

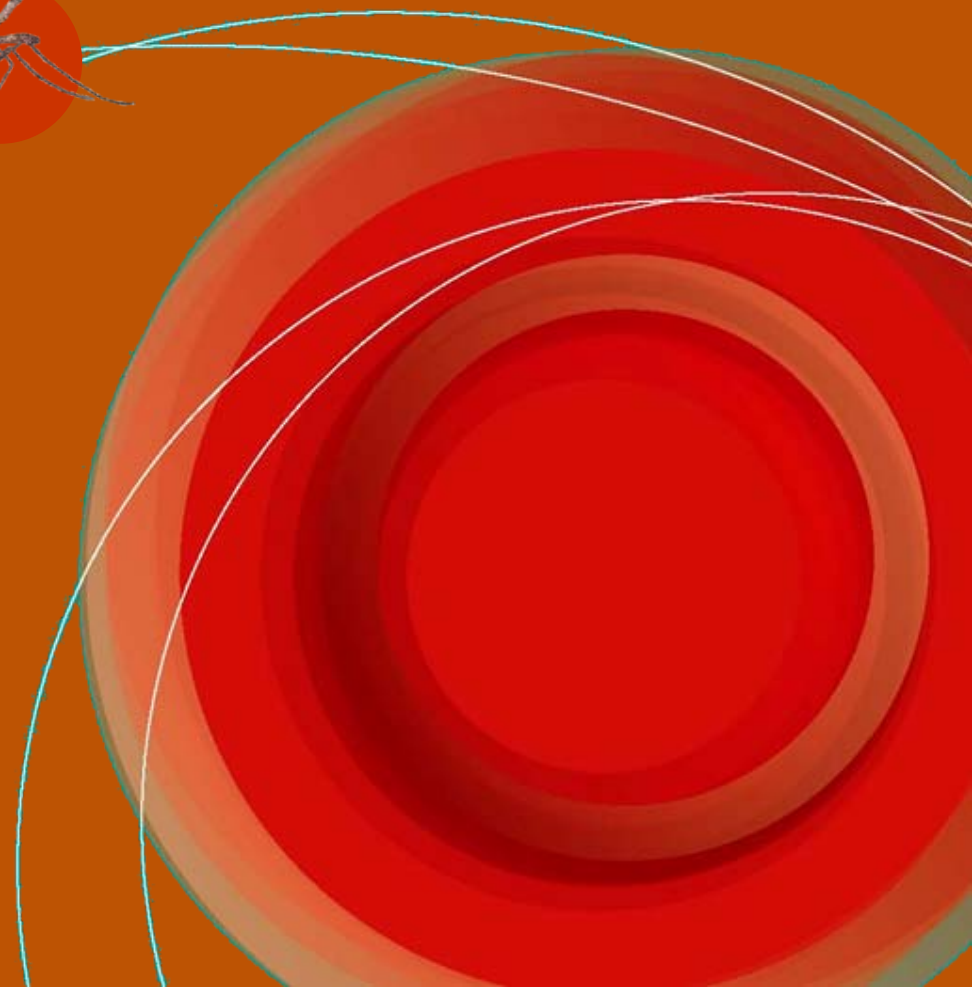
Overview of recent progress and way forward for malaria control and elimination

Dr Andrea Bosman,
WHO Global Malaria Programme

Global Health Histories Seminars
WHO, Geneva, 22 September 2009

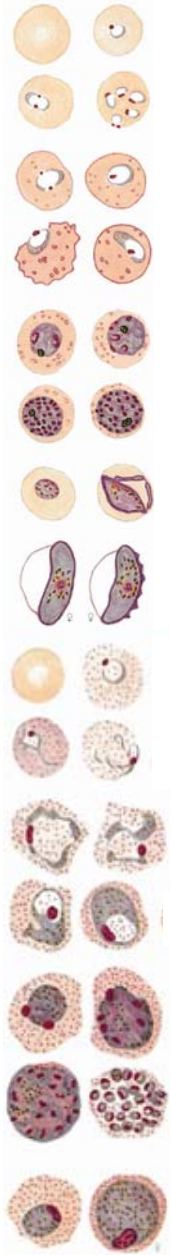


**World Health
Organization**



Presentation Outline

- Malaria burden and status of malaria control & elimination
- Policies, interventions and progress towards 2010 targets
- Needs, opportunities and threats for access to prompt and effective treatment
- Recent impact in several countries and lessons learnt
- Tools for the next phases of malaria control and elimination



Global malaria burden

- 5 species of malaria parasites infect people
 - *Plasmodium falciparum*, *P. vivax*, *P. malariae*, *P. ovale* and *P. knowlesi*
- Estimated 247 (152-387) million malaria patients in 2006
- Estimated 881 (610-1212) thousand malaria in 2006
- 91% of deaths and 86% of cases occur in Africa south of the Sahara
- 109 malaria endemic countries/territories
 - 15 no *P.falciparum* transmission, only *P.vivax*
 - 8 recently no more locally transmitted cases



Populations at risk of malaria

Approximately 3.3 billion at risk of malaria and 1.2 billion at high risk

High risk = more than 1 case per 1000 per year

	Total population	Population at any risk	Population at high risk	High risk (%)
Africa	774	647	586	76%
Americas	895	137	61	7%
Eastern Mediterranean	540	295	66	12%
Europe	887	22	2	0%
South-East Asia	1,721	1,319	457	27%
Western Pacific	1,763	888	54	3%
World	6,581	3,308	1,226	19%

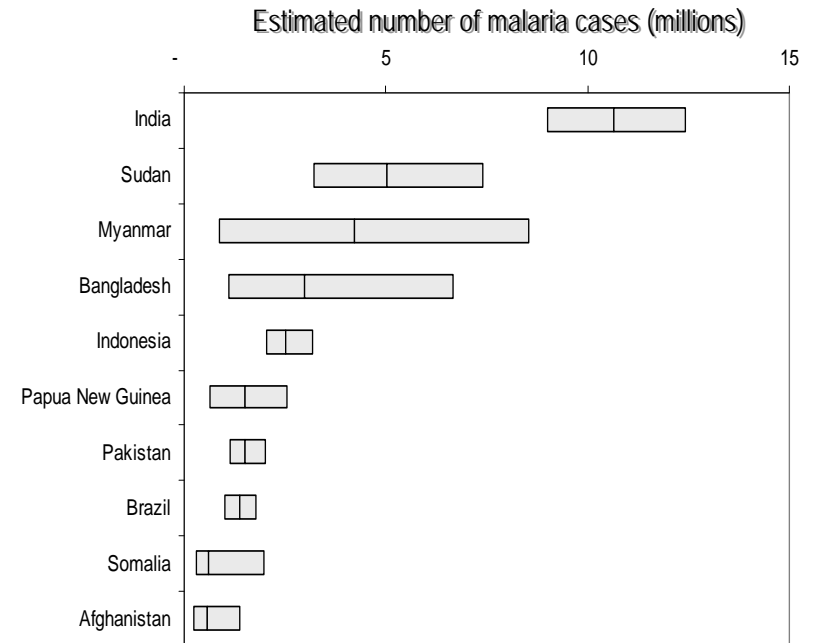
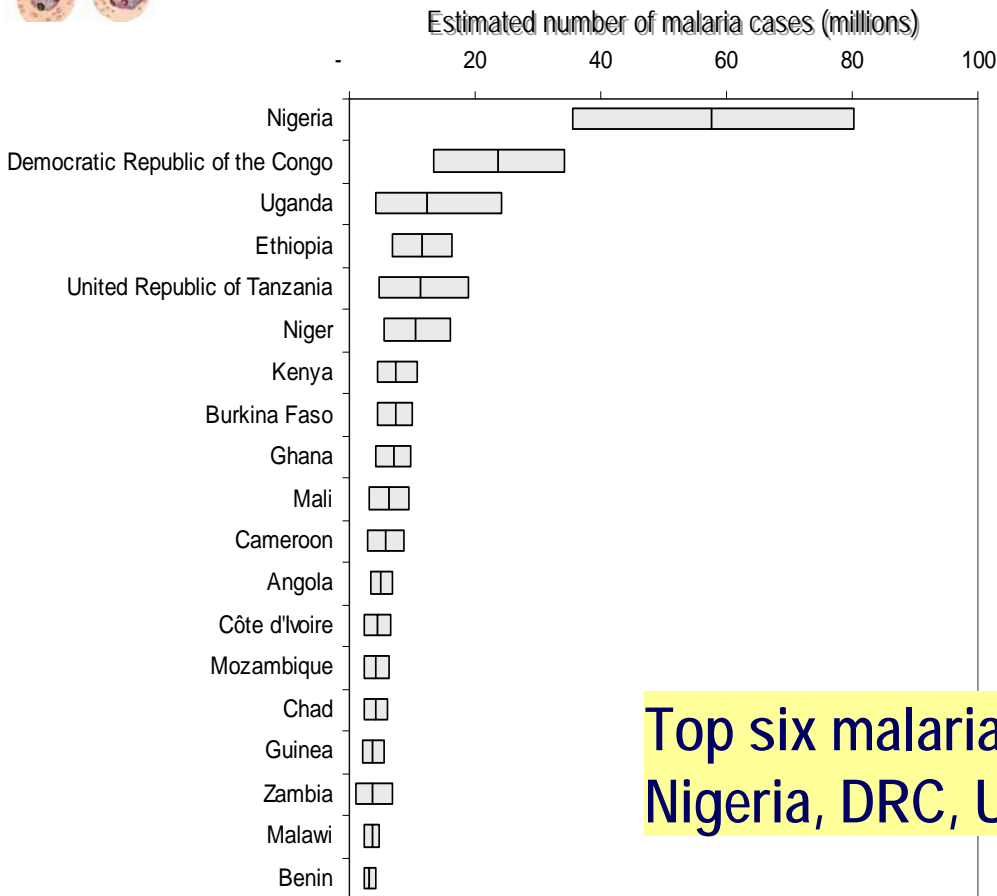
(Source: World Malaria Report 2008)



Countries that account for 90% of cases

19 in the African Region

10 outside the African Region

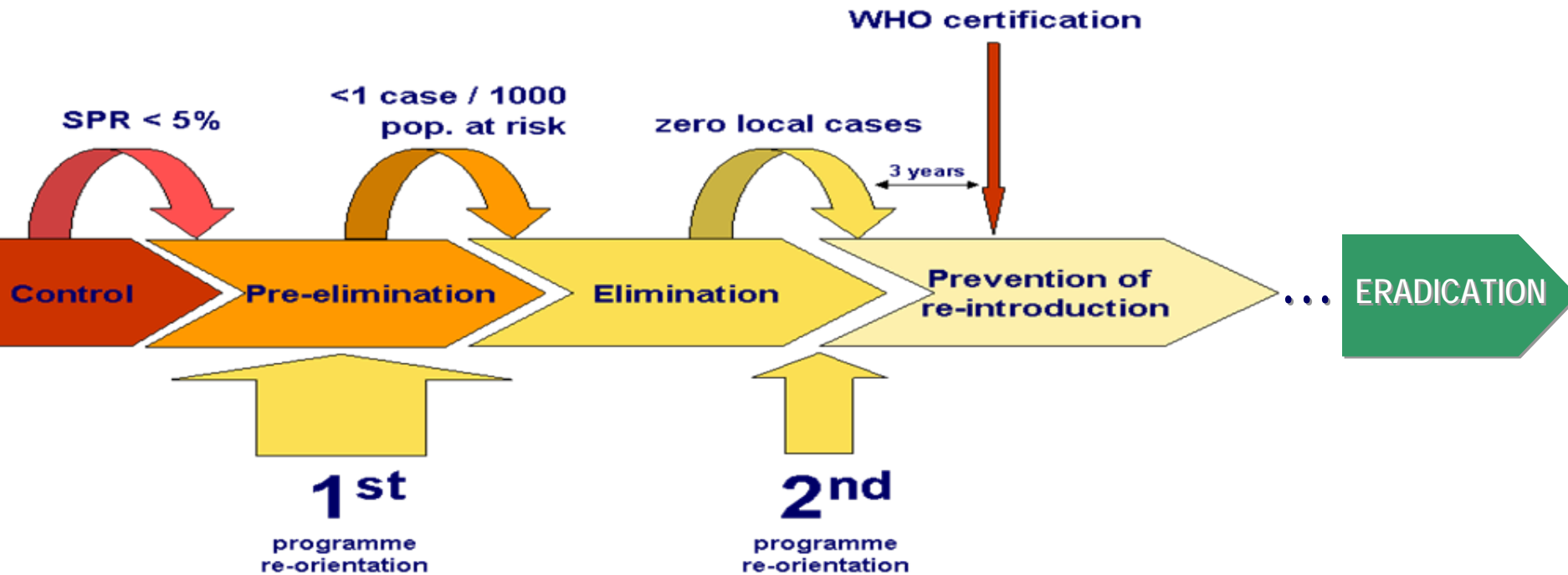


Top six malaria burden countries in the African Region: Nigeria, DRC, Uganda, Ethiopia, Niger and Tanzania

(Source: World Malaria Report 2008)



Progression from control to elimination for countries with low to moderate endemicity



- *Elimination*: Need for continued measures to prevent re-establishment of transmission
- *Eradiation*: Interventions are no longer needed *once eradiation has been achieved*



Reprogramming malaria interventions

Pre-elimination

Treatment policy update to include anti-gametocyte

No OTC antimalarial medicines

100% case detection by QA microscopy

Immediate notification of cases

Geographical reconnaissance

Vector control in transmission foci

GIS database on foci, vectors, cases

Central records and isolate bank

Trained, qualified staff availability

Mobilize domestic funding

Cross-border and regional initiatives

Elimination

Implementation of new drug policy

Routine QA/QC expert microscopy

Free diagnosis and treatment

Full cooperation of private sector

Active case detection

Case investigation and classification

Routine genotyping

Foci investigation and classification

Vector control to reduce receptivity in foci

Prevention of malaria in travellers

Prevention of re-introduction

Prevention/management imported cases

Vigilance through general health services

In-depth case detection and investigation

Vector control to reduce receptivity in vulnerable areas

Outbreak control

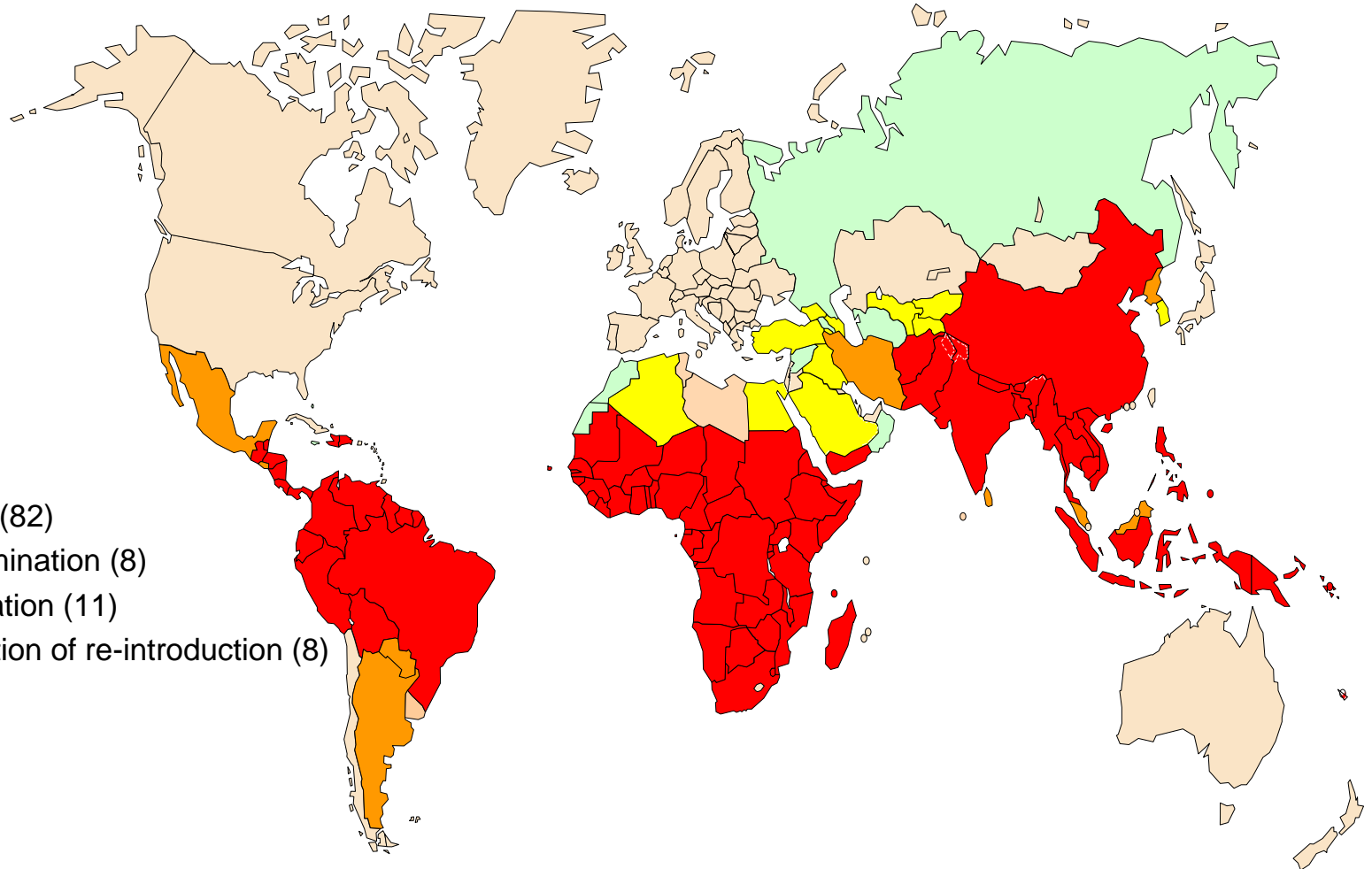
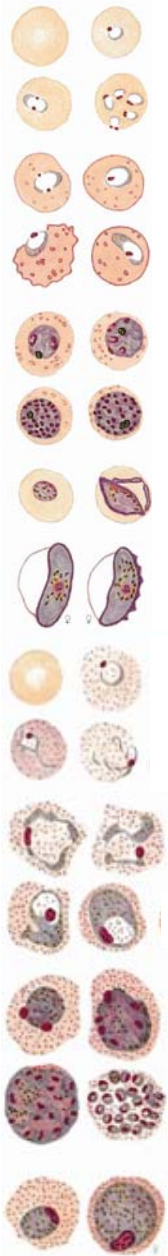
Maintenance of malaria expertise at central level

Integration of malaria programme staff in public health VC programmes

WHO certification process



Malaria programme phases, 2009



- = control (82)
- = pre-elimination (8)
- = elimination (11)
- = prevention of re-introduction (8)



Highly effective prevention and control strategies

1. Long-lasting insecticide treated nets (LLINs) to prevent malaria
2. Indoor residual spraying (IRS) to prevent malaria and control epidemics
3. Malaria rapid diagnostic tests (RDTs) to confirm diagnosis where microscopy is not available
4. Artemisinin-combination therapy (ACTs) to cure malaria and prevent deaths
5. Intermittent preventive therapy to protect pregnant women (IPT)



Global malaria targets *(WHA 58.2, May 2005)*

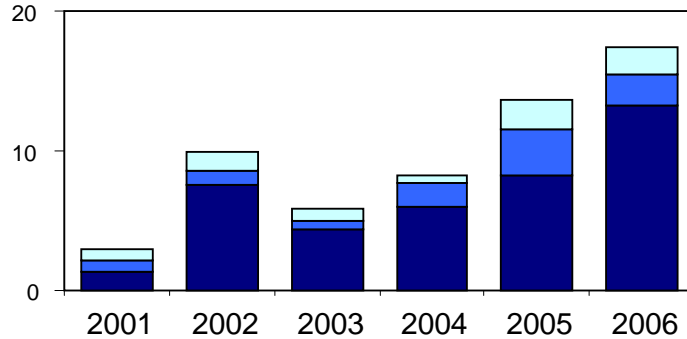
STRATEGIES	OUTCOME TARGET (by 2010)
Insecticide-treated nets (ITN)	At least 80% of those at risk use ITN/LLIN
Indoor residual spraying (IRS)	At least 80% of targeted houses sprayed
Prompt and effective treatment	At least 80% of those suffering malaria receive effective treatment within 24h of onset of fever
Prevention of malaria in pregnancy	At least 80% of pregnant women receive IPT in high transmission areas
IMPACT MEASURE	IMPACT TARGET
Reduction in malaria cases	At least 50% by 2010 as compared with 2000
Reduction in malaria deaths	At least 75% by 2015 as compared with 2005



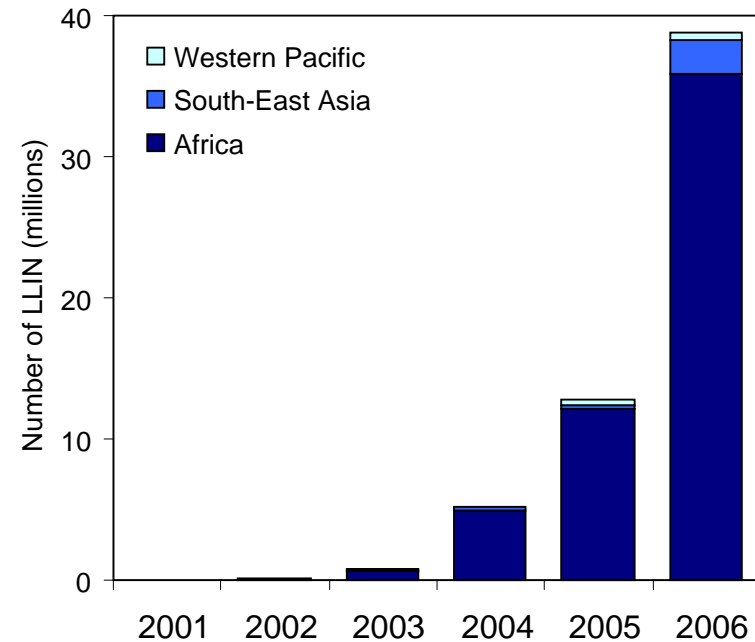
Number of mosquito nets delivered

all types of
insecticide-treated nets (ITN)

Number of ITN except LLIIN (millions)



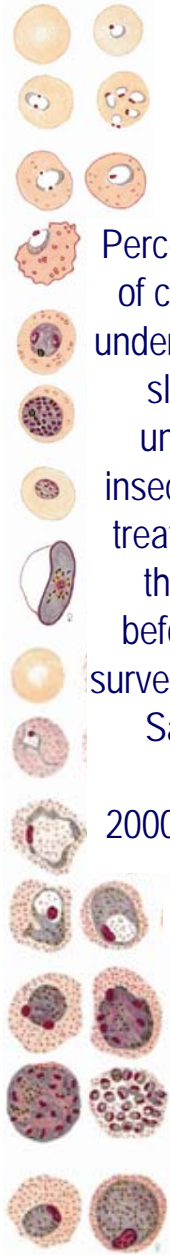
long-lasting nets (LLIN)



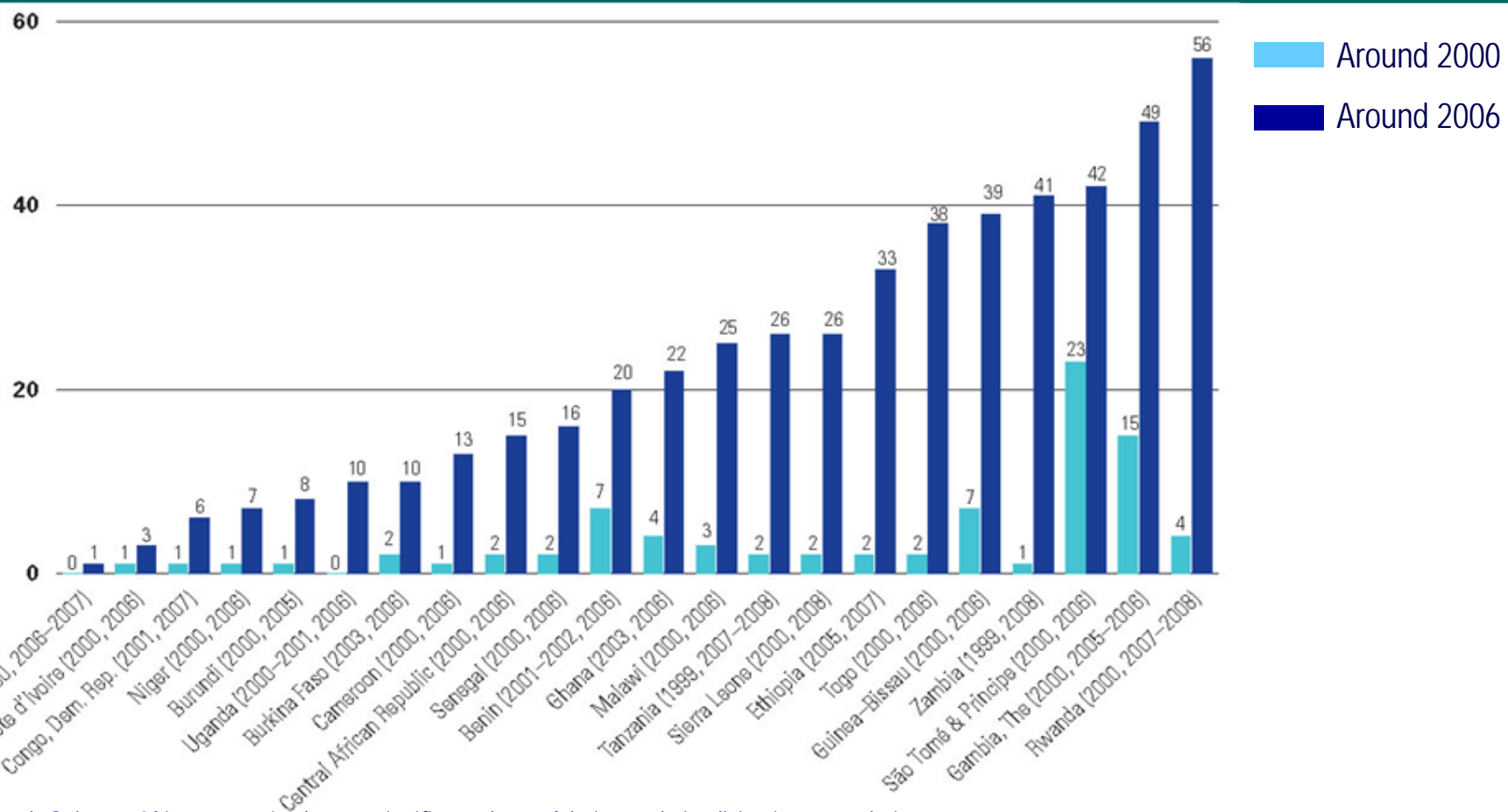
(Source: World Malaria Report 2008)



Trends in insecticide-treated net use



Percentage of children under age 5 sleeping under an insecticide-treated net the night before the survey, sub-Saharan Africa, 2000–2006

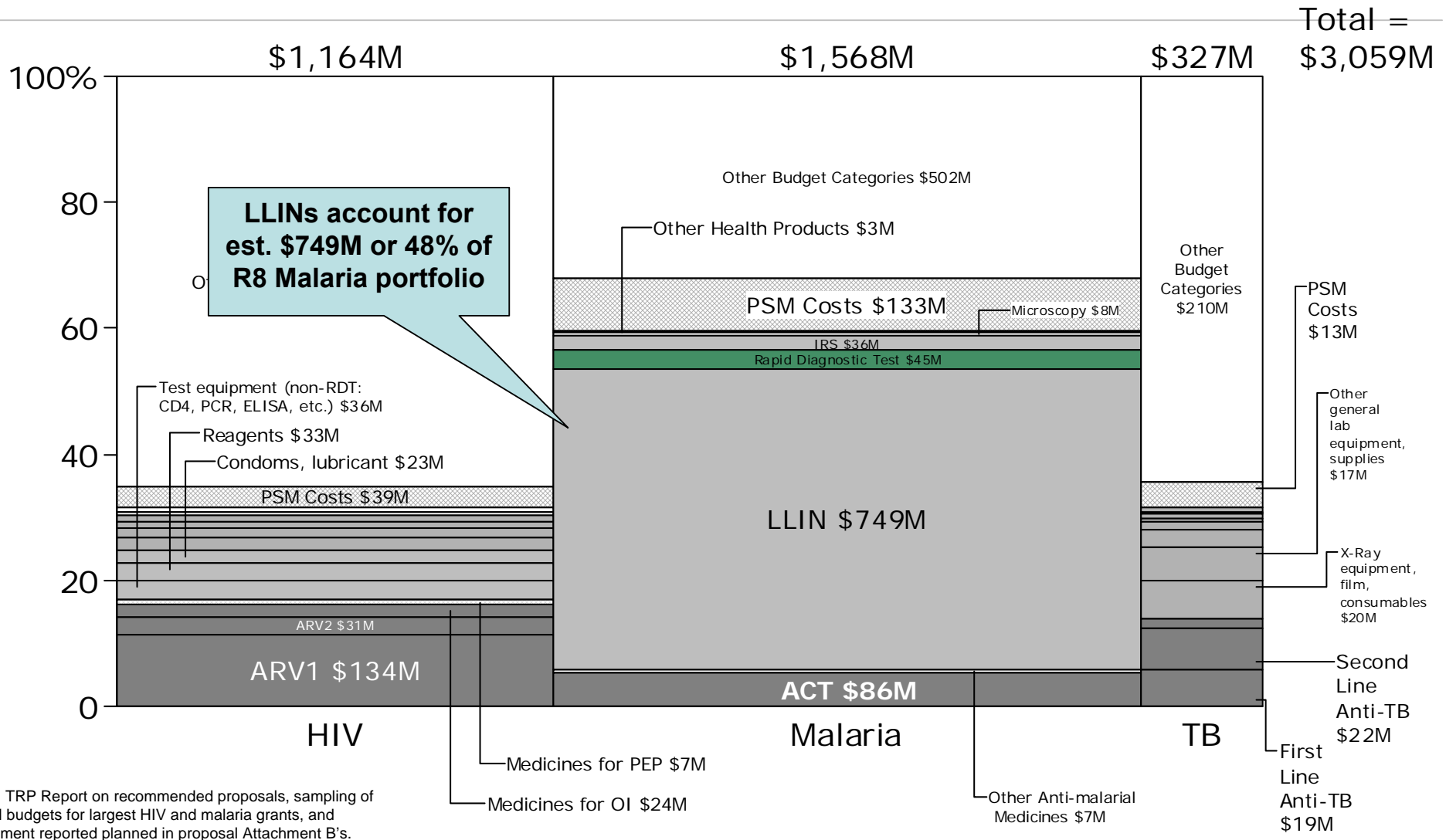


Note: Some sub-Saharan African countries have a significant share of their population living in non-malarious areas. National-level estimates may obscure higher coverage in endemic subnational areas targeted by programmes.

Source: UNICEF global malaria databases 2009, based on 22 countries with trend data for around 2000 and 2006, covering 53 per cent of children under age five.



LLINs in context of overall Round 8 portfolio



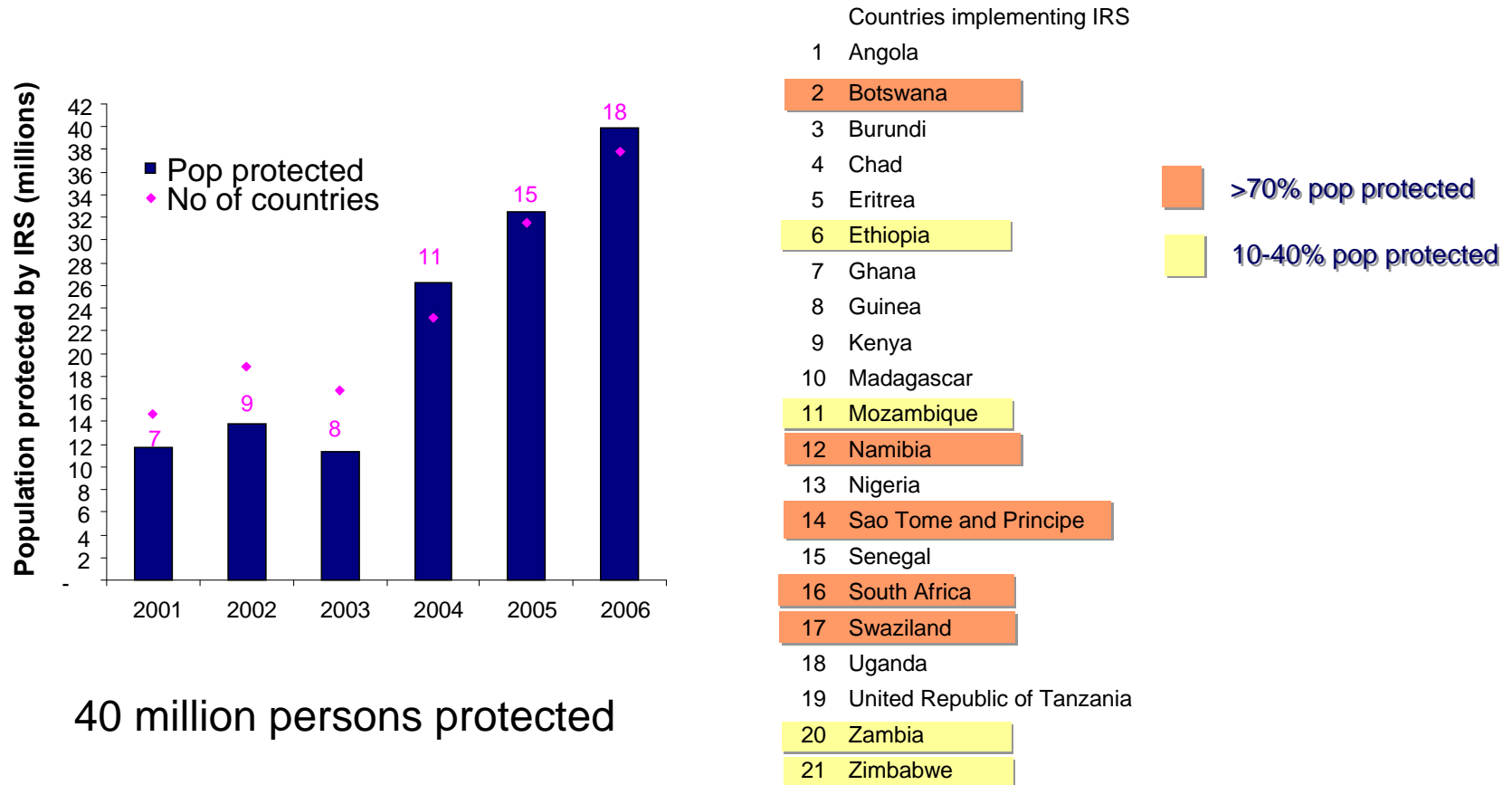
Source: TRP Report on recommended proposals, sampling of detailed budgets for largest HIV and malaria grants, and procurement reported planned in proposal Attachment B's.

Note that applicants were inconsistent in where freight, insurance, distribution, etc. costs were allocated. In most cases, it appears that these costs were included under "PSM Costs" but requires further review.

Courtesy of Dr Joelle Daviaud, GFATM

Indoor residual spraying in the African Region

(Source: World Malaria Report 2008)



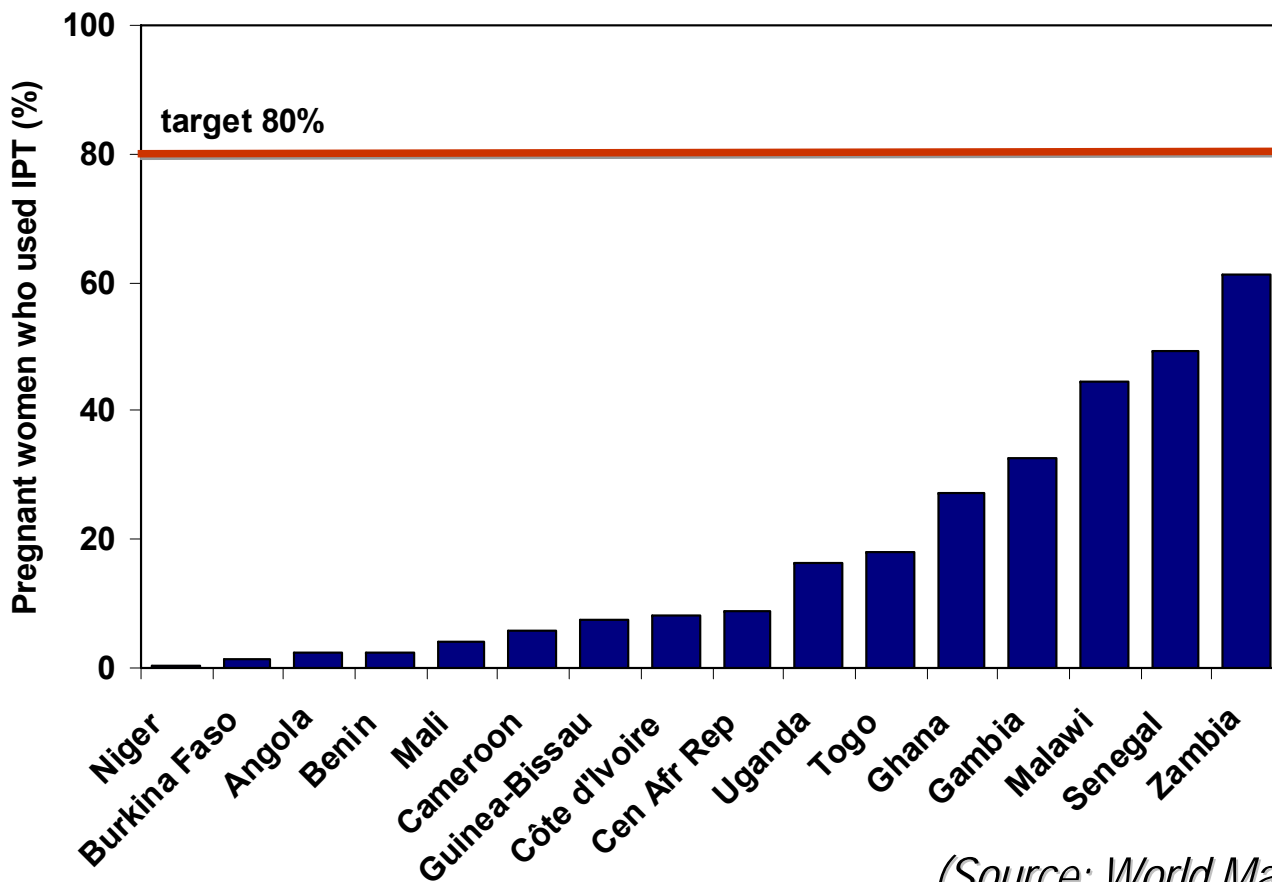
40 million persons protected

(a few more started in 2007)



Use of IPT in pregnant women

(≥ 2 doses of SP; DHS, MICS and MIS surveys)



(Source: World Malaria Report 2008)

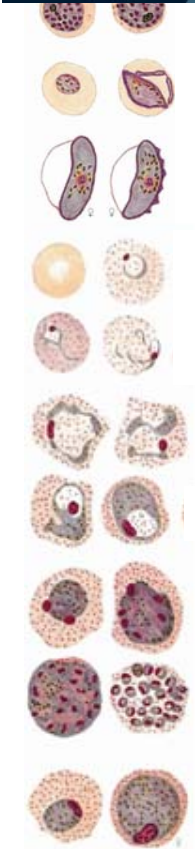
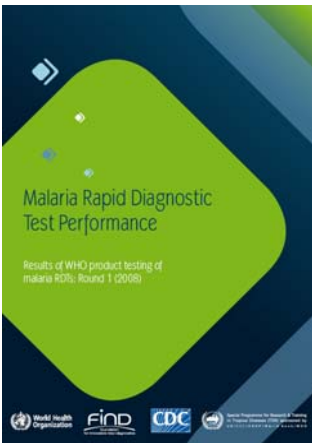


Expanding laboratory diagnosis of malaria

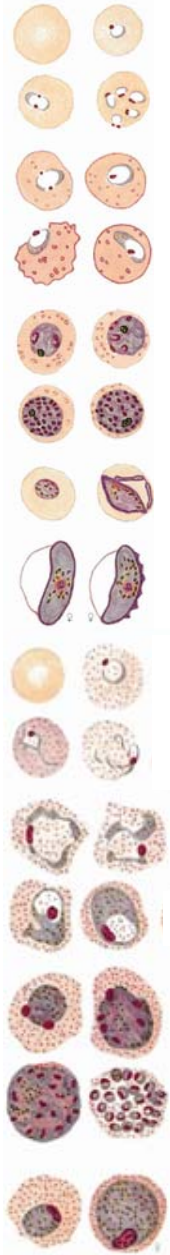
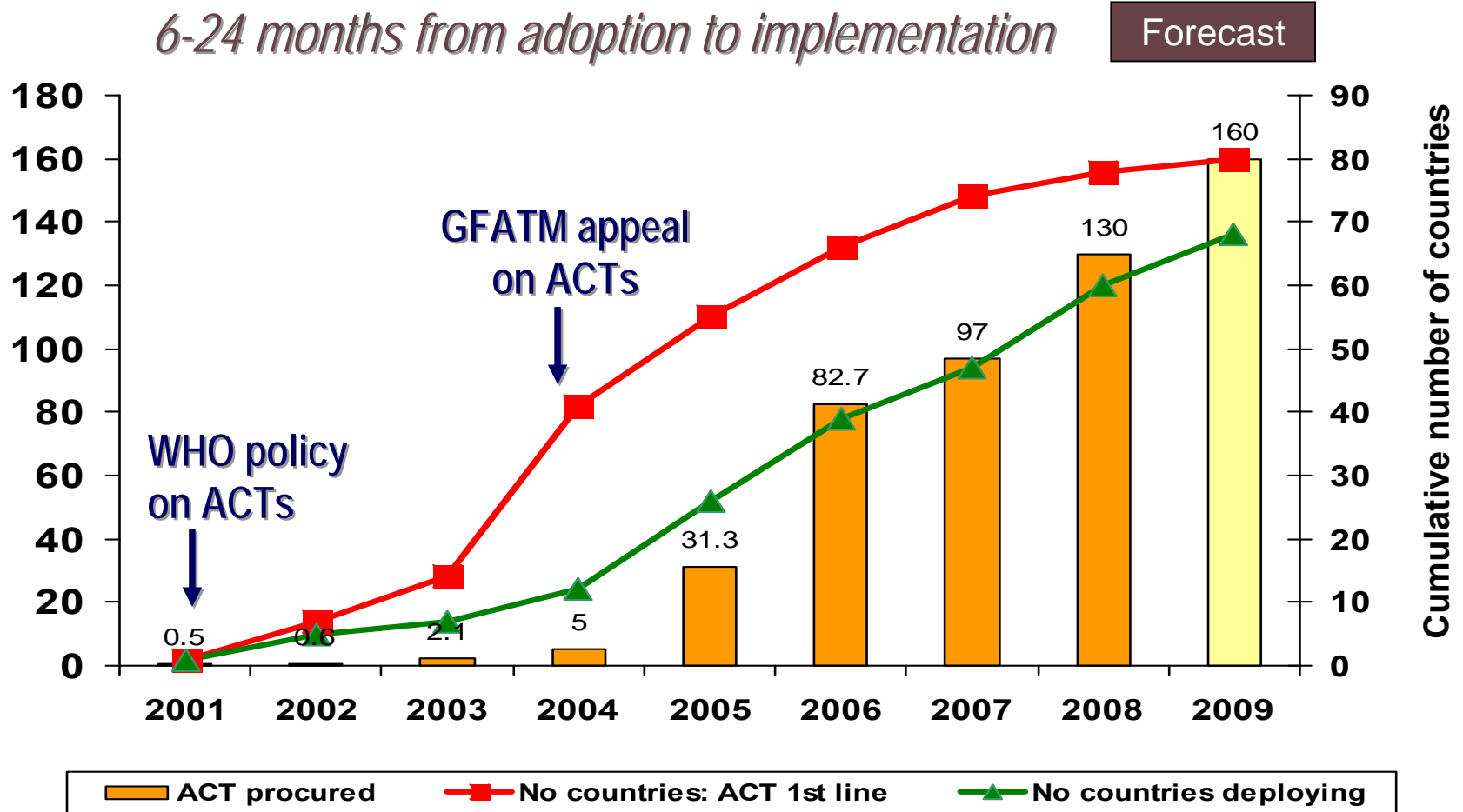
1 - International QA systems in place

The WHO Malaria RDT Evaluation Programme, jointly coordinated by WPRO, TDR, FIND and US CDC, completed Round 1 product testing in 2009 and publication of results allows comparative assessment of RDTs in relation to parasite detection thresholds, stability, false positivity rate, invalid test results and ease of use.

- Product testing, together with pre/post-shipment lot-testing, allows informed decisions for procurement agencies to take place.
- New WHO guidelines for Quality Assurance of Malaria Microscopy have been published and provide new and practical approaches for QA in malaria microscopy, including methods for accreditation of national expert microscopists, and routine validation of slide examination.



ACT adoption and deployment in public sector



Expanding laboratory diagnosis of malaria

— 3 - Malaria decrease due to effective control —

Systematic review: 24 studies

conducted between 1989 and 2005
in 15 different African countries
including 15'331 patients

**Proportion of malaria among fevers highly variable:
2% to 81%: Median parasite rate = 26%**

Median PfPR 1985-1999₂₋₁₀ = 37%

Median PfPR 2000-2007₂₋₁₀ = 17%

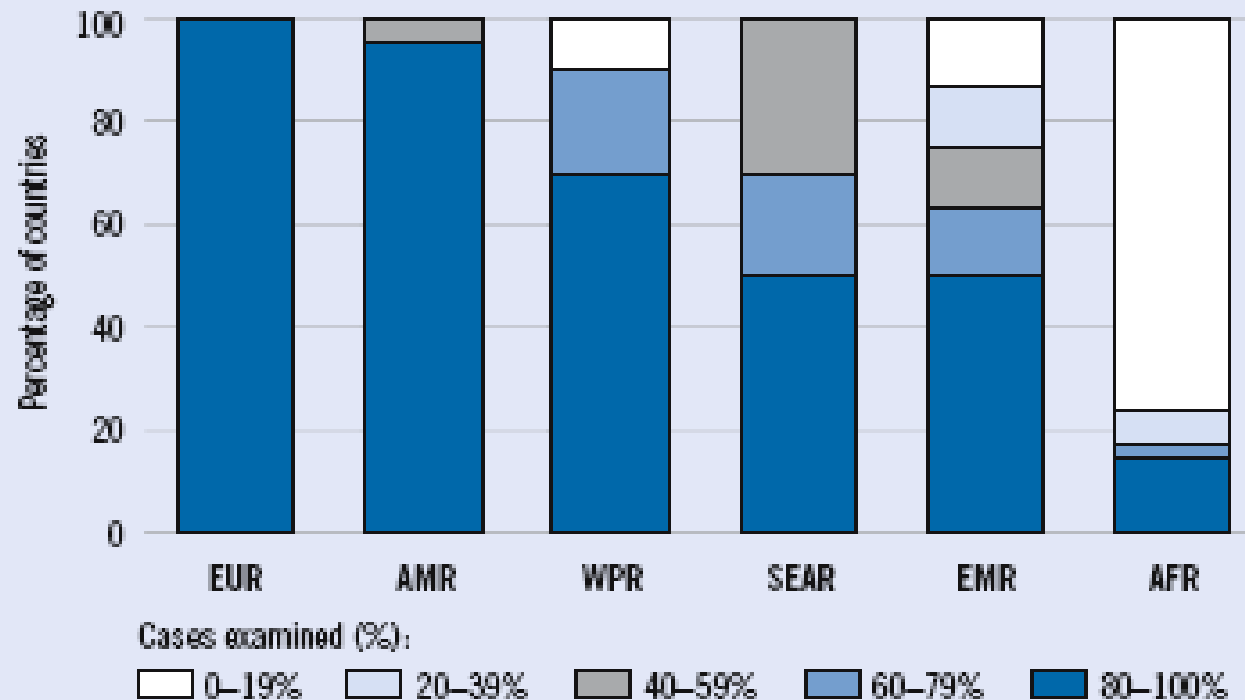
D'Acrémont *et. al.* (2009). *PLoS Med*, 6 (1): e252



Access to malaria laboratory diagnosis

(Source: World Malaria Report 2008)

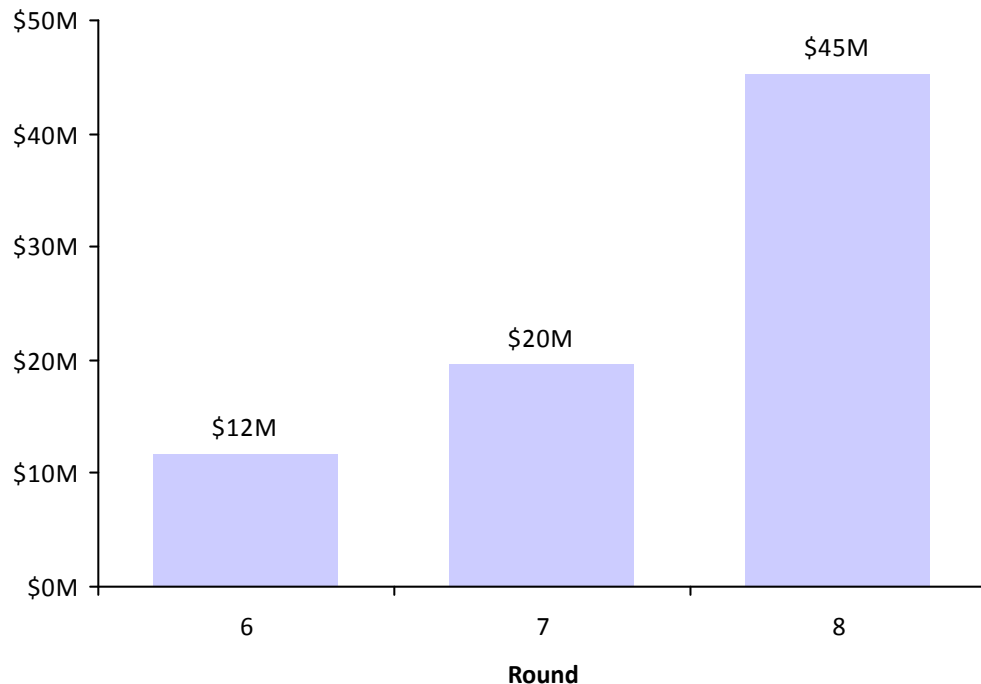
Fig. 3C Percentage of suspected malaria cases in public health facilities that were given a laboratory diagnostic test, by WHO region, 2006



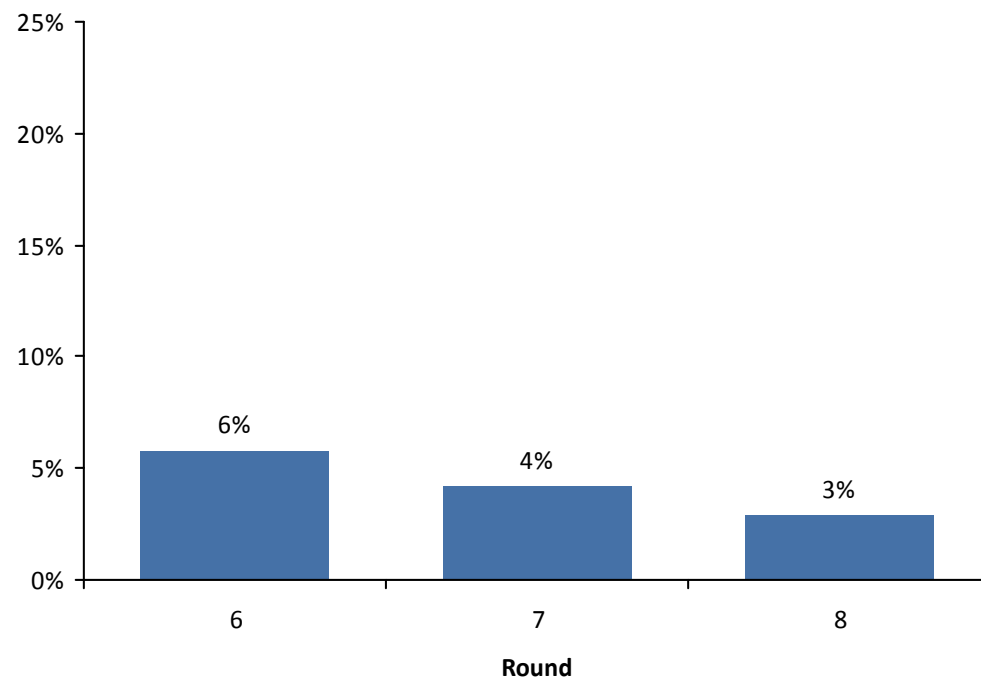
Malaria RDTs in approved proposals for Rounds 6-8

ESTIMATES

Estimated Proposed Malaria RDT Procurement included in Approved Proposals (Years 1-2) by Round



Estimated Proposed RDT Procurement as Percentage of Total Malaria Budget in Approved Proposals by Round



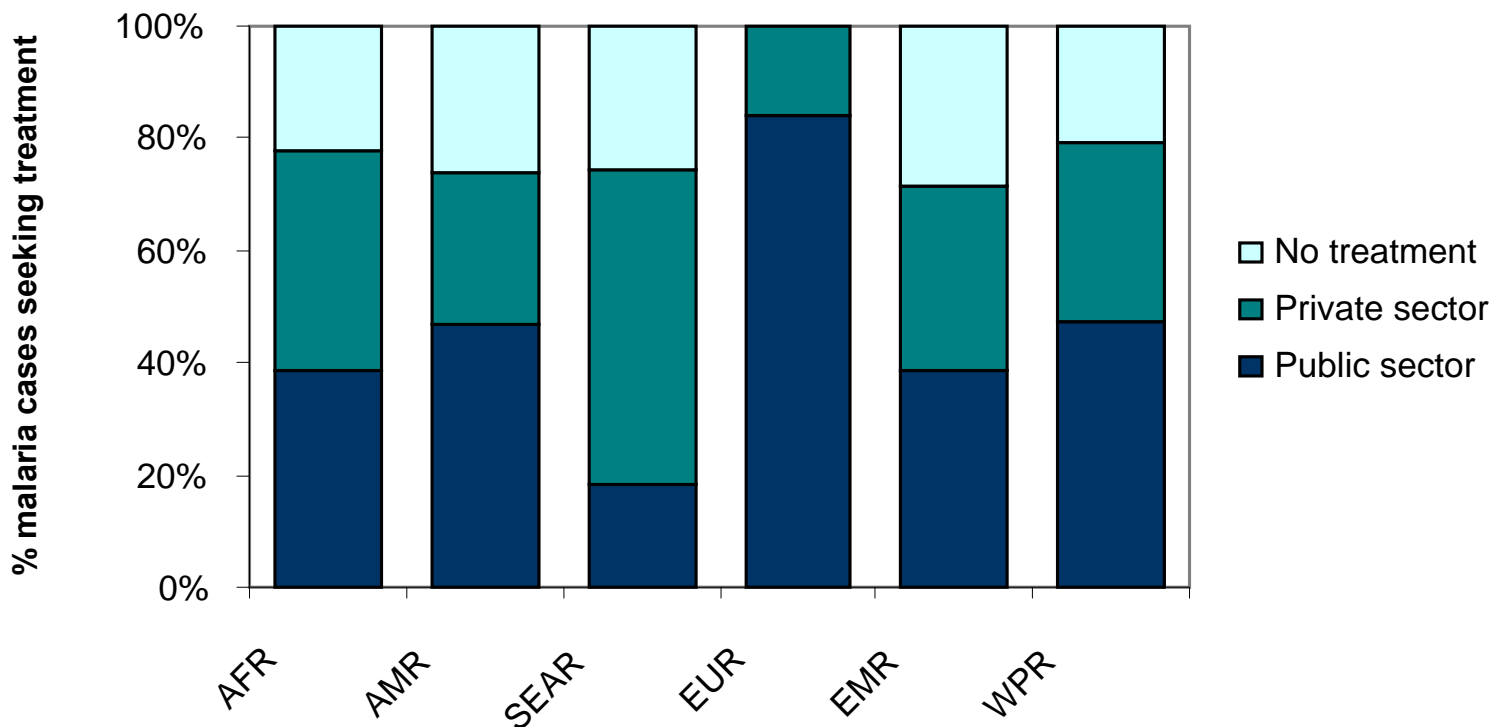
- Significant increase in value of procurement proposed for malaria RDTs over Rounds 6-8
- As percentage of total malaria proposal budgets, RDTs have accounted for 3-6% over last three rounds

Source: Sampling and analysis of proposal documents for R6-8.

Courtesy of Dr Joelle Daviaud, GFATM

Malaria treatment seeking behaviour

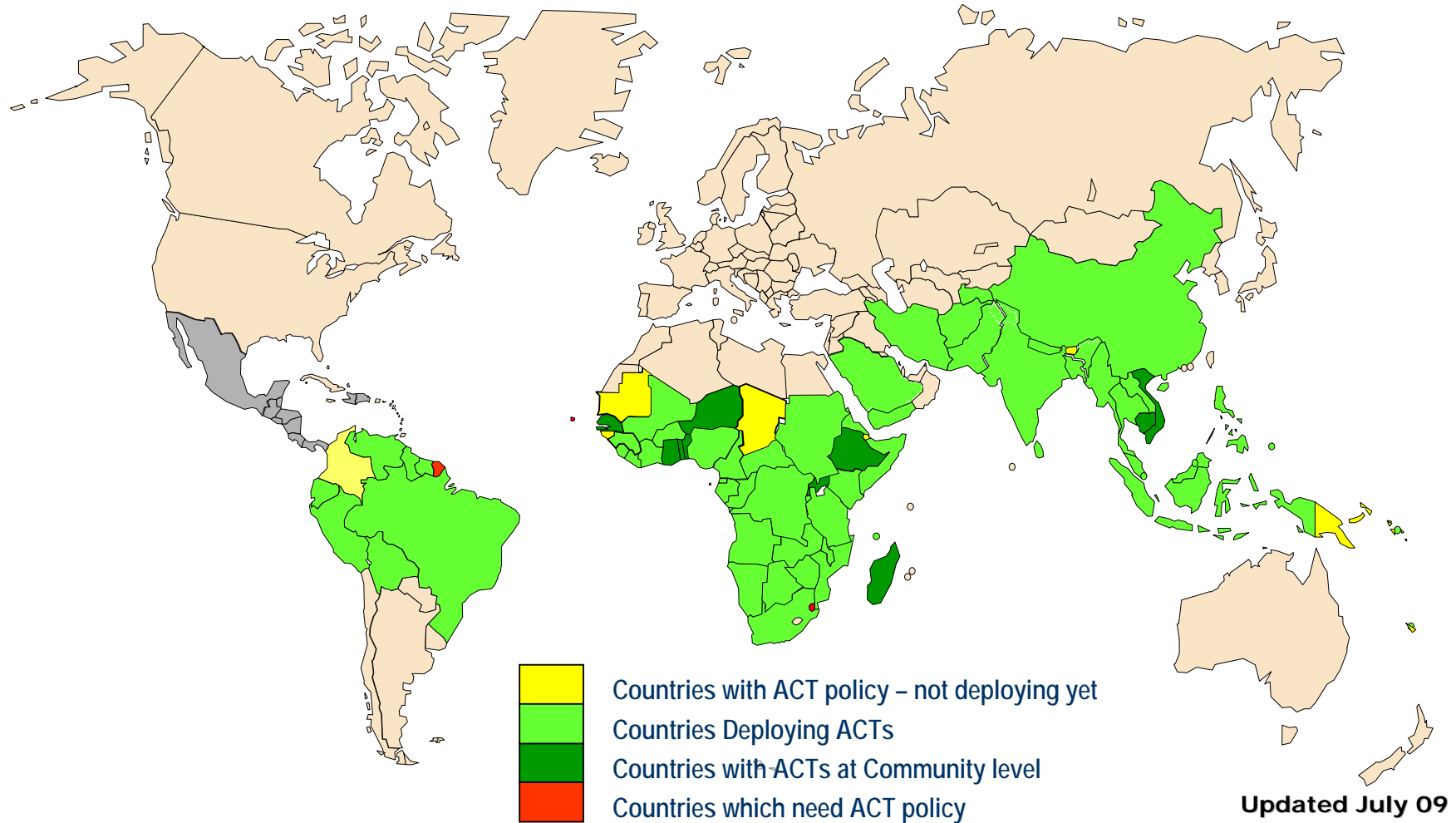
Percentage of patients with fever that seek treatment in public and private health facilities and who do not seek any treatment, by WHO Region (data from 59 DHS and MICS surveys)



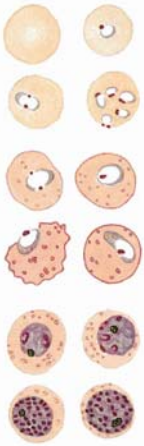
(Source: World Malaria Report 2008)



Global Status of ACT Implementation



Affordable Medicine Facility for malaria

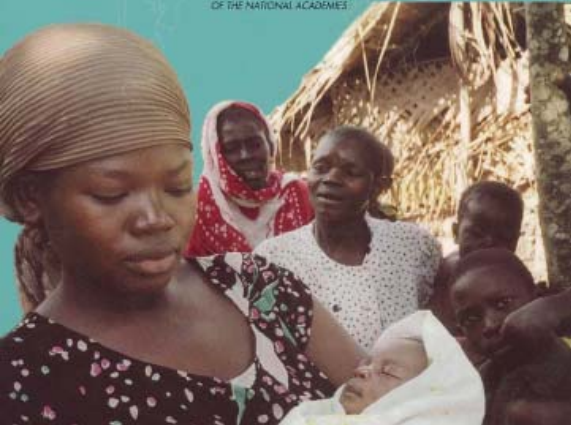


- Initiative hosted by the Global Fund to supply quality ACTs at highly subsidized price, **aiming to:**
 - Make **ACTs more available and affordable** across the **public, private and not-for-profit sectors** in malaria endemic countries;
 - **Delay emergence of resistance** to artemisinin by displacing use of oral artemisinin-based monotherapies

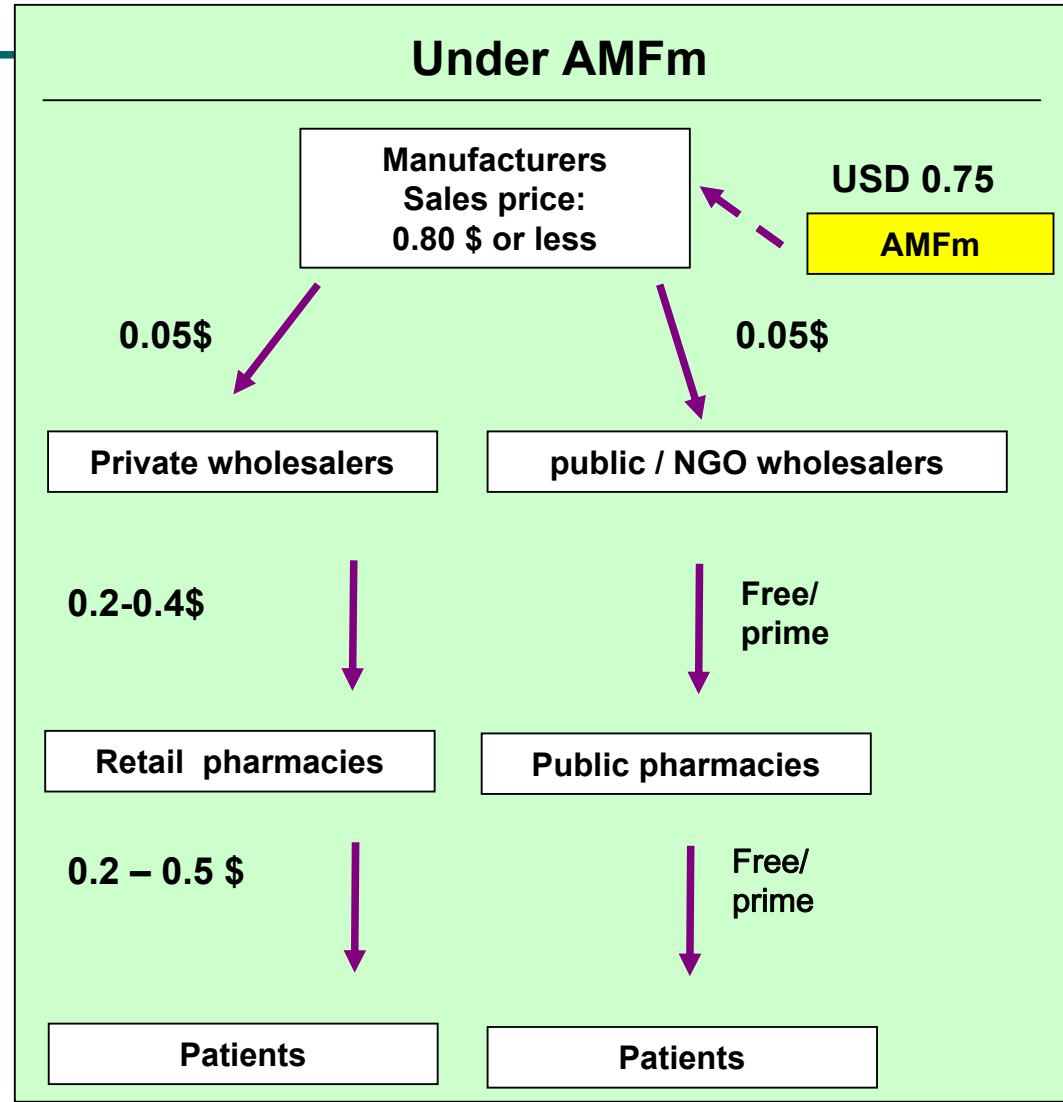
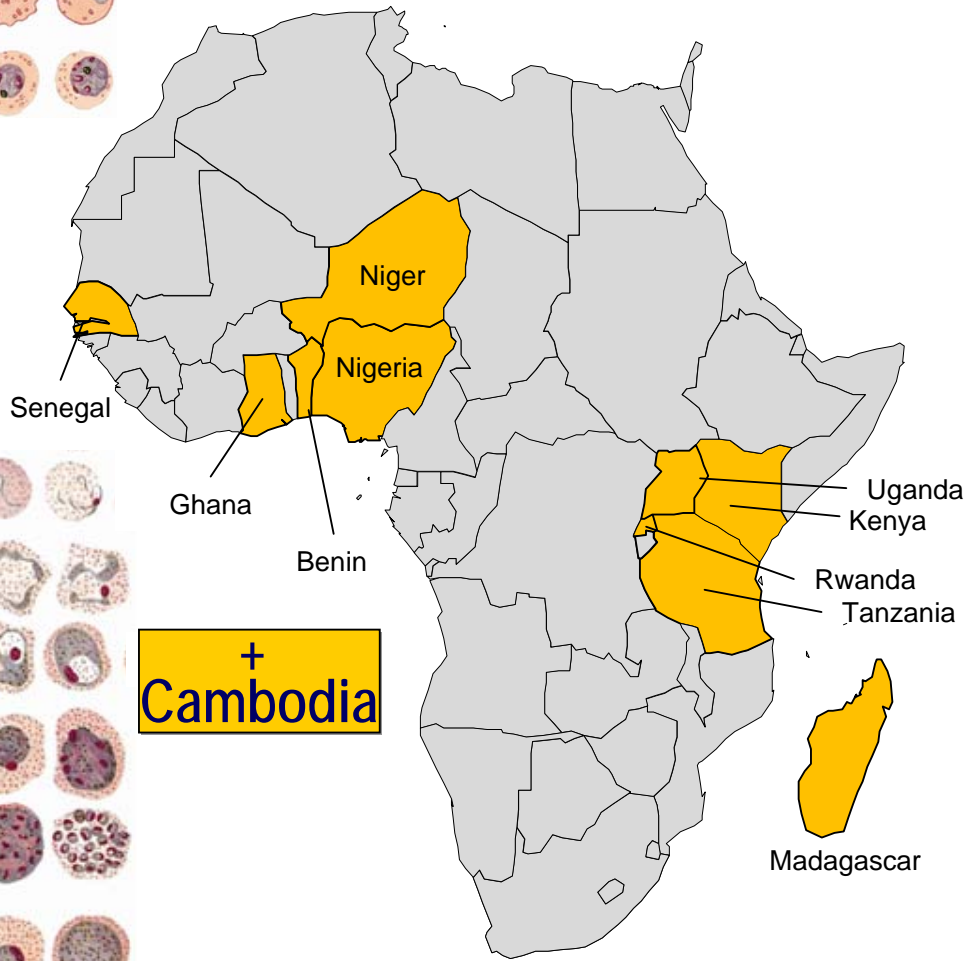
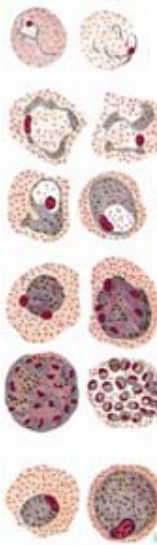
SAVING LIVES, BUYING TIME

Economics of Malaria Drugs
in an Age of Resistance

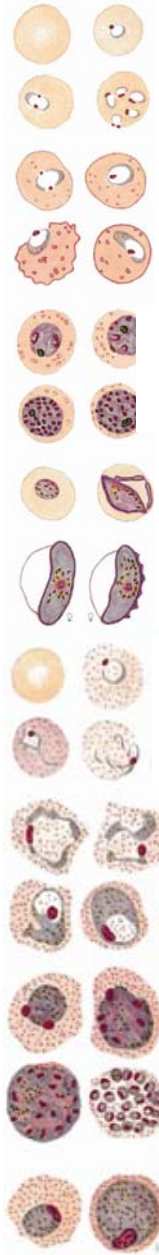
INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES



Eligibility and co-payment (AMFm Phase I)



ACTs on the market up to 2010



artemether-
lumefantrine

AS+MQ }
AS+AQ } co-blistered
AS+SP } products

Fixed-dose combinations

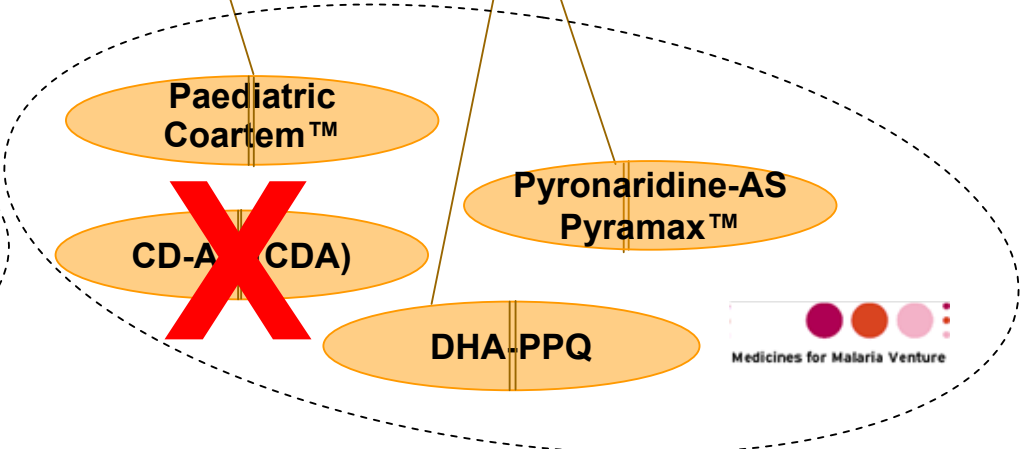
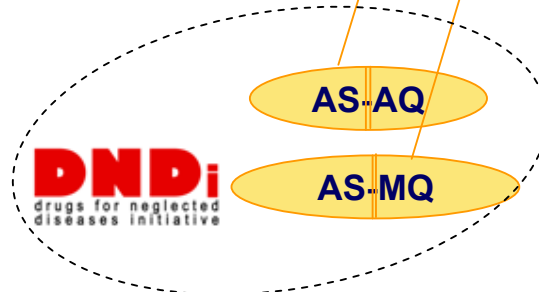
Alternatives
to artemisinin



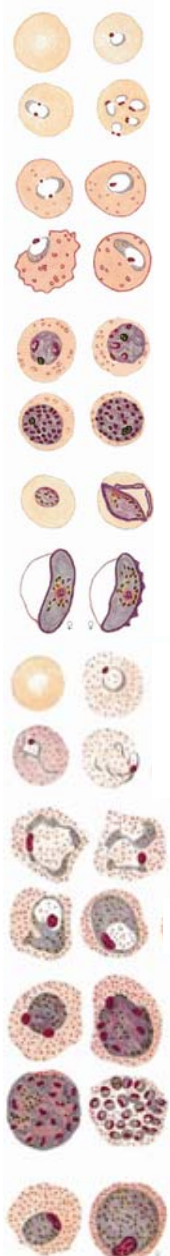
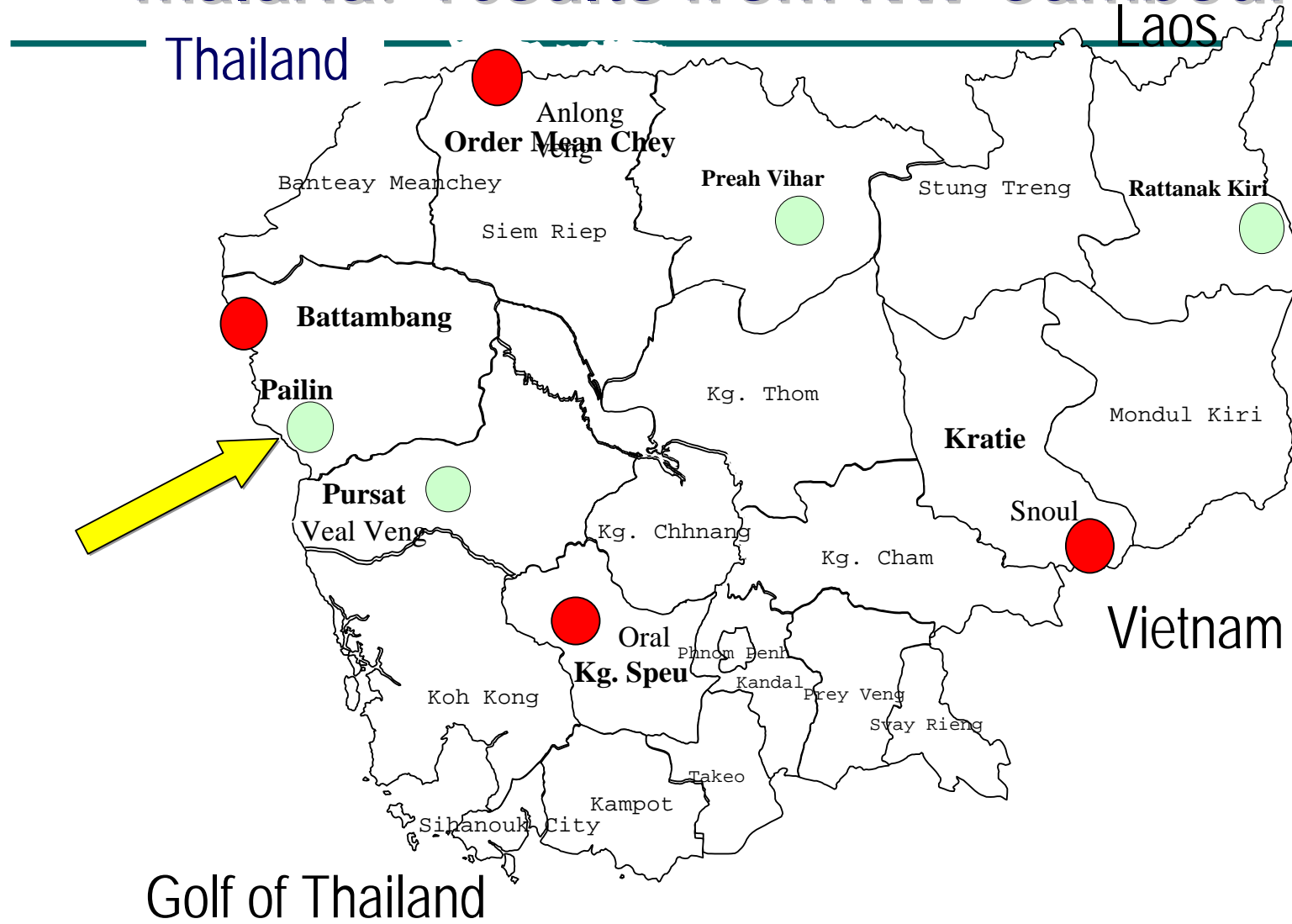
2017?



DHA-PPQ+TMP

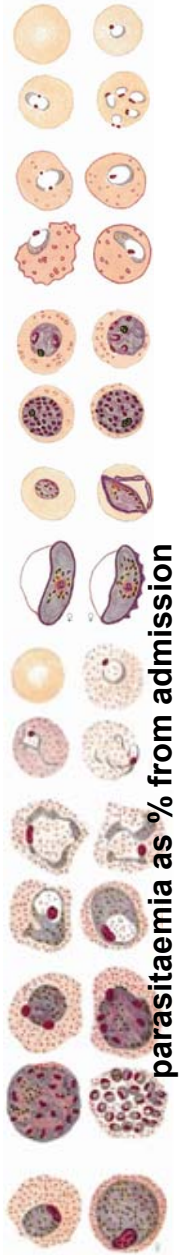
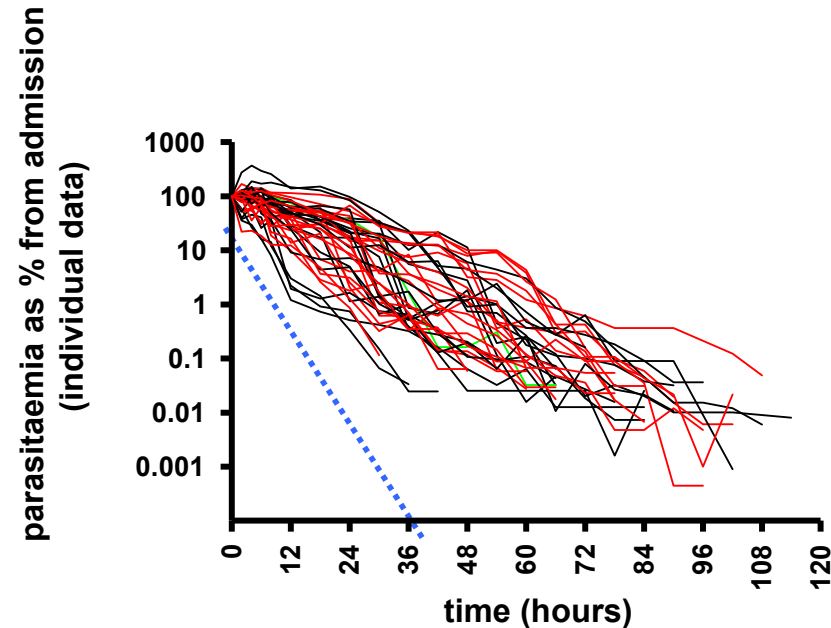
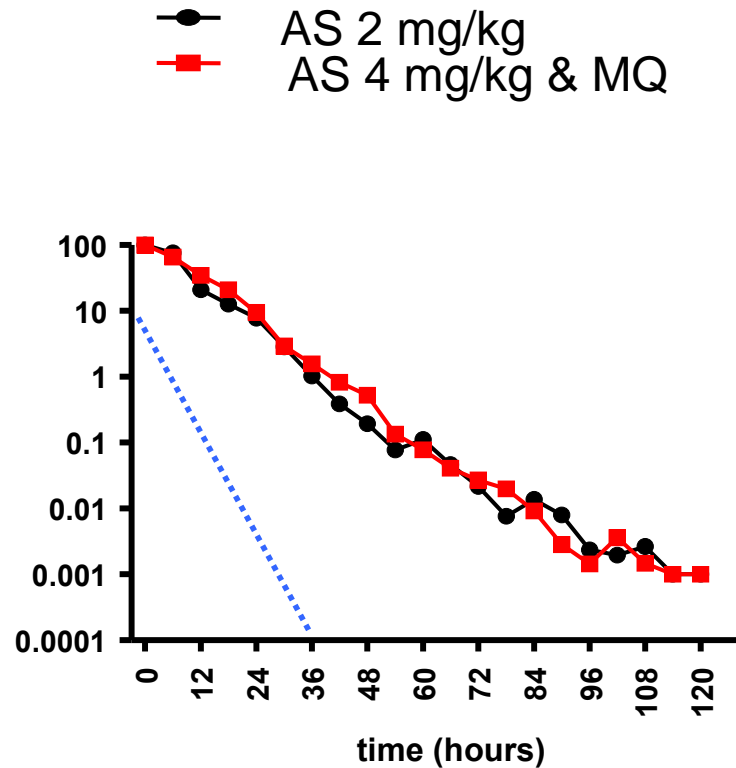


Artemisinin resistance in *P. falciparum* malaria: results from NW Cambodia



Delayed parasite clearance: first evidence of tolerance to artesunate

PCT in Pailin study 2007-2008:



Confirmation of AS drug resistance (as defined by WHO) 2008-2009

- Failure to cure a blood infection
 - high failure rate with AS 2 mg/kg (7 days monotherapy)
 - 8% early treatment failures & 30% late treatment failures
- In the presence of high AS and DHA blood levels confirmed in all patients
- Higher doses of AS (6 & 8 mg/kg) did not overcome resistance

Dondorp *et al.* N Engl J Med 2009; 361: 455-67



Artemisinin resistance





World Health Organization

WHO calls for artemisinin combination therapies

"It is critical that artemisinins be used correctly," said Dr LEE Jong-wook, WHO's Director-General. "We request pharmaceutical companies to immediately stop marketing single-drug artemisinin tablets and instead market artemisinin combination therapies only. The new treatment guidelines we are releasing today provide countries with clear and evidence-based direction on the best treatment options for malaria."

According to the new WHO malaria treatment guidelines, uncomplicated falciparum malaria must be treated with ACTs and not by artemisinin alone or any other monotherapy.

...and the
...medicine available to

...LEE Jong-wook, WHO's Director-General. "We request
...marketing single-drug artemisinin tablets and instead market
...The new treatment guidelines we are releasing today provide countries
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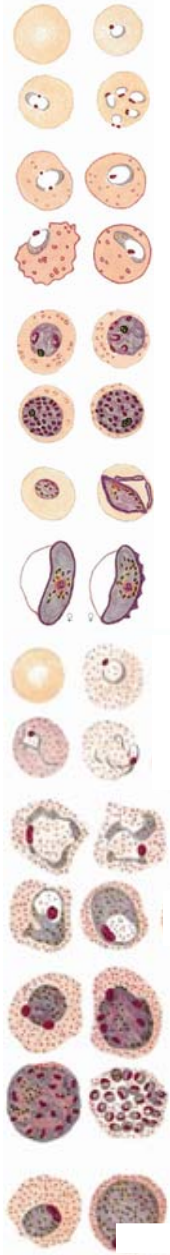
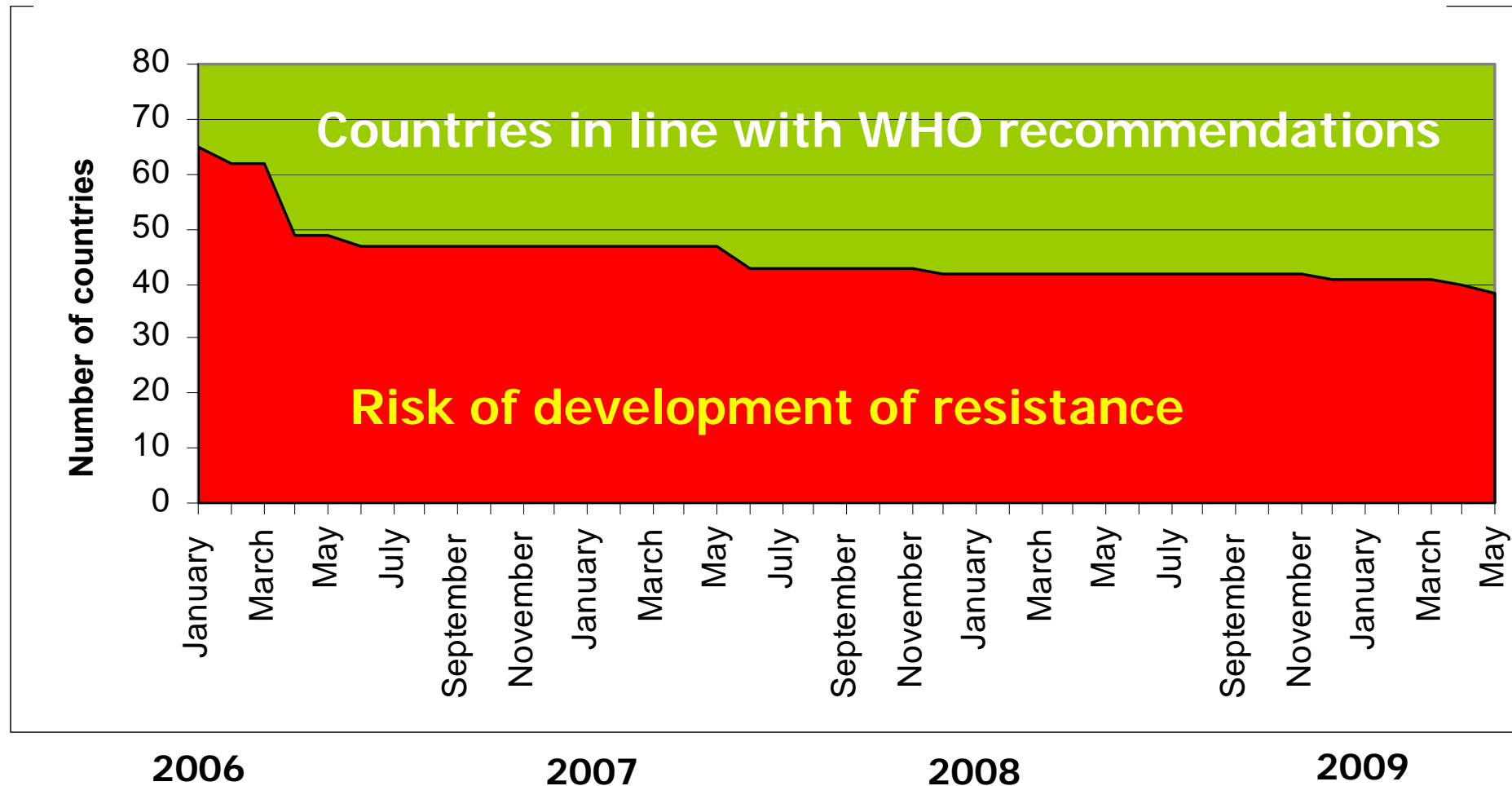


Steps to implement WHO recommendations

1. 19 January 2006 – WHO Press Release
2. Monitoring marketing practices and position of NDRA on <http://malaria.who.int/>
3. Dissemination of WHO position via WHO Offices, WHO staff briefings, inter- country and regional meetings with MOH officials
4. 19 April 2006 – WHO technical briefing on malaria guidelines and artemisinin monotherapies
5. Alignment of funding and procurement agencies
6. 23 May 2007 - WHA Resolution 60.18
7. 24 August 2007 – WHO informal consultation with manufacturers of artemisinin-based antimalarials
8. WHO country meetings with pharmaceutical companies (India, China, Pakistan, Viet Nam)



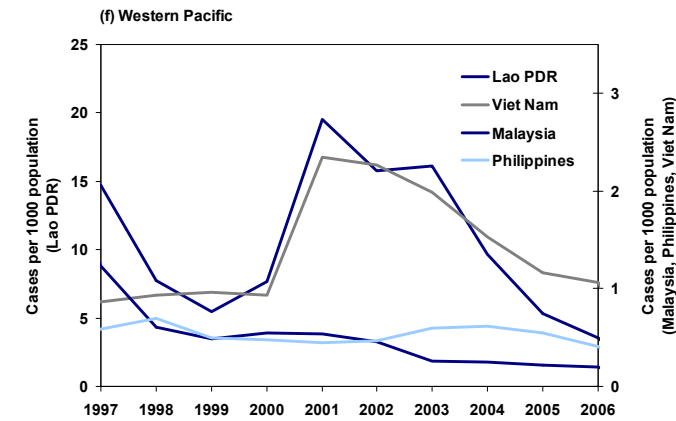
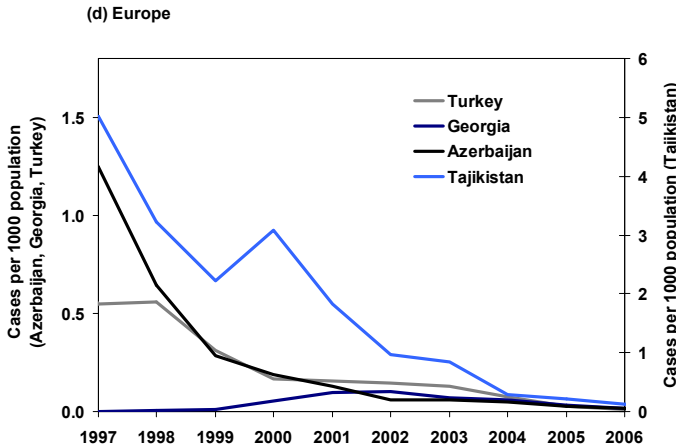
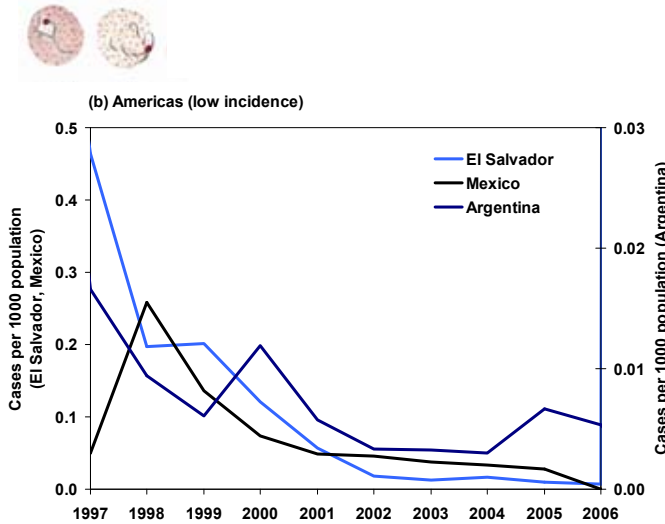
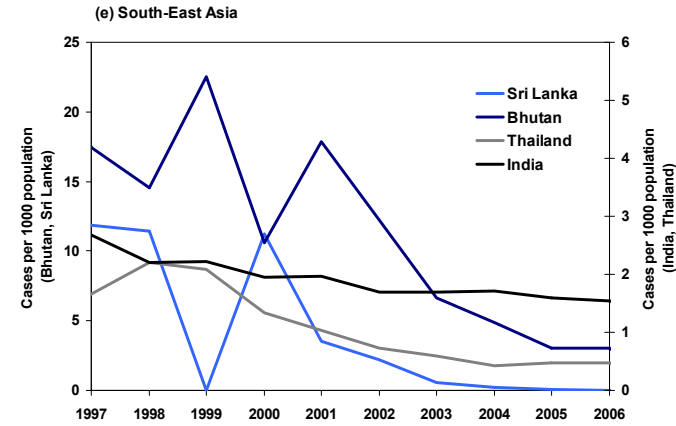
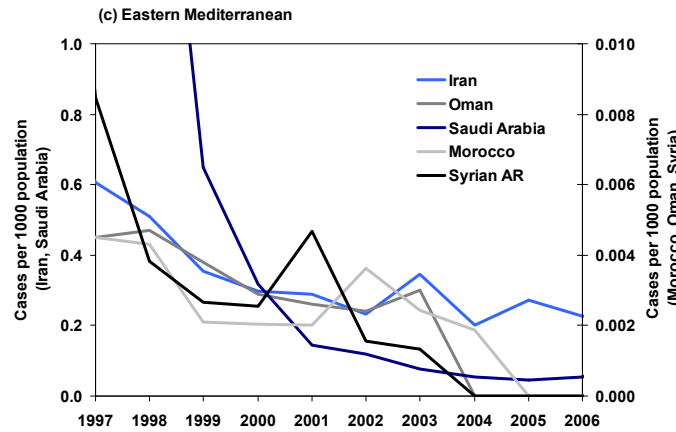
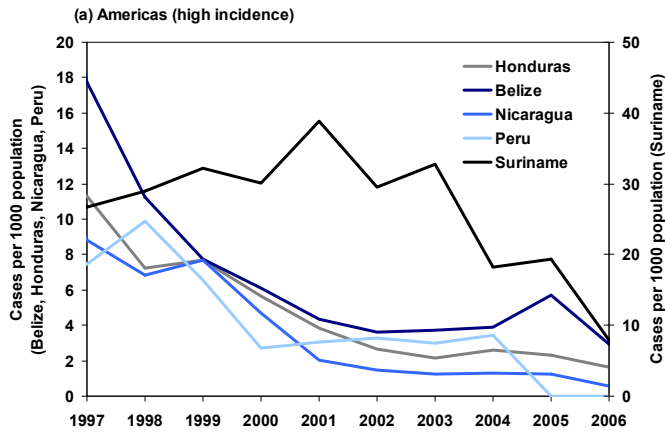
39 countries provide marketing authorization of oral artemisinin-based monotherapies





Trends in reported malaria cases: reduction in 25 countries outside the African Region

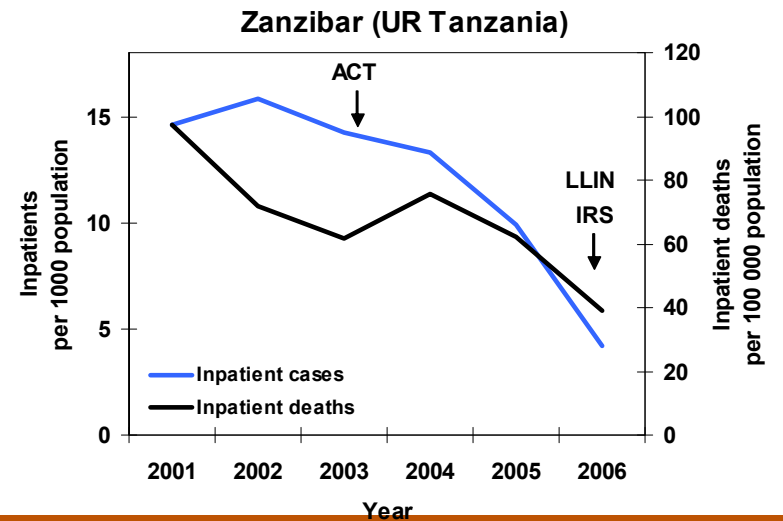
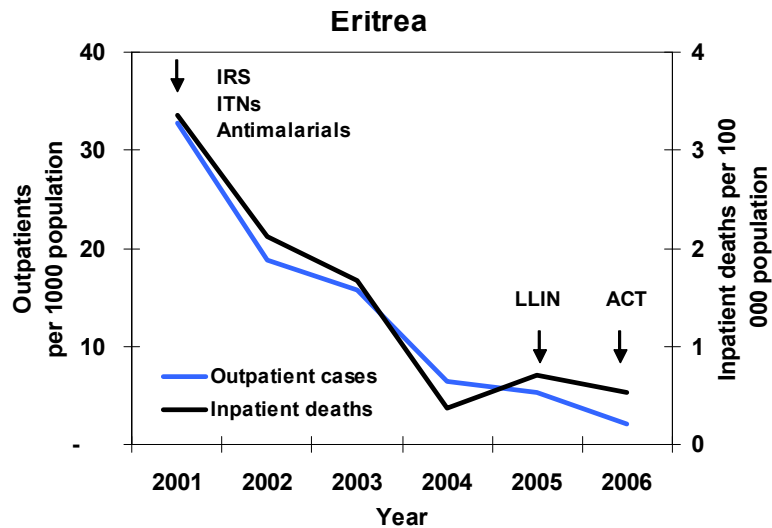
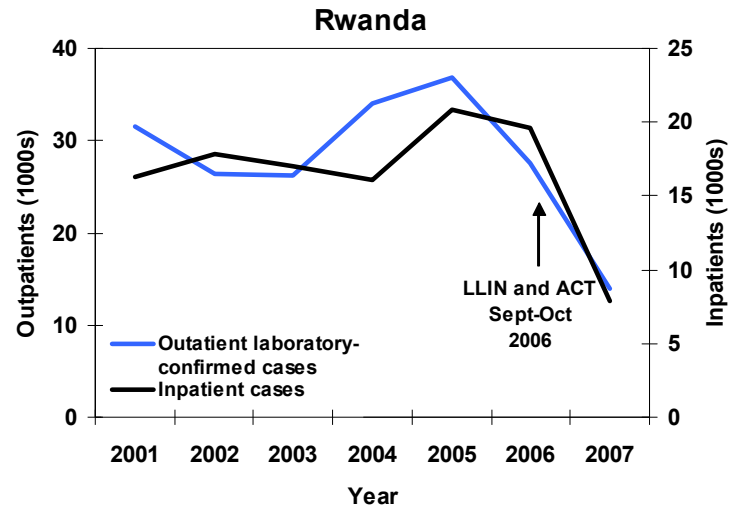
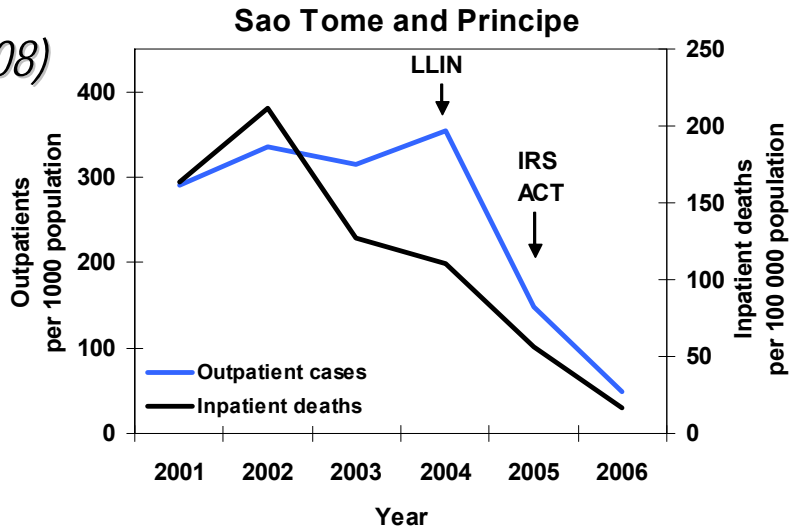
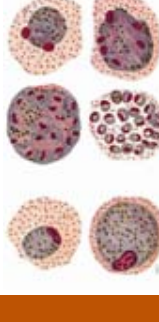
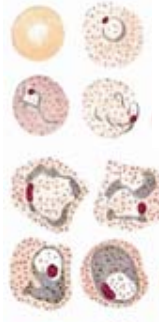
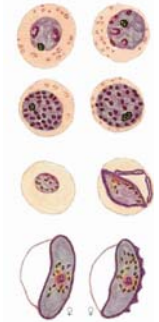
(Source: World Malaria Report 2008)



Impact: progress is possible in Africa



(Source: WMR2008)



Key lessons

- Increased access to effective malaria control interventions in recent years - higher political support and mobilization of resources
- Preliminary analysis suggest that 2010 target has been already achieved in 2008 by 5 African countries (Eritrea, Gambia, Rwanda, Sao Tomé and Príncipe, and Zambia) and by the islands of Zanzibar (United Republic of Tanzania). Sao Tomé and Príncipe has already achieved the 2015 target of at least 75% reduction in malaria mortality using IRS, in addition to ITNs and ACTs
- Since 2008 Report, impact is confirmed in countries with low-moderate transmission and high intervention coverage.



Key lessons (2)

- Outside the African Region malaria declined in 22 countries since 2000, but reduction was lowest in countries with the highest incidence rates.
- In some Western African countries (Togo and Niger) and in the high-transmission areas of western Kenya, the mass distribution of ITNs targeted to only children and pregnant women has not produced same impact as observed in countries with lower malaria transmission implementing universal coverage. To reach the 2010 global impact targets, malaria interventions need to target all persons, instead of just children and pregnant women, especially in areas of high transmission.
- In view of the resilient nature of malaria transmission, success in control and elimination should be measured in decades, not in few years; failure to sustain control results in resurgence and epidemics.



Antimalarial tools required for the next phase of malaria control and elimination

- New long-acting insecticides for IRS and LLINs (without excito-repellency)
- Longer acting LLINs
- Mosaic/combination insecticide treatment of LLIN and for IRS
- ITM for forest workers and dwellers (e.g. hammocks, blankets)
- Antimalarial with >95% cure rate & transmission blocking effect
- Triple FDC medicines, single dose regimen & high safety profile (IPT)
- Safe, effective medicines for radical treatment of *P. vivax*
- Robust & sensitive diagnostic tools and strong surveillance systems
- Effective pre-erythrocytic and transmission blocking malaria vaccines



The contribution of WHO/GMP colleagues

- Dr Richard Cibulski,
- Dr Kamini Mendis,
- Dr Mac Otten,
- Dr Aafje Rietveld,
- Dr Pascal Ringwald,
- Dr Sergio Spinaci

Is gratefully acknowledged

