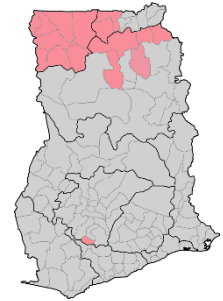


Evidence Snapshot: 3rd generation IRS (3GIRS) in northern savannah, Ghana

Background:

In Ghana, in 2014, malaria caused more than 8 million outpatient cases^{1,2}, 2,200 deaths in health facilities and 48.2% of all deaths in children younger than five years old. Particularly high burden areas include the northern savannah, i.e. Upper West, Upper East and Northern Regions. The country has implemented a package of malaria control activities, including vector control with indoor residual spraying (IRS), leading to steady success in reducing the prevalence of malaria in Ghana. Under 5-year-old prevalence, for example, has decreased from 27.5% in 2011 to 20.4% in 2016.



■ Ghana 2017
IRS Districts

Evidence of high pyrethroid resistance has led the two main IRS implementers, the US President's Malaria Initiative (PMI) Africa Indoor Residual Spraying (AIRS) project and the AngloGold Ashanti Malaria Control Programme Limited (AGAMal), to switch to a third generation IRS (3GIRS) product: Actellic® 300CS, which contains an organophosphate insecticide, pirimiphos-methyl (PM).

The epidemiological impact of 3GIRS in the Northern Region, 2015-2017:

District-level analysis of monthly reporting trends from 2015 to 2017 show that districts where Actellic® 300CS was sprayed reported each year, respectively, malaria incidence rates 36%, 25% and 56% lower than non-IRS districts; a total of ~4,200 fewer cases per 10,000 person-months at risk than in the districts with no IRS in the 6 months that followed spraying during those years.

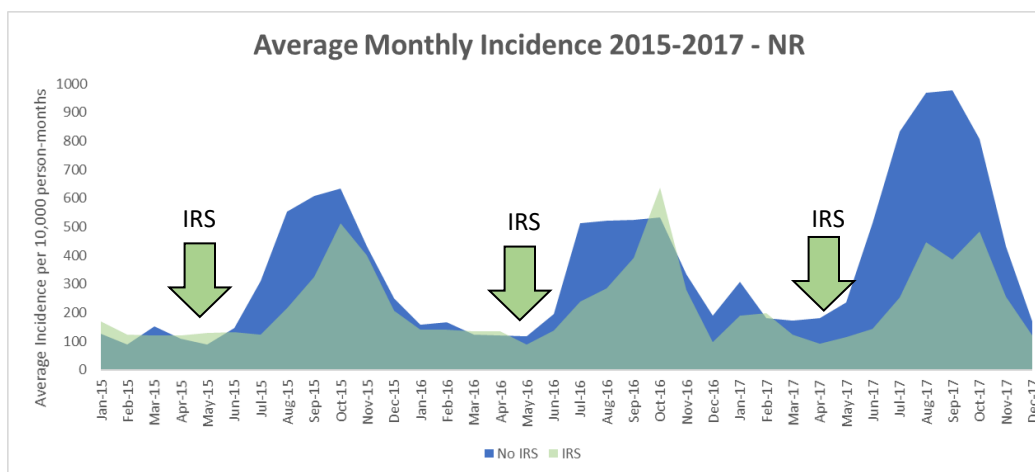


Figure 1. From 2015-2017, malaria cases reporting to public health centers were reduced by an average of 39% compared to neighboring districts without an IRS intervention during the 6 months after spraying.

The epidemiological impact of suspending 3GIRS in Upper East Region, 2014-2017:

In 2015, IRS operations were suspended in all Upper East Districts that were previously sprayed with Actellic® 300CS in 2014. The effect of suspending IRS in the region was striking. **From 2014 to 2015, malaria case incidence rates went up by an average of 50% and doubled from 2014 to 2016.**

Note: Seasonal Malaria Chemoprevention (SMC) was introduced in Upper West and Upper East Regions in 2015 and 2016 respectively. SMC implementation data (coverage and specific districts) are yet to be confirmed and included in this analysis.

Evidence Snapshot: 3rd generation IRS (3GIRS) in northern savannah, Ghana

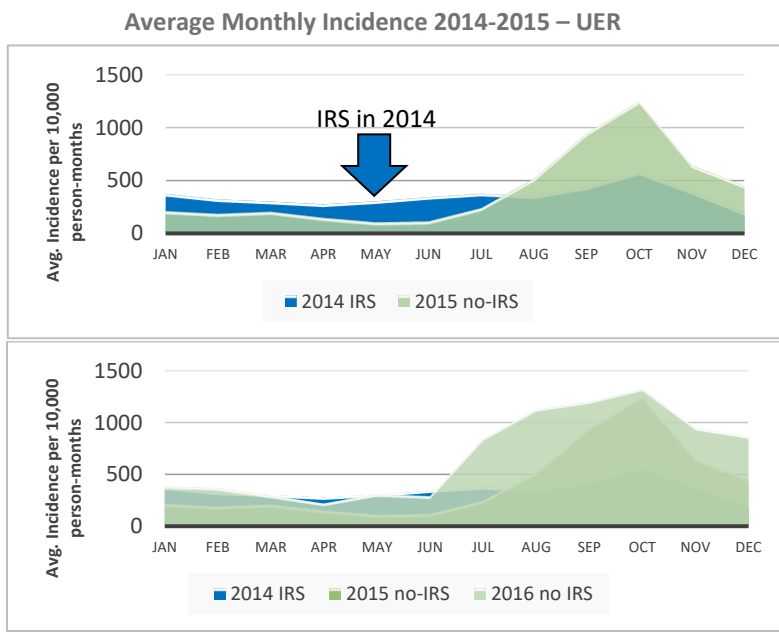


Figure 2. After 3GIRS operations were suspended in Upper East Region in 2015, the incidence of malaria cases reported at health facilities went up an average of 50% in 2016 and doubled in 2017.

The epidemiological impact of expanding IRS operations in Upper West Region, 2015-2017:

In Upper West, district-level analysis of monthly reporting trends from 2014 show that districts where Actellic® 300CS was sprayed had 2,400 fewer cases per 10,000 person-months at risk than in the districts with no IRS in the 6 months that followed spraying (represented by the area of the tan curve). In 2015 and 2016, when IRS was expanded to all districts in the region, this difference disappeared, and incidence rates were equivalent across the districts by 2016.

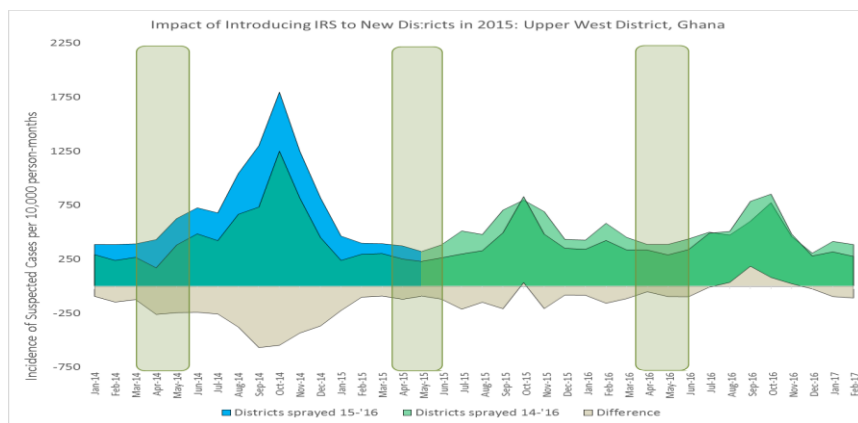


Figure 3. In 2014, the districts shown in green were sprayed with Actellic® 300CS, while districts in blue received no IRS. In 2015 and 2016, IRS operations expanded to include all the districts in UW Region. IRS campaigns are indicated, as is the difference in incidence among the two groups of districts (tan curve).

The switch to the 3GIRS product, Actellic® 300CS, starting in 2011 in selected districts and to all IRS districts in 2014, has proven to be a positive investment in an area with high evidence of pyrethroid resistance. With available resources through the Next Generation IRS project, IRS was reintroduced in three additional districts in Upper East Region (Kassena, Builsa North and Builsa South) in 2017; leading to 815 fewer cases per 10,000-person months in the incidence of confirmed malaria cases in June-August 2017. Further analyses are underway with the introduction of another 3GIRS product, SumiShield® 50WG in 2018.

¹ WHO (2015) World Malaria Report 2015.

² Programme NMC (2015) 2014 Annual Report. Ghana: National Malaria