



**World Health  
Organization**

**GLOBAL MALARIA  
PROGRAMME**



Organization



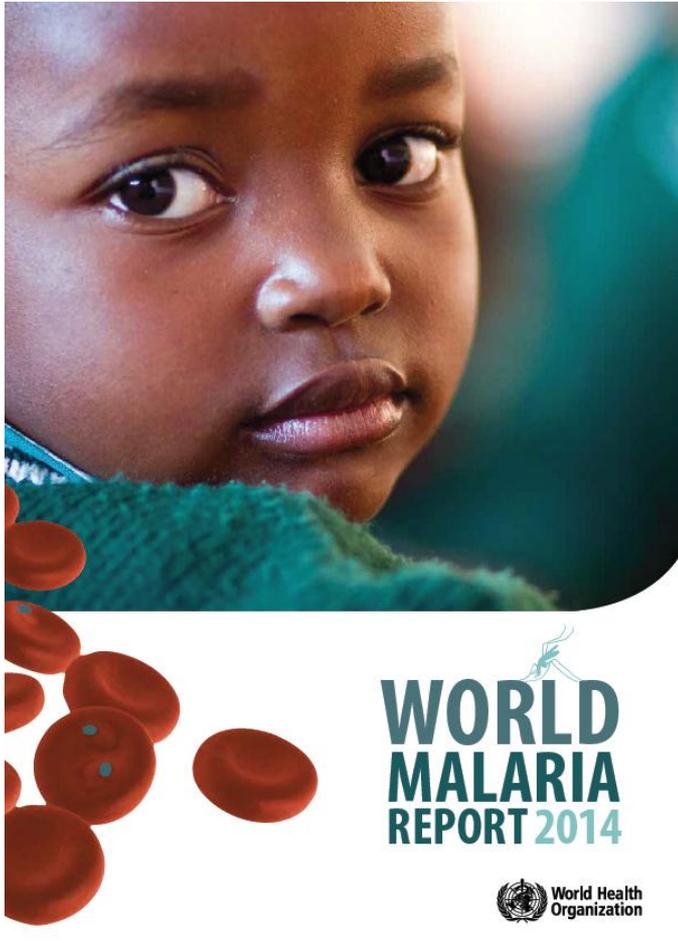
PROGRAMME

## **Progress in ITN Coverage**

**Alliance for Malaria Prevention  
Annual Meeting  
23 January 2015**

**Michael Lynch  
WHO Global Malaria Programme**

# World Malaria Report 2014



- Released on 9 December 2014
- Annual reference on the status of global malaria control & elimination. Data to 2013 and 2014.
- Principal data source is national malaria control programs with support from: WHO Regional offices, ALMA, CDC, DHS/ Measure, FIND, GHG UCSF, Global Fund, JHSPH, KFF, Oxford University, RBM, Tulane University, UNICEF, UNSE, USAID.
- Summarizes key malaria targets & goals
- Documents trends in financing, intervention coverage and malaria cases and deaths
- Profiles for 6 WHO regions and 97 endemic countries and areas

# Indicators for malaria interventions reported in WMR are linked to GMAP targets

Table 1.1 Roll Back Malaria objectives, targets for 2015 and indicators for measuring progress (23)

GMAP Objective or Target	Key Indicator	Further Analysis	Supporting Indicator
Objective 1 Reduce global malaria deaths to near zero* by end 2015	→ Inpatient malaria deaths per 1000 persons per year → <b>All-cause under 5 mortality rate</b>	→ Has health facility reporting completeness changed over time? → What factors are responsible?	→ Completeness of monthly health facility reports → Programme coverage indicators in this table (detailed below)
Target 1.1 Achieve universal access to case management in the public sector	→ Proportion of suspected malaria cases that receive a parasitological test → <b>Proportion of children under 5 years old with fever in the last two weeks who had a finger or head stick</b>	→ Are people seeking advice or treatment for fever and from where?	→ Proportion of children under 5 years old with fever in the last two weeks for whom advice or treatment was sought
Target 1.2 Achieve universal access to case management, or appropriate referral, in the private sector	→ Proportion of confirmed malaria cases that receive first-line antimalarial treatment according to national policy	→ Are adequate quantities of antimalarial medicines available?	→ Proportion of health facilities without stock-outs of key commodities by month
Target 1.3 Achieve universal access to community case management (CCM) of malaria	→ <b>Proportion receiving first-line treatment among children under 5 years old with fever in the last two weeks who received any antimalarial drug</b>		
Objective 2 Reduce global malaria cases by 75% by end 2015 (from 2000 levels)	Confirmed malaria cases (microscopy or RDT) per 1000 persons per year	→ Has diagnostic effort changed over time?	→ Annual blood examination rate
		→ Has health facility reporting completeness changed over time?	→ Completeness of monthly health facility reports
	Parasite prevalence: proportion of children aged 6-59 months with	→ Have test positivity rates changed over time?	→ Malaria test positivity rate
		→ Is there other evidence of morbidity change?	→ <b>Proportion of children aged 6-59 months with a hemoglobin</b>
	Proportion of population with access to an ITN within their household	→ How many households have at least one ITN?	→ <b>Proportion of households with at least one ITN</b>
		→ How many households have enough ITNs for each occupant?	→ <b>Proportion of households with at least one ITN for every two people</b>
		→ Were enough ITNs delivered to ensure at least one ITN per two people at risk?	→ <b>Proportion of population at risk potentially covered by ITNs distributed</b>
		→ Are specific risk groups receiving ITNs?	→ <b>Proportion of targeted risk group receiving ITNs</b>
		→ Are specific population groups using ITNs?	→ <b>Proportion of children under 5 years old who slept under an ITN the previous night</b>
		→ Are available ITNs being used?	→ <b>Proportion of pregnant women who slept under an ITN the previous night</b> → <b>Proportion of existing ITNs used the previous night</b>
Target 2.1 Achieve universal access to and utilization of prevention measures**	→ Proportion of population protected by IRS within the last 12 months	→ How many households have been reached with at least one vector control method?	→ Proportion of households with at least one ITN and/or sprayed by IRS within the last 12 months
Target 2.2 Sustain universal access to and utilization of prevention measures**	→ <b>Proportion of households with at least one ITN for every two people and/or sprayed by IRS within the last 12 months</b>		
	→ Proportion of women who received at least three or more doses of IPTp during ANC visits during their last pregnancy	→ Is IPTp received by all pregnant women at each scheduled ANC visit?	→ Proportion of women who received at least one, two or four doses of IPTp during ANC visits during their last pregnancy → Proportion of women attending antenatal care (ANC) who received at least one, two, three or four doses of IPTp
Target 2.3 Accelerate development of surveillance systems	→ Percent of districts reporting monthly numbers of suspected malaria cases, number of cases receiving a diagnostic test and number of confirmed malaria cases		
Objective 3 Eliminate malaria by end 2015 in 10 new countries (since 2008) and in the WHO European Region	→ Number of new countries in which malaria has been eliminated	→ What are the trends in malaria cases? → How strong are surveillance systems?	→ Number of active foci reported per year → Number of cases by classification (indigenous, introduced, imported, induced) → Proportion of private facilities reporting to national malaria surveillance system

Indicators derived from household surveys are in bold.

\* In areas where public health facilities are able to provide a parasitological test for all suspected malaria cases, near zero malaria deaths is defined as no more than 1 confirmed malaria death per 100,000 population at risk.

\*\* Universal access to and utilization is defined as every person at risk sleeping under a quality insecticide-treated net or in a space protected by indoor residual spraying and every pregnant woman at risk receiving a dose of IPTp at each ANC visit after the first trimester (in settings where IPTp is appropriate).

- Objective 2: Reduce global malaria cases by 75% by end of 2015
- Target 2.1, 2.2: Achieve and sustain universal access to and utilization of prevention measures (ITNs, IRS, IPTp)

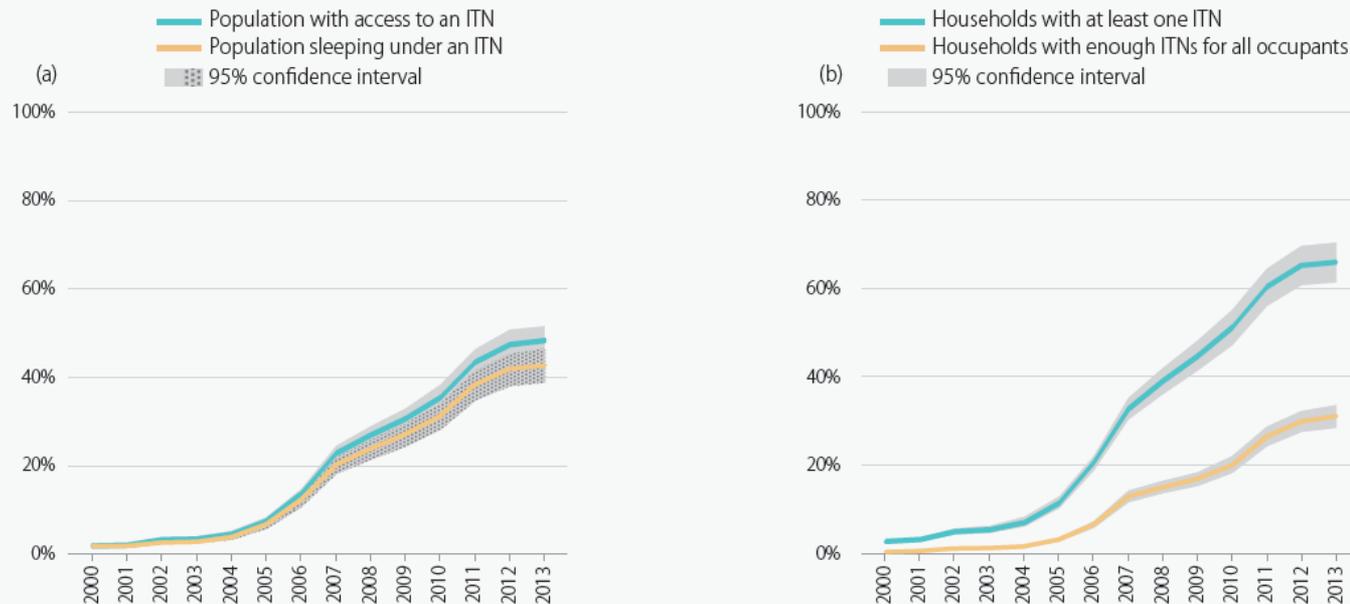
## Key indicators-ITNs

- Proportion of population with access to an ITN in their household
- Proportion of population that slept under an ITN the previous night

## Several supporting indicators

# ITN coverage – large increase in access and high use of available nets

**Figure 3.1** a) Proportion of population with access to an ITN and proportion sleeping under an ITN, b) Proportion of households with at least one ITN and proportion of households with enough ITNs for all persons, sub-Saharan Africa, 2000–2013



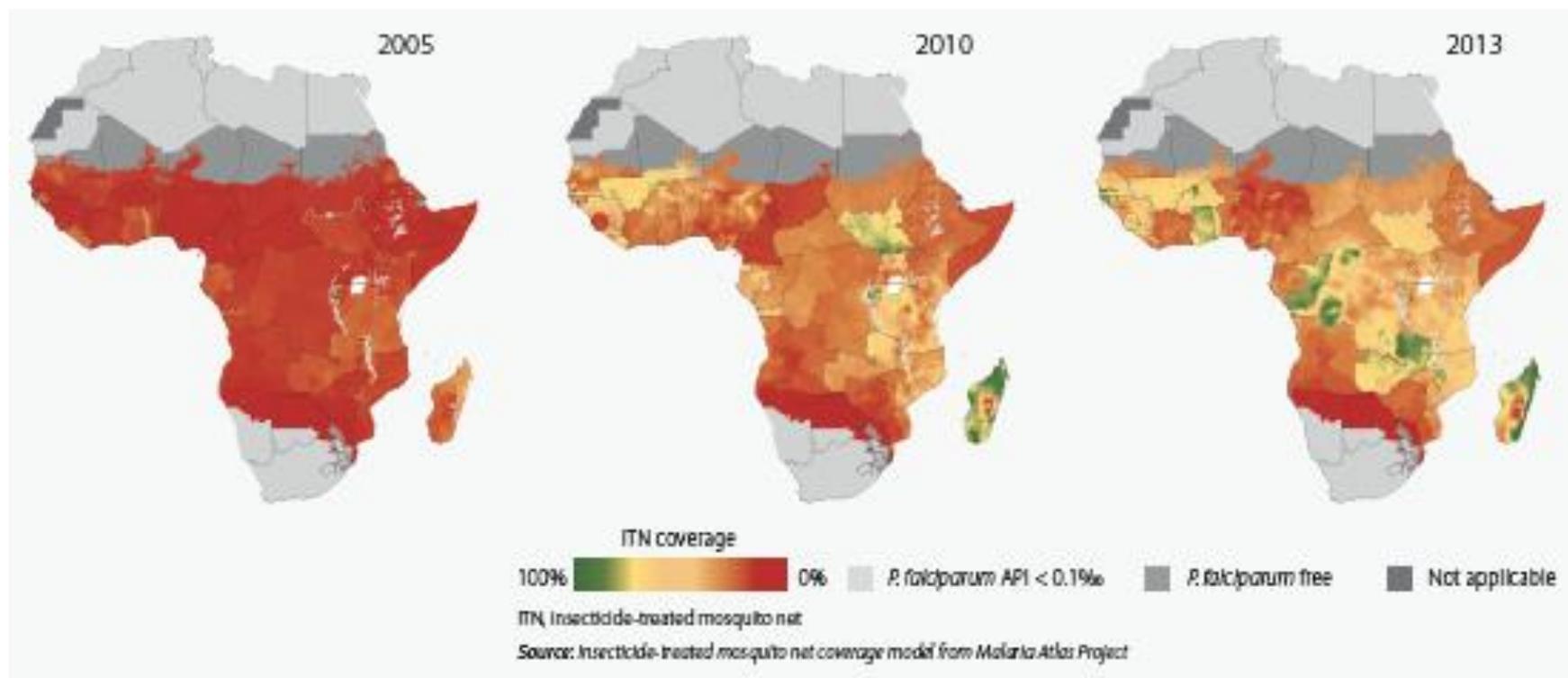
ITN, insecticide-treated mosquito net

Source: ITN coverage model from the Malaria Atlas Project (based at the University of Oxford)

49% of at risk population in sub-Saharan Africa had access to an ITN in 2013, 44% were sleeping under an ITN

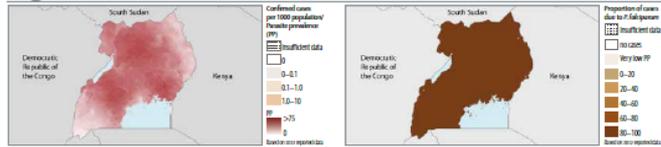
Gap between owning at least one net and owning enough for all household members

# Change in proportion of population sleeping under an ITN 2005 - 2013



# Trends in country-level ITN population access included in WMR profiles of malaria endemic countries

## Uganda



**I. Epidemiological profile**

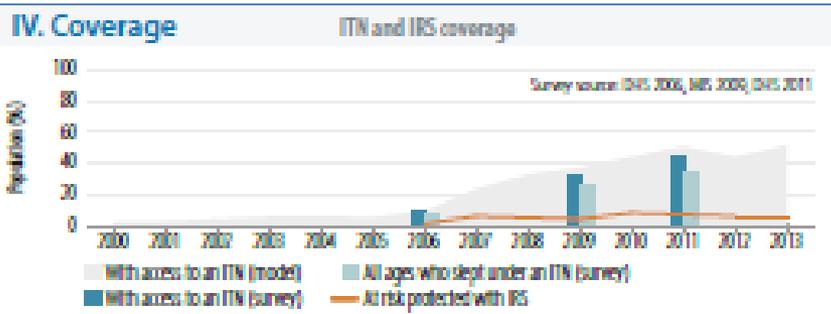
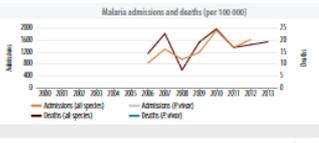
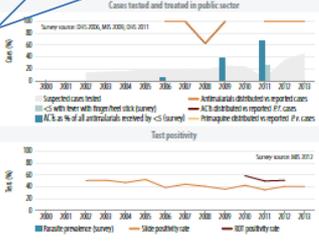
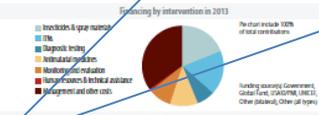
Population	2013	%
High transmission (> 1 case per 1000 population)	13 800 000	90
Low transmission (< 1 case per 1000 population)	3 760 000	10
Malaria free (0 cases)	0	0
Total	17 560 000	

Parasites and vectors

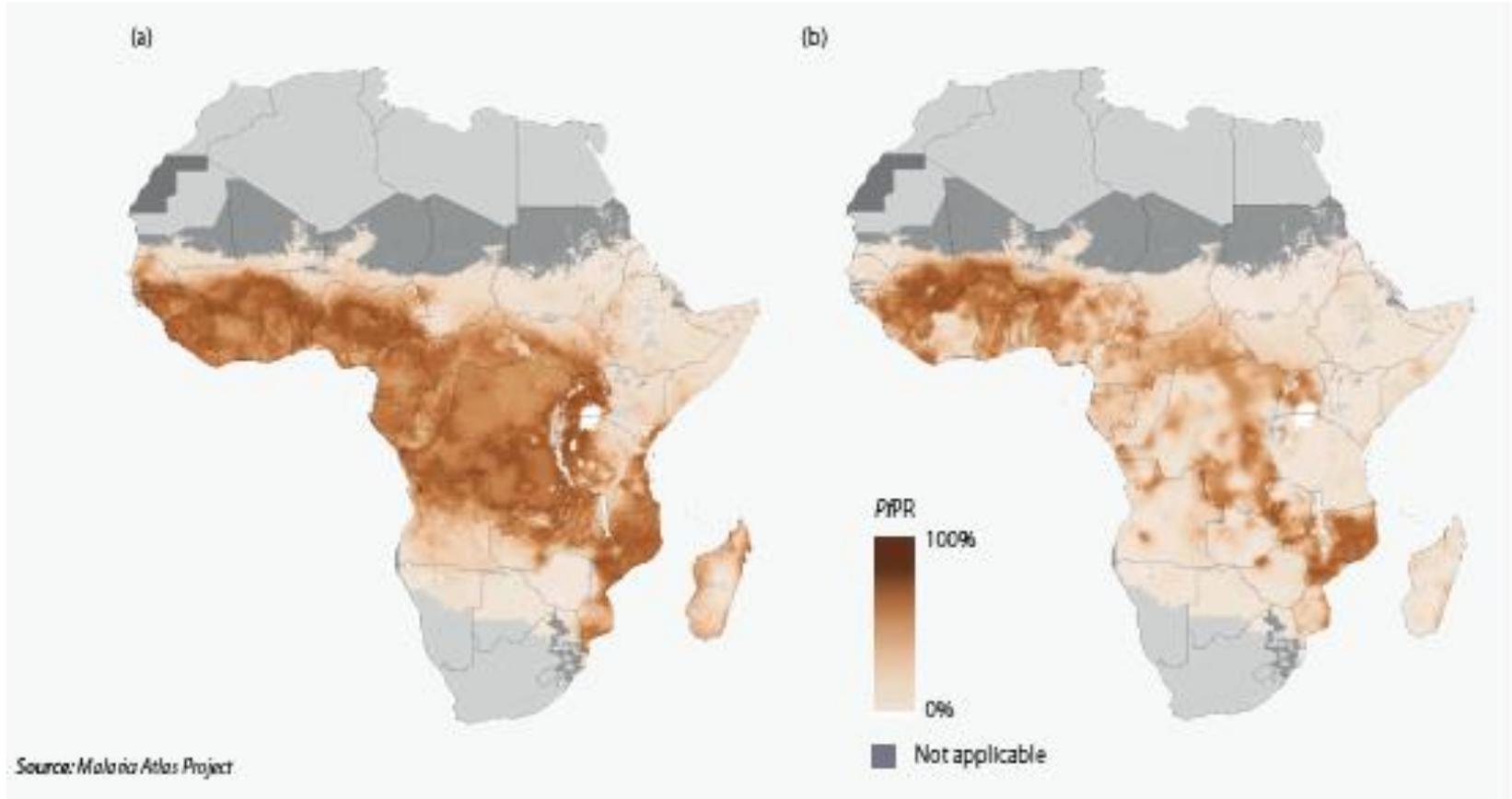
Major plasmodium species: P. falciparum (100%), P. vivax (0%)
Major anopheline species: An. gambiae, An. funestus, An. funestus
Programme phase: Control
Reported confirmed cases: 1 502 362
Reported deaths: 7277

**II. Intervention policies and strategies**

Intervention	Policy/strategies	Yes	Year adopted
ITN	ITNs/LNs distributed free of charge	Yes	2006
	ITNs/LNs distributed to all age groups	Yes	2013
IRS	IRS is recommended	Yes	2005
	IRS is authorized for IRS	Yes	2008
Larval control	Use of larval control recommended	Yes	2011
IPT	IPT used to prevent malaria during pregnancy	Yes	1998
Diagnosis	Patients of all ages should receive diagnostic test	Yes	2012
	Malaria diagnosis is free of charge in the public sector	Yes	2001
Treatment	ACT is free for all ages in public sector	Yes	2005
	Artemisinin-based monotherapies withdrawn	Yes	2005
	Single dose of primaquine used as prophylactic medicine for P. falciparum	No	-
	Primaquine is used for radical treatment of P. vivax	No	-
	GAPD test is a requirement before treatment with primaquine	No	-
	Directly observed treatment with primaquine is undertaken	No	-
	System for monitoring of adverse reactions to antimalarials exists	Yes	-

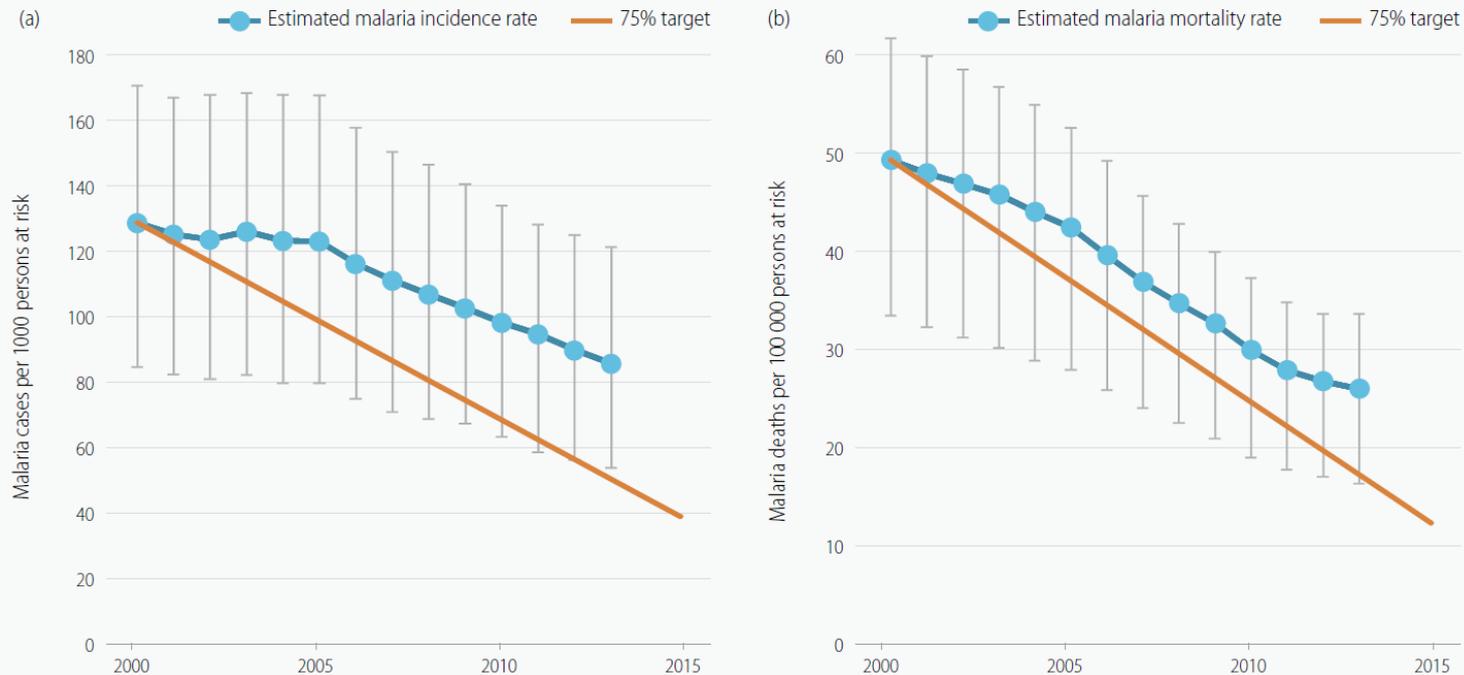


# Change in proportion of children aged 2-10 years infected with *P. falciparum*: a) 2000 and b) 2013



# Global trends in estimated malaria case incidence and malaria mortality rates

**Figure 8.8** Change in a) Estimated malaria case incidence rate, 2000–2013 and b) Estimated malaria mortality rate, 2000–2013

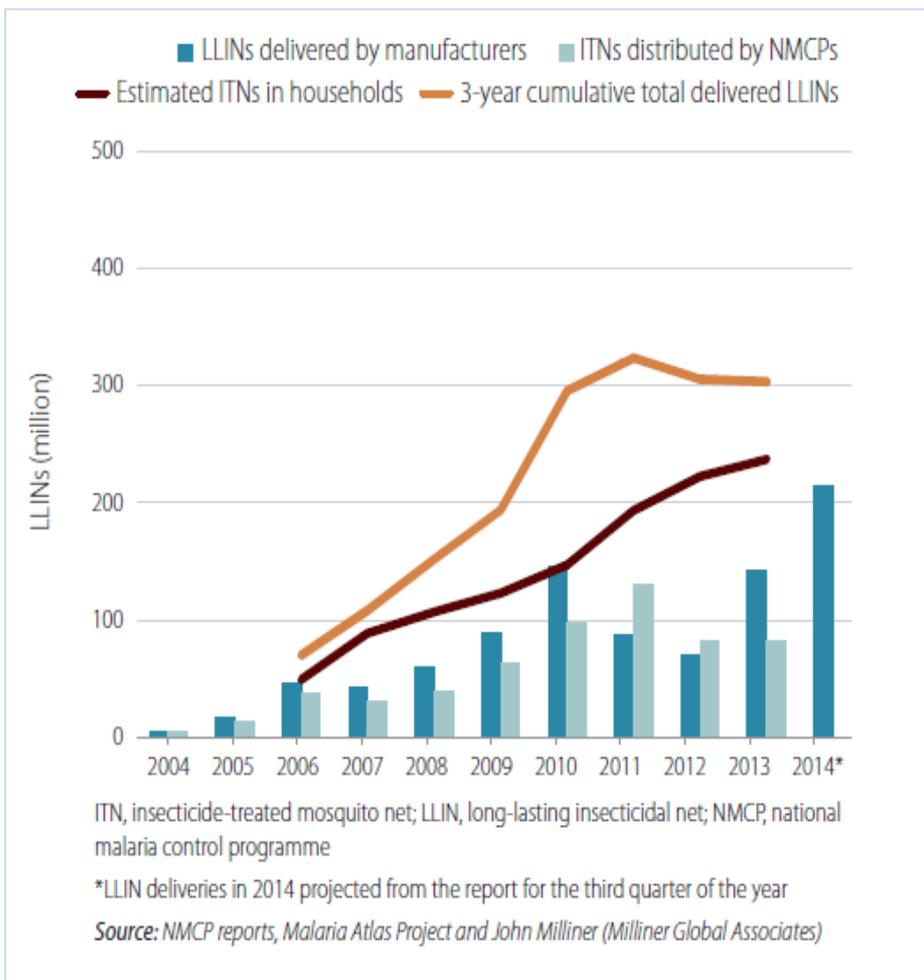


Source: WHO estimates

Worldwide, between 2000 and 2013, estimated malaria mortality rates fell by 47% in all age groups and by 53% in children under 5 years of age.

If the annual rate of decrease that has occurred over the past 13 years is maintained, then malaria mortality rates are projected to decrease by 55% in all ages, and by 61% in children under 5 years of age by 2015

# Number of LLINs delivered, distributed and estimated in households, Sub-Saharan Africa, 2004-2014



- Increased delivery and distribution of nets, particularly during 2013-2014
- Time lag from manufacturer delivery to NMCP distribution but totals equal over time
- Due to loss of nets over time, not all delivered nets are available in households

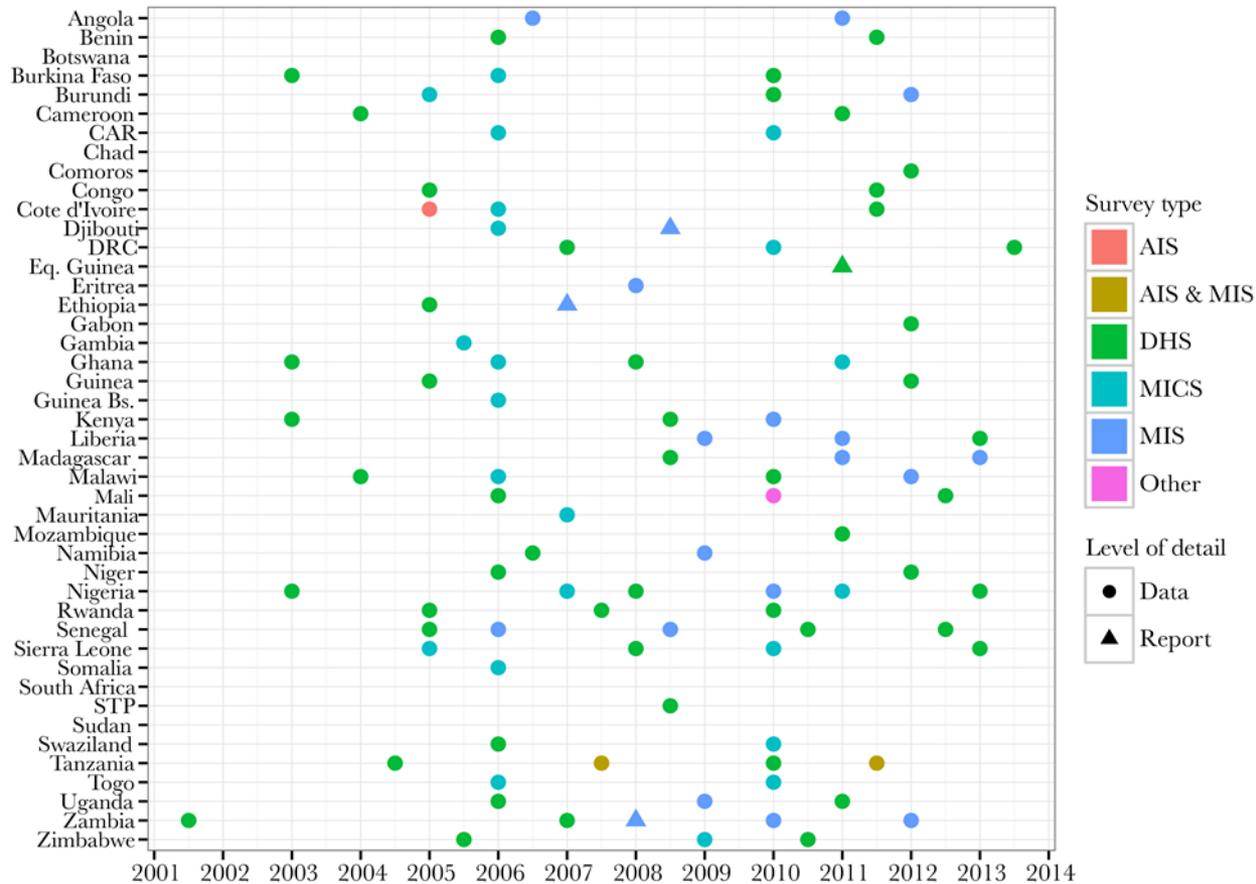
# Measuring ITN coverage with available information

- Household surveys great source of information on ITN ownership, access and use
  - Surveys not available for every country every year
- Information on number of ITNs delivered and distributed available for each country each year
  - Using cumulative total does not account for loss of nets over time
  - Doesn't account for distribution of nets between households
- Can combine information on number nets delivered and distributed with household survey data
  - Compare number of nets from delivery/distribution and in survey--accounts for loss of nets over time
  - Examine distribution of nets among households--accounts for inefficiencies in distribution

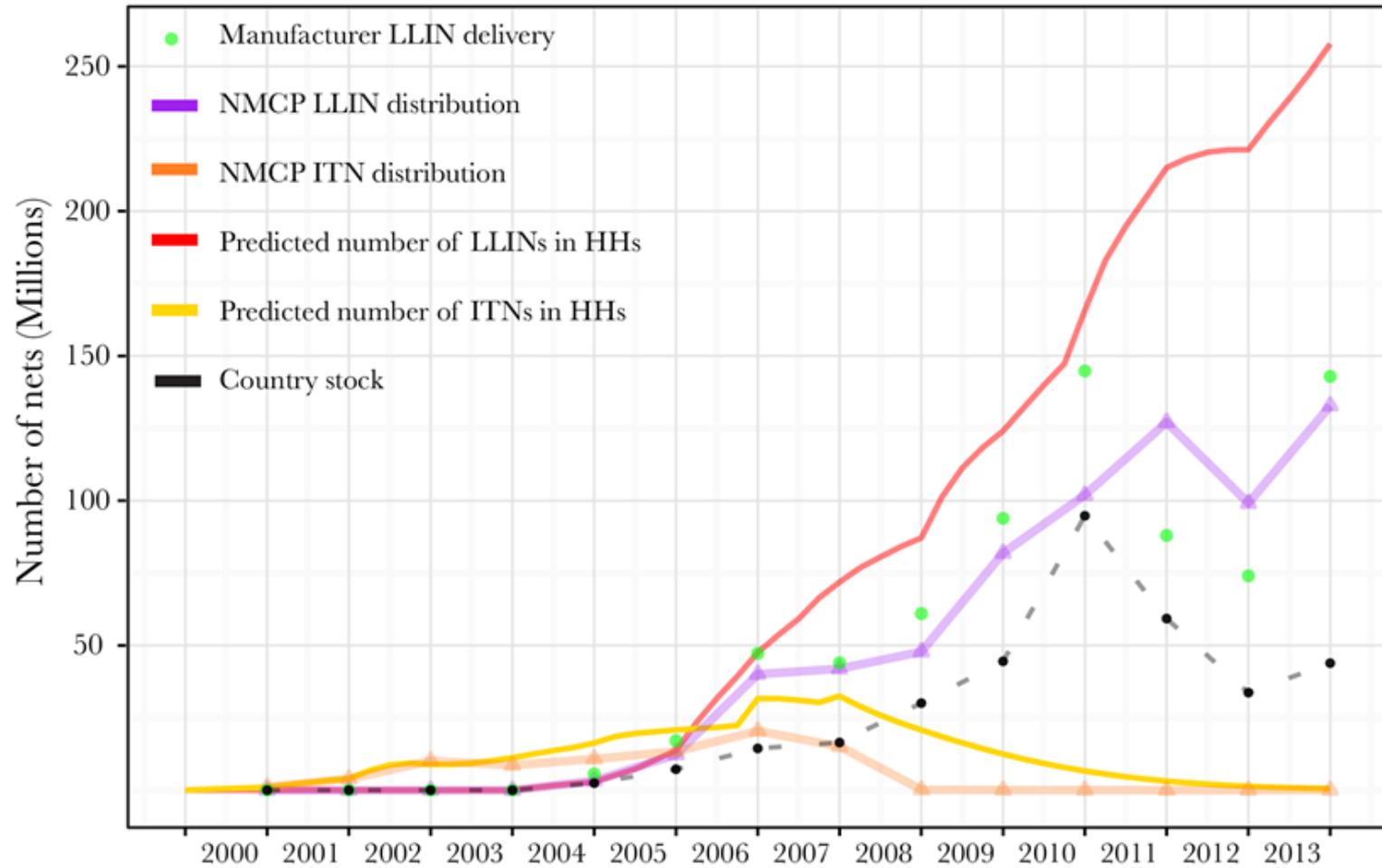
# ITN coverage model used for WMR 2014

- Developed by MAP University of Oxford, builds on previous work of IHME and Netcalc tool
  - determines the total number of nets in households at point in time
  - translate number of nets into resulting levels of coverage
- Compartment model which incorporates manufacturer reports of LLINs delivered (Milliner), NMCP data on ITNs distributed, and national household surveys
- Accounts for loss of nets over time
  - shape of loss function is fixed, however rate of loss determined by comparison of nets delivered/distributed and number from household survey for each country
- Incorporates distribution of nets by household size to translate number of nets to ownership and access

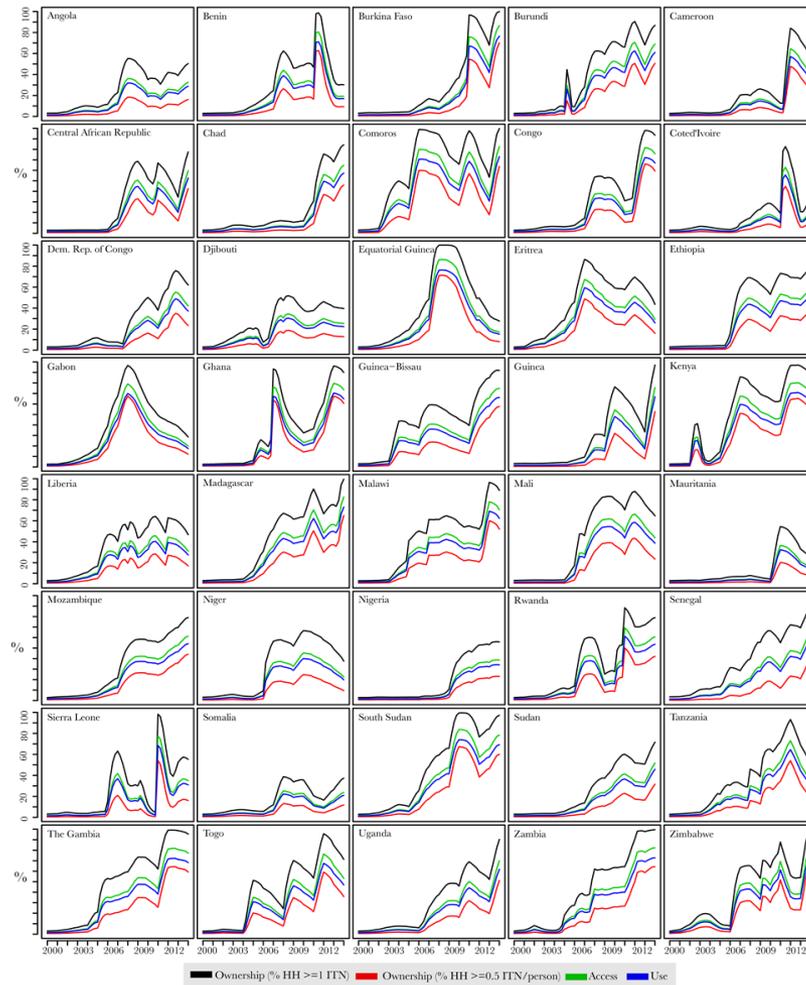
# National surveys (93) on ITN ownership, access, and use included in model by country, over time



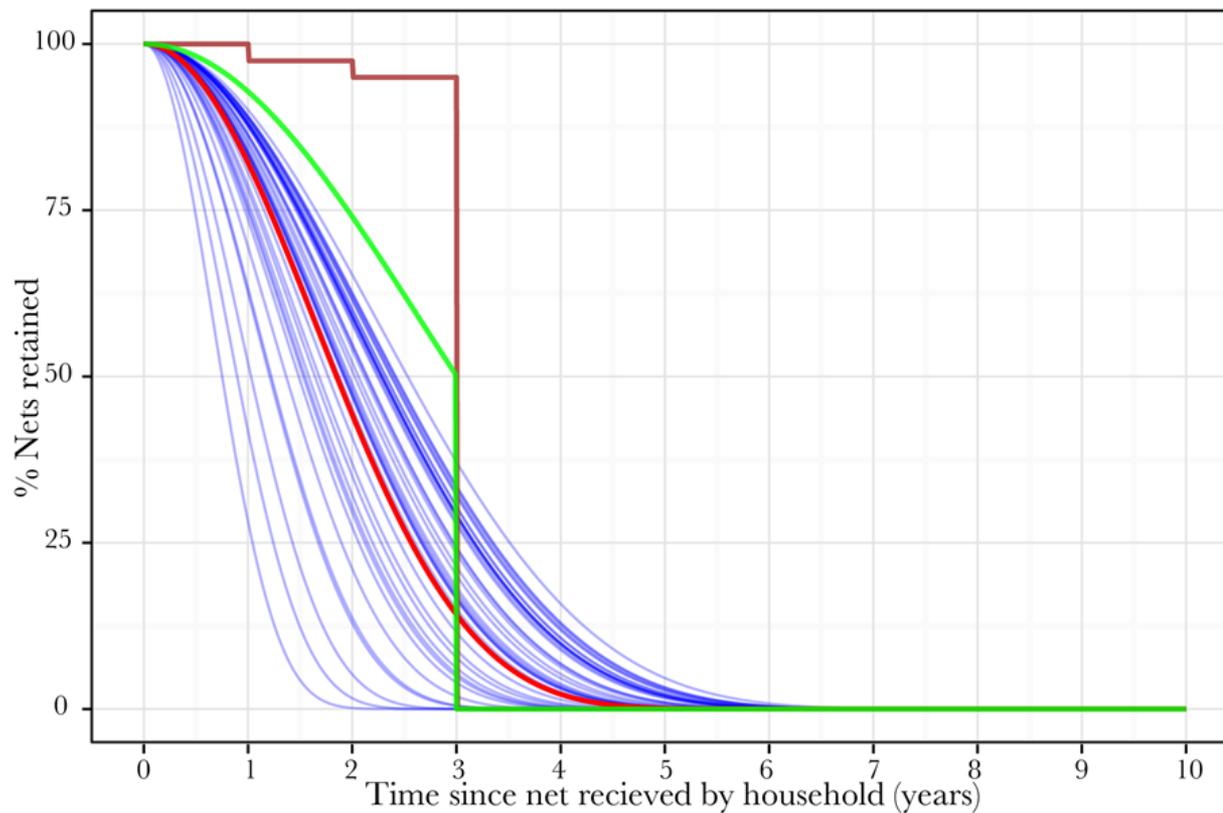
# Time series of ITN delivery, distribution and estimated net crop 2000-2013



# Model provides ITN coverage indicators for each country over time



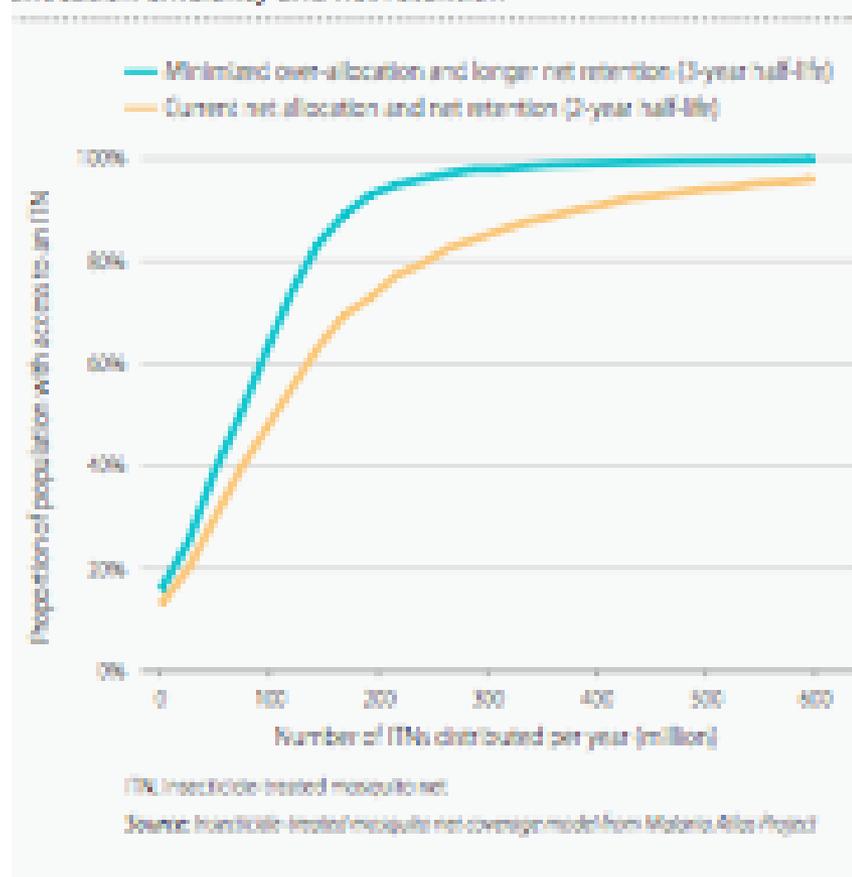
# Estimated LLIN retention curves from MAP model in most recent surveys



Blue = each country; Red = combined for all

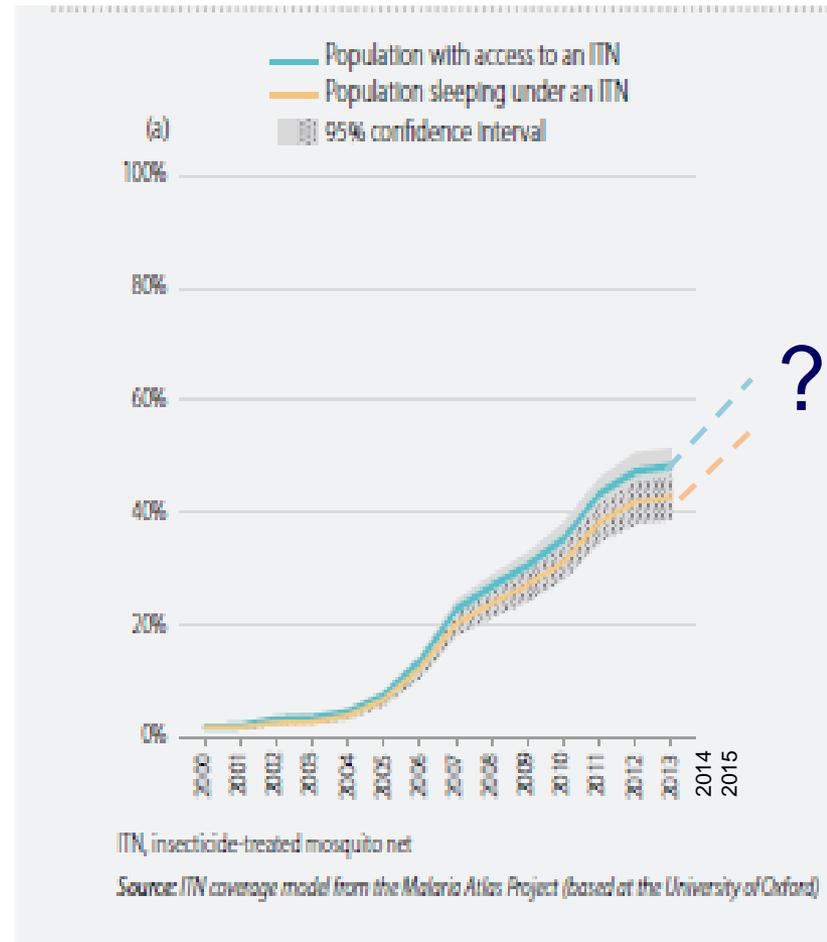
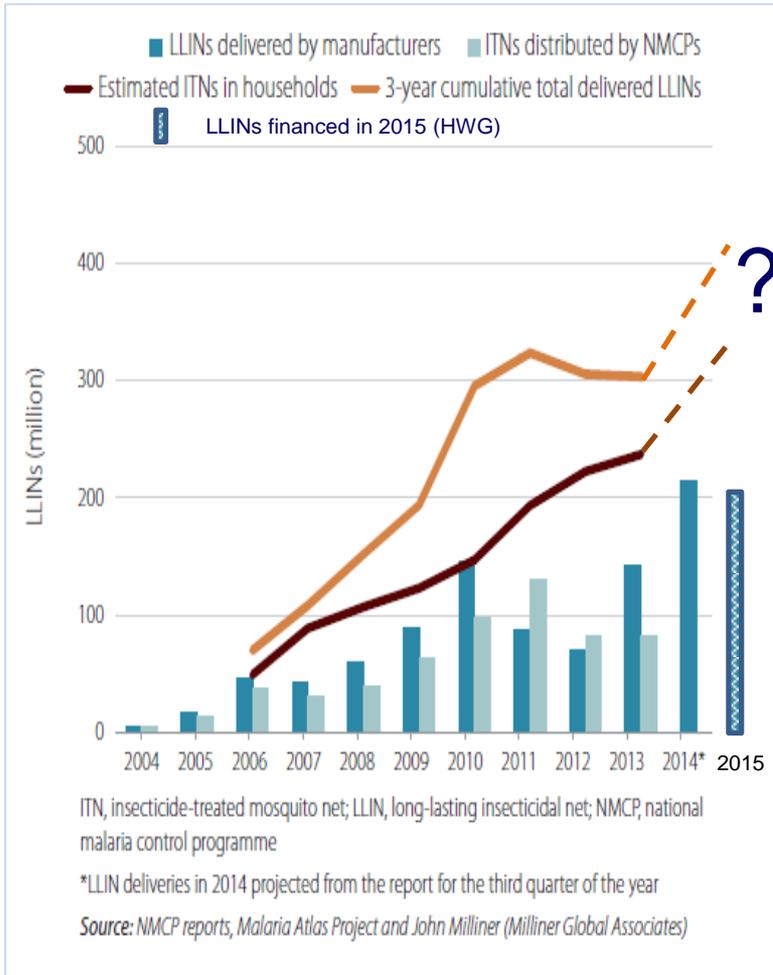
# Using model to estimate ITN need

Figure 3.4 Estimated proportion of population with access to an ITN compared to the number of ITNs distributed per year, by net allocation efficiency and net retention



- If allocation of ITNs to households 100% efficient and a higher proportion of nets retained in households (equivalent to a 3 year half life)
- Then, approximately 200 million ITNs per year would achieve 90% population access

# Large number of LLIN delivered in 2014 and financed for 2015 suggest ITN coverage will be even greater



# Conclusions

- Nets procured and delivered by manufacturers get to households
- Population access to ITNs has increased markedly through 2013
- There is high use of ITNs among the population with access to them
  
- ITN model provides ITN coverage measures by country and in Sub-Saharan Africa over time
- Net loss function can be incorporated into gap analysis tools
- ITN access will likely be even higher when recent net deliveries taken into account.

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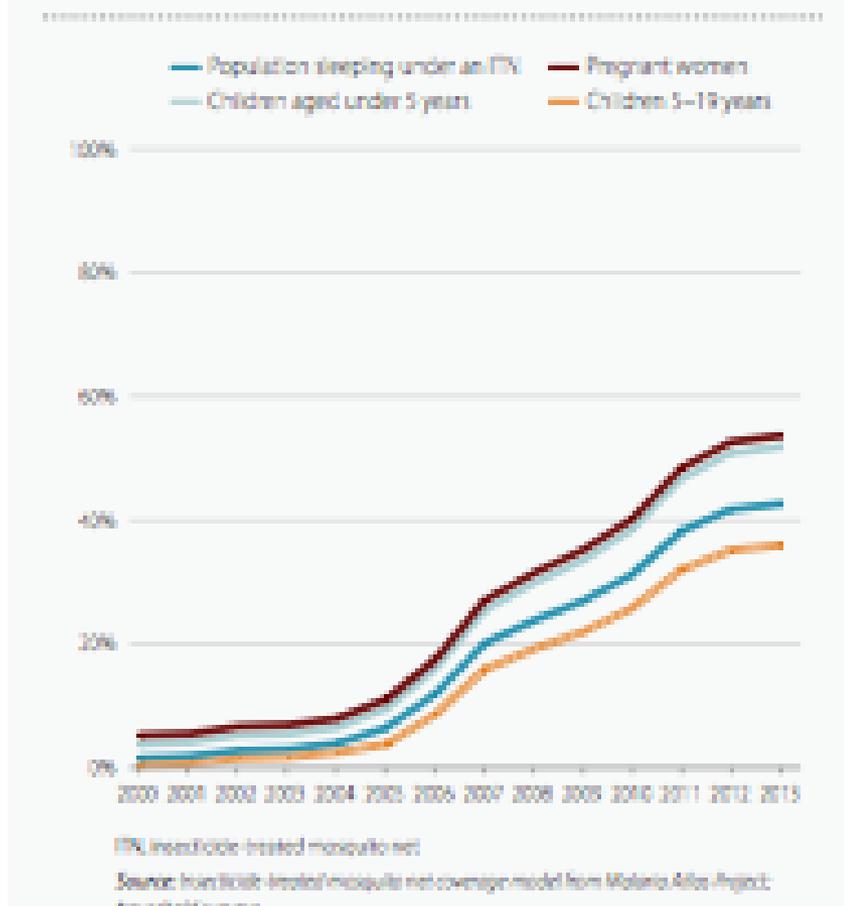
Thank you!

# Distribution among households by household size

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# ITN use among groups

Figure 3.5 Proportion of population sleeping under an ITN, by selected subpopulations, sub-Saharan Africa, 2000–2013



- Proportion of children under 5 and pregnant women sleeping under an ITN greater than proportion in population as a whole
- Proportion older children sleeping under a net is less than population as a whole

# HWG Gap analysis for LLINs

	2014	2015	2016
Need	238m	256m	185m
Financed	213m	206m	112m
Gap	25m	50m	73m