

## Short Communication

# “Super Hunters” A Strategy to Promote Good Practices for the Control of Vector Borne Diseases in School Children of a Rural Community in Yucatan, Mexico

Emilio Trujillo-Peña<sup>1</sup>, Norma Pavía-Ruz<sup>2</sup>, Josué Villegas-Chim<sup>2</sup>, Carolina Carmona-Carballo<sup>1</sup>, Celia Selem-Salas<sup>1</sup>, Guadalupe Chíméndez<sup>1</sup>, Marine Briceño-Ancona<sup>1</sup>, Ligia Vera-Gamboa<sup>2</sup>, Felipe Dzul-Manzanilla<sup>3</sup>, and Pablo Manrique-Saide<sup>1\*</sup>

<sup>1</sup>Collaborative Unit for Entomological Bioassays, Universidad Autónoma de Yucatán, Mexico

<sup>2</sup>Regional Research Center, Universidad Autónoma de Yucatán, Mexico

<sup>3</sup>Ministry of Health, National Center for Preventive Programs and Disease Control (CENAPRECE), México

## \*Corresponding author

Pablo Manrique-Saide, Unidad Colaborativa para Bioensayos Entomológicos, Campus de Ciencias Biológicas y Agropecuarias, Universidad Autónoma de Yucatán. Km. 15.5 Carr. Mérida-Xmatkuil s.n.C.P. 97315, Mérida, Yucatán, Mexico. Tel: 52-9999423200; Email: pablo\_manrique2000@hotmail.com

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- Vector-borne diseases
- Aedes-borne diseases
- Constructivism
- Integrated vector management

## Abstract

**Introduction:** The implementation of methods for prevention-control of diseases transmitted by *Aedes aegypti* and other arthropod vectors should consider approaches involving urban and rural communities. A pending strategic component for integrated vector management is the inclusion of models for educational and health promotion interventions at schools v.gr. ludic strategies.

**Objective:** To implement the strategy “Super Hunters” as part of an educational proposal with elementary school students about the vector *Aedes aegypti* and the transmission of vector-borne diseases to motivate favorable changes and good practices for health in a rural community.

**Material and methods:** The intervention was carried out in Yaxunah, Yucatan, Mexico in October 2013. Theoretical-practical activities were developed. In the classroom, we provided information on the generalities of the biology-ecology of the *Aedes aegypti* vector, about its health importance, and activities for the prevention and control of the vector and the diseases. Teams called “Super hunters” were formed and they were given a kit with materials for the collection and identification of vectors. Lastly, an educational play was performed to reinforce knowledge learned by the participating children.

**Results:** It was observed that providing information about the vector in a playful way and encouraging the active participation of children can be key to generate behavioral changes in them that allows them to carry out preventive work, replicable in their own houses, contributing to the elimination of vector breeding-sites in their community.

## ABBREVIATIONS

SH: Super Hunters; VBD: Vector-Borne Diseases; ABD: Aedes-Borne Diseases; CON: Constructivism; HP: Health Promotion; IVM: Integrated Vector Management; DEN: Dengue; BS: Breeding Sites.

## INTRODUCTION

Vector-borne diseases, including dengue, chikungunya, Zika and Chagas disease, are a public health problem affecting negatively life and health of large social groups in urban and rural areas of Latin America [1]. Dengue, chikungunya and Zika are viral diseases transmitted by the mosquito vector

*Aedes aegypti*. The presence and abundance of this mosquito in human premises (house and its peridomiliary area) depends on the presence and abundance of productive breeding sites, containers with water that maintain the immature populations until the emergence of adult mosquitoes [2]. Health Promotion and Integrated Vector Management [3,4] have been proposed as strategies to complement the effectiveness of the program based on physical (management and elimination of breeding sites) and chemical (insecticides) control of the vector of these diseases. Thus, different educational community models have been implemented in popular sectors and in schools in countries such as Cuba [5], Honduras [6], Venezuela [7], Colombia [8] México [9],

showing as result that ludic strategies may contribute to positive practices to reduce infestation rates by vector *Aedes aegypti*. The acquisition of knowledge *per se* does not automatically lead to good practices [10,11] and in the case of VBD, including ABD, it is necessary to redesign innovative strategies that promote community participation in a sustainable way [12]. The “Super Hunters” strategy focuses on the development of special activities aimed at elementary education children so that they acquire the knowledge and skills that lead to the adoption of good vector control practices at household level, involving children, teachers and parents. In order to achieve such strategy, we are based on the constructivist model, postulating that knowledge is achieved through acting on reality, and therefore it requires the active participation of the subjects (students, teachers, parents) and games as part of the methods for the construction and strengthening of knowledge [13].

## MATERIALS AND METHODS

The activities were performed with 32 volunteer children (20 females and 12 males), between 9 and 12 years old, from 5th and 6th grade in elementary school in the Mayan community of Yaxunah, Yucatan, located in southeast Mexico (Figure 1). As part of our staff, university students from areas such as biology, psychology, social work, education and anthropology participated in the design of the methodology and the interventions. This allowed the generation of community awareness with scientific approach. The theoretical-practical activities included: in the classroom, generalities on the biology and ecology of the vector *Aedes aegypti* (and additionally of *Triatoma dimidiata*) i.e. life cycle, main breeding sites and refuges in the locality, their health importance, and prevention and control activities. In the case of *Aedes*, students were only informed about Dengue, as it was the only disease transmitted by this vector at that time. In addition, the subject of Chagas disease and its vector *Triatoma dimidiata* was included in the activities due to the ecological environment of the community. The information used was based on an earlier diagnosis made by the multidisciplinary technical-scientific team of our working group in the locality [14]. To ensure that information was transmitted to the children in an appropriate way according to the cultural context of the community, teams called “Super Hunters” were formed and they were provided with material for the identification of breeding sites and collection of vector specimens: collecting jars, pipettes, alcohol, a water strainer, a tray, soup spoon (Figure 2). With these tools, and supervised by a team of biologists, the children made expeditions within the surroundings of the school, the Community Cultural Center and backyards of the participants’ houses, identifying the mosquito breeding sites and refuged of the triatomine bugs. In addition, an educational play called “Bugland” was written and acted by the children order to reinforce learned knowledge (Figure 3).

## RESULTS

After the theoretical session, a survey was conducted to evaluate knowledge learned by the children (Table 1). Most of the children (91%) recognized Dengue as a significant theme of the activities and associated *Aedes aegypti* as the vector of DEN (78%). Regarding the identification of breeding sites, the majority (91%) related *Aedes* with BS such as tires, animal drinking vessels and



Figure 1 A) State of Yucatan, Mexico; B) Study location: Yaxunah; C) Traditional Mayan House; D) Typical Mayan backyard.



Figure 2 The kit supplied for the “Super hunters” and activities developed by school children.



**Figure 3** The stage created by school children for the play with puppets “Bugland”.

“children leaders” were chosen to organize a play with puppets called “Bugland”, its purpose was to reflect the need to prevent and also the importance to attend to the health center in case of suspicion of some type of infection caused by the vectors *Aedes aegypti* mosquito and/or *Triatoma dimidiata* (Figure 3). Children performed with puppets the characters of the two vectors, a child had the role of a “patient”, and a girl, the role of “the doctor”; and in the play the patient goes to the doctor for medical consultation due to “suspicious symptoms.”

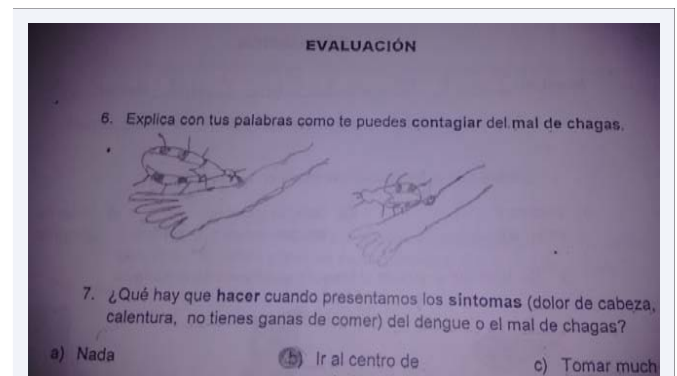
## DISCUSSIONS/CONCLUSION

This study highlights the importance of the socio-cultural dimension in the prevention control of VBD and ABD. Educational-community strategies such as “Super Hunters” seek to apply epistemological principles such as the constructivist approach to reinforce health promotion that involves the beneficiary population in the reduction of vector infestation rates. That is a fundamental part for Integrated Vector Management. A key to the success of interventions such as SH lies in the process design, materials and the facilitating team. Baseline biological-ecological diagnosis as well as intercultural adaptation to the context played an important role for the *ad hoc* use of words, concepts and ways of delivering activities and guiding the participating children. Thus, understanding the socio-community perception of VBD increases the chances of success of the facilitator in being able to communicate to the target population information on prevention and vector control. Another key aspect was the ludic dimension of activities, since game itself is a valuable resource through which new knowledge is learned and reinforced with local knowledge regarding health care. Participating students internalize-socialize cultural practices and social perceptions of their community; it is in such process that “Super Hunters” seeks to incorporate playful preventive practices so that they become part of daily life in the locality through its younger members and future children educators. A third positive input was the empowerment of children community leaders so that they become promoters of good vector prevention- practices at domestic level. Thus, addressing these future community leaders can increase opportunities for them to become conscious decision makers aware of the negative consequences and the way to prevent diseases transmitted by the *Aedes aegypti* mosquito and/or the *Triatoma dimidiata* bug, such as Dengue, Chikungunya, Zika, and Chagas disease. Finally, the pending challenge is the sustainability of this kind of interventions and their scaling-up within and also

**Table 1:** Evaluation survey on knowledge of the intervention.

Theme	Evaluation questions
Knowledge about diseases explained in previous talks	What diseases did they talk to you about in the talks?
Vector identification	Circle the insect that transmits dengue.
Disease transmitted by <i>Triatoma dimidiata</i> .	What disease can the bedbug give us (pic)?
Possible mosquito breeding sites Identification	Circle the places that are mosquito breeding sites
Possible shelters of <i>Triatoma dimidiata</i> Identification.	Underline what could NOT be a hideaway for bedbugs(pic)?
Ways to get the Chagas disease	Explain in your own words how you can get the Chagas disease.
Attitudes in case of presenting symptoms of a disease.	What is there to do when we present the symptoms (headache, fever, you do not feel like eating) of Dengue or Chagas disease?
Attitudes to avoid the presence of the vector at home.	Write 2 things you can do to keep mosquitoes or pic from living at home

containers to accumulate water. As to the presence of suspected dengue symptoms, 100% of the participants responded that it is important to go to the health center, eliminating the options of doing nothing or self medication. In the evaluation, 63% of the children recognized the vector *Triatoma dimidiata* (or “Pic”, local Mayan name) as the vector of Chagas disease and 59% identified the refuges of the vector i.e. Chicken coops, clusters of firewood and stones. Students were asked to express in their own words the mechanism of transmission of this disease, children made drawings about this process by associating: vector- feeding by biting - fecal excretion -infection by scratching the bite area (Figure 4). Regarding the domestic measures for the reduction of the population of the mosquito *Aedes aegypti* and the bug *Triatoma dimidiata*, the most common responses given by students, in order of importance, were: control of breeding sites [16], household cleaning [12], avoiding the generation of vector breeding-sites and refuges [4], killing insects [3] and fumigation [3]. The dynamics of the identification of breeding sites by students was carried out, first, within the schools and then, the activity was replicated at the Community Cultural Center. Later,



**Figure 4** Image of a “pic” feeding, drawn by children.

to other communities. First, how do we guarantee the follow up in the locality intervened so that the children participating and their families reproduce the preventive good practices and socialize them to the whole community? Second, how can we continue involving other groups, such as those that will be future mothers, fathers, professionals, government authorities that will eventually direct in the short-medium term the course of their communities? Last, but not least, students and university professors from different disciplines such as biology, education, psychology, social work and anthropology participated in the activities carried out by the work team. The present project benefit the integration of these young professionals within a multidisciplinary learning collaboration scenario, as a part of the social insertion programs of the University Autonomous of Yucatan.

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