

ANEMIA DATA IN EVALUATING IMPACT OF MALARIA INTERVENTIONS: A MULTI COUNTRY ANALYSIS

Anemia Task Force

October 18, 2013

Outline

- How does PMI assess impact of malaria control?
- Severe anemia as an indicator of impact
- Monitoring anemia
- Country examples

Framework for Impact Evaluation

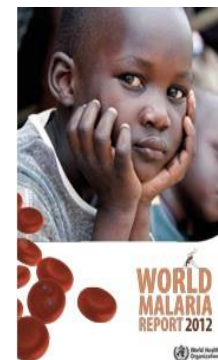
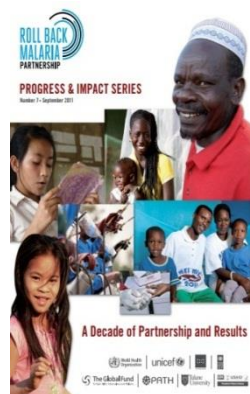
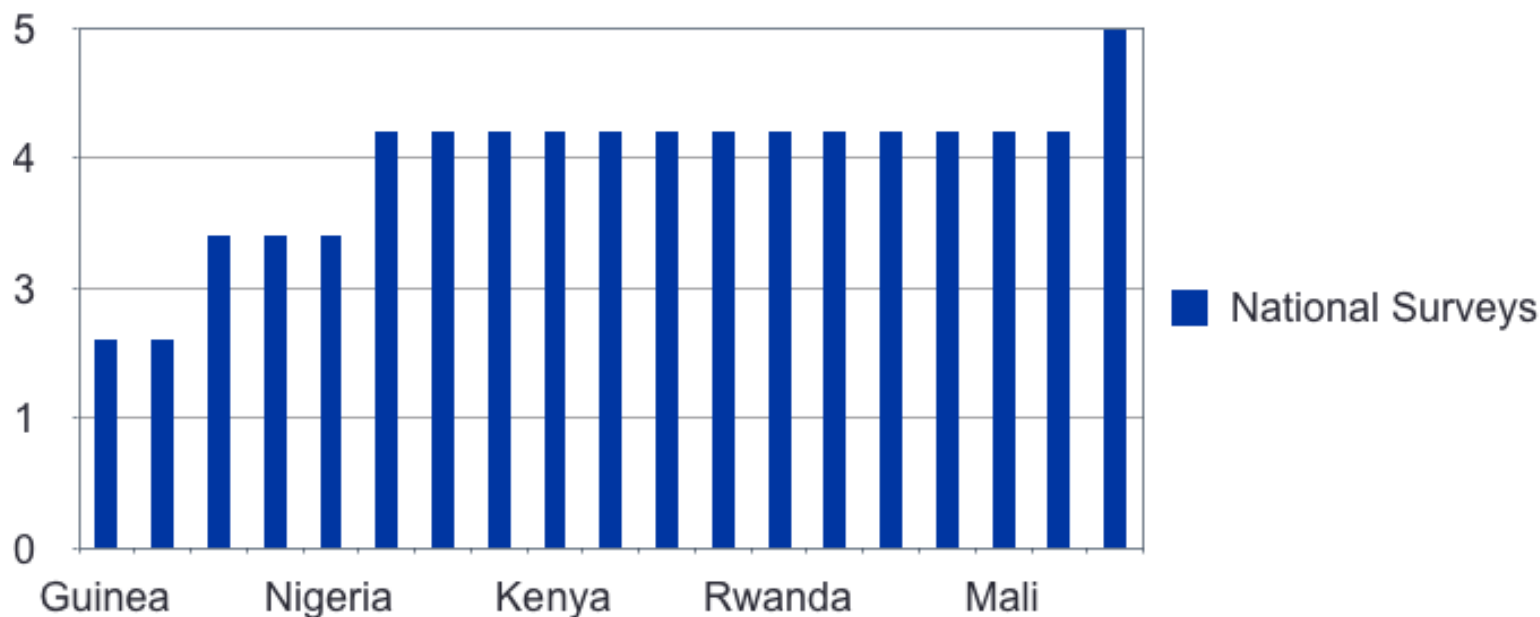
1. Determine if:
 - All-cause under-five mortality decreased
 - Malaria morbidity (anemia, parasitemia) decreased
 - Malaria control intervention coverage increased
 - Alternate explanations exist for decreased mortality

2. Conclude whether it is plausible that scale up of malaria control interventions reduced malaria-related deaths

Severe anemia as an indicator of impact

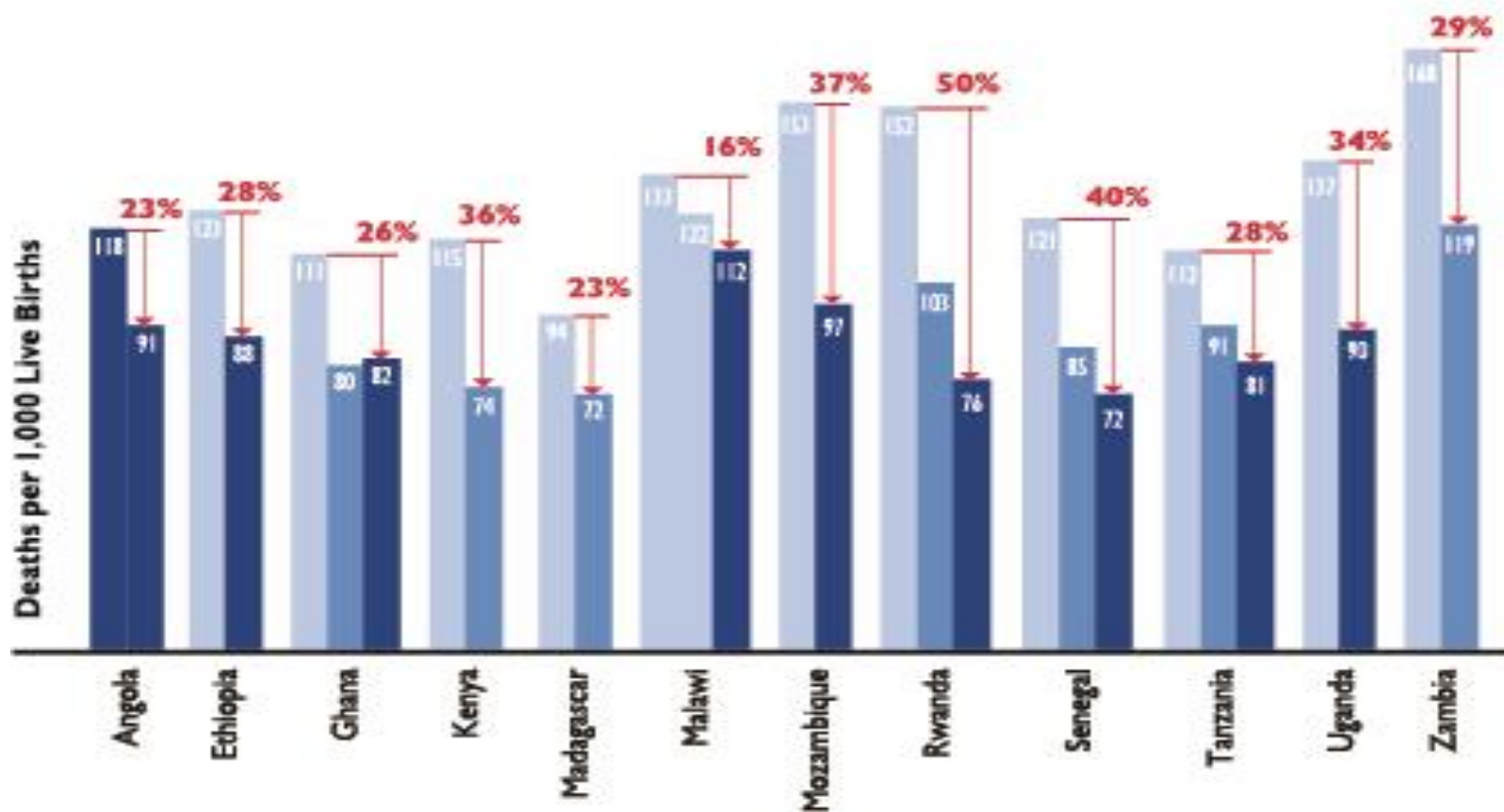
- Severe anemia, defined as blood hemoglobin levels <8 g/dL, is associated with malaria-related mortality and it is measurable at the population level with less seasonality than parasitemia.
- Declines in severe anemia have been found to be associated with malaria control interventions.
- In sub-Saharan Africa, between 17% and 54% of malaria-attributable deaths are estimated to be due to severe anemia.

National HH Surveys Supported by PMI 2006 – Planned 2014



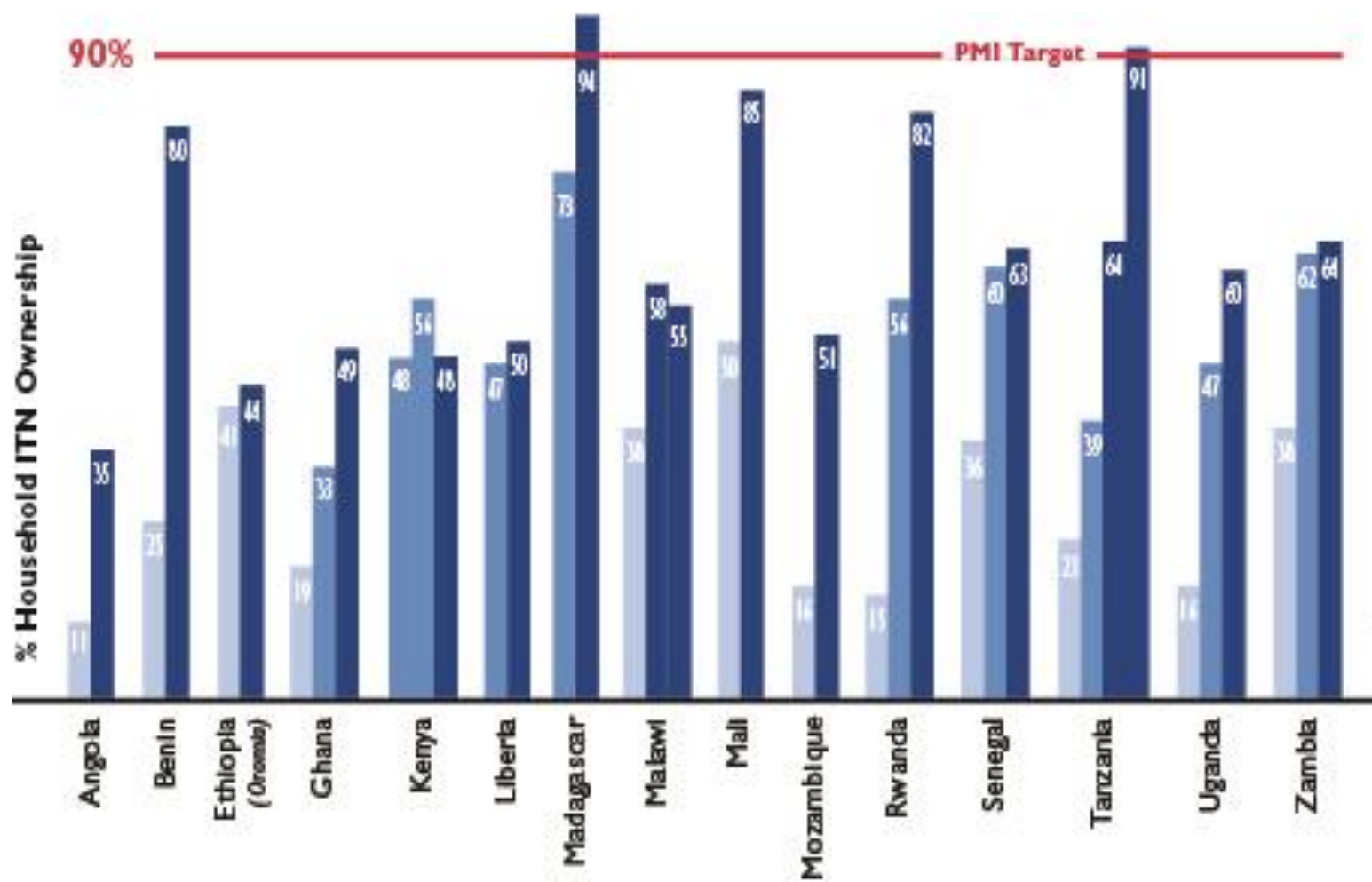
Measuring Mortality

Reduction in All-Cause Mortality Rates of Children Under Five

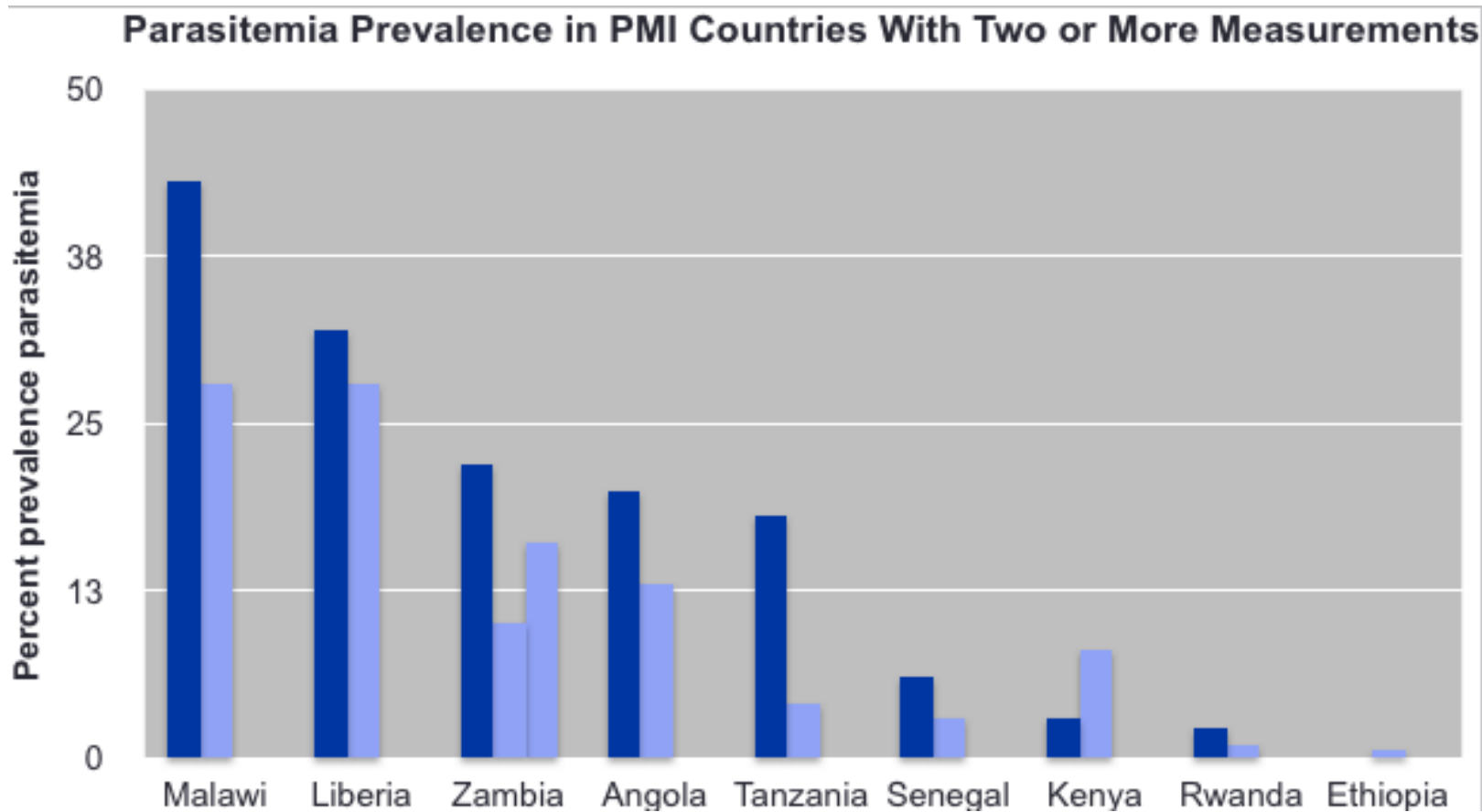


PMI Progress: ITN Coverage

Increasing ITN Ownership



Measuring Morbidity

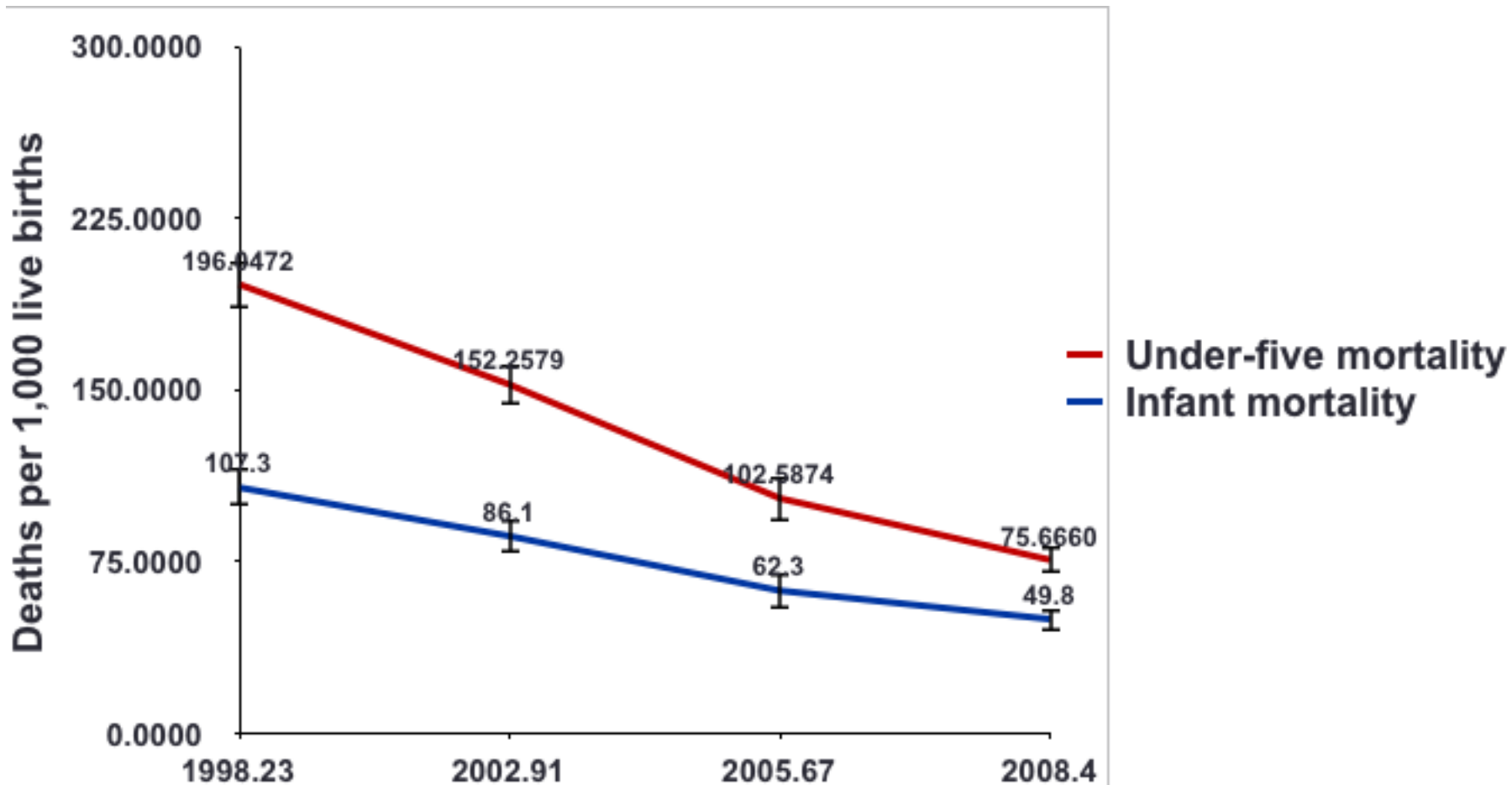


Results of Impact Evaluations to Date

Country	U5 Mortality Decline	Malaria Intervention Coverage Increase	Decline in Malaria Morbidity	Do contextual factors explain all mortality decline?	Plausible Impact
<i>Tanzania</i>	45%	√	<i>Anemia</i> <input type="checkbox"/>	No	√
<i>Malawi</i>	41%	√	<i>Anemia</i> <input type="checkbox"/> <i>Parasitemia</i> <input type="checkbox"/>	No	√
<i>Angola</i>	21%	√ (still low)	<i>Parasitemia</i> <input type="checkbox"/>	Likely	Subnational
<i>Rwanda</i>	61%	√	<i>Anemia</i> <input type="checkbox"/> <i>Parasitemia</i> <input type="checkbox"/> <i>Malaria Incidence</i> <input type="checkbox"/>	No	√
<i>Ethiopia</i>	47%	√	<i>Epidemics</i> <input type="checkbox"/> <i>Malaria Deaths</i> <input type="checkbox"/>	No	√
<i>Zanzibar</i>	34%*	√	<i>Anemia</i> <input type="checkbox"/> <i>Parasitemia</i> <input type="checkbox"/> <i>Malaria Incidence</i> <input type="checkbox"/>	No	√

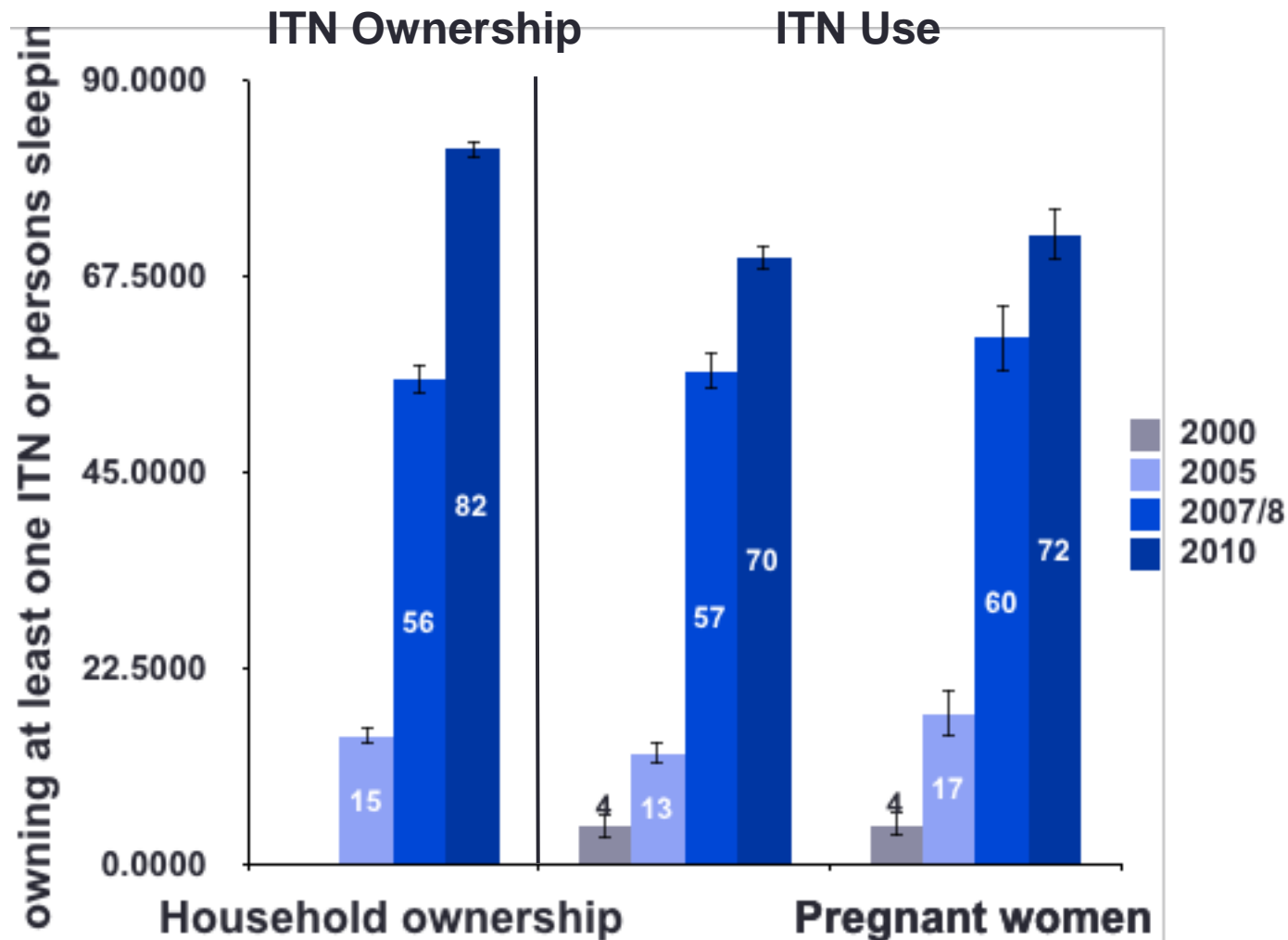
*Overlapping confidence intervals

All-cause Under-five and Infant Mortality* Rwanda, 1998-2008

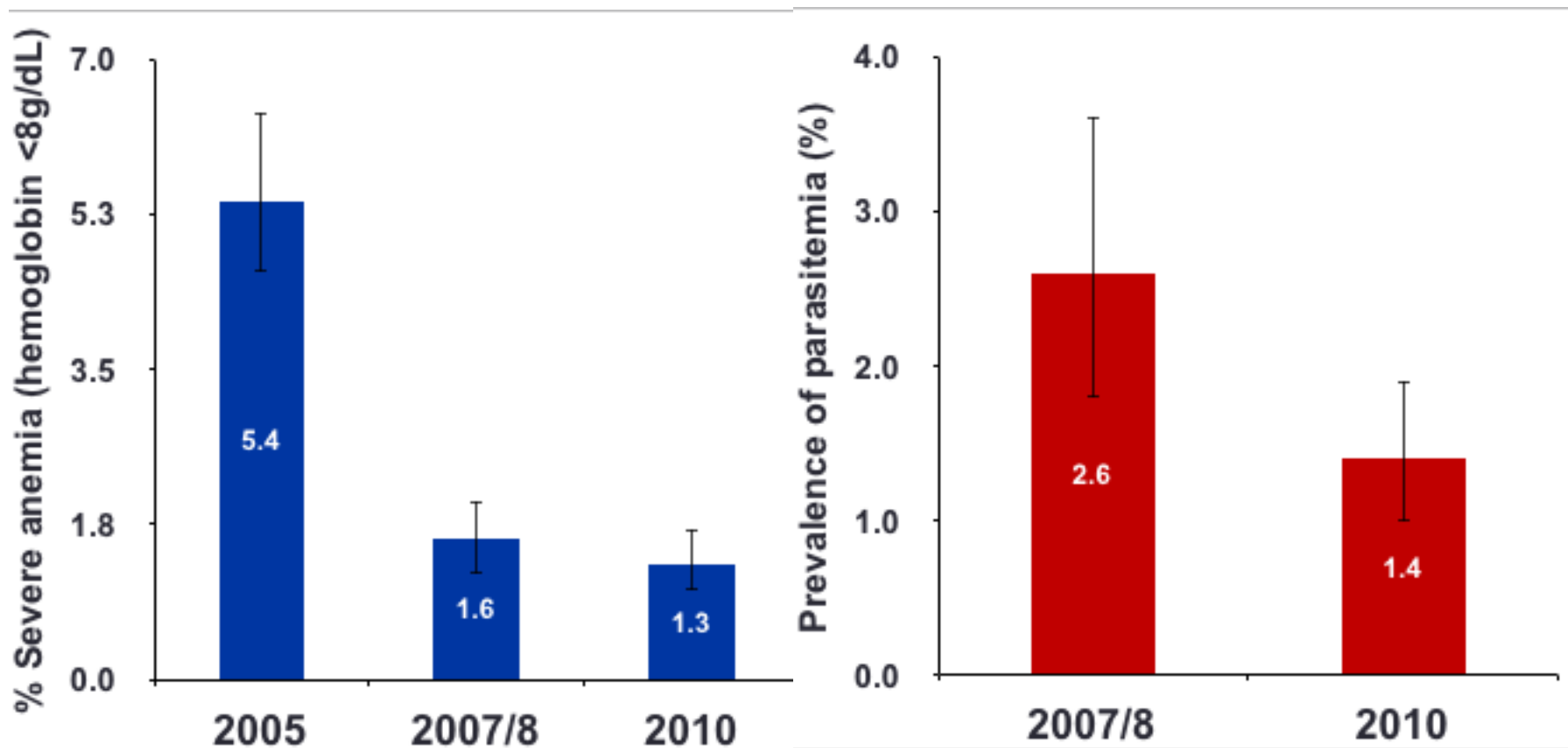


*Mortality is shown at the midpoint of the five-year period.

Household ITN Ownership and Use Rwanda, 2000 -2010

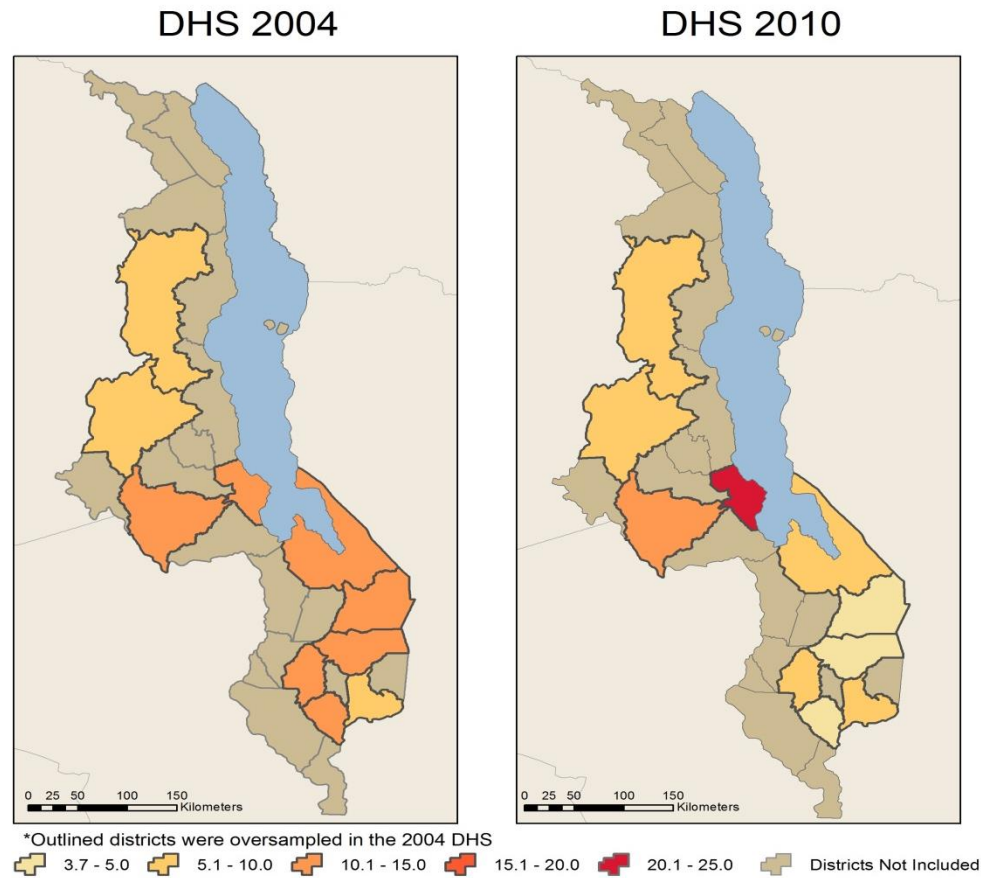


Severe Anemia* & Malaria Parasitemia in Children 6-59 Months Old, 2005-2010



*Hemoglobin <8 g/dL

Prevalence of severe anemia in children 6–59 months, by oversampled districts, Malawi, 2004 & 2010, DHS

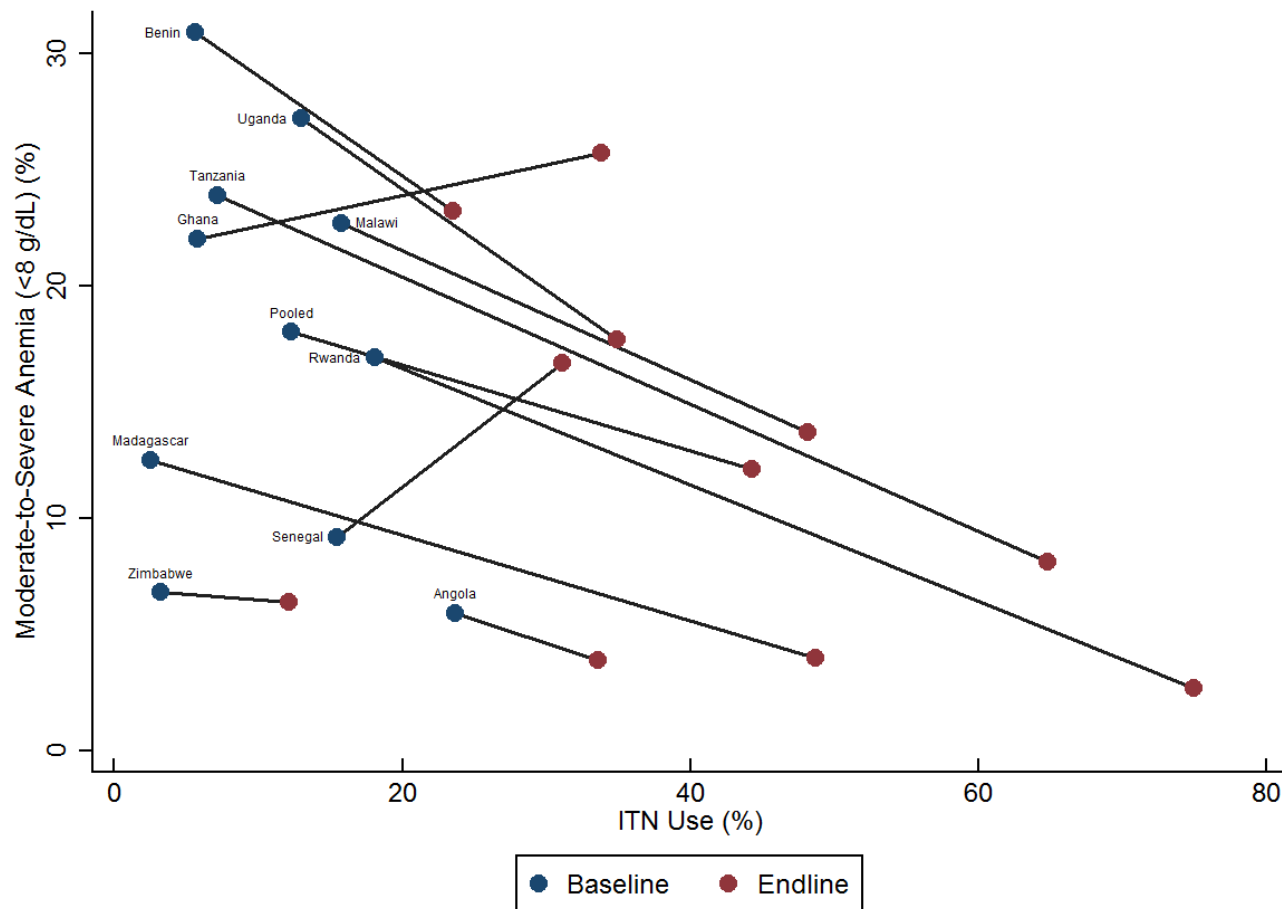


Declining Prevalence of Malaria Morbidity and Mortality

Inpatient Malaria Deaths All Ages, 2001-2010

- HMIS data show that malaria incidence declined by 70% between 2005 and 2010
 - Malaria outpatient visits declined by 60%
 - Malaria mortality in inpatient admissions declined by 54%

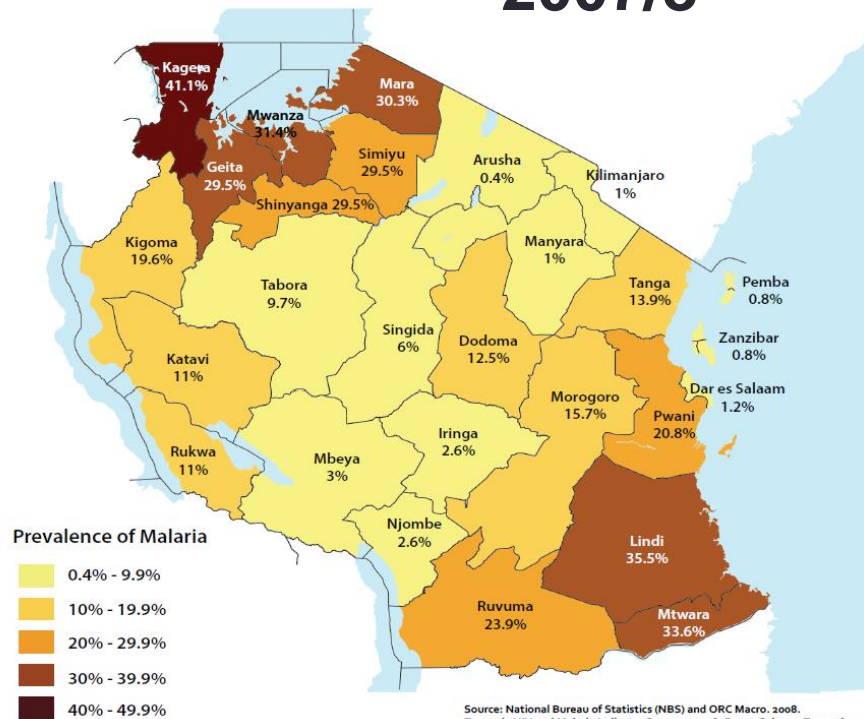
Baseline and endline estimates of the proportion of last-born children age 6–23 months using ITNs and the prevalence of moderate-to-severe anemia at the national level



Issues

Subnational Heterogeneity: Tanzania Malaria Prevalence

2007/8



2011/12

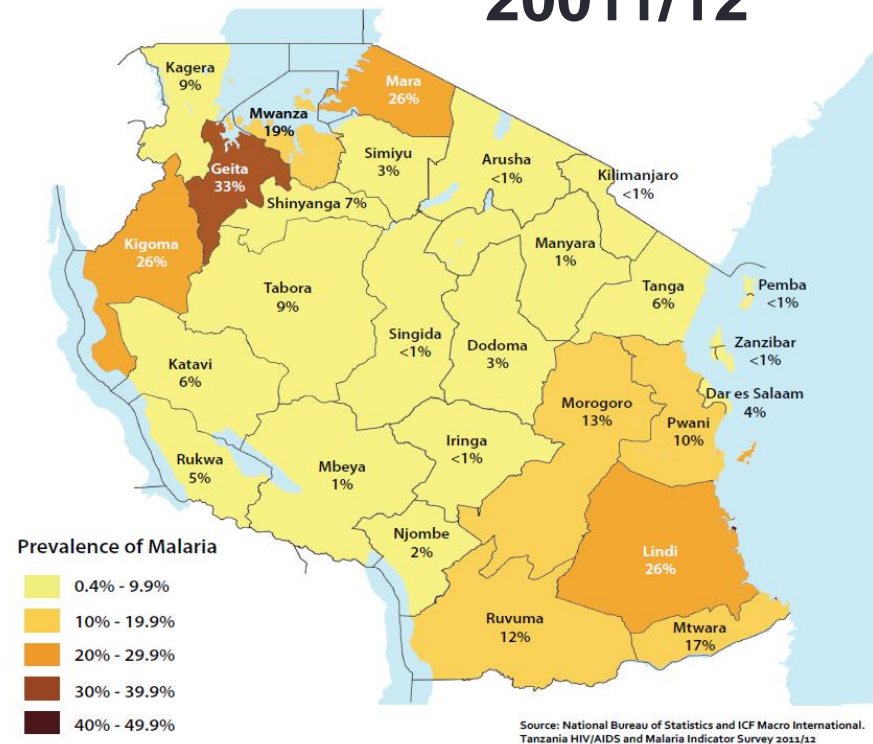
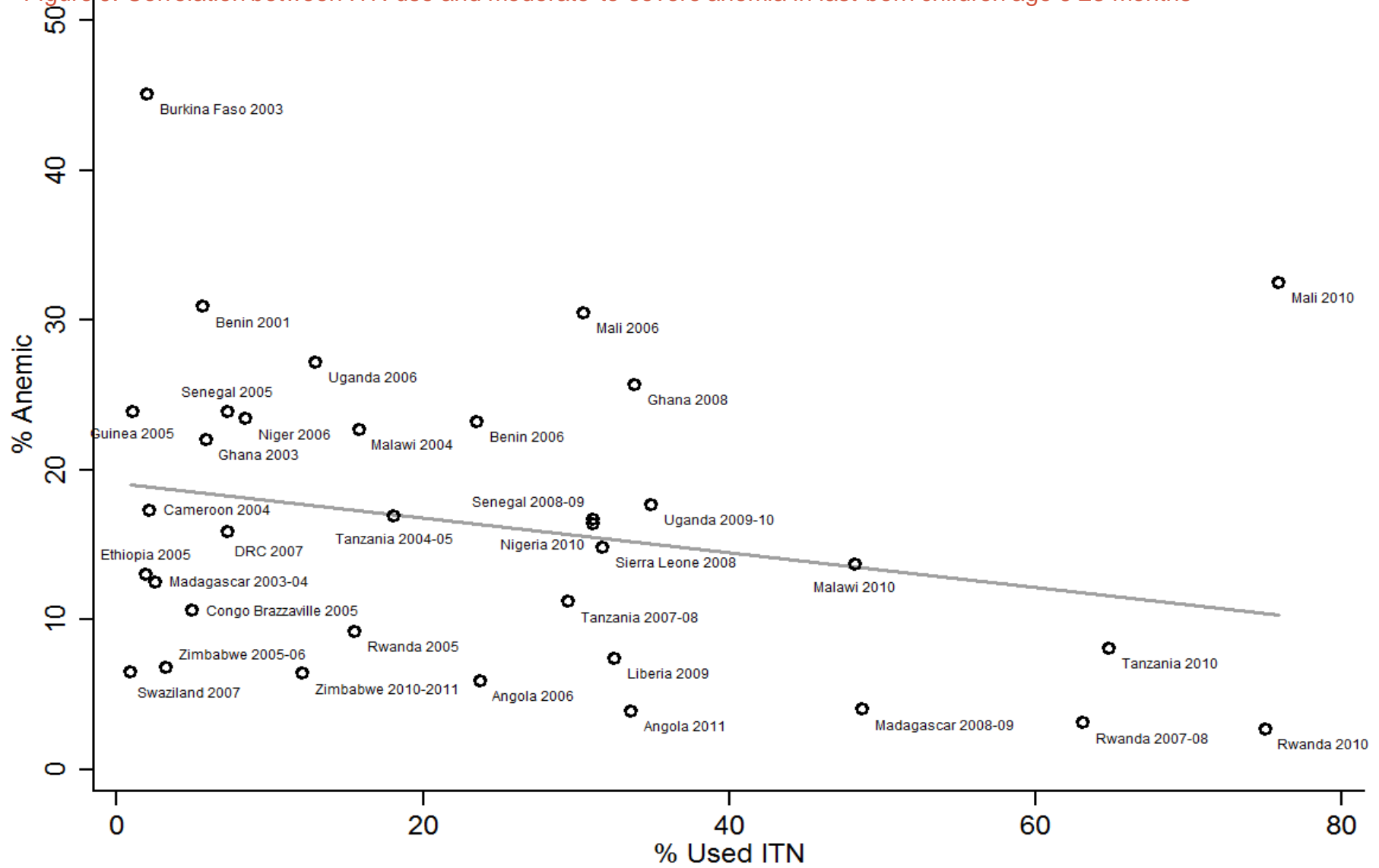


Figure 9. Correlation between ITN use and moderate-to-severe anemia in last-born children age 6-23 months



$n = 35$

Figure 10. Adjusted odds ratios of moderate-to-severe anemia in last-born children age 6–23 months comparing ITN users with nonusers, by survey and pooled across survey*

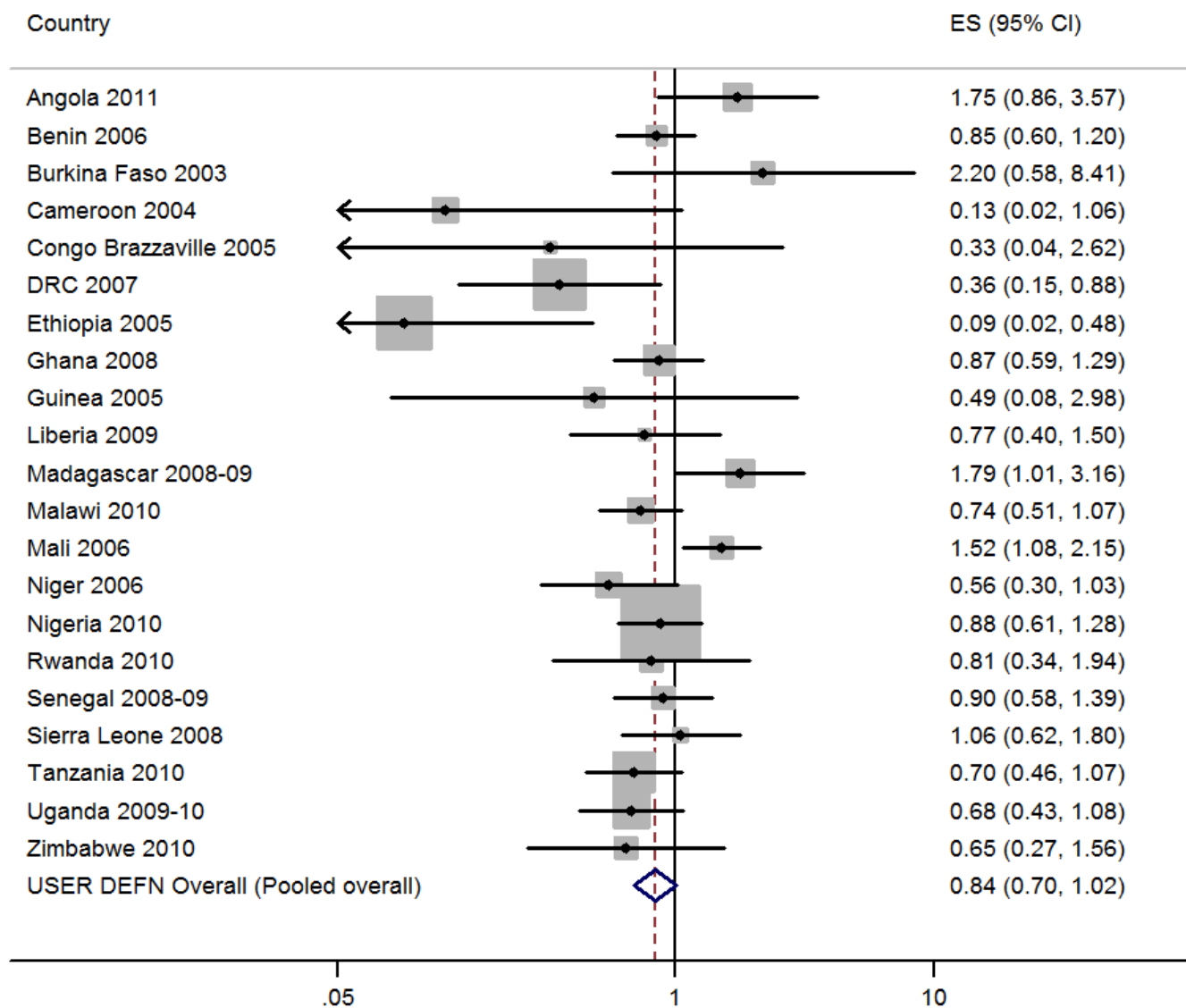


Figure 12. Scatterplot of proportion of last-born children age 6-23 months who used an ITN the night preceding interview by the proportion with moderate-to-severe anemia in surveys with ITN use greater than 20%

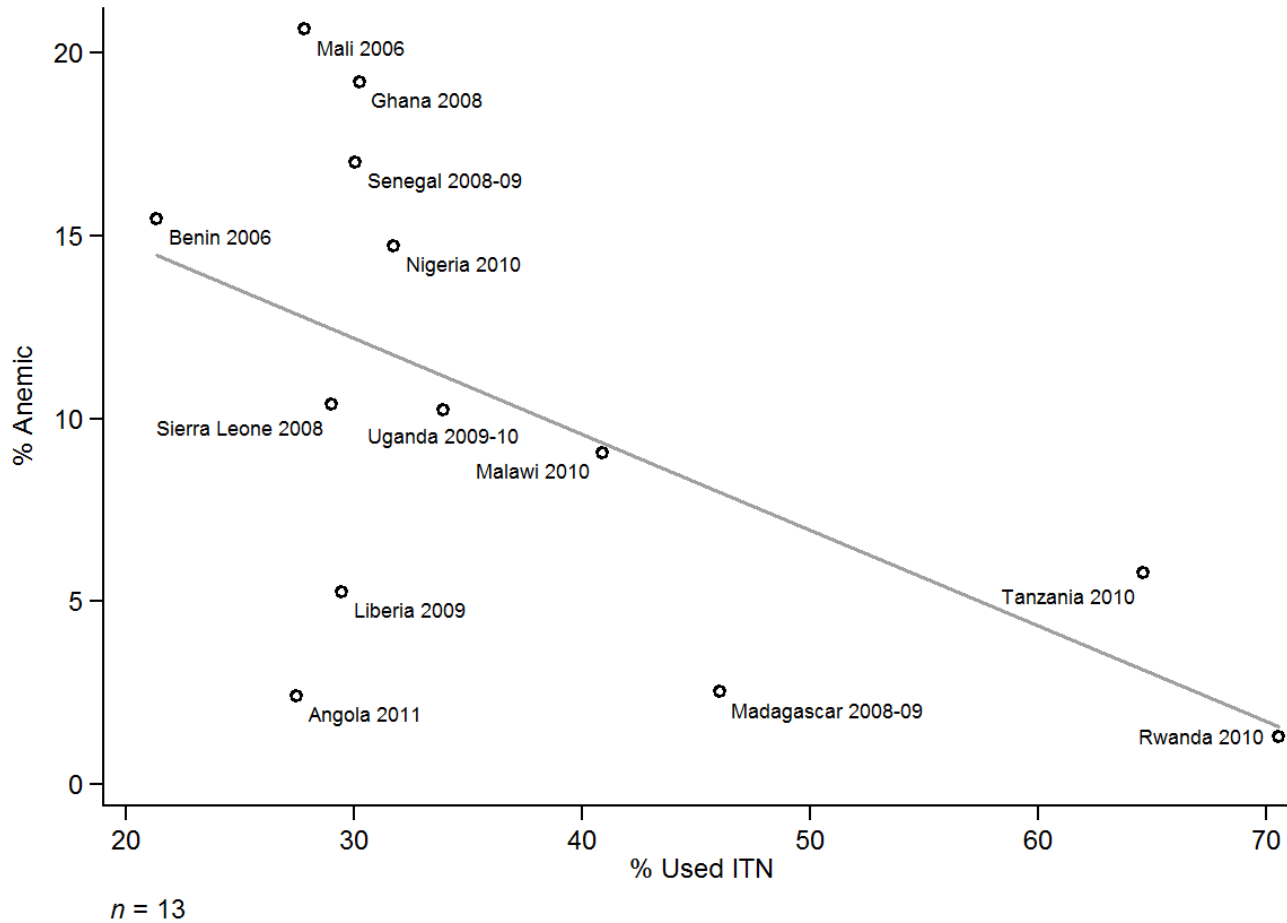


Figure 13. Scatterplot of proportion of last-born children age 6-23 months who used an ITN the night preceding interview by the proportion with moderate-to-severe anemia in surveys with ITN use less than 20%

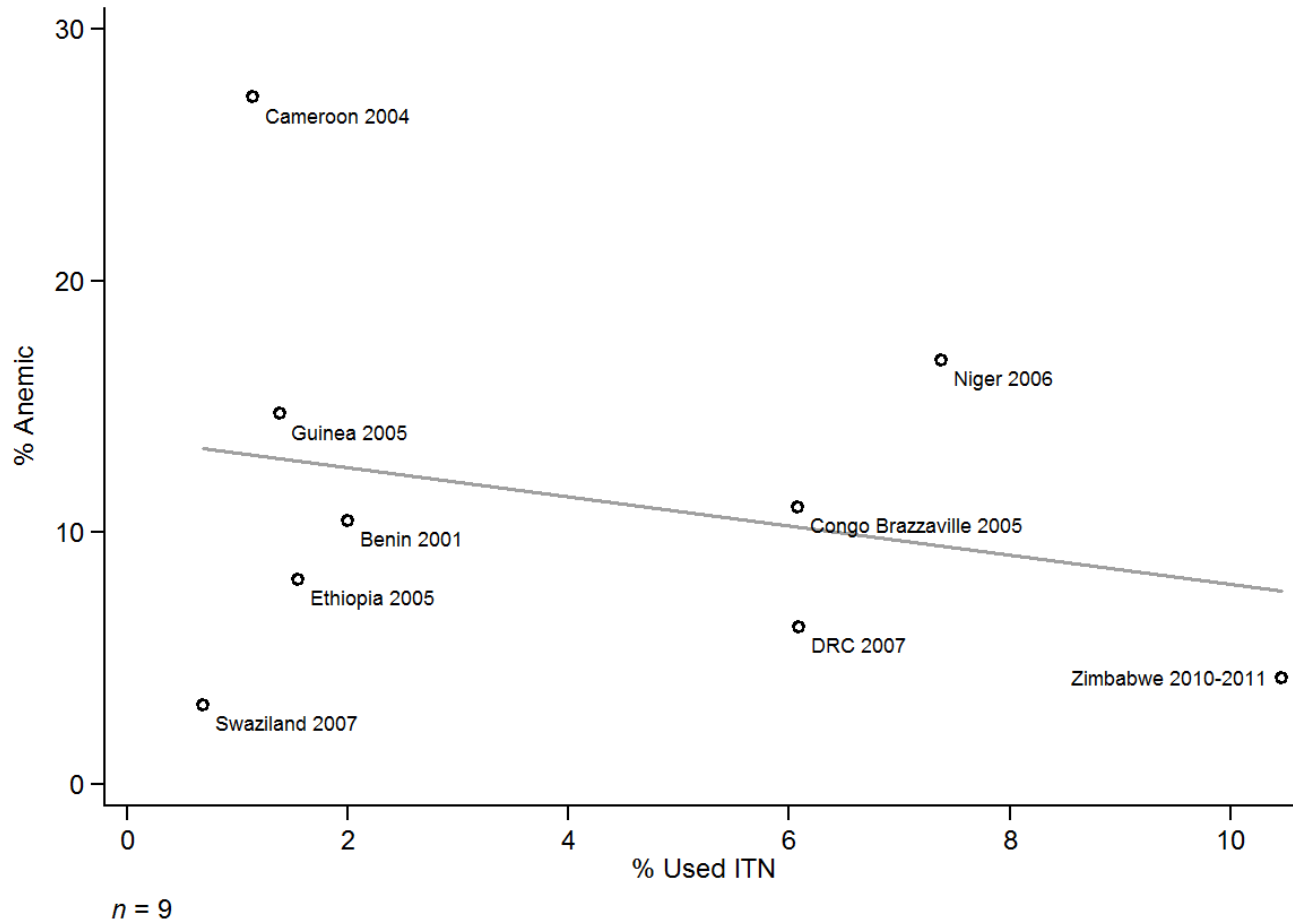
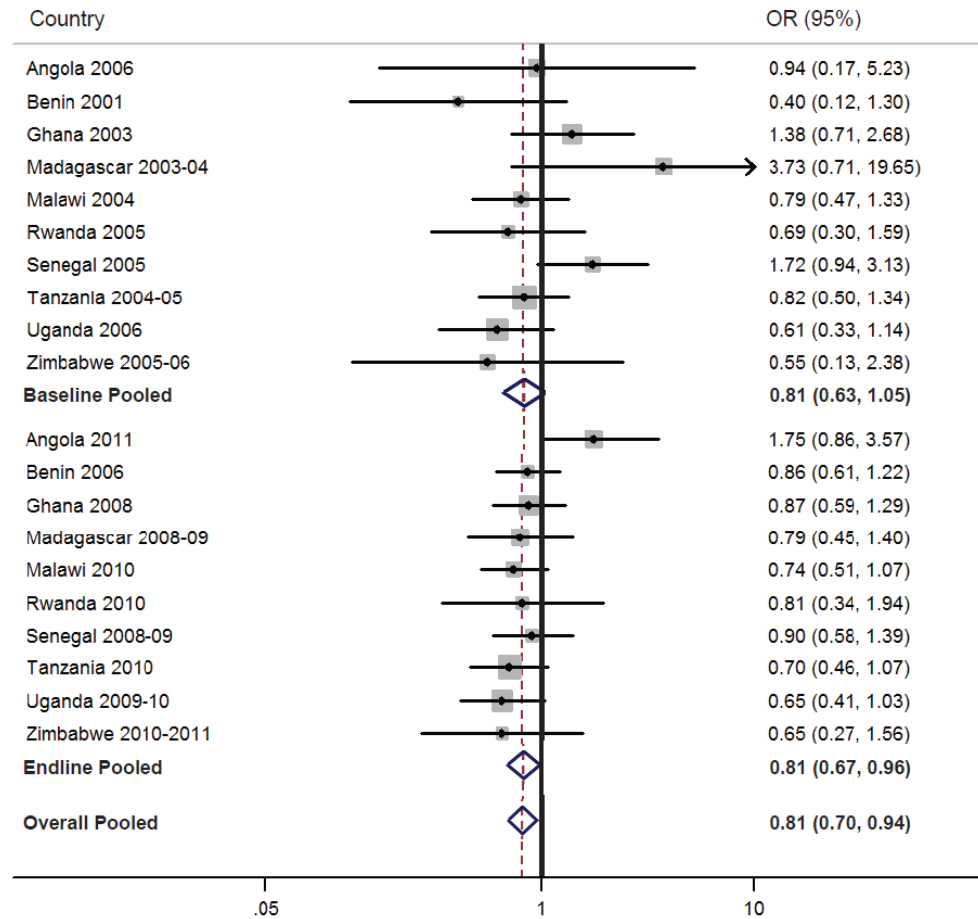


Figure 18. Adjusted odds ratios of moderate-to-severe anemia in last-born children age 6-23 months who used an ITN the previous night compared with those who did not*



*Adjusted for urban-rural residence, wealth quintile, multiple births, mother's education, sex, age, mother's age, and recent fever. Baseline pooled I2 test for heterogeneity = 33.8% (p=0.138). Endline pooled I2 test for heterogeneity = 0.0% (p=0.661). Overall pooled I2 test for heterogeneity = 10.9% (p=0.319).