Report from the Global Malaria Programme

Malaria Policy Advisory Committee

Geneva, Switzerland

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11 April 2018

Global **Malaria** Programme

World Health Organization

GMP Strategy

I

In collaboration with the malaria community, address key **strategic questions** related to malaria control and elimination

II

Set, communicate & disseminate evidence-based **normative guidance**, policy advice and implementation guidance to support country action

III

Coordinate WHO **capacity building & technical support** to member states, jointly with Regions, ISTs and countries

IV

Help countries develop & implement robust **surveillance** systems to generate quality data and use that data to achieve greater impact

Independent score of global progress: are we on track ?

Global **Malaria** Programme

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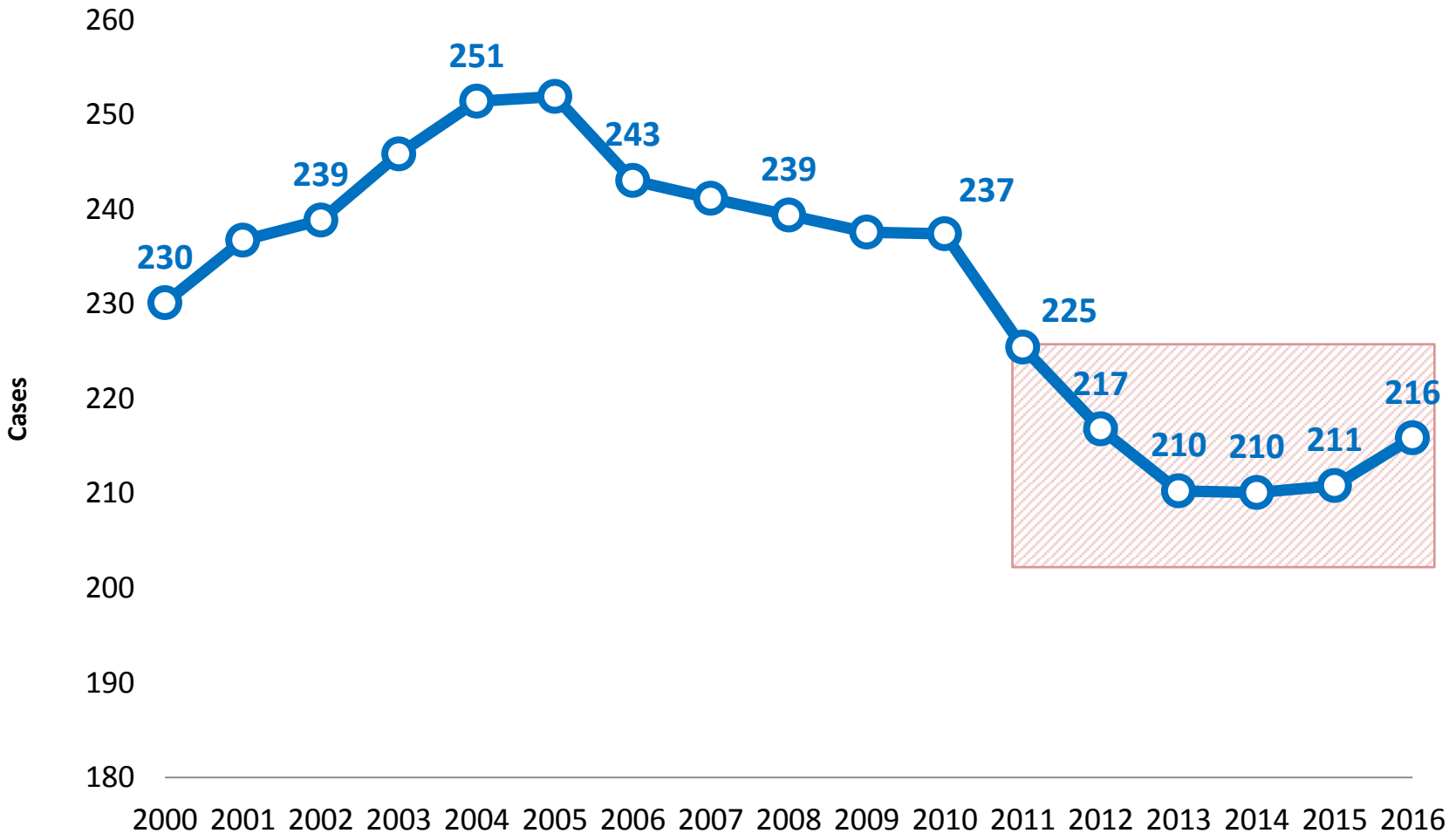
Number of malaria cases, 2016

TABLE 6.1.

Estimated malaria cases, 2010–2016 Estimated cases are shown with 95% upper and lower confidence intervals. *Source: WHO estimates*

	Number of cases (000)						
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Lower 95% CI	218 000	207 000	199 000	191 000	191 000	192 000	196 000
Estimated total	**237 000**	**225 000**	**217 000**	**210 000**	**210 000**	**211 000**	**216 000**
Upper 95% CI	278 000	267 000	262 000	256 000	256 000	257 000	263 000
Estimated *P. vivax*							
Lower 95% CI	10 490	11 170	9 930	6 800	6 440	6 060	6 430
Estimated total	**15 860**	**14 730**	**13 200**	**10 250**	**8 750**	**8 160**	**8 550**
Upper 95% CI	21 680	19 630	18 000	14 600	11 520	10 640	11 140

Number of malaria cases worldwide, 2000-2016



Number of malaria cases by region, 2016

TABLE 6.2.

Estimated malaria cases by WHO region, 2016 Estimated cases are shown with 95% upper and lower confidence intervals (CI). *Source: WHO estimates*

	Number of cases (000's)					
	African	Americas	Eastern Mediterranean	South-East Asia	Western Pacific	World
Lower 95% CI	176 000	665	3600	10 900	1200	198 000
Estimated total	**194 000**	**875**	**4300**	**14 600**	**1600**	**216 000**
Upper 95% CI	242 000	1190	5900	19 800	2100	265 000
Estimated *P. vivax*						
Lower 95% CI	182	405	1360	3280	214	6430
Estimated total	**859**	**556**	**1790**	**4960**	**385**	**8550**
Upper 95% CI	2090	786	2340	7234	592	11 140
Proportion of *P. vivax* cases	0.4%	64%	42%	34%	24%	4%

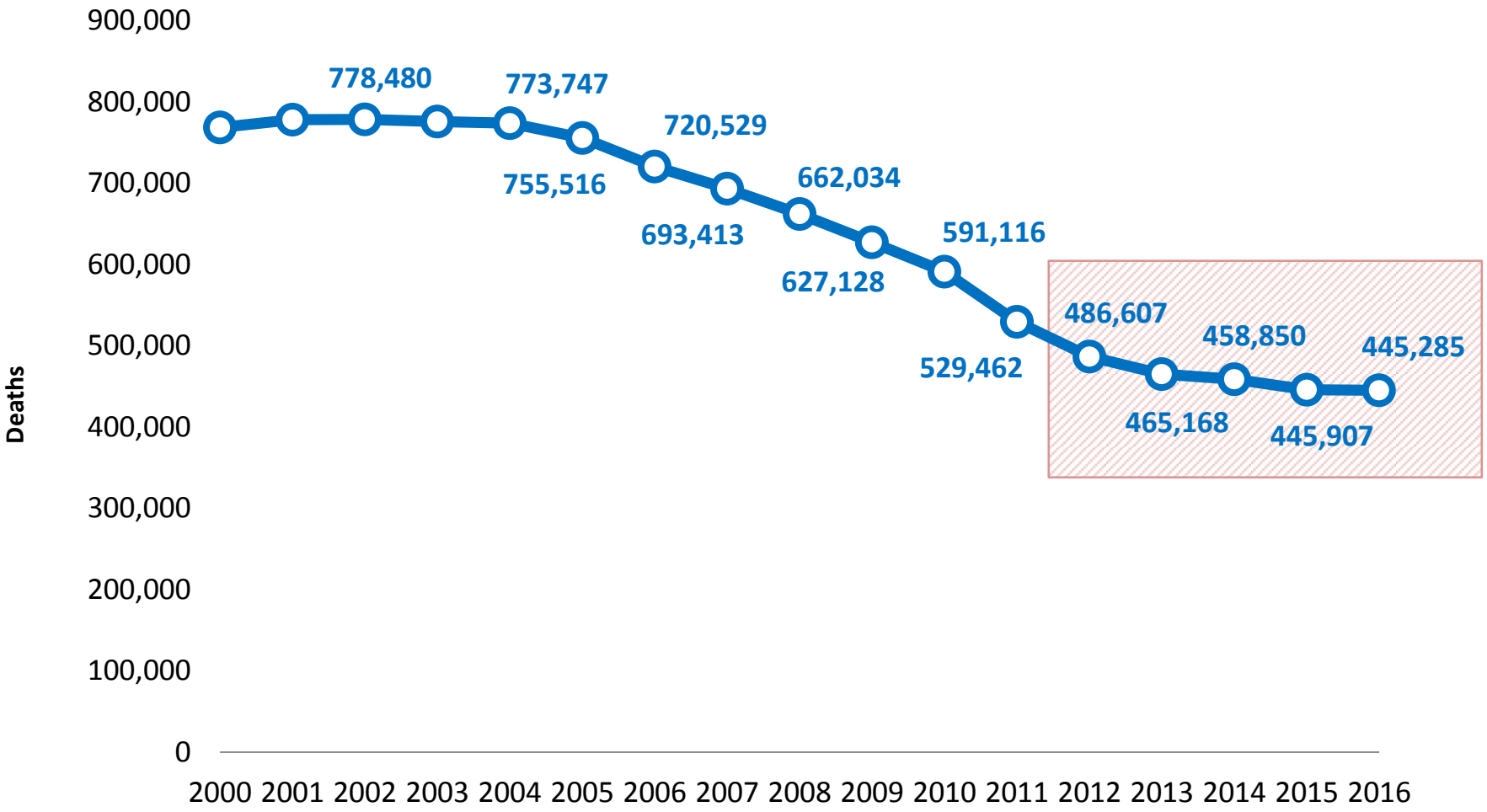
Malaria mortality globally and by region, 2010-2016

TABLE 6.4.

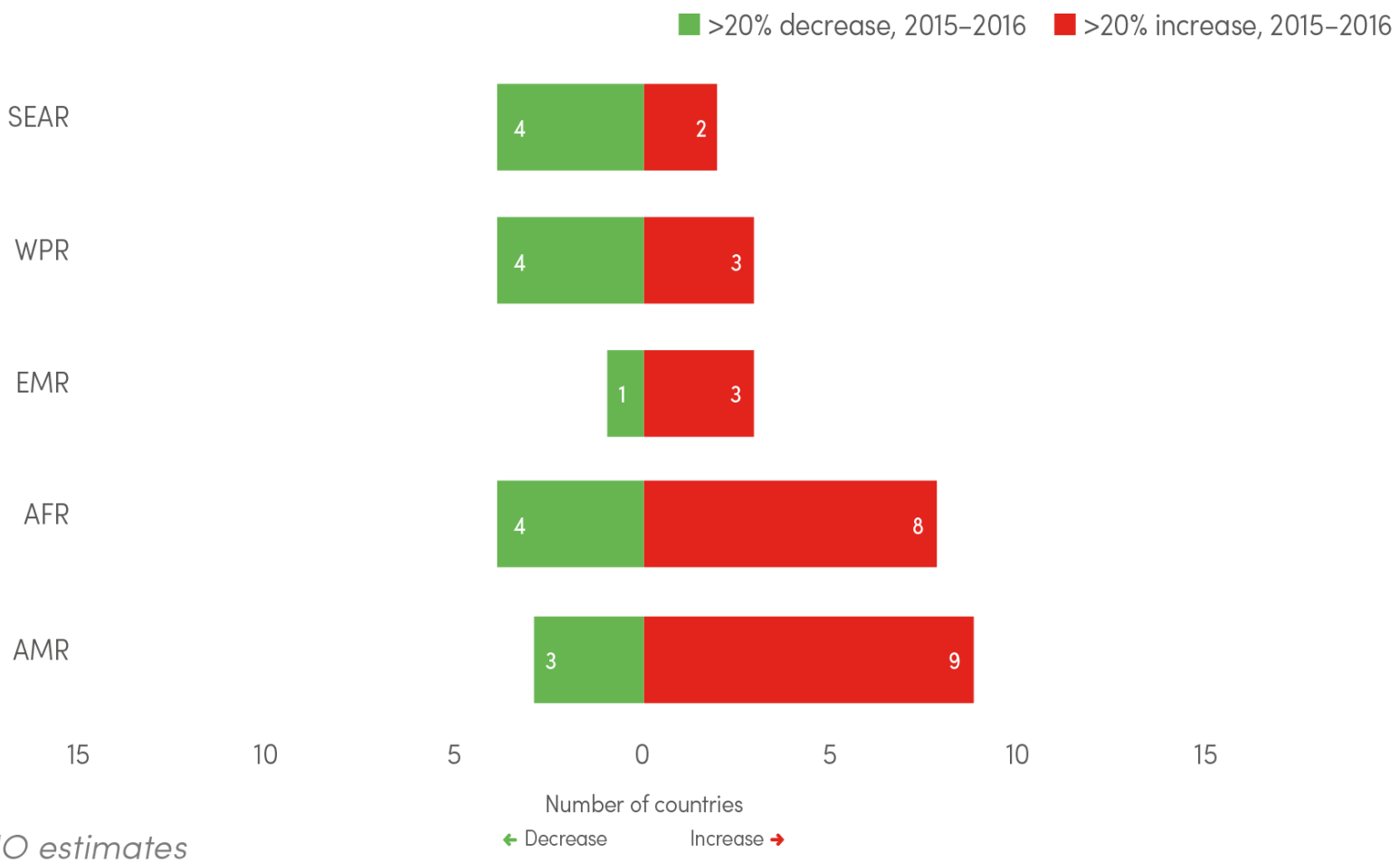
Estimated number of malaria deaths by WHO region, 2010–2016 *Source: WHO estimates*

	Number of deaths						
	2010	2011	2012	2013	2014	2015	2016
African	538 000	484 000	445 000	430 000	423 000	409 000	407 000
Eastern Mediterranean	7 200	7 100	7 700	7 800	7 800	7 600	8 200
European	0	0	0	0	0	0	0
Americas	830	790	630	620	420	450	650
South-East Asia	41 700	34 000	29 000	22 000	25 000	26 000	27 000
Western Pacific	3 800	3 300	4 000	4 300	2 900	2 600	3 300
World	**591 000**	**529 000**	**487 000**	**465 000**	**459 000**	**446 000**	**445 000**

Number of malaria deaths worldwide, 2000-2016



Decreases and increases in cases >20%, 2015-2016



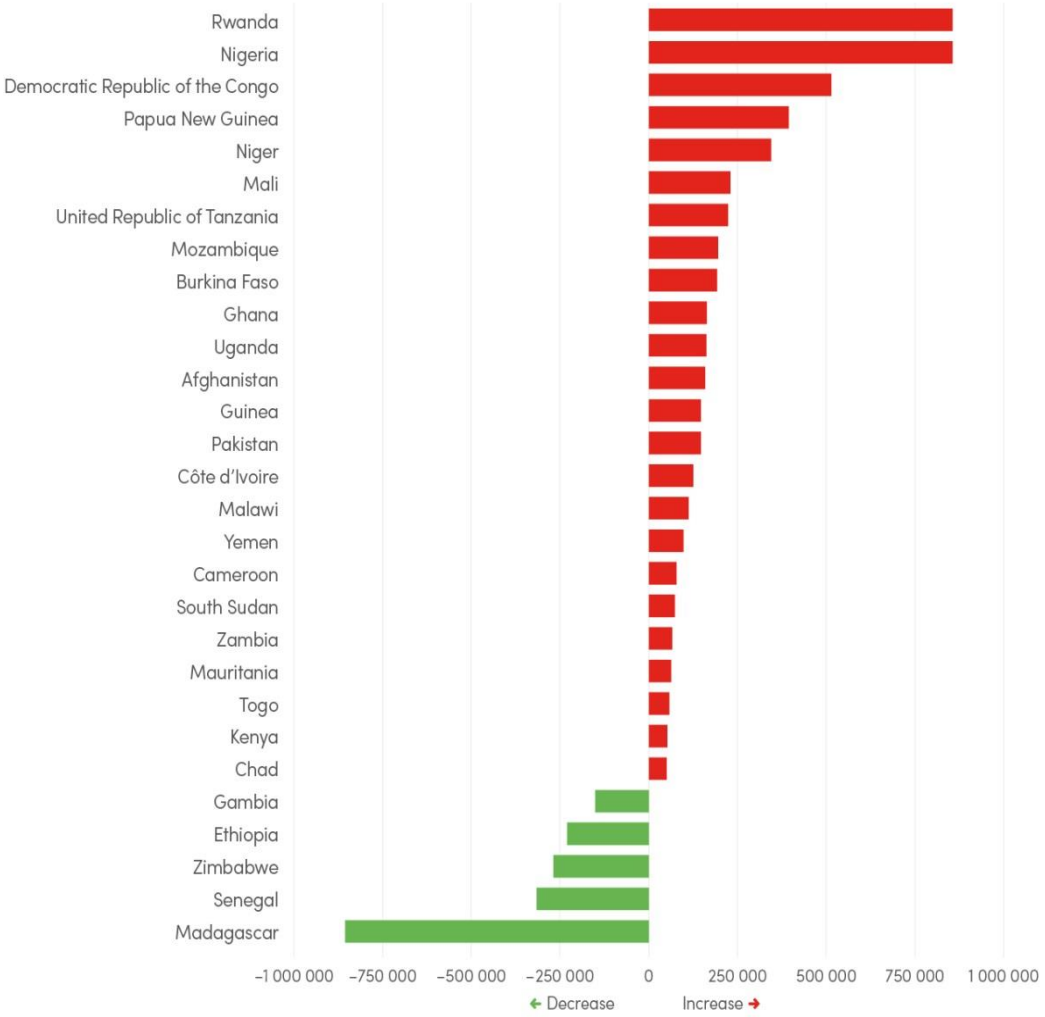
Source: WHO estimates

AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

High-burden countries (300 000 cases or more) with a change in cases of at least 50 000 from 2015-2016

FIG. 6.4.

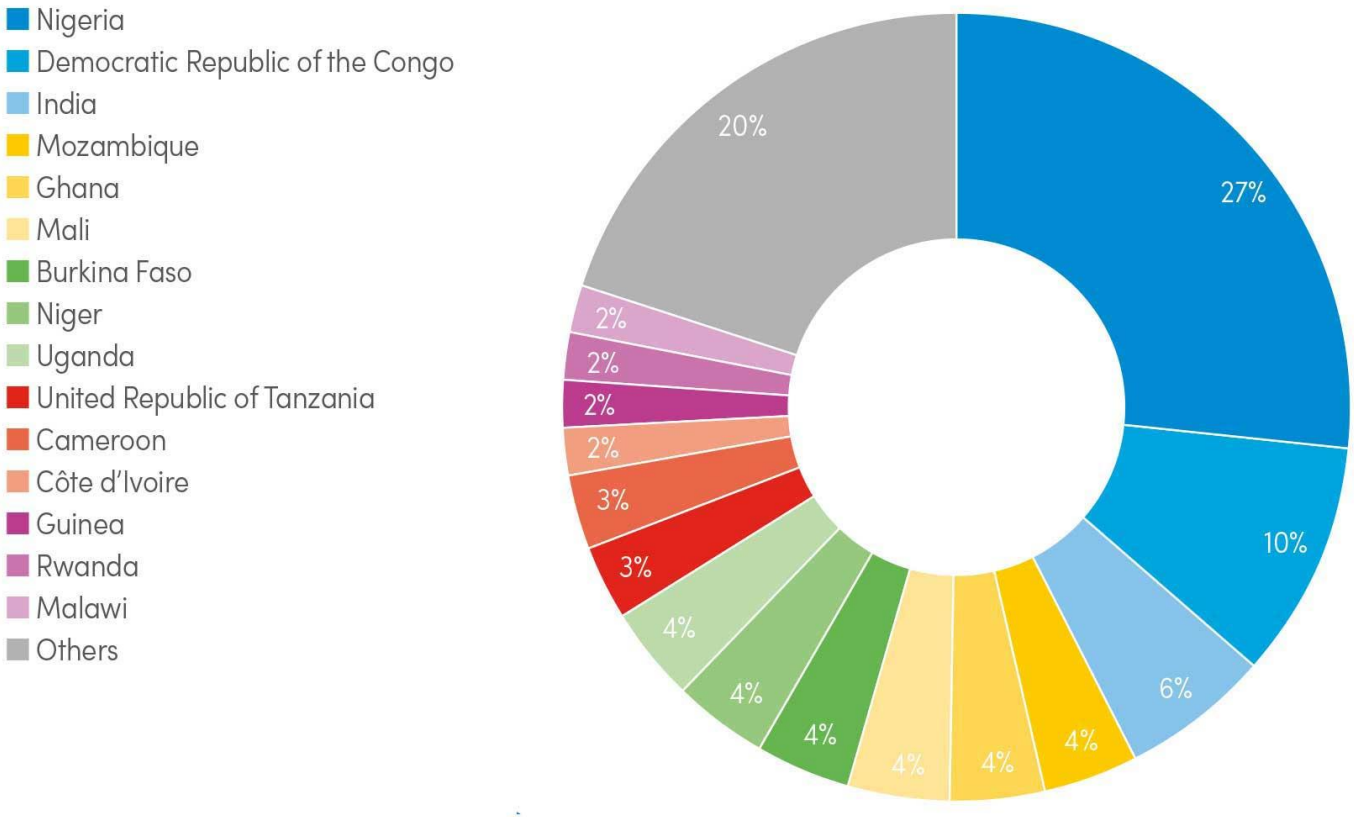
Differences in malaria cases in 2015 and 2016 in countries with more than 300 000 malaria cases in 2015 Positive values indicate an increase, and negative values indicate a decrease. *Source: WHO estimates*



Malaria cases by country, 2016

FIG. 6.2.

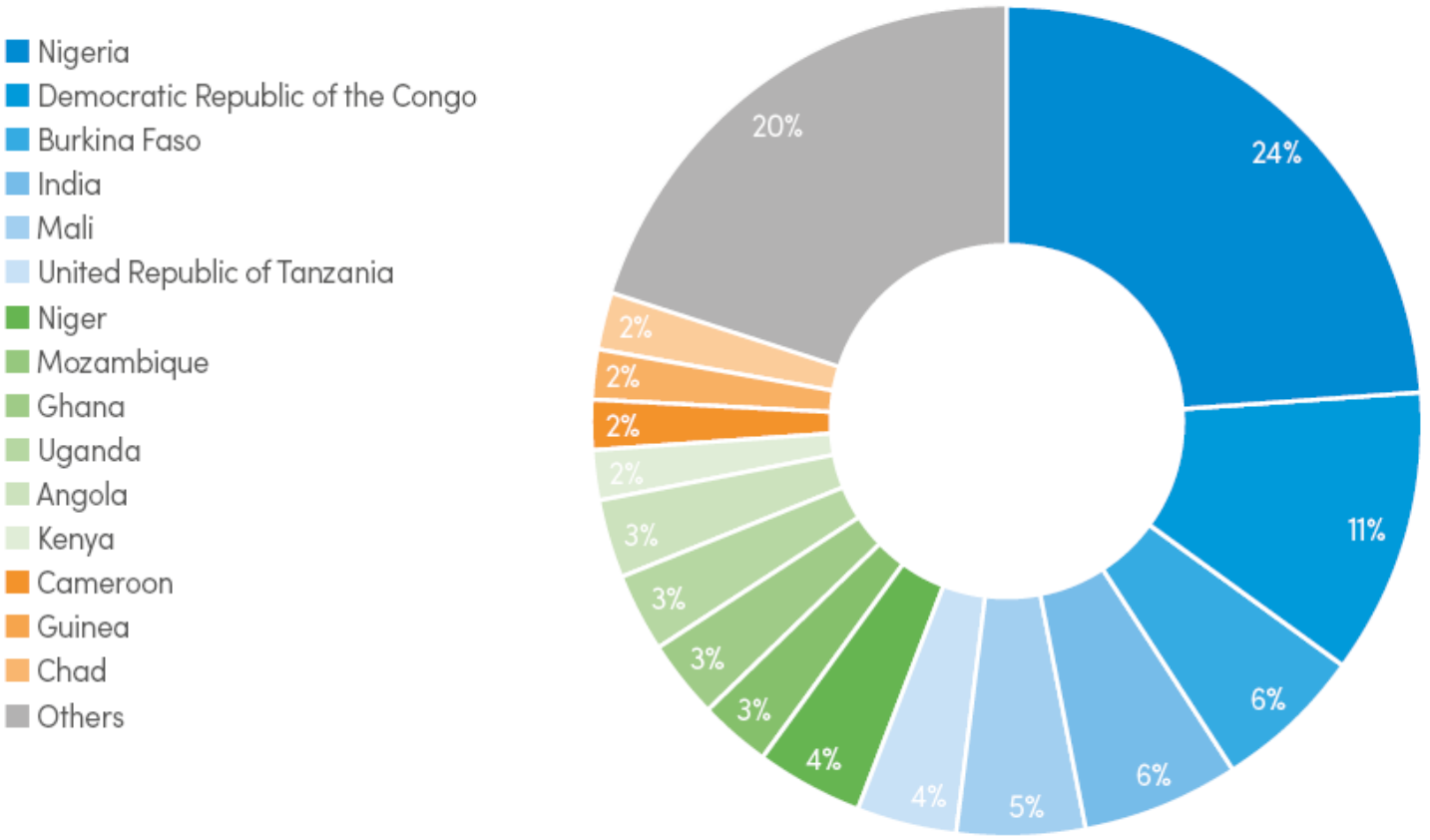
Estimated country share of total malaria cases, 2016 *Source: WHO estimates*



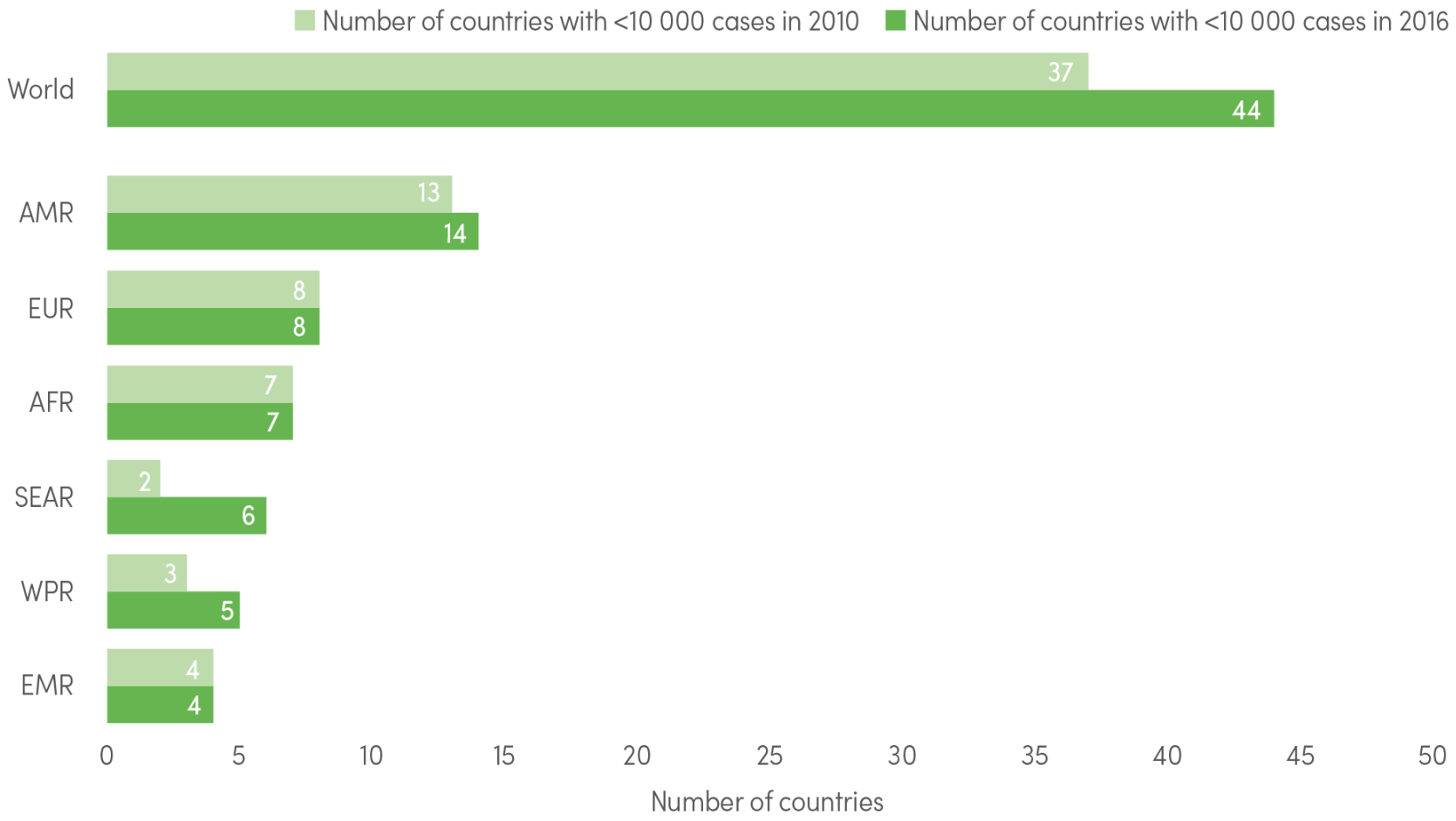
Malaria mortality by country, 2016

FIG. 6.7.

Proportion of estimated malaria deaths attributable to the 15 countries with nearly 80% of malaria deaths globally in 2016 *Source: WHO estimates*



Number of countries that were endemic in 2000 with <10 000 malaria cases in 2010 and 2016, by WHO region



AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; EUR, WHO European Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

Source: National malaria control programme reports

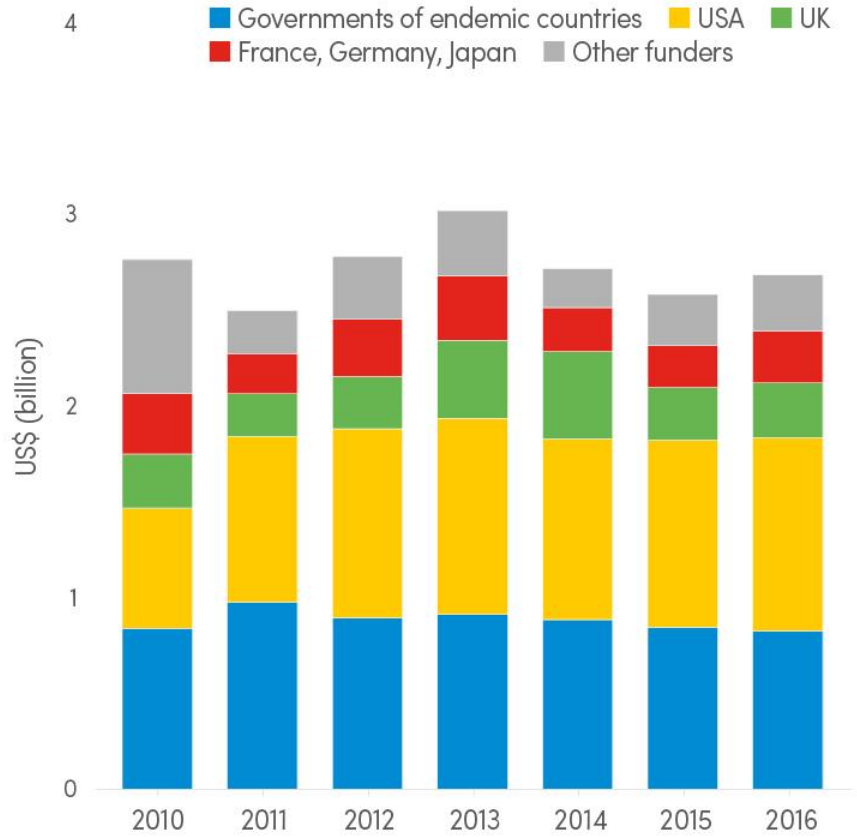
Global **Malaria** Programme

World Health Organization

Malaria funding, 2010-2016 – source

FIG. 2.1.

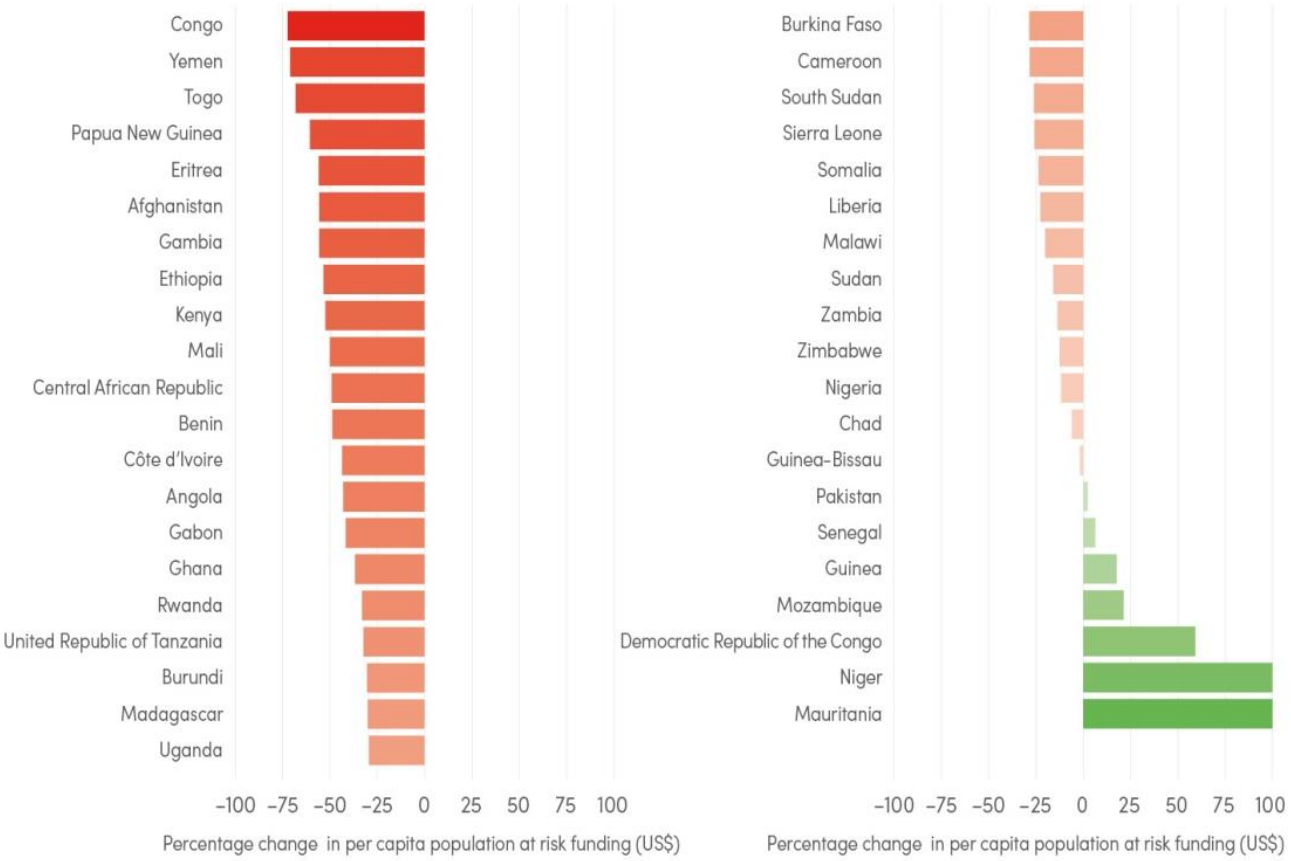
Investments in malaria control and elimination by source of funds[2] (constant 2016 US$), 2010–2016



Malaria funding in 41 high-burden countries

FIG. 8.2.

Percentage change in average of funding (US$) per capita population at risk in 2011–2013 and 2014–2016 in 41 high burden countries *Sources: ForeignAssistance.gov; Global Fund to Fight AIDS, Tuberculosis and Malaria; national malaria control programmes; Organisation for Economic Co-operation and Development creditor reporting system; the World Bank Data Bank; Department for International Development*

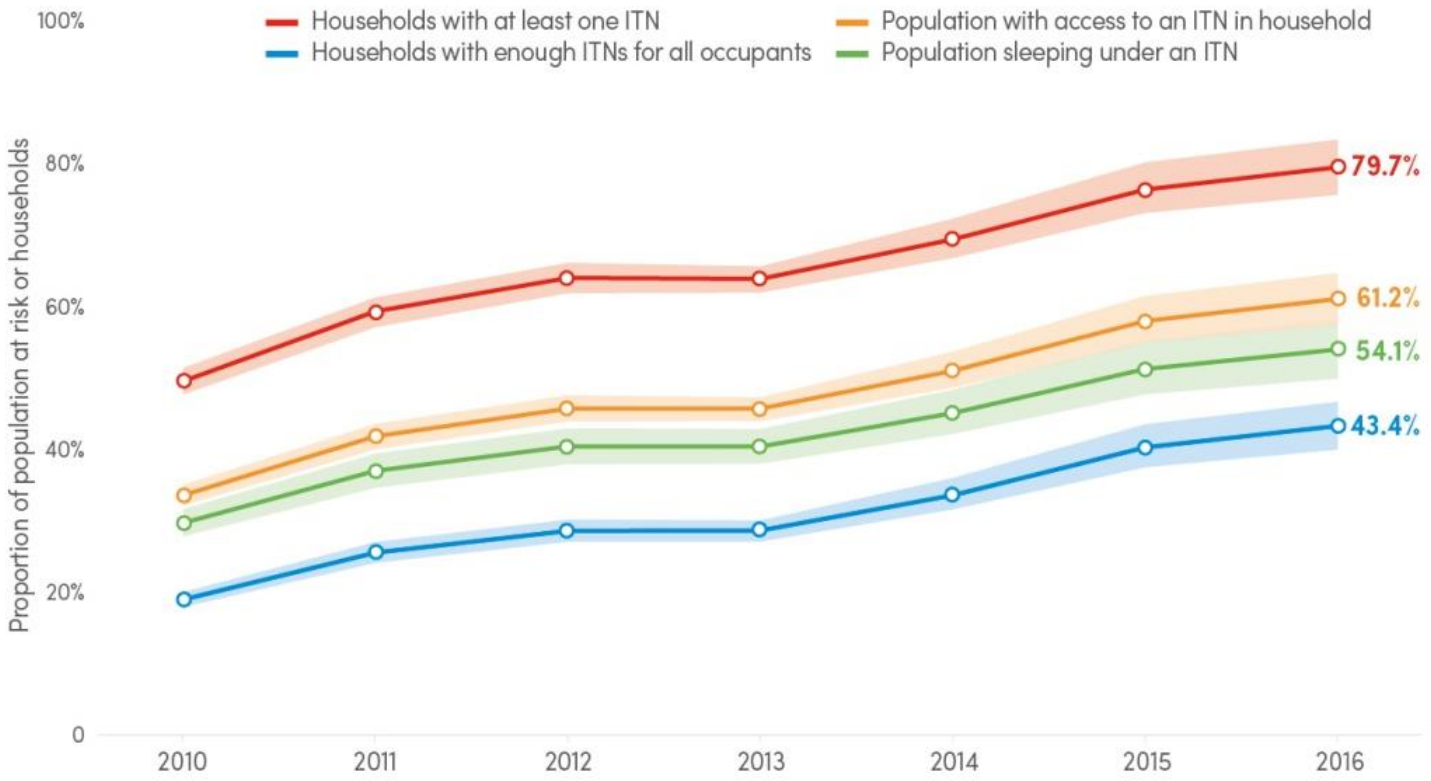


Coverage of insecticide-treated nets (ITNs) in sub-Saharan Africa, 2010-2016

FIG. 3.1.

Proportion of population at risk with access to an ITN and sleeping under an ITN, and proportion of households with at least one ITN and enough ITNs for all occupants, sub-Saharan Africa, 2010–2016

Source: Insecticide-treated mosquito net coverage model from Malaria Atlas Project[6]

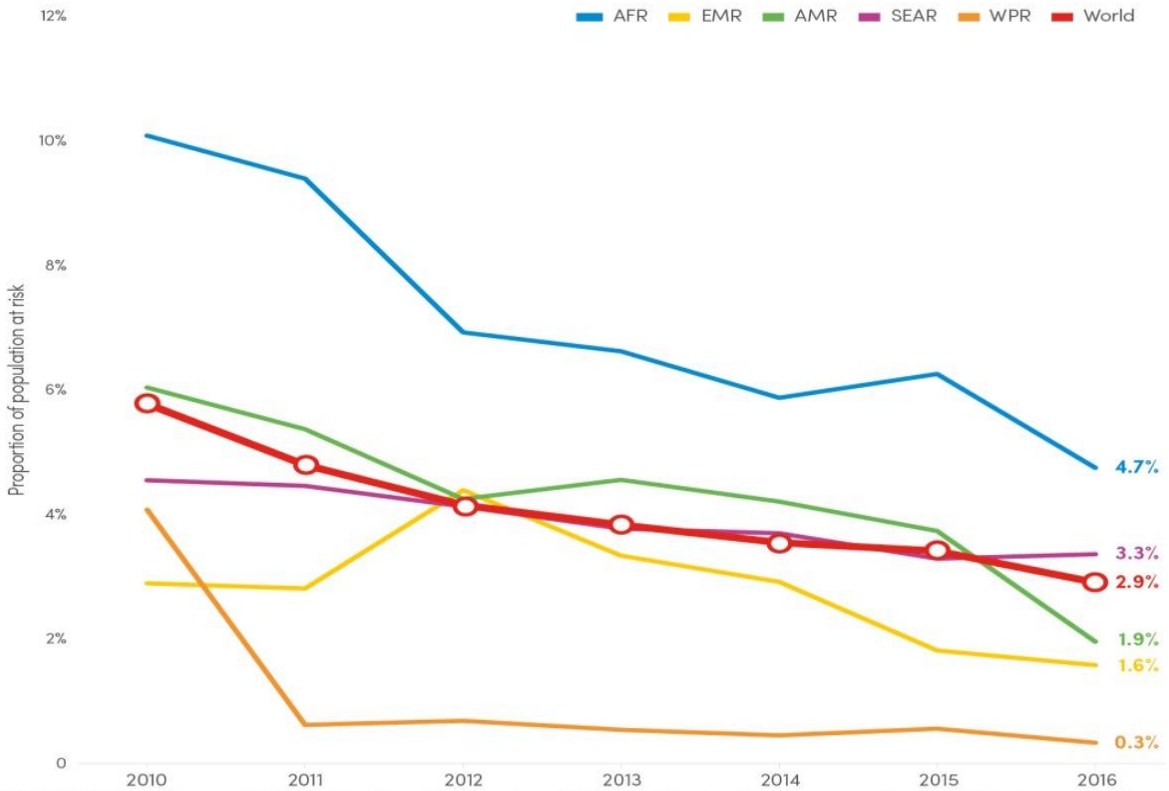


ITN, insecticide-treated mosquito net

Population protected by indoor residual spraying (IRS), 2010-2016

FIG. 3.4.

Proportion of the population at risk protected by IRS by WHO region, 2010–2016 *Source: National malaria control programme reports*



AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; IRS, indoor residual spraying; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

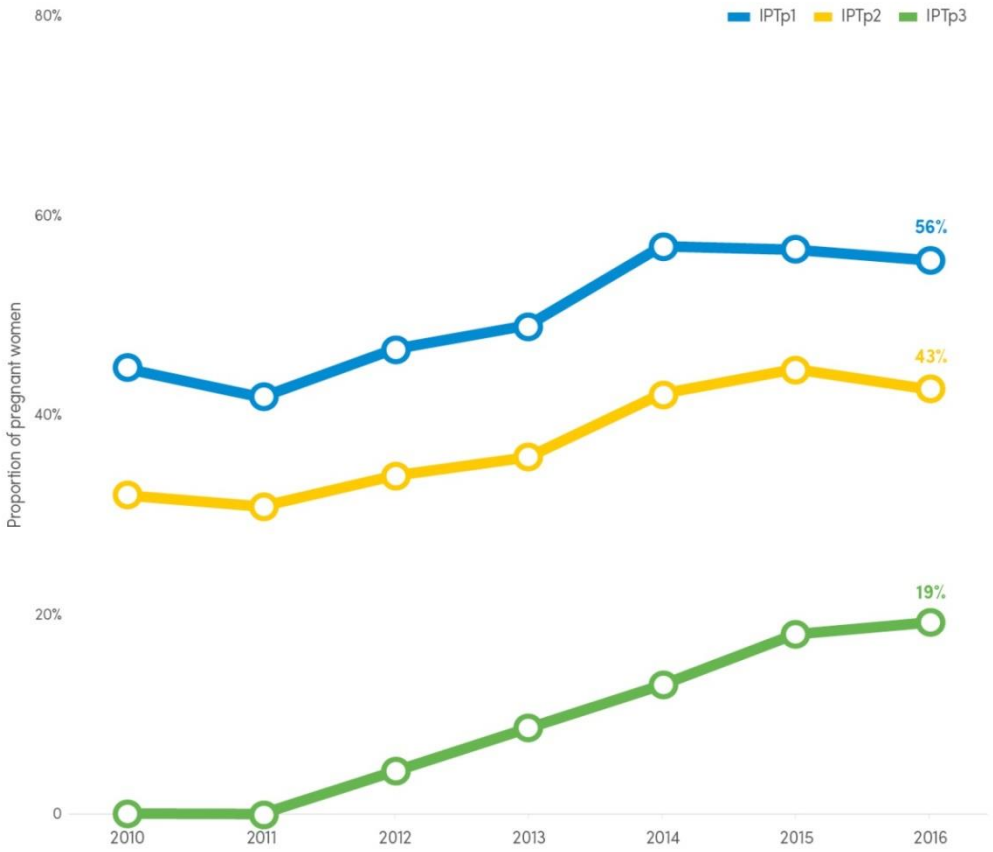
People at risk of malaria protected by IRS:

- **2010:** 180 million
- **2016:** 100 million

Intermittent preventive treatment of malaria in pregnancy (IPTp) in sub-Saharan Africa, 2010-2016

FIG. 3.7.

Proportion of pregnant women attending ANC at least once and receiving IPTp, by dose, sub-Saharan Africa, 2010–2016 *Source: National malaria control programme reports*

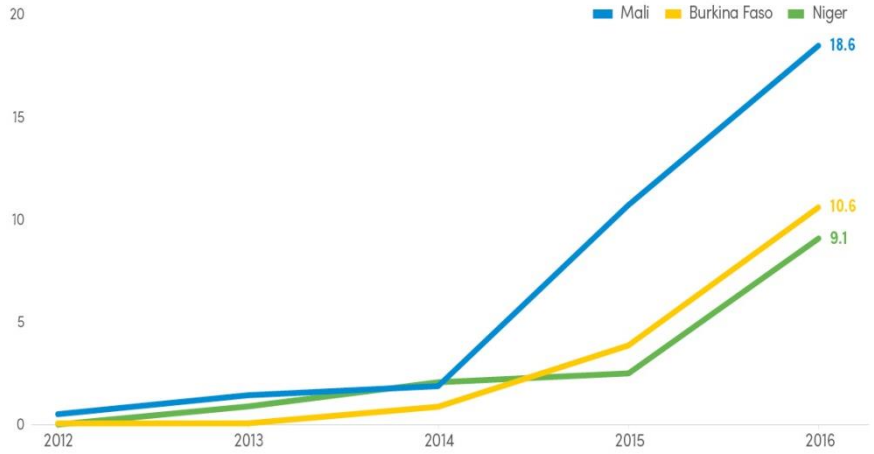


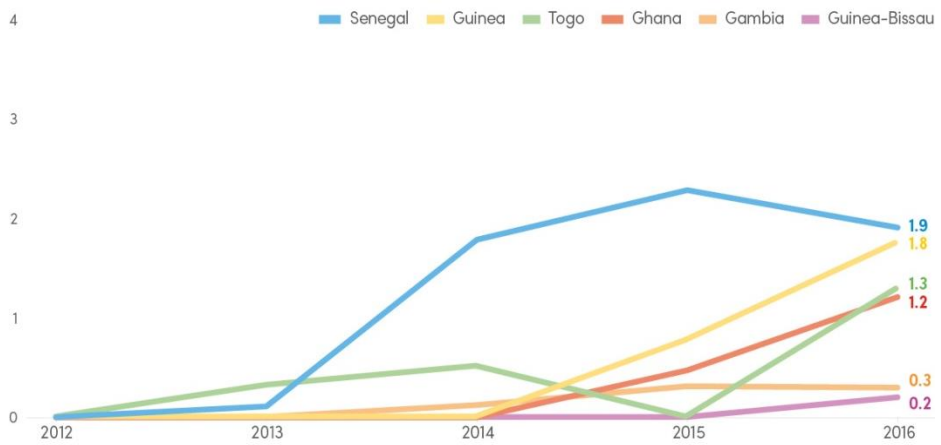
ANC, antenatal care; IPT, intermittent preventive treatment in pregnancy

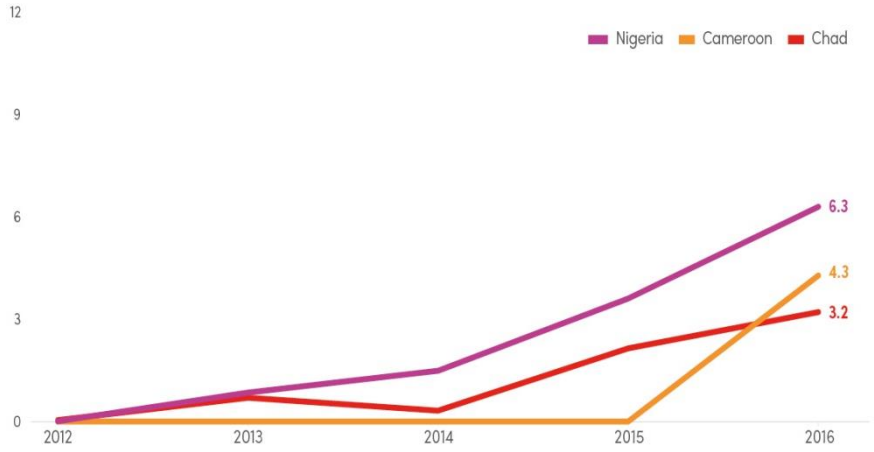
Seasonal malaria chemoprevention (SMC) in the Sahel subregion of Africa, 2012-2016

FIG. 3.9.

Number of SMC treatments administered in scale-up countries, 2012–2016 (in million) *Source: Seasonal Malaria Chemoprevention Working Group*







SMC, seasonal malaria chemoprevention

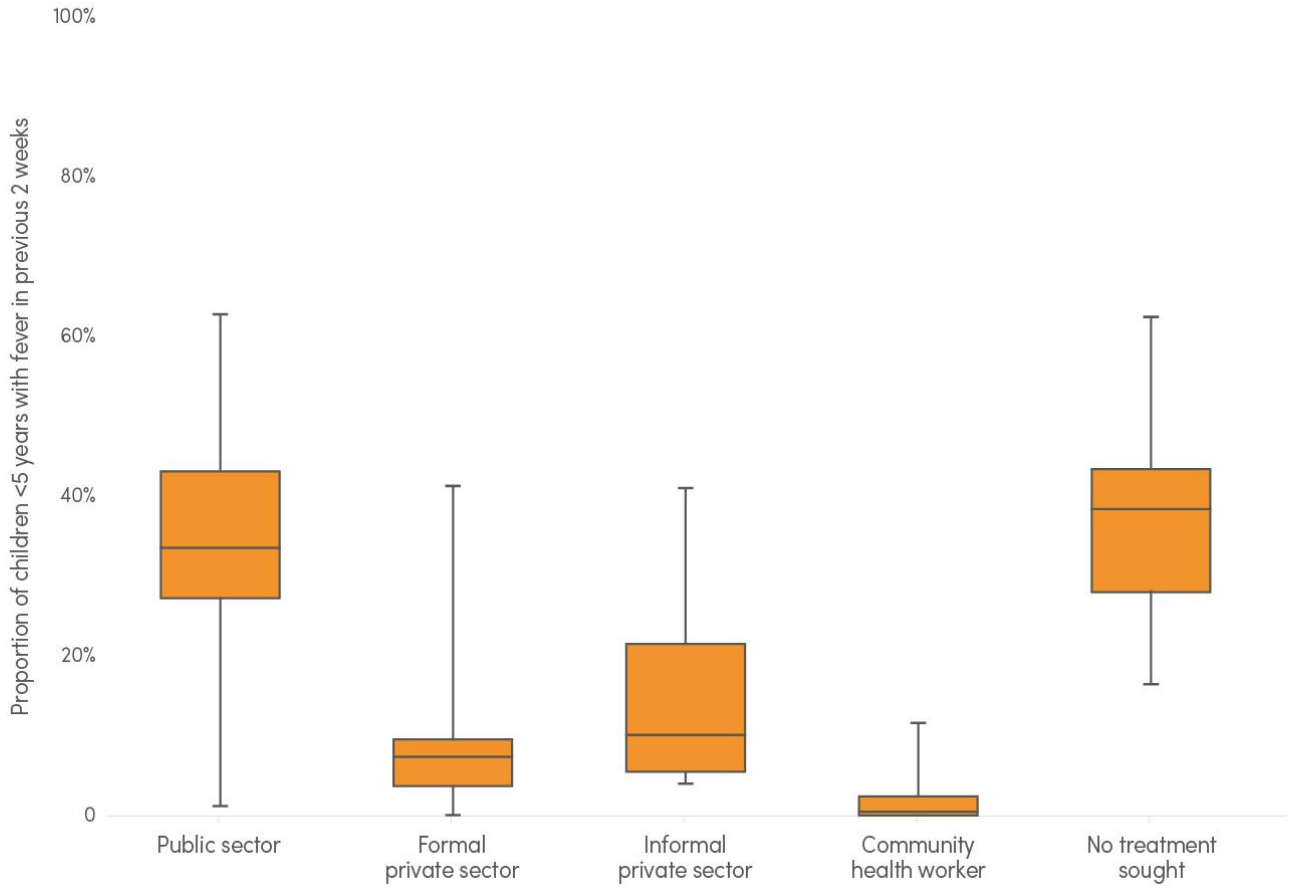
In 2016, 15 million children in 12 countries protected by SMC leaving a coverage gap of 13 million children

Proportion of children under five with a fever for whom care was sought in sub-Saharan Africa, 2014-2016

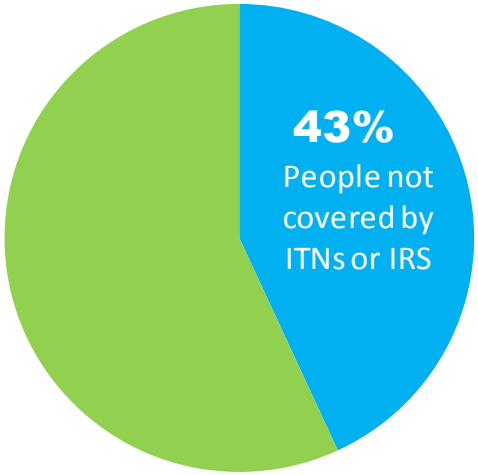
FIG. 4.1.

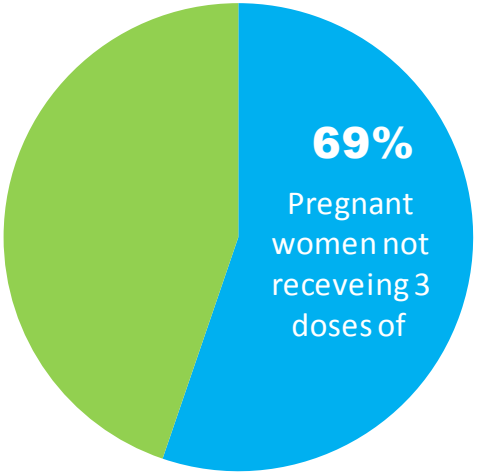
Proportion of febrile children for whom care was sought, by health sector, sub-Saharan Africa, 2014–2016

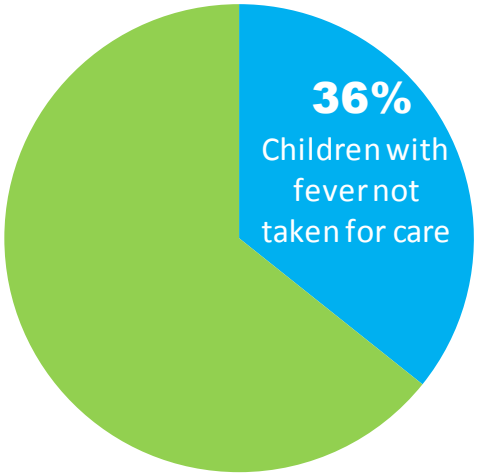
Sources: Nationally representative household survey data from demographic and health surveys, and malaria indicator surveys



An unfinished agenda – coverage gaps





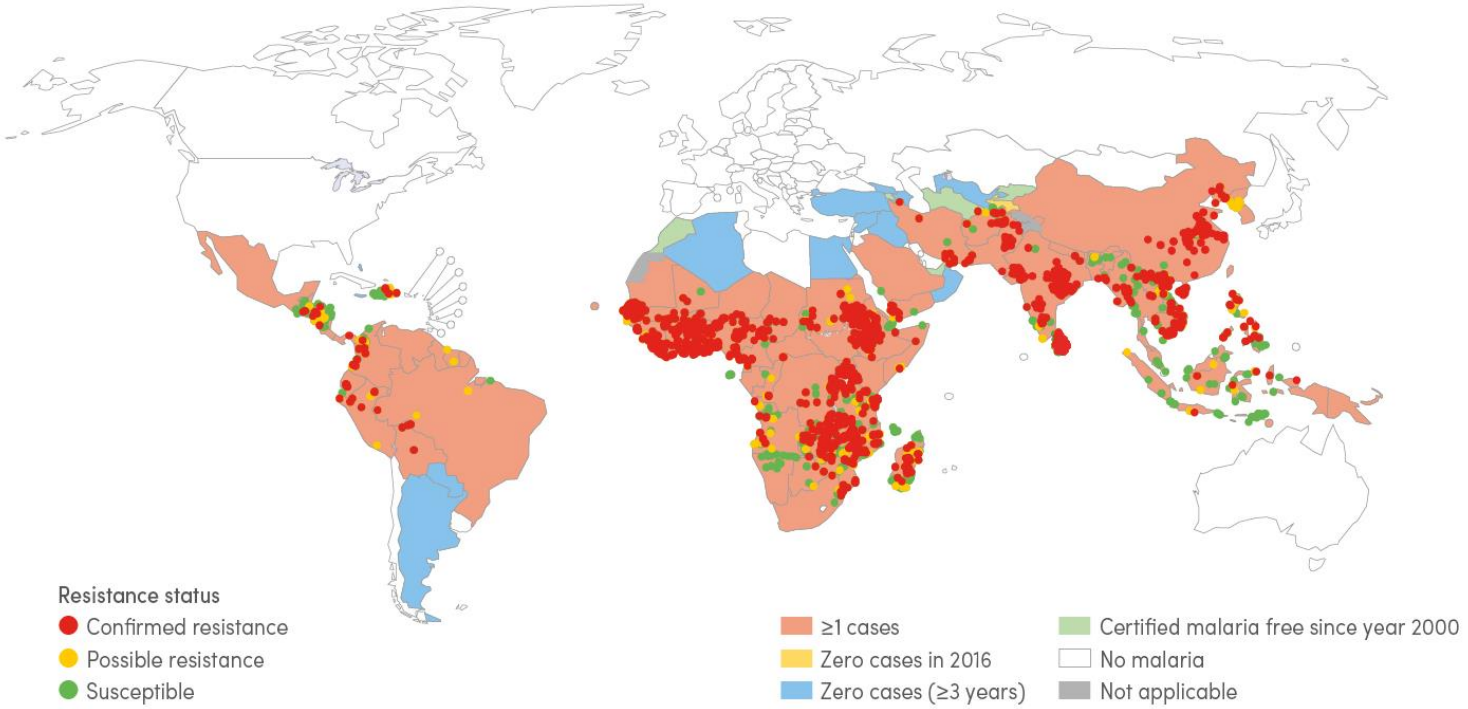


In many countries with a high malaria burden, health systems remain under-resourced

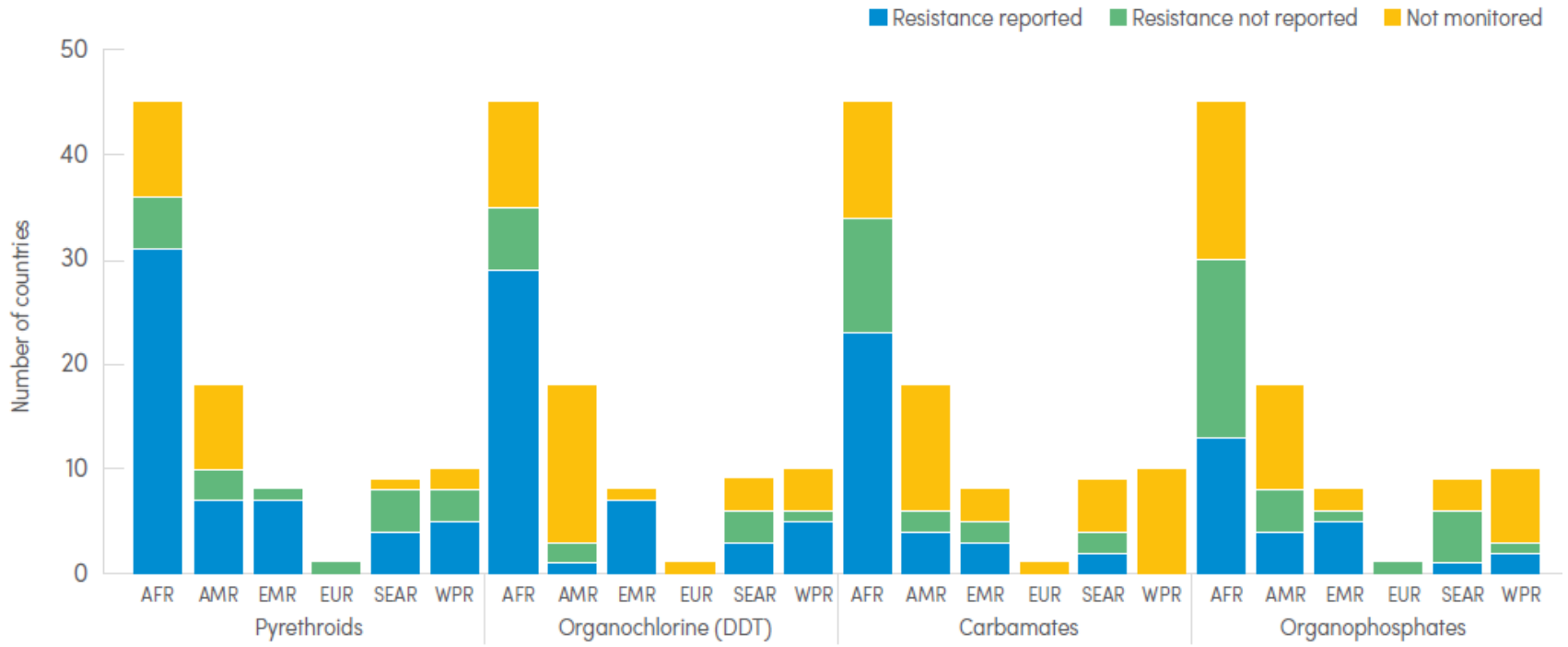
The challenges: insecticide resistance

FIG. 8.8.

Reported pyrethroid resistance status of malaria vectors measured with insecticide bioassays, 2010–2016 Data are from standard WHO insecticide susceptibility or Centers for Disease Control and Prevention (CDC) bottle bioassays. Where multiple insecticide classes or types, mosquito species or time points were tested, the most recent resistance status is shown. *Sources: National malaria control programme reports, African Network for Vector Resistance, Liverpool School of Tropical Medicine, Malaria Atlas Project, US President's Malaria Initiative and scientific publications*



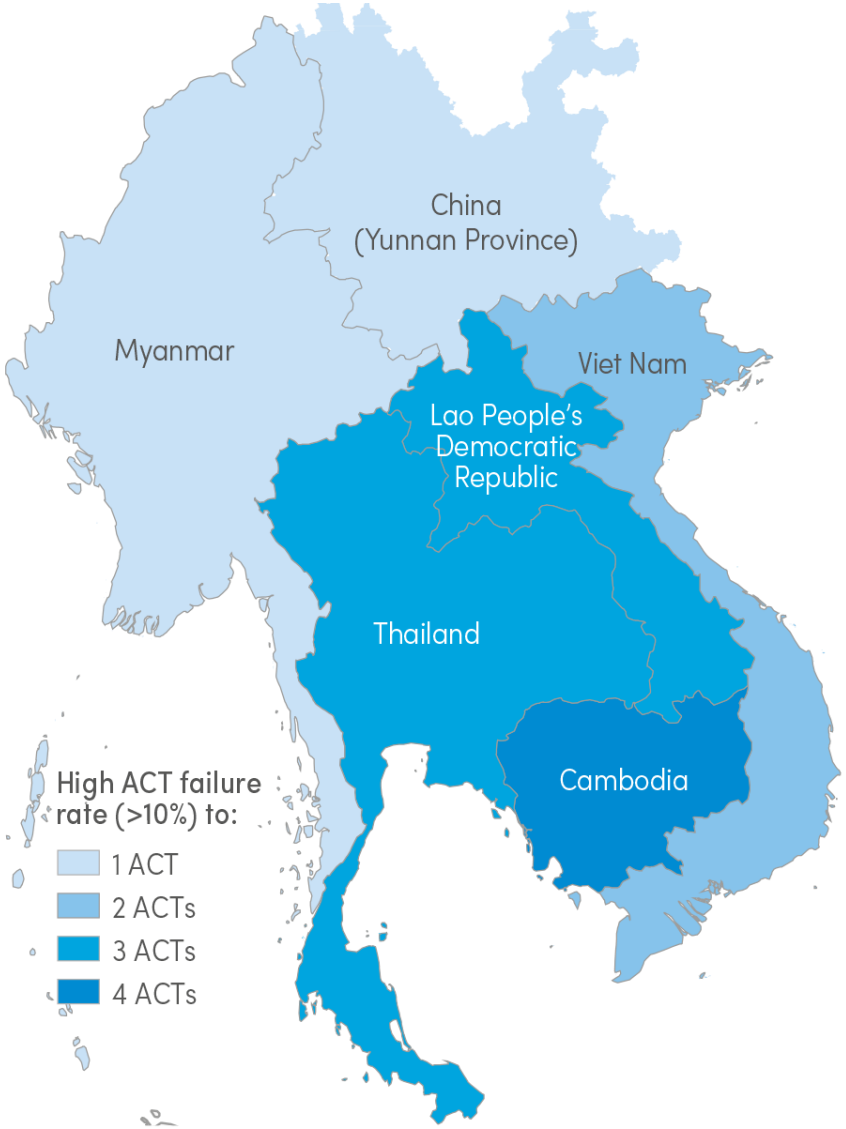
The challenges: insecticide resistance



AFR, WHO African Region; AMR, WHO Region of the Americas; DDT, dichloro-diphenyl-trichloroethane; EMR, WHO Eastern Mediterranean Region; EUR, European Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

- Mosquito resistance to at least one insecticide reported from 60 countries
- A WHO-coordinated 5-country evaluation showed that ITNs still remained effective

The challenges: drug resistance

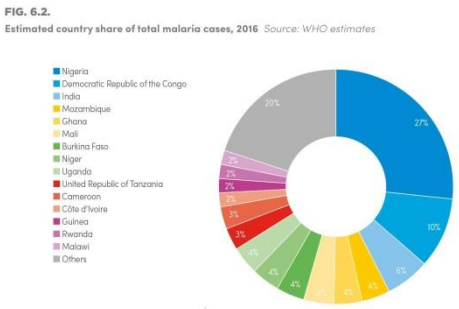


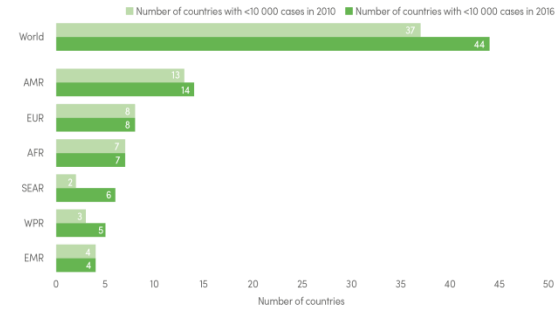
- The colour scale in the map denotes the number of ACTs that have failed across the subregion
- Currently, the first-line treatments in all 5 countries are efficacious

Conclusion 1

We are not on track to meet the 2020 morbidity and mortality targets

The world increasingly divided into 2 distinct groups





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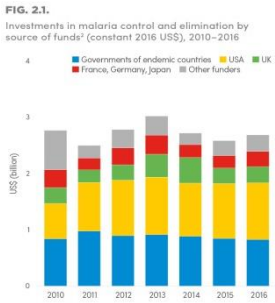
Source: National malaria control programme reports



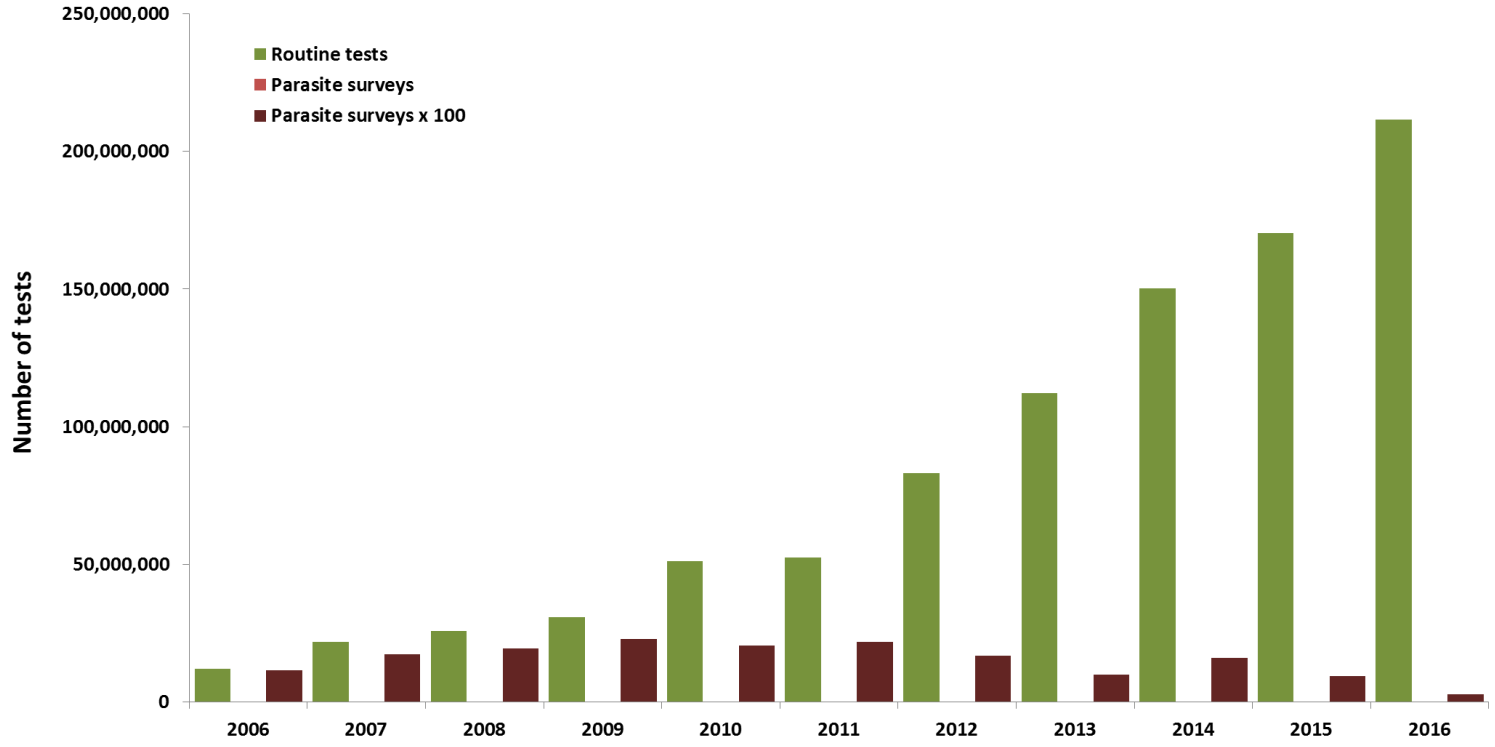
Conclusion 2

New challenges and opportunities in estimating burden of disease

Transitioning from modelling to use of routine data

Number of persons tested, household surveys vs routine data, SSA

921 million *vs* 1.7 million tests between 2006 and 2016



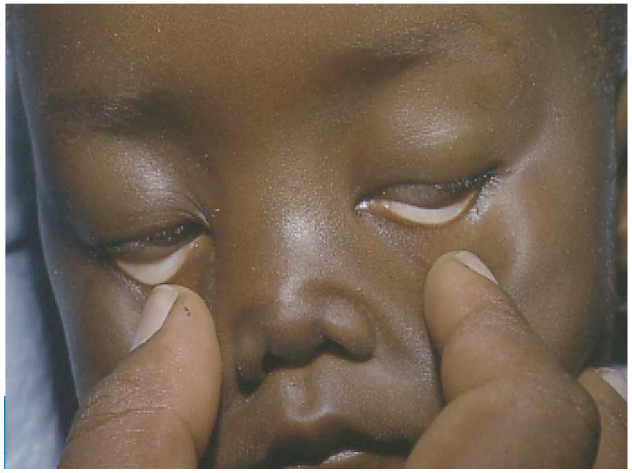
Comparisons of parasite rate-to-incidence vs adjusted routine data model estimates

TABLE 6.3.

Cases estimated using: parasite rate-to-incidence model (current WHO approach); cases confirmed in the public health sector; and cases confirmed in the public health sector, adjusted for confirmation, reporting and treatment seeking rates *Source: National malaria control programme reports and WHO estimates*

Country	Method i) Parasite-to-incidence model (current WHO approach)	Method ii) Confirmed cases in the public health sector	Method iii) Cases confirmed in the public health sector, adjusted for confirmation, reporting and treatment seeking rates	Ratio of cases (Method i:Method iii)
Angola	3 465 156	3 794 253	7 369 301	0.47
Burkina Faso	7 892 794	9 779 154	17 751 661	0.44
Burundi	1 643 872	8 274 062	15 468 564	0.11
Guinea-Bissau	132 586	150 903	253 423	0.52
Kenya	3 519 272	2 783 846	9 583 406	0.37
Liberia	1 093 659	1 191 137	4 659 583	0.23
Malawi	4 506 310	4 827 373	9 890 653	0.46
Mozambique	8 872 978	8 520 376	14 503 748	0.61
Sierra Leone	2 244 481	1 775 306	2 977 452	0.75
United Republic of Tanzania	6 880 659	5 193 520	10 865 481	0.63
Uganda	7 768 405	9 385 132	31 288 839	0.25
Zambia	3 148 638	4 851 319	8 541 200	0.37
Total	**51 168 810**	**60 526 381**	**133 153 311**	**0.38**

Challenges in improving mortality estimates: severe malaria, direct and indirect mortality



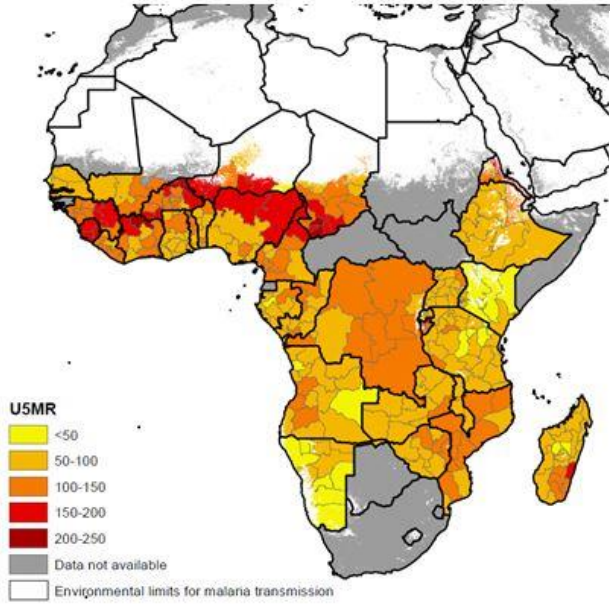
What are the implications ?

How do we get back on track to meet the GTS morbidity and mortality 2020 / 2025 targets ?

Assumptions for the next five years

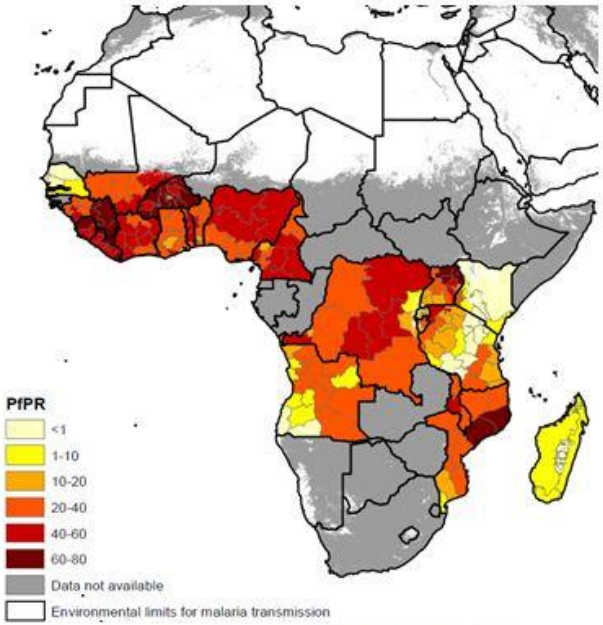
- Challenging financial landscape
- Unlikely to see new transformative tools
- Malaria can be diagnosed and is entirely treatable. No one should be dying of malaria
- Malaria deaths are not evenly distributed
- Status quo is not an option

U5M (surveys in 32 countries)



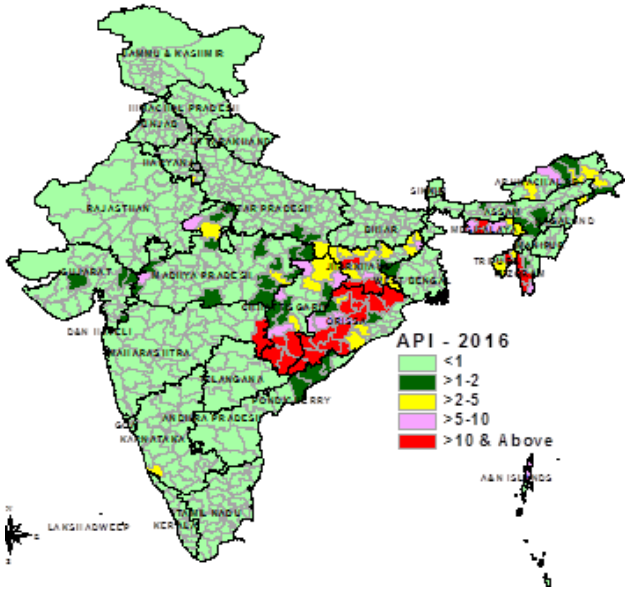
Source : WHO calculation using Demographic and Health Surveys (as of 15 March 2018). DHS were conducted in 2016 in Uganda, Senegal and Ethiopia, in 2015-16 in Angola, Malawi and Tanzania, in 2015 in Zimbabwe, in 2014-15 in Chad and Rwanda, in 2014 in Ghana and Kenya, in 2013-14 in DRC, Togo and Zambia, and in 2013 in Gambia, Liberia, Namibia, Nigeria, Sierra Leone, in 2012-13 in Mali, in 2012 in Comoros, Gabon, Guinea and Niger, in 2011-2012 in Benin, Congo, Côte d'Ivoire, in 2011 in Cameroon and Mozambique, in 2010 in Burundi and Burkina Faso, in and in 2008-09 in Madagascar and Sao Tome and Principe.

PfPR (surveys in 22 countries)



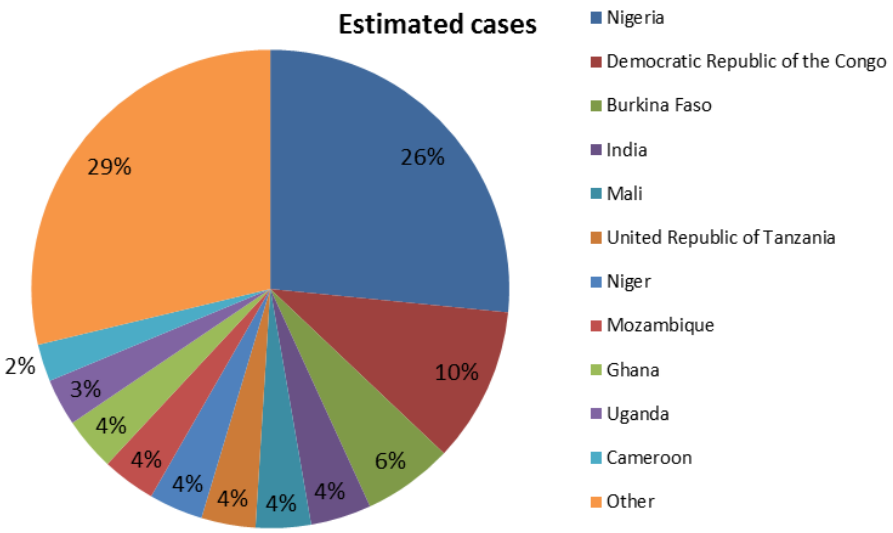
Source : WHO calculation using DHS/MIS (as of 26 March 2018) conducted in 2016 in Ghana, Liberia, Madagascar, Senegal, Sierra Leone and Uganda, in 2015-16 in Angola and Tanzania, in 2015 in Kenya, Mali, Mozambique and Nigeria, in 2014-15 in Rwanda, in 2014 in Burkina Faso and Malawi, in 2013-14 in DRC and Togo, in 2013 in Gambia, in 2012 in Burundi and Guinea, in 2011-2012 in Benin and Côte d'Ivoire.

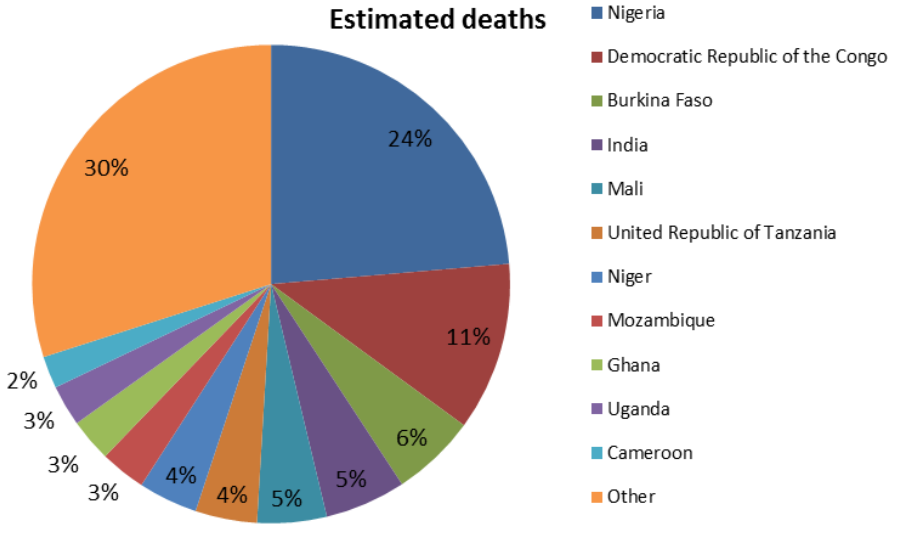
API in India, 2016



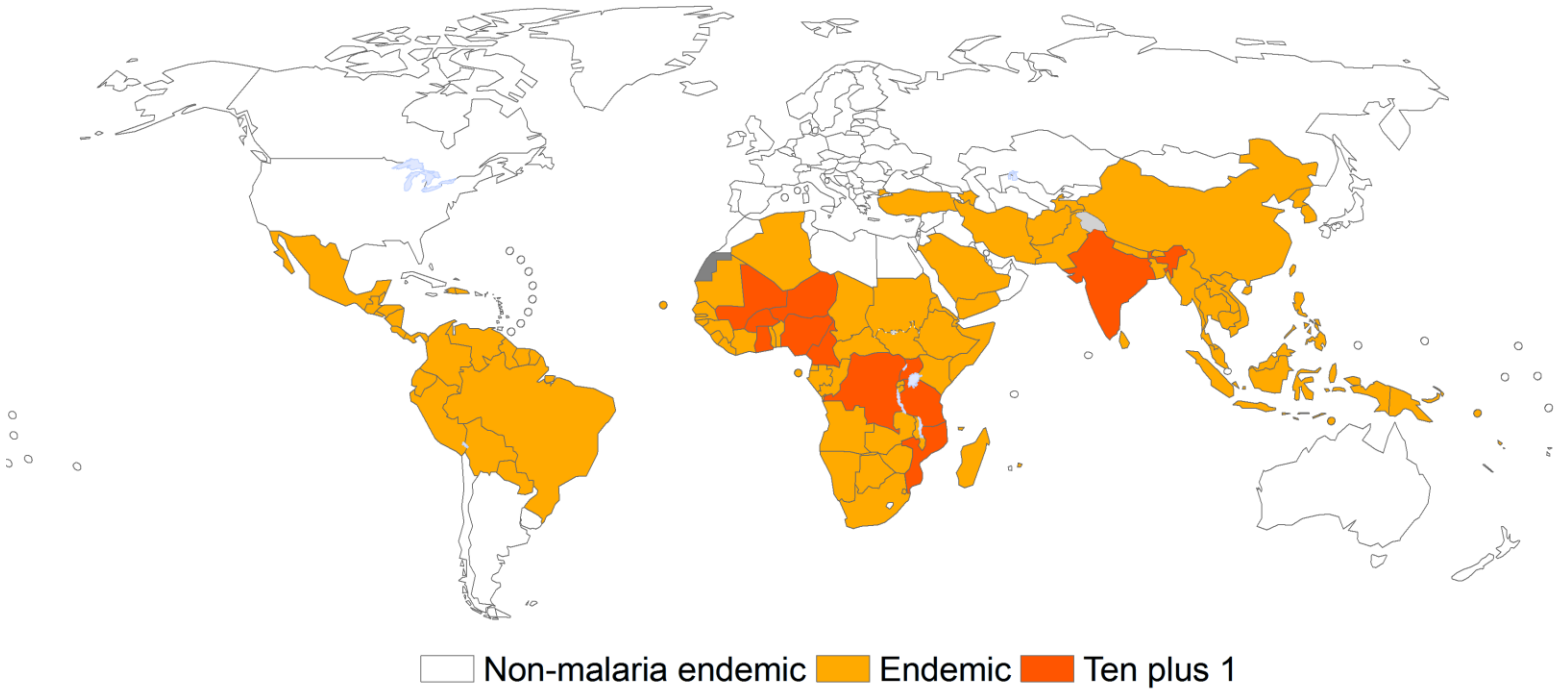
Contributes to *>62%* of cases outside Africa

11 countries contribute to 71% of cases and 70% of deaths globally



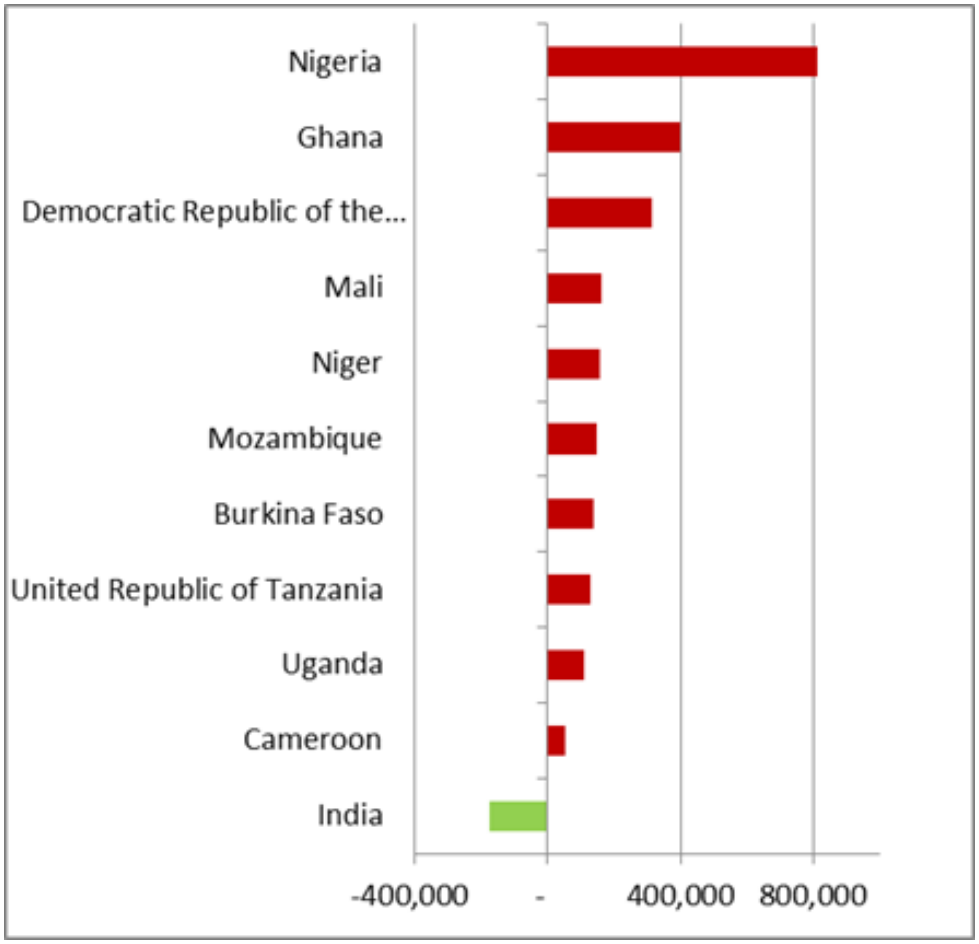


The 10 + 1 Initiative



…Rationale for focusing on 10+1

All the 10 countries in sub-Saharan Africa had increase in estimated case incidence in 2016 compared to 2015

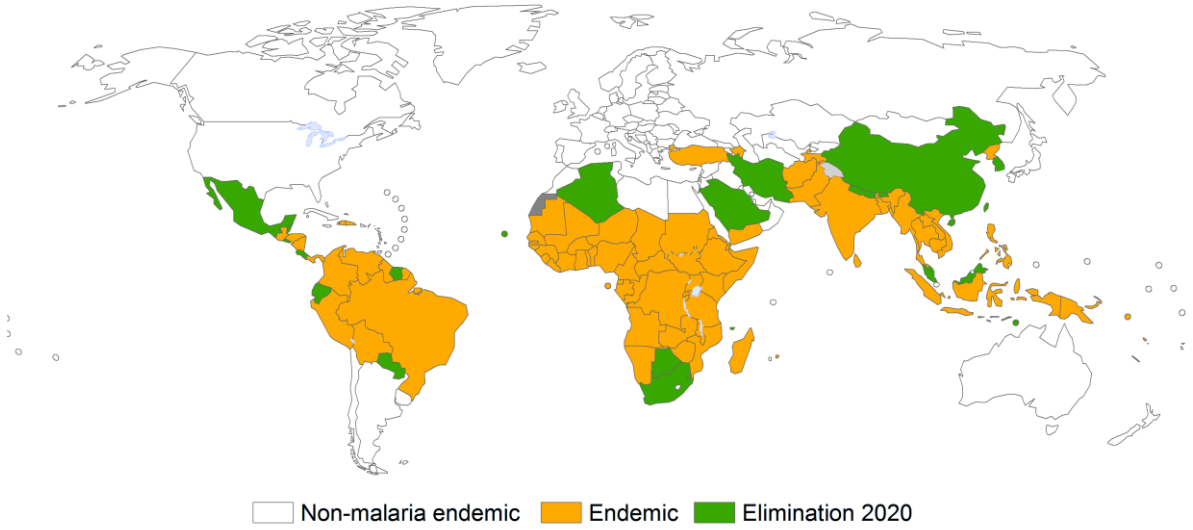


Response elements (tiers)

1. Political and financial dialogue, advocacy, and resource mobilization
2. Improved technical guidance on policies and strategies adaptable to the country situations
3. Intensified technical support to countries to prioritize interventions for impact
4. Country action

The elimination countries

- E-2020 – Initiative launched in 2017
- Annual Forum in Costa Rica in June 2018
- Regional focal points in five Regions



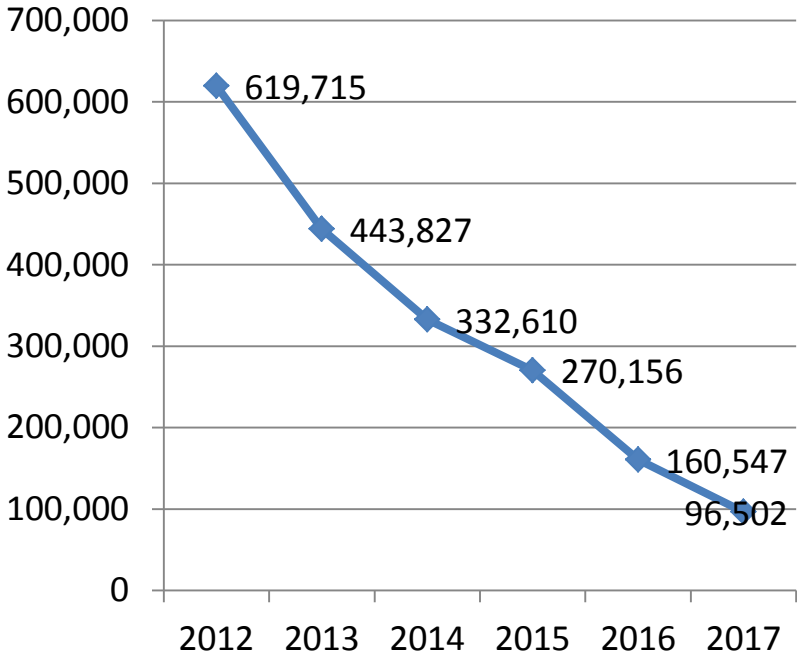
Malaria Elimination Oversight Committee

Malaria Elimination Certification Panel

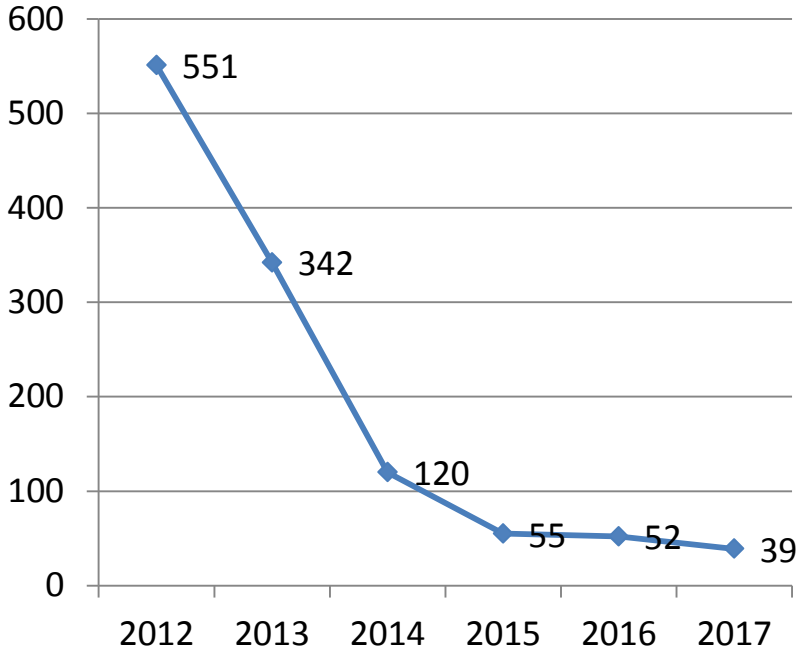
Mekong Malaria Elimination Programme

Progress in malaria elimination in the GMS

Malaria cases in GMS countries

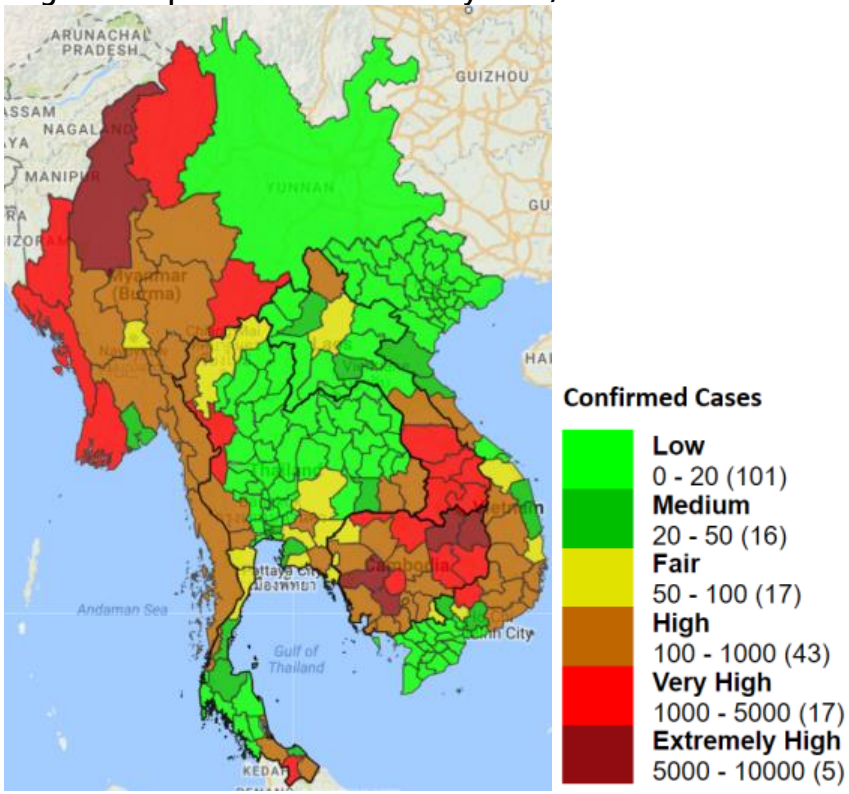


Malaria deaths in GMS countries



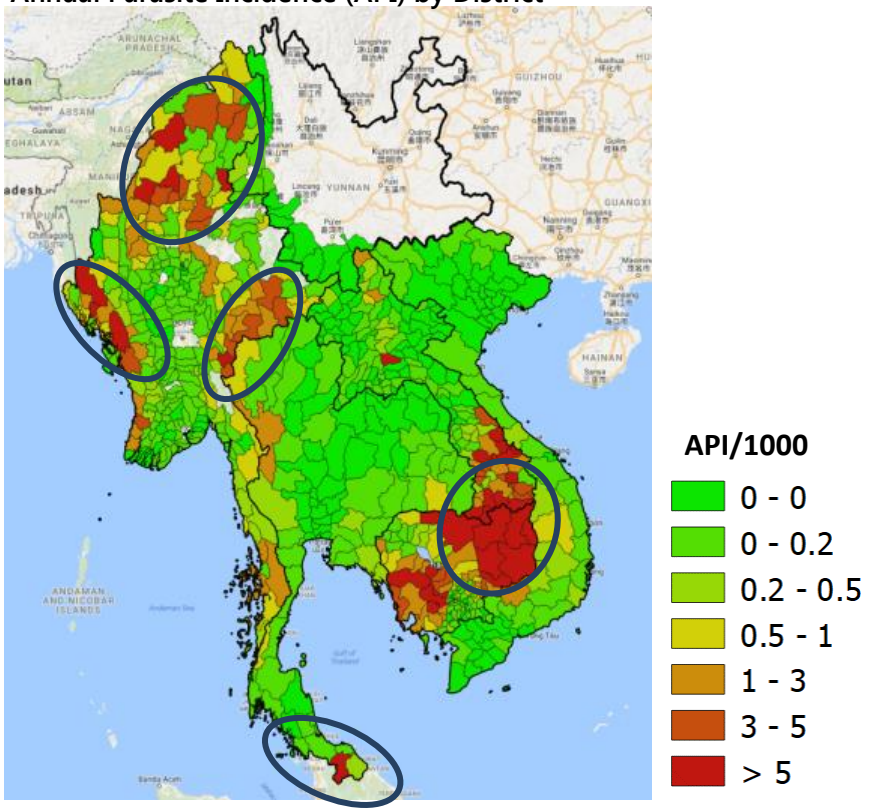
Epidemiology of malaria in the GMS (2017)

Regional Map of Confirmed Cases by State/Province



Source: WHO subregional database

Annual Parasite Incidence (API) by District*



*Provincial levels in Viet Nam and Thailand; State/Region level in Myanmar

GMP strategy refresh - core roles

I

In collaboration with the malaria community, address key **strategic questions** related to malaria control and elimination

II

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III

Coordinate WHO **capacity building & technical support** to member states, jointly with Regions, ISTs and countries

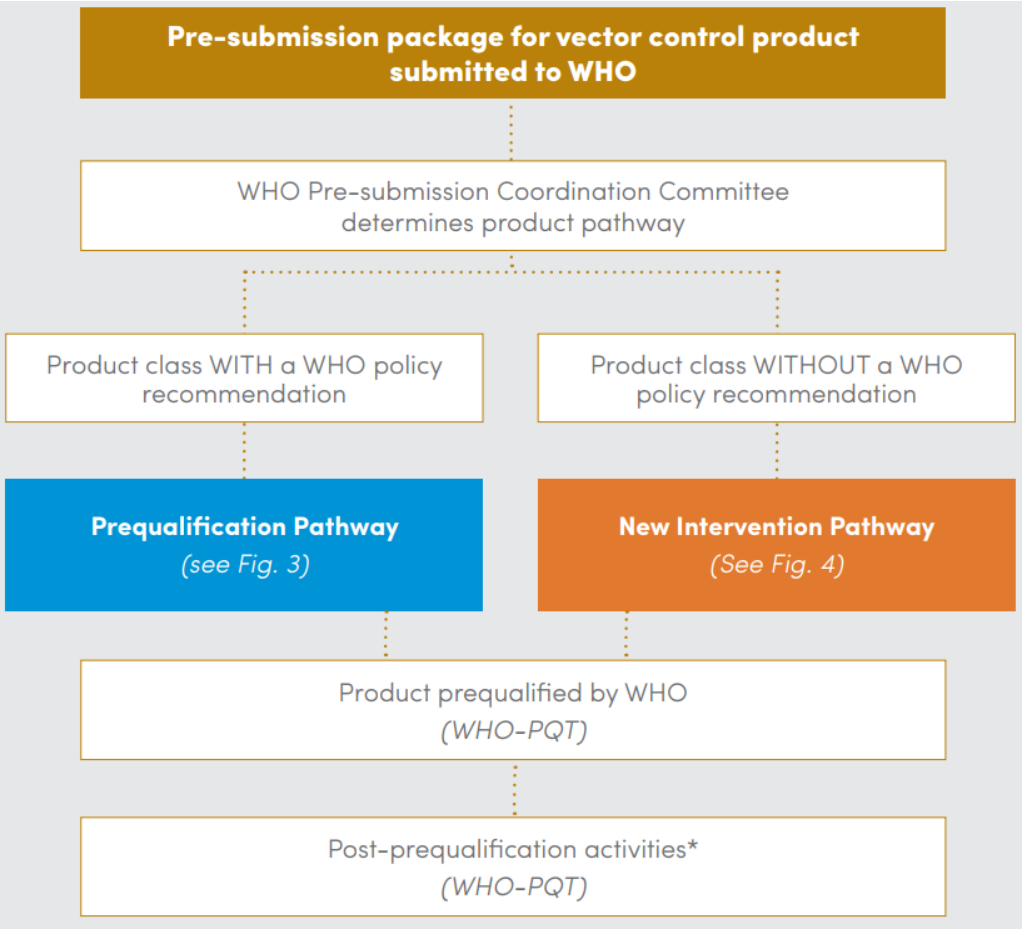
IV

Help countries develop & implement robust **surveillance** systems to generate quality data and use that data to achieve greater impact

V

Keep an **independent score** of global progress in malaria control and elimination, including **drug & insecticide resistance**

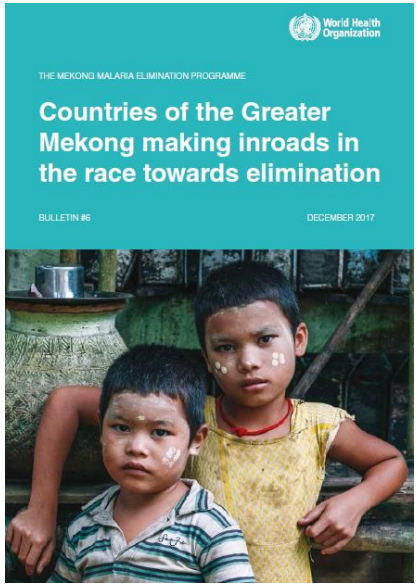
Normative and policy-making process

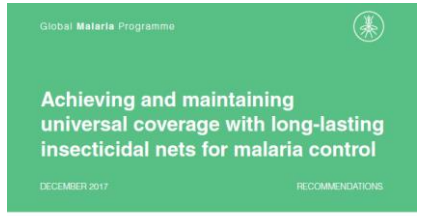


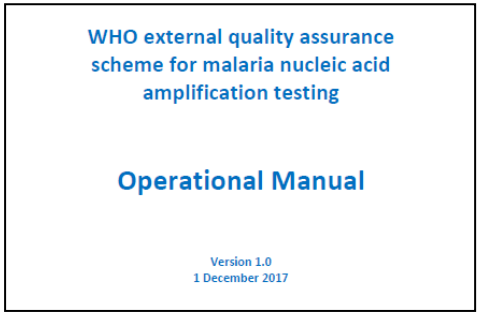
Key products

October 2017

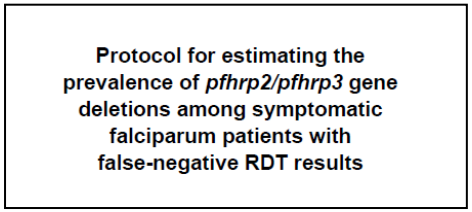
December 2017



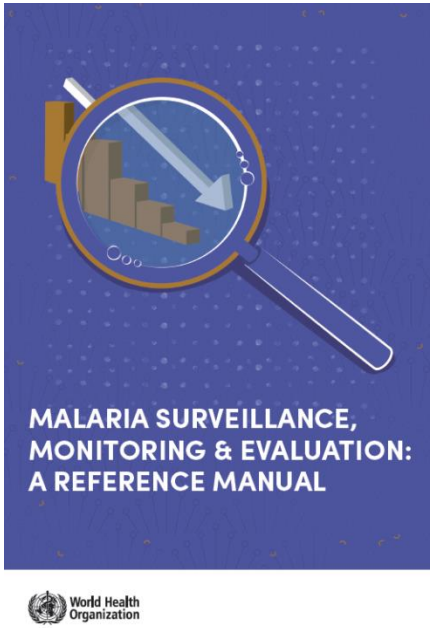




January 2018



April 2018



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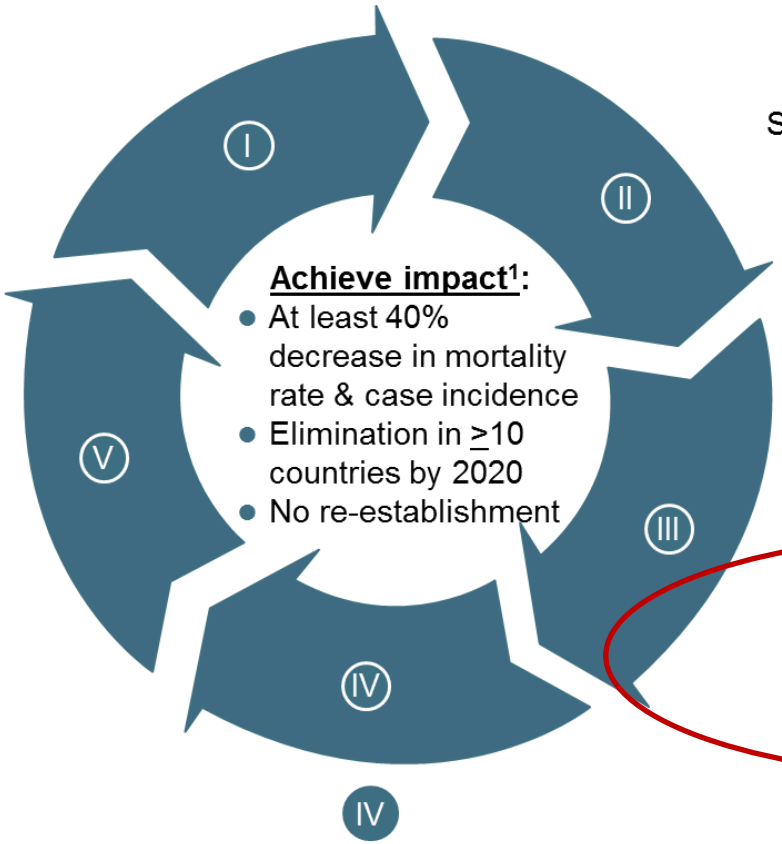

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Malaria in complex situations

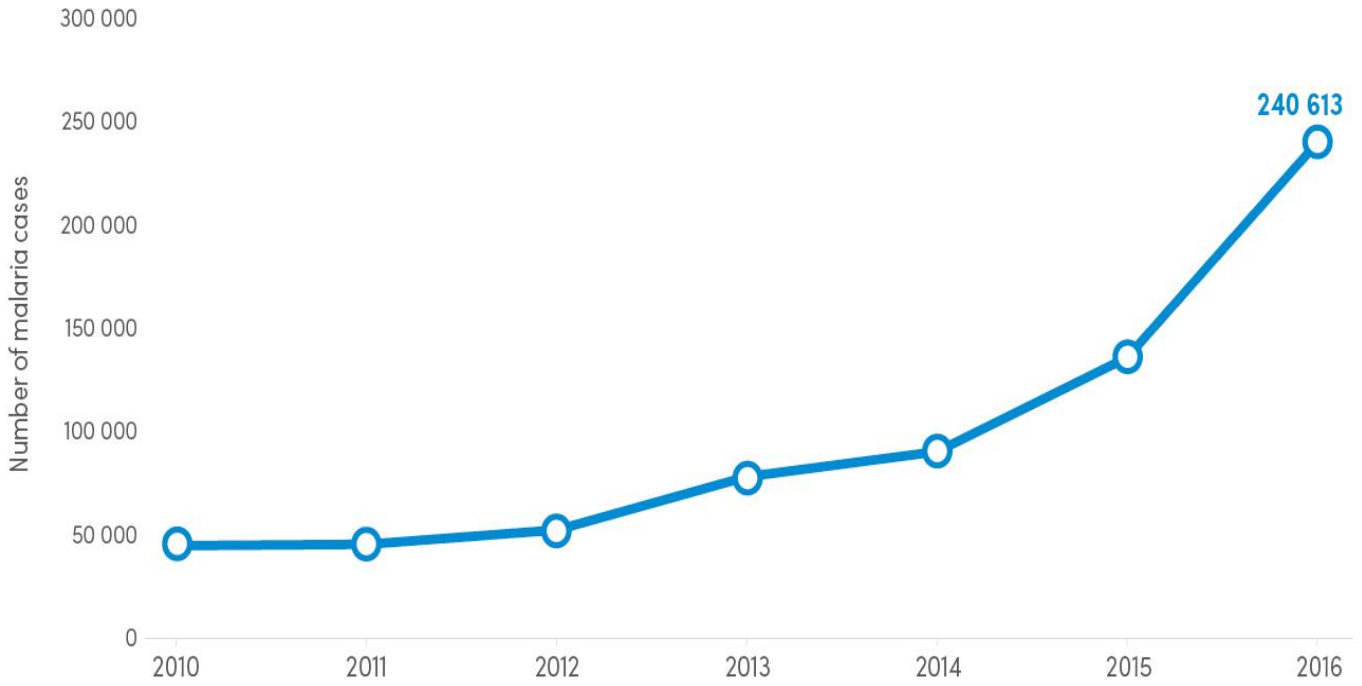
- WHO malaria response in Venezuela, Nigeria, South Sudan and Yemen

Malaria in complex situations

Venezuela

FIG. 8.5.

Malaria cases in the Bolivarian Republic of Venezuela, 2010–2016 *Sources: National malaria control programme reports and WHO estimates*

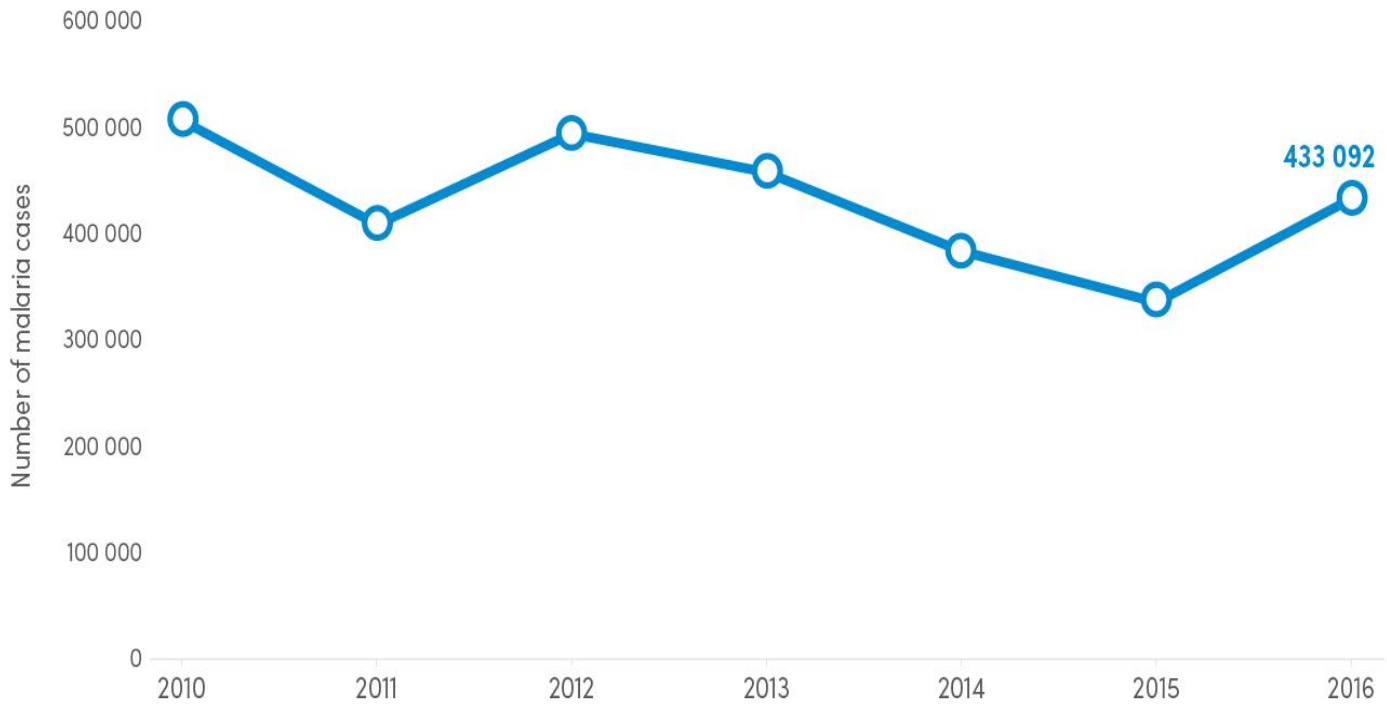


Malaria in complex situations

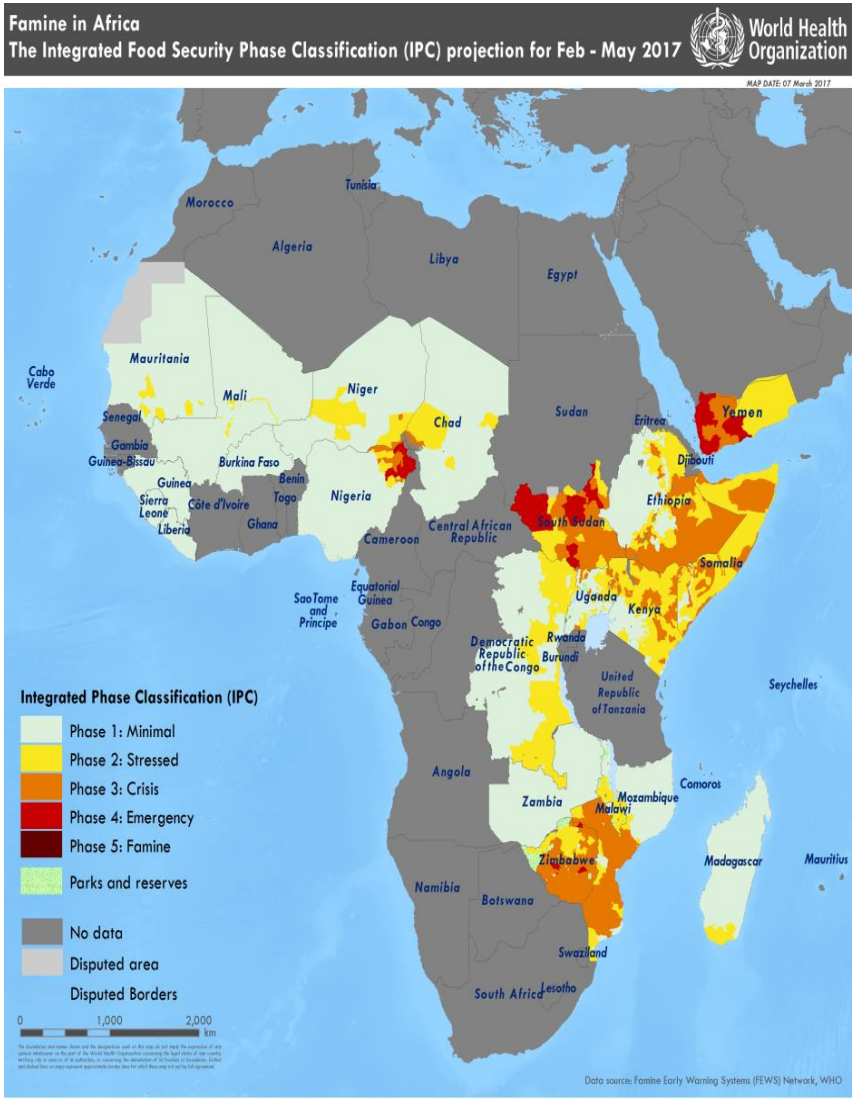
Yemen

FIG. 8.4.

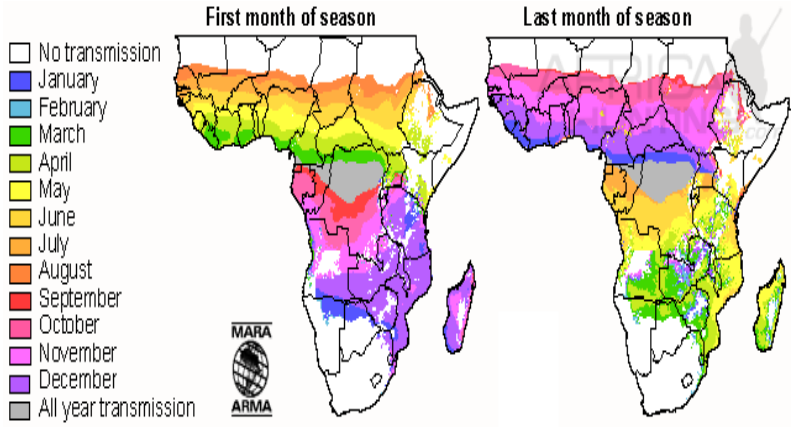
Malaria cases in Yemen, 2010–2016 *Sources: WHO estimates*



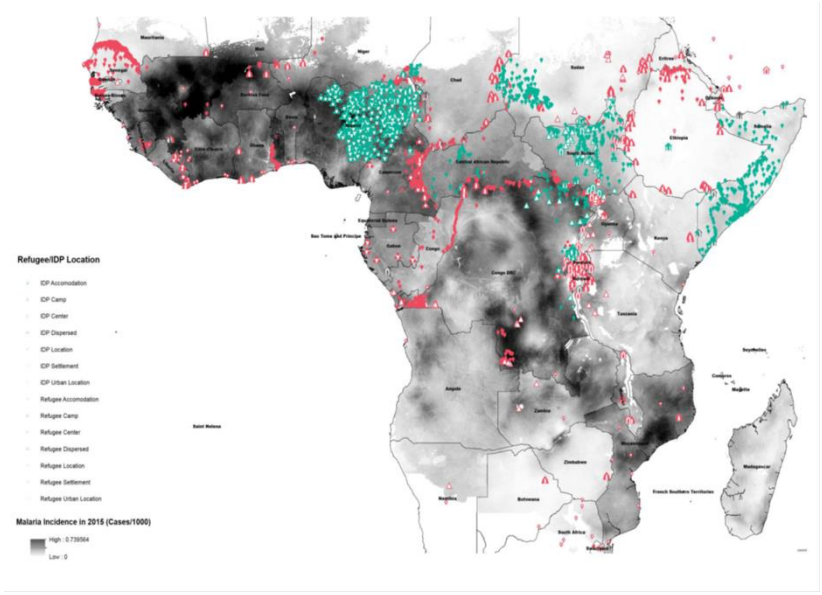
Malaria in the current areas of food insecurity



Malaria transmission seasons



IDP and Refugee locations in areas of malaria transmission



Global **Malaria** Programme

World Health Organization

Custom tailored response

- Analytical framework to estimate potential impact
- Use of evidence based malaria tools and strategies
- Support to the WHE
- Integration and use of delivery platforms


unicef


World Health Organization

Custom tailored response for every county

Planned WHO response to excess all-cause child mortality caused by malaria, malnutrition and other comorbidities in South Sudan

Malaria emergency response interventions:

Strengthening the NMCP through financial and technical support to stratify and deliver:

1. Securing supplies to health facilities remaining functional
2. Include malaria into activities of mobile WFP-UNICEF-FAO Integrated Rapid Response Mechanism to highest risk groups of malaria and malnutrition including age-targeted MDA and LLIN distribution during food distributions

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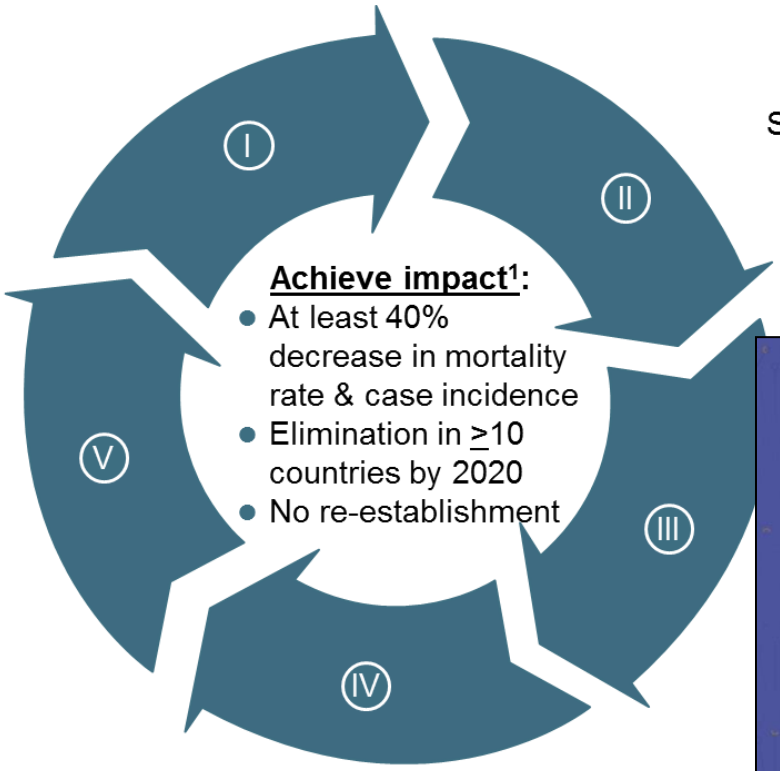

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IV

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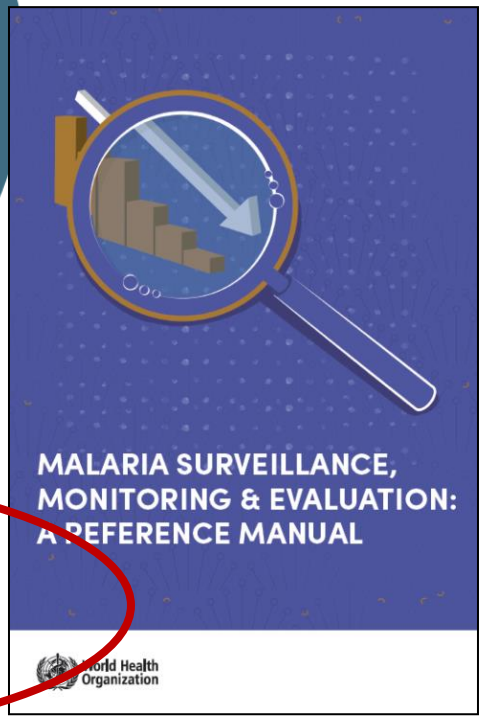

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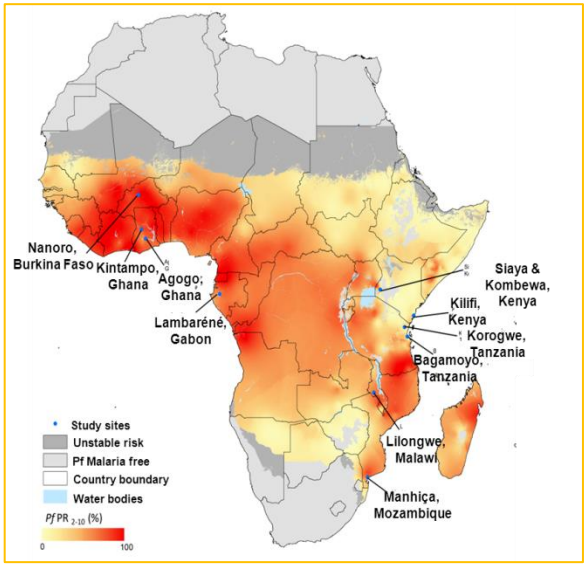
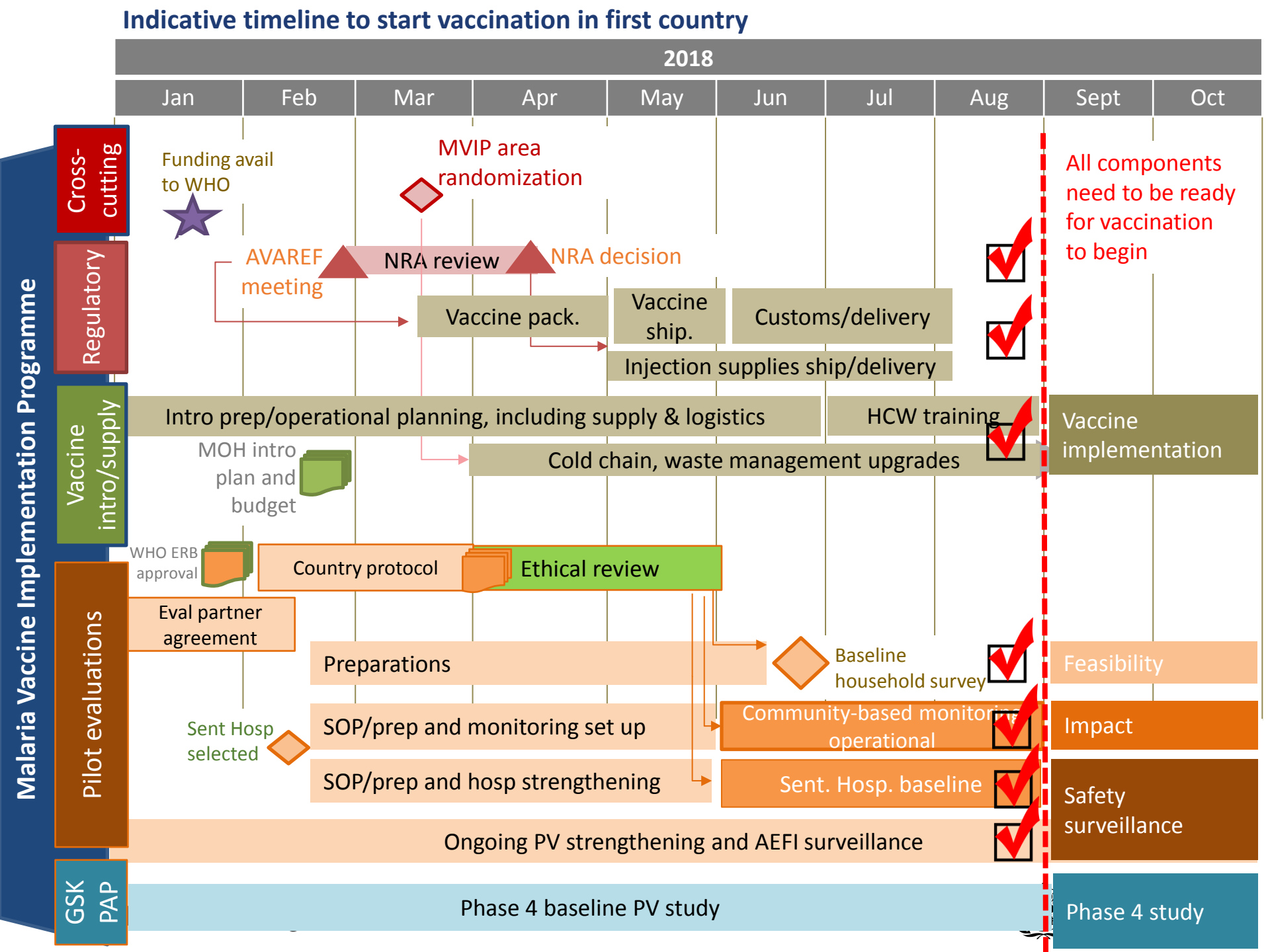
Strategic Advisory Group on malaria eradication

- Purpose of the SAGme:
  - Analyze future scenarios for malaria
    - Biological, technical, socioeconomic, political and environmental determinants
    - Potential products of innovation
  - Provide advice to WHO on the feasibility, expected cost and potential strategies of malaria eradication over the ensuing decades
- Meetings in August 2016, February and November 2017
- Subgroup meeting in June 2018
- Likely final meeting in Q4 2018

RTS,S Malaria Vaccine Implementation Programme (MVIP)

- RTS,S/AS01 Phase 3 trial
  - 15,499 children, 11 sites, 7 African countries
- Children 5-17 months, 4 doses over 4 years:
  - 39% reduction in clinical malaria,
  - 31% reduction in severe malaria
  - 62% reduction severe malaria anaemia
  - 29% reduction blood transfusions




Indicative timeline to start vaccination in first country
2018
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Malaria Vaccine Implementation Programme
Cross-cutting
Regulatory
Vaccine intro/supply
Pilot evaluations
GSK PAP
Funding avail to WHO
MVIP area randomization
All components need to be ready for vaccination to begin
AVAREF meeting
NRA review
NRA decision
Vaccine pack.
Vaccine ship.
Customs/delivery
Injection supplies ship/delivery
Intro prep/operational planning, including supply & logistics
HCW training
Vaccine implementation
MOH intro plan and budget
Cold chain, waste management upgrades
WHO ERB approval
Country protocol
Ethical review
Eval partner agreement
Preparations
Baseline household survey
Feasibility
Sent Hosp selected
SOP/prep and monitoring set up
Community-based monitoring operational
Impact
SOP/prep and hosp strengthening
Sent. Hosp. baseline
Safety surveillance
Ongoing PV strengthening and AEFI surveillance
Phase 4 baseline PV study
Phase 4 study

Ruth Nussenzweig

- Ruth Nussenzweig was born in 1928 in Vienna. In 1939, her family fled to Brazil. After graduating in Medicine from the University of Sao Paulo, Nussenzweig dedicated herself to research, most of it carried at at NYU.
- In 1967, she provide the first evidence that protection against PE stages of malaria existed and that it could be extremely effective at inhibiting parasite infection; that it was mediated by adaptive immune responses specific for parasite antigens such as the CS protein and that it could be mimicked at least in part by immunization with sub-unit vaccines
- She published more than 200 scientific papers in her lifetime, most recently coauthoring a study in Scientific Reports on vaccines against Plasmodium vivax in January of this year.

Thank you