ENTOMOLOGICAL MONITORING, ENVIRONMENTAL COMPLIANCE, AND VECTOR CONTROL CAPACITY

FOR THE PREVENTION OF ZIKA AND OTHER ARBOVIRUSES

HONDURAS

ASSESSMENT REPORT

August 2016
This publication was produced for review by the United States Agency for International Development. It was prepared by Juan I. Arredondo-Jiménez and Manuel F. Lluberas for the Health Finance and Governance Project.

The Health Finance and Governance Project
USAID's Health Finance and Governance (HFG) project improves health in developing countries by expanding people's access to health care. Led by Abt Associates, the project team works with partner countries to increase their domestic resources for health, manage those precious resources more effectively, and make wise purchasing decisions. As a result, this five-year, $209 million global project increases the use of both primary and priority health services, including HIV/AIDS, tuberculosis, malaria, and reproductive health services. Designed to fundamentally strengthen health systems, HFG supports countries as they navigate the economic transitions needed to achieve universal health care.

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DISCLAIMER

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CONTENTS

ACRONYMS

BCC	Behavior change communication
Bti	*Bacillus thuringiensis* var. *israelensis*
CFST	Cold-fogging insecticide space treatments
EHT	Environmental Health Technicians
GBS	Guillain-Barré Syndrome
GIS	Geographic information system
HFG	Health Finance and Governance project
HSIN	Health Services Integrated Network
HSU	Health Surveillance Unit
IEC	Information, education, and communication
LAC	Latin America and the Caribbean
LIRAa	Rapid Index Survey of *Aedes aegypti* (Levantamiento Rápido de Índices de *Aedes aegypti*)
MOH	Ministry of Health (*Secretaría de Salud)*
PAHO	Pan American Health Organization
PPE	Personal protective equipment
QA	Quality assurance
ULV	Ultra low volume
USAID	United States Agency for International Development
WHO	World Health Organization
ZCT	Zika Command Team

EXECUTIVE SUMMARY

The first case of local, vector-borne transmission of the Zika virus in the Americas was identified in May 2015 in Brazil. By July 2016, the virus had spread to nearly all Zika-suitable transmission zones in the Americas, including the majority of countries and territories in the Latin America and the Caribbean (LAC) region. Governments in the region face a formidable challenge to minimize Zika transmission and limit the impact of Zika on their populations.

The United States Agency for International Development (USAID) supports efforts to strengthen the region's Zika response through targeted technical assistance, stakeholder coordination, and implementation of key interventions. In Honduras, the USAID-funded Health Finance and Governance project assessed country capacity to conduct vector control and entomological monitoring of *Aedes* mosquitoes, the primary vector of the virus. The assessment was conducted from June 29 to July 8, 2016, and sought to appraise current capacities, identify strengths and weaknesses in these capacities, and recommend countermeasures, i.e., specific strategies to minimize the impact of Zika virus transmission.

After acknowledging the presence of the disease in the country, the Government of Honduras formed a national-level Zika Command Team (ZCT) composed of members of Health Surveillance Units and Health Services Integrated Networks (HSINs), including Environmental Health Technicians (vector surveillance and control), Communications Unit, Promotion Unit, Epidemiology Unit, National Reference Laboratory, and medical providers (under Hospitals and HSIN). The ZCT meets every week to review the latest information available and decide on responses that have national and department application. Thus far, however, focus has been on diagnosis and awareness through activities such as procuring laboratory reagents for diagnosis, epidemiological reporting, and production of communication materials to advise on Zika prevention. Unlike with earlier responses to other arboviral diseases, like dengue and chikungunya, Honduras has not taken any specific measures on vector surveillance and control related to Zika.

The assessment found that the vector control program in Honduras is limited by:

1. **Inadequate capacity for basic entomological studies to determine biological efficacy of Zika vector control activities.** This is due to reliance on two qualitative assessments per year and lack of a reference entomology laboratory and associated insectary facilities.
2. **Inadequate capacity to maintain and calibrate spray equipment.** At both the national and department level, the capacity to maintain spray equipment appears limited due to a lack of spare parts and insufficient space for equipment repair at storage facilities. This issue has rendered older equipment non-functional and will shorten the useful life of newer equipment.
3. **Poor environmental compliance in insecticide/equipment storage facilities.** Most application equipment is obsolete and poorly maintained, spray operators lack personal protective equipment (PPE), insecticide storage facilities are unsafe, and there is no plan to safely dispose of empty insecticide containers. Honduras does not have an insecticide management component that regulates storage facilities and the handling, transport, use, and disposal of insecticides. Facilities allow storage of large amounts of insecticides and application equipment, but the facilities should not be considered safe. At the chemical and equipment storage facility, clean and contaminated areas are intermingled, and PPE is unavailable.

4. **Lack of an integrated, online system to manage the data on disease transmission, and vector surveillance and control.** The country has no central entomological database, and therefore all vector surveillance and control data are available only at the local level. As a result, vector control efforts are limited in scope because maps used to locate risk areas are imprecise. Epidemiological surveillance is weak because very few cases are laboratory confirmed and there is possible misdiagnosis of Zika, dengue, and chikungunya cases. Although Honduran regulations require immediate notification of Zika cases, limited or no access to computers at the department level delays case reporting (which done manually on paper commonly takes at least one week). In addition, case records of Zika (or other arboviruses) are dated according to the date of diagnosis and not the date of symptom onset. Consequently, epidemiological information does not reach the vector control team and other stakeholders in a timely way, leading to reactive and delayed vector control efforts.
5. **No quality assurance mechanisms** of data systems, chemical and biological intervention methods, and the extent and effectiveness of community-based source reduction projects.

Underlying the capacity issues listed above is inadequate funding, which prevents vector control personnel from fully implementing the operational plans. There is no funding for vehicles, fuel, spray equipment, or PPE. Nor is there funding for laboratory equipment, materials, and reagents needed for entomological monitoring, according to personnel involved with procurement. The US$1.1 million national budget approved for the 2016 response to Zika and other arboviral diseases is insufficient.

Based on these findings, the assessment team recommends that the Government of Honduras, with external support, should:

1. Provide space, equipment, and supplies to national and regional insectaries and insecticide testing facilities.
2. Conduct studies immediately to determine the resistance status of the local Aedes aegypti population to the larvicides and adulticides currently being used and other products being considered. The entomological surveillance program should use ovitraps placed in all Zika-prioritized cities (see Annex E for detailed recommendation regarding ovitraps).
3. Develop a national insecticide resistance management plan based on the findings from insecticide testing (per Recommendation 2 above).
4. Provide vector control with a dedicated budget for insecticides, equipment, spare parts, and safety supplies (i.e. PPE).
5. Select Environmental Health Technicians in the Environmental Health Units to be exclusively dedicated to vector control instead of having multiple functions. Train and supervise these personnel to deepen their expertise and skills in all aspects of vector control.
6. Develop an online database that includes geographic information systems to map disease, vectors, vector control activities and resistance at the national level and in all 20 departments.
7. Create a Vector Control Quality Assurance Officer position under the National Vector Control Program.
8. As entomological monitoring and vector control capacity is strengthened, plan and conduct a large-scale educational campaign to promote behavior changes among households, communities, and medical providers for healthy environments, personal protection measures, and improved diagnosis and care of those infected.

In addition to supporting the country to implement the recommendations above, donors are recommended to support technical and professional training in medical entomology, possibly through the Pan American Health Organization's virtual campus platform [https://www.campusvirtualsp.org/en].

1. INTRODUCTION

The Zika virus was first isolated in 1947 from a rhesus monkey in the Zika forest of Uganda. The earliest human Zika cases were detected in 1952, yet it was not until 1964 that Zika was confirmed to cause human disease. Over subsequent decades, evidence of Zika emerged in numerous countries outside of east Africa, yet documented human cases were rare until a 2007 outbreak in Yap, Micronesia. Prior to 2015, there was no confirmation of Zika virus circulation in the Western Hemisphere.[1] The first case of local, vector-borne transmission of the Zika virus in the Americas was identified in Brazil in May 2015. By the end of July 2016, autochthonous cases had been diagnosed in the majority of countries and territories in the Americas and nearly all of the Latin America and the Caribbean (LAC) region.[2,3]

As Zika continues its rapid proliferation throughout the LAC region, national and local governments face a daunting task to control its spread and minimize its impact. The United States Agency for International Development (USAID) is supporting the Zika response in the region across four key technical areas: service delivery, including maternal and child health, family planning, and child development; social and behavior change communication; innovation; and vector control. Through targeted technical assistance, USAID's vector control efforts aim to strengthen national vector control programs, catalyze community mobilization to eliminate mosquito breeding sites, and facilitate the procurement and promotion of repellents for personal use.

To gauge the readiness of governments in the region to respond to Zika and other vector-borne diseases, the USAID-funded Health Finance and Governance (HFG) project assessed country capacity to conduct vector control and entomological monitoring of *Aedes* mosquitoes, the primary vector of the virus. Assessments were carried out in five countries in the region: the Dominican Republic, El Salvador, Guatemala, Haiti, and Honduras, in June and July of 2016. They were designed to focus on nine elements of national and subnational capacity:

- Place, Structure, and Financial Resources of Entomological Surveillance and Vector Control at Various Administrative Levels
- Stakeholders' Coordination and Community Mobilization /Engagement for Control of *Aedes* Mosquitoes
- Human Resources
- Infrastructure
- Capacity to Design and Prepare Entomological Monitoring, Vector Control, and Environmental Control Plan
- Implementation Capacity
- Data Collection, Analysis, and Reporting
- Stakeholders' Engagement and Use of Entomological Data to Inform Vector Control
- Insecticide Registration Status and Environmental Compliance

[1] http://www.who.int/emergencies/zika-virus/history/en/
[2] http://www.paho.org/hq/index.php?option=com_content&id=11599&Itemid=41691.
[3] http://www.floridahealth.gov/diseases-and-conditions/zika-virus/.

HFG drafted a capacity assessment tool, comprised of the nine elements of national and subnational capacity, and then modified it based on feedback from USAID (see Annex A for the assessment tool). In each of the five assessment countries, a two-person team used the tool through semi-structured interviews with individuals involved in or knowledgeable of vector control and entomological monitoring in the country. In addition to data gathered using the assessment tool, the teams collected and reviewed secondary data to aid in the contextualization of Zika and the Zika response in each of the target countries.

The assessment in Honduras took place from June 29 to July 8, 2016. The assessment team interacted with various stakeholders including representatives from the following institutions and organizations:

- Ministry of Health (MOH) of Honduras
- USAID/Honduras
- Pan American Health Organization (PAHO)
- Choluteca Health Region
- El Paraíso Health Region
- Metropolitan Health Region
- Universidad Autónoma de Honduras

See Annex B for a complete list of contacts made by the assessment team, including organizational affiliation, and title/role.

2. SITUATION ANALYSIS

2.1 Situation of Zika and Other Arboviral Diseases in Honduras

Honduras is located in Central America, and borders Guatemala, El Salvador, and Nicaragua. It has a total 8,303,771 inhabitants (est. 2013), living over 112,492 km² of territory; slightly more than half (53%) of the population is urban.[4] People at risk of Zika and other arboviral diseases approaches 80% of the population, since most of the territory is infested with the mosquito vectors *Aedes aegypti* and *Aedes albopictus*.

Zika virus was first detected in Honduras in 2015. By week 26 of 2016, 26,105 suspected Zika cases were reported[5] (135/525 laboratory confirmed).[6] In the same period, 450 pregnant women were identified as suspected cases (61/150 laboratory confirmed positive). Of these, 69 were hospitalized (the team did not receive information regarding the reason for the hospitalizations). As of the end of August 2016, 34 cases of microcephaly had been reported in mothers with suspected Zika in Honduras.[7] Guillain-Barré Syndrome (GBS) associated with Zika has also been found in the country. As of June 2016, there were 111 GBS suspected cases (0 laboratory confirmed) with seven hospitalized patients in intensive care units and three deaths (unconfirmed).

In 2016, a total of 12,504 suspected cases of chikungunya virus have been recorded (12/35 laboratory confirmed). Of the 15,792 suspected cases of dengue virus reported, 215 were diagnosed as severe (55/124 laboratory confirmed). According to the endemic channel (a monthly or seasonal mean to define the baseline level of transmission), dengue transmission is reported to be high, described by informants as "in the emergency zone."

Because of the similarity of clinical symptoms in the three diseases and few laboratory confirmations, it is likely that some of the cases were misdiagnosed. It is clear, however, that the high number of reported cases from all three diseases combined reflects the vulnerability of Honduras to arboviral diseases.

[4] http://www.ine.gob.hn/index.php/component/content/article?id=81
[5] Comando Estratégico contra Zika, Tegucigalpa, Honduras, SE No. 26 (26 de junio al 2 de julio, 2016).
[6] Based on findings from two diagnostic laboratories, the National Virology Laboratory: (38/230 Zika) and National University of Honduras (97/295 Zika).
[7] As per verbal communication on September 1, 2016 with Mr. Oscar Orlando Urrutia, Vector Control Manager, National Environmental Health Unit.

2.2 Vectors of Arboviral Diseases and their Distribution in Honduras

In the Americas, *Aedes aegypti* has been implicated as the primary vector of all four serotypes of dengue virus, chikungunya virus, and Zika virus (*Aedes albopictus* is suspected of being a secondary vector).[8,9] *Aedes aegypti* prefers to feed on humans (as opposed to *Albopictus*), and generally favors breeding sites that are in close proximity to humans, such as manmade containers found in and around households. Water supply in most Honduran cities is insufficient. As a result, residents can access municipal water sources only once or twice per month, thus promoting the storage of water in all available containers. These containers are among the main breeding habitats for mosquitoes. *Aedes aegypti* is commonly found at high elevations, such as 1,700m in Mexico,[10] and up to 2,300 m in Colombia.[11] For this reason, it is thought to exist across most of Honduras, except at the highest elevations – the mountains in the west with elevations above 2,500 meters (8,200 ft). Dengue outbreaks have been reported in León, México (1,800 m), and, in Colombia, dengue-infected mosquitoes were found at an altitude as high as 1,984m.[7]

In assessment interviews, Honduran vector surveillance and control personnel stated that *Aedes aegypti* has been found in all 18 departments and the capitol of Honduras. *Aedes albopictus* is limited to cities along the Pacific coast, and is a more peridomestic mosquito, commonly found in semi-urban environments that provide a variety of breeding sites (i.e. small containers in extra-domiciliary sites), but also in natural habitats like tree holes, bromeliads, and rock holes.

It was recently reported that another domestic mosquito, *Culex quinquefasciatus,* could be another Zika vector.[12] This mosquito is as common as *Aedes aegypti* in domestic environments in Honduras, so vector control activities must also prevent its breeding, not only in containers in use – such as for water storage – but also in discarded containers, other refuse, ditches, septic tanks, and sewers, as well as in natural habitats.

2.3 Vector Control Interventions in Honduras

Zika, dengue, and chikungunya are considered to be major public health problems in Honduras and are subject to immediate or weekly (uncomplicated dengue) epidemiological notification. These diseases have the same primary mosquito vector, *Aedes aegypti*, although Zika can also be transmitted by sexual contact.

Current integrated vector management in Honduras relies on:

- Source reduction (i.e., elimination and management of water-holding domestic containers): This requires the engagement and mobilization of communities, through intersectoral participation, and national and regional behavior change campaigns.

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[8] Rodriguez-Morales AJ, Villamil-Gómez WE, Franco-Paredes C. The arboviral burden of disease caused by co-circulation and co-infection of dengue, chikungunya and Zika in the Americas. Travel Med Infect Dis. 2016;14(3):177-179.
[9] Porrino P. Zika virus infection and once again the risk from other neglected diseases. Trop Doct. 2016;46(3):159-165.
[10] Lozano-Fuentes S, Hayden MH, Welsh-Rodriguez C, Ochoa-Martinez C, Tapia-Santos B, Kobylinski KC, Uejio CK, Zielinski-Gutierrez E, Monache LD, Monaghan AJ, Steinhoff DF, Eisen L. The dengue virus mosquito vector *Aedes aegypti* at high elevation in Mexico. Am J Trop Med Hyg. 2012;87(5):902-909.
[11] Ruiz-López F, González-Mazo A, Vélez-Mira A, Gómez GF, Zuleta L, Uribe S, Vélez-Bernal ID. Presencia de *Aedes (Stegomyia) aegypti* (Linnaeus, 1762) y su infección natural con el virus dengue en alturas no registradas para Colombia. Biomédica. 2016;36:303-308.
[12] http://edition.cnn.com/2016/07/22/health/zika-culex-mosquito-brazil/

- Application of larvicides (insecticides that kill mosquito larvae) of biological origin: Vector control officials indicated that previous insecticide resistance assessments revealed high resistance of larvae to the organophosphate temephos. The Honduran Ministry of Health (MOH) decided to transition to *Bacillus thuringiensis* var. *israelensis* (Bti). This year, the MOH acquired 300 kg of the insect growth regulator pyriproxyfen in granular formulation, sufficient for 150,000 55-gal containers.
- Application of adulticides (insecticides that kill adult mosquitoes): Insecticides in use are the pyrethroids deltamethrin 4 UL (ultra-low volume (ULV) formulation) and permethrin 10% with esbioallethrin and piperonyl butoxide (aqueous emulsion formulation). The insecticides are applied using 20 recently purchased, vehicle-mounted ULV Leco 18 HP® sprayer machines for cold fogging space treatments (CFST) and old portable thermal foggers. The assessment team did not actually observe an insecticide application by any of the machines. No indoor residual spraying is carried out to control Zika vectors.

Vector control officials mentioned that they had found resistance to both to temephos and pyrethroids insecticides and so were worried about its field efficacy. When asked how resistance tests were carried out, it was clear that they lack the capabilities to conduct reliable assays, beginning with the lack of a proper insectary to breed wild caught mosquitoes and compare them with a reference colony. While it is possible to do proper tests without an insectary, a proper insectary is needed to breed wild mosquitoes to the level of generation F1, and breed susceptible reference mosquitoes (Rockefeller or New Orleans strains) to make proper comparisons.

Since resistance to temephos and pyrethroids is suspected in Honduras and has been reported in neighboring countries.[3,13] it is advisable that the resistance status of the local *Aedes aegypti* populations be determined using adequate resistance testing methods as soon as possible.

Biological control intervention uses larvivorous fish that are placed in permanent water storage tanks. Although this has been shown to be effective in some countries,[14] no data are available on its effectiveness in Honduras and the coverage in terms of residences utilizing this technique remains unknown.[15]

[13] García GP, Flores AE, Fernández-Salas I, Saavedra-Rodríguez K, Reyes-Solis G, Lozano-Fuentes S, Guillermo Bond J, Casas-Martínez M, Ramsey JM, García-Rejón J, Domínguez-Galera M, Ranson H, Hemingway J, Eisen L, Black IV WC. Recent rapid rise of a permethrin knock down resistance allele in *Aedes aegypti* in México. PLoS Negl Trop Dis. 2009;3(10):e531.

[14] Han WW, Lazaro A, McCall PJ, George L, Runge-Ranzinger S, Toledo J, Velayudhan R, Horstick O. Efficacy and community effectiveness of larvivorous fish for dengue vector control. Trop Med Int Health. 2015;20(9):1239-1256..

[15] http://www.multimedios.com/telediario/tendencias/proponen-honduras-tortugas-y-peces.html

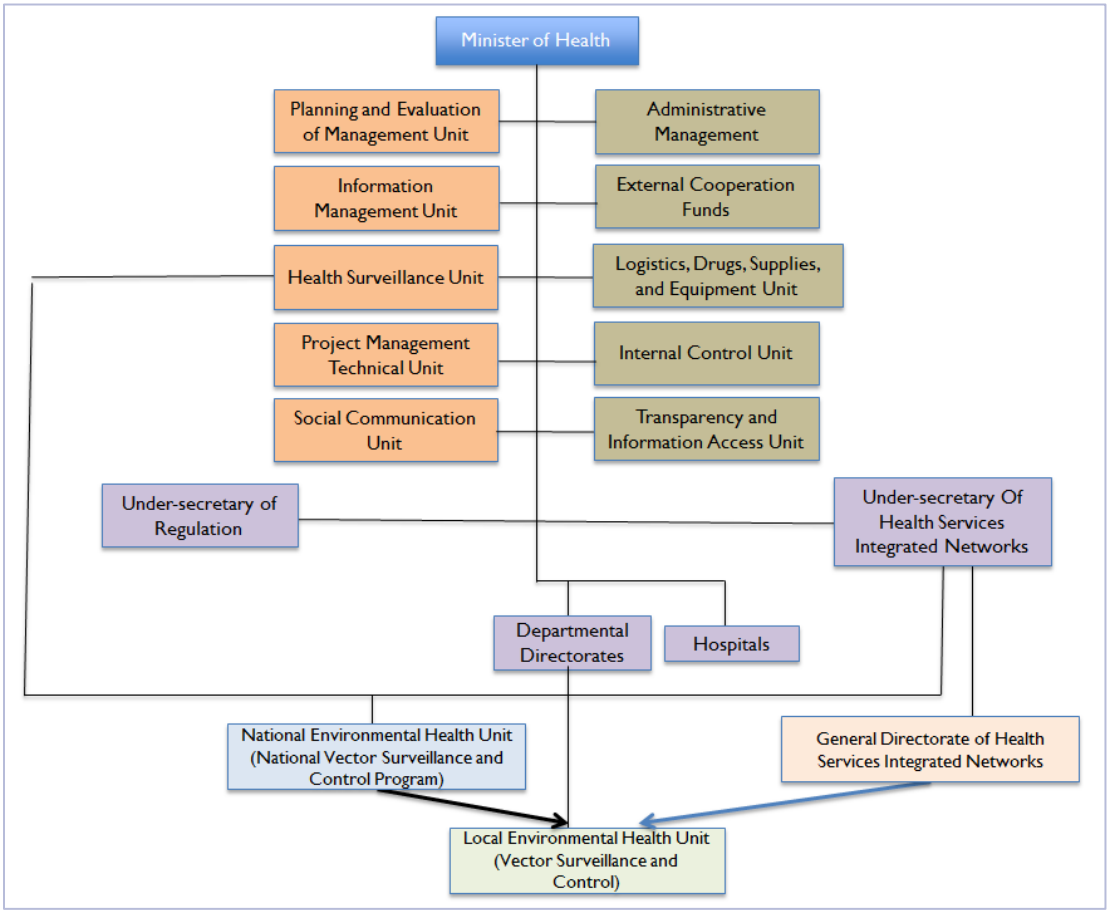
3. FINDINGS

3.1 Place, Structure, and Financial Resources of Entomological Surveillance and Vector Control

3.1.1 National Level

The National Vector Control Program caries out both entomological surveillance and vector control activities at the national and subnational levels. At the national level, the Health Surveillance Unit (HSU), one of several units reporting directly to the Minister of Health, coordinates entomological surveillance under the leadership of the national vector control manager (see Figure 1). The Under-secretary of Health Services Integrated Networks (HSINs) is in charge of coordination of vector control activities through 20 Environmental Health Units under the HSU in each of the 20 departmental health regions of Honduras. The National Vector Control Program is a vertical program under which the Environmental Health Units at the department level carry out diverse activities, such as: environmental health, vector surveillance and control of all vector-borne diseases (Zika, dengue, chikungunya, malaria, Chagas disease, and others), and are also involved in water quality inspection, basic sanitation, zoonosis, and health regulatory inspections.

FIGURE 1: MOH ORGANOGRAM



The National Vector Control Program in Honduras has adequate guidelines, protocols, and manuals to guide operations targeting *Aedes* mosquitoes. The country leadership and national stakeholders support the efforts the program is trying to achieve.

Following government acknowledgement of Zika transmission in the country in 2015, a national-level Zika Command Team (ZCT) was appointed. The ZCT is composed of members of HSU and HSIN including Environmental Health Technicians (EHTs) (vector surveillance and control), Communications Unit, Promotion Unit, Epidemiology Unit, National Reference Laboratory, and medical providers (under Hospitals and HSIN). The ZCT convenes for weekly meetings to analyze epidemiological and entomological data.

The government budget for the 2016 response to Zika and other arboviral diseases, exclusive of salaries of permanent personnel, is approximately US$1.1 million, for equipment and insecticides. In addition, donors such as the Foundation for Rural Socio-economic Development (*Fundación para el Desarrollo Socio Económico Rural,* FUNDESUR) and the Honduran Council for Private Business (*Consejo Hondureño de la Empresa Privada,* COHEP) provide approximately US$1.0 million. Honduran authorities considered this amount insufficient to effectively respond to the Zika outbreak, and in February 2016, prepared a 2016 Zika response plan that was costed at about US$14.4 million, indicating a gap of over US$12million between available and needed funding (see Annex C for the National Zika Response Plan).

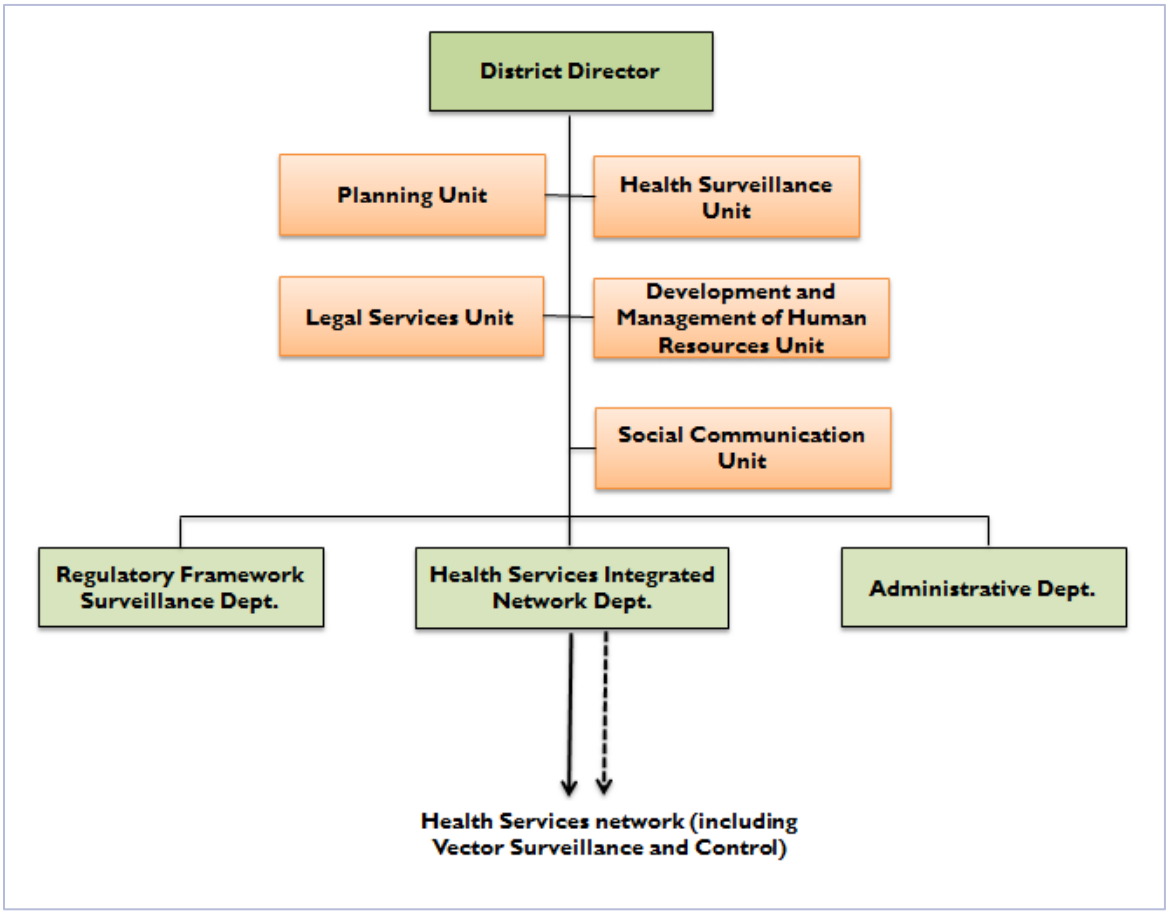
The national-level Zika response plan guided preparation of plans at the department level (for example, the Integrated Response Plan from the department of El Paraíso for Zika, dengue, and chikungunya, see Annex D), and the national-level budget was allocated to procure equipment and insecticide that were distributed to the departments. Yet no specific budget is allocated to the departments for entomological surveillance or critical vector control items such as vehicles, spray equipment, gasoline, and personal protection equipment (PPE). The departments must therefore rely on the general budget given to each departmental health region for these items. Administratively, no staff is assigned solely to vector surveillance and control at any level. Vector surveillance is carried out by two assessments using randomized determination of qualitative *Stegomyia* indices (see below).[16] From these assessments, vector control operations including source reduction and insecticide applications (larvicides: Bti and pyriproxyfen, and adulticides: deltamethrin and permethrin) are carried out. To evaluate impact, nonrandom sampling is conducted to determine larval indices reduction, but no impact on adult population following applications is done. Passive epidemiological surveillance may further be used to assess any impact of vector control.

3.1.2 Subnational Level

As noted above, there are Environmental Health Units under the HSU in each of the 20 departments of Honduras. Each unit is staffed with one EHT coordinator and two additional EHTs, totaling 60 EHTs nationwide; departments are staffed with an additional 1,200 local technicians. The EHTs report directly to their departmental director but are under the technical supervision and evaluation of the National Vector Control Program, which in turn is instructed by both the HSU and HSIN (see Figure 2 for the organizational structure of a department level directorate). As mentioned, none of the EHTs works exclusively in vector surveillance and control, and thus the department-level Environmental Health Units are severely understaffed. The units also are acutely under-supplied, with the vertical Vector Control Program procuring equipment and insecticides but not logistical items like vehicles, gasoline, or PPE. Funds for these items are sent to and managed at the department level.

[16] http://www.paho.org/hon/index.php?option=com_content&view=article&id=951:implementacion-estrategia-liraa-levantamiento-indices-rapidos-aedes-aegypti-&catid=517:hon-05-enfermedades-transmisibles&Itemid=229

FIGURE 2: ORGANIZATIONAL STRUCTURE, DEPARTMENT LEVEL DIRECTORATE



3.2 Stakeholders' Coordination and Community Mobilization/ Engagement for Control of *Aedes* Mosquitoes

3.2.1 National Level

At the national level, the HSU manages epidemiological surveillance and vector control/surveillance activities. As mentioned above, in response to the Zika threat, the National Government appointed the ZCT. The ZCT is composed of members of HSU and HSIN including EHTs (vector surveillance and control), Communications Unit, Promotion Unit, Epidemiology Unit, National Reference Laboratory, and medical providers (under Hospitals and HSIN). The ZCT meets on a weekly basis to direct vector control and surveillance activities, yet there is limited clarity around what data informs weekly vector control activities; entomological assessments are qualitative and only undertaken twice a year. As a reference, the VCT uses a report of limited circulation. No weekly bulletin that deals with arboviruses or other diseases is published on line.

The ZCT is responsible for directing all vector surveillance and control activities, which are coordinated by the national EHTs and three EHTs in each of the departments. The EHTs, together with local technicians, meet with the various local stakeholders and organize cross-sector groups in each municipality of their department.

Through the ZCT, the Social Communications Unit and Promotion Unit plan and implement information, education and communication (IEC), behavior change communication (BCC), and community engagement activities. Social mobilization and advocacy are carried out with the Departmental Health Director as the spokesperson and facilitator. Visual educational material is distributed. A cross-sector group is convened with volunteers and infrastructure (vehicles, dump trucks, etc.). The group, led by vector control personnel, initiate cleaning campaigns to eliminate mosquito breeding sites (see Figure 3 for a photo from a recent campaign). It is unclear how often these campaigns are conducted and whether inspectors enter into houses/yards.

FIGURE 3: CAMPAIGN TO ERADICATE MOSQUITO BREEDING SITES

Foto: La Prensa Honduras[17]

To assist with advancing community awareness regarding the various arboviruses transmitted by *Aedes* mosquitoes, the MOH has produced IEC and BCC materials (see Figure 4 for an example).[18] However, few printed copies are currently available for distribution. There is no dedicated budget for the production of IEC and BCC materials.

[17] http://www.tn8.tv/cronica-tn8/263330-masiva-asistencia-en-jornada-para-combatir-el-virus-del-zika/
[18] http://www.latribuna.hn/2016/02/03/gobierno-lanza-instructivo-para-prevencion-del-zika/

FIGURE 4: MOH ZIKA-RELATED IEC AND BCC MATERIALS

3.2.2 Subnational Level

As described above, an intra-sectoral group undertakes cleaning campaigns at the department level led by EHTs. Specific groups such as churches and schools carry out other community-wide control efforts under the advice and direction of the Department Health Offices. The Environmental Education Program (PEA), oriented to schoolchildren, started in 2007 in four public schools, and is currently underway in El Paraíso Department.

These community action efforts are a step in the right direction, but are still limited in scope and achievements because they rely on scarce external funding. The activities could be strengthened if funding were provided for communication materials, equipment, and training.

3.3 Human Resources

3.3.1 National Level

According to the current organizational structure of the MOH, personnel involved in vector surveillance and control are in the HSU and HSIN. Technical personnel at the national level are also involved in control of malaria, Chagas disease, and all other vector-borne diseases, plus unrelated activities such as zoonotic diseases, regulatory health inspection, environmental sanitation and water safety. National-level personnel consist of a national Vector Control Manager and six EHTs in the Central Department.

National vector control personnel has to plan and organize implementation of the vector surveillance and control response to Zika and other arboviruses. They supervise entomological monitoring and vector control activities, sometimes on site and sometimes through reports sent from departments (no reports were made available to the assessment team). Personnel have the capability to identify mosquito vectors; however, the team found limitations in their capacity to conduct entomological monitoring based on the visit to the Metropolitan health headquarters (see section 3.6.1 Implementation Capacity). The methodology observed seems different from the standard WHO method and indicates a gap in capacity to conduct resistance testing properly. Therefore, insecticide resistance assessments are scarce and technically questionable, and do not follow a national plan. Despite these limitations, they are able to alert stakeholders and initiate mitigation activities in response to a sudden increase of entomological risk or reported Zika case. The national Vector Control Manager claimed that some technicians have taken a course on insectary maintenance techniques.

As mentioned, in response to the Zika threat, the national government appointed the ZCT. This team is composed of members of HSU and HSIN including EHTs (vector surveillance and control), Communications Unit, Promotion Unit, Epidemiology Unit, National Reference Laboratory, and medical attention (under Hospitals and HSIN). ZCT meets on a weekly basis to direct vector control and surveillance activities. As a reference, the ZCT uses an unpublished report produced by the Epidemiology Unit. Within the ZCT, the assessment team observed competent and skilled staff available for the production of IEC and BCC materials.

In terms of medical personnel, as of 2010, the MOH employed 2,794 doctors and 1,242 nurses, a ratio of 1.0 doctor and 1.1 nurses per 1,000 inhabitants.[19]

3.3.2 Subnational Level

As described in section 3.1, each of the 20 departments (including the two metro areas) has an Environmental Health Unit. Each unit is staffed with one EHT coordinator and two additional EHTs for a total of 60 EHTs at the department level, along with the 1,200 local technicians. In addition to being responsible for vector surveillance and control work of all vector-borne diseases (Zika, dengue, chikungunya, malaria, Chagas disease, and others), EHTs are involved in water quality inspection, basic sanitation, zoonosis, and health regulatory inspections. Because EHTs do not work exclusively in vector surveillance and control activities, there is a shortage of human resources to sustain regular vector control efforts. The assessment team observed competent and skilled staff available for the production of IEC and BCC materials in the departments that it visited.

[19] Bermúdez-Madriz JL, Sáenz MR, Muiser J, Acosta M. Sistema de Salud de Honduras. Salud Pública Méx 2011;53(2):209-219 (http://bvs.insp.mx/rsp/articulos/articulo_e4.php?id=002624)

3.4 Infrastructure

In terms of public sector infrastructure for health service provision, the MOH is administratively organized into 18 regional departments plus two metropolitan departments (i.e. Tegucigalpa and San Pedro Sula). In each department, there is a reference hospital. As of 2010, the entire public health service network had 28 hospitals, 32 maternal and child clinics, 252 health centers, 1,058 rural health centers, 4 peripheral emergency clinics and 14 family health facilities. In the private health sector, a 2004 survey counted 1,131 private health providers including pharmacies, labs, medical centers, clinics and doctor offices.[20]

3.4.1 Presence of Reference Laboratory at the National Level

Although the MOH has a national reference laboratory for epidemiological work, it does not have a national entomological reference laboratory. The MOH has identified a building in which to install a national entomological reference laboratory, but it has yet to be equipped. In Tegucigalpa, the Metropolitan Health headquarters has an entomology laboratory where technicians were observed identifying mosquito larvae (with only one stereoscopic microscope) collected via community-based data collection using the Rapid Index Survey of *Aedes aegypti* (LIRAa). The laboratory carries out such collections twice a year.

3.4.2 Functional Insectary

In a visit to the Metropolitan Health headquarters, the assessment team learned that technicians have a rudimentary insectary, limited in space, to assess the efficacy of insecticides currently used (see description of this capacity in section 3.6.1 Implementation). However, the team concludes that there is no adequate functional insectary in Honduras, in spite of the great need to carry out studies to confirm biological efficacy of insecticides in use, or if resistance is confirmed and insecticide rotation is required. There is already a building where supposedly an insectary will be installed. Currently, it is empty, in need of all materials and equipment to function properly.

The Autonomous University of Honduras (Universidad Autónoma de Honduras) has an insectary but it also requires additional equipment to be fully functional. As noted under the Human Resources section (3.3), the national Vector Control Manager claimed that some technicians have taken a course on insectary maintenance techniques, however infrastructure and equipment are needed.

[20] Bermúdez-Madriz JL, Sáenz MR, Muiser J, Acosta M. Sistema de Salud de Honduras. Salud Pública Méx 2011;53(2):209-219 (http://bvs.insp.mx/rsp/articulos/articulo_e4.php?id=002624)

3.4.3 Transportation and Equipment

There are severe shortages of vehicles used to transport personnel to areas where vector surveillance and control activities are planned and/or needed. The government recently acquired 20 cold-fogging ULV Leco 18 HP™ vehicle-mounted insecticide application machines. They have to be mounted and dismounted from pick-up trucks for each application, because when no insecticide applications are being done, the vehicles are used for other equally important activities. This means that a lot of time is wasted moving the application equipment and the heavy use of the trucks makes them prone to quickly wearing out or being damaged. Storage facilities permit the safe storage of large amounts of insecticides and application equipment for the current volume of vector surveillance and control activities. These require updating to comply with international rules and regulations pertaining to storage and handling of insecticides. Moreover, the physical capacity of the storage facilities may have to be expanded as the program grows.

3.5 Capacity to Design and Prepare Entomological Monitoring, Vector Control, and Environmental Control Plan

3.5.1 National Level

The National Vector Control Plan covers both entomological monitoring and vector control. However, the entomological monitoring component only covers abundance (LIRAa). It does not include insecticide resistance monitoring.

The capacity to plan entomological monitoring and vector control operations exists in the country, as the National Vector Control Manager possesses the requisite skills and experience. In addition, national-level personnel involved in the integrated management of Zika and arboviral diseases, under the guidance of the ZCT, have similar capacities and can design health education campaigns for community mobilization. Under the ZCT, Honduran authorities prepared a Zika response plan that was budgeted to cost about US$14,400,000 (Annex C).

However, additional support is needed to develop a suitable plan for entomological monitoring that includes insecticide resistance assessment and monitoring as a key component. Previous and current efforts to assess and monitor insecticide resistance reveal deficiencies including lack of an adequate insectary (see section 3.4.2) and implementation capacity (section 3.6.1).

Related to planning capacity, please see also the findings on capacity for data recording, mapping, dissemination and reporting in section 3.7.1.

3.5.2 Subnational Level

Each department has a plan derived from the National Vector Control Plan, developed by the ZCT in early 2016, which outlines how the department should implement vector control activities including cross-sector activities that involve various stakeholders and the community. The plan ensures that all stakeholders are involved at an early stage in the planning of vector control activities. In addition, regional plans to respond to Zika were prepared at the department level (for example, the El Paraíso Plan, Annex D) in accordance with the national level plan.

At the departmental level there are 60 environmental health technicians in the country who should be able to produce vector control/surveillance plans. Despite the existence of the department-level plans, even after visits to three Departmental Health Offices (Metropolitan, Choluteca, and Paraíso), the team was not able to conclusively determine the capacity of the EHTs to design and prepare entomological monitoring and vector control plans at the department level.

3.6 Implementation Capacity

3.6.1 National Level

Given the short duration of the assessment visit, the team was not able to conduct a comprehensive assessment of capacity to implement the vector control plans of the National Vector Control Program, but definite areas for improvement were identified.

Funding: At the national level, the ZCT instructs the Environmental Health Units in each department to manage and direct epidemiological surveillance and vector control/surveillance activities. Besides the budget for insecticides and some equipment and external donor contribution reported in section 3.1.1, there is no funding for vehicles, fuel, spray equipment, or PPE. Lack of funding is considered a major weakness and hinders vector control personnel from implementing their operational plans. There is also no funding for equipment, materials, and reagents needed for entomological monitoring, according to personnel involved with procurement.

Equipment use and maintenance: At the national level, large amounts of equipment were found to be in a condition beyond routine repair. Parts of older equipment had been removed and used to repair other equipment due to a lack of spare parts. The program recently bought 20 ULV Leco® machines, yet clogs observed in the hoses of the insecticide application system will probably trigger a need for major repairs in the future.

Entomological monitoring: The national Vector Control Manager and EHTs record a wide range of entomological surveillance measures including the species composition of Zika vectors, vector distribution, and vector seasonality. Entomological monitoring is based on LIRAa random sampling of mosquito larvae in houses and the calculation of qualitative *Stegomyia* indices, namely the house infestation index, container index, and Breteau index.[21,22] Quantitative counts of mosquito stages (eggs, pupae, and adults) are not recorded. Indices are obtained two times per year in all cities where the ZCT demands. The national Vector Control Manager claimed that all vector control operations were based on the entomological risk determined by qualitative measurements. He said that those areas at higher entomological risk were treated. Unfortunately, no data were available for review, but the house infestation rate was claimed to be greater than 10% (in the Metropolitan region). The Pan American Health Organization (PAHO) considers such a rate to be evidence of a high risk of dengue transmission.[23]

[21] https://www.google.com.mx/?gws_rd=ssl#q=paho+liraa
[22] Connor ME, Monroe WM. Stegomyia indices and their value in yellow fever control. Am J Trop Med Hyg. 1923;1: 9–19.
[23] Pan American Health Organization. Dengue and dengue hemorrhagic fever in the Americas: guidelines for prevention and control. Scientific publication no. 548. Washington: The Organization; 1994.

Insecticide resistance monitoring: Since resistance to temephos and pyrethroids has been found in the country (personal communication by Vector Control Manager) and has been reported in neighboring countries[24] it is advisable that the resistance status of the local *Aedes aegypti* populations is determined as soon as possible. Regarding the capacity for resistance monitoring, in addition to the lack of infrastructure (section 3.4), the team found limitations in capacity to implement regular insecticide resistance monitoring based on the visit to the Metropolitan health headquarters. During the visit, the consultants found that technicians have a functional, but rudimentary insectary, limited in space, consisting in two small cages with live *Aedes aegypti* mosquitoes.

FIGURE 5: INSECTARY AT THE METROPOLITAN HEALTH HEADQUARTERS

These mosquitoes, reared from field collections using ovitraps, were being used to assess the efficacy of insecticide currently used in the country (i.e. permethrin, emulsion in water formulation). Tests were undertaken by placing two cages (each with 20 mosquitoes produced directly from field collected eggs, and not F1 generations) in a market, after which insecticide was applied with vehicle-mounted applicators. Cages were then transported to the cubicle-sized office laboratory that also serves as the office of four technicians and exposed mosquito cages were positioned next to control cages. It was observed that the control (unexposed) mosquitoes showed mortality >30%, indicating that the bioassays had to be declared invalid (mortality in control mosquitoes should not exceed 10%). This methodology seems different from the standard WHO method and indicates a gap in capacity to conduct resistance testing properly. The technicians said that previously an entomologist under contract with Doctors without Borders, carried out with them susceptibility tests and found that mosquitoes were resistant to permethrin. Tests were conducted with impregnated papers, and no bottle assays were carried out. No parallel tests were done with a reference colony of susceptible mosquitos (e.g., Rockefeller or New Orleans). No printed actual results were provided.

[24] García GP, Flores AE, Fernández-Salas I, Saavedra-Rodríguez K, Reyes-Solis G, Lozano-Fuentes S, Guillermo Bond J, Casas-Martínez M, Ramsey JM, García-Rejón J, Domínguez-Galera M, Ranson H, Hemingway J, Eisen L, Black IV WC. Recent rapid rise of a permethrin knock down resistance allele in *Aedes aegypti* in México. PLoS Negl Trop Dis. 2009;3(10):e531.

Primarily due to the lack of a national entomological reference laboratory and insectary and the associated trained laboratory personnel, the HSU is not able to establish sentinel sites and carry out regular entomological monitoring. Based on scarcity of published research papers, there also appears to be limited capacity to work with external research organizations. However, the main, and arguably the most important consequence of not having a national entomological reference laboratory and insectary is the inability to collect data on insecticide susceptibility. This is of major concern given the adulticides being used for *Aedes aegypti* control have been used for a long time, making it is highly likely that resistance is widespread and therefore compromising control efforts for Zika and other arbovirus diseases.

The Autonomous University of Honduras (Universidad Autónoma de Honduras) has an insectary but also requires equipment to be fully functional. It has the capability to diagnose Zika in patients and could also develop the capacity to isolate arbovirus in mosquitoes.

Quality Assurance: There are no quality assurance (QA) measures of vector control or surveillance activities, including larviciding and adulticiding activities. The extent of use and success rate of biological control interventions (*Tilapia* and *Gambusia* fish), although reported as being widespread and highly effective, cannot be verified due to the lack of QA data.

3.6.2 Subnational Level

Vector control: Vector control activities are carried out at the local level. Until 2016, they consisted of the distribution of the larvicides *Bacillus thuringiensis* var. *israelensis* (Bti), a dispersible granules formulation (10 per 55 gal drums) in water. In 2016, MOH purchased 300 kg of the insect growth regulator pyriproxyfen to substitute for costly Bti. For adulticiding, the MOH conducted outdoor spraying of emulsion in water (EW) formulations of deltamethrin and permethrin (at dosages, of 2 and 10 g AI/Ha respectively) using truck-mounted cold fogging equipment. These activities are rarely undertaken simultaneously in the same areas; therefore, control effects are not additive.

Moreover, there is reportedly widespread and highly effective use of biological control interventions (*Tilapia* and *Gambusia* fish), although this cannot be verified due to lack of QA mechanisms.

Equipment use and maintenance: With respect to portable application equipment, hand compression sprayers and thermal foggers were on hand although neither was in active use for *Aedes* control. It was also observed that that personnel involved in insecticide application was not using PPE as it is not readily available. Finally, the assessment team observed that insecticide storage facilities are unsuitable, with sprayers and insecticide containers confined and piled up in the same spaces, and many empty containers left in those rooms without a plan for final disposal.

At the department level, employees were unaware that equipment needs to be calibrated. While employees were familiar with the maintenance of Hudson Compression Sprayers, those seen were non-functional due to a lack of spare parts. More complex equipment such as thermal foggers, mistblowers, and truck-mounted ULV for CFST were found to be non-functional and or in need of maintenance. However, employees were not trained in the maintenance of this type of equipment.

Insecticide resistance monitoring: As noted above, the team found limitations in capacity to implement regular insecticide resistance monitoring based on the visit to the Metropolitan health headquarters, including lack of sentinel sites at the department level.

BBC and ICE: Within the ZCT and at departments visited, there is competent and skilled staff available for the production of BCC and ICE materials. Budgetary constraints have limited the printing and dissemination of IEC-BCC materials such as leaflets and pamphlets. In 2016, a budget to print such materials was provided by external funding agencies. Community engagement activities are recorded in terms of number of houses visited, number of hours talking directly to residents, and the total number of pamphlets distributed. However, there is no strategy in place to assess the impact of these materials and to improve them based on feedback from the target population.

3.7 Data Collection, Analysis, and Reporting

3.7.1 Capacity to Capture Comprehensive Entomological, Environmental Compliance, and Vector Control Data in One Central Database

Although the MOH claimed that there are systems for data recording, dissemination, and reporting, the assessment team could not verify all aspects of data management. The country has no central entomological database. No vector control activities currently carried out are detailed in the weekly epidemiological report. All vector surveillance and control data currently collected are available only at the local level. Any report that may exist at the national level was not made available to the assessment team. Supposedly, there are formats in which information is recorded in the field and captured in the SISLO (subsystem of information at local level), but such a system and it operation was not available to the team.

The ZCT produces somewhat stratified maps based on a combination of entomological monitoring for Zika and other arboviruses, which has been implemented since 2013.[25] The entomological monitoring is based on LIRAa random sampling of mosquito larvae in houses and the calculation of qualitative *Stegomyia* indices, namely the house infestation index, container index, and Breteau index.[26,27] Quantitative counts of mosquito stages (eggs, pupae, and adults) are not recorded. Indices are obtained two times per year in all cities that the ZCT selects. However, data are handled by hand or in documents prepared for this purpose, but not in a database system. Once obtained, indices are used to direct vector control activities to where house infestation rates are the highest. Unfortunately, these indices are of little use to assess entomological risk for arboviral disease transmission and, therefore not useful to downstream effective vector control activities.[28]

In addition, epidemiological data collection and reporting has two serious flaws: (1) the system for recording cases at the health facility level registers cases by the date on which a patient seeks medical care, not on the date of the onset of symptoms; and (2) the epidemiology unit does not have a system in place to inform vector control personnel of the exact address of suspected cases, thus impeding more targeted vector control.

As noted above, Honduras has in place a system in which information is shared among health officials, but it lacks the capacity to use geographic information system (GIS) to map disease distribution and entomological risk in cities. As a result, vector control efforts are delayed and limited in scope because the maps used to locate risk areas are not precise.

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[25] http://www.paho.org/hon/index.php?option=com_content&view=article&id=951:implementacion-estrategia-liraa-levantamiento-indices-rapidos-aedes-aegypti-&catid=517:hon-05-enfermedades-transmisibles&Itemid=229

[26] https://www.google.com.mx/?gws_rd=ssl#q=paho+liraa

[27] Connor ME, Monroe WM. Stegomyia indices and their value in yellow fever control. Am J Trop Med Hyg. 1923;1: 9–19.

[28] Bowman LR, Runge-Ranzinger S, McCall PJ (2014) Assessing the relationship between vector indices and dengue transmission: A Systematic Review of the Evidence. PLoS Negl Trop Dis 8(5): e2848.

The coverage of vector control activities is recorded in terms of total number of houses visited, the percentage of the population covered by control activities, and the total houses treated with larvicides and by CFST. Community engagement activities are recorded in terms of number of houses visited and hours spent talking directly to residents and the total number of pamphlets distributed. The cost of carrying out vector surveillance and control activities is recorded in terms of both human resources involved and quantity of chemicals applied. It does not appear that MOH has an established a data tracking system at the national level that aggregates the data on community engagement, environmental management, and other interventions directed to control arbovirus transmissions.

3.7.2 Capacity to Analyze and Interpret Data

The 60 EHTs and 1,200 local technicians are responsible for collecting entomological indices twice per year for entomological surveillance using the LIRAa collection methods, as described above (section 3.7.1). They analyze the data to prioritize areas within cities that need to be treated for mosquito control. Reports on these activities were not provided to the assessment team, so it is not known whether they are done effectively.

Besides vector control coverage, the percentage of the population protected by vector control and the number /percentage of the communities educated and mobilized for vector control are regularly reported. No report was shared with the assessment team, for which the frequency of vector control interventions could not be confirmed.

The lack of an entomological reference laboratory and insectary and the trained staff required to work in them precludes or limits the capacity to carry out certain research projects. Determination of the percentage of mosquitoes of a given species infected with arboviruses would require specialized polymerase chain reaction (PCR) equipment and trained laboratory technicians to carry out the analysis. Studies such as determination of resting habits (and changes to resting habits) or vector longevity are not carried out as part of routine vector control/surveillance).

3.7.3 Capacity to Produce High Quality Reports

The assessment team cannot repot on this subject, because no reports were shared with the team other than examples of a weekly epidemiological report.

3.8 Stakeholders' Engagement and Use of Entomological Data to Inform Vector Control

3.8.1 National Level

The MOH ensures that there is good communication between all stakeholders involved in Zika vector control and surveillance through the mechanisms implemented by the ZCT. All intra-sectoral actions the ZCT implements are based on the agreements reached with the active and effective engagement of stakeholders and community. A major weakness is the lack of an effective way to share information regarding the epidemiological situation, entomological risks, and prevention and control plans devised or implemented.

The MOH issues press releases to the general public [http://www.salud.gob.hn/web/index.php/sala-de-prensa] with information on the number of pregnant women in the country with suspected or confirmed Zika infection, the number and departmental distribution of suspected and confirmed Zika cases, and Zika-associated cases of GBS. Information regarding larval indices, number of containers found harboring insectivorous fish, total number of breeding sites found, and type of breeding sites

identified is only known by Vector Control Program personnel (the national Vector Control Manager and EHTs) and is shared with other health services personnel through the ZCT.

The Autonomous University of Honduras could be a partner in entomological research studies such as insecticide resistance and the efficacy of vector control, but its contribution currently is limited to laboratory diagnosis of Zika and other arbovirus due to lack of equipment for an insectary. Contributions by other universities and research institutes, national or external, have been very limited because of lack of engagement and/or equipment.

3.8.2 Subnational Level

Vector control and management activities planned at the department level are based on the National Vector Control Plan. Each department has a plan, which outlines how it should implement vector control activities including cross-sector activities that involve various stakeholders and the community. The plan ensures that all stakeholders are involved at an early stage in the planning of vector control activities. Specifically, the EHTs implement entomological surveillance and also are directly involved in the dissemination of vector control IEC and BCC materials. They also hold face-to-face health promotion conversations with residents, although they lack formal training for those matters. The regional director of each department is responsible for implementing decisions and events planned at the national level. Such events include community mobilization days, in which the community assists with the removal of potential breeding sites. No documentation was shared with the assessment team, so the frequency of the community mobilization days could not be confirmed.

3.9 Insecticide Registration Status and Environmental Compliance

3.9.1 National Level

Honduras has legislation regarding registration of pesticides, including those to be used in public health activities.[29] Honduran health authorities that were interviewed noted that, if necessary, they could fast-track registration of unlisted products advised for use. The team did not visit an insecticide storage facility at the national level.

The equipment storage facility at the national level does not provide sufficient space for equipment repair and maintenance and fails to separate clean and contaminated areas. Large amounts of equipment were found in a condition beyond routine repair. Parts of older equipment had been removed and used to repair other equipment due to a lack of spare parts. Employees were familiar with repairing the equipment but much of it was too old or beyond repair and spare parts were generally unavailable. The program recently bought 20 ULV Leco® machines, and operators were already leaving hoses with evident clogs in the insecticide application system, which will probably soon result in the need for major repairs.

3.9.2 Subnational Level

The assessment team visited three pesticide storage facilities in the headquarters of Regional Metropolitan Departments of Tegucigalpa, Choluteca, and Paraíso (Danlí). None of the three facilities was suitable for storing pesticides although all did (deltamethrin, permethrin, Bti, and some remaining temephos, although it has been discontinued). No inventory of the products had been done, thus there

[29] http://colprocah.com/wp-content/uploads/2011/08/COMPENDIO-plaguicidas.pdf

was no record of current quantities. The storage areas had pesticides such as Bti that require lower temperature storage, but the areas were not air-conditioned. Different insecticides and sprayers are confined in the same spaces with risk of mixing, contamination, and spills, without proper ventilation, or emergency kits to treat operators accidentally in contact with insecticides.

Many pesticide containers were already empty and there was no plan for safe disposal. The assessment team was told that they take empty containers to be buried in the city dump. No high temperature ovens for incineration of empty containers are available in the country. No chemical spill response or containment equipment was present, nor was any PPE available at the locations. Operators are likely over-exposed to insecticides because of failure to use PPE.

4. Key Issues and Challenges

The National Vector Control Program in Honduras has developed adequate guidelines, protocols, and manuals to guide operations targeting *Aedes* mosquitoes. The program enjoys the support of national authorities and stakeholders, which have enthusiastically favored its implementation and encourage its future expansion. Below is a summary of the key issues and challenges found by the assessment team.

1. **Zika is established in Honduras and throughout the continent.**

   It is not known exactly how many people have been infected, considering that only a small proportion of cases are symptomatic and there is high possibility that physicians misdiagnose Zika as another arbovirus disease. Also, while there is vector control capacity at the department level, it is reactive, delayed and not well targeted because:

   - Honduras lacks capacity to monitor biological efficacy and determine insecticide resistance.
   - Vector control efforts are not directed to areas where entomological risk is highest due to use of qualitative indices only twice a year.
   - Vector control efforts are not directed to areas where epidemiological risk is highest because of inaccurate diagnosis and delayed epidemiological reporting to vector control program personnel.
   - Environmental Health Technicians in the EHUs do not work exclusively in vector surveillance and control activities, so there is a shortage of human resources to conduct vector control efforts on a regular basis.

Given these challenges, it may not be possible in the short run for Honduras to mount a large-scale, effective vector control effort against the vector mosquitoes that would have a significant impact on the spread of the disease. Therefore, to protect the population from Zika infection, short-term efforts could focus on a large-scale educational campaign to promote behavioral changes among households, communities, and medical providers for healthy environments, personal protection measures, and improved diagnosis and care of those infected.

As noted above, vector control capacity can be greatly enhanced if the following issues are addressed:

2. **Inadequate capacity for basic entomological studies to determine biological efficacy of Zika vector control activities.**

   - Honduras currently carries out entomological surveillance activities using only two qualitative assessments per year of vector abundance in the field: the mosquito pre-treatment infestation (house infestation qualitative index) and the post-treatment infestation. Although these estimates have little or no association with disease transmission, they are used to direct vector control and determine effectiveness of Zika vector control efforts.
   - Due to lack of a reference entomology laboratory and associated insectary facilities, the Vector Control Program cannot implement essential entomological activities either at all or with necessary quality/frequency such as:
     - Routine biological efficacy and resistance testing of larvicides and adulticides.
     - Evaluation and monitoring of chemical-based intervention methods.
     - Evaluation of the effectiveness of alternative insecticides.

- Detection and determination of insecticide resistance mechanisms in Zika vectors.
- Monitoring of the behavior and ecology of these mosquitoes.

3. **Inadequate capacity to maintain and calibrate spray equipment.** At the department level, employees are unaware that equipment needs to be calibrated. At both the national and subnational levels, the capacity to maintain spray equipment appears to be limited because of lack of spare parts and equipment storage facilities do not provide sufficient space for spare parts and equipment repair. Also, employees have not been trained in the maintenance of all types equipment and not held accountable for lapses. This issue has rendered some older equipment non-functional and will shorten the useful life of newer equipment. Not only does this reduce current capacity for vector control, but could also influence government or donor willingness to procure new equipment if the program does not take steps to improve care of these assets.
4. **Poor environmental compliance in insecticide/equipment storage facilities.** Honduras does not have an insecticide management component that ensures insecticide storage facilities and the protocols for handling, transport, use, and disposal of insecticides comply with local environmental and international regulations and conventions. Facilities allow storage of large amounts of insecticides and application equipment, but they are not safe and need to be updated to comply with international rules and regulations pertaining to storage and handling of insecticides; they also may have to be expanded as the program grows. The chemical and equipment storage facility fails to separate clean and contaminated areas, and PPE was not available.
5. **Lack of an integrated, online system to manage the data on disease transmission, and vector surveillance and control.** The country has no central entomological database, and therefore all vector surveillance and control data are available only at the local level. Honduras has in place a system in which information is shared among health officials, but it lacks the capacity to use GIS to map disease distribution and entomological risk in cities. As a result, vector control efforts are seemingly delayed and limited in scope because the maps used to locate risk areas are not precise.
6. **No QA mechanisms.** There is no QA of data systems, nor of chemical and biological intervention methods, nor of the extent and effectiveness of community-based source reduction projects.
7. **Limited budget to carry out an effective response to Zika.** Underlying the capacity issues listed above is inadequate funding, which prevents vector control personnel from fully implementing the operational plans. There has been no funding for vehicles, fuel, spray equipment, or PPE. Nor is there funding for the lab equipment, materials, and reagents needed for entomological monitoring, according to personnel involved with procurement. The US$1.1 million national budget approved for the 2016 response to Zika and other arboviral diseases is for buying equipment and insecticides. It is insufficient to meet the needs of activities such as logistics, vector surveillance, and IEC-BCC communication strategies.

5. RECOMMENDATIONS

5.1 Recommendations to Government Partners

1. Provide space, equipment and supplies to national and regional insectaries and insecticide testing facilities. The government should provide suitable building spaces (e.g. insectary in the Universidad Autónoma de Honduras) and request donor funding for essential equipment and material. The insecticide testing facility should be separate from the insectary rearing facility to prevent contamination.
2. Conduct studies immediately to determine the resistance status of the local *Aedes aegypti* population to the larvicides and adulticides currently being used and products being considered. For example, confirm that temephos alternative larvicides recommended by the WHO Pesticide Evaluation Scheme (WHOPES) are effective and operationally feasible. The entomological surveillance program should use ovitraps placed in all Zika-prioritized cities, and include communication campaign, transportation expenses, supplies (ovitraps, filter paper, stationary), computer hardware and software, and personnel (see Annex E for a more detailed recommendation of a potential pilot study using ovitraps).
3. Develop a national insecticide resistance management plan based on the findings from insecticide testing (per Recommendation 2 above). The plan should include resistance mitigation approaches such as rotation of insecticides. Resistance testing should then be carried out at least once a year.
4. Provide vector control with a dedicated budget for insecticides, equipment, spare parts and safety supplies (PPE).
5. Select EHTs in the Environmental Health Units to be exclusively dedicated to vector control instead of having multiple functions. Train and supervise these personnel to deepen their expertise and skills all aspects of vector control: spraying, entomological surveillance, equipment maintenance, environmental compliance, planning, data analysis, and reporting.
6. Develop an online database that includes GIS to map disease, vectors, vector control activities and resistance. A server, computers, and software licenses are needed at both the national level and in all 20 departments.
7. Create a Vector Control Quality Assurance Officer position under the National Vector Control Program
8. As capacity is strengthened in entomological monitoring and vector control (recommendations above) over the medium to long term, in the short term plan and conduct a large-scale educational campaign to promote behavioral changes among households, communities, and medical providers for healthy environments, personal protection measures, and improved diagnosis and care of those infected. This would include diverse printing materials, massive media advertisement (radio and TV), and meetings with cross-sector groups and residents through workshops, focal groups, and one-on-one meetings.

5.2 Recommendations to Donors

1. Provide funding for short-term technical and professional onsite training program in medical entomology, to include mosquito rearing and testing, surveillance and control operations, environmental compliance and IEC-BCC. Rather than sending staff overseas or bringing in specialized trainers, it is recommended to offer more cost-effective training through PAHO's virtual campus platform [https://www.campusvirtualsp.org/en]. A certification exam should be included at the end of each session to ensure that trainees have reached the required standard. The virtual classroom could be made available to all countries in the region.
2. Support the recommendations to the government partners by providing funding or in-kind contributions such as:
    - Essential equipment and material for an entomology laboratory and separate insectary
    - Supplies and equipment to strengthen regional laboratories, such as stereoscopes;
    - Installation of the ovitrap surveillance system (ovitraps, filter paper, stationery, computer hardware and software);
    - Vector control equipment and supplies (insecticides, application equipment, spare parts and safety supplies (PPE);
    - Monitoring the impact of spatial and residual application of insecticides on vector density reduction (in collaboration with health personnel, to ensure skills and knowledge transfer);
    - A server, computers, and software licenses for the on-line database for the national level and in all 20 departments;
    - Printed materials, and mass media (radio and TV) for a large-scale educational campaign to promote source reduction, including identification and eleimination of breeding sites at the household level.

ANNEX A: CAPACITY ASSESSMENT TOOL

HFG Project

TOOL TO ASSESS ENTOMOLOGICAL MONITORING, ENVIRONMENTAL COMPLIANCE, AND VECTOR CONTROL CAPACITY

FOR THE PREVENTION AND CONTROL OF ZIKA AND OTHER ARBOVIRUSES

The Health Finance and Governance Project
USAID's Health Finance and Governance (HFG) project helps to improve health in developing countries by expanding people's access to health care. Led by Abt Associates, the project team works with partner countries to increase their domestic resources for health, manage those precious resources more effectively, and make wise purchasing decisions. The five-year, $209 million global project is intended to increase the use of both primary and priority health services, including HIV/AIDS, tuberculosis, malaria, and reproductive health services. Designed to fundamentally strengthen health systems, HFG supports countries as they navigate the economic transitions needed to achieve universal health care.

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June 2016

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| Johns Hopkins Bloomberg School of Public Health (JHSPH) | Results for Development Institute (R4D)
| RTI International | Training Resources Group, Inc. (TRG)

TOOL TO ASSESS ENTOMOLOGICAL MONITORING, ENVIRONMENTAL COMPLIANCE, AND VECTOR CONTROL CAPACITY

FOR THE PREVENTION AND CONTROL OF ZIKA AND OTHER ARBOVIRUSES

1. INTRODUCTION

This assessment tool was designed to assess country capacity to conduct *Aedes* vector control and entomological monitoring activities in five countries in Latin America and the Caribbean – the Dominican Republic, El Salvador, Guatemala, Haiti, and Honduras. The purpose of the tool is to review capacity strengths and gaps within each of these countries, and to propose recommendations that improve country readiness to prevent and control Zika and other arboviruses. The tool will assess capacity in line with nine thematic areas:

1. Place, Structure, and Financial Resources of Entomological Surveillance and Vector Control at Various Administrative Levels
2. Stakeholders' Coordination and Community Mobilization /Engagement for Control of *Aedes* Mosquitoes
3. Human Resources
    - 3.1. National Level
    - 3.2. Province/District Level
4. Infrastructure
    - 4.1. Presence of Reference Laboratory at the National Level
    - 4.2. Functional Insectary
5. Capacity to Design and Prepare Entomological Monitoring, Vector Control, and Environmental Control Plan
6. Implementation Capacity
7. Data Collection, Analysis, and Reporting
    - 7.1. Capacity to Capture Comprehensive Entomological, Environmental Compliance and Vector Control Data in One Central Database
    - 7.2. Capacity to Analyze and Interpret Data
    - 7.3. Capacity to Produce High Quality Reports
8. Stakeholders' Engagement and Use of Entomological Data to Inform Vector Control
9. Insecticide Registration Status and Environmental Compliance

2. ASSESSMENT CHECKLIST

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
1. Place, Structure, and Financial Resources of Entomological Surveillance and Vector Control at Various Administrative Levels		
• How are entomological monitoring and *Aedes* mosquitoes of arboviral vector control programs organized structurally? Is it a vertical program or is it integrated into the health offices at various administrative levels? Is entomological surveillance part of vector control? Please attach the copy of the current organogram, if available, to indicate how it relates to other health programs.		
• Are the entomological monitoring and vector control unit/s responsible for all vector-borne diseases? Do these units structurally exist at different levels of administration? If there is no separate unit at a lower administrative level, are there at least focal persons at each administrative level, particularly for the control of *Aedes* mosquitoes that are vectors of arboviral diseases? Describe how the different levels undertake planning, implementation and monitoring and evaluation. Describe the information (report) and feedback flow between the centers and peripheral administrative levels.		
• How are entomological surveillance and vector control for different vector- borne diseases organized? Are they organized under one unit or in different departments? Describe how the entomological surveillance and vector control efforts		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
for different vector-borne diseases undertake joint planning for budgeting, implementation, and monitoring and evaluation, with emphasis on the control of *Aedes* mosquitoes that are vectors of arboviral diseases.		
• Do entomological surveillance and vector control efforts for different vector–borne diseases share a common budget at different levels? Which levels are these?		
• Is a there strategic plan for entomological surveillance and vector control for all vector- borne diseases? If yes, provide the copy and briefly describe the different elements of the plan.		
• What is the main vector control methods used to reduce diseases transmitted by *Aedes* mosquitoes? Briefly describe how each of the vector control methods is planned, implemented, monitored and evaluated, and who is responsible at each administrative level for these activities? What indicators are used for monitoring and evaluation? Is the country vector control program open to evaluate and deploy new novel *Aedes* mosquitoes control techniques, if found effective, such as male SIT, Pyriproxyfen, Bti, infection refractory mosquitoes (Wolbahcia), and lethal ovitraps, etc.?		
• How frequently is entomological surveillance monitoring data collected? Is it adequate to inform vector control program? Which entomological indicators are regularly monitored? What sampling methods are used?		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
• Is there an annual government allocation of funds for entomological surveillance and vector control planning, implementation, and monitoring and evaluation, for the different vector-borne diseases? Please provide a detailed cost breakdown by administrative level and vector–borne disease, if possible. Indicate other sources of funding if any, and short falls in funding level.		
• What is the status and trend of vector resistance to different insecticides and larvicides?		
• Is there a central database for entomological surveillance and vector control to which all in country stakeholders have access? Is the country using mHealth for rapid transmission of data from the peripheral to the central database? Is there capacity at the national level to perform appropriate statistical analysis using rigorous statistical methods to inform the vector control program?		
• Does the program have nationwide data on VC coverage in terms number households/people and/ or administrative units like number of municipalities? If yes, please provide the copy of the report. Please disaggregate the data by vector control type if possible.		
• Is there coordination among health care providers (Zika should be the immediately notifiable disease), public health offices, environmental compliance officers, and vector control officers, in terms of sharing of epidemiological, entomological and vector control data? If yes, please describe the information		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
sharing mechanism in place and frequency.		
2. Stakeholders' Coordination and Community Mobilization/ Engagement for Control of *Aedes* Mosquitoes		
• Is there a vector control technical working group or steering committee at the national level? If yes, describe the terms of reference of this committee, the composition of the members and the roles and responsibilities of each member. Please also describe the role and achievement of the steering committee in terms of advancing entomological surveillance and vector control.		
• Are there strategies for social mobilization and advocacy? If yes, please describe how the overall goal of such strategic effort is being achieved.		
• Are there IEC/ BCC materials available that could help to advance community awareness and knowledge about vector- borne diseases transmitted by *Aedes* mosquitoes? What is best approach to reach out to the community to create awareness?		
• Is there community wide/level surveillance and control of *Aedes* mosquitoes lead by the communities or peripheral health workers? What are the best methods/ approaches to strengthen these activities?		
• Are there systems in place for planning, implementation, and monitoring and evaluation, of IEC/BCC campaigns and community engagement? Is there coordination among the vector–borne diseases control stakeholders in the planning and		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
implementation of IEC/BCC?		
3. Human Resources		
3.1 National Level - Presence of well trained and experienced entomologists, vector control officers, and environmental health officers at the national level that have the capacity to:		
• Develop Zika and other arboviral vector control strategy and guidelines		
• Develop national level entomological surveillance, Zika and other arboviral vector control, and human and environmental safety plans		
• Lead and oversee implementation of entomological surveillance, vector control, and environmental compliance activities		
• Conduct (annual) susceptibility tests on both larvae and adult *Aedes* mosquitoes		
• Determine the competence of suspected *Aedes* mosquitoes in transmission of Zika		
• Morphologically identify primary and secondary vectors of Zika		
• Conduct (annual) molecular analysis		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
• Conduct biochemical tests if vector resistance to insecticides is detected		
• Manage insectary and sustain susceptible colony of mosquitoes		
• Provide continuous training to sustain pool of trained technicians/ vector control and environmental health officers for entomological surveillance, vector control, and environmental compliance at provincial and district levels.		
• Ensure that high quality entomological data are collected from representative Zika risk areas		
• Map out high transmission risk geographical areas from moderate to low risk (stratification based on the level of risk)		
• Establish one central database that captures entomological surveillance and vector control data at the national level to which all in country stakeholders have access to. Ability to use rigorous statistical methods to analyze data.		
• Immediately share data on insecticide and larvicide resistance, when it becomes available, with in country vector control stakeholders		
• If change in vector density or behavior is observed, share data immediately with in country Zika and		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
Arboviruses vector control stakeholders for decision making		
• Analyze and interpret comprehensive entomological data and share the report with in country Zika and other Arbovirus vector control stakeholders (twice per year)		
• Establish entomological thresholds at which humans get infected with Zika		
• Triangulate entomological, vector control and epidemiological data to inform control of Zika and other arboviruses and share this report with in country stake holders (annually)		
• Establish strong intersectoral collaboration among public sectors such as ministry of health, ministry of education, ministry of finance, municipalities, ministry of water resources, etc., private sectors and civil society		
• Develop standard IEC/BCC materials for community mobilization and education campaigns		
• Ensure constant coordination among health care providers (Zika should be an immediately notifiable disease), public health offices, and environmental compliance and vector control officers.		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
• Monitor the effectiveness of vector control methods deployed and compliance to human and environmental safety		
3.2 Province/District Level - Presence of trained entomologists, vector control and environmental health officers / technicians working for Ministry of Health or other health institutions that have the capacity to:		
• Establish community- wide survey of aquatic stages (larvae and pupae) of known or suspected vectors of Zika		
• Identify *Aedes* larvae from others (*Culex*, *Anopheles*, etc.)		
• Identify types of breeding containers and geographical areas that are most productive for targeting vector control		
• Develop detailed maps to help track larval sites of Zika vectors		
• Collect *Aedes* mosquito larvae and pupae, and transport and rear them to adults in the insectary for correct identification of species, density monitoring by species, and perform susceptibility tests		
• Identify and use proper adult *Aedes* mosquito sampling methods		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
• Morphologically identify adult *Aedes* mosquitoes from others (*Culex, Anopheles*, etc.)		
• Morphologically identify male from female *Aedes* mosquitoes		
• Morphologically identify species of *Aedes* mosquitoes		
• Determine vector resting		
• Monitor vector density by species		
• Monitor changes in seasonality and vector composition		
• Monitor changes in vector behaviors		
• Dissection of ovaries and determination of parity rates		
• Properly preserve mosquitoes and send them to the central level for further molecular analysis that includes proper labelling of samples (unique codes corresponding to the sample record, etc.)		
• Assess changes in vector abundance before and after deployment of an intervention (impact of vector control intervention on vector density and behavior)		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
• Perform descriptive analysis of entomological data and assess the impact of vector control on entomological indicators		
• Perform resistance testing		
• Perform quality check on vector control products/tools		
• Ensure constant coordination among health care providers (Zika should be immediately notifiable disease), public health offices, environmental compliance officers and vector control officers		
• Conduct community mobilization focusing on reducing or eliminating vector larval habitats		
• Lead community wide source reduction (remove and dispose of water holding containers)		
• Make sure that large water holding containers are covered, dumped, modified so that they would not serve as breeding site for the vector or treat the breeding sites with long-lasting larvicide		
• Deploy larvicides (chemical and biological larvicides) where needed		
• Assess the possibility of using biological control (copepods and larvivorious fish, etc.)		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
• Deploy adulticides (space spray, residual spray, barrier spray) where necessary		
• Deploy physical control (e.g., non-insecticidal mosquito traps) where feasible		
• Is there funding to support entomological surveillance and control of *Aedes* mosquitoes that transmit arboviruses? If yes, please describe the amount by the source of funding if possible (government, bilateral donors, WHO, etc.).		
4. Infrastructure		
4.1 Presence of Reference Laboratory at the National Level that has the capacity to:		
• Accurately identify *Aedes* mosquitoes by species using morphological identification key (serve as quality control of field identification work)		
• Accurately label, preserve, and store mosquito samples		
• Labels have unique codes and correspond to some record		
• Do PCR to determine arbovirus infection rates		
• Do molecular analysis to determine mechanism of		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
resistance (KDR and ACE-1R)		
• Conduct biochemical analysis (to identify the presence of detoxifying enzymes) or have connection with other laboratories that have the capacity to perform this activity		
• Procure all the equipment, materials, regents and other supplies needed to perform their duties		
• Provide feedback to the field entomologists on the quality of preserved samples received and guidance on how to improve the quality further if needed.		
4.2 Functional Insectary – Presence of one or more functional insectary that has:		
• Separate well-screened adult and larval room with optimal temperature and humidity		
• Consistent water supply		
• Consistent power supply to keep the micro-climate at optimum for rearing mosquitoes		
• Insectary has:		
o Thermometer		
o Hygrometer		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
o Heater		
o Humidifier		
• Regular supply of larval food and sugar/blood source for adults		
• Susceptible mosquito colony for vector control and susceptibility test quality control		
• Trained technicians to perform routine activities to sustain mosquito colony		
• Space and capacity to rear field collected larvae and pupae to adult when needed		
• Ability to increase vector population when large numbers of mosquitoes are needed for different activities		
5. Capacity to Design and Prepare Entomological Monitoring , Vector Control, and Environmental Plan – Ability to perform:		
• Desk review and compilation of comprehensive entomological and vector control data available including information from neighboring countries		
• Stratification of country using combination of factors that include but not limited to:		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
o Distribution of Zika vectors		
o Intensity of Zika transmission		
o Level of community awareness about Zika, its mode of transmission, vector breeding habitat and level of health education needed		
o Distribution and type of breeding sites		
o Type of vector control method used		
o Quantity of insecticides used for agriculture and other vector control purposes		
o History, status and trends of vector resistance to different insecticides and larvicides		
o Uses of insecticides at the house-hold level		
• Based on the assessment results, prepare a comprehensive health education campaign, community mobilization, entomological monitoring, and a vector control and environmental compliance plan		
6. Implementation Capacity - Assess capacity to:		
• Procure equipment, materials, and reagents needed for entomological monitoring activities, vector control,		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
and environmental compliance		
• Entomological monitoring, vector control, and environmental teams have:		
o Transportation services needed for the field work		
o Fuel for vehicles		
o Adequate field staff		
o Maintain and calibrate equipment		
• Establish adequate number of sentinel sites in each geographical areas with different levels of disease (Zika) risk and regularly collect data on:		
o Proportion of breeding sites that are positive for aquatic stages of target mosquitoes (eggs, larvae, and pupae)		
o Species composition of the vectors		
o Vector distribution and seasonality		
o Vector resting behavior		
o Vector infectivity		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
o Parity rates		
• Collect data on insecticide and larvicide susceptibility and mechanism of resistance from Zika infested areas annually		
• Conduct community education and mobilization campaign at the community level to promote source reduction (environmental management), weekly		
• Monitor environmental management (source reduction) activities by the community and coverage, weekly		
• Perform IRS, mosquito traps where effective, and assess the feasibility of biological control		
• Apply larvicides on breeding sites that can't be removed by source reduction or covered to prevent mosquito breeding on a weekly interval?		
7. Data Collection, Analysis, and Reporting		
7.1 Capacity to Capture Comprehensive Entomological, Environmental Compliance and Vector Control Data in One Central Database		
• Have standard data collection tools /worksheets for entomological monitoring, IEC/BCC, vector control, and environmental compliance across the country		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
• Presence of central entomological, vector control, and environmental compliance databases		
• Ability to link molecular/lab data back to field specimens		
7.2 Capacity to Analyze and Interpret Data - Capacity to perform some descriptive analysis and interpret and determine entomological indices:		
• Determine larval, pupal, egg, and female adult survey indices		
• Proportion of mosquitoes of a given species infected with arboviruses		
• Resting habit		
• Longevity of the population of vectors		
• Interpret the entomological measurements and their implication on vector control and local epidemiology of Zika.		
• Number and percentage of community educated and mobilized for vector control		
• Vector control coverage		
• Number and percentage of population protected by vector control		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
7.3 Capacity to Produce Good Quality Report		
• Produce good quality progress and final report that can be shared with stakeholders		
8. Stakeholders' Engagement and Use of Entomological Data to Inform Vector Control		
• The presence of functional cross-sector coordination mechanism established in the country		
• Organizational structure of MOH established to fulfill their vector control, entomological monitoring, and environmental compliance mission		
• Mechanism in place to involve all stakeholders in the early design and planning of entomological monitoring, vector control, and environmental compliance activities		
• Mechanisms in place to educate and mobilize community to help reduce or eliminate vector breeding sites		
• Regular stakeholders meeting platform where entomological surveillance data and vector control coverages are discussed and used for decision-making		
• Linkage with universities and/ or research institutions for operational research and data sharing to inform		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
vector control and policy formulation		
• Availability of financial and technical support for entomological monitoring, community education and mobilization, vector control and environmental compliance by partners		
• Please describe if there any challenges with regards to shareholders coordination and/or opportunities that enhance control of *Aedes* mosquitoes		
9. Insecticide Registration Status and Environmental Compliance		
• What insecticides are registered for public health use in the country?		
• Is there any law/policy that allows pesticides to be registered during a public health emergency situation, such as Zika?		
• What is the waste management capacity in country with respect to insecticide waste - specifically, are there high temperature facilities (including cement kilns) that meet the following specifications: **o** Commercially licensed facilities that are accredited and licensed by the host governments to dispose toxic waste; **o** Burn between 1100°C and 1300°C, with a minimum 2 second residence time in the afterburner chamber (hot zone) with excess oxygen (>11%) and with high levels of induced		

Thematic Area	Current Status As applicable: Specify administrative level (e.g. National, Provincial, District, etc.)	Recommendations As applicable: Specify audience (e.g. Government, Donors, etc.)
turbulence in the gas stream to promote complete combustion; o Have air scrubbers to ensure minimal impact to air quality.		
• Does the country require its own environmental assessment for use of public health insecticides, or can it use USAID's environmental assessments?		
• Is there a public consultation period for public health insecticides, and if so, does the emergency nature of the situation preclude public consultation?		
• Is there an environmental expert sitting within MOH, or what is the interface between the Ministries of Environment (or equivalent) and Health?		
• When was last time the country conducted an IRS and or larviciding campaign?		

ANNEX B: CONTACTS

Name	Organization	Title/Department
Gustavo Ávila Montez	USAID	Health Services Officer
Theodore Glenn	USAID	Democracy and Governance Office Chief
Mario René Mejía Núñez	Universidad Autónoma de Honduras	Graduate studies in Epidemiology Coordinator
Nancy Padilla	MoH Honduras	Communications Unit Head
Nía Carvajal	MoH Honduras	Social Communications Coordinator
Oscar Orlando Urrutia	MoH Honduras	Vector Control Manager, National Environmental Health Unit
Maria Castillo	Metropolitan Health Region	RISS Head
Daniela Carvajal Martell	Metropolitan Health Region	Management Support Coordinator
Avilio Cárcamo	Metropolitan Health Region	Environmental Health Technician
Guillermo Rivera	Metropolitan Health Region	Environmental Health Technician
Menfi Ernesto Pineda	Metropolitan Health Region	Assistant to the Director
Antonio Díaz	Metropolitan Health Region	Environmental Health Unit Regional Coordinator
Mario Mejía Núñez	Metropolitan Health Region	Environmental Health Unit Chief
Eduardo A. Fernández	Metropolitan Health Region	Environmental Health Unit Assistant
Jose Maria Paguada	Choluteca Health Region	Regional Director
Delia Fuentes	Choluteca Health Region	Social Communication and Health Promotion Coordinator
Rigoberto Garcia	Choluteca Health Region	Environmental Health Coordinator
Douglas Avelar	Choluteca Health Region	Health Surveillance
Ana Silvia Murillo	Choluteca Health Region	Regulatory Framework Dept
Luis Roberto Gomez	Choluteca Health Region	Health Services Integrated Network
Donaldo Garcia	Choluteca Health Region	Human Resources Staff
Marco Tulio González	El Paraíso Health Region	Social Communication
Ruben Castellanos	El Paraíso Health Region	Environmental Health Technician
Yuki Sato	El Paraíso Health Region	Social Communication
José Miguel Moncada	El Paraíso Health Region	Environmental Health Technician
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Carmina Sosa	El Paraíso Health Region	Health Surveillance Unit
Claudia Avila	El Paraíso Health Region	Health Promotion
Mariano Amador Flores	El Paraíso Health Region	Environmental Risk
Alexis Antonio Castellanos	El Paraíso Health Region	Environmental Risk
Angel Gabriel Orellana	El Paraíso Health Region	Health Surveillance Unit
Darling Carolina Fuentes	El Paraíso Health Region	Regulatory Framework Dept.
Indiana A.Argeñal	El Paraíso Health Region	Regional Director
Dulce A. Padilla	MoH Honduras	Zika Command Team
Dora Méndez	MoH Honduras	Zika Command Team

ANNEX C: NATIONAL ZIKA RESPONSE PLAN 2016

GOBIERNO DE LA
REPÚBLICA DE HONDURAS

SECRETARÍA DE SALUD

SECRETARIA DE SALUD

DIRECCION GENERAL DE REDES INTEGRADAS DE SERVICIOS DE SALUD

PLAN DE OPERATIVO PARA EL ABORDAJE DEL DENGUE, CHIKUNGUNYA Y ZIKA BASADO EN LA ESTRATEGIA DE GESTION INTEGRADA EN HONDURAS. AÑO 2016

ENERO 2016

Dirección General De Redes Integradas De Servicios De Salud

INTRODUCCION

En 1959 la OPS/OMS declara erradicado el Aedes aegypti del territorio hondureño, considerando que la infestación era focalizada en las ciudades principales, lo que permitió que las acciones anti vectoriales fueran eficaces, pero en la década de los sesenta, el país vuelve a reinfestarse, y el vector encuentra condiciones ambientales propicias para su reproducción y dispersión.

Honduras al igual que muchos países del mundo ha estado sometida a un creciente incremento de casos de dengue desde su reintroducción en 1978 lo que ha ocasionado altos costos sociales y económicos para la población hondureña. A partir de entonces el comportamiento del Dengue ha sido característicamente epidémico con algunas oscilaciones en el periodo pero con tendencia alcista. A mediados del año 2014 se introduce en el país la enfermedad por el virus de Chikungunya y aunque su comportamiento no ha sido tan explosivo como en otros países de la región de las américas, ha impactado negativamente en las condiciones de vida y de salud de la población hondureña, haciendo sinergia con la enfermedad del dengue. en mayo del 2015 las autoridades de Brasil anunciaron la circulación autóctona del virus del Zika en este país y posteriormente Colombia anuncio también la circulación del este virus y el día 25 de noviembre del 2015 la ministra de salud de la Republica de El Salvador anuncio la confirmación de casos positivos de zika en ese país.
El hecho que las tres enfermedades son transmitidas por el mismo vector Aedes sp, plantea la necesidad de una estrategia común para el control del vector.

Gracias al esfuerzo combinado de las distintas fuerzas sociales que operan desde las mesas intersectoriales aplicando los planes de acción basados en la Estrategia de Gestión Integrada del Dengue en que destaca el rol protagónico de las Regiones Sanitarias y el Grupo de Trabajo del Nivel Central de la SESAL, se ha logrado una reducción sostenida de los casos de dengue a partir de la semana 25 hasta abandonar el estado de epidemia Este logro es totalmente inédito, hasta donde podemos documentarlo, pues se presenta en un periodo del ciclo estacional en que el comportamiento tradicional es precisamente hacia un incremento sostenido de los casos, evidenciándolo aún más si lo contrastamos con el comportamiento del dengue en el año 2014 y 2010, años francamente epidémicos.

Merece la pena destacar que el comienzo del año 2015 fue muy preocupante al operarse un registro histórico de casos de dengue cercanos a los mil. Al reorientar la lucha contra el vector hacia el fortalecimiento de las mesas intersectoriales y la implementación sistemática y supervisada de la EGI, rápidamente comenzó a operarse un descenso importante de los mismos particularmente en las regiones sanitarias ubicadas en el sur del país (Choluteca y Valle) así como las comprendidas en el Valle de Sula (Metro San Pedro Sula, Cortes y Yoro) y en el litoral atlántico (Atlántida, Islas de la Bahía y Colon). El control sostenido de las poblaciones aédicas en estos tres polos de desarrollo económico, además de preservar la salud de las personas y disminuir la presión sobre los servicios de salud, ha logrado minimizar el ausentismo laboral y escolar disminuyendo el impacto negativo

sobre la actividad económica tradicional en estas zonas particularmente la industria de la maquila, el turismo y la producción agropecuaria, columna vertebral de la economía del país.

El descenso inicial observado del dengue se extiende hasta finales del mes de abril en que comienza a invertirse esta tendencia al agotarse los limitados insumos (químicos y logísticos diversos) disponibles. El incremento posterior de los casos de dengue y chikungunya a expensas sobre todo de una intensificación de la epidemia en el Distrito Central amenazaba con convertirse en una situación que escapaba de control tal como ocurrió en el año 2010 en que el costo en mortalidad y morbilidad por dengue fue inadmisiblemente muy elevado. Sin embargo, un extenso e intenso operativo integral antiaédico liderado por la Región Metropolitana del Distrito Central y la Mesa Intersectorial Municipal y sus expresiones locales con el apoyo del Grupo de Trabajo del Nivel Central logró que a partir de la semana epidemiológica 25 se operara un significativo descenso de los casos de dengue y chikungunya que continúa hasta el momento actual.

Visitas del Equipo del Nivel Central dirigidas a apoyar al análisis de la situación y reforzar el entendimiento y operación de la EGI en el marco de las Mesas Intersectoriales contribuyeron significativamente a controlar incrementos aislados de casos en regiones tales como Copan, Olancho y Atlántida.

Hasta la semana epidemiológica número 5 1 del 2015, se han reportado un total de 44,834 casos de dengue y desde su introducción en el país en Agosto del 2014, y se reportaron un total de 85,369 casos en el año 2015.

A partir de octubre del 2014 la Secretaria de Salud reoriento su enfoque en relación a la lucha contra el Dengue y Chikungunya hacia el reforzamiento de la estrategia de Gestión Integrada para el control de estas enfermedades promoviendo la organización y funcionamiento de mesas Intersectoriales a nivel departamental y municipal, concertando alianzas con los diferentes actores sociales e institucionales cuya participación es fundamental para el combate efectivo del Aedes.

Sin embargo el comportamiento de estas tres enfermedades amenaza en convertirse en un problema de salud pública de grandes dimensiones con alto costo económico, social y político.

El presente plan de acción incluye una serie de intervenciones con las cuales se espera lograr un control efectivo de estas enfermedades a la mayor brevedad y al menor costo posible las acciones en los municipios y regiones priorizadas.

JUSTIFICACION

Honduras al igual que muchos países del mundo ha estado sometida a un creciente incremento de casos de dengue, desde su reintroducción en 1978 y la introducción del virus del Chikungunya en agosto del 2014, así como también a partir del mes de diciembre del 2015 la introducción del virus del Zika especialmente en la zona sur del país, sin embargo a enero del 2016 ya se reportan casos en otras regiones del país como ser Cortes, Francisco Morazán y el Paraíso, lo que ha ocasionado altos costos sociales y económicos para la población hondureña.

En el periodo 1996 a 2016 el total de casos de Dengue hemorrágico (grave) asciende a 16614 con 251 defunciones para una letalidad en el periodo del 1.8% aunque se estima que la sub notificación de casos graves y defunciones se profundizó en los últimos años. En este sentido, la capacidad de respuesta de los servicios de salud ha mejorado notablemente si se considera que al inicio del periodo más de diez de cada 100 pacientes con Dengue hemorrágico fallecían.

Los resultados de un estudio realizados en el año 2014, indican que el costo de la atención de un caso de Dengue manejado ambulatoriamente seria de Lps. 1,135 mientras que el de un paciente hospitalizado con Dengue y signos de alarma ascendería a Lps. 9,663 en tanto que en el paciente hospitalizado con Dengue grave el costo llegaría a Lps. 22,907. Dentro de estas estimaciones no se incluye el costo del recurso humano implicado en la atención de los casos ni el costo de la cama hospitalaria destinado a la atención general de pacientes. (SESAL-PND 2014).

El gasto que significó el abordaje de la intensificación de la epidemia de Dengue en el 2000 fue de alrededor de 60 millones de lempiras, tal como fue anunciado por las autoridades políticas de ese entonces. Otros 70 millones de lempiras fueron utilizados durante el año 2002 cuando se suscitó un escenario similar. Esta cifra podría ser notablemente superior si tomamos en cuenta que un número desconocido de casos de Dengue y Chikungunya que no acuden a los servicios de salud y que una cantidad importante de dinero en insumos diversos es utilizada todos los años de manera rutinaria, sin el impacto deseado. Por otra parte, una significativa proporción del tiempo de trabajo de los empleados de salud se destina a la atención de este problema, particularmente entre mayo y noviembre, a expensas de la atención de otros problemas prioritarios que deben ser atendidos en los servicios de salud.

La introducción de la enfermedad ZIKA implica un incremento importante de los costos en los servicios de salud, en la economía familiar y en la actividad productiva del país en general considerando las complicaciones médicas como ser síndrome de Guillain barré y el riesgo de la presentación de microcefalia en recién nacidos de embarazadas con exposición al virus del zika.

Situación del Dengue, Chikungunya y Zika en el año 2015

Hasta la semana epidemiológica número 52 del 2015, se reportaron un total de 44,834 casos de dengue no grave y 1062 casos de dengue grave. De chikungunya se notificaron 85,369 y 169 casos sospechosos de Zika, atendidos en los servicios de salud en el 2015. Según fuentes oficiales se han confirmado siete muertes por dengue y dos por chikungunya en ese año.

En el acumulado de los casos de dengue, El Distrito Central concentra más de la mitad de los casos (51%) de esta enfermedad, mientras que la región metropolitana de San Pedro Sula el 6%, Comayagua con el 5.4%, Choluteca 5.3%, Olancho con el 4.7% y Yoro con el 3.8% y Atlántida con el 3.4% y que en su conjunto acumularon durante el año 2015 el 79.4 % de los casos a nivel nacional.

A partir de octubre del 2014 la Secretaria de Salud reoriento su enfoque en relación a la lucha contra el Dengue y Chikungunya hacia el reforzamiento de la estrategia de Gestión Integrada para el control de estas enfermedades promoviendo la organización y funcionamiento de mesas Intersectoriales a nivel departamental y municipal, concertando alianzas con los diferentes actores sociales e institucionales cuya participación es fundamental para el combate efectivo del Aedes, que es el mosquito(vector) trasmisor de las tres enfermedades.

Avances muy notables se han documentaron en el año 2015, en los departamentos de Santa Bárbara, Cortes y la ciudad de San Pedro Sula en donde se han lograron reducciones importantes y sostenidas de casos de dengue y Chikungunya lo que ha repercutido en un impacto francamente atenuado en la economía de esas zonas, la salud de las personas y la presión sobre los servicios de salud, éxitos que se asocian al papel protagónico que han desempeñado los gobiernos municipales y la empresa privada así como otros actores.

Por todo lo anteriormente expuesto la Secretaria de Salud presenta el:
PLAN OPERATIVO PARA EL ABORDAJE DEL DENGUE, CHIKUNGUNYA Y ZIKA BASADO EN LA ESTRATEGIA DE GESTION INTEGRADA EN HONDURAS. AÑO 2016, dirigido a continuar controlando el avance epidémico del dengue, chikungunya y zika en el país, generando las condiciones locales y nacionales para el sostenimiento de las medidas de control.

El presupuesto estimado es muy inferior a las cuantiosas pérdidas que el dengue, Chikungunya y Zika generarían en el país de no aplicarse las medidas contempladas en este plan.

Para que el presente plan sea efectivo, el Gobierno de Honduras, debe garantizar los recursos (Humanos, financieros, logísticos, insumos, equipo, reactivos de laboratorio, insecticidas, capacitaciones y otros) que sean competencia de la Secretaria de Salud, por lo que se requiere que sea aprobado y se cuente con la disponibilidad del presupuesto solicitado a la mayor brevedad posible.

En la medida en que garanticemos los insumos y equipos necesarios que se requieren y la transparencia en la gestión de los mismos, mantendremos la credibilidad ante los miembros de las mesas intersectoriales y la población en general.

PROPOSITO

Lograr el control efectivo de estas tres enfermedades: Dengue, Chikungunya y Zika, mediante la aplicación de estrategias eficaces a partir de un esfuerzo colectivo y participativo que conduzca a movilizaciones nacionales como momentos integradores de iniciativas que favorezcan el proceso de abordaje sostenible del problema con énfasis en el control integrado del vector.

OBJETIVOS

1. Mantener el control efectivo del Dengue en el país fuera de la zona de epidemia.
2. Mantener el control efectivo del Chikungunya en el País.
3. Mantener el control efectivo de zika en el País.
4. Promover la participación responsable, activa, decidida y organizada de todos los sectores sociales en el marco de la estrategia de gestión integrada del Dengue, Chikungunya y zika, para garantizar la sostenibilidad de las acciones a traves de las mesas intersectoriales lideradas por los gobiernos locales y con la conducción técnica de la Secretaria de Salud.

METODOLOGÍA

Bajo la conducción técnica de la Secretaria de Salud y con amplio respaldo político de las autoridades nacionales y municipales en el marco de las mesas intersectoriales se definirán planes de acción con el fin de facilitar la aplicación de medidas de control vectorial tanto físicas, biológicas y químicas, intervenciones de educación, promoción y comunicación, atención al paciente y de laboratorio, además de disposiciones municipales que favorezcan la participación organizada de la ciudadanía.

PLAN OPERATIVO PARA EL CONTROL DEL DENGUE ,CHIKUNGUNYA Y ZIKA BASADO EN LA ESTRATEGIA DE GESTION INTEGRADA Y EN EL MARCO DE UN ABORDAJE INTERSECTORIAL Y MULTIDISCIPLINARIO		
COMPONENTE	**ACTIVIDAD**	**TAREAS**
Coordinación y Gestión del Plan	1) Fortalecimiento y Sostenibilidad de la mesa Intersectorial Departamental y municipal	1.1. Implementación y cumplimiento de las ordenanzas municipal.
		1.2. Definir un único vocero sobre el plan de intervención. Se amplia como vocero el coordinador de Mesa.
		1.3. Definición de sectores, distritos, zonas y responsables de los mismos (Regidores, o los designados por el Alcalde municipal).
		1.4. Establecimiento de Incentivos a los patronatos y otras organizaciones de base comunitaria que logran la meta.
		1.5. Intercambio de experiencias del trabajo de las mesas intersectoriales
	2) Gestión de los recursos necesarios para desarrollar el plan permanente.	2.1. Inventario de Insumos y Recurso por Institución para el control vectorial, actividades de promoción y prevención.
		2.2. Convocatoria permanente de nuevos actores aun no involucrados potencialmente aportantes de recursos (COPECO, Club Rotario, Empresa Privadas, Organizaciones basadas en la Fé, entre otras).
		2.3. Establecer un plan de movilización del colectivo estudiantil y de maestros de apoyo a la eliminación de criaderos intramuros o extramuros.
		2.4. Recibo y administración de cooperaciones y donativos en insumos, equipo, materiales, etc. (Agencias de cooperación Externa, Empresa privada, Gobiernos amigos).
		2.5 Establecimiento de acuerdos interinstitucionales de implementación de medidas de control físico del vector.
	3) Monitoreo y Evaluación.	3.1 Continuar las actividades de monitoreo diario y semana del comportamiento de casos.
		3.2 Definir recursos para la movilización de personal para las supervisiones.
		3.3 Establecimiento de una plataforma interactiva de WastsAPP .(REDES SOCIALES)
		3.4 Elaboración y difusión de boletines informativos de acuerdo a la evolución de la epidemia.
		3.5 Definir los mecanismos de Monitoria y evaluación del plan de la mesa intersectorial .
		3.6 Fortalecimiento del Centro Nacional de Enlace para monitoreo de la epidemia a a nivel nacional e internacional.
		3.7 Reactivacion y fortalecimiento de las salas situacionales en las Regiones y municipios.

Movilización Social y comunicación	1. Consolidación de la organización social de base para la Prevención y control con énfasis en la eliminación de criaderos del zancudo transmisor de estas enfermedades.(Dengue – Chik –ZIKA)	1.1 Gestionar reunión con el titular de las instituciones de alto nivel político involucrados en el manejo del tema Dengue – Chik -ZIKA (Secretaria de Finanzas , Ministra de Salud, Ministro de Educación, COHEP, AHMON, Gobernación Política ,COPECO)
		1.2 Promover participación por parte del equipo de salud departamental en las asambleas de la AHMON de cada municipio para dar a conocer la situación o los logros de salud sobre enfermedades trasmitidas por el Aedes e incentivar al resto de alcaldes, instituciones para que se integren al trabajo de control del vector.
		1.3 Gestionar la aprobación de un POA presupuesto por parte de las alcaldías/ mesas intersectoriales para que se canalice en las diferentes temáticas de salud, en la planificación, organización, operativización, en la parte preventiva más que reactiva.
	2. Gestión del componente de comunicación (redes social,Spot, foros radiales, perifoneo, afiches, capacitaciones, reuniones informativas etc.)	2.1 Promover reuniones con los alcaldes y jefes regionales para compartir la experiencia de los municipios que han tenido éxito en el manejo de las mesas intersectoriales sobre el control social del Dengue – Chik en el año 2015, para la sensibilización y readecuación del Plan 2016
		2.2 Implementar una política pública en las diferentes instituciones y establecimientos públicos - privados con el objetivo que los mismos están libres de criaderos de vectores.(Vigilancia del Marco Normativo).
		2.3 Elaboración de una campaña de comunicación masiva con mensajes estandarizados , con un enfoque de marketing la cual debe ser dirigida por expertos en publicidad y mercadeo social
		2.4 Capacitar de forma sostenible y continua al personal de salud del sector público y no público sobre los lineamientos en el manejo integral de Dengue – Chik.-Zika.
		2.5 Capacitar a Gerentes de los medios de comunicación y periodistas que cubren la SESAL, en los componentes de educación y prevención sobre dengue – chik- Zika.
		2.6 La Mesa Intersectorial periódicamente debe dar a conocer las acciones programadas para el control del vector, asi como las acciones realizadas y los éxitos de las mismas utilizando los diferentes medios de comunicación
		2.7 Las acciones de control y los logros deben ser enviadas a la sala de situación regional.
		2.8 Mantener informada a la población acerca de las sanciones contempladas en las ordenanzas municipales en el caso de incumplimiento de las medidas de prevención y control del vector Aedes sp.

		2.9 Retomar las actividades de participación de los estudiantes de educación primaria-básica, media y superior en la promoción y divulgación de las medidas de control del vector a través de la participación activa secretaria de educación y salud (ejm: desfiles, carrozas, murales, festivales, ferias, etc..)
		2.10 Promover la creación de grupos organizados para crear entornos saludables (población infantil, jóvenes, adultos, adultos mayores) con orientación al control del Aedes.
		2.11 Enviar la información de las actividades en educación, promoción, prevención y control vectorial y reportarla a la sala situacional de acuerdo a la plantilla enviada por el nivel nacional.
		2.12 Facilitar la participación y acompañamiento permanente de los medios de comunicación en la divulgación de las actividades que se ejecuten.
		2.13 Elaboración de boletines informativos
		2.13 Sistematizar las experiencias exitosas
		2.14 Organización e implementación de mega ferias de la salud para promover la participación ciudadana en el marco de las mesas intersectoriales para el control de Dengue, Chikungunya y zika.
Vigilancia epidemiológica y laboratorio	1. Fortalecimiento de la vigilancia epidemiológica de las enfermedades transmitidas por el Aedes.	1.1. Ampliar el ámbito de los informantes de los casos a nivel privado.
		1.2. El envió diario de la información de las Unidades de Salud y hospitales (29) de los casos con procedencia exacta fecha de inicio de síntomas, edad, sexo, clasificación del caso.
		1.3. Análisis de la información y preparación de informes diarios: con tendencia y evolución de los casos reportados y compartidos con la mesa sectorial.
		1.4. Instalación de una sala situacional que integre la información epidemiológica con la entomológica, acciones realizadas e insumos y recursos invertidos.
	2. Fortalecimiento del laboratorio para el acompañamiento en la vigilancia.	2.1. Gestionar los reactivos y otros insumos necesarios para garantizar la respuesta de laboratorio para dengue- chikv-zikav.
		2.2. Consolidar los mecanismos para el diagnóstico diferencial de las tres enfermedades .
		2.3 Regular el uso de pruebas de diagnóstico rápido para dengue y chikungunya y zika por los laboratorios y clínicas privadas a través de Vigilancia del marco normativo.
Vigilancia y control entomológico.	1. Fortalecimiento de la vigilancia y control entomológico del	1 Lineamientos entomológicos para la vigilancia y control de los vectores socializados en todas las regiones.

	Aedes.	2 Fortalecimiento de las unidades entomológicas departamentales para vigilancia de resistencias, evaluación del impacto de las medidas de control realizadas, vigilancia anual resistencia del aedes sp a los insecticidas utilizados para control larvario.
		3 Confirmación de los índices de infestación de acuerdo a la metodología estandarizada (LIRAa) dos veces al año (febrero y Julio).
		4 Confirmación de especies encontradas en los índices de infestación dos veces al año.
		5 Ejecución de mega operativos de eliminación de criaderos en coordinación con la mesa intersectorial y población en general (dos en verano y uno en invierno) verificación del control de calidad de los mega operativos.
		6 Evaluación de la eficacia de los productos insecticidas para el control químico y biológico.
		7 Evaluación post intervención cada vez q se hagan medidas de intervención físico, biológico y químico en base a estratificación de riesgo entomológico – epidemiológico.
		8 Monitoreo de Ovitrampas se utilizaran para evaluar el impacto de medidas de control del mosquito adulto que medirá el pre y pos intervención de las actividades.
		9 Informes de inventarios de larvicidas, adulticidas tipo de insecticida, nombre del producto comercial, ingrediente activo, concentración y equipo de aplicación que especifique marca, si está en buen o mal estado y si es tipo pesado o portátil. El informe deberá de estar en enero de cada año
		10 Todos los centros educativos tienen que ser rociados en enero con insecticida residual deltrametrina al 5% o bendiocarb al 80% y los cementerios, chatarreras, yonker, llanteras y otros sitios de riesgo se trataran con motomochilas y BTI realizarlo cada tres meses, según especificaciones técnicas.
		11 El uso de temephos será utilizado a granel. Previo aforo manteniendo la dosis de 20 gr/200 lts. y BTI 1 gr/200 lts programando un metro cubico de almacenamiento por vivienda de agua. El aforamiento y la descarga dependerá de la maquina a utilizar con la deltametrina y aquareslin.
		12 Promover una ley de descarte de chatarra institucional cada año.
		13 Incorporación del sistema entomológico de dengue al SISLOC.

		14 Capacitación de todos los recursos de vigilancia sanitaria en manejo integrado de vectores.
		15 Gestionar Mapas digitalizados para el mapeo de las intervenciones y estratificación de las zonas
		16 Almacenamiento adecuado del producto químico de acuerdo a especificaciones técnicas (en caso de no contar con espacio físico en el almacén regional, gestionar la adquisición de contenedores).
		17 Reunión de Evaluación semestral con los equipos técnicos regionales y miembros de las mesas intersectoriales(Gestión por resultados).
		18 Concentración de todo el equipo de control vectorial liviano a nivel regional y MUNICIPAL y el equipo pesado a nivel central.
Atención al Paciente	1. Evitar la complicación y muerte de personas por infecciones trasmitidas por el Aedes.	1.1. Capacitar en lineamientos de manejo clínico de pacientes con dengue- chikv- zikav para su estricta aplicación por personal médico y de enfermería de las los establecimientos de salud públicos y no públicos responsables de la atención a las pacientes.
		1.2 Diseño, impresión y distribución de los lineamientos de manejo clínico de pacientes con dengue-chick y zika en todos los establecimientos de salud públicos y no públicos.
		1.3 Garantizar la aplicación de los criterios de referencia respuesta del primer al segundo nivel de atención.
		1.4 Gestionar con las autoridades de nivel central el fortalecimiento del laboratorio regional a fin de garantizar la existencia de equipo y reactivos para la realización de hemogramas seriados en el primer nivel de atención.
		1.5 Coordinar con las clínicas privadas de atención a pacientes la aplicación de la guía de atención y la notificación oportuna de casos de dengue- chikv-zikav
		1.6 Gestionar los reactivos de laboratorio clínico para la monitoria de la evolución clínica del paciente a nivel
		1.7 Gestionar los reactivos para la vigilancia serológica y virológica de dengue- chikv-zikav.
		1.8 Actualización del plan de contingencia en los hospitales ante la emergencia del
		dengue- chikv- zikav
		1.9 Establecimiento un sistema de capacitación continua para el personal de salud de la redes del primer y segundo nivel que incluya también al sector privado.

		1.10. Reactivación de las comisiones de certificación de casos y muertes por estas tres enfermedades en el nivel nacional y de las regiones.
		1.11. Establecer un sistema de vigilancia para caracterizar y analizar eventos congénitos asociados a Zika en el segundo nivel de atención.
		1.12 Establecer la sistematización del seguimiento de la mujer embarazada de preferencia durante el control prenatal con riesgo de exposición a zikav en el primer nivel y segundo de atención.
		1.13 Crear un sistema de vigilancia a la mujer embarazada con riesgo de exposición a Zika.
		1.14 Fortalecer el sistema de vigilancia de eventos neurológicos (S. Guillian Barre) en el primer nivel y segundo de atención que incluya al sector privado, en coordinación con el PAI.
Agua y Saneamiento	1. Garantizar el abastecimiento de agua de manera oportuna y segura durante el periodo de la emergencia de dengue.	1.1 Gestión de programaciones de estricto cumplimiento de la distribución oportuna del agua según los barrios donde se estarán realizando las intervenciones de eliminación de criaderos.
		1.2 Elaborar recomendaciones a través de spot radiales y televisivos para los habitantes a fin de promover agua segura libre de larvas zancudos para evitar criaderos dentro de la vivienda.
		1.3 Promover el drenaje de aguas y recipientes que acumulan agua y que constituyen criaderos de Aedes.
		1.4 cumplimiento estricto de la Ordenanza Municipal para el Limpieza de solares, cementerios, yonker, llanteras y otros sitios peligrosos así como la eliminación de la chatarreras.
		1.5 Cumplir estrictamente con la programación de la recolección de los desechos sólidos en toda la ciudad (sin descuidar ningún sector, barrio y colonia).

PLAN FINANCIERO DE INSUMOS, EQUIPO Y MEDICAMENTOS MINIMOS NECESARIOS PARA ATENCION DE LA EMERGENCIA

COMPONENTE	INSUMOS	COSTOS EN LEMPIRAS	NECESIDADES
CONTROL ENTOMOLOGICO (CONTROL DEL VECTOR)	INSTALACION Y DE UN TALLER NACIONAL PARA EL MANTENIMIENTO Y REPARACION DE EQUIPO PARA EL CONTROL DE VECTORES	10000000.00	CAPACITACION DE RECURSO HUMANO NACIONAL Y DE LAS REGIONES, COMPRA DE REPUESTOS, MATERIALES E INSUMOS PARA LA INSTALACION DE UN TALLER DE MANTENIMIENTO Y REPARACION.
	CAMION PARA TRASLADO DE MAQUINAS DE EQUIPO PESADO,INSUMOS Y EQUIPO DEL TALLER A LAS REGIONES Y VICEVERSA	1000000.00	UN CAMION DE CAPACIDAD DE 10 TONELADAS PARA TRASLADO DE MAQUINAS LECO.
	TERMONEBULIZADORAS MANUALES	10000000.00	400 MAQUINAS PARA FUMIGACION DE USO EN FRIO Y CALIENTE (en la misma maquina).
	MAQUINAS ULV EN FRIO (LECCO)	7000000.00	20 MAQUINAS
	KIT DE REPUESTOS PARA LAS MAQUINAS DE FUMIGACION	2000000.00	1000 KIT
	INHIBIDORES DE CRECIMIENTO	7000000.00	2500 KILOS
	COMBUSTIBLE GASOLINA	7500000.00	100,000 GALONES
	COMBUSTIBLE DIESEL para maquinas y vehiculos	13000000.00	200,000 GALONES
	DELTAMETRINA 2.5% CE + PBO 250 g/litro	4000000.00	4,000 LITROS de insecticida para tres ciclos de fumigación

	BENDIOCARB WP 80%	7000000.00	2500 KILOGRAMOS
	BTI	4000000.00	4000 KILOGRAMOS
	AQUARESLIN SUPER	15000000.00	15,000 LITROS
	EQUIPO DE PROTECCION PERSONAL PARA FUMIGACION	2000000.00	2000 KITS DE PROTECCION PERSONAL (OVEROLES IMPERMEABLES, ANTEOJOS,CASCOS DE PLASTICO,MASCARILL AS DE FILTRO DE CARBON ACTIVADO)
VIGILANCIA EPIDEMIOLOGICA Y LABORATORIAL	LABORATORIO (REACTIVOS), EQUIPO RECURSO HUMANO	10000000.00	VIROLOGIA Y SEROLOGIA
COMUNICACIÓN SOCIAL	PROMOCION DE LA SALUD	10000000.00	MATERIAL DE PROMOCION, SPOT RADIALES, IMPRESIÓN DE MATERIALES, OTROS
ATENCION AL PACIENTE	CONTRATACION DE PERSONAL (EN CASO DE DECLARACION DE EMERGENCIA POR PACIENTES GRAVES)	3,900,000.00	50 MEDICOS POR TRES MESES
		1,620,000.00	30 ENFERMERAS POR TRES MESES
		3,285,000.00	150 A/E POR TRES MESES

	INSUMOS PARA MANEJO DE PACIENTES GRAVES POR ESTAS ENFERMEDADES (Incluye manejo de pacientes en UCI)	30000000.00	Sales de rehidratacion oral, sueros iv, acetaminofén, catéter, venoclisis, termómetros, dopamina, adrenalina, dobutamina, milrinone, , midazolan, bombas de infusión, inmunoglobulinas,plasma, cartillas de seguimiento, afiches con flujograma de pacientes, lineamientos de manejo clínico de pacientes, mosquiteros, otros.
	INSUMOS PARA MANEJO DE PACIENTES CHIKUNGUNYA Y ZIKA	8000000.00	ACETAMINOFEN, IBUPROFENO, DICLOFENACO, SALES DE REHIDRATACION ORAL,CARTILLAS DE SEGUIMIENTO, AFICHES CON FLUJOGRAMA DE PACIENTES, LINEAMIENTOS DE MANEJO CLINICO DE PACIENTES, OTROS
	ESFIGMOMANOMETROS DE ADULTOS Y PEDIATRICOS	800000.00	1000 ESFIGMOMANOMETROS(DE DULTOS Y PEDIATRICOS , MANUALES)
	LABORATORIO HEMOGRAMA	10000000.00	5 HEMOGRAMAS POR PACIENTE POR CUARENTA MIL PACIENTES
SUPERVISION Y MONITORIA	SUPERVISION Y MONITORIA	8000000.00	GASTOS DE MOVILIZACION, CAPACITACIONES Y EVALUACION
	JORNADAS DE CAPACITACION A EPIDEMIOLOGOS Y EVALUACION DE LAS INTERVENCIONES	15000000.00	Talleres de CAPACITACION Y DE SEGUIMIENTO.(manejo clínico, control vectorial, vigilancia epidemiológica, control de calidad, unidades de análisis y sistemas de información, entre otras)
			TALLER DE EVALUACION Y PLANIFICACION

TOTAL		**190105000.00**	
SOLICITANDO APOYO DE RECURSO HUMANO AL SEÑOR MINISTRO, IDECOAS/FHIS	PREVENCIÓN DEL RIEGO EN SALUD		5000 RECURSOS

PLAN DE NECESIDADES IDONEAS PARA LA ATENCION DE LA EMERGENCIA DE ZIKA EN EL PAÍS PARA SOLICITUD DE APOYO A LA COOPERACION EXTERNA.

Este plan incluye la adquisición de Inmunoglobulina, Ventiladores mecánicos debidamente equipados, mosquiteros impregnados y repelentes para la atención de embarazadas con sospecha de zika, vehículos de 4 ruedas tipo pick up, incremento en el número de máquinas pesadas de fumigación tipo LECO

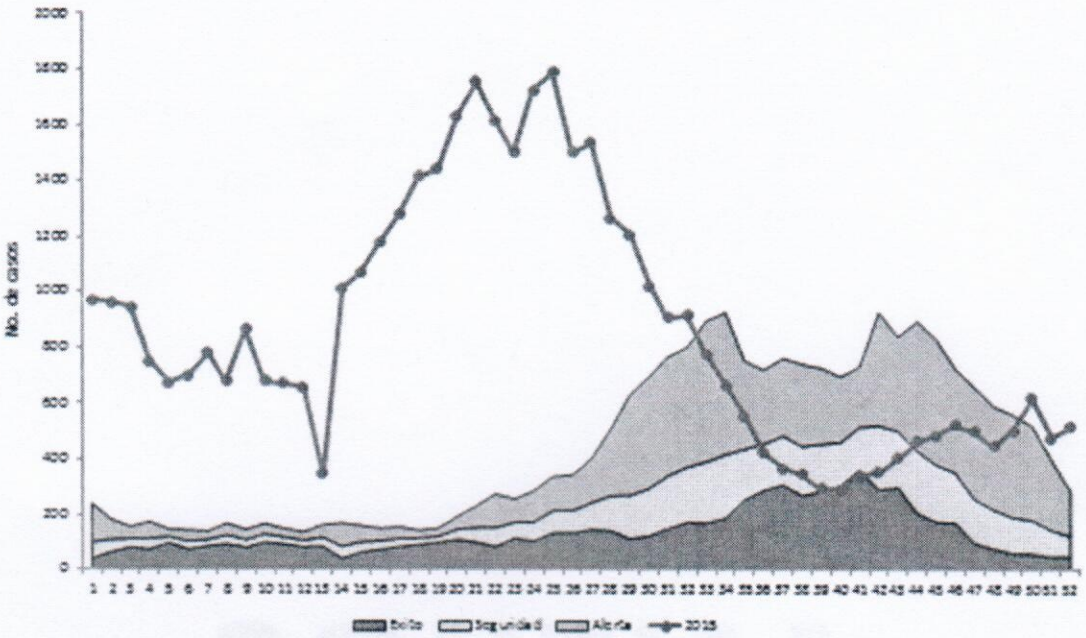
INSUMO	CANTIDAD	PRECIO UNITARIO APROXIMADO EN LEMPIRAS	COSTO EN LEMPIRAS	PRECIO APROXIMADO EN DOLARES
Medicamentos para la atención de pacientes graves por dengue o las complicaciones del virus del zika como ser el síndrome de Guillain Barré: Inmunoglobulinas proyección 300 pacientes	12,000 amp	7000	84000000	3716814
Ventiladores mecánicos	10 unidades	300000	3000000	132743
Equipo portátil de fumigación: Termonebulizadoras Dual(aplicación con agua y diesel)	400 unidades	25000	10000000	442478
Equipo pesado de fumigación: Maquinas LECO	40 unidades	300000	12000000	530973
Los repelentes que contienen DEET (N, N-dietil-3-metilbenzamida), IR3535 (3-[N-acetil-N-butil]-éster etil ácido aminopropiónico) o Icaridina (ácido-1 piperidinecarboxílico, 2-(2-hidroxietil)- 1-metilpropilester) , Frascos de 250 ml	500,000 unidades	150	75000000	3318584
Cartillas plastificadas de signos y sintomas de dengue , chikungunya y zika	15,000 unidades	50	750000	33186
Mosquiteros impregnados para protección de la embarazada.	100,000 unidades	300	30000000	1327434
Impresión de lineamientos clínicos y protocolos de manejo	15,000 unidades	300	4500000	199115
Afiches de protocolos (reproducción).	10000 unidades	50	500000	22124
Impresión de material educativo	15,000 ejemplares	150	2250000	99558
Equipo de sonido para perifoneo para montaje en vehículo	45 unidades	25000	1125000	49779

Megafonos	200 Unidades	1500	300000	13274
Chalecos, gorras, gafetes de identificación del personal de las brigadas.	10,000	500	5000,000	221239
Financiamiento para contratacion de personal médico y de enfermería (medicos Lic. Enfermeras y Auxiliares de Enfermería 230 personas)	8805000	8805000	8805000	389602
Insecticidas: Permetrina+PBO-biolaletrina	20,000 litros	1500	30000000	1327434
Larvicidas: Bacillus Thuringiensis Israeliensis BTI WG.	10,000 kg	1000	10000000	442478
Inhibidores de crecimiento	2500 kg	2300	5750000	254425
Vehículos de 4 ruedas tipo pick up.	40 unidades	600000	24000000	1061946
Reactivos de Laboratorio para serología y virología	para 3000 muestras	2000	6000000	265487
Combustible diesel	200000 galones	65	13000000	575221
Combustible gasolina	100,000 galones	75	7500000	331859
Trajes de protección personal (overoles impermeables, anteojos, cascos plásticos, mascarillas de filtro de carbón activado, botas de hule).	2000 trajes	2000	4000000	176991
BENDIOCARB WP 80%	2500 kilogramos	2300	5750000	254425
Camión para el traslado de equipo pesado y otros insumos desde el nivel central a las regiones y viceversa	1 unidad	1000000	1000000	44248
TOTAL		11076240	344230000	15231416

COMPONENTE DEL PLAN	**COSTO APROXIMADO EN LEMPIRAS**	**PRECIO APROXIMADO EN DOLARES AMERICANOS**
COORDINACION Y GESTION DEL PLAN		
CONTROL ENTOMOLOGICO (CONTROL DEL VECTOR)	123000000	5442477
VIGILANCIA EPIDEMIOLOGICA Y LABORATORIAL	6000000	265486
ATENCION AL PACIENTE	206555000	9139601
COMUNICACIÓN Y MOVILIZACION SOCIAL	8675,000	383849
AGUA Y SANEAMIENTO		
TOTAL	**344230000**	**15231413**

ANEXOS

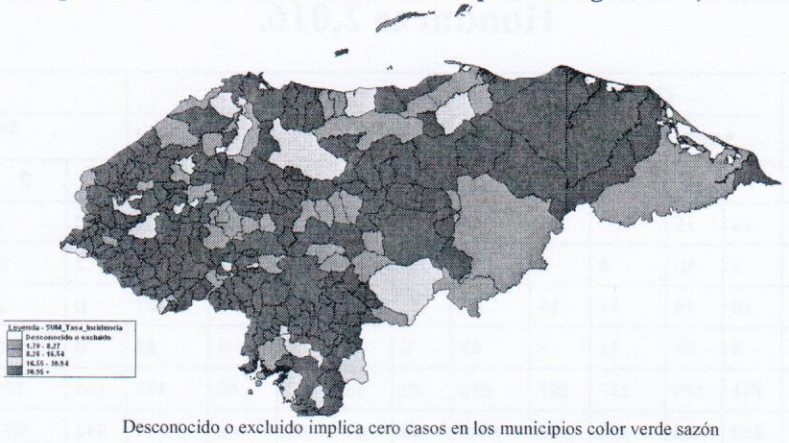
Corredor endemico semanal de dengue 2015, Honduras
Historico de 5 años: 2006 - 2014 (excluyendo 2007, 2010, 2013 Y 2014
Semana No. 52



Casos sospechosos de Chikungunya Dengue y Zika a la semana 4 en Honduras 2,016.

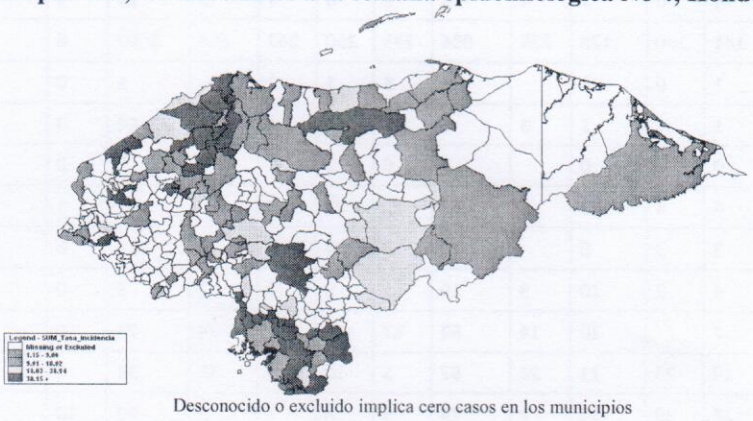
Regiones Sanitarias /Semanas	Chikungunya					Dengue					Zika				
	Semanas 2015/16				Acumulado 2016	Semanas 2015/16				Acumulado 2016	Semanas 2015/16				Acumulado 2016
	1	2	3	4		1	2	3	4		1	2	3	4	
Atlántida	16	16	20	14	**66**	32	23	28	18	**101**	0	2	2	5	**9**
Colon	8	10	8	2	**28**	8	9	5	11	**33**	1	0	0	2	**3**
Comayagua	18	14	17	14	**63**	28	30	25	24	**107**	0	2	0	3	**5**
Copan	8	18	12	9	**47**	6	3	4	9	**22**	0	0	0		**0**
Cortes	251	175	137	107	**670**	29	35	52	40	**156**	164	329	403	468	**1364**
Metro San Pedro Sula	310	226	226	256	**1018**	86	61	81	82	**310**	342	595	681	698	**2316**
Choluteca	97	79	57	54	**287**	218	168	84	90	**560**	73	151	147	101	**472**
El Paraíso	6	15	14	26	**61**	7	6	12	17	**42**	6	5	3	16	**30**
Francisco Morazán	4	6	1	4	**15**	2	0	4	5	**11**	3	0	1		**4**
Metro de Tegucigalpa	141	140	128	225	**634**	233	250	242	284	**1009**	6	5	24	49	**84**
Gracias a Dios	1	0	0		**1**	3	1	2		**6**	0	0	0		**0**
Intibuca	1	1	1	3	**6**	5	3	4	2	**14**	0	1	0	1	**2**
Islas de la Bahía	0	0	0		**0**	0	3	0	2	**5**	0	0	0		**0**
La Paz	4	4	3	2	**13**	16	23	3	5	**47**	1	9	17	15	**42**
Lempira	3	3	0		**6**	4	4	2	1	**11**	0	0	0		**0**
Ocotepeque	4	2	10	3	**19**	1	0	2	2	**5**	0	0	0		**0**
Olancho	7	11	20	14	**52**	17	11	22	24	**74**	0	0	2	7	**9**
Santa Bárbara	19	23	21	24	**87**	5	10	3	13	**31**	0	0	10	47	**57**
Valle	24	29	12	9	**74**	9	8	7	5	**29**	10	15	13	11	**49**
Yoro	67	46	49	39	**201**	22	12	22	15	**71**	2	5	7	13	**27**
Total Nacional	**989**	**818**	**736**	**805**	**3348**	**731**	**660**	**604**	**649**	**2644**	**608**	**1119**	**1310**	**1436**	**4473**

Caracterización de los municipios con Dengue
por tasa por 100,000 habitantes a la semana epidemiológica No 4, Honduras, 2016



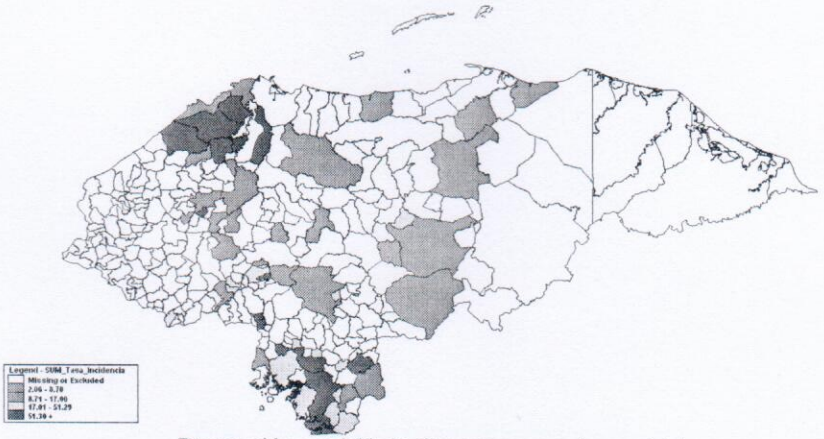
Desconocido o excluido implica cero casos en los municipios color verde sazón

Caracterización de los municipios con Chikungunya
por tasa por 100,000 habitantes a la semana epidemiológica No 4, Honduras, 2016



Desconocido o excluido implica cero casos en los municipios

Caracterización de los municipios con Zika
por tasa por 100,000 habitantes a la semana epidemiológica No 4, Honduras, 2016



Desconocido o excluido implica cero casos en los municipios

ANNEX D: INTEGRATED ZIKA, CHIKUNGUNYA DENGUE RESPONSE PLAN – EXAMPLE FROM EL PARAÍSO

Secretaria de Salud

DEPARTAMENTO DE VIGILANCIA DE LA SALUD

REGIÓN SANITARIA EL PARAÍSO

PLAN ESTRATÉGICO DE GESTIÓN INTEGRADO DE PREVENCION Y CONTROL DE LAS ENFERMEDADES TRANSMITIDAS POR EL VECTOR AEDES AEGYPTI PRODUCIDAS POR ARBOVIRUS: DENGUE-CHICUNGUNYA-ZIKAV

DEPARTAMENTO DE EL PARAÍSO.

2016

INDICE

Marco de Referencia Estratégico

La situación epidemiológica anual a la alarmante situación de las enfermedades producidas por **Arbovirus Dengue-chicungunya y zikav** constituye un marco de referencia para prevención y control de estas enfermedades, teniendo como paradigma la promoción de salud, con énfasis en la coordinación de acciones entre el sector salud, los sectores económicos y sociales, las organizaciones no gubernamentales, y todas aquellas nuevas asociaciones tradicionales o no que sean capaces de apoyar el fortalecimiento de los programas regionales de prevención y control. Las acciones que se generen deben perseguir como objetivo final, fomentar el cambio de conducta tanto individual como colectiva en lo relacionado con un mejor ordenamiento ambiental en función de la prevención de las enfermedades producidas por **Arbovirus Dengue-chicungunya y zikav**.

Dando respuesta a esta situación presentada, se propone introducir un modelo de gestión, el cual contempla una nueva forma de cooperación técnica, con la creación de un *Grupo de Trabajo de prevención en* las enfermedades producidas por **Arbovirus Dengue-chicungunya y zikav**.

El GT- **Arbovirosis Dengue-chicungunya y zikav** es un grupo municipal regional para modificar las prácticas existentes y poner en marcha la estrategia de gestión integrada para la prevención y control de las enfermedades producidas por **Arbovirus Dengue-chicungunya y zikav**. Esta estrategia es horizontal, intersectorial, inter-programática y busca el cambio de conducta para condicionantes de riesgo a las enfermedades producidas por **Arbovirus**.

Las metas que concretamente persigue la EGI- **Arbovirus Dengue-chicungunya y zikav** a nivel de Región El Paraíso son:

(i) reducir el número de brotes;
(ii) (ii) Disminuir la magnitud y gravedad de los brotes;
(iii) Mantener bajo el número de casos de la enfermedad; y
(iv) Reducir la mortalidad causada por dengue u otras arbovirosis.

INTRODUCCION

En los últimos años la temática de las enfermedades producidas por Arbovirosis ha adquirido mayor relevancia ya que son enfermedades graves de gran impacto epidemiológico, considerada como un problema creciente de salud pública y más alarmante que su propagación, es el hecho de que haya logrado introducirse en las Américas en sus formas mas graves como lo son el dengue hemorrágico y el síndrome de choque por dengue., el chicungunya y el Zikav. Aunque en todos los países de Centroamérica se realizan importantes esfuerzos para la prevención y control de estas enfermedades, las intervenciones ejecutadas hasta el momento no han dado los resultados esperados porque las acciones orientadas a la prevención y control de la enfermedad no rebasaban la frontera del sector salud y sobre todo en nuestro país, razón por la cual la coordinación intersectorial ha sido muy limitada o prácticamente nula.

En base a un nuevo modelo de trabajo integrado que incluye la promoción de salud y la búsqueda de nuevas asociaciones, se elabora una estrategia de gestión integrada para prevenir y controlar los **Arbovirus Dengue-chicungunya y zikav**. Esta estrategia introduce una nueva forma de colaboración técnica: la creación del Grupo Técnico para la implementación de la Estrategia de Gestión Integrada-, esto permitirá el fortalecimiento de los programas a nivel Regional municipal y local, acciones que estarán orientadas a reducir los factores de transmisión de las enfermedades e implementar un sistema de vigilancia integral.

El presente documento integra los componentes propios que tienen que ver con la prevención y control de **Arbovirus Dengue-chicungunya y zikav** en: * promocion de la salud, * atención al paciente, * comunicación social, * entomología, * laboratorio y * vigilancia epidemiológica, pero también, tomando en cuenta los macrofactores del medio ambiente que influyen directa e indirectamente en el comportamiento epidemiológico y social que estas enfermedades representan para El Departamento de El Paraíso y todo el país.

La Organización Panamericana de la Salud (OPS) / Organización Mundial de la Salud (OMS) recomienda a sus Estados Miembros que establezcan y mantengan la capacidad para detectar y confirmar casos de infección por virus de Dengue, Chicungunya y Zika, tratar a los pacientes, implementar una efectiva estrategia de comunicación con el público para reducir la presencia del mosquito transmisor de esta enfermedad, en especial en las áreas en las que está presente el vector.

En aquellos ZONAS con casos autóctonas de infección por virus de Dengue, Chicungunya Zika, se recomienda:

[1] Información disponible en: http://web.minsal.cl/node/794

☐Vigilar la diseminación geográfica del virus para detectar la introducción en nuevas áreas;

☐Evaluar la gravedad clínica y el impacto en salud pública;

☐Identificar factores de riesgo asociados a la infección por virus Dengue, Chicungunya Zika, y, cuando exista la capacidad; e

☐Identificar los linajes del virus Zika circulantes.

Estos esfuerzos proporcionarán la base para desarrollar y mantener medidas de control efectivas. Una vez documentada la introducción del virus, se deberá mantener la vigilancia continua para monitorizar los cambios epidemiológicos y entomológicos que puedan afectar a la transmisión del virus Dengue, Chicungunya, Zika. Todo cambio detectado mediante la vigilancia debe ser rápidamente comunicado a las autoridades nacionales de prevención y control para garantizar la adopción oportuna de las medidas pertinentes.

Las metas que se pretenden alcanzar con la estrategia de Gestion Integrada en El Paraíso son:

- Reducir el numero de brotes
- Disminuir la magnitud y gravedad de los brotes
- Mantener tasa de morbilidad bajas por esta enfermedad
- Reducir la mortalidad causada por dengue
- Incrementar las acciones de prevencion y control

Situación Epidemiológica de Arbovirus Dengue-chicungunya y zikav en Honduras y El Paraíso

En los últimos años la temática de **Arbovirosis Dengue-chicungunya y zikav** ha adquirido mayor relevancia ya que son enfermedades graves y de gran impacto epidemiológico, considerados como un problema creciente de salud pública y más alarmante que su propagación, es el hecho de que haya logrado introducirse en las Américas en sus formas mas graves como lo son el dengue hemorrágico y el síndrome de choque por dengue, **chicungunya y zikav**.

Las condiciones de pobreza del país, y en el departamento de El Paraíso la migración de la población del área rural hacia la ciudad de Danlí, el crecimiento urbano no planificado, hacinamiento, viviendas inadecuadas, abastecimiento de agua potable deficiente en zonas de mayor concentración poblacional, bajo grado de escolaridad, escasa percepción de la población sobre la enfermedad y el vector, entre otros son determinantes que favorecen el riesgo de enfermar y/o morir por **Arbovirosis Dengue-chicungunya y zikav**.

El impacto económico del dengue, el dengue hemorrágico y otras arbovirosis es alto ya que para la intervención en la epidemia del año 2002 y 2007 se invirtieron aproximadamente $ 2,449,067 en atención a pacientes y $1,262,043 para equipo e insumos haciendo un total de $3,711,110 cada año para el control de estas epidemias y consideramos que este presupuesto constituye una carga considerable para la población y para el gobierno, el impacto economico en la intervencion de la epidemia del año 2010 no se ha cuantificado aun. Estos impactos en la medidas de intervencion incluye pérdidas de vidas con un promedio de 10 defunciones por año, a excepción del año 2010 donde se reportaron 83 defunciones. Ademas se debe tomar en cuenta el período de incapacidad laboral por cada persona sospechosa de dengue clasico y otras arbovirosis, que puede ser de 3 a 7 días, puediendose incrementar este periodo si el paciente desarrolla dengue hemorragico o su complicacion mas grave como lo es el shock por dengue, enfermedades post Chicungunyas como artritis crónica, los riesgos de desarrollo de microcefalia en los fetos de mujeres embarazadas, Sd de Guillian Barré posterior al Zikav, con la consecuente pérdida de productividad de la población económicamente activa afectando la economía nacional.[30]

[30] Secretaría de Salud. Informe Ejecutivo, Programa Nacional de Dengue 2002.

La vigilancia de fiebre por virus Zika debe desarrollarse a partir de la vigilancia existente para el dengue y chikungunya, teniendo en cuenta las diferencias en la presentación clínica. Según corresponda a la situación epidemiológica del país, la vigilancia debe estar orientada a (i) detectar la introducción del virus Zika en un área, (ii) a rastrear la dispersión de la fiebre por virus Zika una vez introducida o (iii) vigilar la enfermedad cuando ésta se ha establecido.

Tradicionalmente se han utilizado medidas de control vectorial que incluye los operativos de eliminacion de criaderos, asi como la utilizacion de larvicidas y adulticidas lo

que genera un alto costo para la institución dado la falta de recursos humanos y financieros para hacer frente a este problema de salud, sin lograr un impacto sostenible de las acciones de prevencion y control.

Para este año la Región Sanitarian asumió continuar con la implementación de estrategias de control vectorial, centradas en la eliminación de criaderos con participación comunitaria y de los gobiernos locales, así como de otras instituciones de carácter público y privado, logrando una disminución de los casos en un 63% comparado con el año anterior. Esta estrategia enfoca elementos de comunicación social que refuerzan de manera proactiva el concepto de limpieza en los hogares a través del lavado de recipientes que almacenan agua. Sin embargo, los índices de infestación por *Aedes aegypti* continúan siendo altos, prevaleciendo la positividad en pilas, barriles, depósitos diversos y llantas.

Las lecciones aprendidas a nivel institucional nos enseña, que la participación comunitaria es un elemento fundamental, desempeñando un rol importante en la sostenibilidad de las acciones de control y prevención de las enfermedades causadas por arbovirosis y transmitidas por el vector Aedes aegypti. Así como la integración de otros componentes como la vigilancia epidemiológica y entomológica, laboratorio y atención al paciente y la intra e intersectorialidad con empresas públicas y privadas, gobiernos municipales, ministerio de medio ambiente y organismos responsables por agua,recoleccion de desechos, destino final de llantas usadas, propietarios de yonker, car wash entre otros.

IV. Estrategia de Gestion Integrada – **Arbovirus Dengue-chicungunya y zikav**

Objetivo General:

- Implementar y consolidar a nivel regional la Estrategia Integrada de Prevención y Control de las **Arbovirosis Dengue-chicungunya y zikav** para disminuir la magnitud y gravedad de casos, menteniendo bajos el numero de casos y reducir la morbi-mortalidad causada por estas a traves del fortalecimiento los componentes de comunicación social, vigilancia epidemiologica, el manejo integrado de vectores, ambiente, atencion al paciente, laboratorio y entomología.

Objetivos Específicos:

1. Fortalecer la vigilancia epidemiológica, entomológica y laboratorio a traves de la implementacion de nuevos mecanismos de vigilancia a traves de un sistema único de información los establecimientos de salud centinelas que ademas vigilará otras enfermedades de acuerdo a sus normas y procedimientos.
2. Atender oportunamente y de manera eficaz a todo paciente sospechoso de **Arbovirus Dengue-chicungunya y zikav** que demande los servicios de salud.
3. Gestionar con los gobiernos municipales, Proveedores de agua a nivel público, urbano y rural y otros instituciones encargadas del suministro de agua potable y la recoleccion de desechos el incremento al % de viviendas con cobertura de estos servicios basicos para garantizar la dotacion oportuna de agua segura y la recoleccion de desechos solidos en las comunidades.
4. Desarrollar nuevas tecnicas en acciones de prevencion con la adquisicion de insumos y equipos.

Meta

- Contribuir a la reducción de la morbilidad, mortalidad y la carga socio-económica causada por enfermedades por **Arbovirus Dengue-chicungunya y zikav**.

Metodologia

1. Coordinar en el nivel , regional y municipal la participacion de otras instituciones publicas y privadas las acciones de prevencion y control del vector Aedes aegypti.
2. Establecer alianzas estrategicas con la secretaria de Educacion y gobiernos municipales para lograr la sostenibilidad de las acciones de prevencion y control de vector Aedes aegypti.

3. Garantizar durante el año la campaña de educacion a la población orientada a desarrollar las medidas de prevención y control del vector Aedes aegypti a traves de medios de comunicación.
4. Promover cambios de conducta en la poblacion orientados a la prevención y control del vector Aedes aegypti.
5. Capacitar a personal médico, enfermería de las unidades de salud, públicas y privadas donde exista mayor demanda por pacientes con vector Aedes aegypti sobre los lineamientos de vigilancia y manejo estandarizado del paciente con vector Aedes aegypti.
6. Concertar a traves del nivel regional, municipal y local reuniones de trabajo con los patronatos de barrios y colonias para la coordinacion de las acciones de prevencion y control del vector Aedes aegypti.
7. Fortalecer el comité de certificacion de casos de arbovirosis a nivel nacional y departamental de manera progresiva.
8. Desarrollar proceso de supervisión capacitante y sistemática para monitoriar los indicares de la EGI-arbovirosis Dengue-chicungunya- zikav.


Componentes de Estrategia de Gestión Integrada – Dengue
Vigilancia Epidemiológica
Comunicación Social
Manejo Integrado de vectores
Estrategia de Gestión Integrada
Laboratorio
Ambiente/Gestión
Atención al paciente
Participación del pueblo hondureño

v. *Estrategia de Gestión Integrada para la Prevención y Control de* vector Aedes aegypti para prevenir Arbovirus Dengue-chicungunya y zikav *REGIÓN SANITARIA El Paraíso*

Propósito	Indicadores	Fuentes de verificación	Supuestos
Una estrategia de gestión integral y multisectorial para la prevención y control *de* vector Aedes aegypti para prevenir Arbovirus Dengue-chicungunya y zikav implementada y consolidada en El Paraíso.	Alcanzar y mantener una reduccion a menos de 500 casos a partir de una disminución progresiva anual del 20%; y sostener la tasa de letalidad por DH por debajo del 0.5% anualmente en El Paraíso. Incorporar el 100% de instituciones públicas y privadas en zonas de riesgo de cada una de los municipios. El 70% de los sectores Públicos y privados de Honduras Incorporados activamente a la Estrategia integrada de prevención y control de *de* vector Aedes aegypti para prevenir Arbovirus Dengue-chicungunya y zikav.	Plan Regional de la EGI-EL PARAÍSO. Informes de monitoreo y evaluación de la EGI Regional. Actas, acuerdos, convenios con instituciones involucradas Boletín epidemiológico	Voluntad politica Participacion activa de las autoridades de salud regionales, municipales y locales. Compromiso intra-inter institucional y sectorial.

COMPONENTE AGUA Y SANEAMIENTO AMBIENTAL

Resultado Esperado	Indicadores	Fuentes de verificación	Supuestos
R.1 Suministrada el agua potable en forma oportuna y eficiente (calidad, cantidad y presion).	50% de las localidades con mayor riesgo tienen suministro de agua potable.	Informes de Suministro del Aguas de danlí y todos los proveesores de agua potable municipales, Municipalidades y concesionarias. Encuestas de verificacion	Voluntad política Recursos Financieros asignados.
R.2 Emitidas Leyes, Reglamentos y/u ordenanzas para el manejo, disposición e importación de llantas, desechos no biodegradables y chatarras.	Aplicación del 100% de leyes, reglamentos u ordenanzas vigentes.	Publicacion en Gaceta Oficial o Gaceta Municipal Informes de sanciones aplicadas Informes de monitoreo de cumplimiento de las leyes.	Voluntad Politica Participación activa de los gobiernos municipales
R.3 Implementado en forma eficaz y eficiente el servicio de recoleccion, manejo y destino final de los desechos solidos.	50% de localidades de mayor riesgo con recoleccion, manejo y destino final adecuado de los desechos solidos.	Informes de Supervision de la prestacion del Servicio.	Voluntad politica Recursos financieros asignados. Participacion activa de los gobiernos municipales

COMPONENTE AGUA Y SANEAMIENTO AMBIENTAL

Resultados Esperados	Actividades
R.1 Suministrada el agua potable en forma oportuna y eficiente (calidad, cantidad y presion).	1. Gestionar el incremento al % de viviendas con el abastecimiento de agua de manera oportuna en las localidades de riesgo. 2. Capacitar a los miembros de las juntas de agua y poblacion en general, etc en el correcto manejo, uso y almacenamiento del agua.
R.2 Emitidas Leyes, Reglamentos y/u ordenanzas para el manejo, disposicion e importacion de llantas, desechos no biodegradables y chatarras.	1. Gestionar para que se legisle la ley sobre la controlada importación, uso y destino final de llantas y chatarra. 2. Vigilar el cumplimiento de ordenanzas municipales en sitios de riesgo y solares baldios
R.3 Incrementado el % de viviendas con un eficaz y eficiente servicio de recoleccion, manejo y destino final de los desechos solidos	1. Gestionar el incremento al % de viviendas con la recoleccion de desechos solidos de manera oportuna en las localidades de riesgo. 2. Eficientar la recolección , manejo y destino final de los desechos solidos.

COMPONENTE: AGUA Y SANEAMIENTO AMBIENTAL

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
1. Mejorar la distribución del abastecimiento de agua en cada comunidad.	1. Realizar reuniones con los entes involucrados para ampliar la cobertura. 2. Establecer sistemas de verificación y monitoreo	X X	X X	X X	Comisiones Inter-institucionales AGUAS DE DANLÍ SERNA Municipalidades Concesionarias de Agua Potable	Concensuar alianzas de cooperacion estrategica para la ejecucion de las actividades que contemplen convenios de compromiso financiero.
2.Aplicar la tecnología para el manejo, uso y almacenamiento del agua.	1. Realizar Ferias de Agua 2.Impartir capacitaciones 3. Implementar nuevas tecnicas de manejo, uso y almacenamiento de agua.	X X X X	X X X	X X X	SANAA SERNA Municipalidades Secretaria de Salud Comisiones Interinstitucionales FHIS	
3.Vigilar el cumplimiento de ordenanzas municipales en sitios de riesgo.	Monitoreo del cumplimiento de ordenanzas en sitios de riesgo. Aplicación de sanciones según la ley.	X X	X X	X X	Gobiernos Municipales Fiscalia del medio Ambiente	

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
4. Gestionar para que se legisle sobre la importanción, uso y destino final de llantas y chatarra.	Conformar un Comité para la gestion. Revisar leyes existentes y su vigencia Preparar y presentar Propuestas de Ley Socializar las leyes aprobadas	X X X X	 X X	 X	Secretaria de Salud Poder Legislativo Gobiernos municipales Empresa Privada	
5. Eficientar la recolección, manejo y destino final de los desechos solidos.	1. Ajustar los planes de desechos solidos de acuerdo a los riesgos de salud de la poblacion expuesta. 2. Monitorear el cumplimiento de los planes de desechos solidos.	X X	X X	 X	Gobiernos Municipales Concesionarias SERNA Ministerio de Educación ONG's Agencias de Cooperacion Externa	

C= Corto plazo (1 año), M= Mediano plazo (2-3 años), L= Largo plazo (4-5 años)

COMPONENTE: PROMOCIÓN DE LA SALUD

Resultado Esperado	Indicadores	Fuentes de verificación	Supuestos
R1. Desarrollado e implementado el Plan de educación, comunicación y participación social adecuado a las características socio-culturales, demográficas, económicas, ambientales, epidemiológicas, clínicas y entomológicas de la población.	100% de las localidades en riesgo disponen de un diagnóstico situacional con participación social. 80% de las localidades en riesgo tienen comité de salud integral organizado y funcionando. 100% de las localidades en riesgo con un plan integral para la prevención y control del aedes para combatir las arbovirosis: dengue, Chick y Zika, concertado y negociado con los diferentes actores y sectores de la sociedad. 75% de las familias en las localidades de riesgo lavando y cepillando pilas y barriles adecuadamente. 100% de la curricula de educacion pre-basica y basica incluyen la tematica de salud ambiental. 100% del material y mensajes educativos de prevención y control del vector aedes, para evitar las arbovirosis: dengue, chick y zika diseñado y validado con la comunidad.	Diagnóstico situacional elaborado. Informe de estudios de investigación social Actas de constitución de los Comités y ayudas memorias de reuniones. Plan Integral elaborado Encuestas Entomologicas Jornalizacion periodica escolar. Materiales de promoción y educación producidos Informes descriptivo de la validación del material educativo producido.	Voluntad y compromiso comunitario Coordinación Inter.-institucional y multidisciplinaría. Disponibilidad de recursos materiales, humanos y financieros. Voluntad política y decision de las autoridades de Educacion. Disponibilidad de Recursos humanos y recursos financieros asignados.

COMPONENTE PROMOCION SOCIAL

Resultados Esperados	Actividades
R1. Desarrollado e implementado el Plan de educación, comunicación y participación social adecuado a las características socio-culturales, demográficas, económicas, ambientales, epidemiológicas, clínicas y entomológicas de la población.	Sistematizar, actualizar, capacitar y evaluar los procesos de investigación-acción-participativa. Estudiantes universitarios, en servicio social, Elaborar planes integrales de prevención y control del vector Aedes: y evitar dengue chicungunya y zika, a nivel departamental y municipal y local. Incorporar en la curricula de educacion pre-basica y basica la tematica de Salud Ambiental Producir material educativo según las características de la población en riesgo. Divulgar mensajes de prevencion y control de dengue.

COMPONENTE PROMOCION SOCIAL

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
Sistematizar, actualizar, capacitar y evaluar los procesos de investigación-acción-participativa.	1. Realizar los diagnósticos situacionales de los municipios de mayor riesgo.	X			Equipo departamental y municipal.	Realizado en Localidades de mayor riesgo.
	2. Capacitar equipos departamentales y municipales en metodología orientada a los cambios de conducta en la poblacion	X	X	X		Deberá ser gestionado con agencias cooperantes.
	Jornadas de trabajo con duracion de 3 a 4 dias con los equipos de trabajo departamentales y municipales	X	X	X		
Elaborar planes integrales de prevención y control del Aedes: y evitar el dengue, chicungunya y zika a nivel departamental y municipal.	1. Intercambiar experiencias de trabajo municipales y locales	X	X	X	Direcciones Departamentales y Municipalidades	Localidades de mayor riesgo.
	2. Organizar y/o fortalecer los comites municipales y locales	X	X	X	Municipalidades	Deberá ser gestionado con agencias cooperantes.
	3. Socializar e impulsar la estrategia de Municipio Saludable en barrios, escuelas y casas de localidades de mayor riesgo.	X	X		Sector Privado	
	4.Realización de Talleres	X	X			

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
3. Incorporar en la curricula de educacion pre-basica y basica la tematica de Salud Ambiental.	1. Abogacia con Autoridades de la Secretaria de Educacion y de Salud.	X			Nivel regional y municipal	Iniciado en Localidades de mayor riesgo.
	2. Elaborar e implementar el Plan de educación en Salud Ambiental dirigido al nivel pre básico y básico	X	X		Secretaria de Educacion, distritales de educación	Deberá ser gestionado con agencias cooperantes.
	3. Jornadas de trabajo para la implementación y fortalecimiento de módulos escolares sobre higiene doméstica y salud ambiental.	X	X	X		
4.Producir material educativo según las características de la población en riesgo.	1. Diseñar, validar y producir material educativo	X			Direcciones departamentales y municipales.	4 municipios y localidades de mayor riesgo.
	2. Realizar reuniones de trabajo.	X	X	X	Actores y sectores sociales involucrados.	(autofinanciado
	3. Establecer alianzas estratégicas	X	X	X		Revisión periodica de los planes
	1. Elaborar el Plan de educación a traves de medios de comunicación	X	X	X		
	2. Gestión de espacios en prensa, radio y televisión para la difusión de mensajes de prevención y control del dengue		X	X		
5. Divulgar mensajes de prevencion y control de dengue.	3.-Monitorear y adecuar la difusión de mensajes	X				
		X	X	X		

COMPONENTE LABORATORIO

Resultado Esperado	Indicadores	Fuentes de verificación	Supuestos
R.1 Fortalecida la capacidad de respuesta del Laboratorio Nacional de Vigilancia y de los Laboratorios de la Red de Salud brindando respuesta oportuna y de calidad para la toma de decisiones.	95% de Resultados Serológicos de Dengue Zika, entregados oportunamente a las estancias establecidas según flujograma. 90% de los laboratorios de Vigilancia de Dengue y Laboratorios Clinicos cuentan con los insumos y equipos necesarios.	Informes de Resultados de Laboratorio. Informes de Control de Calidad Inventarios. Informe de la Comision de Certificacion de Caso de Dengue Hemorragico.	Asignacion de Presupuesto anual para el Laboratorio Nacional de Vigilancia de Dengue. Asignacion de recursos basicos necesarios para los Laboratorios descentralizados. Apoyo necesario para el desarrollo de las capacidades de Laboratorio.

COMPONENTE LABORATORIO

Resultados Esperados	Actividades
R.1 Fortalecida la capacidad de respuesta del Laboratorio Nacional de Vigilancia y de los Laboratorios de la Red de Salud brindando respuesta oportuna y de calidad para la toma de decisiones.	1. Gestionar el financiamiento del Laboratorio Regional de Vigilancia y de los laboratorios de la red. **2.** Realizar la captacion y capacitacion de recursos humanos para el Laboratorio**.** 3. Sistematizar el sistema de informacion de Laboratorio hacia los diferentes niveles de vigilancia. 4. Implementar un plan de mantenimiento y reparacion de equipo de laboratorio. 5. Fortalecer el sistema de Control de Calidad que se realiza con Laboratorios de referencia Internacional y a la Red Nacional de Laboratorios. 6. Implementar pruebas rapidas confiables de diagnostico de Dengue en los laboratorios departamentalizados. 7. Fortalecer el área de hematologia dentro de los Laboratorios Clinicosde los hospitales y centros de salud. 8. Establecer nuevos laboratorios descentralizados en el marco de la departamentalizacion. 9. Equipar los sitios centinelas de vigilancia de enfermedades febriles

COMPONENTE LABORATORIO

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
Gestionar el financiamiento del Laboratorio Regional de Vigilancia y de los laboratorios de la red.	Elaborar solicitudes de finanaciameinto a los donantes de cooperacion externa , empresa privada y fundaciones	X			Dirección regional Vigilancia Epidemiologica Gobernación Departamental	
Realizar la captacion y capacitacion de recursos humanos para el Laboratorio.	1. Ejecucion de Talleres de capacitacion en diagnóstico y vigilancia de Arbovirosis: Dengue, chicungunya y zikav.	X	X	X	Región Sanitaria ONG's Gobiernos Municipales	
Sistematizar el sistema de informacion de Laboratorio hacia los diferentes niveles de vigilancia.	Implemantar base de datos integradas	X			Laboratorio Regional Vigilancia de la Salud Regional Técnico de Dengue	
Implementar un plan de mantenimiento y reparacion de equipo de laboratorio.	Elaborar inventario de equipo y necesidades de reparacion Gestionar el mantenimiento	X			Dirección Regional Laboratorio Regional Vigilancia de la salud	

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
5. Fortalecer el sistema de Control de Calidad que se realiza con Laboratorios de referencia Nacional y a la Red municipal de Laboratorios	Aplicar la normas de control de calidad existentes.	X			Laboratorio Regional Vigilancia de la salud Programa de Dengue	
6. Implementar pruebas rápidas confiables de diagnóstico de Dengue en los laboratorios municipales y departamentales	1. Elaboración y presentación de propuesta de licenciamiento de registro obligatorio de kits para diagnóstico de Dengue que se compren en la región 2. Elaboracion del protocolo de validación de pruebas de diagnóstico rápido de Dengue. 3. Preparación de paneles de sueros conocidos para validaciones.	X X X	X	X	Laboratorio Regional Vigilancia de la salud Programa de Dengue	
7. Fortalecer el área de hematologia dentro de los Laboratorios Clinicos		X			Laboratorio Regional Vigilancia de la salud Programa de Dengue	

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
8. Establecer nuevos laboratorios descentralizados en el marco de la departamentalización.	1. Identificar los laboratorios departamentalizados que tengan la infraestructura adecuada y alta incidencia de casos sospechosos de Dengue para la implementacion de pruebas rapidas de diagnostico.	X	X	X	Laboratorio Regional Vigilancia de la salud.	
	2. Dar cumplimiento a los flujos de informacion establecidos por el Laboratorio de Vigilancia y los laboratorios descentralizados	X			Vigilancia Epidemiologica	
	3. Evaluaciones periodicas de control de calidad de los laboratorios descentralizados.	X	X	X		
			X	X		

COMPONENTE DE ATENCION AL PACIENTE

RESULTADOS ESPERADO	Indicadores	Fuentes de verificación	Supuestos/Riesgos
R1. Diagnosticar y tratar oportunamente a los enfermos de Arbovirus Dengue-chicungunya y zikav	100% de unidades de salud poseen la infraestructura y recursos humanos para aplicar adecuadamente los lineamientos y normas de atención a pacientes 100% de personal asistencial de las zonas de riesgo estén capacitadas, en el manejo y aplicación de normas de Arbovirosis, diferenciando dengue chicungunya y zikav.	Informes finales de actividades de capacitacion, certificación y recertificación que contengan listados de asistencia y evaluaciones Datos del sistema de vigilancia epidemiológica de arbovirosis dengue, Chicungunya y zikav. Informes de actividades de monitoreo según cronograma	Que las autoridades centrales de salud estén anuentes en todo momento en el entrenamiento de su personal y a la revisión de expedientes El personal certificado y entrenado como multiplicador reúne los requisitos mínimos

COMPONENTE ATENCION AL PACIENTE

Resultados Esperados	Actividades
R1. Diagnosticar y tratar oportunamente a los enfermos de Arbovirus Dengue-chicungunya y zikav	1. Capacitación al equipo Regional de instructores. 2. Capacitación a todos los profesionales del sector salud, especialmente a los involucrados en la asisitencia a pacientes. 3. Actividades de monitoreo y evaluación a personal capacitado 4. Definir los principales componentes del proceso de fortalecimiento de los servicios de atención de pacientes con arbovirosis: dengue, chicungunya y zikav. 5. Acordar en conjunto con las autoridades departamentales y locales, las nuevas formas de fortalecimiento de la organización de la atención médica.

COMPONENTE: ATENCION AL PACIENTE

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
1. Capacitación al equipo Regional de instructores GTC Arbovirosis: Dengue, chicungunya y zikav= Grupo Tecnico Central de arbovirosis Dengue.	1. Oficialización del GTC-control de arbovirosis: Dengue,chicungunya y zikav y nombramiento del coordinador 2. Conformar y capacitar al equipo multidisciplinario responsable de la capacitación. 3. Elaborar el Plan de capacitación en atención clínica. 4. Intercambiar experiencia con clinicos locales para el enriquecimiento del GTC-control de arbovirosis: Dengue,chicungunya y zikav.	X X X X	X X		Región sanitaria Vigilancia de la Salud Ministerio de Salud Coord. Nacional vigilancia de la Salud GTC- control de arbovirosis: Dengue,chicungunya y zikav. OPS Honduras	
2. Capacitación a todos los profesionales del sector salud, especialmente a los involucrados en la asistencia a pacientes	1. Programa de capacitación continua al personal de asistencia a pacientes con dengue, chicungunya y zikav. 2. Realización de talleres de certificación 3. Identificar y preparar multiplicadores locales del plan de acción en atención clínica de dengue,	X X X	X X X	X X	GTC control de arbovirosis: Dengue,chicungunya y zikav. GTC Instructores control de arbovirosis: Dengue,chicungunya y zikav. GTC Instructores	

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
	chicungunya y zikav 4. Crear comité local de instructores, certificación y de analisis de morbilidad y mortalidad por dengue chicungunya y zikav 5. Establecer lineamientos para el funcionamiento y regulación de los comites locales.	 X X	 X X		control de arbovirosis: Dengue,chicungunya y zikav. GTC Instructores control de arbovirosis: Dengue,chicungunya y zikav. GT Local	
3. Actividades de monitoreo y evaluación al personal capacitado	1. Elaboración de instrumento autorizado para monitoreo y supervisión. 2. Elaboración de cronograma de monitoreo bimensual 3. Realizar visitas de Monitoreo clinico estandarizada	 X X X	X	X	GTC- Supervisión control de arbovirosis: Dengue,chicungunya y zikav GTC- Supervisión control de arbovirosis: Dengue,chicungunya y zikav GTC -Supervisión control de arbovirosis: Dengue,chicungunya y zikav GTC Supervisión control de arbovirosis: Dengue,chicungunya y zikav	
4. Definir los principales componentes del proceso de fortalecimiento de los servicios	1. Creación de unidades de Arbovirosis- dengue para	X	X		GTC Local de control de arbovirosis: Dengue,chicungunya y	

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
de atención de pacientes con dengue.	manejo de pacientes.				zikav	
	2. Ubicación espacial de las unidades de dengue de acorde a otras exitosas experiencias de la región	X	X		GTC Supervisión control de arbovirosis: Dengue,chicungunya y zikav	
	3. Dotación de equipo e insumos necesarios para el buen funcionamiento de la unidad.	X	X		Dirección de Hospitales	
	4. Selección, evaluación y captacion del personal que laborara en las unidades de dengue chicungunya y zikav.	X	X		GTC Local de control de arbovirosis: Dengue,chicungunya y zikav	
	5. Establecer las normas de funcionamiento de la unidades de dengue a nivel nacional.	X	X		Dirección Administrativa	
	6. Cultivo y/o serología para dengue y otras arbovirosis en el 100% de los pacientes hospitalizados por FHD y FD, y en el 10% de pacientes ambulatorios, a partir del inicio del año.	X	X		GTC Supervisión control de arbovirosis: Dengue,chicungunya y zikav	
	7. Selección de las Unidades de Salud que conformaran el grupo de Clinica de Febriles para el manejo de los pacientes ambulatorios.	X			GTC Supervisor control de arbovirosis: Dengue,chicungunya y zikav	
	8. Establecer un compromiso				GT Local control de arbovirosis: Dengue,chicungunya y zikav Jefe Regional GTC Instructores	

ACTIVIDAD	TAREA	PRIODO DE EJECUCION C	M	L	Responsable	Comentarios
5. Acordar en conjunto con las autoridades departamentales y locales, las nuevas formas de fortalecimiento de la organización de la atención médica.	con las instituciones universitarias generadoras de personal de salud para dar los talleres de capacitación del personal medico en internado rotatorio ,y enfermeria en servicio Social). 1. Concertar reunión multidiciplinaria para intercambio de información y análisis 2. Conformar con el Colegio de Médicos un plan para regular la practica medica en la atención de los pacientes con dengue y otras Arbovirosis Dengue-chicungunya y zikav que no dependan de la secretaría de salud (Clinicas Privadas) 3. Integrar con los gobiernos municipales brigadas de atención a pacientes febriles en Zonas de Bajo Acceso de Salud en Areas de Riesgo.	X X			control de arbovirosis: Dengue,chicungunya y zikav GTC Supervisión GTC Supervición GT Local	

COMPONENTE ENTOMOLOGIA

Resultados Esperados	Actividades
R1.Fortalecida y organizada las unidades entomologicas departamentales en la vigilancia, monitoreo y evalucion del control de Aedes aegypti.	1. Diagnóstico de la capacidad instalada en la region departamental. 2. Realización de Diagnósticos Situacionales en las zonas de riesgo 3. Actualización técnica de los recursos humanos en vigilancia y control 4. Integrar la información entomológica a las UDAs 5. Actualizar y automatizar el sub sistema de información 6. Incorporación de la estrategia del manejo integrado de vectores en las normas de atención primaria del dengue

COMPONENTE: ENTOMOLOGIA

ACTIVIDAD	TAREA	PERIODO DE EJECUCION C	M	L	Responsable	Comentarios
1.Diagnóstico de la capacidad instalada en la region departamental.	1. Inventario de recursos humanos, materiales equipo infra estructura existentes y demandas. 2. Asignación de recursos humanos, económicos, materiales y equipo.	X			Director departamental y municipales de Salud	
2. Realización de Diagnósticos Situacionales en las zonas de riesgo	1. Estratificación de la infestación por factores de riesgo 2. Elaboración de planes de control vectorial locales. Realizar investigaciones operativas 3. Evaluación de densidad de mosquitos grávidas colectadas con trampa para grávidas y la presencia de casos de dengue endémico e índices por larvas según protocolo. 4. Vigilancia de las poblaciones vectoriales 5. Aplicación de medidas antivectoriales para el control de criaderos	X x			Equipo regional municipal y local de salud	

ACTIVIDAD	TAREA	PERIODO DE EJECUCION C	M	L	Responsable	Comentarios
3. Actualizacion técnica de los recursos humanos en vigilancia y control	1. Negociar a traves del departamento de recursos humanos de la Secretaria de Salud (Región Sanitaria como ente rector regional) con las diversas instituciones afines la revisión de la curricula educativa de los planes de estudio en las escuelas de formación de recursos humanos en salud especialmente enfermeria. 2. Revisión, tiraje y socialización de normas integradas para el manejo del vector	X			Grupo Tecnico Nacional	
4.Integrar la información entomológica a las UDAs, Sala Situacional	1. Reuniones multidisciplinarias para la definición de criterios 2. Elaboración y envio de informes periodicamente a las UDAs	X			Grupo Tecnico regional	
5. Actualizar y automatizar el sub sistema de información	1. Revisión de los formatos establecidos . 2. Análisis y retroalimentación de la información en todos niveles involucrados	X			Grupo Tecnico Regional	

ACTIVIDAD	TAREA	PERIODO DE EJECUCION C	M	L	Responsable	Comentarios
6. Incorporación de la estrategia del manejo integrado de vectores en las normas de atención primaria del dengue	1. Aplicación de criterios definidos	X			Nivel local, de area, Departamental.	

C= Corto plazo (1 año), M= Mediano plazo (2-3 años), L= Largo plazo (4-5 años)

EPIDEMIOLOGIA

Resultado Esperado	Indicadores	Fuentes de verificación	Supuestos
R.1. Establecido y funcionando a nivel Regional el Sistema de Vigilancia Integral para el control de arbovirosis: Dengue,chicungunya y zikav en todos sus componentes	100% de las unidades de salud realizando vigilancia integral a partir del inicio de año. 100% de las unidades de salud notifican oportunamente y con calidad al final del cada año. 100% de cumplimiento en la aplicación del protocolo de casos de dengue a partir del inicio del año. 100% de los Municipios estratificados según criterios de riesgo a partir del inicio del año 100 % de brotes investigados y controlados a partir del iicio del año.	Informes de analisis diarios, semanal y mensual de las unidades de salud Informes diarios, semanal y mensual de las unidades de analisis Informes de la Comisión de Certificación de Casos de Dengue Informes de vigilancia Informes de intervención Reporte de investigación y control de brotes.	Consolidación del proceso de Departamentalización Aceptación al sistema de vigilancia Recursos disponibles y estabilidad laboral, para la actividad en el país. Se dispone de un mecanismo de comunicación y difusión Personal de salud capacitado en la estratificación Equipos de investigación y control de brotes en los niveles locales funcionando.

COMPONENTE EPIDEMIOLOGIA

Resultados Esperados	Actividades
R1. Establecido y funcionando a nivel regional el Sistema de Vigilancia Integral para el control de arbovirosis: Dengue,chicungunya y zikav en todos sus componentes	1. Capacitación en el sistema de vigilancia integral 2. Implementación del sistema de vigilancia integral 3. Intercambio de información entre los diferentes niveles de atención 4. Estandarización de los criterios de estratificación 5. Análisis estratificado de la situación epidemilógica, incluyendo macro y microfactores en cada localidad. 6. Realizar análisis semanales de tendencia con referencia a valores esperados para esa localidad y tiempo 7. Intervenciones de prevención y control del dengue basados en información de vigilancia integraL 8. Intervención oportuna en el control de brotes y epidemias a partir de un plan de emergencia elaborado.

COMPONENTE: EPIDEMIOLOGIA

ACTIVIDAD	TAREA	PERIODO DE EJECUCION C	M	L	Responsable	Comentarios
1. Capacitación en el sistema de vigilancia integral del dengue.	1. Realización de talleres de capacitación al personal de salud iniciandodese en los zonas de riesgo	**X**			Grupo Tecnico regional	
2. Implementación del sistema de vigilancia integral del dengue	1. Revisión y divulgación de los protocolos de vigilancia epidemiológica. 2. Monitoreo Supervisión y evaluación del sistema de vigilancia integral del dengue 3. Sesiones de revision y análisis de casos sospechosos de dengue hemorragico para su certificación. 4. Definicion de los indicadores minimos de cada uno de los componentes (vigilancia, entomologia, laboratorio, atencion al paciente y comportamiento)	**X**			Grupo Tecnico regional Direcion departamental, municipal de salud	
3. Intercambio de información entre los diferentes niveles de atención	1. Reuniones periódicas de analisis de información con los diferentes niveles de atención	**X**			Grupo Tecnico regional	

ACTIVIDAD	TAREA	PERIODO DE EJECUCION C	M	L	Responsable	Comentarios
4. Estandarización de los criterios de estratificación	1. Reuniones multidisciplinarias para la definicion de criterios	X			Grupo Tecnico regional	
5. Análisis estratificado de la situación epidemilógica, incluyendo macro y microfactores en cada localidad	1. Aplicación de criterios definidos para la estratificiacion 2. Informacion oportuna 3. Elaboracion de canales endemicos 4. Levantamiento de indices de infestacion por aedes a.	X			Nivel local, de area, departamental.	
6. Realizar análisis semanales de tendencia con referencia a valores esperados para esa localidad y tiempo	1. Intercambio de informacion tecnica cada mes.		X		Unidades de salud	
7. Intervenciones de prevención y control del dengue basados en información de vigilancia integral.	1. Realizacion de analisis de informacion	X				
8. Intervención oportuna en el control de brotes y epidemias a partir de un plan de emergencia elaborado.	1. Realizacion de investigaciones de campo 2. Establecimiento de medidas de control integral		X		Nivel regional	

C= Corto plazo (1 año), M= Mediano plazo (2-3 años), L= Largo plazo (4-5 años)

VI. PLAN DE SEGUIMIENTO A LA EGI-
CONTROL DE ARBOVIROSIS: DENGUE,CHICUNGUNYA Y ZIKAV EL PARAÍSO HONDURAS.

AGENDA de Seguimiento para Implementación de la EGI:

1. Presentar al (Responsable Programa regional de control de arbovirosis: Dengue,chicungunya y zikav SRGabriel Orellana

2. Designar por la directora regional de Salud el ente de liderazgo a nivel regional para implementar, monitorear y evaluar la EGI en el departamento.

3. Formar un Comité Interinstitucional Regional que tome en cuenta los actores sociales tales como: Secretaría de Educación, Salud, Gobernación y Justicia, SANAA, SERNA, AMHON, COHEP, FHIS, UNAH, Asociación de Comunicadores Sociales, Colegio Médico, Comisionado Derechos Humanos, Representante de la Iglesia Catolica, Asociacion de Iglesias Evangelicas, entre otros.

4. Socialización de la EGI-El Paraíso entre las diferentes instituciones, municipalidades.

5. Fortalecer u Organizar Comités municipales Interinstitucional que coordine las acciones que están plasmadas en la EGI, teniendo su propio reglamento.

6. Realizar una rueda de prensa para el lanzamiento de la EGI-El Paraíso con representación de las diferentes instituciones en la mesa principal. (Secretaría de Educación, Salud, Gobernación y Justicia, Fiscalia, SANAA, SERNA, AMHON, COHEP, FHIS, UNAH, Asociación de Comunicadores Sociales, Colegio Médico, Comisionado Derechos Humanos, Representante de la Iglesia Catolica, Asociacion de Iglesias Evangelicas, entre otros)

7. Suscribir convenios de coordinación entre las diferentes instituciones publicas y privadas para desarrollar la EGI-El Paraíso

8. Establecer un medio de divulgación de la implementación y avances de la EGI- El Paraíso

PARTICIPANTES EGI- EL PARAÍSO

INSTITUCIONES PÚBLICAS, PRIVADAS, ONG, IGLESIAS,

COMPONENTE AMBIENTE Y SALUD

- Lic Alexis castellanos.

COMPONENTE EPIDEMIOLOGIA

- Dra. Carminda Noemí Sosa, Lic. Alexis Castellanos, Técnico Angel Gabriel Orellana. Región Sanitaria El Paraíso. Secretaria de Salud.

COMPONENTE LABORATORIO

- Dra. Karla Mejía, Dra Patricia Varela
- Dra. Ismael Salinas

COMPONENTE ATENCION MEDICA

- Dr. Miriam Ordoñez. Hospital Gabriela Alvarado
- Médicos Municipales

COMPONENTE ENTOMOLOGIA

- Lic Alexis Castellanos. TSA Rubén Ávila Unidadad de Entomologia Región Departamental

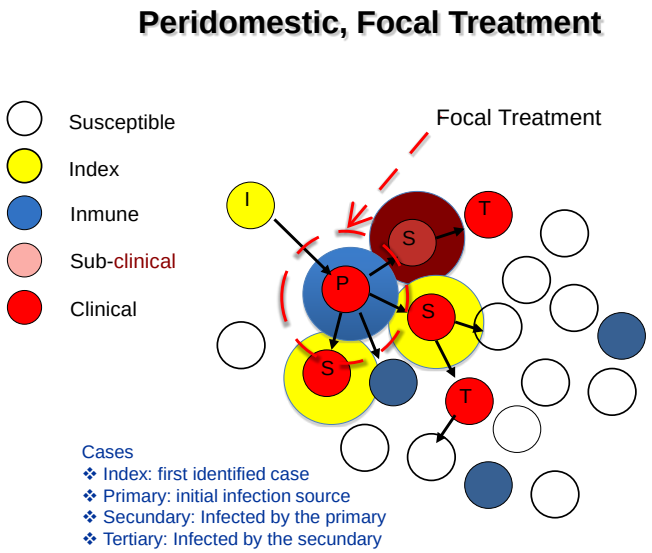
COMPONENTE DE COMUNICACIÓN SOCIAL Y PROMOCIÓN

- Lic. Olman Izaguirre

ANNEX E: PILOT WITH OVITRAPS

There have been two remarkable victories over *Ae. aegypti* in the past: the source-reduction campaigns that began in the Western Hemisphere at the turn of the 20th century and the *Ae. aegypti* Eradication Campaign coordinated by PAHO that followed in the 1950s and 60s. By 1962, 18 countries had been declared free of the mosquito and of dengue.

In the eradication campaign, the principal approach was "perifocal" treatment (see image): field operators searched for infested containers and treated them[31] and surrounding surfaces to a radius of about 50 cm with DDT. These residual treatments kill mosquitoes on contact.



The success of the PAHO campaign may be attributable to a specific aspect of the behavior of the female mosquito, known as skip oviposition. *Ae. aegypti* lay up to 60-80 eggs per gonotrophic cycle, depositing a small number of eggs (or even a single egg) across many sites. The meant that, even if only a portion of infested sites was treated by field workers, it was highly likely that female *Ae. aegypti* would encounter a treated site.

Though *Ae. aegypti* has regained territory in the region, its previous successes can be harnessed while recognizing new challenges. The assessment team proposes a small field trial to test the efficacy of a mix of interventions: new insecticide formulations, source reduction through community engagement, and larviciding. A comprehensive analysis is required to determine the optimal site for a pilot trial and a non-adjacent community similar in relevant factors and where current interventions were expected to continue would serve as a comparison.

The pilot trial would include the following steps:

1. Divide the site area in blocks of nine, using city blocks as a rough guide, and selecting a sample of central blocks (see Figure below)
2. Deploy ovitraps in and around the selected blocks.
3. Monitor the ovitraps weekly for three to six weeks, recording the number of eggs collected at each to help identify high-risk areas.

[31] Applying insecticides with a compression sprayer

4. While source reduction methods and larviciding with Methoprene, *Bti* or other materials continue, conduct perifocal treatment ULV sprays using portable, motorized application equipment around primary cases to minimize the possibility of further transmission and maximize the protection of the population.

In addition, this method should be implemented in and around prenatal clinics and other medical facilities to protect pregnant women from *Ae. aegypti.* A search for mosquito sources in and around the clinic to a distance of at least 150 meters should be conducted. Containers that cannot be made mosquito-proof by physical means will be treated with a larvicide. For added protection, the internal walls of the waiting areas of these facilities could be treated with residual insecticides using a high volume, motorized back pack sprayer or a compression sprayer, both currently available.

A new formulation of a residual insecticide like Deltamethrin SC-PE (trade name Suspend-Polyzone®) could be used. This is a long-lasting, polymer-enhanced formulation that forms a stable, UV-opaque, water-proof deposit when sprayed on solid surfaces. The active ingredient, Deltamethrin, is widely used for insect control and approved for mosquito control by the WHO, CDC, European Commission etc. The manufacturer claims that the treatment can remain effective outdoors for at least three months (see: https://www.backedbybayer.com/pest-management/general-insect-control/suspend-polyzone). The WHO approves it for Indoor Residual Spray for six months; in several studies, indoor persistence has exceeded 12 months (http://apps.who.int/iris/bitstream/10665/90976/1/9789241506304_eng.pdf).

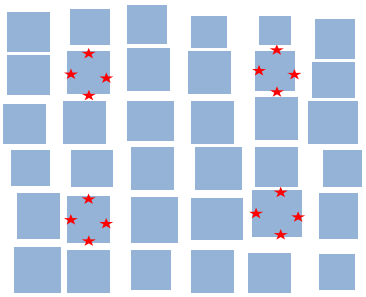


FIGURE: ILLUSTRATIVE OVITRAP DEPLOYMENT LOCATIONS

BOLD THINKERS DRIVING
REAL-WORLD IMPACT