



Project Goal - To develop an integrated and sustainable program for the canton of Jaco, Costa Rica to minimize the health and economic risks resulting from Zika and (Dengue, Chikungunya and Yellow Fever).

Project Objective – To work with and through Rotary to obtain funding, resourcing and support for this program in Jaco --- with plans to share the documented program and process with other cantons in Costa Rica and through Rotary to Guatemala, Nicaragua and Panama.

1. Background

- Zika carrying mosquitoes can be killed with fumigation, its eggs or larvae cannot
- Zika carrying mosquitoes can lay 1,000 eggs in up to five different locations in its 10 day lifetime
- Zika eggs can lay dormant for up to one year. Add water ---they hatch
- Zika virus stays in blood for five days --- it survives in body fluids for up to six months
- Zika virus can lead to sickness, hospitalization, Microcephaly and Guillain-Barré paralysis
- As of July 26 year todate there have been 238 Zika, 10,200 Dengue and 1,647 Chikungunya cases in Costa Rica--- and we are just entering the green season with more rain and therefore opportunities for increased Zika cases.
- The canton of Garrabito which includes Jaco now has the highest count of Zika cases in Costa Rica – 120 as of August 5th of which there are 7 pregnant women and unfortunately the first case of Guillain-Barre syndrome (paralysis) was reported in Jaco on August 4th.
- Todate, there has not been any cases of Microcephaly reported in Costa Rica.
- The Ministry of Health has fumigated approximately 1,500 houses in Jaco and eliminated over 7,000 potential Zika sites.
- Our Jaco Zika Safe Facebook page now reaches 18,000 followers

“Economic losses associated with the mosquito-borne Zika virus spreading across Latin America and the Caribbean are expected to total roughly \$3.5 billion this year, according to initial estimates from the World Bank”

The 15,000+ local community of Jaco, Costa Rica is largely dependent upon tourism with its world renowned surfing beach and local attractions. It is therefore particularly vulnerable to any issue which dissuades tourists. The current outbreak of the Zika virus and the underlying dengue and Chikungunya exposure is affecting the local community in terms of personal and economic health.

In response to the Zika outbreak, the Costa Rican Ministry of Health supplied Jaco with a team of 42 fumigators to contain the Zika exposure by killing the adult mosquitoes. The program was to run from May 8th to June 3rd as there was insufficient resources to sustain the program longer. The Health Ministry recognizes this is only a stop-gap measure as the fumigation does not kill the larvae nor the eggs which can last up to one year without water.

The World Health Organization recommends the only sustainable and environmentally responsible solution in constraining the Zika virus is by fully engaging the wider community in removing all sources of stagnant water, applying larvacides where appropriate and supporting environmentally containment options such as bats, birds and fish. And while the Zika virus is currently the number one headline, there have been over 100,000 cases of Chikungunya in Central America since 2014.

A number of concerned Jaco citizens attended an update from Dr. Rodrigo Marin Rodríguez, Coordinador Nacional Control de Vectores, Ministerio Salud, Costa Rica and were shocked to hear that he may be recommending that the upcoming ISA World Surfing Games awarded to Jaco for August, in fact be cancelled based on the spike in Zika exposure. He advocated that the community must become more engaged in addressing this serious health risk from Zika. While the local municipality is concerned, there appeared to be a lack of organization, funding and sense of urgency to develop a sustainable solution.

A small group (non-political/non-profit) subsequently met and decided that the community needed to become more aware of the problem and develop a comprehensive and sustainable program. We researched best practices in terms of developing a successful mosquito control program. Working directly with Dr. Marin, we organized a town hall meeting with local community and business leaders and were pleased to have over 125 attendees. Dr. Marin outlined the severity of the problem and the limited benefit from ongoing fumigation. His key recommendation was that the community needed to take primary responsibility. We provided the attendees with background information on the Zika virus, the life cycle of mosquitoes and the health and economic risks to Jaco if not addressed aggressively. The Q&A reinforced the lack of awareness of what actions were necessary. We concluded the meeting with a goal to raise \$75,000 to fund a sustainable Zika eradication program for Jaco. There was also encouragement from the local and business community to fund an extension of the fumigation program which was supported by Dr. Marin and his team.

Dr. Marin endorsed this plan saying he believed it would be the first civic program of its kind in Central America and should be shared widely when appropriate. One of our objectives therefore is to document our program development, key learnings, and metrics and public feedback so that this program format could be shared with other communities in Central America. We drafted a press release post this Town Hall meeting which was covered by both local and national media. We also started a Facebook Page ---"Jaco Zika Safe" to provide additional information and coverage.

Thomas Ghormley, Garrabito Rotario attended the meeting and approached Robert Sinclair, Jaco Zika Safe Organizer to explore how Rotary could support this program.

Jaco Zika Safe – Resource & Communications Plan

Goal – To develop an integrated and sustainable program for Jaco to minimize the health and economic risks resulting from Zika and (Dengue, Chikungunya, Yellow Fever)

| RESOURCES (\$, Manpower) | INFORM (In/Out) | LIAISON (Out) | |
|--|---|---------------------------|------------|
| Jaco Businesses | Tourism Sites | Social Media | risks |
| Home/Property Owners | Community (Social Media, Brochures) | Adjoining Cantons | |
| Jaco Municipality | Jaco Municipality Leaders | Jaco Municipality Leaders | owners, |
| Chamber of Commerce | Jaco Tourist Industry (Advocacy) | | mmerce |
| Ministry of Health | Ministry of Health | | istries of |
| Ministry of Tourism | Ministry of Tourism | | businesses |
| Rotary Club | Metrics, Performance Targets | | r |
| Associations (e.g. Surfing Federation) | University Projects (Environment, Social, Health) | | unteers, |
| Mosquito Treatment Companies | Social Media | | g sites |
| Schools | Schools | | Safe |
| Churches | Churches | | m to |

Key elements of the program based on successful mosquito control best practices:

1. Larvae and adult mosquito sampling – Vector program
2. Source reduction – Garbage clean up campaigns, Vector program, Education program
3. Biological control using native or introduced predators, parasites of mosquitoes, genetically modified options – University program
4. Larvaciding and adulticiding when indicated by surveillance – Targeted fumigation, University Project
5. Resistance monitoring – Vector program
6. Disease surveillance in mosquitoes, birds, cows, horses and humans – Vector program
7. Public education – Comprehensive education program and University program

The local response to the Jaco Zika Safe program has been tremendous. The Ministry of Health has been delighted with our local response. Hotel owners offered to provide free housing to sustain the extended fumigation program. Various surfing federations and the Sea Shepherd association provided over 30 volunteers to clean up the garbage in the beach and surrounding areas. The Costa Rican Surfing Federation arranged to service and maintain the fumigation equipment provided by the Ministry of Health. And the Jaco News station has been providing weekly updates and coverage on Channel 7.

We organized several successful community led clean-up programs in collaboration with the Jaco Municipality to eliminate mosquito breeding sites:

We scheduled these projects to marshal business and community participation in the Jaco Zika Safe program in advance of the World Surfing Games. We provided Zika Guerrero buttons to reward students and children for demonstrating personal leadership in cleaning up garbage and removing standing water sources.

Tire Collection: We organized a successful used tire collection drives July 29th and 30th which recovered 395 tires for recycling. We printed 4,000 fliers and distributed these fliers to all the every student in Jaco through the Ministry of Education. We also made arrangements with a local Jaco appliance store Gollo for residents to redeem a coupon for each tire collected. We contracted with a loud speaker mounted car to drive through the local streets to promote awareness. And based upon our Face Book page circulation (Jaco Zika Safe) we have been approached by the neighboring canton of Parrita to participate in the collection and recycling of used tires.

Garbage Blitz's: We supported a Sea Shepherd beach clean-up on June 7th; organized clean-ups on July 13th and 18th and organized a Jaco garbage blitz on July 28th and 29th involving 60 volunteers from the community and local tourist businesses. We printed 1,000 stickers which were distributed during the campaign and awarded each volunteer with a Zika Guerrero button.

Metrics - Eliminating Breeding Sites

| | | | |
|------------------|------------|-----------|--------|
| Tire Collection | June 29/30 | 395 Tires | |
| | | Kgs | Lbs |
| Waste Collection | June 7 | 4,580 | 10097 |
| | July 13/18 | 1,480 | 3263 |
| | July 28/29 | 16,310 | 35957 |
| Subtotal | | 22,370 | 49,317 |

The Rotary Club of Jaco printed 1,000 World Health Organization educational brochures in Spanish and English by a local Jaco printer to share the following:

- Mosquito Life Cycle
- Controlling Mosquitoes
- Zika Basics
- Zika - Talking with Children

We also printed 500 "The 5 Zika Golden Rule" flyers and the Red Cross also donated an additional 500 flyers to distribute through the local transportation services coming to Jaco.

Another key component of the program under consideration is to employ ongoing surveillance and monitoring of the growing spread of viruses from the aedes aegypti mosquitoes. We are working with the Ministry of Health along with Ministry of Tourism to build out a Vector managing program to train, monitor and report mosquito managing accreditation at all commercial and social locations. This will include initial training and assessment --- to introduce the program and provide a Q&A opportunity. The accreditation program will be reviewed highlighting the process, timing and benefits. An initial surveillance report will be shared with key actions for follow-up. A follow-up 30 day visitation will then take place to review progress, highlight gaps and provide certification if appropriate. We will use the Facebook page to highlight those with accreditation and those in a "Non-Compliance" status.

The Vector Management program will involve:

1. Working with business operations to educate them on source elimination management
2. Conducting initial sampling and provide assessment reporting
3. Conducting follow-up sampling, report deficiencies
4. Presenting accreditation certification for posting with achievements shared on Jaco Zika Safe Facebook page. We will also be approaching Trip Advisor

Another key component of the Jaco Zika Safe sustainability program is education. Our discussions with civic leaders and tourist industry representatives confirms a significant gap in understanding the life cycle of mosquitoes and in the case of Zika – the significant health risks. We are undertaking a fundamental education program engaging the schools, churches and civic associations to share the rapid life cycle of the *aedes aegypti* mosquito and the challenges in eradication. Most ominously, *Aedes aegypti* mosquitoes, which long bred in water collected in tree holes and the axils of plant leaves in forests, have adapted to breed in urban areas, flourishing in impoverished crowded areas with no piped water and poorly collected garbage and trash. These adaptations classify the *Aedes aegypti* species as a “container breeder”. The mosquitoes can breed wherever rain collects or water is stored, with preference for outdoor breeding sites. Larvae are regularly found in a host of artificial containers, like discarded plastic cups and bottle caps, plates under potted plants, birdbaths, vases in cemeteries, and water bowls for pets. The mosquitoes can also breed in the microbial stew found in septic tanks, toilet tanks, and shower stalls. Construction sites, used tires, and clogged rain gutters offer additional opportunities to breed in large numbers. The typical Zika-carrying mosquito can't travel very far, only about 50 to 100 meters, said mosquito expert Phil Lounibos, a distinguished professor in the department of entomology at the University of Florida. He also said there's concern that the virus could also be carried by the related *Aedes Albopictus* or tiger mosquito, which can live in cooler climates which could mean higher altitude population centers such as San Jose, Costa Rica could be impacted over time.

We believe this lack of knowledge or appreciation of the mosquito life cycle is a generational issue which needs to start at the school level to understand the relationship of garbage, stagnant water and the challenges in eradicating. Our plan includes subsidizing the cost of a Zika Warrior educator who would lead this initiative. Our plan would be to track the number of students and teachers trained and to undertake a follow-up survey of how well the training has been applied on a personal and family basis. All this information would be shared on our Facebook page with appropriate press releases.

There is also a need and a benefit by expanding the sustainability program by engaging university students in special environmental and social projects. One environmental project under consideration is to employ nature's antidotes to mosquitoes --- in terms of bats, fish and insects. Another project is to explore the application of genetically modified mosquitoes which has been successfully implemented in the Cayman Islands, Brazil and Panama. This project would be aligned with a Costa Rican university to provide both the practical environmental experience for university students while effectively contributing to the sustainability program. Another project which we have discussed with the Jaco Municipal Environmental Engineer is to revamp the now defunct Jaco recycling/land fill operation. The recycling service was recently closed down due to financing and lack of residual value sales. We believe there is sufficient value in a revamped recycling program --- which could be expanded to include food

waste similar to successful programs launched in Bangladesh. This project would be closely tied with university student training under the direction of the Jaco Environmental Engineer.

When pandemics or emergencies occur, it is essential the political and social organizations move rapidly to identify the issues and develop an integrated response plan. A related but distinctive program therefore could be focused on how local communities can be more effective in responding to a localized issue such as Zika. Our experience to date suggests there is a fundamental gap in small regional organizations working together to address local and urgent health risks.

3. Jaco Zika Safe Funding and Financial Management

The program financing will be run through the Garrabito Rotario account. All donations will be issued a tax contribution statement for US and Canadian donors. All expenses will be documented and reviewed with Rotario Garrabito for monthly reconciliation. To date we have received pledges for almost \$20,000 through local donations and have received donations of almost \$10,000 to date. Our goal is to continue to secure specific funded projects by local businesses which connects the value of the program Vs the adverse and tourism impact if left unchecked. For example, one of the prominent tourist booking sites indicated they have four US tourist bookings cancelled on the day of our Town Hall meeting. The direct booking loss was almost \$30,000 – excluding complementary tourist spending on taxis, adventure trips, meals and incidentals. A subsequent meeting with the Marriot Los Suenos Resort confirmed they were also experiencing cancellations including one large and profitable convention. The World Health Organization indicated the potential cost to Costa Rica for Zika could be \$150MM this tourist season. And with Jaco being such a prime tourist destination, the potential economic impact is huge.

JACO ZIKA SAFE

Last Updated: August 18, 2016
US \$

Funding
Sign Up Pledges
Funding received/forecast
Rotary Grant
Facebook Contribution (grant: \$0)
Garbage Can Sponsorship
Zika Safe Accreditation Sites
Hotel Zika Safe Certification
Funding Subtotal

Expenses
Program Manager
Education Assistant
Brochure Printing
Zika Guerrero buttons
Tire Collection/Recycling
Garbage Clean Up
Garbage Blitz Jaco
Garbage Cans
Educational Events
University Projects (tbc)

Expense Sub Total
Running Balance

Key Assumptions

May Town Hall Meeting - Sign up local businesses sign up pledges received to date
Tire Recycling - First drive - 395 tires; Second drive - 200 tires. Paying 250 Colones/tire for each drop off and \$.80/tire for transportation and shredding
Garbage Blitz - Hiring backhoe/trucks, supporting volunteers
Vector Certification - Certify business sites that implement Mosquito abatement program (surveillance, training, testing) bi-annual \$ 100 per audit
University Projects - Cost for travel, accommodation, supplies and meals
Garbage Cans - Selection/specification prepared by Jaco Environmental Engineer (estimated \$0 @ \$52 each) - Goal is to have hotels, tourist agencies sponsor garbage cans
Educational events - Providing printed brochures to share with families, student awards for becoming Zika Guerrero's

| Month | Complete | | | 2016 | | | | 2017 | | | | | | | | | | | |
|------------------------------------|----------|------------|----------|----------|----------|----------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | May | June | July | Sept | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
| Funding | | | | | | | | | | | | | | | | | | | |
| Sign Up Pledges | | | | | | | | | | | | | | | | | | | |
| Funding received/forecast | | | | \$ 9,450 | \$ 5,000 | \$ 3,000 | \$ 2,000 | | | | | | | | | | | | |
| Rotary Grant | | | | | | | | | | | | | | | | | | | |
| Facebook Contribution (grant: \$0) | | | | | | | | | | | | | | | | | | | |
| Garbage Can Sponsorship | | | | \$ 800 | \$ 800 | \$ 600 | \$ 400 | | | | | | | | | | | | |
| Zika Safe Accreditation Sites | | | | | | | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Hotel Zika Safe Certification | | | | | | | | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 |
| Funding Subtotal | \$ - | \$ - | \$ - | \$ 9,450 | \$ 5,800 | \$ 3,600 | \$ 2,400 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 | \$ 1,200 |
| Expenses | | | | | | | | | | | | | | | | | | | |
| Program Manager | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 | \$ 1,250 |
| Education Assistant | \$ 300 | \$ 300 | \$ 300 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 | \$ 400 |
| Brochure Printing | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 |
| Zika Guerrero buttons | \$ 110 | \$ 110 | \$ 110 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 | \$ 300 |
| Tire Collection/Recycling | \$ 995 | \$ 995 | \$ 995 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 | \$ 900 |
| Garbage Clean Up | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 | \$ 295 |
| Garbage Blitz Jaco | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 | \$ 1,280 |
| Garbage Cans | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 | \$ 1,300 |
| Educational Events | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 |
| University Projects (tbc) | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 | \$ 200 |
| Expense Sub Total | \$ 2,545 | \$ 3,455 | \$ 2,450 | \$ 4,350 | \$ 4,950 | \$ 2,650 | \$ 3,350 | \$ 3,850 | \$ 3,150 | \$ 3,050 | \$ 1,650 | \$ 1,850 | \$ 3,050 | \$ 2,850 | \$ 1,850 | \$ 2,850 | \$ 1,650 | \$ 1,650 | \$ 2,850 |
| Running Balance | \$ - | \$ (6,000) | \$ 3,000 | \$ 450 | \$ (700) | \$ (400) | \$ (1,950) | \$ (3,850) | \$ (5,900) | \$ (7,750) | \$ (8,200) | \$ (8,850) | \$ (10,700) | \$ (12,350) | \$ (13,900) | \$ (15,000) | \$ (15,500) | \$ (15,500) | \$ (17,200) |

4. Metrics

[illegible]

Specific Business Projects to be updated post follow-up discussions

Will also be working with the Ministry of Health and the Ministry of Tourism to flesh out programs and events during the month of August.

Worked with Salud to secure additional 10 fumigators

5. Education Program (Sustaining)

Subject: Educational Program – Jaco Zika Safe -- Schools

Purpose: To inform, educate and re-inforce how students can keep themselves, their families and community Jaco Zika Safe.

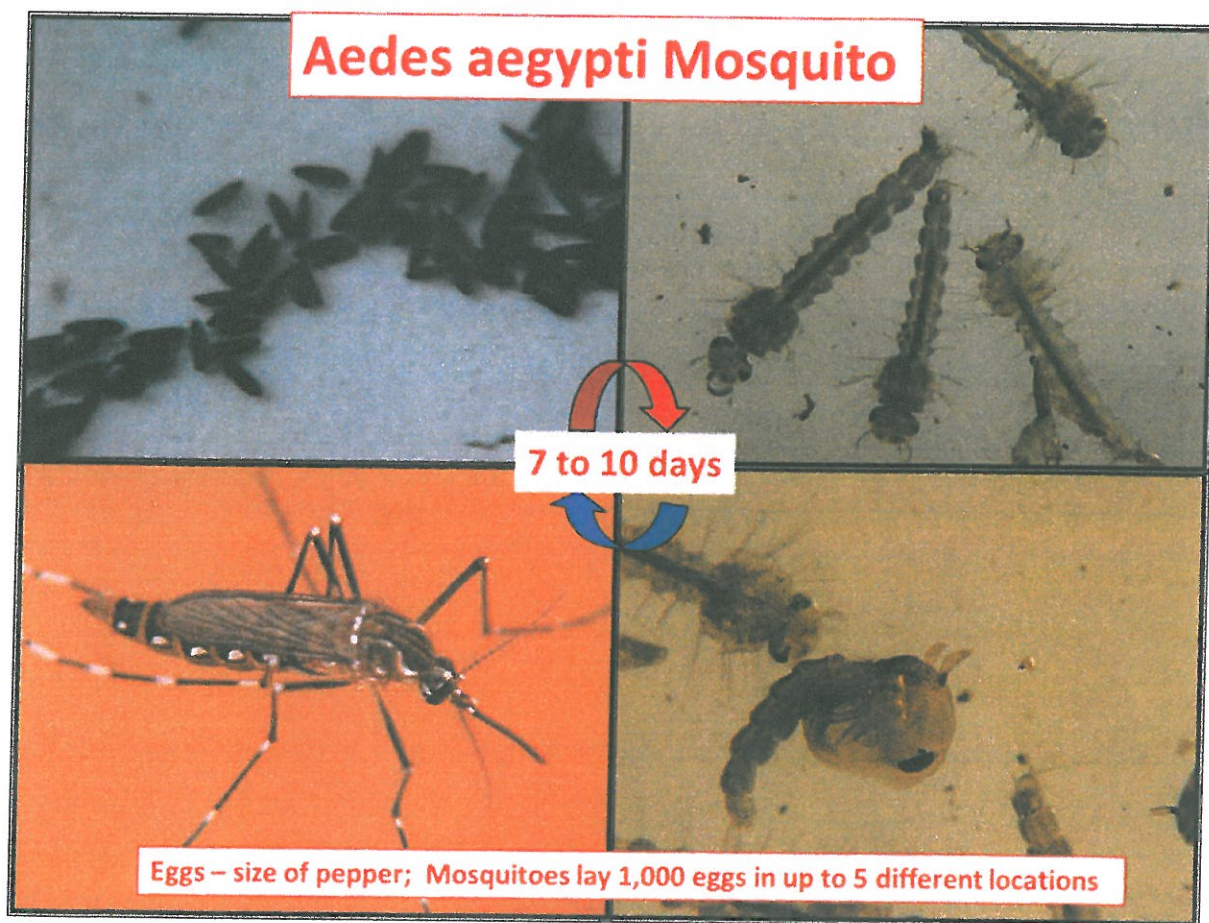
Target: Heads of all local schools and Administrators

Present: Jaco status and update
Why you are at the school -- what's in the news/impact on Rio Olympics?
Community led initiative
Examples of co-operation with ministries and municipality
Address sustainable actions

Message: The Zika mosquito poses a real threat to the residential and economic community in Jaco.

- . Everyone can make a difference -- here's how
- . 5 messages to take away -- easy to remember/share
- . 5 things to do every morning

World Health Organization: Printed brochure leave behind (pdf document)





Sickness/Enfermedad



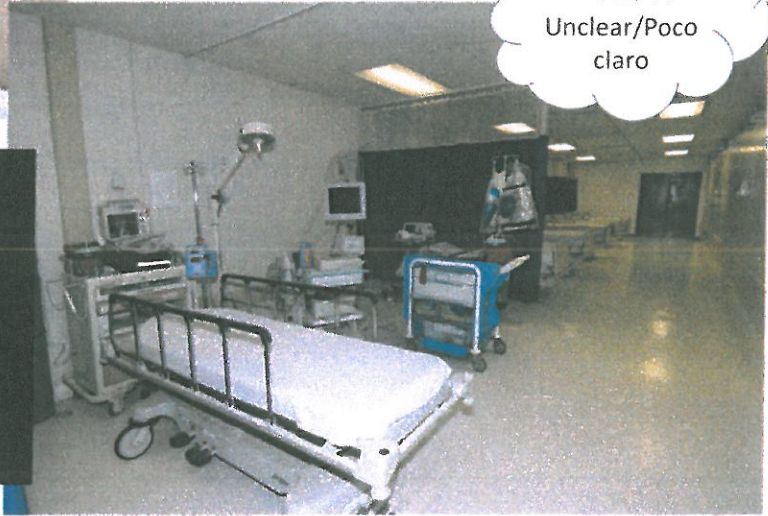
Microcephaly/Microcefalia

6/10/2016

ZIKA HEALTH RISKS/ RIESGOS DE SALUD

?????

Unclear/Poco
claro



NEEDS TO BE SUSTAINABLE.....



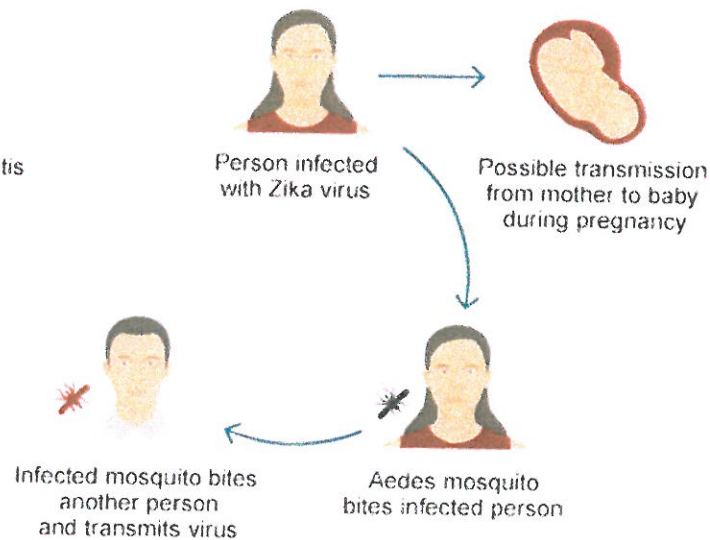
ZIKA



Zika virus transmission cycle

Symptoms

- Fever
- Rash
- Joint pain
- Conjunctivitis (red eyes)



Zika can be transmitted through blood, but this is an infrequent mechanism. The virus has also been isolated in semen, but person-to-person sexual transmission is unconfirmed.

Source: PAHO/WHO

BBC



Tire Recycling

- Old tires represent one of the largest breeding sources for mosquitoes
- Background – National decree to pay recycling deposit for new tires
 - 2 million tires imported into Costa Rica each year
 - Tire manufacturers have not been paying out recycling deposits and have been simply warehousing old tires (1600 tes currently)
 - Opportunity to recycle - shred tires to recover steel, cording and rubber
- Tire Collection Plan – Jaco plus surrounding areas – date to be scheduled
 - Target is to collect 1600 passenger and truck tires
 - Jaco Zika Safe will pay 250 Colones for each tire delivered
 - Jaco Zika Safe will pay for sending the collected tires to a recycling center