Use of guppy fish (*Poecilia reticulata*) for *Aedes* control in Cambodia: challenges, opportunities, and community acceptance

Vanney Keo

07- December, JITMM 2016

Dengue

- **3.6 billion at risk** with 390 million infections each year of which 96 million are symptomatic (70% in Asia)
- Cambodia reported **approximately 15,000 dengue cases in 2015** through its surveillance system. 13% of these were registered in Kampong Cham province
- Dengue is not confined to urban areas or only affecting children. There are **outbreaks in rural areas and non-endemic areas** in north-east provinces (12% of symptomatic cases in Cambodia are over 18 years of age)
- **No vaccine or therapeutic treatment** is available at scale in Cambodia, so prevention relies on vector control

Vector control in Cambodia

Challenges

- Reliance on temephos and permethrin/deltamethrin sprays which are now resistant in most provinces tested*
- Little evidence available for effectiveness and acceptability of other vector control methods for *Aedes* in Cambodia

Opportunities

- Demonstrate the impact of a combination of previously proven and new vector control tools to sustainably reduce *Aedes* populations and thus reduce dengue transmission

*Polson et al. 2001, Khun et al. 2007, Hii et al. 2016

Container surveys in Kampong Cham, Cambodia

Container Type	Baseline (297)		Baseline (251)	
	No.	Pupae	No.	Pupae
Drum	120	148	173	247
Concrete water jar	896	9,804	595	7,496
Concrete tank	162	692	73	550
Small pot	165	284	123	490
Flower vase	51	29	76	24
Tires	79	251	75	158
Tin can	189	129	47	2
Broken pot	283	72	121	12
Other	293	290	191	127
Total	**2,238**	**11,699**	**1,474**	**9,106**

Pupal biomass:

Water jars, drums, and concrete tanks (>50L) ≈91%

Source: Chang et al. 2008

Vector control

Interventions

Vector control tools

- Larvivorous fish (guppies or seven colour fish) in jars > 50 L
- Communication for Behavioral Impact (COMBI)

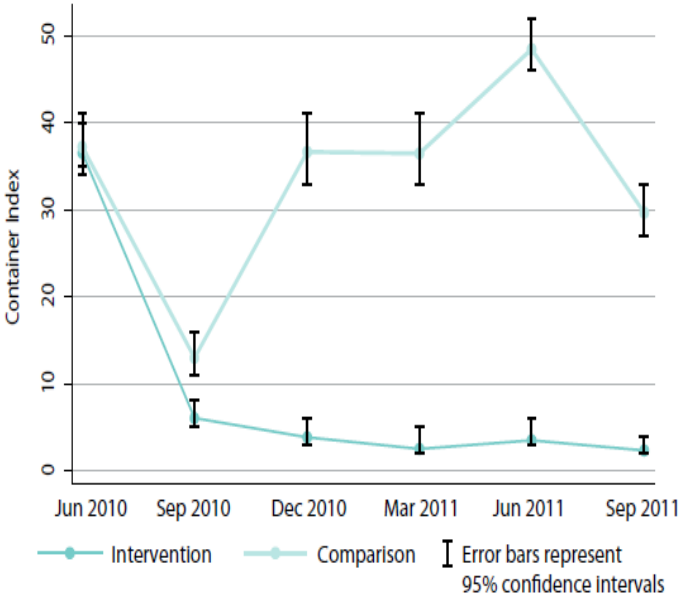
Site selection – Kampong Cham

- Kampong Cham was selected as it has one of the highest per-capita dengue burden in Cambodia, and is ecologically similar to other endemic areas

Guppy fish

malaria
consortium
disease control, better health

Guppy fish

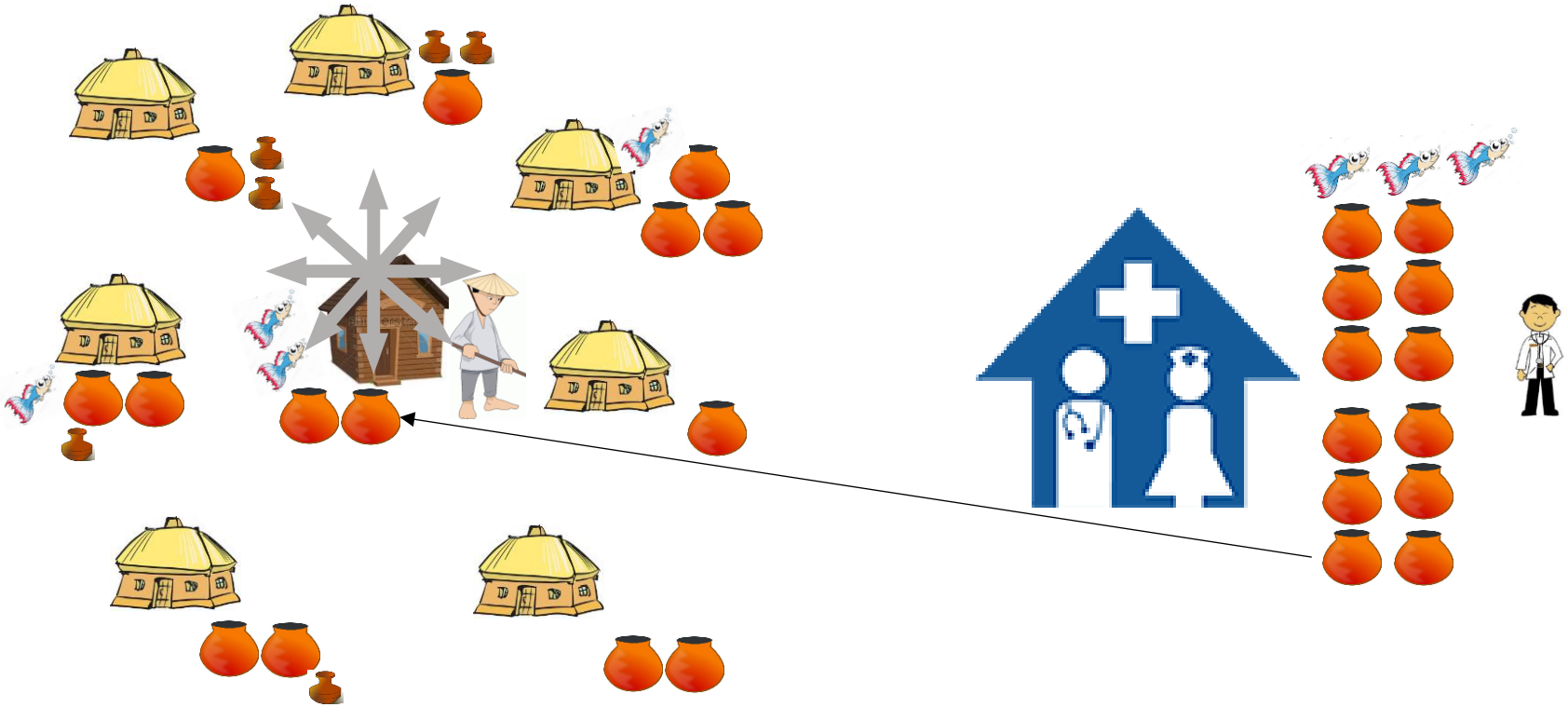


Source: WHO, 2013

Distribution process

Intervention Village

Health centre guppy bank



Challenges and opportunities

Vanney Keo (វ៉ណ្ណី)

malaria consortium
disease control, better health

Challenges in using guppy fish

1. Location of breeding
2. Choice of food
3. Warm climate or changes in climate
4. Community beliefs
5. Children playing with the guppy fish
6. Guppy fish predators
7. Community’s water use
8. Guppy rearing
9. Understanding the importance of guppies

1. Location of guppy fish reproduction

Challenge	Opportunity/Solution
• Guppy fish don’t seem to breed well in crowded jars and in busy places	• Placing the jars in backyards or quiet places improved breeding of guppies

2. Food for guppy colonisation

Challenge	Opportunity/Solution
• Guppies did not survive with certain foods. CHWs used rice husks sold in the market, which was not pure and killed the guppies • Fish food purchased in the market worked well, but was expensive	• Using rice husks made in communities as they are cheaper, easy to find and safe for guppies

3. Climate challenges

Challenge	Opportunity/Solution
• Jars become dry • High water temperature • Jars become full during the rainy season	• Moving guppies to big jars for the next season • Moving water jars into the shade under the house or a tree, or creating shade with jar covers, nets • Creating covers to avoid guppies to jump out of jars

4. Beliefs

Challenge	Opportunity/Solutions
• Older people often rejected guppy fish or insecticides because killing living organisms (larvae) were opposed to their religious beliefs	• Engaging with communities, through COMBI, using community meeting and community health workers to explain the advantages of using guppies and to support its distribution

5. Children playing with guppies

Challenge	Opportunity
• Children find the guppies ‘funny’ and play with the guppies • Children take the guppies and use them for fish-fighting games	• Using COMBI activities with communities and teachers in schools

6. Predators

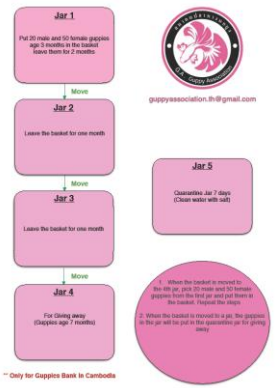
Challenge	Opportunity/Solutions
• Frogs, lizards/gecko eat the guppies	• Making a cover from bamboo or net to keep predators from reaching the interior of jars

7. Water use

Challenge	Opportunity
• Guppies are removed when water is used for cloth washing • Guppies are removed when people use water at night for bathing	• Focusing COMBI strategies on water use to avoid removing guppies

8. Guppy rearing

Challenge	Opportunity
• Fry are eaten by adult fish • Smaller fish are bitten by older fish and can become infected • Rain changes the PH level in the water for guppies to survive	• Following the plan developed by the guppy association of Thailand



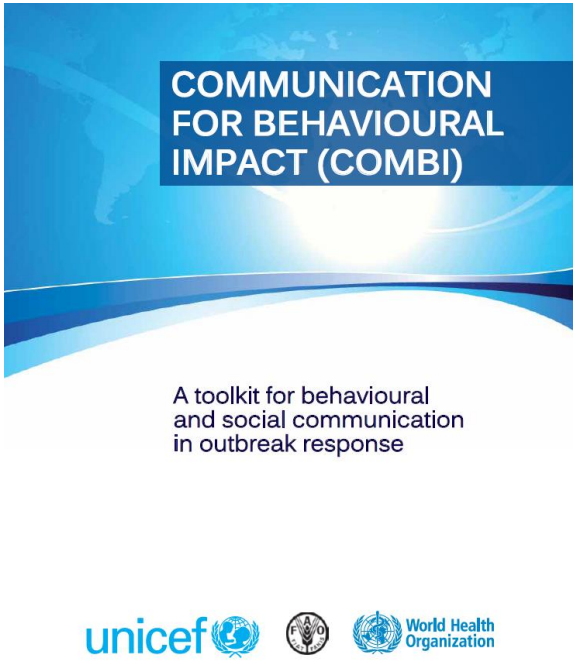
9. Lack of understanding of intervention benefits

Challenge	Opportunity
• No time to check • Lack of concern	• Focusing COMBI activities on the importance of using vector control strategies

Communication for Behavioral Impact (COMBI)

malaria
consortium
disease control, better health

Communication for Behavioral Impact (COMBI)



Provides a social mobilisation and communication approach that:

Connects knowledge and behaviour

Addresses the cost and value of engaging in healthy behaviours

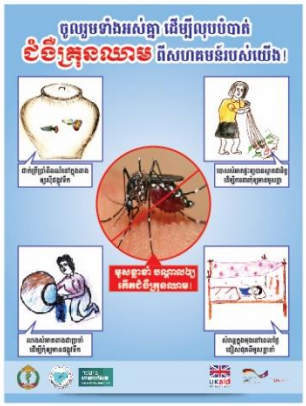
Recognizes the gradual stages of behaviour change

Creates a supportive environment for behaviour change

Source: UNICEF

COMBI activities:

1. Developing banners, posters and leaflets



2. Using tuk tuks with messages

3. Using information, education, communication (IEC) material

4. Producing caps, t-shirt and carry bags

Discussion

- Guppy fish were widely accepted as demonstrated by qualitative assessment done
- Operational roll out/scale up needs to consider some of the challenges that are related to guppy fish biology and with social habits in Cambodian communities
- Easy, low cost solutions are available for most of the challenges
- COMBI is essential to ensure:
  - Community questions and problems are heard
  - Disseminate the solutions and ensure problems are fixed
  - Engaging schools and pagodas in guppy roll out and COMBI activities may bring faster and better results

Discussion and conclusion

malaria
consortium
disease control, better health

Discussion

- **Guppy fish were widely accepted**, as demonstrated in the qualitative assessment
- **Operational roll out/scale up needs to consider the challenges** related to guppy fish biology and social habits in Cambodian communities
- **Easy, low-cost solutions are available** for most challenges encountered
- **COMBI is essential** to ensure:
  - Community questions and problems are heard
  - Solutions are disseminated and challenge are addressed
  - Schools and pagodas are engaged in guppy roll out and COMBI activities bring faster and better results

Conclusion

- **Guppies can be effective** for *Aedes* control in Cambodia
- Operational challenges can be easily overcome with **local and low-cost solutions**
- **COMBI activities** must be done together with any vector control method

Acknowledgements

World Health Organization

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

SUMITOMO CHEMICAL

កិច្ចសហប្រតិបត្តិការ
អាល្លឺម៉ង់
DEUTSCHE ZUSAMMENARBEIT

អនុវត្តដោយ:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

UKaid
from the British people

Thank you

malaria consortium
disease control, better health

www.malariaconsortium.org