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Introduction

- Current vector control methods in Cambodia could be improved by increasing community engagement and by the use of biological control methods to mitigate temephos-resistance in *Aedes aegypti* [1].
- Larvivorous fish are a cost-effective, domestic vector control method. They have demonstrated effectiveness in small-scale studies [2] and their usage is culturally accepted in Cambodia [3].
- A controlled release pyriproxyfen (PPF) matrix

release formulation (Sumilarv® 2MR) has been developed requiring distribution every six months and reducing operational costs when compared to temephos/*Bti*, which have residual efficacy of two to three months and can be used at levels well below World Health Organization's Joint Meeting on Pesticide Residues potable water limits.

- This trial study aims to demonstrate community effectiveness of guppies, PPF and Communication for Behavioural Impact (COMBI) activities.

Methods

Study site

The study site includes 30 clusters with approximately 200 households (HHs) or 1,000 individuals per cluster, randomised into three Arms:

- 1) Guppies, PPF, and COMBI activities (see black circles)
- 2) Guppies and COMBI activities (see red circles)
- 3) Standard vector control activities from the Ministry of Health (see green circles)

responsible for distribution of guppies from the health centre guppy banks (supplied with 20 jars of 500L) and their homes (supplied with two 500L jars).

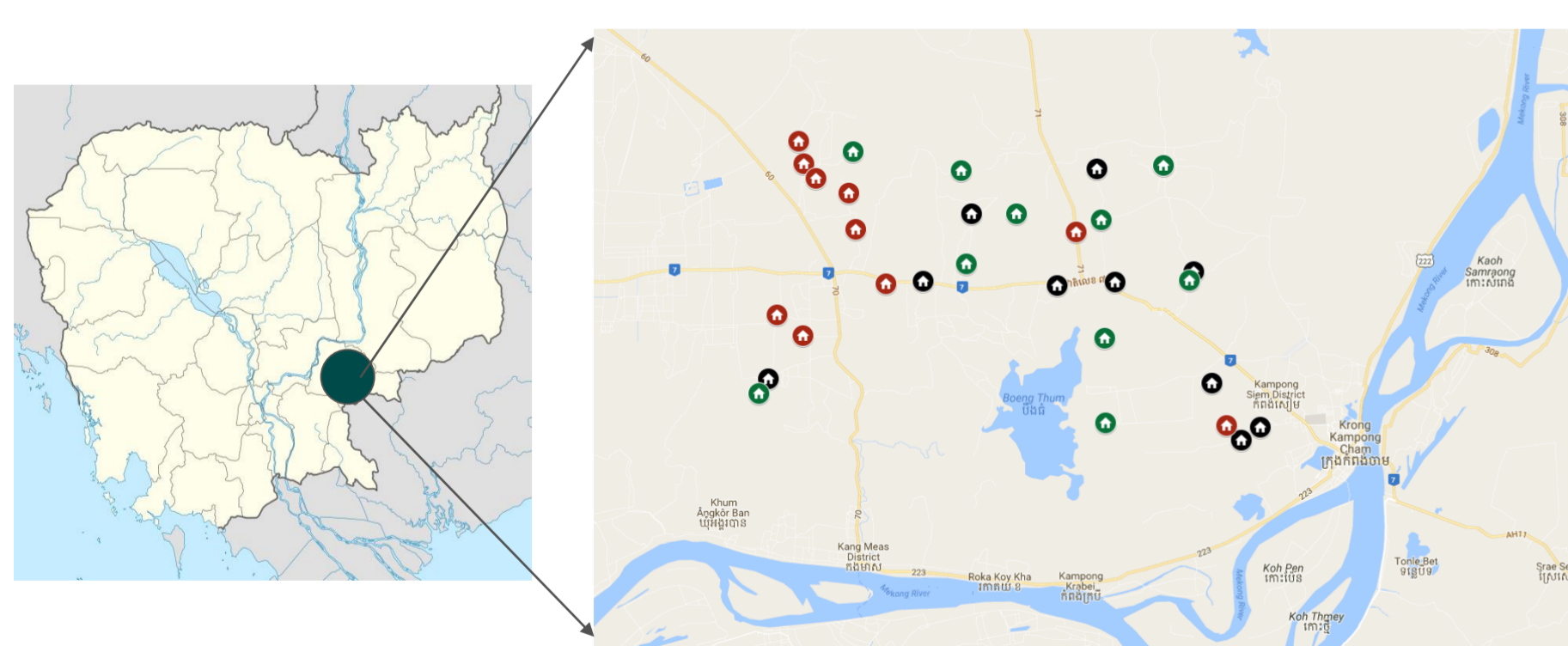
- Sumilarv® 2MR were replaced at six months post-intervention.
- COMBI activities included health education sessions, posters, banners, t-shirts and songs.

Surveys and Assessments

- 4 Entomology surveys conducted with a sample size of 10 clusters per Arm and 40 HHs per village at baseline and every 4 months post-intervention.
- Baseline/endline KAP surveys with a sample size of 10 clusters per Arm and 20 HHs per cluster
- CHWs recorded monthly coverage of guppy fish and Sumilarv® 2MR in each household container
- Focus group discussions and in-depth interviews were conducted to assess the acceptability of vector control tools in the study area.

Survey design and implementation

- Two guppy fish (*Poecilia reticulata*) were placed into each water container greater than 50L (in Arms 1 and 2) and one Sumilarv® 2MR was placed in each container from 10-50L (in Arm 1).
- Community health workers (CHWs) were



Results

- Throughout the study period, the mean number of adult *Aedes* females per household (primary outcome) was significantly greater in Arm 3 (0.72, 95% CI 0.59-0.84) than Arm 1 (0.42, 95% CI 0.37-0.47) or Arm 2 (0.37, 95% CI 0.32-0.42), with the greatest difference between Arms in Ento 3 (See Figure 1).

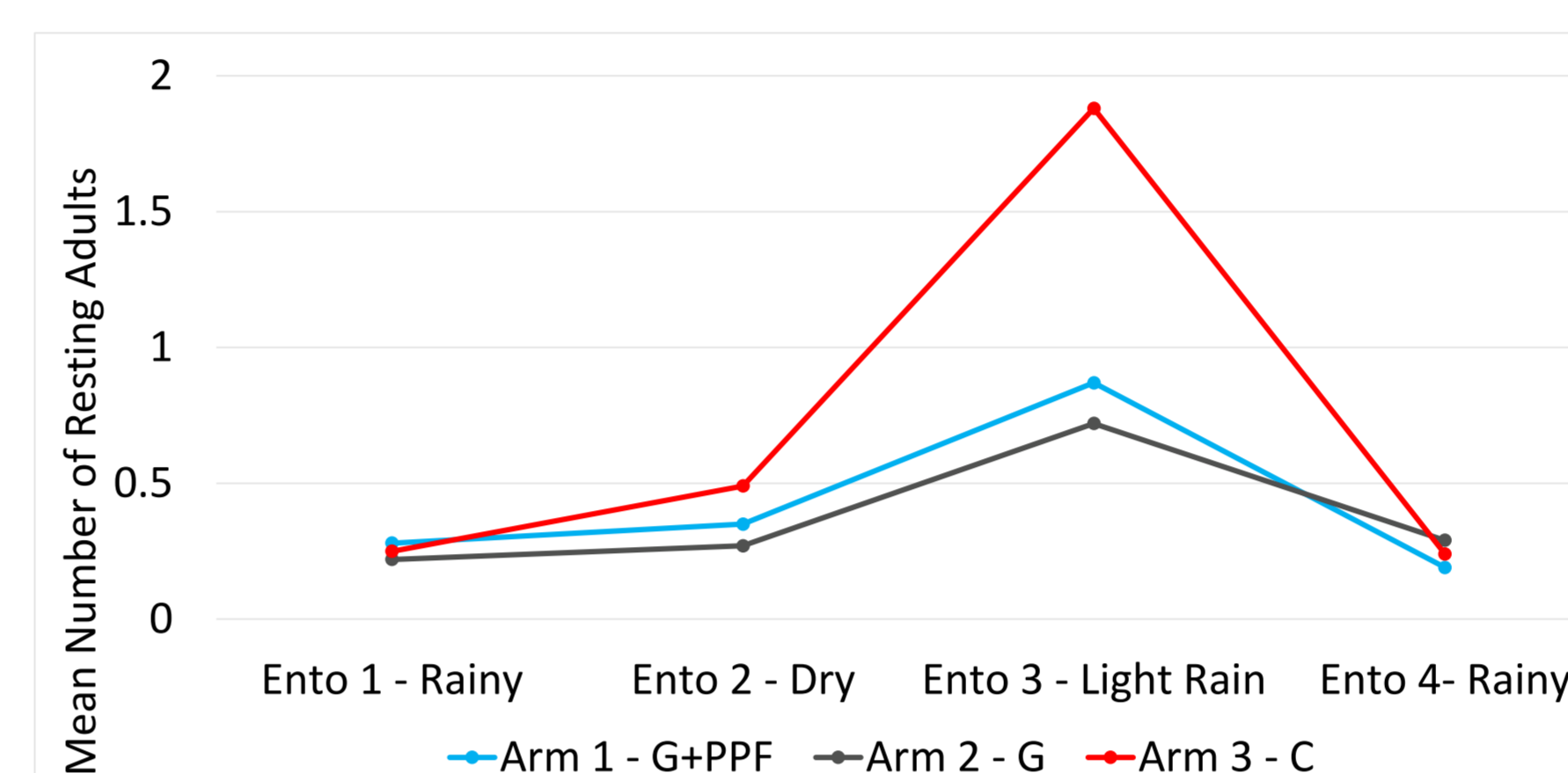


Figure 1: Mean number of adult *Aedes* females per household by Arm and survey

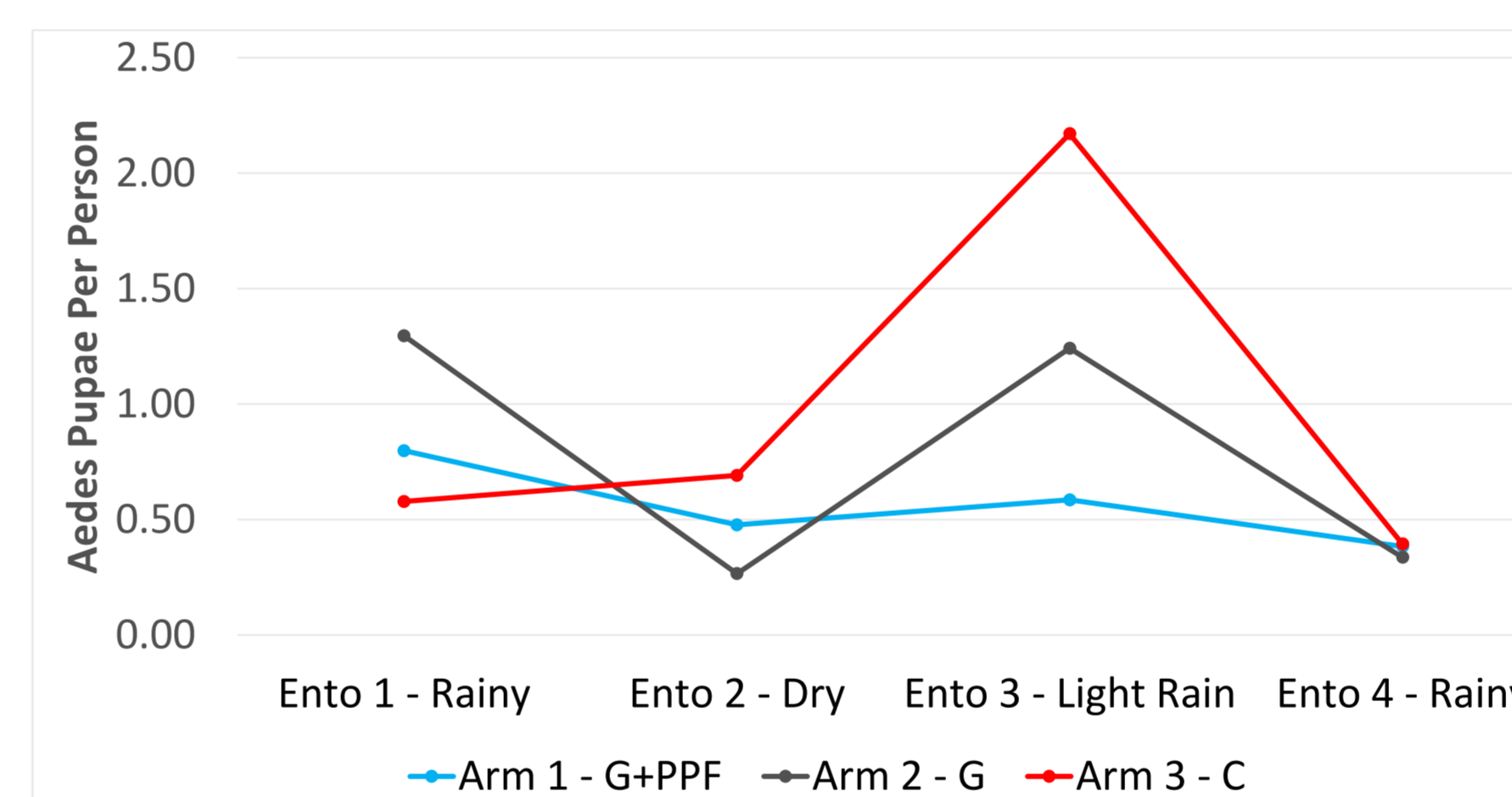


Figure 2: Mean number of *Aedes* pupae per person by Arm and survey

- Figure 2 shows a statistically greater number of pupae per person (PPP) overall in Arm 3 (0.65, 95% CI 0.55-0.75) than in Arm 1 (0.41, 95% CI 0.34-0.47).

- Figure 3 shows that coverage of guppies remained high in Arm 2 while PPF and guppy coverage fluctuated in Arm 1.

- The KAP and qualitative findings revealed strong community participation in COMBI activities, high acceptability rates and demand for the guppies.

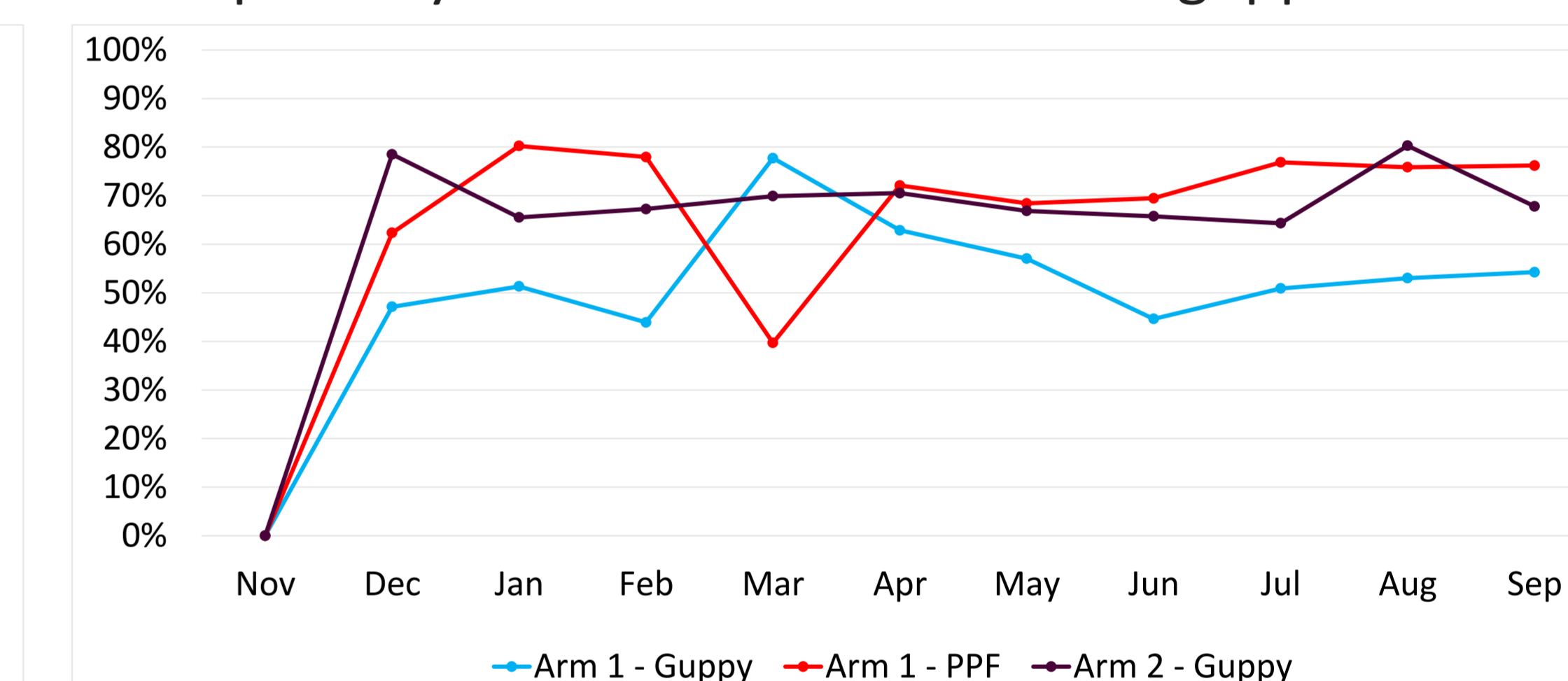


Figure 3: Coverage of guppies and PPF in intervention villages by Arm and month

Discussion and conclusions

- Preliminary data shows that both intervention Arms had a demonstrable reduction on the number of *Aedes* females per house and PPP as compared to the control Arm.
- Comparing Arms 1 and 2 in terms of *Aedes* females per house, there was no evidence of a benefit of PPF on top of the fish (p=0.17).

- However, the lower than expected performance in Arm 1 may have been due to lower guppy coverage than in Arm 2.
- The development of an engagement tailored to the specific needs of the communities, ensured high rates of acceptability and enhanced the demand and compliance of guppies.

References:

[1] Khun S, Manderson LH: 'Abate distribution and dengue control in rural Cambodia'. Acta Trop 2007, 101:139-146. [2] Seng CM, et al. (2008). 'Community-based use of the larvivorous fish *Poecilia reticulata* to control the dengue vector *Aedes aegypti* in domestic water storage containers in rural Cambodia'. J Vector Ecol, 33:139-144; [3] Charles CV, et al. (2015). 'A randomized control trial using a fish-shaped iron ingot for the amelioration of iron deficiency anaemia in rural Cambodian women'. Trop Med & Surg, 2015 3:3; [4] World Health Organization (2013). Managing Regional Public Goods for Health: Community-Based Dengue Vector Control. Philippines: World Health Organization.