

## Improving local management with ordinary data

Mac W. Otten Jr., MD MPH,  
CDC/WHO

## Maximize impact

- Gaps
  - Local impact monitoring
  - Mass campaign gaps → improve routine ITN distribution
  - ITN use

### 1. Surveillance to monitor local impact

		Reduction in-pt cases, deaths, <5y
Rwanda	ACTs + ITN use = 60% from <5y mass LLINs	60%
Ethiopia	ACTs + mass LLINs all HHs	50%
Kaoma, Zambia	ACTs + mass LLINs	53,85%
Kaloma, Zambia	ACTs + mass LLINs	71,33%
Zambia, national	ACTs + 23% ('06) ITN use	33%

### 1. Surveillance to monitor local impact II

		Reduction in-pt cases, deaths, <5y
Ghana	ACTs + ITN use = 55% (Jul '07), <2y mass LLINs	Little definite effect (?)

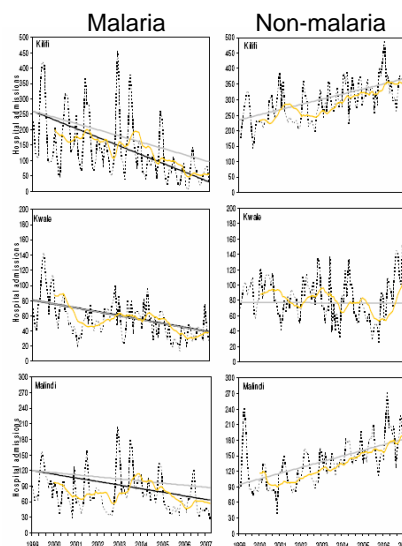
**The decline in paediatric malaria admissions on the coast of Kenya**

*Malaria Journal* 2007, 6:151 doi:10.1186/1475-2875-6-151

Emelda A Okiro (eokiro@nairobi.kemri-wellcome.org)

- Pediatric malaria admissions declined 63%, 53%, and 28% by March 2007 compared to 1999 in 3 hospitals

ITN "coverage" <5y: 7% ('04)-24% ('05)-67% (end '06). AL starting August 2006.

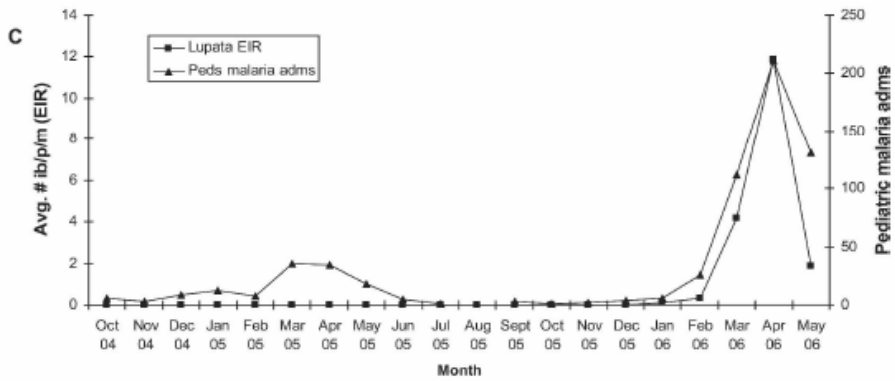


**Impact of ACT use for 24 months in 13 health facilities, North A district, Zanzibar, 2002-2005**

Measure of impact	Measurement method	Before ACT intervention, 2002	After ACT intervention, 2005	% decline
<b>ACTs only, public sector</b>				
<5y in-patient malaria cases	Routine	1261	296	77
<5y in-patient malaria deaths	Routine	40	10	75
<5y out-patient malaria cases	Routine	20634	4817	77
<5y % asexual parasite +	Survey	9.0	5.3	41
<5y all-cause mortality	Vital event registration	133	64	52
<b>ACTs+ITNs</b>				
<5y % asexual parasite +	Survey	9.0	0.3	97

Source: Bhattarai et al. Impact of artemisinin-combination therapy and insecticide treated nets on malaria burden in Zanzibar. PLOS November 2007.

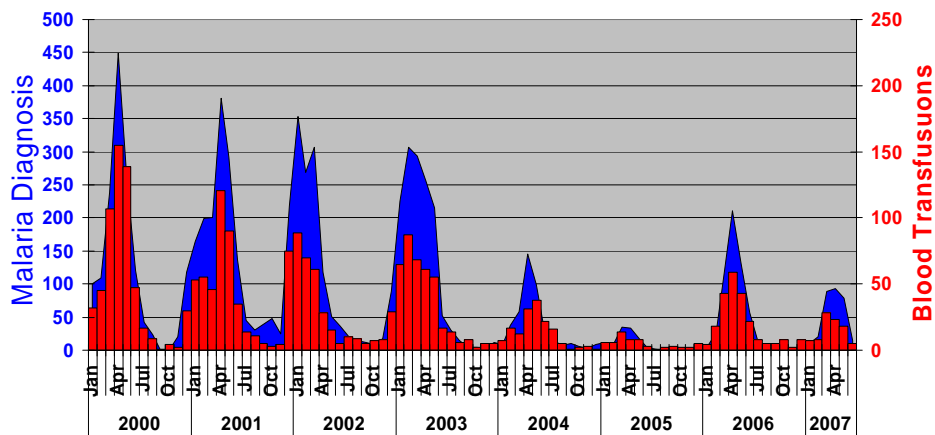
### Timing of increase in <5y in-patient malaria cases exactly matched entomologic measures



Kent RJ, Thuma PE, Mharakurwa S, Norris DE. Seasonality, blood feeding behavior, and transmission of *Plasmodium falciparum* by *Anopheles arabiensis* after an extended drought in southern Zambia. *Am J Trop Med Hyg.* 2007 Feb;76(2):267-74.

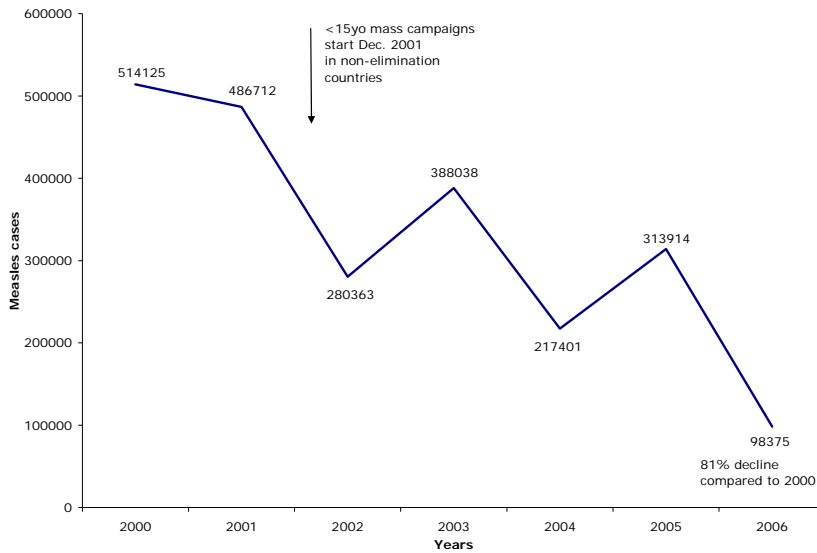
### In-patient trends exactly match transfusions

#### Macha Hospital Children's Ward

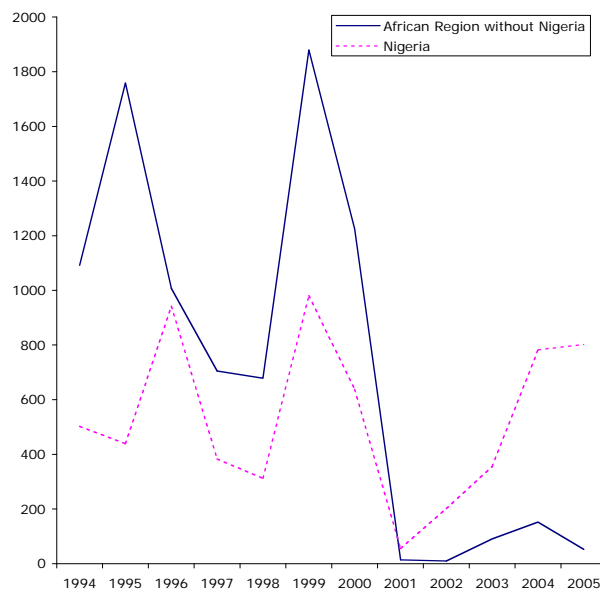


Source: Dr. Phil Thuma, Malaria Institute at Macha. Zambia

## Measles cases in Africa have declined 81% in four years



## Reported polio cases, WHO African Region countries, 1994-2005



## <5y measles and malaria deaths, HMIS, Zambia, 2000-2007

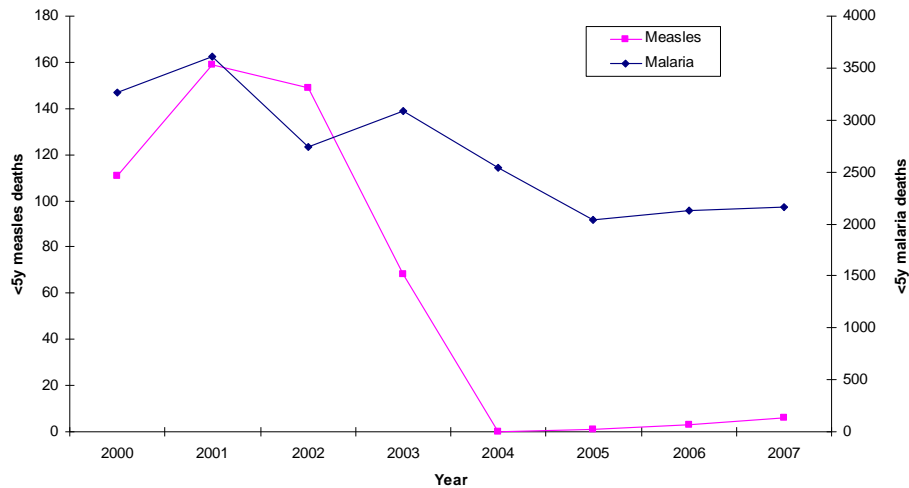


Figure 1. Location of hospitals and health centers that were selected for data collection, October 2007, Ethiopia.

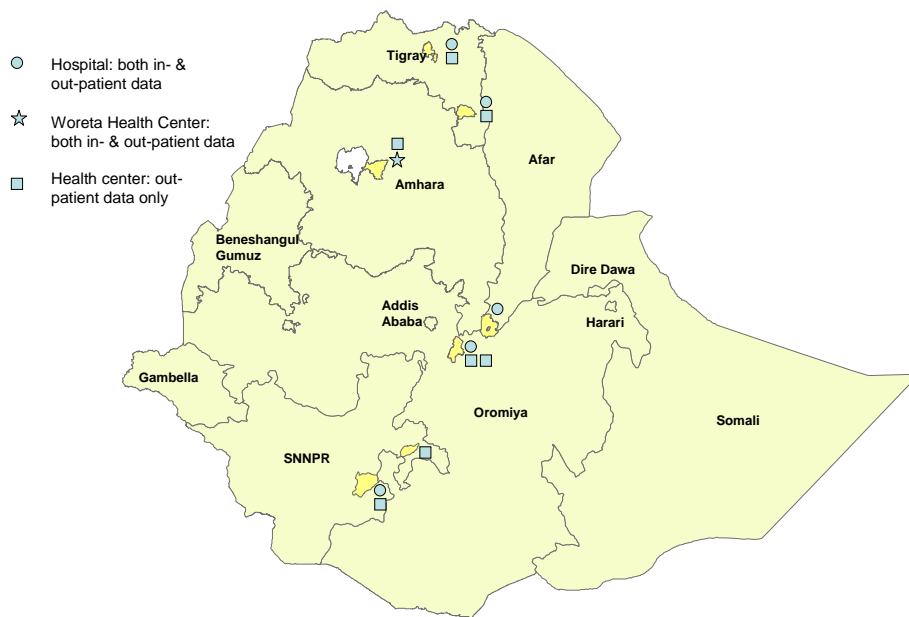


Figure 2. Location of hospitals and health centers that were selected for data collection, December 2007, Rwanda.

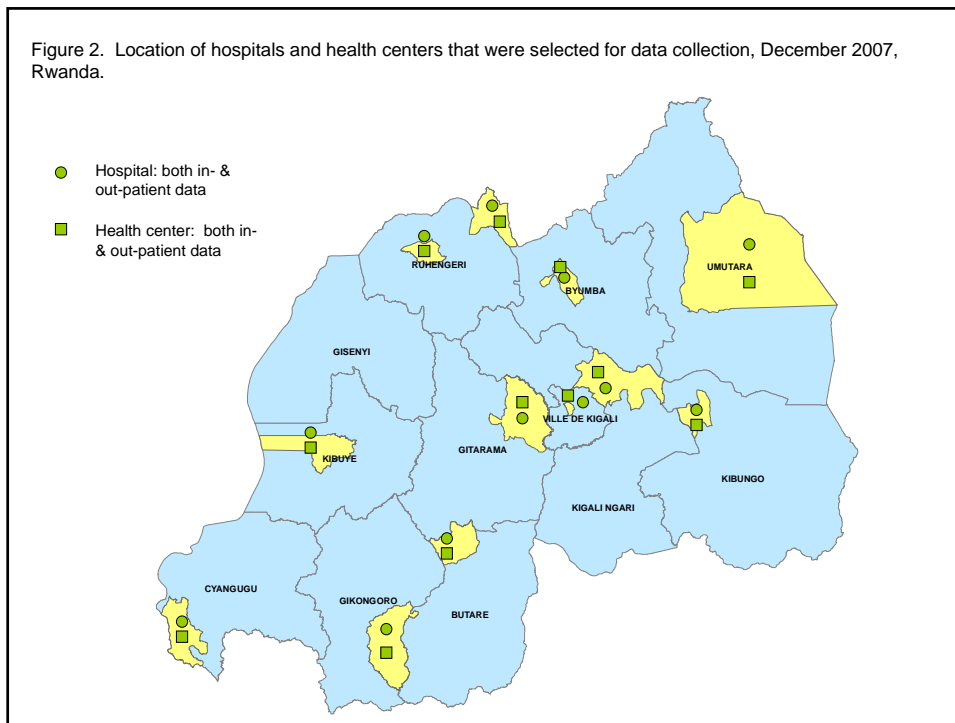
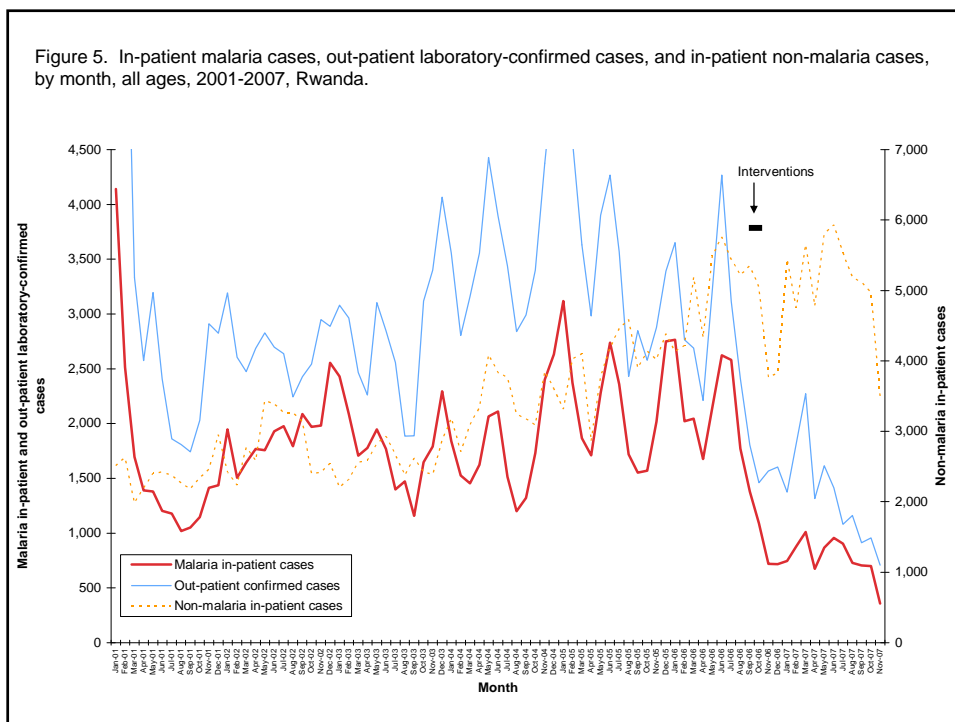
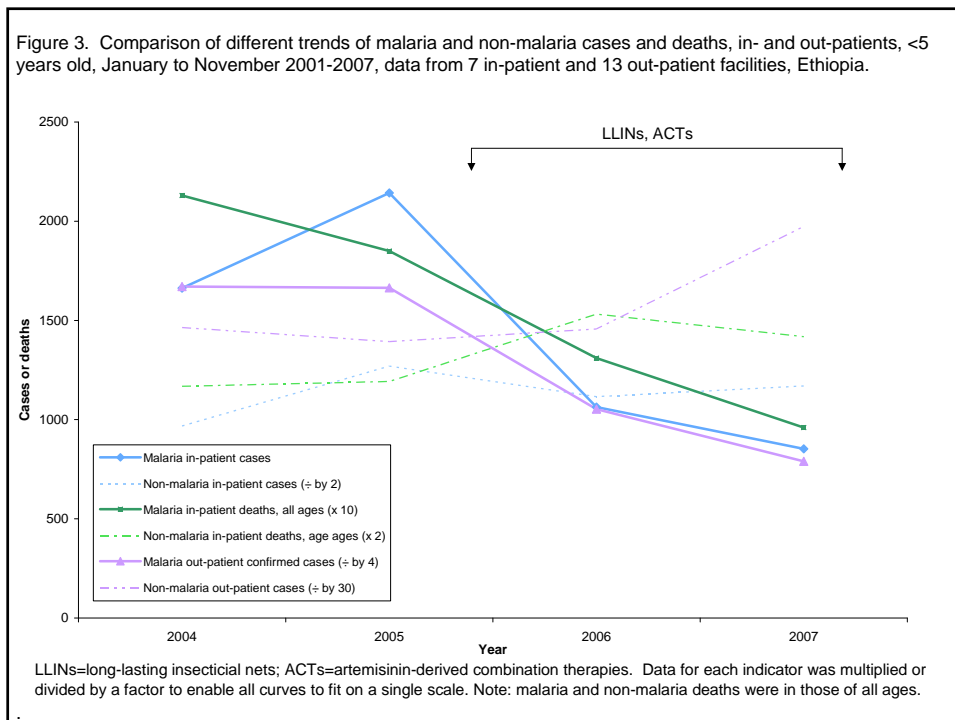
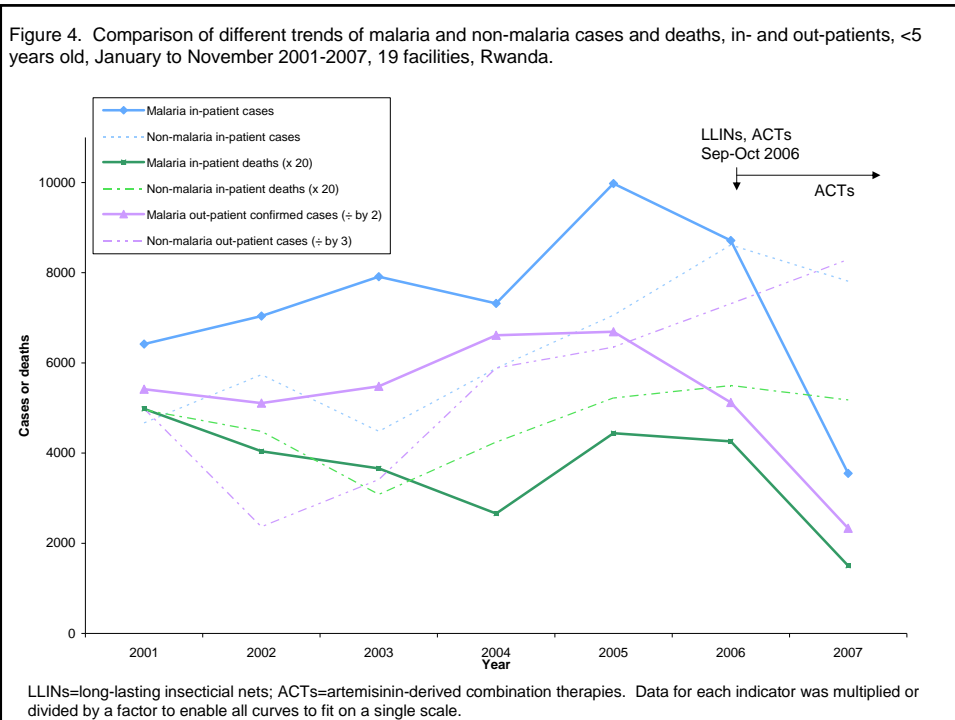


Figure 5. In-patient malaria cases, out-patient laboratory-confirmed cases, and in-patient non-malaria cases, by month, all ages, 2001-2007, Rwanda.





## Using practical field methods for local problem-solving

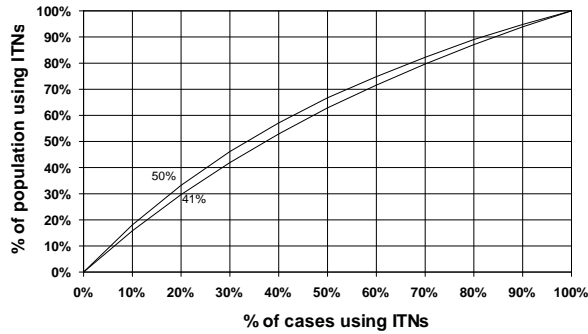
- Why little impact in Ghana?
- Why certain hospitals and health centers had <50% impact in Rwanda and Ethiopia
  - 5/19 in Rwanda, 2/7 in Ethiopia
- Simple, classic epidemiologic method
  - Ask cases about ITN use
  - Example: if only <20% of cases have an ITN in the house and 10% used ITNs last night, ITN coverage is the problem

## Surveillance can measure coverage

- Coverage monitoring
  - Cases (in-pt) = intervention coverage x efficacy
- Quantitative estimate of population coverage from intervention "coverage" in cases

## Estimating population coverage from case data

Estimating ITN use in a population from reported use of ITNs in clinical cases



$$PPI = \frac{PCI}{(1 - \text{Efficacy} (1 - PCI))}$$

Note:  $Pop_{ITNs} = \text{Case}_{ITNs} / (1 - (\text{Efficacy} * (1 - \text{Case}_{ITNs})))$ . Efficacy line = 41% from Kilifi study, endpoint was <5 yo in-patient malaria cases. Efficacy line = 50% from Cochran Review, endpoint was <5 yo laboratory-confirmed (out-patient) malaria cases.

## Gap #2 and #3. Improving routine and reaching >80% ITN use

	ITN poss., HH, All	ITN poss., HH <5 yo	ITN poss., <5 yo	ITN use, <5 yo
Zambia: 4 rural districts			81	56
Togo: nationwide, SIA Dec 2003			91	54
Niger: nationwide, SIA Dec 2004	63	75		56
Mozambique: 2 provinces	55, 60	68, 69	--	59, 62
Tanzania: 2 prov.; July-Aug 2005		91, 82		21, 55
Kenya, 2005	39	68	74	52
Ghana, July 2007				55
Rwanda, 2007				60

Source: Measles-Malaria Partnership and Adam Wolkon, CDC Malaria Branch, MOHs

## Togo—decline over time

Nationwide, mass ITN distribution, <5 yo, Dec 2003

Time of survey	Use of ITN last night, <5 years old
2004, Sept	54%
2006, May 2.5 years after mass distribution	38% (HH ownership, 40%)

Hypothesis: Unlikely to get from 55% to >80% without local management, measurement and problem-solving

## Improving routine Monitoring stock-outs of LLINs, ACTs, RDTs at health facility level

HMIS

Immunizations and Malaria Items				
		Fixed	Outreach	Total
BCG	c1y			
DPT1	c1y			
	1+y			
DPT2	c1y			
	1+y			
DPT3	c1y			
	1+y			
OPV1	c1y			
	1+y			
OPV2	c1y			
	1+y			
OPV3	c1y			
	1+y			
Measles	c1y			
	1+y			
Yellow fever	c1y			
	1+y			
Fully immunized child	c1y			
	1+y			
Vitamin A	c1y			
	1+y			
	Lac.			
<b>ANC Tally Data</b>				
	1			
	2			
	3			
	4			
	5			
Tetanus toxoid, pregnant women				
IPT 1st dose, pregnant women				
IPT 2nd dose, pregnant women				
Total ANC first visits				

Malaria-related stockouts this month			
Item	Stock-out*	Item	Stock-out*
ACT PrePack 1		Quinine	
ACT PrePack 2		SP	
ACT PrePack 3		RDTs	
ACT PrePack 4		Giemsa	
ACT suppository		Slides	
Second line drug		ITNs	

\* Stock-out code: N=None, L=Less 1 week, G=1 week or greater

Nets distributed	Fixed	Out-reach	Total
ANC			
Routine EPI - DPT3			
Community			

Vaccines		No. doses opened	Vaccines		No. doses opened
BCG			Measles		
DPT/Tetra/Penta			Yellow fever		
OPV			IT		

Drugs	No. 1st courses distributed	Drugs	No. 1st courses distributed
ACT PrePack 1		ACT suppository	
ACT PrePack 2		Second line drug	
ACT PrePack 3		Quinine	
ACT PrePack 4		SP	

## Improving routine, linking with ANC and EPI

- Check for ITN possession and use at all EPI/ANC contacts
- Record ITN use at DPT3 and measles

## EPI/ANC Contact Method

- Ask about LLIN use at DPT3 and Measles
- Within 10% of population-based estimate
- Provides LLIN use data every month
  - At fixed health facility visits
  - At outreach visits, far from health facility

## Not telling truth?

Benin	Increased from 5% to 60% over two years
Zambia	One million women: 15%
Ghana	30% at first ANC visit, to 50-60% at second ANC visit

## Summary

- Surveillance can provide local impact monitoring for LLINs + ACTs
- Unlikely to reach >80% LLIN use unless routine is approved and nationwide local measurement/ management is adopted
- LLIN/ACTs stock-outs at HF/district should be monitored