

Evaluation of community-level vector control activities and *A. aegypti* egg density indices in Guatemala

Perry M₁, Niemczura de Carvalho J₁, Buekens J₁, Monzon JE₁, Romero MR₁, Sanchez A₁, Arredondo J₂, Benavente L₁

1=Medical Care Development 2=Independent
CONTACT: Megan Perry, mperry@mcd.org



INTRODUCTION

The Zika Community Response (ZICORE) project in Guatemala aims to improve surveillance of the *Aedes aegypti* vector by using entomological data as the basis for low-cost community-level vector control, as well as social and behavior change interventions. Weekly ovitrap reading averages were used to target communities for vector control activities.

METHODS

- In 2018, household-level *Aedes aegypti* breeding site monitoring was conducted in 41 communities
- Four sentinel households were selected for every group of 9 blocks (G9Ms) in each community
- Ovitrap were installed in the selected households and egg counts were recorded weekly using Collector for ArcGIS
- In these communities, 8,142 traps were positive out of 14,314 readings
- A weekly average was calculated at the community level to identify G9Ms with very high entomological risk (90th percentile) to be targeted for community-level clean-up campaigns.
- Using weekly ovitrap monitoring results, the ZICORE project has implemented community-level efforts to prevent *Aedes aegypti* breeding without the use of chemicals, such as:
 - Eliminate breeding sites within communities in G9Ms in the 90th percentile or above for egg counts, e.g. disposal of non-useful containers, scrubbing of sinks and useful containers as part of the “VELITA” methodology, which is a Spanish acronym for the steps to be taken to prevent artificial breeding sites: 1-flip, 2-eliminate, 3-clean and 4-cover different types of containers.
 - Remove solid waste identified as potential *Aedes* breeding sites, e.g. tires and non-useful containers of varying sizes. Enlisted strong municipal government support, such as provision of trash removal vehicles to dispose of waste.

Distribution of ovitraps across groups of 9 blocks



RESULTS

The table below shows average egg counts per community by epidemiological week in 2018. Cells highlighted in green denote averages in the 90th percentile or higher for the week. Averages were calculated based on the number of ovitraps assessed per community.

Community	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38					
Barberena - Canoguitas	6.3	5.0	14.5	5.8	8.6	14.9	0.0	14.1	9.7	22.3	17.1	11.6	19.6	24.8	24.5																												
Barberena - Cerrito de la cruz								0.0	1.3	0.8	2.1	37.4	33.9	12.0	14.2	15.2	8.9	9.5	6.6	0.0	82.3	45.9	31.6	84.9	70.4	191.1	133.0	154.1	103.2	73.3	39.9	79.9	127.6	91.1	75.6	53.8							
Barberena - Cogussa								5.1	3.9	60.7	77.4	60.8	59.7	39.5	57.4	0.0	67.8	48.3	16.0	112.5	69.1	109.8	163.4	79.9	86.3	66.1	61.8	55.9	38.5	106.8	60.4	92.1	17.3										
Barberena - Pocitos								28.0	8.0	1.4	12.2	4.0	3.0	2.4	35.0	33.3	116.3	137.3	46.6	47.4	37.5	92.8	107.6	41.6	71.6	37.6	43.8	32.8	34.5	34.5	0.0	0.0	27.6										
Barberena - Utzumazate											24.0	27.0	11.1	0.0	10.1	4.4	0.0	15.9	0.0	9.0	1.8	0.0	38.0	8.1	60.5	92.0	87.6	143.0	19.9	16.0	4.1	45.7	34.4	55.1	39.9	66.9	37.6	73.5					
Camotán - Agua Caliente				1.5	11.0	0.0	68.5	15.0	15.0	0.0	0.0	5.0	55.5	0.0	0.0	0.0	7.5	0.0	0.0	25.0	47.5	1.0	0.0	7.5	17.0	70.0	0.0	30.5	1.5	0.0	15.0	0.0	5.5	27.5	10.0	0.0							
Camotán - Aldea Brasil	38.8	15.9	4.9	5.0	0.0	4.0	22.8	6.1	5.0	15.0	2.9	4.0	26.0	9.3	3.8	5.6	0.4	36.1	32.9	11.1	11.8	26.8	36.0	16.0	15.0	33.9	55.5	52.6	36.8	34.6	40.6	17.0	33.6	37.5	56.1	24.6	24.3	77.8					
Camotán - Aldea Caparrá	51.6	34.6	19.9	21.4	9.3	0.0	29.9	16.3	8.4	24.9	18.0	0.0	5.8	37.8	29.0	1.6	7.9	22.6	32.8	6.5	36.9	62.0	28.0	53.5	61.9	35.6	58.9	66.4	99.9	97.0	96.1	50.9	21.8	37.5	65.9	23.4	47.8	45.8					
Camotán - Aldea Pajcá	17.7	10.9	9.4	12.1	7.5	6.9	93.8	43.5	47.5	25.7	45.5	10.9	27.8	19.8	26.5	14.8	18.6	35.7	9.9	11.8	17.9	35.1	33.9	15.9	20.2	87.4	79.1	59.9	41.8	51.8	48.9	40.0	56.7	44.1	39.1	50.2	57.0						
Camotán - Área Urbana	41.0	52.6	63.3	40.3	27.8	24.6	95.8	40.2	61.0	59.4	38.8	34.9	36.4	28.3	33.4	29.5	60.1	36.4	44.0	54.6	34.8	29.0	39.8	40.1	53.7	74.1	83.2	94.2	110.0	47.0	62.9	15.7	60.5	68.0	53.7	40.9	50.2	83.7					
Camotán - Col. Guillermo Guerra	13.0	8.8	20.5	3.8	0.0	1.8	3.7	7.8	58.8	0.0	0.0	60.8	0.0	0.0	0.0	0.0	0.0	9.0	49.3	0.0	0.0	13.8	12.5	3.8	8.0	14.0	14.0	5.8	7.3	0.0	8.8	18.5	39.8	0.0	18.3	1.3	20.0						
Camotán - Colonia Las Brisas	6.0	15.0	19.0	29.5	0.0	15.0	47.3	0.0	40.7	116.0	34.5	17.8	13.0	36.5	1.0	31.0	2.5	76.0	85.0	19.8	110.5	27.7	45.0	3.5	3.8	31.0	21.0	136.3	15.0	47.8	22.3	35.0	50.8	22.5	0.0	51.8	9.3	5.8					
Camotán - Tierra Blanca							8.5	5.0	11.5	0.0	16.5	0.0	32.5	13.5	1.5	25.5	42.5	23.0	78.0	0.0	120.5	36.5	66.0	11.5	104.0	91.5	48.5	17.0	47.0	6.5	0.0	40.0	0.0	14.0	0.0	6.5	9.0	13.5					
Coatepeque - Paraiso	43.2	32.6	37.2	20.1	40.3	31.3	15.9	27.6	27.6	26.5	3.7	29.6	23.6	18.9	43.1																												
Coatepeque - San Isidro	58.5	61.4	28.0	71.0	69.7	33.3	52.3	47.6	47.5	21.7	82.5	35.9	74.4	41.0	29.8																												
Coatepeque - San Isidro Robles	113.1	73.9	163.3	116.5	65.8	26.1	63.9	62.1	59.3	34.0	1.8	15.4	10.9	19.2	17.2																												
Coatepeque - Satélite	31.3	36.3	43.4	69.1	23.0	31.0	23.4	7.9	125.4	42.2	153.3	82.7	67.9	23.4	28.9																												
Cullapa - El Llano				0.1	5.5	9.2	58.0	46.3	141.1	66.8	86.3	113.8	91.8	134.8	63.7	62.2	97.4	82.4	87.1	104.4	46.9	78.9	88.1	49.9	77.9	115.1	136.4	96.5	57.6	67.1	79.9	89.5	111.6	95.8	151.1								
Cullapa - El Pinito				0.3	0.7	2.7	0.1	2.3	4.6	3.2	20.2	10.7	55.8	22.8	41.5	20.3	12.2	33.8	13.4	61.0	72.5	93.4	58.4	67.5	19.7	66.3	94.0	41.4	62.4	24.3	69.1	81.3	24.6	49.0	30.3	30.6	22.8						
Cullapa - Los Esclavos				3.1	39.8	13.0	16.8	17.6	18.8	70.9	156.1	146.4	122.6	27.7	9.4	181.8																											
El Palmar - El Manantial	11.9	2.3	0.0	4.0	5.4	0.0	6.4	4.9	3.0	7.3	0.0	0.0	0.0	2.1	4.1	0.0	7.8	19.0	22.4	17.4	47.0	51.2	19.6	38.8	38.2	29.5	30.0	23.5	87.0	29.0	53.4	43.7	39.8	20.8	28.6	8.2							
El Palmar - Sector A	36.3	20.4	19.8	47.5	23.0	29.4	43.0	30.4	18.2	34.6	25.6	49.5	47.3	32.1	41.8	64.9	25.6	90.4	52.9	40.3	94.5	45.3	40.9	120.0	120.5	118.0	41.8	121.5	105.1	85.6	135.8	64.0	76.8	43.3	35.6	25.0	14.4	26.9					
El Palmar - Sector B	33.0	46.3	43.2	19.3	47.2	30.3	49.0	35.6	46.6	48.7	53.9	35.6	15.3	45.0	33.8	21.4	83.3	62.4	103.6	63.6	68.2	104.0	96.8	85.0	88.0	124.8	87.5	46.8	63.7	68.0	88.8	56.7	52.5	42.8	43.8	58.4	0.0	43.3					
El Palmar - Sector C	42.8	19.1	78.0	90.6	67.7	75.9	48.5	68.2	32.6	17.9	14.2	17.2	33.4	39.2	69.0	92.1	84.0	89.4	93.8	68.8	83.8	74.6	54.9	97.1	87.0	55.4	66.4	34.4	87.1	72.9	46.0	107.8	41.6	76.0	67.9	37.4	11.0						
Jocotán - Los Vados	0.0	0.0	31.7	27.3	22.3	15.3	0.0	9.0	5.3	14.5	0.0	17.5	0.0	43.8	11.8	33.7	14.8	42.7	32.2	29.5	51.5	55.0	60.6	58.3	35.7	37.2	64.0	38.8	46.2	29.8	10.0	14.8											
Jocotán - Moncho Diaz				20.0	12.0	24.0	108.0	50.3	0.0	28.3	0.0	35.0	23.7	35.7	0.0	68.7	47.0	111.3	93.3	38.7	10.7	23.0	1.7	17.0	33.3	1.7	17.0	33.3	43.3	28.7	1.7	10.0	10.3	15.9	9.7	58.7	0.0	106.7	37.0	100.0	61.0		
Jocotán - Sector A	19.2	10.6	7.8	46.8	34.0	13.4	8.2	81.7	34.3	48.0	48.3	54.8	16.3	41.8	43.1	8.8	33.1	21.5	17.5	19.5	30.3	22.5	17.8	22.3	10.5	14.8	86.2	56.3	45.7	38.8	19.4	27.7	38.3	20.8	16.8	12.8	22.3	25.5					
Jocotán - Sector B	24.4	45.4	53.6	32.2	12.3	51.4	67.8	44.5	45.5	51.6	22.9	99.1	76.8	118.8	29.2	41.9	89.6	64.7	16.8	40.7	56.3	85.2	44.6	47.3	58.5	57.9	127.7	76.1	63.8	68.5	76.8	57.0	80.6	82.7	119.0	80.5	103.8	150.8					
Jocotán - Sector D	23.4	9.6	17.6	10.4	8.0	17.7	35.9	38.0	33.1	17.3	7.8	48.0	17.5	12.9	14.8	11.8	10.6	6.0	14.9	3.0	10.9	6.4	38.7	21.9	26.0	44.6	36.0	68.6	24.6	19.8	23.9	13.0	11.5	34.8	78.9	17.0	39.9	17.8					
Jocotán - Tesoro Abajo																																											
Oratorio - Casco urbano	7.1	0.9	1.0	0.9	6.4	11.4	9.8	7.4	6.5	11.7	20.5	24.0	12.4	39.1	36.3	41.1	58.1	50.4	69.6	75.6	47.1	80.0	42.3	36.0	32.1	72.2	27.7	20.4	36.1	31.5	33.1	46.4	57.2	22.5	38.7	6.3	35.3						
Oratorio - Las Cabezas	3.0	4.9	20.8	29.5	7.8	17.0	5.8	9.2	17.9	34.2	59.5	26.2	37.9	32.9	41.0	58.6	62.0	58.6	69.2	39.6	37.7	75.4	113.4	74.3	47.8	190.7	48.2	77.1	37.2	30.1	41.4	27.1	23.1	20.6	52.1	20.6	51.7						
Santo Domingo - Casco urbano	64.8	109.0	100.8	63.0	108.4	67.8	104.4	114.6	85.1																																		

Evaluation of community-level vector control activities and *A. aegypti* egg density indices in Guatemala

Luis Benavente¹, Julie Buekens¹, Megan Perry¹, Julie Niemczura de Carvalho¹, Jose Ernesto Monzon¹, Arturo Sanchez¹, Juan Arredondo²

1=Medical Care Development International 2=Independent

The Zika Community Response (ZICORE) project in Guatemala aims to improve surveillance of the *Aedes* vector by using entomological data as the basis for low-cost community-level vector monitoring as well as social and behavior change interventions. In 2017, household-level *Aedes aegypti* breeding site monitoring was conducted in 44 communities. Ovitrap traps were installed in selected households and egg counts were recorded weekly. In these communities, 4,457 traps were positive out of 8,004 readings. A moving average was used to adjust for seasonality to enhance vector monitoring and identify communities of high entomological risk to be targeted for community-level clean-up campaigns. Utilizing weekly ovitrap monitoring results, the ZICORE project has implemented community-level campaigns to prevent *Aedes aegypti* breeding, such as:

- Breeding sites eliminated in targeted communities in the 90th percentile or above for ovitrap egg counts. Activities included disposal of non-useful containers and scrubbing of sinks and useful containers as part of the ZICORE-VELITA (*Voltear, Eliminar, Limpiar y Tapar*) protocol, which describes in Spanish the steps to be taken with household items that have the potential to become mosquito breeding sites (in English: flip, eliminate, clean and cover).
- Elimination of solid waste identified as potential *Aedes* breeding sites, including tires and non-useful containers of varying sizes. Included strong municipal government support, such as sponsored trash removal vehicles to dispose of waste.

Communities below the 90th percentile for ovitrap egg counts did not receive intensified community-level interventions and will be analyzed as controls. This analysis is useful for assessing any correlation between community-led clean-up campaigns and *Aedes aegypti* egg counts in intervention versus control communities.