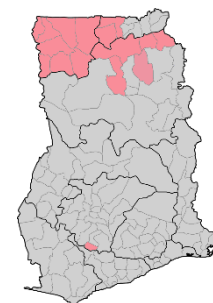


## Evidence snapshot: 3<sup>rd</sup> generation IRS (3GIRS) in northern savannah, Ghana

### Background:

In Ghana, in 2014, malaria caused more than 8 million outpatient cases<sup>1,2</sup>, 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: 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 47.5% in 2011 to 27.5% in 2016<sup>3</sup>.

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<sup>‡</sup>: Actellic® 300CS, which contains an organophosphate insecticide, pirimiphos-methyl (PM).



■ Ghana 2017 IRS Districts

### 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 39%, 26% and 58% lower than non-IRS districts; a total of around 260,000 fewer cases in the districts with IRS in the 6 months that followed spraying during those years.

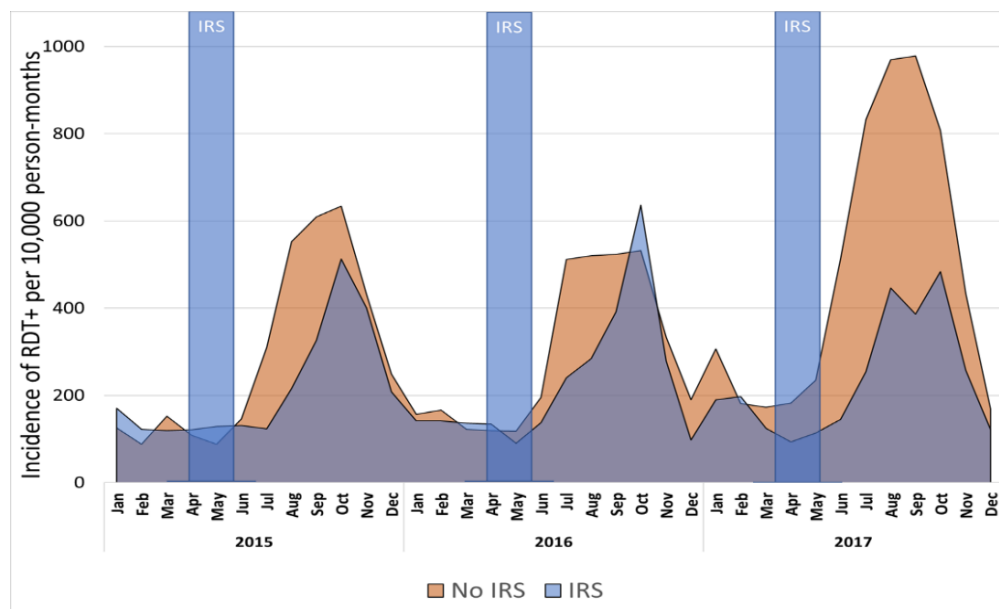


Figure 1. From 2015-2017, malaria cases reporting to public health centers were lower than neighboring districts without an IRS intervention during the 6 months after spraying.



### 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. **After spray operations were suspended in 2015, incidence during the same 6-month window increased an average of 485% per district to 6,115 confirmed cases per 10,000 person-months at risk.**

Seasonal malaria chemoprevention (SMC) was gradually introduced in Upper West and Upper East Regions in 2015 and 2016 respectively. SMC implementation was considered in comparing districts.

# Evidence snapshot: 3<sup>rd</sup> generation IRS (3GIRS) in northern savannah, Ghana

Percent change in confirmed malaria cases from 2014 to 2015 at health facilities in Upper East, after IRS operations were suspended

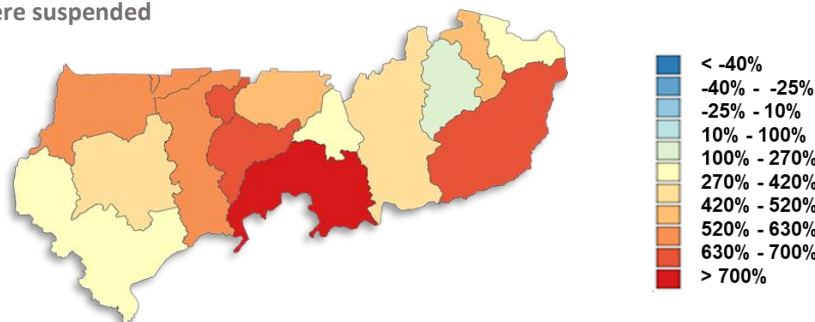
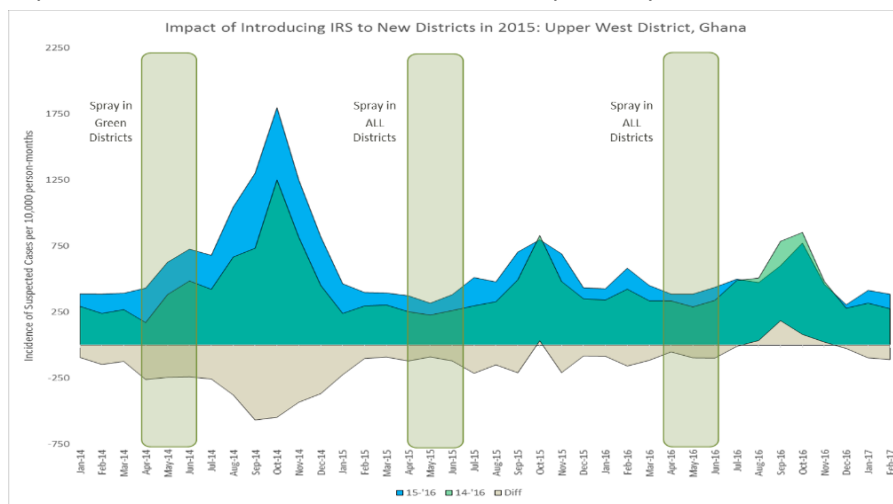
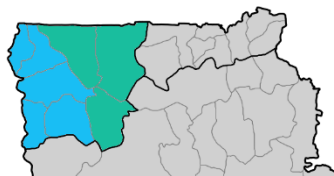


Figure 2. After 3GIRS operations were suspended in Upper East Region in 2015, there was a significant resurgence of incidence of malaria cases reported at health facilities

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

In Upper West, 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. District-level analysis of monthly reporting trends from 2015 to 2017 in Upper West Region show this to be the only study region where incidence rates declined consistently each year, from an average of 1,500 cases per 10,000 person-months at risk in the transmission season of 2015 to 825 and 740 cases per 10,000 person-months at risk in 2016 and 2017 respectively.

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 Upper West 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. In the six months after the IRS campaign (September 2017 to February 2018), cumulative monthly incidence rates were 42% lower, translating to over 146,000 fewer cases. Further analyses are underway with the introduction of another 3GIRS product, SumiShield® 50WG in 2018.

<sup>1</sup> WHO (2015) World Malaria Report 2015.

<sup>2</sup> Programme NMC (2015) 2014 Annual Report. Ghana: National Malaria Control Programme.

<sup>3</sup> 2016 Ghana Malaria Indicator Survey

<sup>‡</sup> 3<sup>rd</sup> generation IRS products are effective against pyrethroid-resistant vectors and have a residual efficacy of at least 6 months.