access (i.e. “pull”) commodities such as LLINs in times of need; this can be done through continuous distribution systems that make LLINs available at a variety of sources within communities and can include public sector subsidies applied through private sector outlets (where conditions are appropriate); and


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- counter active leakage from supply chains and reinforce accountabilities by ensuring that community representatives are present whenever drugs and other commodities are ordered, received or inventoried, or need to be destroyed.


## IMPROVING PUBLIC-PRIVATE COLLABORATION AND "SMART INTEGRATION"

Stronger cooperation and collaboration between the public and private (profit, not-for-profit, faith-based and military) health systems not only increases the reach of service provision, but is also likely to strengthen the private sector's willingness to adhere to national regulatory structures and systems in general (e.g. surveillance and reporting, and use of generics). Integration across interventions and sectors provides a platform for greater access by populations. It can also improve outcomes for the entire health system, and address community health issues more holistically (e.g. comorbidities between malaria and malnutrition, or malaria and HIV). To strengthen collaboration between public and private providers and take advantage of integration, action is needed to:

- strengthen communication channels, and clarify roles and responsibilities between the private (profit and non-profit) and public health sectors at all levels;
- align malaria programming and the broader health sector planning processes to take full advantage of opportunities to integrate into existing systems; and
- ensure that malaria and health sector planning is undertaken with strong representation of the private health sector (e.g. service providers, training institutions and private pharmacies).

## SMART INTEGRATION HAS TWO-WAY BENEFITS:

Integrated vector management (IVM) seeks to leverage health and other sector funds, and expertise and infrastructure in laboratories and communications, to improve vector control for several diseases concurrently (e.g. malaria and lymphatic filariasis in Africa, malaria and kala-azar in South Asia, and malaria and dengue in Asia and the Americas). This saves costs, and by combining interventions, monitoring and evaluation, other efficiency gains can be made. At the same time, the reach of other health services can be extended by combining them with IVM activities at community level.[155]

Interventions to prevent malaria in pregnant women in sub-Saharan Africa can be delivered via routine antenatal care (ANC). However, coverage with three or more doses of IPTp is still insufficient, in part because many women only attend ANC once or twice in the course of a pregnancy. A combined effort by ANC and malaria teams may bring more women into ANC more regularly, increasing the uptake to at least four ANC visits (as recommended), and ensuring the visits are used to deliver life-saving malaria interventions, while also making it easier for women to access other services at the facility.

# 8. FOSTERING AND SHARING INNOVATIONS AND SOLUTIONS

These scientific innovations, new technologies, strategies and tools promise to make preventing, diagnosing, treating and eliminating malaria more effective and efficient.

**Innovation will be essential for the achievement of the 2030 malaria goals. New malaria tools and products, including vaccine development, could substantially influence the future of the global response, benefit the world's poorest and most vulnerable populations, and move countries along the path to elimination and eradication.**

In 2008, the launch of the first GMAP was accompanied by a renewed interest in malaria R&D, a significant increase in funding, and unprecedented levels of political support. This spotlight of attention, in combination with recent progress towards elimination, led to a reframing of the malaria research agenda. Although the lack of alternatives to ACTs and pyrethroids are constraints, at the same time there are exciting pipelines for new drugs, vaccines, vector-control strategies and other technological advances. Several new developments in the field of drugs and vaccines are on the verge of entering the market. New vector-control products are on the horizon from 2020. Major innovative efforts are also underway to improve delivery mechanisms, although challenges remain with regards to innovation in community participation. These scientific innovations, new technologies, strategies and tools promise to make preventing, diagnosing, treating and eliminating malaria more effective and efficient. Yet, as the malERA process showed, available interventions, approaches and strategies remain insufficient to eradicate malaria.[223] Intensive R&D must continue as a strategic priority, to ensure that the anticipated innovations are delivered, to make it possible to meet the 2030 malaria goals and eventually achieve global eradication.

## MALARIA ERADICATION RESEARCH AGENDA (malERA)

The malERA process engaged over 250 experts to examine the feasibility of eradication. Released in 2011, the findings provided guidance on the innovations resource platforms, approaches, tools and training required for malaria elimination and eradication; it encompassed basic research, vector control, diagnostics, drugs, vaccines, surveillance, health systems and operational research, and mathematical modelling.[223]

# DEVELOPING NEW TOOLS AND TECHNOLOGIES

The malERA process provided important guidance on the tools and technologies required to reach eradication. Creative new solutions are needed to help in realizing this research agenda. To facilitate this, private sector engagement in product development partnerships (PDPs) for malaria research and innovation needs to continue, researchers require a safe space to take risks, and better ways must be found to engage people from affected communities. It is naive to expect one-size-fits-all solutions in malaria. Innovation is also essential to ensure that new tools and technologies meet the highly heterogeneous contextual needs of communities, so that they will be adopted and valued. To ensure continued innovation, action is needed to:[224]

- develop new active ingredients (chemicals) for use in LLINs and IRS – the threat of insecticide resistance means that the identification of new ingredients is now a top priority;
- create new treatments for malaria to complement or replace ACTs – ideally, new malaria medicines should be single-dose and should aim to treat all types of malaria, prevent relapse, clear gametocytes to stop further transmission, provide post-treatment prophylaxis against all malaria lifecycles and species, and treat all patient groups (e.g. pregnant women and infants); in addition, a drug is needed that will be suitable for mass administration, protect against malaria for up to a month or longer, and be effective against all species of malaria;
- continue to support the development of vaccines that interrupt malaria transmission and are active against *P. vivax* or *P. falciparum* (or both);
- explore cutting-edge diagnostic technologies, especially for the detection of low-level, asymptomatic infections; non-invasive methods that do not require blood being drawn are also desirable;
- leverage new technologies to collect, analyse and disseminate surveillance data, including for use of the data at local level;
- continue to conduct basic research into malaria disease processes, pathogens, vectors and so on; and
- keep a healthy product development pipeline, while continually assessing the efficacy of tools; develop back-up products in all areas of malaria prevention, diagnostics and treatment, and remain abreast of future R&D needs.

## PRODUCT DEVELOPMENT PARTNERSHIPS (PDPs)

Leveraging PDPs remains central to progress. PDPs offer a unique way to combine the expertise and knowledge of the public and private sectors, to find efficient and effective solutions for malaria interventions. The Medicines for Malaria Venture (MMV) is making progress in developing the next generation of antimalarial drugs; the Innovative Vector Control Consortium (IVCC) is bringing forward vector-control innovations with new active ingredients and new paradigms; the Foundation for Innovative New Diagnostics (FIND) works with WHO to develop new diagnostic approaches; and PATH's Malaria Vaccine Initiative (MVI) and the European Vaccines Initiative are supporting the development of malaria vaccines.

## BRINGING PRODUCTS TO MARKET

As new tools become available, WHO and other regulatory bodies must review the effectiveness and appropriate use of those tools, and formulate recommendations based on appropriate evidence. Many countries and donor organizations purchase only products that have been recommended by WHO. Having regulatory and policy processes that are transparent, predictable and thorough is essential for stimulating innovation and bringing new products to market as quickly and efficiently as possible. UNITAID applies innovation to create healthier markets for malaria products, to overcome the challenges of purely consumer driven markets.[225]


## OPTIMIZING OPERATIONS FOR CONTROL AND ELIMINATION

**Operations research is essential for optimizing the modes of delivery and implementation for current and future tools and products.**[223] To optimize operations research, action is needed to:

- prioritize funding and build capacity to address the research priorities of malaria operations;
- ensure that operational research focuses on overcoming bottlenecks and adding knowledge to make delivery of malaria interventions more efficient and effective; and
- develop information-sharing platforms to disseminate research findings across partners, health systems and sectors.

## STRENGTHENING THE CYCLE OF RESEARCH TO POLICY AND PRACTICE

As countries move along the path to elimination, it will become even more critical to minimize the gaps between research, policy and practice. Interdisciplinary dialogue and timely exchange between researchers, policy-makers, service providers, programme implementers and community representatives are needed to coordinate, generate, share and act upon the findings of research. By putting people at the centre of policy and practice, and involving implementers early, people are more likely to be active partners in testing innovations, helping to bring them to scale, and ensuring their sustainability.

ENSURING PROGRESS AND ACCOUNTABILITY

# 9. FACILITATING CHANGE

> Through united action, more and more countries will meet the 2020 and 2025 milestones and 2030 targets, reducing malaria-related morbidity and mortality, or eliminating the disease.

AIM builds a strong case for investment to mobilize collective action and resources for the fight against malaria. By building multisectoral and intercountry partnerships, the broader enabling environment that will facilitate the achievement of the 2030 malaria goals can be created. Such an environment requires policy coherence for malaria across ministries, departments and sectors, and strong health systems that can establish surveillance as a core intervention. By improving the quality, accessibility, layering and use of health, malaria and other data (e.g. socioeconomic and climatic), malaria prevention and treatment services can be targeted, giving value for money and reaching all those in need. With their flexibility and commitment, CSOs, faith-based organizations and emergency response organizations are crucial, complementing government efforts to deliver services in remote areas and fragile situations.

Advocacy and resource mobilization are also crucial for continued malaria research and innovation. Global and local stakeholders in the private sector, and in research and academia, are essential to ensuring a healthy pipeline of future products, and the approval, delivery and adoption of products currently in development. Engaging communities at all stages of the response, and strengthening operations research, will stimulate innovations in implementation and allow the efficient delivery of products.

Through united action, more and more countries will meet the 2020 and 2025 milestones and 2030 targets, reducing malaria-related morbidity and mortality, or eliminating the disease. Monitoring progress across sectors will make it possible to better quantify the returns on investing in malaria across all domains of development, and to strengthen the evidence. This will enable malaria programmes and their partners to make an ever more compelling case for continued investment, and maintain the cycle of progress.

## UNLEASHING THE POTENTIAL OF PARTNERSHIP

The fight against malaria epitomizes the philosophy of the SDGs, with their emphasis on partnership, solidarity and people-centred development. AIM recommends actions to guide progress towards the 2030 malaria goals. Although these actions can be taken by a single country, or by individual partners, we know from experience that no country, sector, stakeholder or group working alone can defeat malaria. Bringing diverse partners together creates advantageous synergies whereby the whole becomes far greater than the sum of the individual partners. Taking an inclusive approach and building successful partnerships within and across constituencies, sectors and countries will be essential for achieving the 2030 malaria goals.

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> “No country, sector, stakeholder or group working alone can defeat malaria. Bringing diverse partners together creates advantageous synergies whereby the whole becomes far greater than the sum of the individual partners.

Partnership is needed to leverage the SDG agenda, elevate the profile of malaria as a wider challenge to poverty reduction and economic development, and ensure it is addressed at all decision-making levels. Partnership is also essential for effective advocacy for both action and resource mobilization, regardless of where a country is, on the path to elimination. The RBM Partnership will develop a resource mobilization strategy that takes account of future potential funders, and facilitates country access to international funds and innovative financing mechanisms. Over the next 15 years, countries that are affected by malaria need to transition to being in a position to sustain and fund their malaria response with a much higher proportion of domestic financing. The RBM Partnership will provide strategic support to build in-country capabilities, and work with countries to mobilize domestic public and private sector financing.

The RBM Partnership will further coordinate and widen intercountry forums, to strengthen engagement of non-traditional players and other sectors, including the private sector and civil society. To keep people at the centre of the response, the RBM Partnership will work to engage communities more effectively, to highlight the need for contextual knowledge and diagnosis, and to involve people in the creation of innovative tools and strategies. It will also work to strengthen SBCC, and to animate and support civil society networks and emergency agencies to deliver malaria services to MMPs and other vulnerable populations, and to those affected by emergencies, while also championing the need for greater disaster preparedness at all levels.

With regards to the supporting elements, the RBM Partnership will work to strengthen regional alignment, make policies across sectors more “malaria smart”, link regional banks with independent agencies that carry out health impact assessments, foster the availability and use of quality data for decision-making, and strengthen integrated health systems. It will encourage stronger intrasectoral collaboration and partnership within the broader health sector (e.g. by focusing attention on the importance of progress in malaria for reducing maternal and child mortality and morbidity), and boost efforts to improve the quality of care, optimize integrated vector control and establish responsive surveillance systems.

Partnership is also needed to ensure resource mobilization for malaria research, continue the successes of product development partnership for innovation, and facilitate collaboration and the sharing of findings from implementation research. Partnership with academia will help to strengthen the evidence on the returns of investing in malaria control and elimination, and the potential costs of resurgence.

The RBM Partnership will continue to play a coordinating function, to facilitate the convening of stakeholders, collaboration and sharing of best practices across countries and regions, and to unleash the potential of each RBM partner, according to their comparative advantage and commitment to the shared 2030 goals and vision of a malaria-free world. Across all these areas, the RBM Partnership will track the progress that is being made, report back to all partners on the status and bring attention to the areas that require greater action and investment.

## ALL PARTNERS HAVE IMPORTANT ROLES TO PLAY IN THE IMPLEMENTATION OF AIM

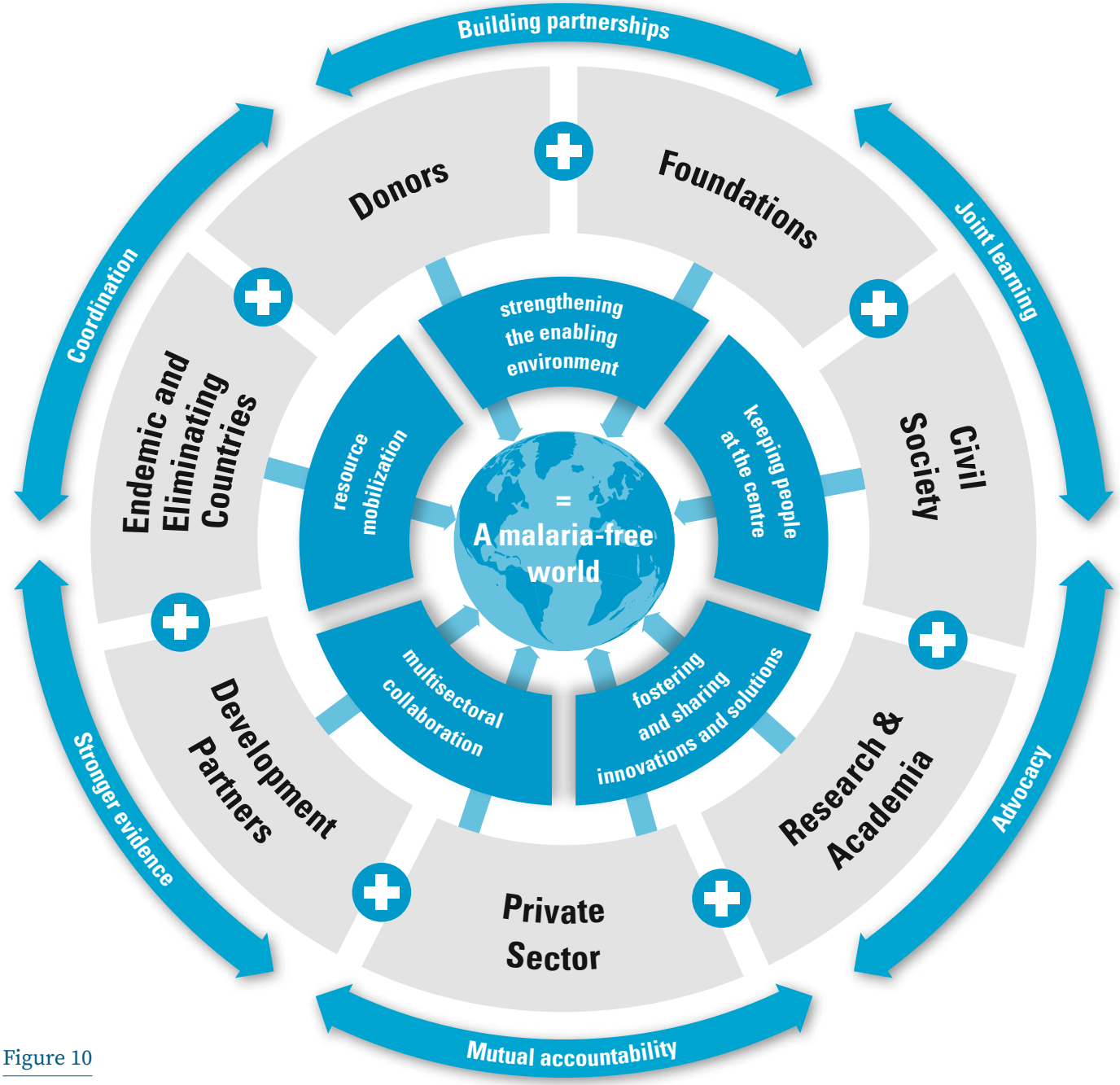


Figure 10

## MONITORING RESULTS

Robust and reliable data are needed for stakeholders at all levels, to track progress towards the 2020 and 2025 milestones and the 2030 malaria targets. Effective indicators will help to guide the malaria community over the course of the next 15 years. The indicators developed for the WHO *Global Technical Strategy for Malaria*, outlined in Table 2, will be reported on in subsequent World Malaria Reports.

To complement these indicators, a monitoring framework has also been developed for AIM. Whereas output, outcomes and impact are well captured by the indicators in the WHO *Global Technical Strategy for Malaria*, the AIM indicators are directed towards processes and inputs. In accordance with the technical nature of the document, the WHO *Global Technical Strategy for Malaria* indicators are effective in determining progress in areas such as testing, commodities and impact on morbidity and mortality. Similarly, the AIM indicators allow evaluation in terms appropriate for the scope of the document, including success in fostering multisectoral engagement for malaria, mobilizing sufficient resources to ensure continued malaria research and innovation, and financing the achievement of the 2030 malaria goals.

> “Robust and reliable data are needed to track progress towards malaria 2020 and 2025 milestones and 2030 targets.

### TABLE 2: MONITORING FRAMEWORK FOR WHO *GLOBAL TECHNICAL STRATEGY FOR MALARIA 2016-2030*

| Outcome indicators |
|---|
| • Proportion of population at risk who slept under an insecticide-treated net the previous night |
| • Proportion of population at risk protected by IRS within the past 12 months |
| • Proportion of pregnant women who received at least three or more doses of intermittent preventive treatment of malaria while attending antenatal care during their previous pregnancy (sub-Saharan Africa only) |
| • Proportion of patients with suspected malaria who receive a parasitological test |
| • Proportion of patients with confirmed malaria who receive first-line antimalarial treatment according to national policy |
| • Proportion of expected health facility reports received at national level |
| • Proportion of malaria cases detected by surveillance systems |
| • Proportion of cases investigated (programmes engaged in elimination) |
| • Proportion of foci investigated (programmes engaged in elimination) |
| **Impact indicators** |
| • Parasite prevalence: proportion of the population with evidence of infection with malaria parasites |
| • Malaria case incidence: number of confirmed malaria cases per 1000 persons per year |
| • Malaria mortality rate: number of malaria deaths per 100 000 persons per year |
| • Number of countries that have newly eliminated malaria since 2015 |
| • Number of countries that were malaria-free in 2015 in which malaria was re-established |

The AIM monitoring framework, presented in Table 3, confines itself to indicators that are credible reflections of the phenomenon to be measured, and for which the information is already available, or can be collected with a manageable level of effort. It has been designed so that the monitoring can be carried out at global, regional, country and local levels, as appropriate.

The AIM monitoring framework is relatively streamlined because other important accountability mechanisms are already in place; for example, the scorecards that have been developed by African Leader's Malaria Alliance and Asia Pacific Leader's Malaria Alliance. The framework will allow the global community to track the extent to which political leaders honour their pledges and support local stakeholders in their efforts to achieve the 2030 malaria goals. Individual partners should also have their own accountability frameworks, ideally compatible with, or adapted to, the AIM monitoring framework.

During 2015, the baseline information for all of these indicators will be gathered. As we move forward, it will be important to monitor the availability of quality-assured data that can be used to generate the indicators.

## TABLE 3: MONITORING FRAMEWORK FOR *ACTION AND INVESTMENT TO DEFEAT MALARIA 2016-2030*

| Indicator | Operational definition | Illustrative data source(s) | Suggested level(s) |
|---|---|---|---|
| High-level commitment to control and elimination of malaria | Existence of a high-level malaria advisory or governing body that includes representation from the non-health and private sectors, as well as civil society | Will require engagement of malaria leadership to review malaria bodies | Regional, national and local levels, where possible |
| Resources committed to malaria control and elimination | Total funding and proportion of annual health funding (per capita) allocated to malaria in affected countries (by source, including national funding, donor and out-of-pocket) | RBM Malaria Funding Data Platform, OECD/DAC, Country data and surveys | Global, regional, national and local levels, where possible |
| Accountability to citizens for progress in malaria control and elimination | Public (web-based) access to geographically disaggregated data regarding malaria incidence or prevalence and intervention (prevention, diagnosis and treatment) | Will require accessing of websites for each affected country | Global, regional, national and local levels, where possible |
| Engagement of the private sector in malaria control and elimination | Number of top-10 registered corporations in the national tax base that invest in malaria (programmatic or financial contribution to malaria prevention and control for the company's workforce or the broader community, or both) | Will require measurement by malaria leadership to interview top-10 corporations regarding these investments | National level |
| Investment in malaria research and innovation | Total funding and proportion of funding for malaria relevant research (including R&D and operations or implementation research) | GFINDER (Policy Cures), MMV, IVCC, MVI, Global Fund, WHO and national research agencies | Global and national levels, where possible |

# APPENDICES

## APPENDIX A: DEVELOPMENT PROCESS

**AIM was developed through a participatory consultative process that directly engaged a multisectoral audience of over 1600 people. Regional consultations, which were held back-to-back with consultations for the WHO *Global Technical Strategy for Malaria* in the Republic of the Congo, India, Panama, Philippines, Morocco and Zimbabwe, followed by 13 country consultations, specifically focused upon the development of this document. These included site visits to consult with the leaders and members of affected communities, first-line service providers and aid workers to learn more about the challenges of providing basic services to vulnerable populations, in remote areas and in humanitarian situations. Many more engaged via social media or took part in the public online review held February to March 2015.**

The work was carried out under the guidance of, and with active support from, a task force that comprised: **David Brandling-Bennett**, Bill & Melinda Gates Foundation; **Bernard Nahlen**, US President's Malaria Initiative; **Alastair Robb**, Department for International Development, UK; **Lisa Goldman-Van Nostrand**, Sumitomo Chemical; **Andre Tchouatieu**, Sanofi; **Rima Shretta**, University of California, San Francisco; **David Schellenberg**, London School of Hygiene and Tropical Medicine; **Noel Chisaka**, The World Bank; **Wichai Satimai**, Ministry of Public Health, Kingdom of Thailand; **Ana Carolina Santelli**, Ministry of Health, Brazil; **Sheila Rodovalho**, Ministry of Health, Brazil; **Dharma Rao**, Ministry of Health and Family Welfare, India; **Corine Karema**, Ministry of Health, Rwanda; **James Whiting**, Malaria No More UK; **Esther Tallah**, Cameroon Coalition Against Malaria; **Pedro Alonso**, WHO; **Erin Shutes**, WHO; **Fatoumata Nafo-Traoré**, RBM.

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Antoine Darlie
Anvikar Anup
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Arbildo Wilder
Arias Vargas Margarita
Arnold Fred
Arrospide Velasco Nancy
Arroz Jorge
Arroz Deborah
Asencios Rivera Jorge Luis
Ashurov U.Kh.
Asiedu Agyei Samuel
Asik Surya Asik
Assefa Meseret
Atherly Deb
Atienza Jolita
Atta Hoda Youssef
Audu Balla Mohamed
Aultman Kathryn
Aung Kaung Khant
Aung Myint Soe
Aung Naing Cho
Aung San
Aung Than
Aung Thant Tin
Aung Win Soe
Awab Ghulam Rahim
Aye Aung
Aye Aye Khaing
Aye Aye Pyone
Aye Aye Than
Aye Aye Thin
Aye Mar Lwin
Aye Soe
Aye Thandar Htu
Aye Thet Oo
Aye Yu Soe
Aye Yupar
Ayubova Sumangul
Ba Mady
Ba Doudou
Ba Maelle
Babacar Gueye El Hadj
Babuga Abubakar Umar
Badi Moamer
Bagaria Jay
Bah Amadou
Baird Kevin
Balari Jilimai
Balfour-Greenslade Felicia
Balkew Meshesha
Banda James
Banerjee Chandrani
Bankhede Hermant Kumar
Banze Arminda
Baptiste Sheila Evelina
Baquilod Mario
Barbosa Susana
Barela Akela
Barman Santana
Barman K.
Barnati Kaira Kanta
Barrera Tello Martin
Barro Ibrahima
Barruga Elvie
Barruga Lucy
Barruga Richard
Bart-Plange Constance
Bartsch Sarah
Baruah Biren Kumar
Barwa Caroline
Bashaye Seife
Bassat Quique
Basu Suprotik
Basumatary L.
Batché Etien
Batenga Amir
Batista Magalhães Izanelda
Baud Francis
Bautista Antonio
Bautista Kim
Bayabil Estifanos
Bayaki Cyriaque Seroy
Baza Dismas
Be'eli Lohia Marlene
Becerra-Riveroll Ana
Beck Albert
Becker Norbert
Bedada Dinsa
Be'eu Lohia Marlene
Begum Shahnaz
Beichumila Saula
Beknazarov M.B.
Belayneh Bayeu
Belemvire Allison
Bell David
Bellamy Knox Tessa
Bello Souleymane
Benié Henri
Benmamoun Abderrahman
Beredin Seifedin
Bernhards Ragama Ogutu
Bertram Kathryn
Bery Emma
Besnier Maxime
Bezerra Haroldo
Bhashyam Sumitra
Bhatnagar P.C.
Bhatt Samir
Bhattacharya Gita Rani
Bilak Hana
Billingsley Christie
Biluta
Bimenyimana Ignace
Binkro Dayogo
Bioncio Fely
Biru Shargie Estifanos
Bisigoro Verediana
Bisimwa Nsibula Zahinda Jean Paul
Blé Hervé
Blumenfeld Josh
Bobieva M.Kh.
Bobogare Albino
Boboko Michaelyn
Bobomurodova Zebo
Bobonazarov Z.
Bocado Analie
Bokota Alain
Bola Tangeli
Bolaños Julie
Bole Sirro
Bonfoh Bassirou
Boni Kouassi Auguste
Boniface Kinvi E
Bope Bienvenu
Bora Ananta
Bordoloi Jeban
Borowitz Michael
Borua Tarkeswar
Bosselmann Rune
Bouah Nathalie
Bouchez Jean-Marc
Boulton Ian
Bourgeot Ann
Boutsika Konstantina
Boyer Sebastien
Bradley David
Braimah Faustina
Braimah Stephen A.
Brhane Yemane
Brieger William
Briet Olivier
Brooke Basil
Brown Graham
Brown Nicholas
Broyo Bolou
Bualombai Pongwit
Buasen Carlos
Bubelwa Ephraim
Buj Valentina
Bukaka Mayakasa
Burgess Peter
Burkhanova Mavzuna
Burkot Thomas
Butenhoff Andrew
Butt Waqar
Butts Jessica K.
Bwese Joceline
Bygbjerg Ib Christian
Bywater Andy
Cabellos Vanessa
Cáceres Carrera Lorenzo
Cachola Angelica
Cadge Nicola
Calderon Jr. Jaime F.
Camara Matar
Cameron Alexandra
Candanedo Yessica
Candari Christine Joy
Candrinho Baltazar
Carbajal Elizabeth
Cardenas Gomez Tanja
Carey Angeles Cristian Armando
Carr Richard Michael
Carter Keith
Casamitjana Nuria
Casanova Wilma
Castañeda Q.F. Judy
Castro Marcia
Catteruccia Flaminia
Cayche Walter
Cazetien René
Cepeda Ildefonso
Céron Nicolás
Certeza Hermogenes
Céspedes Sonia Loarte
Chaccour Carlos
Chaki Prosper
Chan Aye Aung
Chan Mya Shwe Chu

Chancellor Arna
Chandler Clare
Chandrani
Chang Moh Seng
Chang Caroline
Chang Jaime
Chanthavisouk Chitsavang
Chapman Ronald
Charimari Lincoln
Charles Sherwin
Charles Michael
Chavez Rosa Elena
Chawla Umesh
Chen Jun-Hu
Chibsa Sheleme
Chicote Hudson
Chihale Albertina
Childers Clayton
Chimusoro Anderson
Chiribagula-Kamala J.M.
Chitnis Nakul
Chna Il Jong
Cho Myat Nwe
Chol Kwang
Chowdhury Jayeeta
Chrakowiecka Agnieszka
Christiansen Martin
Christophel Eva Maria
Chuchon Daniel
Chundusu Christiana
Chuor Char Meng
Churcher Tom
Chyrmang Theiolin
Cibulskis Richard
Cisse Moustapha
Cisse Badara
Cizubu Yvon
Clayton John
Clement Godfrida
Clendenes Alvarado Orlando Martin
Cohen Justin
Cohen Jessica
Colborn James
Coleman Marlize
Colompo Paolo
Come Rubão
Connolly Maire
Constantine Asia
Conteh Lesong
Coosemans Marc
Coppola Annette
Corporal Verginia
Cotrina Armando
Coulibaly Jack
Coulibaly Nibon
Coulibaly Adama
Court Alan
Couson Emmanuel
Cruz Eduardo
Dabo Moustapha
Da Gama Louis
Dahl Gary
Dahouin Edwige
Dai Tran Cong
Dalley Sancia
Damasceno Camila
Damsbo Sorensen Thomas
Dangao Thelma
Dao Daouda
Das Pradip
Da Silva Mariana
Da Silva Joaquim
Dattani Mamta L.
Deane Derrick
De Belen Melendez Mónica
De Calan Mathilde
De Carvalho Eva
Degefie Tedbabe
Degregorio Adelaida
De Jager Christiaan
Delizo HB
Demassa Utpal
Dengela Dereje
Denon Yves Eric D.
DeRonghe Meg
De Savigny Donald
Desbrandes François
De Souza Jose
Desrousseaux Caroline
Dhariwal A.C.
Dhingra Naina
Diabate Abdoulaye
Diatezua Michel
Díaz César
Diedenhofen Andreas
Diene Massamba
Dieng Moustapha
Dieye Yakou
Digal Drea
Digal Sushila
Digal Uttam
Digal Sushanti
Dilnesash Defar
Dimatera Nelliza
Dinh Trung Ho
Diop El hadj
Diouf Mame Birame
Diouf Moussa
Diouf Therese
Dissanayake Gunawardena
Dixon Thomas L.
Djézou Casimir
Djibo Yacine
Dlamini Bongani
Dlamini Sabelo
Dodoli Wilfre
Dolenz Charlotte
Donaires Toscano Luis Fernando
Donayre Purilla Pedro
Doyle Sarah
Drexter Anna
Druce Nel
D'Souza Frederick
Du Mortier Stéphane
Duigan Patrick
Dumesty Sjafri Refni
Duna Isabell
Durand Salomon
Durrani Mohammad Naeem
Ebol Antonietta
Eckert Erin
Edlund Martin
Ehtesham Fareeda
Ei Ei Han
Ei Mon Soe
El Bakry Azza
El Idrissi Abderrahmane Laamrani
Elbegiev I.
Ellyin Lise
Elnour Fahad Awa Ali
Elongo Tarcisse
Epse K J Kouon
Erandio Catherine
Erick Beatrice
Erskine Marcy
Escalada Rainier P.
Escalante Eireen
Escobar José Pablo
Escobedo Paredes Jorge
Espino Esperanza (Effie)
Essou hot Etoumou
Etang Josiane
Ethelston Sally
Etmma Etien René
Evans David
Exconde Lucida
Ezeigwe Nnenna
Ezigbo Chidi
Factor Anabelle
Fain Laurel
Fall Ibrahima-Soce
Fan Victoria
Farinas Nieva
Farnum Alexandra
Fatoeva Chinigul
Fatoeva Nazira
Fatu Ayembe
Faye Ousmane
Faye Emile
Fayzulloeva N.
Feachem Richard
Ferazzi Silvia
Ferreira Marcelo
Ferreira John-Heyns
Fiagbey Emmanuel
Fiedler Heidi
Figueroa Ruben
Filler Scott
Flanders Dean
Flinn Roderick
Flores Ching Marlene
Florey Lia
Fokou Gilbert
Fornadel Christen
Fotheringham Megan
Fouque Florence
Fournier-Wendes Sanne
France Tim
Francis Kasolo
Frank Otete
Freeman Tim
Frempong Owusu Henry
Frimpong James
Fukuda Kanako
Gabong Rebecca
Gadde Renuka
Gadiaga Libasse
Gafurov S.
Galan Oscar
Galatas Beatriz
Galili Amir
Galloway Rae
Gamboa Dionicia
Game Christopher
Gangmei Stephen
Gangte Rody
Garama Andrew
Garcia Roberto
García Lourdes
Garmendia Iñigo
Gassama Cheikh Sidiya
Gateyineza Yvettee
Gaudart Jean
Gausi Khoti
Gaye Oumar
Gbahou Bombet
Gebre Yitades
Gebrehiwot Teklehaymanot
Gelua John
George Kristen
Geraghty Annie
Gereson Volly
Gericke Anton
Getachew Asefaw
Ghani Azra
Gheen Carrie M.
Ghosh Sunetra
Gimnig John
Girma Samuel
Gittelman David
Giusti Hundskopf María Paulina Esther
Glaister Leslie
Go Esther
Gobou Vincent de Paul
Goibov S.
Gomane Góquio
Gomaya Maria
Gomes Sambo Luis
Gonzales Glenda
Gonzalez Iveth
Gonzalez Seminario Rommell Veintimilla
Gonzalvez Guillermo
Gopinath Deyer
Goraleski Karen
Gordon Andy
Goswami Purnima
Greer George
Grever Annika
Grieco John
Groepe Mary Anne
Guardo Monica
Guerra Cremilde
Gueye Mame Omar
Gueye Babacar
Guintran Jean Olivier
Gupta Chitra
Gupta Indrani
Gutierrez Sanchez Norma
Gwinji Gerald
Gyapong Margaret
Habi Gado
Habimana Jean Pierre
Hadi Melinda
Hadiza Djermakoye Jackou
Haile Mebrhatom
Hainsworth Mike
Haji Khamis Ameir
Haknazarova M.
Haknazarova Manzura
Haknazarova Havasmo
Hamid Mohd Hafizi Abdul
Hamm-Rush Sarah
Hamon Nick
Hanif Issaka
Hansda Patrick
Hanson Kara
Harding Patrick
Hare Lisa
Harrison Griffith
Hasantha MB Rasika
Hassan Abdikarim Hussein

Hassan Hamisu
Hastings Ian
Hasubi Charles
Hegar Antonio
Helm Chris
Hemingway Charlotte
Hemingway Janet
Henderson Mary
Hengda A.
Hering Heiko
Hernandez Filiberto
Herrera Socrates
Hesse Gerhard
Hetzel Manuel W.
Hewitt Barbara
Hidalgo Macedo David
Hill Jenny
Hill-Mlati Julia
Himeidan Yousif
Hinder Rachel
Hiscox Alexandra
Hla Yin Kyawt
Hnin Hnin Wint
Hnin Su Su Khin
Hnin Yee Mon Kyaw
Hoang-Vu Eozenou Patrick
Hoffman Eric
Hoibak Sara
Holder Melanie
Hopkins Heidi
Hoppé Mark
Horumpende Pius
Hosseini Mehran
Hoyer Stefan
Hsu Hsu Phyo
Hsu Myat Nandar Aung
Htay Maung
Htet Wai Lin
Htike
Htike Htike Htet
Htin Kyaw Thu
Htun Htun Myint
Htun May San
Huamán Baltazar Domitila
Hugo Cecilia
Hulme Alex
Humphrey Wannzira
Hunter Gabrielle
Hussain Alhilal Samir
Hussain Hi Lal
Hussen Musa Ali
Hutton Ross
Ibana Célestin
Ibragimova Hanita
Ibronova Guliston
Igwemezie Linus N.
Ihove Copeland
Ilungu Naomi
Intarti Yetty
Invest John
Isabirye Frederick
Ishengoma Lawrence
Ishengoma Philbert
Ishiwatari Takao
Isimel Hamilton
Isla Halder
Islam Riyadul
Isoeva Zaragul
Ivanovich Elizabeth
Jacob Regina
Jafarov N.
Jalilova Marziya
Jamet Helen
Jany William
Jatamo Duleisána
Jayanetti S. Ravindra
Jenarun Jelip
Jesus Sanchez Maria
Jiménez Gutiérrez Lilliana
Jobic Sylvestre
Jobin William
John Lucy
John Maurice
Johnston Riven
Jones James
Jones Caroline
Joseph Sherry
Joshi P.L.
Julane Sergio
Julilova Marzya
Julo Réminiac Jean-Emmanuel
Jumaeva Badakhshon
Jumakhon Odinaev
Jyoti Gogoi Partha
Kabale-Omari Therese
Kabanda David
Kabavas Emma
Kabeya-Mukendi Faustin
Kabir Mohammad Moktadir
Kacou Ekon
Kafore Olivier
Kajubi Robert
Kakar Qutbuddin
Kakati Mahendra
Kalemwa Mitembo Didier
Kalita Pranab
Kalita Chandra
Kalonji Albert
Kalthom Shamsudin Ummi
Kalu Akpaka
Kamagaté Elhadji Diéoua Ali
Kambi Conrad
Kamlan Kadjo Jonas
Kamuliwo Mulakwa
Kanyinda Tshiende E.
Kapologwe Ntuli
Karapetyan Gagik
Karim Mohammad Jahirul
Karimov S. Saiffudin
Karimov M.
Kaseya Hyacinthe
Kaslow David
Kassabara Adjaratou
Kassi Ambroise Tanoh
Kasubi Athanas
Kaszubska Wiweka
Katamba HS
Katamba Vincent
Katureebe Charles
Kaung Htut Zaw
Kaung Thain Kha
Kaur Jasmit
Kay Thi Kyaw
Kay Zin Soe
Kazadi Walter M.
Kazungu Salome
Kebede Asnakew
Kengia James T.
Khaing Thuzar Tun
Khaing Yu Wai
Khaing Zar Mon
Khalakdina Asheena
Khary Khary
Khat Khat Nwe
Khatib Bakari Omar
Khayae Htun
Khin Aye Khaing
Khin Maung Wynn
Khin Mg Zin
Khin Mon Mon
Khin Nan Lon
Khin Pa Pa Naing
Khin Phyu Pyar
Khin Than Win
Khin Zaw
Khine Haymar Myint
Khine Khine Tun
Khudoieva Hikoyat
Kiala Hertier
Kibati Agnes
Kiefer Sabine
Kilabuko Genoveva
Kilawe Francis
Kilian Albert
Killeen Gerard
Kimaro Daniel
Kimati Bilham
Kin Kyi
Kinagala Astrid
King Marilou
Kinyanjui Wainaina David
Kipapa Tatwiri
Kirkwood Geoffrey
Kissa John
Kiszewski Anthony
Kitchakarn Suravadee
Kivuyo Mbarwa
Kleinschmidt Immo
Knoblauch Astrid
Knols Bart
Kobylinski Kevin
Koenker Hannah
Koffi Sylvain
Koffi Paul Agenor
Kohi Victor
Kokoua Yapi Jacob
Kolaczinski Jan
Kolam Joel
Komatsu Ryuichi
Konate Salimata
Kone Demba
Kone Inza
Koniel Dainah
Konte Kalidou
Korenromp Eline
Kouadio Casmir
Kouadio Ahou C.
Kouadio bla M'bra
Kouakou Boris
Kouakou Nouaman
Kouamé Tanoh Antoine
Kouamé Koffi Ablé
Kouamé née Sessie
Kouassi N'guessan V.
Kpékplé K Abou
Kramer Karen
Kramer Randall
Krongthong Thimasarn
Kubeka Vusi
Kulwa Sothenes
Kulwijila Ndaro
Kumar Avdhesh
Kungirotov D.
Kununginina
Kutepa Rosemary
Kweka Elinangaya
Kweka Happiness
Kwilasa Martine L.
Kyambadde Paul
Kyan Yint
Kyaw Aung
Kyaw Kyaw
Kyaw Min
Kyaw Myint
Kyaw Zan Lin
Kyaw Zay Ya
Kyi Kyi Ohn
Kyi Minn
Kyi Pyar Nwe
Laaziri Mohamed
Lacerda Marcus
Lama Marcel
Lani Saidi
Larin Angelica
Larme Nicholas
Larsen Torben Holm
Larson Erika
Lath Elysée
Lauer Jeremy
Lauffer Leander
Lauzer Glory
Lavuvur Terral
Lawrence-Williams Patrice
Le Menach Arneaud
Leandro Patricia
Leang Rithea
Lee Bruce
Lehman Leopold Gustave
Lehmann Amy
Lemma Hailemariam
Lemma Seblewongel
Lemoine Jean Frantz
Lendo Dede
Lengeler Christian
Leon Luis Miguel
Leonce Leontine
Leornard Method
Leresche Enrica
Lesaso Boitumelo
Lescano Andrés (Willy)
Levin Ann
Levine Mike
Lewicky Nan
Ley Serej D.
Leyva Wilfredo
Li Chenbiao
Lico Joy Ann
Lindsay Steve W.
Lines Jo
Lipsey John
Llach Mireia
Llanos Cuentas Alejandro
Lluberas Manuel
Loarte Céspedes Sonia
Lokko Kojo
Longoso Ngboso Charles
Loomis Molly
López Ampié Rolando
Lopez Pacaya Rosario del Jesus
Lorenz Lena
Lorenz Nicolaus
Losimba Likwela Joris
Loumpangong Alice
Lounes Stefano

Lu Lu Kyaw Tin Oo
Luana Minion
Luana Sakora
Lucard Andrea
Lucas John
Lucas Bradford
Luhanga Misheck
Lunwa Vitaline
Lusana Susana
Luzolo Sandra
Lwin Sandii
Lynch Michael
Lynch Matthew
Maalsen Anna
Macameni Idrissa
MacArthur John
Macdonald Michael
Madan
Madata Joseph
Madinga Kakonda
Magauzi Regis
Magramo Epifania
Magumun Joselito
Mahalingam Vimal
Maharaj Rajendra
Mahendeka Anna
Mahjour Jaouad
Mahmud Khan Jahangir Akber
Maire Mark
Majambere Silas
Majani Florence
Makadzaire Kevin
Makatukatu-Bat Achille
Makhmadsharifov S.
Makhmudova Adolat
Makiese Olivier
Makita Leo
Makomwa Kudzai
Makongwe Beatrice
Makwenge Victor
Malapara Emilia
Maldonado Joel Nain
Malick Nicole
Malingo George
Malla Jonathan
Malm Keziah
Maloms Josepa
Malonga Gladys
Malori Elizabeth
Mandarip Ronnie N.
Mande Manix
Mandike Renatha
Mangiaterra Viviana
Maniga Wohi Aimé
Mansoor Faisal
Manteaw-Kutin Juliet
Manub Gordon
Manuel Cherry
Manzi Gervais
Mapunda Maximillian
Maqsudova Soadat
Marasini B.R.
Marau Hedwig
Marcelo Irma Rose
Marchesini Paola
Marco Amon
Marnelle Maza
Masaninga Freddy
Masanja Honorati
Mashako Patie
Mashalla Samson
Masiko David
Massey Troy
Mate Guidion
Mathenge Evan M.
Matiko Umbura
Matinde Jonathon
Matsolo Dinis
Maung Aye
Maung Maung Hla
Maung Maung Lwin
Mavlonova Latofat
Mavula Ange
May Aung Lin
Mayala Alphonsine
Mayeto Wamoyo
Mayowa Salu
Mazigi Veronica
Mbagnick Diop Yerim
Mbaha Patrick
Mbeboura Anicet
Mbengi Masiaza
Mberikunashe Joseph
Mbewe Daniso
Mbogo Charles
Mbuaki Micheline
Mbulumi David
Mbuyi Adèle
McCartney-Melstad Anna
McCully Tim
McGill Alan
Mcha Juma Hassan
McLean Thomas
McLean Kate
McSmith Deborah
Meek Sylvia
Mehari Goitom
Mejia Carmen
Mellor Steven
Mellor Louise
Mendes Helder
Mendis Chandana
Mengiboeva Z.
Mengliboeva Zulfira
Meredith Stephanie
Mesones Lapouble Oscar
Meyer Annemarie
Meyer Noleen
Meza Arteaga Olivia Edith
Mg Mg Lwin
Mgonja Adbulrahman
Miguel Carlos
Miguel Editha
Mihrete Abere
Miller Anna
Milliner John
Mills Anne
Min Min Thein
Mingat Cedric
Minja Beatrice
Mirov Dodarbek
Mirzoaliev Yunus
Mirzoev A.S.
Mirzoev M.
Mirzoeva Shamiston
Mishra Deepti
Mistry Nerges
Mkwizu Zukrah
Mnzava Abraham
Moakofhi Kentse
Mohamed Abdirahman
Molnar Attila
Molteni Fabrizio
Mombunza César
Mon Mon Khin
Mondy Mathias
Mongkalangoon Piti
Monroe April
Monserate Juancho
Monteil Rose
Montiel Humberto
Montoya Romeo Humberto
Monyo Godfrey
Monzón Llamas Laura
Moonasar Devanand Patrick
Moore Sarah
Morel Carlos
Mori Kunizo
Moses Joselyn
Mosweunyane Tjantilili
Mota Stéphanie
Motlaleng Mpho
Motus Nenette
Mouhamadou Chouaïbou
Mouzin Eric Louis
Moyen Jean Méthode
Moza Seleman
Mozambite Irene
Mpalanyi Andrew
Mpelasoka Oswald
Mpona Agathe
Mshandete David
Mtindi Eva
Mtunge Romanus
Muanze Roldan
Mubiru Wilson
Mubua Ali
Mubuto Joseph
Muchoki Theresia
Mudambo Kaka Stanley
Muderekeza Blaise
Mudin Rose Nani
Mudingayi Albert
Muhondwa Thomas
Mujinga Ngonga
Mujuaio Olude
Mukaza Bitoumba
Mukeni Norbert
Mukhtar Muhammad
Mukoko-Mbamu Thierry
Mukuabanga Kano
Mukwaba Mulondo Kenneth
Mukyala Edith
Mulele Jean
Mulele Tassin
Mulele-Ngalia S.
Muller Gunter
Müller Ivo
Müller Pie
Mulligan Jo
Mulombo Walter Kazadi
Muluken Dereje
Mulumba Paola
Mulyani Pranti
Mulyazawo Matthias Kasule
Mumbengegwi Davies
Muminov R.
Muminshoev M.
Mungamu François
Munodawafa David
Muntenge Georges
Murhandarwati Elsa Herdiana
Murillo Olga
Muro Cortez Manuel Francisco
Murugasampillay Shiva
Mussa Mussa Haji
Musset Lise
Mustafa Kamal Salih
Muwawa Valentine
Muyumbu Wibroad
Mvuanda Nkuba
Mwambi Kamulete Célestin
Mwanga Amumpaire Juliet
Mwangi Edward
Mwanza Mercy
Mwenesi Halima
Mya Mya
Mya Sapal Ngon
Myaing Nyunt
Myat Phone Kyaw
Myint San
Myo Myint Naing
Myo Naing
Myo Swe Oo
Myo Thiri Lwin
Myo Win Tin
Myo Zin Oo
Nabakoza Jane
Nabwire Ruth
Nachbar Nancy
Nag Shampa
Nagpal B.N.
Nagwansi Jyoti
Nahusenay Honelgn
Nahzat Muhammad Sami
Nakamura Masatoshi
Naket Esau
Nambozi Josephine
Namgay Rinzin
Namuwenge Proscovia
Nan Kyu Kham
Nanda Mehak
Nandi Suchandra
Nant Khin Thuzar Than
Nantamu Dyogo
Navarro Greg
Nay Lin Yin Maung
Nay Myo Zaw
Nay Nyi Nyi Lwin
Nazarkhudoeva D.
Nda Evody
Ndangi Ntoya
N'depo Rose
N'depo Cerah
Ndiaye Fara
Ndiaye Abib
Negussu Nebiyu
Nentunze Agnes
Ngabudi-Banse Robi
Ngaila Bernard
Ngarta Samuel
Nghipumbwa Hendrina
Ngmlunde Singwanda
Ngoko Alain
N'golba Fatoumata
Ngom Algaye
N'goran Komenan
N'goran Bah Denis D.
Ngou Olivia
N'guesson Kadjo
Ngufor Corine
Nhanthumbo Elsa
Nickels Emily

Nidoev S.
Ningsih Ria
Nino Jeunessa
Niramitsantipong Apinya
Nishimoto-San Ray
N'jai Dinah
Njesada Ndolembai
Nkanga François
Nkoy Matthieu
Nkuni Jose
Nlandu Clémentine
Noor Abdisalan Mohamed
Noriega Oscar
Norris Laura
Nozaki Tomoyoshi
Nsimundele
Ntakarutimana Sabine
Ntambwe Michel
Ntembo Jules
Ntomola Sophia
Ntshalintshali Nyasatu
Ntuku Henry
Nu Nu Aye
Nunjar Castillo Juan
Nupur Roy
Nusayrieva R.
Nuwa Arthur
Nyalusi Winfrida
Nyambare Fredrick O.
Nyan Sint
Nyanor-Fosu Felix
Nyi Nyi Zaw
Nyi Zaw
Nyombo Samuel
Nyoni Waziri
Nzimenya Hermenegilde
Obaldia Nicanor
Ochalek Jessica
Odinaeva M.S.
Oginyemi Foluke
Ogosuku Asato María Elena
Ohnmar
Oke Mariam
Okello David
Okui Peter Albert
Okumu Fredros
Ole-Moi Yoi Kileken
Olguín Bernal Hector
Olimova Shamsiya
Oliva Jessica
Olobia Leonido
Olumese Peter
Olymova Shamsyv
Ongom Robert
Onkara Miriam
Onwujekwe Obinna Emmanuel
Onyimbo Kerama
Opollo Marc Sam
Orford Ricki
Ortega Leonard
Ortiz Monica
Ortíz Eduardo
Oschalek Jessica
Osinga Anne
Ostos Jara Bernardo Elvis
Otten Mac
Ozorio Monica
Padaiuree Yasum
Padilla Norma
Paintain Lucy
Paisparea Florence
Palacios Agurto Orlando
Palafox Benjamin
Palata Lemba Olivier
Palmer Kevin
Palomino Huamani Amelia
Panda Pratyush
Panda Pradeep
Paniu Steven
Pantaleon Mary Ann
Paoner Melanie
Pascual Romeo
Pasipamire Jasper
Pasqualle Harriet
Patel Bhavna
Pathak Garima
Pati Geetanjali
Patouillard Edith
Paw Tun Kyaw
Peat Jason
Pelami Pelas
Pender Jon
Peneri Elsie
Pennetier Cédric
Peralta Novi
Perez Evelyn
Pérez Luis Miguel
Perret-Gentil Monique
Persoons Frederick
Peter Rosemary
Phanzu Fernandine
Phanzu Babaka
Phetsouvanh Rattanaxay
Phone Si Hein
Phumaphi Joy
Phyu Phyu Khin
Pidik Clare
Piñon Alberto
Pinto Liliana
Polmonis Marcila
Polmonis Cleofe
Pondze Maria
Ponono Rolando
Porau Willie
Porcioncula Cristita G.
Portocarrero Leonardo
Pothapregada Sai
Pothin Emilie
Pozo Edward
Pradhan M.M.
Pradhan Shreya
Prakash Inder
Prasad Jagdish
Premaratne Risintha
Priale Pinillos Carlos Justino
Prosper Chen Francia
Prytherch Helen
Pulford Justin
Pun Martin
Pungu Mamie
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Quiroz Herrera Aida Esther
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Rabinovich Regina
Racloz Vanessa
Raeisi Ahmad
Rahimi Bilal Ahmad
Rahimjonov Ismoil
Rahman Reyaud
Rahmatova Mehriniso
Rakhmonov T.M.
Ramanathan Natarajan
Ramarosandratana B. Fanomezana
Ramirez Montoya Estela
Ramos Aguilar Luis Carlos
Ranaivoarison Hanitra Irène
Ranjbar Mansour
Ranson Hilary
Rashid Abdur Md
Rashidov M.A.
Rathor Hamayun Rashid
Razokova Kumri
Rebaza Iparraguirre Henry
Reddy Mike
Redhead Bustamante Guillermo F.
Reeder John
Reithinger Richard
Renshaw Melanie
Richardson Jason
Ricopa Eugenia
Ricotta Emily
Rietveld Hans
Rinzi Nanmay
Rivera Pilarita
Roberts Kate
Robertson Molly
Roca-Feltrer Arantxa
Rockwood Jessica
Rodriguez Muñoz Edith Magaly
Roeder Carbo Estela Aurora
Rolfe Benjamin
Roman Elaine
Romão Arlindo
Romero La Puerte Edgar Martin
Rooney Luke
Rosa Delia
Rose Andreas
Rossi Lois
Rowland Mark
Roy Narpur
Rubahika Denis
Ruebush Trenton
Ruez Edith
Ruiz Francis
Rundi Christina
Rupandisha Mathias
Rusibamayila Neema
Rustamov A.Kh.
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Rutaihwa Mastidia
Rutaizibwa Joseph
Rutayisire Emmanuel
Ruzika Eliah
Rwagacondo Claude Emile
Rwamulaza Leontine Leonce
Ryong Ro Song
Saavedra Rodríguez Elízabeth Karon
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Saduloeva Mohsafar
Safi Naimullah
Safiattou Yusouf
Sai Kyaw Han
Sai Naing Lin
Sai Nan Ngin
Saidaliev Jumakhon
Saidov Ch.
Saifodine Abuchahama
Saikia Dhruba Jyoti
Sakala Cecilia Katebe
Salas Maronsky Hans
Salawika Matata
Saleh Bakhit
Saleheen Sarah
Salgado Rene
Salvatory Gelida
Samiappan Anand
Samwel Njonanje
San San Kyi
Sanga Antony
Sankore Rotimi
Sanou Issa
Santos Wilma
Saparova Nargiza
Sarma Dilip
Sarman Tridib
Sarr Cheikh
Sattorova Sh.D.
Saute Francisco
Saw Hsar Khae Lav
Saw Lwin
Saw Naing
Sawe Philip N.
Sayburhonov Dilshod
Sayburkhonov D.S.
Sayvaliev N.
Schapira Allan
Schirra Benjamin
Sebit Bakhit
Seck Lam Toro
Seehofer Liesel
Segbaya Sylvester
Segura Luis
Sehmi Harki
Selby Richmond Ato
Sene Mbaye
Serbova M.
Sey Omar
Seyha Ros
Shah Jui
Shahrinisso R.
Shahripova Malumvi
Shahripova Mutabar
Shalita Muna
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Sheikh Omar Abdiqani
Shiff Clive
Shomudinov B.
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Shoo Salim
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Silué Issouf
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Singh Sumitra
Singh Thakur Mahendra
Singhasivanon Pratap
Sintasath David
Siqueira André
Sithu Kyaw
Sithu Ye Naung
Sitt Aung
Skovmand Ole
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Sloss Robert
Slutsker Larry
Small Graham
Smith Edward
Smith Prudence
Smith Catherine
Smith Stephen
Smthuis Frank
Sobai Mary
Soe Aung
Soe Naing
Soi Caroline
Sokhna Cheikh
Solomon Hiwot
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Songo Masejo
Sonoria Feliza
Soraluz Carlos
Soro Awa
Soto Bravo Aída Mercedes
Soussan Philippe
Sovannaroth Siv
Sow Sall Djariatou
Spiers Angus
Srivastava Vineet K.
Stansfield Sally
Starace Kevin
Stennies Gale
Stephens Mariana
Sterk Erika
Stevens Rebecca
Strickman Daniel
Stutz Susanne
Su Mon Kyaw
Su Su Khaing
Sullivan Alison
Sumaway Bayani
Surya Asik
Sutcliffe James
Suter Tobias
Sutton Andrew
Swai Johnson
Sway-Tin Isabella
Swe San Oo
Szilagyi Zsofia
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Tafesse Hiwot Solomon
Tafirenyika Alexio
Takano Minoru
Takken Willem
Talbakov H.
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Tamboura Fatoumata
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Tangwena Andrew
Tanko Alia
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Tanoh Marie Louise
Tanon Mangoh
Tao Hu
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Tarlton Dudley
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Tchetche Amenan ch
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Teka Hiwot
Tekalegn Agonafer
Temu Emmanuel
Tennekoon Edgar Rohanm
Terang Bulu
Teseno Emawayish
Tesfaye Gezahegn
Tesfaye Brook
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Tetteh Gifty
Teuscher Thomas
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Thaung Hlaing
Thein Zaw
Theingi Myint
Theint Theint Hlaing
Thi Bich Thuy Nguyen
Thi Thi Win
Thiam Tidiane
Thiha Soe
Thin Zar Theingi
Thomson Madeleine
Thwing Julie
Tieman Diarra
Tilluckdharry Clive
Timoth Jonah
Tin Aung Kyaw
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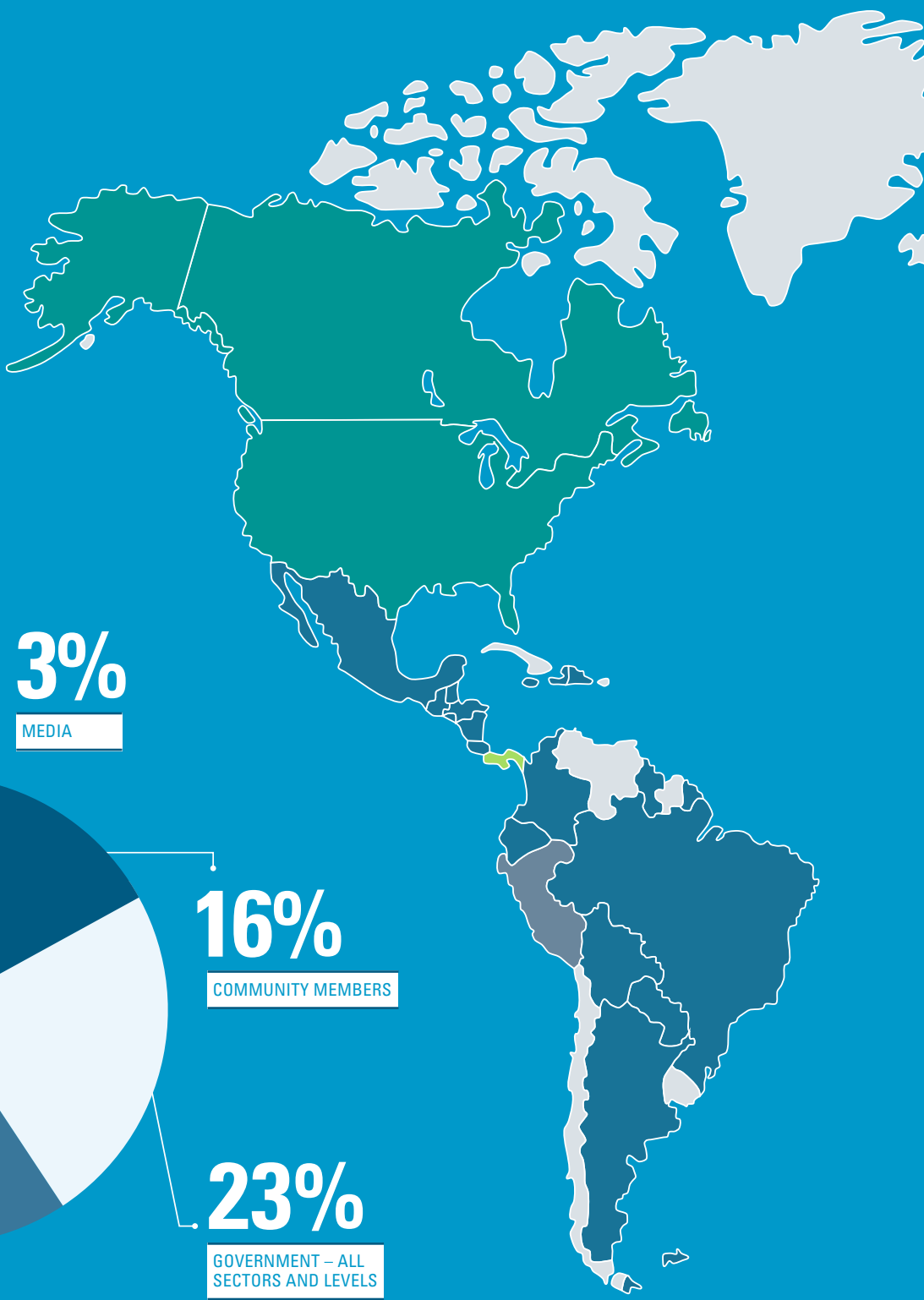
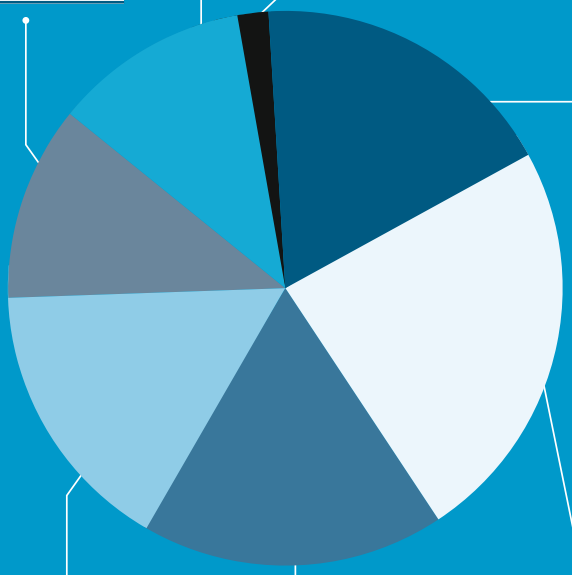
Tin Myint
Tin Naing Soe
Tin Tin Oo
Tin Win
Tiono Alfred
Tobang Paula
Todoc Pas
Tohir Sherkanov
Tokponnon Tatchémè Filémon
Tola Florence
Tolipman Cornillius
Tomekpa Vincent
Toppo Yashvir
Toshmatov P.
Traoré Karim
Travers Max
Tre Sea Fabrice
Trett Anna
Trudeau Marvi
Tukahirwa Anna
Tumbaco Carlos Andres
Tumukurate Espilidon
Tun Zaw Latt
Tungunga Mascom
Turavai Sharon
Turingan Romulo
Tuseo Luciano
Tusiime P.
Tusting Lucy
Urbieta Gorka
Uusiku Petrina
Valdez-Hinvi Flor Lopez
Valecha Neena
Valentine Nicole
Van Brackel Esthel Marie
Van Hulle Suzanne
Vanisaveth Viengxay
Vas Juliana
Velarde Mar
Velayudhan Raman
Ventura Erick
Verhoosel Hervé
Verma Shri Lov
Verma Anil Kumar
Vestergaard Lasse
Vestergaard Mikkel
Victoria Carlos
Vila Córdova Constantino Severo
Villanueva Maria Beatrice
Vink Robertus
Viveros de Franchi Cynthia Z.
Voris Ortikov
Vungho Anaclet
Wade Seynabou
Wade Diop Ndeye
Wadhwan Nipun
Wagner Wolfram
Wai Wai Lwin
Wai Yan Min Htay
Wainaina David Kinyanjui
Walker Patrick
Walyomo Richard
Wamari Musandu Andrew
Wangi James
Wangroongsarb Piyaporn
Wanna Aung
Warren Chris
Warsama Aden
Watunda Blanchard
Weatherby Doreen
Weinmüller Egon
Were Allan
White Chris
White Whitney
White Michael
Whittaker Maxine
Wilastonegoro Nandyan Nurlaksana
Wildfeir-Field Nancy
Wilkinson Thomas
Williams Jacob
Williams Peter
Williams Oliver
Wilner-Heard Autumn
Wilson Anne
Win Thu
Win Win Kyi
Winch Alexander
Winkler Mirko
Wint Lai Han
Wint Lai Phyo
Wint Shwe Yee Win
Wirth Dyanne
Wiskow Christiane
Wogi Aleme
Wong Walter
Wood David
Worku Alemayehu
Worrall Eve
Wut Hmone
Xia Zhi-Gui
Yaba Tiasse
Yadav Rajpal
Yadon Zaida
Yagui Moscoso Martín J.A.
Yameni Chrestien
Yamin
Yan Myo Aung
Yan Naing Oo
Yañez Pajuelo Alfredo
Yao Ablaha Christelle
Yao Yao Gerard
Yapo Edwige Prisca
Yaya Rachel
Ye Yazoume
Ye Htut
Ye Min Oo
Ye Win
Yembe Donat
Yesaya Francis
Yeta Anthony
Yeung Shunmay
Yewhalaw Delnenasaw
Yihdego Yemane
Yin Yin Oo
Yohannes Mekonnen
Yohannes Ambachew
Yohogu Mary
Yoon Steve
Yopla Sosa Silvia Adriana
Yorov K.J.
Youndouka Jean Mermoz
Yu Zin Wint
Yukich Joshua
Yuliana Nurbaeti
Yusuf Fahmi Isse
Zaidenberg Mario
Zaixing Zhang
Zamani Ghasem
Zamora González María Naxalia
Zarzoliana C.
Zaw Linn Htet
Zaw Win Maung
Zaw Win Tun
Zay Htet Aung
Zbinden Evelyn
Zegarra Huapaya Aurora Rubi
Zehaie Assefash
Zhang Shufang
Ziemer Timothy
Zikutala Davin
Zimmerman Drake
Zinzindohoue Pascal
Zoceaire Ahanhan
Zulu Zulisile
Zvantcov A.B.

We sought to keep an accurate list of everyone who assisted the development of AIM, and we apologize if anyone has been missed. The contributions and ideas of all those who participated in the consultative process are greatly appreciated, and every effort was made by the task force and consultant team to incorporate suggestions and address concerns. However, it was not possible to do this in every case, given the need to limit the length and scope of the document. We hope those who do not see their ideas explicitly included in the final version will understand the constraints.

Background Photo: © Swiss Malaria Group/Chaly Descotis

REPRESENTATIVES FROM OVER 90 COUNTRIES PARTICIPATED IN THE DEVELOPMENT OF AIM





12% PRIVATE SECTOR

12% NON-GOVERNMENTAL ORGANIZATIONS

3% MEDIA

16% COMMUNITY MEMBERS

23% GOVERNMENT – ALL SECTORS AND LEVELS

17% DEVELOPMENT PARTNERS AND DONORS

15% RESEARCH AND ACADEMIA

Figure 11

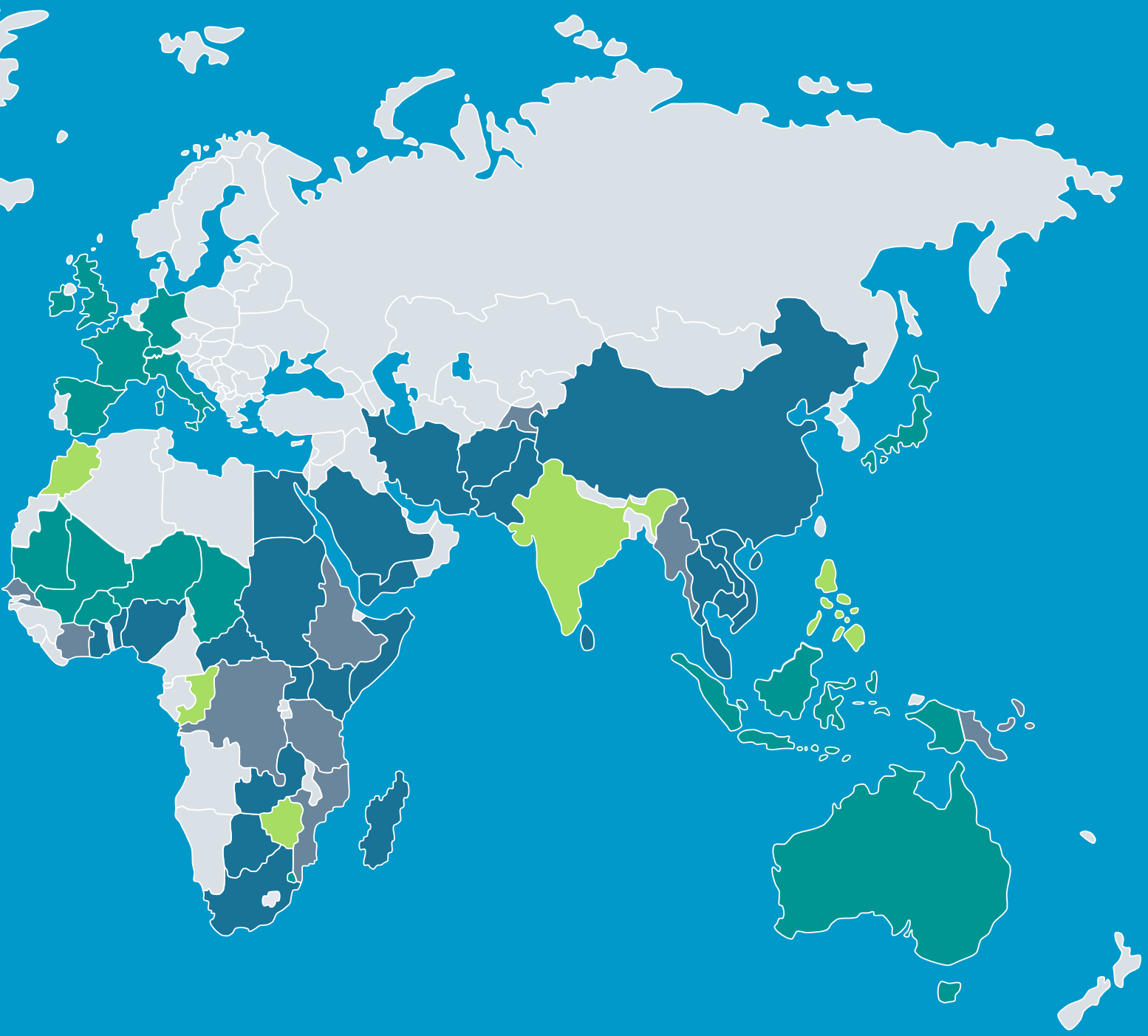

Hosted regional consultation
Participated in regional consultation
Hosted country consultation
Additional consultative event eg. conference.

Figure 12

# APPENDIX B: WAYS IN WHICH FAILURE IN THE FIGHT AGAINST MALARIA WILL IMPEDE PROGRESS TOWARDS THE SUSTAINABLE DEVELOPMENT GOALS

| SDG | Description | Potential negative effects on the SDGs |
|---|---|---|
| 1 | End poverty in all its forms everywhere | Malaria has a negative effect on macroeconomic performance, trapping countries in poverty[47] and significantly impeding the ability of some of the most affected countries to generate sufficient domestic investment to fight the disease. Malaria can account for 40% of health sector budgets, and up to 30% of out-of-pocket health spending in endemic countries, making it a key cause of household poverty. It disproportionally affects the disadvantaged, especially children and pregnant women in the poorest quintile. These are also the people who have least access to quality malaria prevention and treatment services. |
| 2 | End hunger, achieve food security and adequate nutrition, and promote sustainable agriculture | As the world's population increases and greater food production is needed, farming sites will continue to increase. Poorly constructed or maintained irrigation systems and some agricultural practices can increase the risk for malaria transmission, and agricultural pollutants may also favour resistance.[226] Urban farming is increasing rapidly, and is associated with adaptations in vectors' preferred habitats and breeding locations.<br>The groups at highest risk for the adverse effects of malaria – children and pregnant women – are also most affected by poor nutrition. There is consistent evidence that general malnutrition is an important risk factor for greater frequency or more severe malaria.[9,227] |
| 3 | Ensure healthy lives and promote well-being for all at all ages | Malaria is one of the leading causes of childhood death worldwide, and leads to morbidity and mortality across all age groups when it resurges. Malaria is an important cause of anaemia, which particularly compromises the health of children and pregnant women. Malaria makes a substantial contribution to maternal and neonatal deaths in high-transmission settings. Contracting malaria in pregnancy can lead to haemorrhage, spontaneous abortion, neonatal death and low birth weight. In sub-Saharan Africa, 10 000 women die annually as a result of malaria in pregnancy.[10] |
| 4 | Provide inclusive and equitable quality education and lifelong learning opportunities for all | Malaria causes children to miss school. Frequent attacks have a sustained, adverse impact on the school performance of children aged 6-14 years.[228] Children that have malaria repeatedly may also suffer cognitive damage, impairing their ability to learn in the long term. The probability of dying from malaria is inversely related to income and education.[6] |
| 5 | Achieve gender equality and empower all women and girls everywhere | Most caregiving is provided by female household members: mothers, aunts, grandmothers and older female siblings. In high-transmission settings, in addition to time lost by being sick themselves, caregivers invest at least an additional 2 days for every malaria episode in any one of their children.[229] In high-transmission settings where children suffer from malaria frequently and family size is large, this rapidly accumulates to form a significant loss of productive time. |
| 6 | Ensure availability and sustainable management of water and sanitation for all | Failure to pay attention to the unintended consequences of constructing major dams, extractive practices, land drainage and, in some regions, irrigation systems can all increase breeding sites and resting places for vectors and, by extension, malaria transmission.[23] |
| 8 | Promote inclusive and sustainable economic growth, full and productive employment, and decent work for all | Workers in some occupations are more exposed than others, including rice farmers (while they work and sleep), highland migration labourers, forest workers and rubber tappers. Exposure to malaria risk because of working practices (e.g. working through the night) is higher in low-status occupational categories. Low-level workers are far less likely to have access to malaria prevention and treatment services.[230] Adults miss 2-6 days of work per malaria episode, and are often less productive when they return to work during the recovery period, particularly if they are assigned physical tasks. Malaria costs businesses in Africa at least US$ 12 billion in lost productivity every year.[231] |

| | | |
|---|---|---|
| 9 | Build resilient infrastructure, and promote inclusive and sustainable industrialization | Whenever landscapes are artificially adapted, explicit positive efforts are needed to build mosquitoes out. If this effort isn't made then new mosquito breeding sites and resting places may inadvertently be created – resulting in the building in of mosquitoes, with its potential knock-on effect on malaria transmission.[137] In addition, poor prevailing infrastructure can severely impede the delivery of health, malaria and other basic services.[232, 233] |
| 10 | Reduce inequality within and among countries | The malaria burden remains highest in the countries with the lowest human development, within countries in the least developed areas, and within populations among the most disadvantaged groups. These include pregnant women, infants and children, refugees, the displaced, migrants, nomads and people living with HIV/AIDS.[230] Very poor families are hardest hit because the direct and indirect costs of malaria consume such a high proportion of household income.[62] |
| 11 | Make cities and human settlements inclusive, safe, resilient and sustainable | The unintended consequences of development-related landscape changes such as encroaching urbanization and human settlement building can increase malaria transmission. Substandard housing and poor drainage can increase exposure to vectors, including malaria-carrying mosquitoes.[19] Poor security in slums, as elsewhere, poses a serious threat to the provision of life-saving malaria prevention and treatment services.[234] |
| 12 | Ensure sustainable consumption and production patterns | Forest cover and proximity to gold mining operations are important large-scale drivers of disease risk.[235] Increases in deforestation of just 4% can increase malaria incidence by as much as 48%.[236] The logging and extractive industries attract migrant workers to meet labour needs. The mobility of these workers may put them at increased risk of malaria infection, particularly if they lack immunity. |
| 13 | Take urgent action to combat climate change and its impacts | Temperature increases of just 2-3 degrees Celsius will increase the number of people at climatic risk of malaria by around 3-5%, which represents several hundred million people.[237] It is projected that climate change will have increased the population at risk of malaria in Africa by over 80 million by the middle of the next decade. Climate change is likely to result in increased flooding, which not only affects the effectiveness of sanitation systems and leads to contamination of water sources, but also increases mosquito breeding sites and malaria transmission. In China, rising temperatures could set back progress in reducing infectious diseases, including malaria, by as much as 7 years by 2030. |
| 15 | Protect, restore and promote sustainable use of terrestrial ecosystems, and halt and reverse land degradation and biodiversity loss | Unsustainable use of natural resources can result in the risk of malaria being introduced or increased. *P. knowlesi*, a kind of malaria common in monkeys, is increasingly infecting people in Malaysia, and other countries, and is probably due to logging and deforestation into ever deeper forest, resulting in the animals coming into closer contact with humans.[122,238,239] |
| 16 | Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels | Countries in fragile situations – where government is ineffective, governance poor and accountability lacking – are unlikely to reach the 2030 malaria goals, or the other SDGs. Instability impedes malaria control, and the provision of health and malaria services.[240,241] Countries engaged in conflict are highly unlikely to engage in the regional collaboration that is required for the sustained reduction and elimination of malaria. |

# APPENDIX C: BREAKDOWN OF THE MALARIA RESEARCH AND DEVELOPMENT COSTING FIGURE

## BREAKDOWN OF THE ANNUAL MALARIA R&D FUNDING REQUIREMENT BY RESEARCH CATEGORY, 2016-2030 (MILLIONS OF 2014 US DOLLARS)

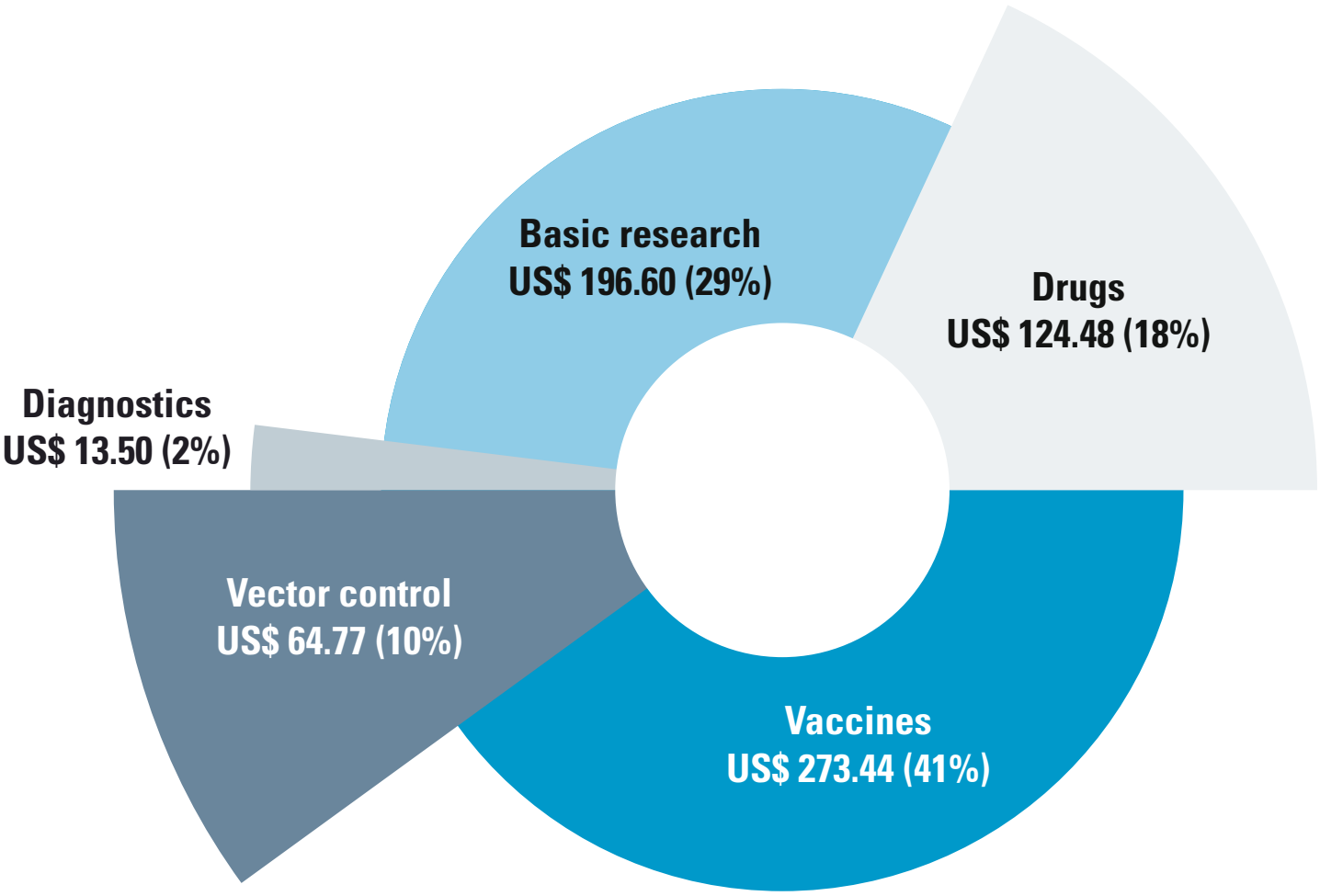



Figure 13

*Source: Policy Cures 2014; work commissioned by the Global Malaria Programme (WHO) for the development of the WHO Global Technical Strategy for Malaria 2016-2030*[27]

# APPENDIX D: METHODOLOGY FOR COST-BENEFIT ANALYSIS

The potential value of investing in malaria control and elimination to reach 90% reduction in cases and deaths by 2030, and elimination in at least 35 countries by 2030, was calculated in terms of direct cost savings to health systems and households, and of wider economic and social benefits. These savings are due to the reduction in malaria incidence (and thus in the morbidity burden), and the wider economic and social benefits are due the increased longevity through a reduction in malaria mortality.

### Scenarios modelled and estimates of malaria cases and deaths

A mathematical modelling of *Plasmodium falciparum* transmission was used to estimate, annually and between 2016 and 2030, the potential number of uncomplicated malaria cases, severe malaria cases and deaths, under four different intervention scenarios: Scenario 1, "sustain" is the counterfactual scenario; Scenario 2, "acceleration 1" and Scenario 3, "acceleration 2" are the enhanced intervention scenarios for malaria reduction and elimination; and Scenario 5, "reverse" depicts a decline in the coverage of interventions.[242]

The number of malaria cases and deaths averted as a result of increasing the coverage of a package of malaria interventions was calculated by subtracting the number of cases and deaths in the "sustain" scenario from the number of cases and deaths in the "acceleration 2" scenario for a given year.

The number of additional malaria cases and deaths rising from the decline in the coverage of interventions was calculated by subtracting the number of cases and deaths in the "reverse" scenario from the number of malaria cases and deaths in the "sustain" scenario for a given year.

### Direct cost savings to health systems and households due to reduced malaria morbidity burden

The potential direct cost savings, from a public-provider perspective, were calculated combining the modelled reduction in country-level malaria incidence with the proportion of patients that would have sought treatment for uncomplicated and severe malaria (collected from the latest available country survey – Demographic and Health Survey, Malaria Indicator Survey or Multiple Indicator Cluster Survey). We also included the potential reduction in household out-of-pocket payments, estimating the proportion of patients who would have sought care in formal health facilities and incurred out-of-pocket costs to access care. The same methodology was applied to assess additional costs to health systems and households due to increased malaria morbidity burden in the "reverse" scenario.

### The economic and social benefits of increased longevity due to malaria mortality reduction

The economic and social benefits of increased longevity due to the reduction in malaria mortality were estimated by adapting the full-income approach proposed by the *Lancet Commission on Investing in Health*.[104] *The Commission* estimated the economic benefits of achieving a "grand convergence" in health over the period 2015-2035, by assessing the value of additional life years gained in monetary terms.

The number of deaths averted (by age group) for a given year was obtained from the modelling. To calculate the number of years of life saved from the number of deaths averted, WHO country-specific life tables were used. The present value of a 1-year increase in life expectancy was calculated by multiplying the income level of a given country (2013 GDP – World Bank) by a World Bank region-specific coefficient provided in the *Lancet Commission on Investing in Health*. The economic and social benefits of increased longevity due to malaria mortality reduction were calculated by multiplying the number of years of life saved by the monetary value of 1-year of life gained. The same methodology was applied to assess the forgone economic value due to increased malaria mortality burden in the "reverse" scenario.

### Cost inputs

Total implementation costs (vector control, chemoprevention, testing, treatment and surveillance) for each scenario were calculated for 97 malaria-endemic countries in 2015, and reported at the global level in the WHO *Global Technical Strategy for Malaria 2016-2030*, and work conducted for the development of that *Strategy* and AIM.[26,27] Unit costs for uncomplicated malaria and severe malaria case management were provided by the Global Malaria Programme (WHO).[27] Unit cost for uncomplicated malaria cases consists of outpatient visit costs and includes consultation, diagnostic tests and drug treatments. Unit cost for hospitalized severe malaria cases consists of inpatient visit costs and includes consultation, diagnostic tests and drug treatments, and hospital bed-day costs. Household out-of-pocket costs incurred on transport to access malaria services were added and collected from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH report *Public transport fares in African cities*.[243] All costs estimates are presented in US$ of 2014.

### Return on investment

The ROI was calculated by dividing the total potential benefits from reduced malaria morbidity and mortality burden by the total implementation costs of scaling up the coverage of malaria interventions.

### Limitations

As the costing of the WHO *Global Technical Strategy for Malaria 2016-2030* was conducted from a public-provider perspective, cost savings and social benefits were captured from a public sector only. The approach did not consider the benefits of eliminating malaria in the 17 countries with either ongoing *P. vivax* malaria transmission and/or unstable *P. falciparum* transmission, or those that are in the pre-elimination, elimination or prevention of re-introduction phases. Costs and benefits were aggregated at country level; however, it should be qualified that costs and benefits could differ substantially according to local contexts.

DIAGRAMMATIC SUMMARY OF THE COST-BENEFIT ANALYSIS METHODOLOGY

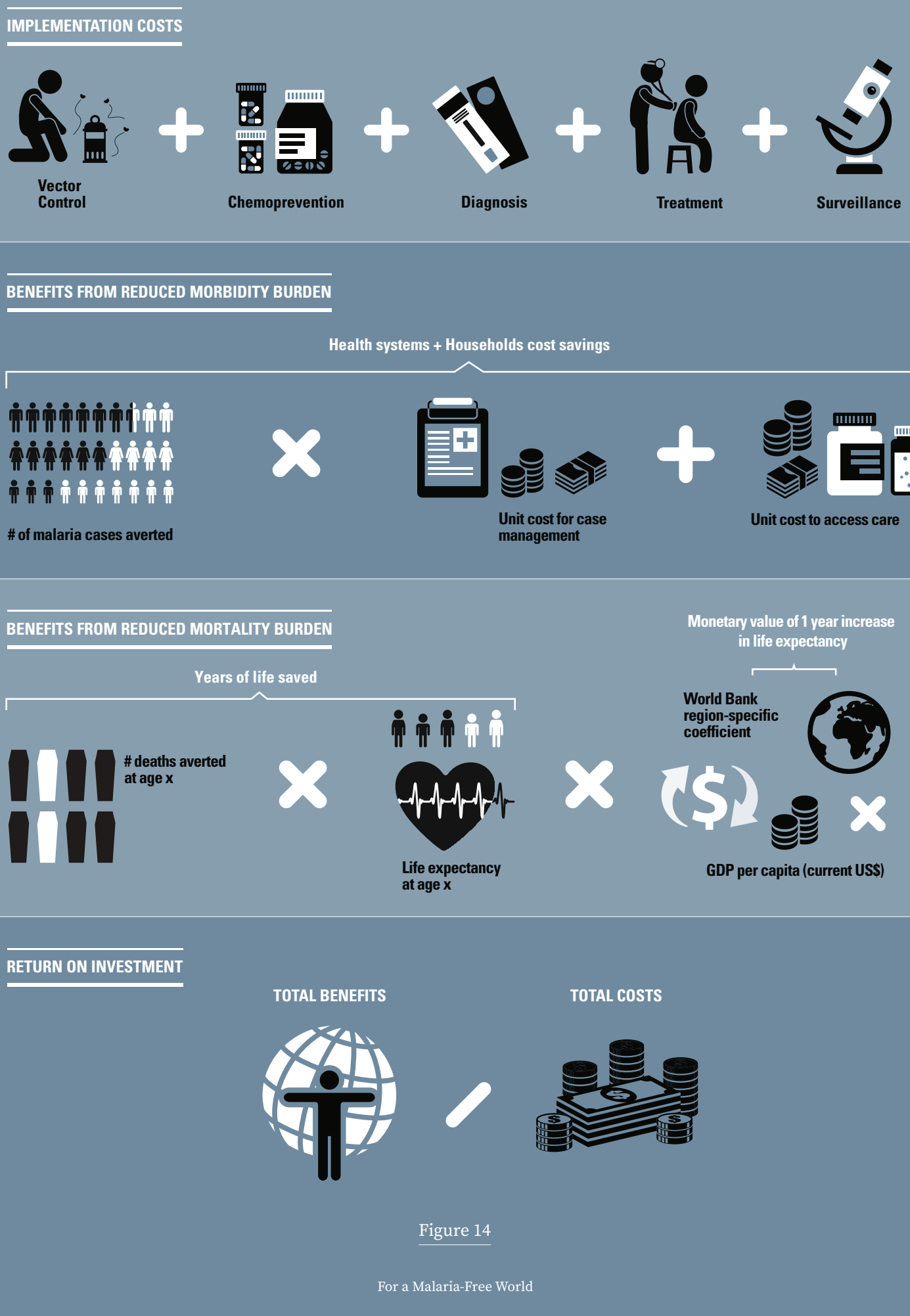



Figure 14

# APPENDIX E: BREAKDOWN OF INTERNATIONAL AND DOMESTIC FUNDING SOURCES FOR MALARIA CONTROL AND ELIMINATION, AND PRIVATE HOUSEHOLD OUT-OF-POCKET SPENDING IN 2013

**Methodology:** The share of funding spent on malaria in 2013 was estimated for two sets of countries: those in the control phase, and those in the pre-elimination, elimination and prevention of re-introduction phase (country classification as of December 2013). Figures for domestic public funding and international funding were collected from the *World Malaria Report 2014*. Figures for private household out-of-pocket spending were based on estimated size of private market for vector control (LLINs), diagnostic testing (RDTs) and malaria treatment (ACTs).

## SOURCES OF MALARIA FUNDING IN COUNTRIES THAT ARE CONTROLLING MALARIA

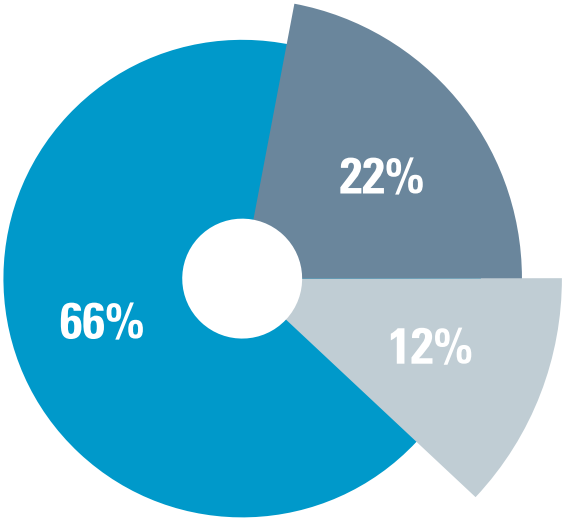



Figure 15

Domestic public funding (US$ 684.4 million)
International funding (US$ 1960.5 million)
Private household out-of-pocket spending (US$ 346.6 million)

## SOURCES OF MALARIA FUNDING IN PRE-ELIMINATION, ELIMINATION AND PREVENTION OF RE-INTRODUCTION COUNTRIES

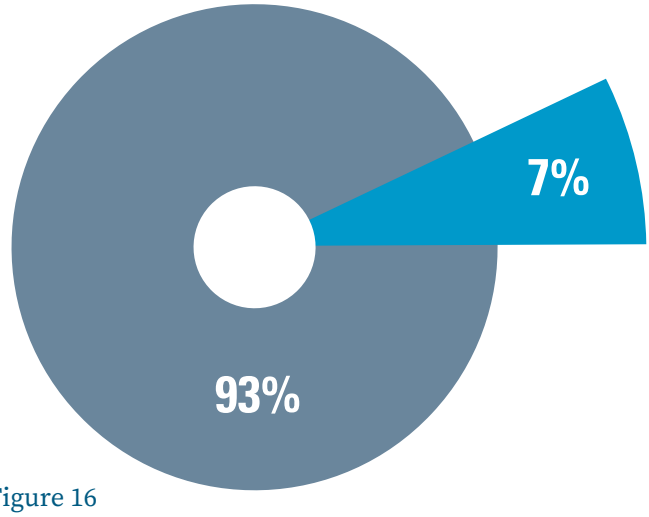



Figure 16

Domestic public funding (US$ 125.5 million)
International public funding (US$ 8.8 million)

**Private household out-of-pocket spending on LLINs in 2013: US$ 16.59 million.** 143 million LLINs were delivered in Africa in 2013 (for the rest of the world no reliable estimates on the size of the private market for LLINs were available). Among those, around 2% were sold through the private sector, a 2.86 million volume. With a fully loaded cost of US$ 5.80, private household out-of-pocket spending on LLINs in Africa totalled US$ 16.59 million in 2013.

*Data source: Malaria vector control commodities landscape. UNITAID, December 2014.*

**Private household out-of-pocket spending on RDTs in 2013: US$ 149 million.** 319 million of RDTs were sold to public and private sectors in 2013. Among those, 160 million were distributed by national malaria control programmes in the public sector. From the 159 million RDTs sold in the private sector, we assume that 60% were *P. falciparum*-specific tests, and 40% were *P.* falciparum and *P. vivax* combination tests. With a fully loaded cost of US$ 0.78 for *P. falciparum* RDTs and US$ 1.17 for *P. falciparum* and *P. vivax* combination tests, private household out-of-pocket spending on RDTs totalled US$ 149 million in 2013.

*Data sources: World Malaria Report 2014; GMAP 2008-2015*

**Private household out-of-pocket spending on ACTs in 2013: US$ 181 million.** Some 392 million ACTs were delivered from manufacturers to the public and private sector in 2013. Among those, 133 million were for the private sector only. The share of sales is assumed to be 70% paediatric ACTs and 30% adult ACTs. With a fully loaded cost of US$ 1.08 for paediatric ACTs and US$ 2.025 for adult ACTs, private household out-of-pocket spending on ACTs totalled US$ 181 million in 2013.

*Data sources: World Malaria Report 2014; GMAP 2008-2015*
*References[1,225,244]*

# APPENDIX F: MAKING PARTNERSHIPS WORK

Strategic and operational partnerships have the potential to overcome the expected challenges and substantially increase the effectiveness of the response in the coming years. Understanding a partner's or sector's motivation for investing in malaria is key to establishing enduring and productive partnerships, where all partners both contribute and enjoy the synergistic benefits. The traditional roles of the different constituencies in the fight against malaria continue to evolve.

### *Operationalizing partnerships*

Engaging with many partners can be time consuming and give rise to transaction costs. Recognizing the strengths of each stakeholder group and establishing clear roles and responsibilities will lay the groundwork for strong and operational partnerships at any level, whether within communities, at a national level, and across sectors and borders. To operationalize partnerships of any type, action is needed to:

- create a convening mechanism or network secretariat to coordinate activities and ensure effective knowledge management;
- develop coalitions and networks to simplify coordination, at any level, while also amplifying the voice of partners;
- jointly agree on the purpose, goals, and expected outcomes of the partnership;
- establish a funding mechanism for the partnership;
- establish formal or informal governance structures to clarify leadership, and agree on the roles and responsibilities of each partner (e.g. national partnerships can leverage the sample terms of reference that are available in Appendix E of the Advocacy and Resource Mobilization Guide [112] http://www.rollbackmalaria.org/resources/publications/2014);
- create a clear framework for taking action and monitoring; and
- arrange either regular external evaluations or joint progress reviews to hold one another accountable for commitments and to recognize progress towards the agreed partnership goals.

## ILLUSTRATIVE INCENTIVES INCLUDE:

- a malaria-free world
- better quality services
- reduced out-of-pocket costs
- increased productivity due to healthier workforces
- stronger local economies
- better resource management
- recognition
- image or branding
- market access

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACT | Artemisinin-based combination therapies |
| ADB | Asian Development Bank |
| AIDB | Asian Infrastructure Investment Bank |
| AIM | Action and Investment to defeat Malaria 2016-2030 |
| AL | Artemether-lumefantrin |
| AMI | Amazon Malaria Initiative |
| ANC | Antenatal care |
| APMEN | Asia Pacific Malaria Elimination Network |
| BRICS | Brazil, Russia, India, China and South Africa |
| CEO | Chief executive officer |
| CHAI | Clinton Health Access Initiative |
| CSO | Civil society organization |
| DFID | Department for International Development (UK) |
| EMMIE | Eliminate Malaria in Mesoamerica and the Island of Espanola |
| EMRO | WHO Regional Office for the Eastern Mediterranean |
| FIND | Foundation for Innovative New Diagnostics |
| GDP | gross domestic product |
| GMAP | Global Malaria Action Plan 2008-2015 |
| iCCM | Integrated community case management |
| IDA | International Development Association |
| IDP | Internally displaced person |
| IOM | International Organization for Migration |
| IPTp | Intermittent preventive treatment in pregnancy |
| IRS | Indoor residual spraying |
| ITPS | Insecticide-treated plastic sheeting |
| IVCC | Innovative Vector Control Consortium |
| IVM | Integrated vector management |
| LLIN | Long-lasting insecticide-treated net |
| malERA | Malaria Eradication Research Agenda |
| MDG | Millennium Development Goal |
| MFI | Malaria-Free Initiative |
| MMP | Mobile and migrant populations |
| MMV | Medicines for Malaria Venture |
| MVI | Malaria Vaccine Initiative |
| NGO | Nongovernmental organization |
| PAHO | Pan American Health Organization |
| PCR | Polymerase chain reaction |
| PDP | Product development partnership |
| PGH | Pledge Guarantee for Health |
| PMI | President's Malaria Initiative (US) |
| R&D | Research and development |
| RBM | Roll Back Malaria Partnership |
| RDT | Rapid diagnostic test |
| ROI | Return on investment |
| SADC | South African Development Community |
| SBCC | Social and behaviour change communication |
| SDG | Sustainable Development Goal |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNHCR | United Nations High Commission for Refugees |
| UNICEF | United Nations Children's Fund |
| VAT | Value added tax |
| WHO | World Health Organization |

# REFERENCES


1. World Health Organization. World Malaria Report 2014. <http://www.who.int/malaria/publications/world_malaria_report_2014/en/>
2. United Nations Secretary-General Ban Ki-moon. Global Strategy for Women's and Children's Health (2010). <http://www.who.int/pmnch/topics/maternal/20100914_gswch_en.pdf>
3. Every woman every child. Committing to child survival: a promise renewed (2015). <http://www.everywomaneverychild.org/networks/a-promise-renewed#sthash.9KhxvUoO.dpuf>
4. United Nations Conference on Trade and Development. Economic Development in Africa Report 2014: Catalysing Investment for Transformative Growth in Africa (2014). <http://unctad.org/en/PublicationsLibrary/aldcafrica2014_en.pdf>
5. International Labour Organization (ILO). Responsible Workplace Practices. Developing responsible workplace practices for better jobs and business (2014). <http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/---ifp_seed/documents/publication/wcms_175472.pdf>
6. Tusting, L. S. et al. Socioeconomic development as an intervention against malaria: a systematic review and meta-analysis. Lancet 382, 963-972 (2013).
7. Gallup, J. L. & Sachs, J. D. The economic burden of malaria. Am. J. Trop. Med. Hyg. 64, 85-96 (2001).
8. Health and Environment Linkages Initiative (HELI), World Health Organization & UNEP. Malaria control: the power of integrated action (2015). <http://www.who.int/heli/risks/vectors/malariacontrol/en/index6.html>
9. Caulfield, L. E., Richard, S. A. & Black, R. E. Undernutrition as an underlying cause of malaria morbidity and mortality in children less than five years old. Am. J. Trop. Med. Hyg. 71, 55-63 (2004).
10. Roll Back Malaria Partnership. The contribution of malaria control to maternal and newborn health (2014).
11. Kuecken, M., Thuilliez, J. & Valfort, M. Does malaria control impact education? A study of the Global Fund in Africa. Doc. Trav. Cent. Econ. Sorbonne 75 (2013).
12. Alaba, O. A. & Alaba, O.B. Malaria in children: implications for the productivity of female caregivers in Nigeria. Human Resource Development in Africa. In Selected papers of the annual conference of the Nigerian Economic Society, Ibadan, Nigeria (2002).
13. McFarland, D. A. Systematic review: household economic burden of malaria. Rollins School of Public Health and Bethesda MD: Abt Associates Inc. (2012).
14. Prüss, A., Kay, D., Fewtrell, L. & Bartram, J. Estimating the burden of disease from water, sanitation, and hygiene at a global level. Environ. Health Perspect. 110, 537-542 (2002).
15. Keiser, J., Singer, B. H. & Utzinger, J. Reducing the burden of malaria in different eco-epidemiological settings with environmental management: a systematic review. Lancet Infect. Dis. 5, 695-708 (2005).
16. Madramootoo, C., Johnston, W., Willardson, L. Health issues related to drainage water management in Management of agricultural drainage water quality (eds. Madramootoo, C. A., Johnston, W. R., Willardson, L. S.). International Commission on Irrigation and Drainage & Food and Agriculture Organization of the United Nations (1997).
17. Oria, P. A. et al. Tracking the mutual shaping of the technical and social dimensions of solar-powered mosquito trapping systems (SMoTS) for malaria control on Rusinga Island, western Kenya. Parasit. Vectors 7, 523 (2014).
18. Kiszewski, A. E. & Darling, S. T. Estimating a mosquito repellent's potential to reduce malaria in communities. J. Vector Borne Dis. 47, 217-221 (2010).
19. Anderson, L., Simpson, D. & Stephens, M. Effective malaria control through durable housing improvements: can we learn new strategies from past experience? Habitat for Humanity (2014).
20. International Labour Organization (ILO). International labour standards on occupational safety and health (2015). <http://www.ilo.org/global/standards/subjects-covered-by-international-labour-standards/occupational-safety-and-health/lang--en/index.htm>
21. Dillon, A. Health information, treatment, and worker productivity: experimental evidence from malaria testing and treatment among Nigerian sugarcane cutters. Centre for the study of African economies (2014).
22. Lindsay, S. W., Emerson, P. M. & Charlwood, J. D. Reducing malaria by mosquito-proofing houses. Trends Parasitol. 18, 510-514 (2002).
23. Atieli, H., Menya, D., Githeko, A. & Scott, T. House design modifications reduce indoor resting malaria vector densities in rice irrigation scheme area in western Kenya. Malar. J. 8, 108 (2009).
24. Lowe, R., Chirombo, J. & Tompkins, A. M. Relative importance of climatic, geographic and socio-economic determinants of malaria in Malawi. Malar. J. 12, 416 (2013).
25. Bourne, J. et al. How can malaria affect our society? Malaria.com – Uniting against Malaria. <http://www.malaria.com/questions/malaria-society-effects>
26. World Health Organization. WHO Global Technical Strategy for Malaria 2016-2030 (2015). <http://www.who.int/malaria/areas/global_technical_strategy/draft_strategy/en/>
27. WHO|GMP and RBM/Swiss TPH. Work conducted for the development of WHO's Global Technical Strategy for Malaria 2016-2030 and RBM's Action and Investment to defeat Malaria 2016-2030 (AIM) – for a malaria free world (2015).
28. ALMA, E2Pi & Clinton Health Access Initiative. Maintaining the gains in malaria control (2011).
29. Purdy, M., Robinson, M., Wei, K. & Rublin, D. The economic case for combating malaria. Am. J. Trop. Med. Hyg. 89, 819-823 (2013).
30. Copenhagen Consensus 2015. Smarter goals for 2030. The Economist. Special online supplement. Post-2015 Consensus. <http://www.copenhagenconsensus.com/post-2015-consensus/economist>
31. Sabot, O. et al. Costs and financial feasibility of malaria elimination. Lancet 376, 1604-1615 (2010).
32. Cohen, J. M. et al. Malaria resurgence: a systematic review and assessment of its causes. Malar. J. 11, 122 (2012).
33. Lengeler, C. Insecticide-treated bed nets and curtains for preventing malaria. Cochrane Database Syst. Rev. CD000363 (2004). doi:10.1002/14651858.CD000363.pub2
34. Murray, C. K. & Bennett, J. W. Rapid diagnosis of malaria. Interdiscip. Perspect. Infect. Dis. 2009, 415953 (2009).
35. Sinclair, D., Zani, B., Donegan, S., Olliaro, P. & Garner, P. Artemisinin-based combination therapy for treating uncomplicated malaria. Cochrane Database Syst. Rev. CD007483 (2009). doi:10.1002/14651858.CD007483.pub2
36. White, M. T., Conteh, L., Cibulskis, R. & Ghani, A. C. Costs and cost-effectiveness of malaria control interventions – a systematic review. Malar. J. 10, 337 (2011).
37. Aponte, J. J. et al. Efficacy and safety of intermittent preventive treatment with sulfadoxine-pyrimethamine for malaria in African infants: a pooled analysis of six randomised, placebo-controlled trials. Lancet 374, 1533-1542 (2009).
38. Pitt, C., Ndiaye, M., Patouillard, E., Milligan, P. & Conteh, L. Economic report for the WHO Technical Expert Group Meeting on Intermittent Preventive Treatment of Malaria in Children. London School of Hygiene and Tropical Medicine (2011). <http://researchonline.lshtm.ac.uk/21179/1/IPTc_Econ_Report___WHO_TEG__Final2.pdf.>
39. Pluess, B., Tanser, F. C., Lengeler, C. & Sharp, B. L. Indoor residual spraying for preventing malaria. Cochrane Database Syst. Rev. CD006657 (2010). doi:10.1002/14651858.CD006657.pub2
40. Mc Laughlin, C., Levy, J., Noonan, K. & Rosqueta, K. Lifting the burden of malaria – an investment guide for impact-driven philanthropy (2009).
41. Laxminarayan, R. et al. Advancement of global health: key messages from the Disease Control Priorities Project. Lancet 367, 1193-1208 (2006).
42. World Health Organization & Global Malaria Programme. Progress towards elimination in Sri Lanka. World Health Organization (2012).
43. Abeyasinghe, R. R., Galappaththy, G. N. L., Smith Gueye, C., Kahn, J. G. & Feachem, R. G. A. Malaria control and elimination in Sri Lanka: documenting progress and success factors in a conflict setting. PloS ONE 7, e43162 (2012).
44. Liu, J. X. et al. Determinants of malaria program expenditures during elimination: case study evidence from select provinces in the Philippines. PLoS ONE 8, e73352 (2013).
45. UCSF Global Health Sciences. The risk of malaria resurgence. Need for sustainable and predictable financing and political will (2014).
46. McCarthy, F. D., Wolf, H. & Wu, Y. Malaria and growth, World Bank Policy Research Working Paper 2303 (2000).
47. Gallup, J. L. & Sachs, J. D. The economic burden of malaria. Am. J. Trop. Med. Hyg. 64, 85-96 (2001).
48. Jobin, W. R. Suppression of malaria transmission and increases in economic productivity in African countries from 2007 to 2011. Malar. World J. 5, 8 (2014).
49. Asenso-Okyere, K., Asante, F. A., Tarekegn, J. & Andam, K. S. The linkages between agriculture and malaria – issues for policy, research, and capacity strengthening. International Food Policy Research Institute (2009).
50. Sachs, J. & Malaney, P. The economic and social burden of malaria. Nature 415, 680-685 (2002).
51. Roll Back Malaria Partnership. Business investing in malaria control: economic returns and a healthy workforce for Africa (2011).

52. Girardin, O. et al. Opportunities and limiting factors of intensive vegetable farming in malaria endemic Côte d'Ivoire. Acta Trop. 89, 109-123 (2004).

53. Endah, N. B. & Ndambi, O. A. Impact of malaria on food production in the Western Highlands of Cameroon. Proc. Tropentag (2006). <http://www.tropentag.de/2006/proceedings/node404.html>

54. Ersado, L., Amacher, G. & Alwang, J. Productivity and land enhancing technologies in Northern Ethiopia: health, public investments, and sequential adoption. Environment and Production Technology Division (2003).

55. Barreca, A. I. The long-term economic impact of in utero and postnatal exposure to malaria. J. Hum. Resour. 45, 865-892 (2010).

56. Modrek, S., Liu, J., Gosling, R. & Feachem, R. G. The economic benefits of malaria elimination: do they include increases in tourism? Malar. J. 11, 244 (2012).

57. Chuma, J., Okungu, V. & Molyneux, C. The economic costs of malaria in four Kenyan districts: do household costs differ by disease endemicity? Malar. J. 9, 149 (2010).

58. Mustafa, M. H. & Babiker, M. A. Economic cost of malaria on households during a transmission season in Khartoum State, Sudan. East. Mediterr. Health J. Rev. Santé Méditerranée Orient. Al-Majallah Al-Ṣiḥḥīyah Li-Sharq Al-Mutawassiṭ 13, 1298-1307 (2007).

59. World Bank. Intensifying the Fight against malaria: the World Bank's booster program for malaria control in Africa Washington, DC : World Bank (2009). <https://openknowledge.worldbank.org/handle/10986/6290>

60. Xu, K. et al. Protecting households from catastrophic health spending. Health Aff. Proj. Hope 26, 972-983 (2007).

61. Ilunga-Ilunga, F., Levêque, A., Laokri, S. & Dramaix, M. Incidence of catastrophic health expenditures for households: an example of medical attention for the treatment of severe childhood malaria in Kinshasa reference hospitals, Democratic Republic of Congo. J. Infect. Public Health (2014). doi:10.1016/j.jiph.2014.08.008

62. Ettling, M., McFarland, D. A., Schultz, L. J. & Chitsulo, L. Economic impact of malaria in Malawian households. Trop. Med. Parasitol. Off. Organ Dtsch. Tropenmedizinische Ges. Dtsch. Ges. Für Tech. Zusammenarbeit GTZ 45, 74-79 (1994).

63. Castillo-Riquelme, M., McIntyre, D. & Barnes, K. Household burden of malaria in South Africa and Mozambique: is there a catastrophic impact? Trop. Med. Int. Health TM IH 13, 108-122 (2008).

64. Arrow, K. J., Dasgupta, P., Goulder, L. H., Mumford, K. J. & Oleson, K. Sustainability and the measurement of wealth. Environ. Dev. Econ. 17, 317-353 (2012).

65. Bleakley, H. Malaria eradication in the Americas: a retrospective analysis of childhood exposure. Am. Econ. J. Appl. Econ. 2, 1-45 (2010).

66. Bleakley, H. Disease and development: evidence from the American South. J. Eur. Econ. Assoc. 1, 376-386 (2003).

67. Menéndez, C. et al. Malaria prevention with IPTp during pregnancy reduces neonatal mortality. PLoS ONE 5, e9438 (2010).

68. Garner, P. et al. Systematic reviews in malaria: global policies need global reviews. Infect. Dis. Clin. North Am. 23, 387-404 (2009).

69. World Health Organization. World Malaria Report 2013 (2013).

70. Malhotra, I. et al. Effect of antenatal parasitic infections on anti-vaccine IgG levels in children: a prospective birth cohort study in Kenya. PLoS Negl. Trop. Dis. 9, e0003466 (2015).

71. Atapattu, R., UNICEF & World Summit for Children. Children and development in the 1990s: a UNICEF sourcebook: on the occasion of the World Summit for Children, 29-30 September 1990, United Nations, New York. (1990).

72. Bell, D. et al. Diagnosis of malaria in a remote area of the Philippines: comparison of techniques and their acceptance by health workers and the community. Bull. World Health Organ. 79, 933-941 (2001).

73. Smith Paintain, L. et al. A systematic review of strategies to increase demand, uptake and quality of community-based diagnosis and case management of malaria. 72 (2012).

74. Smith Paintain, L. et al. Community health workers and stand-alone or integrated case management of malaria: a systematic literature review. Am. J. Trop. Med. Hyg. 91, 461-470 (2014).

75. UNICEF. Malaria. UNICEF Health (2013). <http://www.unicef.org/health/index_malaria.html>

76. Mahende, C. et al. Aetiology of acute febrile episodes in children attending Korogwe District Hospital in north-eastern Tanzania. PloS ONE 9, e104197 (2014).

77. Chisholm, D. & Evans, D. B. Improving health system efficiency as a means of moving towards universal coverage (2010).

78. World Health Organization. World Health Report. Health systems financing: the path to universal coverage (2010). <http://www.who.int/whr/2010/10_summary_en.pdf>

79. Narasimhan, V. & Attaran, A. Roll back malaria? The scarcity of international aid for malaria control. Malar. J. 2, 8 (2003).

80. Mills, A. & Shillcutt, S. The challenge of communicable diseases. Health Economics and Financing Programme & London School of Hygiene & Tropical Medicine (2004).

81. Jowett, M. & Miller, N. J. The financial burden of malaria in Tanzania: implications for future government policy. Int. J. Health Plann. Manage. 20, 67-84 (2005).

82. allAfrica. Uganda: malaria costs country Sh1200b (2009). <http://allafrica.com/stories/200904260015.html>

83. allAfrica. Tanzania: malaria costs dar Sh157 billion annually (2010). <http://allafrica.com/stories/201004141111.html>

84. Comfort, A. B. et al. Hospitalizations and costs incurred at the facility level after scale-up of malaria control: pre-post comparisons from two hospitals in Zambia. Am. J. Trop. Med. Hyg. 90, 20-32 (2014).

85. Konradsen, F. et al. Cost of malaria control in Sri Lanka. Bull. World Health Organ. 77, 301-309 (1999).

86. Phelan, A. L., Gostin, L. O. & Lucey, D. A United Nations Security Council resolution is essential to preventing the threat to international peace and security posed by Ebola. O'Neill Institute for National & Global Health Law (2014).

87. Barclay, V. C., Smith, R. A. & Findeis, J. L. Surveillance considerations for malaria elimination. Malar. J. 11, 304 (2012).

88. Cao, J. et al. Communicating and monitoring surveillance and response activities for malaria elimination: China's '1-3-7' strategy. PLoS Med. 11, e1001642 (2014).

89. World Meteorological Organization, ISDR, World Health Organization & International Federation of Red Cross and Red Crescent Societies. Health and disaster risk reduction within the global framework for climate services (2011).

90. Zofou, D. et al. Control of malaria and other vector-borne protozoan diseases in the tropics: enduring challenges despite considerable progress and achievements. Infect. Dis. Poverty 3, 1 (2014).

91. World Health Organization Europe. An operational framework on integrated vector management (2012).

92. Hasegawa, A., Yasuoka, J., Ly, P., Nguon, C. & Jimba, M. Integrating child health services into malaria control services of village malaria workers in remote Cambodia: service utilization and knowledge of malaria management of caregivers. Malar. J. 12, 292 (2013).

93. WHO|GMP and RBM/Swiss TPH. Work conducted for the development of WHO's Global Technical Strategy for Malaria 2016-2030 and RBM's Action and Investment to defeat Malaria 2016-2030 (AIM) – for a malaria free world (2015). Initially two papers were planned, but they were later combined into one currently under preparation.

94. Lomborg, B. & Copenhagen Consensus Center. Preliminary benefit-cost assessment for 12th session OWG goals (2014). <http://www.copenhagenconsensus.com/sites/default/files/owg12.cost-benefit-assessment_0.pdf>

95. Purdy, M. et al. African summit presentation-Accenture institute for high performance. White house summit "Investing in the next generation", Washington D.C. (2014).

96. World Bank. World Bank data Sub Saharan Africa (2013). <http://data.worldbank.org/region/SSA>

97. Coleman, P. G., Goodman, C. A. & Mills, A. Rebound mortality and the cost-effectiveness of malaria control: potential impact of increased mortality in late childhood following the introduction of insecticide treated nets. Trop. Med. Int. Health 4, 175-186 (1999).

98. Lubell, Y. et al. Artemisinin resistance-modelling the potential human and economic costs. Malar. J. 13, 452 (2014).

99. Kates, J. & Wexler, A. Global financing for malaria: trends & future status. Kaiser Family Foundation (2014). <http://kff.org/report-section/global-financing-for-malaria-introduction/>

100. Moran, M. et al. Neglected disease research and development: emerging trends. Policy Cures (2014).

101. World Bank. Global economic prospects. Forecast table (2015). <http://www.worldbank.org/en/publication/global-economic-prospects/summary-table>

102. OECD. OECD aid statistics: statistics on resource flows to developing countries (2014). <http://www.oecd.org/dac/stats/statisticsonresourceflowstodevelopingcountries.htm>

103. Elovainio, R. & Evans, D. B. Raising and spending domestic money for health (2013).

104. Jamison, D. T. et al. Global health 2035: a world converging within a generation. Lancet 382, 1898-1955 (2013).

105. Clinton Health Access Initiative. Lessons learned from working to increase domestic financing for malaria in Africa 2012-2014 (2014).

106. Pledge Guarantee for Health (PGH). Impact. <http://pledgeguarantee.org/impact-new/>

107. Betru, A. How ministers of health can increase their leverage with ministers of finance. Global Health and Diplomacy (2014).

108. Global Fund to Fight AIDS, Tuberculosis and Malaria. Innovative financing of the Global Fund DEBT2HEALTH. <http://www.theglobalfund.org/documents/private_sector/PrivateSector_D2H_FactSheet_en/>

109. EITI (Extractive Industries Transparency Initiative). Seeing results from natural resources (2015). <https://eiti.org/>

110. Publish What You Pay (2015). <http://www.publishwhatyoupay.org/>

111. Wong, J. The future of development innovation. DFID bloggers (2014). <https://dfid.blog.gov.uk/2014/09/24/the-future-of-development-innovation/>

112. Roll Back Malaria. Advocacy for resource mobilization (ARM) for malaria guide (2014). <http://www.rollbackmalaria.org/resources/publications/2014>

113. Department for International Development. DFID's approach to value for money (VfM) (2011). <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/49551/DFID-approach-value-money.pdf>

114. United Nations General Assembly. The road to dignity by 2030: ending poverty, transforming all lives and protecting the planet. 34 (2014).

115. Frean, J., Brooke, B., Thomas, J. & Blumberg, L. Odyssean malaria outbreaks in Gauteng Province, South Africa, 2007-2013. South Afr. Med. J. Suid-Afr. Tydskr. Vir Geneeskd. 104, 335-338 (2014).

116. IOM (International Organization for Migration). Malaria and mobility: addressing malaria control and elimination in migration and human movements (2014).

117. Piffaretti, N., Ralston, L. & Shaikh, K. The World Bank's harmonized list of fragile situations (2014). <http://documents.worldbank.org/curated/en/2014/01/19794539/information-note-world-banks-harmonized-list-fragile-situations>

118. Whitman, J. The politics of emerging and resurgent infectious diseases. Macmillan Press; St. Martin's Press (2000).

119. World Health Organization. Global Plan for Artemisinin Resistance Containment (GPARC) (2011). <http://www.who.int/malaria/publications/atoz/9789241500838/en/>

120. World Health Organization. Global Plan for Insecticide Resistance Management in Malaria Vectors (2012). <http://www.who.int/malaria/vector_control/ivm/gpirm/en/>

121. Ranson, H. et al. Pyrethroid resistance in African anopheline mosquitoes: what are the implications for malaria control? Trends Parasitol. 27, 91-98 (2011).

122. Imai, N., White, M. T., Ghani, A. C. & Drakeley, C. J. Transmission and control of Plasmodium *knowlesi*: a mathematical modelling study. PLoS Negl. Trop. Dis. 8, e2978 (2014).

123. Tatem, A. J., Gething, P. W., Smith, D. L. & Hay, S. I. Urbanization and the global malaria recession. Malar. J. 12, 133 (2013).

124. Hay, S. I., Guerra, C. A., Tatem, A. J., Atkinson, P. M. & Snow, R. W. Opinion – Tropical infectious diseases: urbanization, malaria transmission and disease burden in Africa. Nat. Rev. Microbiol. 3, 81-90 (2005).

125. Bhumiratana, A., Sorosjinda-Nunthawarasilp, P., Kaewwaen, W., Maneekan, P. & Pimnon, S. Malaria-associated rubber plantations in Thailand. Travel Med. Infect. Dis. 11, 37-50 (2013).

126. Yasuoka, J. & Levins, R. Impact of deforestation and agricultural development on anopheline ecology and malaria epidemiology. Am. J. Trop. Med. Hyg. 76, 450-460 (2007).

127. Temel, T. Malaria from the gap: need for cross-sector co-operation in Azerbaijan. Acta Trop. 89, 249-259 (2004).

128. Ali, H., Zakieldeen, S. A. & Sulaiman, S. Climate change and health in Sudan. Capacity strengthening in the least developed countries (LDCs) for adaptation to climate change (CLACC) (2008).

129. Patz, J. A., Graczyk, T. K., Geller, N. & Vittor, A. Y. Effects of environmental change on emerging parasitic diseases. Int. J. Parasitol. 30, 1395-1405 (2000).

130. World Health Organization & RIO+20 United Nations Conference on Sustainable Development. Health in the green economy: measuring health gains from sustainable development (2012).

131. Carlson, J. C., Byrd, B. D. & Omlin, F. X. Field assessments in western Kenya link malaria vectors to environmentally disturbed habitats during the dry season. BMC Public Health 4, 33 (2004).

132. Mereta, S. T. et al. Physico-chemical and biological characterization of anopheline mosquito larval habitats (Diptera: Culicidae): implications for malaria control. Parasit. Vectors 6, 320 (2013).

133. Mboera, L. E.G., Mazigo, H. D., Rumisha, S. F. & Kramer, R. A. Towards malaria elimination and its implication for vector control, disease management and livelihoods in Tanzania. Malaria World Journal 4, 14 (2013).

134. Dabiré, K. R. et al. Year to year and seasonal variations in vector bionomics and malaria transmission in a humid savannah village in west Burkina Faso. J. Vector Ecol. J. Soc. Vector Ecol. 33, 70-75 (2008).

135. Sinka, M. E. et al. The dominant *Anopheles* vectors of human malaria in Africa, Europe and the Middle East: occurrence data, distribution maps and bionomic précis. Parasit. Vectors 3, 117 (2010).

136. Bloland, P. B. & Williams, H. A. Malaria control during mass population movements and natural disasters. National Academies Press (US) (2002). <http://www.ncbi.nlm.nih.gov/books/NBK221163/>

137. De Silva, P. M. & Marshall, J. M. Factors contributing to urban malaria transmission in sub-Saharan Africa: a systematic review. J. Trop. Med. 2012, 819563 (2012).

138. Roll Back Malaria Partnership & UNDP Multisectoral Action Framework for Malaria (2013). <http://www.rollbackmalaria.org/files/files/about/MultisectoralApproach/Multisectoral-Action-Framework-for-Malaria.pdf>

139. Kang, H. et al. The causal effect of malaria on stunting: a Mendelian randomization and matching approach. Int. J. Epidemiol. 42, 1390-1398 (2013).

140. Basurko, C. et al. Deforestation, agriculture and farm jobs: a good recipe for Plasmodium vivax in French Guiana. Malar. J. 12, 90 (2013).

141. Kebede, A., McCann, J. C., Kiszewski, A. E. & Ye-Ebiyo, Y. New evidence of the effects of agro-ecologic change on malaria transmission. Am. J. Trop. Med. Hyg. 73, 676-680 (2005).

142. Van Lieshout, M., Kovats, R. S., Livermore, M. T. J. & Martens, P. Climate change and malaria: analysis of the SRES climate and socio-economic scenarios. Glob. Environ. Change 14, 87-99 (2004).

143. Noor, A. M. et al. The changing risk of Plasmodium falciparum malaria infection in Africa, 2000-10: a spatial and temporal analysis of transmission intensity. Lancet 383, 1739-1747 (2014).

144. International Research Institute for Climate and Society. Enhancing national climate services maximizing the impact of malaria investment in a varying climate. <http://iri.columbia.edu/wp-content/uploads/2013/07/ENACTS_Health_Oct2014.pdf>

145. Nájera, J. A. The control of tropical diseases and socioeconomic development (with special reference to malaria and its control). Parassitologia 36, 17-33 (1994).

146. Ayi, I. et al. School-based participatory health education for malaria control in Ghana: engaging children as health messengers. Malar. J. 9, 98 (2010).

147. Vélez G., J. R. Iniciativa de la técnica de riego con secas intermitentes en el cultivo de arroz para el control vectorial de la malaria región lambayeque (2007).

148. Guthmann, J. P., Llanos-Cuentas, A., Palacios, A. & Hall, A. J. Environmental factors as determinants of malaria risk. A descriptive study on the northern coast of Peru. Trop. Med. Int. Health TM IH 7, 518-525 (2002).

149. Tusting, L. S. et al. The evidence for improving housing to reduce malaria: a systematic review and meta-analysis. The Lancet (2015).

150. Wanzirah, H. et al. Mind the gap: house structure and the risk of malaria in Uganda. PLOS ONE 10, e0117396 (2015).

151. Economist The world's fastest-growing continent. Aspiring Africa. Mar 2nd 2013 from print edition (2013).

152. Kirby, M. J. et al. Effect of two different house screening interventions on exposure to malaria vectors and on anaemia in children in The Gambia: a randomised controlled trial. Lancet 374, 998-1009 (2009).

153. World Health Organization Regional Office for South-East Asia. Regional framework for an integrated vector management strategy for the South-East Asia Region (2005).

154. UNEP Thematic group on integrated vector management. A global review of implementation of integrated vector management (2011). <http://chm.pops.int/Implementation/DDT/Meetings/GlobalAllianceISC32011/tabid/1666/ctl/Download/mid/5604/Default.aspx?id=8&ObjID=11583>

155. Handbook for integrated vector management. World Health Organization (2012).

156. Bloom, D. E., Bloom, L. R. & Weston, M. Business and malaria: a neglected threat? World Economic Forum Global Health Initiative and Harvard School of Public Health (2006).

157. Department for International Development. Working together for better health. DFID (2007).

158. Sumitomo Chemical Vector Control Division. Manufacturing in Africa. Made in Africa, by Africans, for Africans (2013). <http://sumivector.com/about-us/olyset-manufacturing-in-africa>

159. Global Fund to Fight AIDS, Tuberculosis and Malaria. AngloGold Ashanti, Private Sector Case Study 1. Corporation as Principal Recipient. Ghana (2012).

160. Tenke Fungurume Mining. Tenke Fungurume Mining. An Investment in the Future of the Democratic Republic of Congo (2013). <www.fcx.com/operations/downloads/TFM_CONTRACT_FACTS.pdf>

161. Global Partnership to Roll Back Malaria, Mouzin, E., Malawi, Ministry of Health. Focus on Malawi (Roll Back Malaria Partnership Secretariat, 2013).

162. Roll Back Malaria & Banda, P. Konkola Copper Mines: improving programme success and ensuring sustainability. <http://www.mosquitozone.com/sites/default/files/KonkolaCopperMines.pdf>

163. Corporate Alliance on Malaria in Africa. Company management guide. Implementing an integrated malaria control program (2009). <http://www.gbcimpact.org/files/reports/CAMA%20Company%20Management%20Guide-Malaria%20Final%20document.pdf>

164. Bradley, J. et al. Reduced prevalence of malaria infection in children living in houses with window screening or closed eaves on Bioko Island, equatorial Guinea. PloS ONE 8, e80626 (2013).

165. Kleinschmidt, I. et al. Factors influencing the effectiveness of malaria control in Bioko Island, equatorial Guinea. Am. J. Trop. Med. Hyg. 76, 1027-1032 (2007).

166. Overgaard, H. J. et al. Malaria transmission after five years of vector control on Bioko Island, Equatorial Guinea. Parasit. Vectors 5, 253 (2012).

167. Global Fund to Fight AIDS, Tuberculosis and Malaria. The Global Fund Malaria Grant Proposal Philippines – Principal Recipient Pilipinas Shell Foundation Inc. The Global Fund Grant Portfolio (2014). <http://portfolio.theglobalfund.org/en/Grant/Index/PHL-M-PSFI>

168. Global Fund to Fight AIDS, Tuberculosis and Malaria. The Global Fund Malaria Grant Portfolio Papua New Guinea – Principal Recipient Oil Search Health Foundation. The Global Fund Grant Portfolio (2014). <http://portfolio.theglobalfund.org/en/Grant/Index/PNG-812-G08-M>

169. AngloGold Ashanti. In AngloGold Ashanti sustainability review 2009. Tomorrow's gold: issues that matter (2009).

170. World Health Organization. International health regulations (2005) Second edition (2008). <http://www.who.int/ihr/9789241596664/en/>

171. Roll Back Malaria Partnership. The Asia Pacific Malaria Elimination Network (APMEN): supporting the common goal of a malaria-free Asia Pacific (2014).

172. Strengthening Pharmaceutical Systems & USAID. A new medicine monitoring system helps prevent antimalarial stock-outs in the Americas region (2012). <www.msh.org/sps>

173. World Health Organization Europe. Ottawa charter for health promotion 1986 (1986). <http://www.who.int/healthpromotion/conferences/previous/ottawa/en/>

174. World Health Organization & Roll Back Malaria. Gender, health and malaria (2007). <http://www.who.int/gender/documents/gender_health_malaria.pdf?ua=1>

175. Smith, C. & Whittaker, M. Beyond mobile populations: a critical review of the literature on malaria and population mobility and suggestions for future directions. Malar. J. 13, 307 (2014).

176. Onwujekwe, O., Obikeze, E., Uzochukwu, B., Okoronkwo, I. & Onwujekwe, O. C. Improving quality of malaria treatment services: assessing inequities in consumers' perceptions and providers' behaviour in Nigeria. Int. J. Equity Health 9, 22 (2010).

177. Uzochukwu, B., Onwujekwe, O. & Eriksson, B. Inequity in the Bamako Initiative programme – implications for the treatment of malaria in south-east Nigeria. Int. J. Health Plann. Manage. 19 Suppl 1, S107-116 (2004).

178. Østergaard, L. R. Trust matters: a narrative literature review of the role of trust in health care systems in sub-Saharan Africa. Glob. Public Health 1-14 (2015). doi:10.1080/17441692.2015.1019538

179. Gilson, L. Trust and the development of health care as a social institution. Soc. Sci. Med. 1982 56, 1453-1468 (2003).

180. World Bank. World Development Report 2015. Mind, society and behavior (2014). <http://elibrary.worldbank.org/doi/pdf/10.1596/978-1-4648-0342-0>

181. Shayon, S. Campaign to fight malaria gets big boost from social media. brandchannel. Brands with a cause (2013). <http://www.brandchannel.com/home/post/2013/04/25/Power-Of-One-Malaria-Campaign-042513.aspx>

182. Can social media help end malaria? Let's find out… @Brian Solis. Defining the impact of technology, culture and business (2010). <http://www.briansolis.com/2010/04/can-social-media-help-end-malaria-lets-find-out/>

183. Shafique, M. & George, S. Positive deviance: an asset-based approach to improve malaria outcomes. Malaria Consortium (2014). <www.malariaconsortium.org/ learningpapers>

184. Bowen, H. L. Impact of a mass media campaign on bed net use in Cameroon. Malar. J. 12, 36 (2013).

185. Boulay, M., Lynch, M. & Koenker, H. Comparing two approaches for estimating the causal effect of behaviour-change communication messages promoting insecticide-treated bed nets: an analysis of the 2010 Zambia malaria indicator survey. Malar. J. 13, 342 (2014).

186. Keating, J. et al. A quasi-experimental evaluation of an interpersonal communication intervention to increase insecticide-treated net use among children in Zambia. Malar. J. 11, 313 (2012).

187. Malaria Consortium. Malaria control in Nigeria. Kano net recipient case study. Malari Consortium. infocus. Malaria control in Nigeria. <http://www.malariaconsortium.org/sunmap/pages/content/kano-net-recipient-case-study>

188. Koita, K. et al. Targeting imported malaria through social networks: a potential strategy for malaria elimination in Swaziland. Malar. J. 12, 219 (2013).

189. Tatem, A. J. et al. The use of mobile phone data for the estimation of the travel patterns and imported Plasmodium falciparum rates among Zanzibar residents. Malar. J. 8, 287 (2009).

190. Wangroongsarb, P. et al. Respondent-driven sampling on the Thailand-Cambodia border. II. Knowledge, perception, practice and treatment-seeking behaviour of migrants in malaria endemic zones. Malar. J. 10, 117 (2011).

191. Khamsiriwatchara, A. et al. Respondent-driven sampling on the Thailand-Cambodia border. I. Can malaria cases be contained in mobile migrant workers? Malar. J. 10, 120 (2011).

192. Pindolia, D. K. et al. Human movement data for malaria control and elimination strategic planning. Malar. J. 11, 205 (2012).

193. World Health Organization. Containment of drug-resistance malaria on the Thai-Cambodian border (2011).

194. Sanders, K. C. et al. Eliminating malaria in Malaysia: the role of partnerships between the public and commercial sectors in Sabah. Malar. J. 13, 24 (2014).

195. Wickremasinghe, R., Fernando, S. D., Thillekaratne, J., Wijeyaratne, P. M. & Wickremasinghe, A. R. Importance of active case detection in a malaria elimination programme. Malar. J. 13, 186 (2014).

196. Institut Pasteur du Camboge. A mobile laboratory in Cambodia: when technology moves into the field (2012). <http://www.pasteur-kh.org/international-call-for-candidates/>

197. USAID. From the American people. Mobile malaria workers drive down cases in rural Burma. Volunteers diagnose, treat and educate villagers. USAID Webpage - Results & Data - Progress - Transforming Lives (2014). <http://www.usaid.gov/results-data/success-stories/mobile-volunteer-malaria-workers-drive-down-cases-rural-burma>

198. Edwards, H. M. et al. Novel cross-border approaches to optimise identification of asymptomatic and artemisinin resistant Plasmodium infection in mobile populations crossing Cambodian borders.(under development) (2015).

199. UNHCR (The UN Refugee Agency). UNHCR Mid-Year Trends 2014 (2014). <http://www.unhcr.org/statistics>

200. Albuja, S. et al. Global overview 2014. People internally displaced by conflict and violence (iDMC/NRC). <http://www.internal-displacement.org/publications/2014/global-overview-2014-people-internally-displaced-by-conflict-and-violence>

201. Burns, M. et al. Insecticide-treated plastic sheeting for emergency malaria prevention and shelter among displaced populations: an observational cohort study in a refugee setting in Sierra Leone. Am. J. Trop. Med. Hyg. 87, 242-250 (2012).

202. Graham, K. et al. Insecticide-treated plastic tarpaulins for control of malaria vectors in refugee camps. Med. Vet. Entomol. 16, 404-408 (2002).

203. Rowland, M. et al. Permethrin-treated chaddars and top-sheets: appropriate technology for protection against malaria in Afghanistan and other complex emergencies. Trans. R. Soc. Trop. Med. Hyg. 93, 465-472 (1999).

204. World Health Organization. Malaria control in humanitarian emergencies: an inter-agency field handbook (2013).

205. Hawkes, M., Katsuva, J. P. & Masumbuko, C. K. Use and limitations of malaria rapid diagnostic testing by community health workers in war-torn Democratic Republic of Congo. Malar. J. 8, 308 (2009).

206. Richard, A. The MENTOR Initiative (personal communication) (2014).

207. The MENTOR Initiative. Public and private sector malaria case management: Angola, Liberia and CAR. The last mile for malaria? <http://www.efpia.eu/uploads/Modules/MCMedias/1378910123634/MENTOR.pdf>

208. Sphere Project. The Sphere handbook: humanitarian charter and minimum standards in humanitarian response. The Sphere Project (2011). <http://www.sphereproject.org/handbook/>

209. Centers for Disease Control and Prevention. One Health (2013). <http://www.cdc.gov/onehealth/>

210. Quigley, R. et al. Health impact assessment. International best practice principles. IAIA (2006).

211. Food and Agricultural Organization of the United Nations & World Health Organization. International code of conduct on the distribution and use of pesticides. Guidelines on data requirements for the registration of pesticides (2013). <http://www.who.int/whopes/recommendations/FAO_WHO_Guidelines_Data_Requirement_Registration.pdf>

212. Malaria Policy Advisory Committee & World Health Organization. Capacity building for entomology and vector control (2013).

213. Kiberu, V. M. et al. Strengthening district-based health reporting through the district health management information software system: the Ugandan experience. BMC Med. Inform. Decis. Mak. 14, 40 (2014).

214. World Health Organization, Gobierno de España, Ministerio de Sanidad y Ploítica Social & International Organization for Migration. Health of migrants – the way forward (2010).

215. Thomson, M. C., Mason, S. J., Phindela, T. & Connor, S. J. Use of rainfall and sea surface temperature monitoring for malaria early warning in Botswana. Am. J. Trop. Med. Hyg. 73, 214-221 (2005).

216. Lenna, S. N. Use of technology in malaria prevention and control activities. Blog USAID government (2013). <http://blog.usaid.gov/2013/05/use-of-technology-in-malaria-prevention-and-control-activities/>

217. Anonymous. Malaria surveillance. ICTedge solutions tried and tested in the real world (2013). <http://www.ictedge.org/node/957>

218. KEMRI Wellcome Trust & University of Oxford. INFORM (Information for malaria) (2015). <http://www.inform-malaria.org/>

219. Agence Nationale de Promotion des TIC. Open data Burkina Faso. <http://data.gov.bf/>

220. UN Habitat. For a better urban future. h2.0 Monitoring services to inform and empower. UN Habitat for a better urban future. Water and Sanitation. h2.0 <http://mirror.unhabitat.org/content.asp?cid=7656&catid=635&typeid=24&subMenuId=0>

221. World Health Organisation. Selection of safe and effective quality antimalarial medicines. Malaria (2014). <http://www.who.int/malaria/areas/treatment/antimalarials_selection/en/>

222. Bell, D., Wongsrichanalai, C. & Barnwell, J. W. Ensuring quality and access for malaria diagnosis: how can it be achieved? Nat. Rev. Microbiol. 4, S7-20 (2006).

223. malERA Consultative Group on Health Systems and Operational Research. A research agenda for malaria eradication: health systems and operational research. *PLoS Med.* 8, e1000397 (2011).

224. Policy Cures et al. Estimating costs and measuring investments in malaria R&D for eradication (2014). <http://www.finddiagnostics.org/export/sites/default/resource-centre/reports_brochures/docs/pc_report_malaria_erad_rd_costs.pdf>

225. UNITAID. Malaria vector control commodities landscape 2014 (2014). <http://unitaid.org/en/rss-unitaid/1415-new-vector-control-products-urgently-needed-to-combat-insecticide-resistance-unitaid-report-warns>

226. Nkya, T. et al. Impact of agriculture on the selection of insecticide resistance in the malaria vector *Anopheles* gambiae: a multigenerational study in controlled conditions. Parasit. Vectors 7, 480 (2014).

227. Shankar, A. H. Nutritional modulation of malaria morbidity and mortality. J. Infect. Dis. 182 Suppl 1, S37-53 (2000).

228. Fernando, S. D. et al. The impact of repeated malaria attacks on the school performance of children. Am. J. Trop. Med. Hyg. 69, 582-588 (2003).

229. Asenso-Okyere, W. K. & Dzator, J. A. Household cost of seeking malaria care. A retrospective study of two districts in Ghana. Soc. Sci. Med. 1982 45, 659-667 (1997).

230. Worrall, E., Basu, S. & Hanson, K. The relationship between socio-economic status and malaria: a review of the literature. London School of Hygiene and Tropical Medicine; World Bank (2003).

231. Greenwood, B. M., Bojang, K., Whitty, C. J. M. & Targett, G. A. T. Malaria. Lancet 365, 1487-1498 (2005).

232. Turley, R., Saith, R., Bhan, N., Rehfuess, E. & Carter, B. Slum upgrading strategies involving physical environment and infrastructure interventions and their effects on health and socio-economic outcomes. Cochrane Database Syst. Rev. 1, CD010067 (2013).

233. Schapira, A. & Boutsika, K. Malaria Ecotypes and Stratification. In D. Rollinson & S. I. Hay, ed.: Advances in Parasitology, Vol. 78, Amsterdam: Elsevier, 2012, pp. 97-167.

234. Green, A. Fighting restricts access to health care in South Sudan. Lancet 384, 1252 (2014).

235. Valle, D. & Lima, J. M. T. Large-scale drivers of malaria and priority areas for prevention and control in the Brazilian Amazon region using a novel multi-pathogen geospatial model. Malar. J. 13, 443 (2014).

236. Hahn, M. B., Gangnon, R. E., Barcellos, C., Asner, G. P. & Patz, J. A. Influence of deforestation, logging, and fire on malaria in the Brazilian Amazon. PloS ONE 9, e85725 (2014).

237. World Meteorological Organization & World Health Organization. Factsheet #2: Climate information for protecting human health (2009). <http://www.who.int/globalchange/mediacentre/events/2011/wcc3_factsheet2_health_en.pdf>

238. Luchavez, J. et al. Human infections with Plasmodium *knowlesi*, the Philippines. Emerg. Infect. Dis. 14, 811-813 (2008).

239. Figtree, M. et al. Plasmodium *knowlesi* in human, Indonesian Borneo. Emerg. Infect. Dis. 16, 672-674 (2010).

240. Martins, J. S., Zwi, A. B., Martins, N. & Kelly, P. M. Malaria control in Timor-Leste during a period of political instability: what lessons can be learned? Confl. Health 3, 11 (2009).

241. Connolly, M. A. et al. Communicable diseases in complex emergencies: impact and challenges. Lancet 364, 1974-1983 (2004).

242. Griffin, J. T. et al. Accelerating to zero: mathematical modelling of the potential for burden reduction and local elimination achievable with reducing Plasmodium falciparum transmission (2015). Under review.

243. Metschies, G. P. Public transport fares in African cities. GTZ Transport Database for Africa 2005. GTZ & Federal Ministry for Economic Cooperation and Development (2005).

244. Roll Back Malaria Partnership. The Global Malaria Action Plan. For a malaria-free world (2008).

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The global malaria community, WHO and the RBM Partnership all share the vision of a world free of malaria, and the ambitious yet feasible goals of reducing malaria mortality and incidence rates by at least 90%, and eliminating the disease in 35 more countries by 2030.

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