

Trends of Malaria Morbidity Following IRS: Indicators From a Sentinel Site Surveillance System in Two Epidemiologic Settings

Hasifa Bukirwa for UMSP team

Background

- Malaria control in Africa has been largely dependent on effective case management and the prevention of malaria through the use of ITNs
- Indoor residual spraying (IRS) has recently received increased attention and funding as a control intervention in Africa

Background, cont

- The impact of IRS is dependent on reducing vectorial capacity which is influenced by the following factors:
 - Resting behavior of vector
 - Timing and coverage
 - Baseline level of transmission
- IRS primarily used in the following settings:
 - Low transmission areas
 - Discrete communities (islands, refugee camps)
 - Epidemic response
- WHO now recommending an extended role of IRS in higher transmission areas of Africa

Objectives

- To measure the impact of district wide IRS campaigns in two distinct epidemiologic settings using the USMP sentinel site surveillance system
- To assess the relationship between our measures of impact and the duration following IRS

Methods



- Study site 1: Kanungu district
 - Population of ~ 190,000 persons living in 45,000 households
 - Moderate malaria transmission intensity (EIR=6)
- Intervention:
 - District wide IRS campaign targeting all household from late Feb 2007 – mid March 2007
 - Synthetic pyrethroid (Lambda-cyhalothrin) in 10% WP (wetable powder)

Methods



- Study site 2: Apac district
 - Population of ~ 354,505 persons living in 111,534 households
 - Very high malaria transmission intensity (EIR > 1500)
- Intervention:
 - District wide IRS campaign targeting all household from late April 2008 – late May 2009
 - Lambda-cyhalothrin CS (ICON CS)

Methods, cont

- Outcome measures using UMSP sentinel site surveillance system at Kihihi Health Center IV (Kanungu District) and Aduku Health Center IV (Apac District)
- Following data collected on all patients
- Kihihi August 06 – May 08
- Aduku August 07- February 09
 - Age
 - Parish of residence
 - Blood smear result
 - Whether the patient was diagnosed with malaria
 - Treatment for malaria

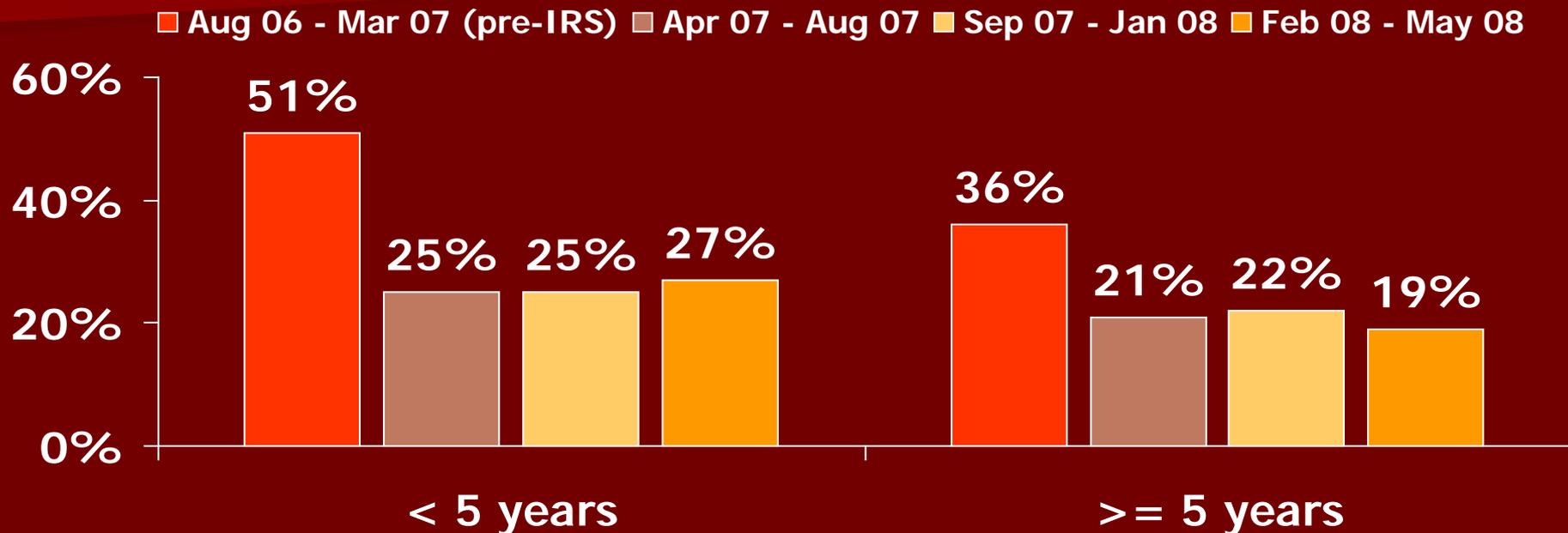
Outcomes of interest

- Data available on several measures
- Two outcomes of interest presented here:
 - Proportion of patients treated for malaria
 - Proportion of blood smear read as positive

Results- Kihihi

Characteristic	Pre-IRS	Post-IRS		
	Aug 06 – Mar 07	Apr 07 – Aug 07	Sep 07- Jan 08	Feb 08 – May 08
	Total number of patients seen	16337	6388	5832
Average number of patients seen per month	2042	1278	1166	1228
Proportion of total with age less than 5 years	35%	25%	24%	25%
Proportion of total with malaria suspected	69%	51%	49%	50%
Proportion of malaria suspected with microscopy done	75%	69%	72%	86%
Proportion with positive blood smear treated for malaria	88%	95%	92%	96%
Proportion with negative blood smear treated for malaria	23%	10%	11%	7%

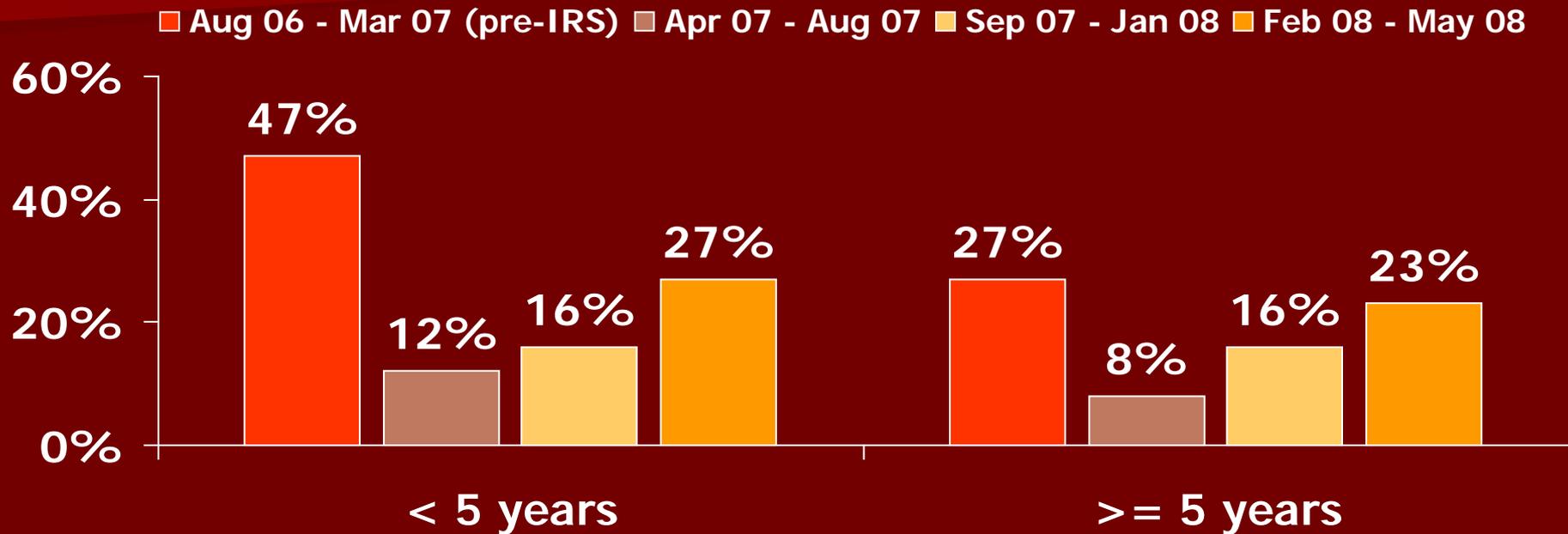
Proportion of patients prescribed antimalarial therapy



Absolute decrease in the probability of a patient being prescribed antimalarial therapy following IRS

Age group	Apr 07-Aug 07		Sep 07-Jan 08		Feb 08-May 08	
	RD (95% CI)	P	RD (95% CI)	P	RD (95% CI)	P
< 5 years	23.1% (15.7-30.5%)	<0.001	25.4% (17.2-33.6%)	<0.001	23.0% (14.6-31.4%)	<0.001
≥ 5 years	12.2% (6.9-17.5%)	0.001	10.8% (4.1-17.5%)	0.002	15.5% (9.2-21.8%)	<0.001

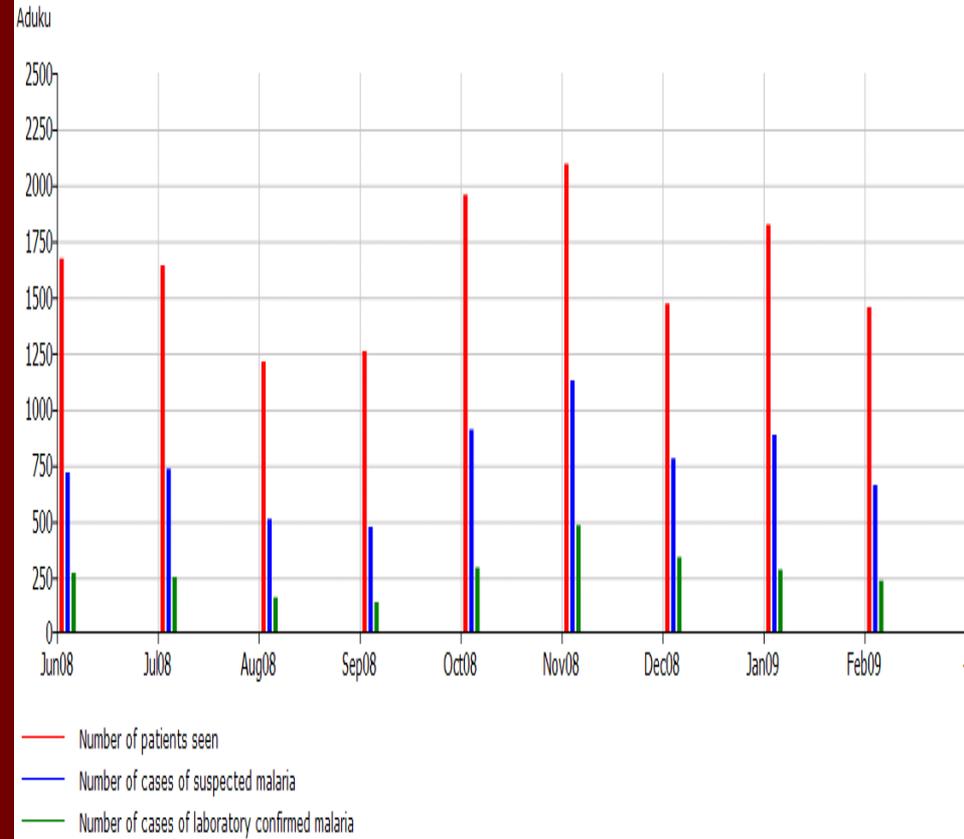
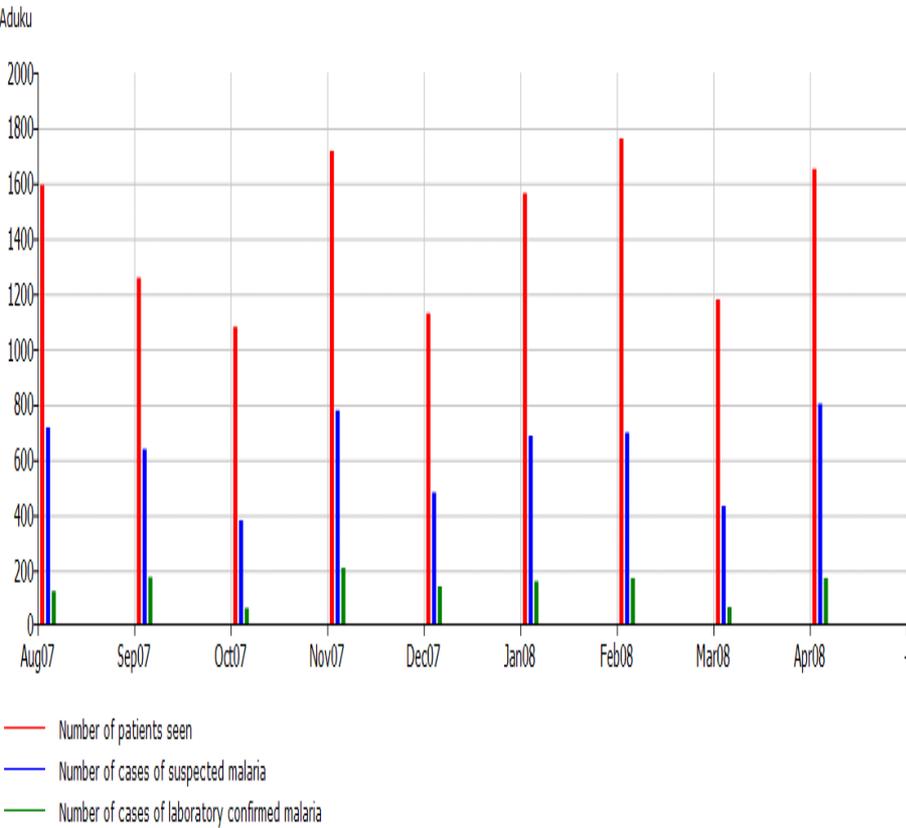
Proportion of blood smear read as positive



Absolute decrease in the probability of a blood smear being positive following IRS

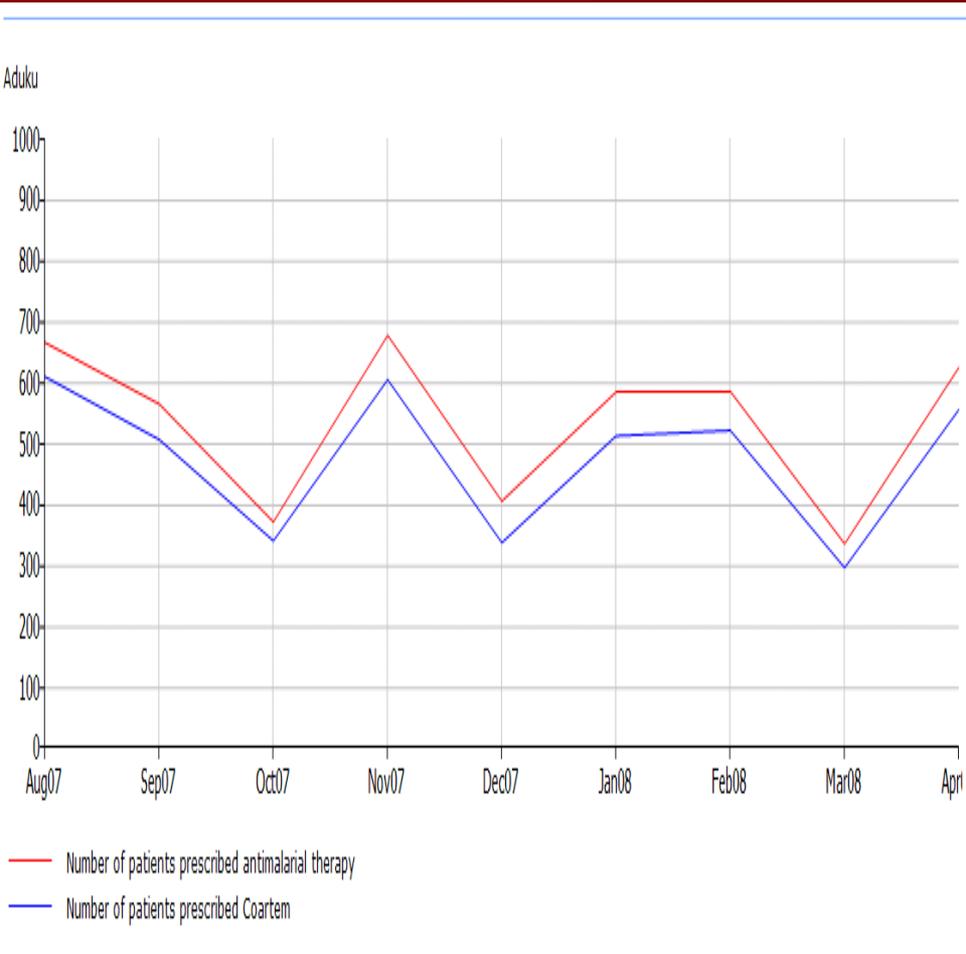
Age group	Apr 07 -Aug 07		Pre IRS vs. Sep 07-Jan 08		Pre IRS vs. Feb 08-May 08	
	RD (95% CI)	P	RD (95% CI)	P	RD (95% CI)	P
< 5 years	32.2% (26.1-38.3%)	<0.001	21.1% (19.1-37.1%)	<0.001	17.6% (11.9-23.3%)	<0.001
≥ 5 years	16.5% (8.5-24.5%)	<0.001	7.9% (2.8-13.0%)	0.003	2.2% (-2.9-7.3%)	0.40

Results-Apac

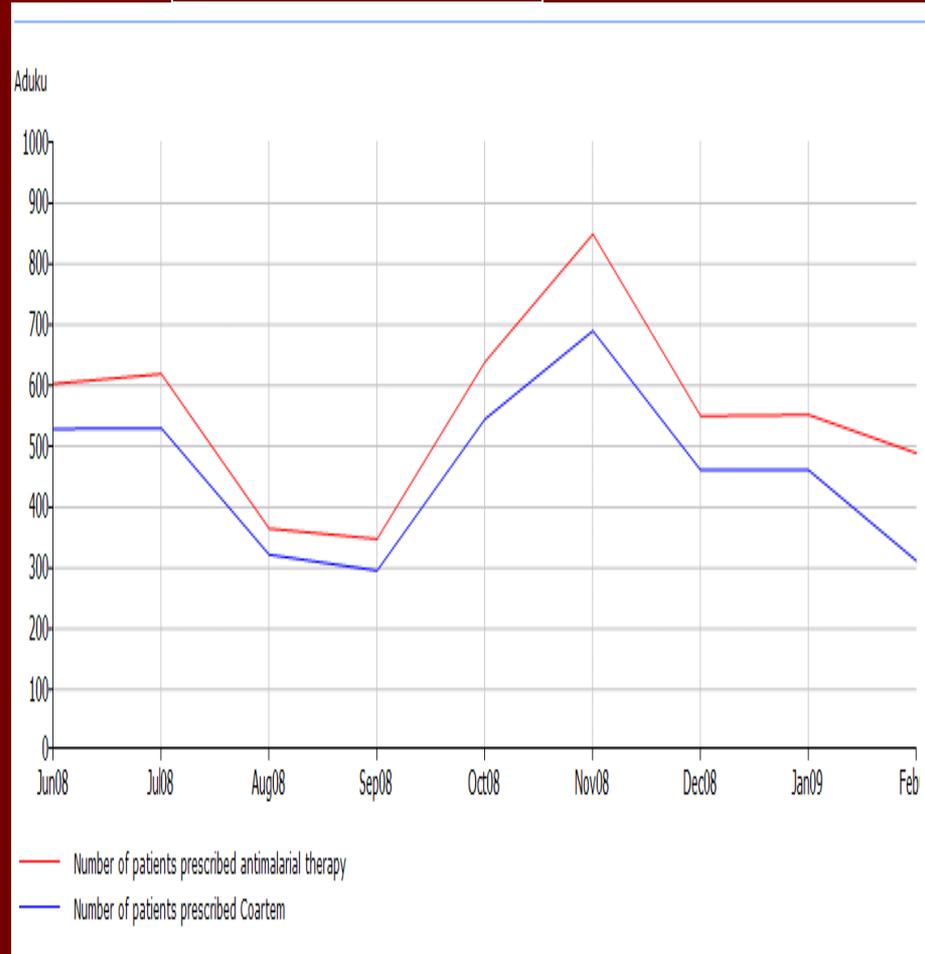


Number of patients prescribed antimalarial therapy

PRE



POST



Conclusions

- IRS was associated with a significant reduction in the proportion of patients treated for malaria and the proportion of blood smears read as positive in Kanungu District but not in Apac District
- IRS resulted in significant and sustained benefit in Kanungu but no noticeable change in Apac District

Recommendations

- Significant antimalarial savings are possible if IRS is coupled with accurate diagnosis in areas of low and moderate transmission
- More data is needed to determine the benefit of IRS in high malaria transmission settings
- Further research is needed to evaluate the cost-effectiveness and impact of IRS at the population level in Africa