Dengue in Sri Lanka: 80,000 & Counting
A glimpse into a global problem

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2017 has been a record year for processing U.S. passport applications. It has also been a big year for mosquitoes. As U.S. tourists travel globally, mosquito-borne illnesses such as a Zika, Malaria and Dengue are relevant health concerns that should be considered. I recently visited Sri Lanka, a small island nation in South Asia just hanging off the southern tip of India. Starting late last year, an outbreak of Dengue has progressed, reaching epic proportions, affecting over 80,000 individuals and killing 215 in just under ten months (www.who.int/csr/don/19-july-2017-dengue-sri-lanka/en/). I spoke with several people who shared their stories of family members and friends that contracted Dengue, and learned about current approaches to the diagnosis, treatment and patient care of people afflicted with this disease. The principal of a prominent girl’s school in Colombo with over 3000 students shared that one student and four parents of students had died of the illness, affecting their families and unsettling their communities.

2016-2017 has had the highest recorded number of cases of Dengue in the past 8 years of available data (Figure 1) with the June-August 2017 time frame topping it with almost 10,000 cases. Colombo is the biggest city in the country. It is highly westernized and has well developed access to water and public sewer systems. A high population of 5.6 million and a tropical climate, still bodies of water, clogged waterways, and an abundance of litter, all contribute to support the mosquito life cycle, allowing dengue to spread throughout the city.

Mosquito Life Cycle
The mosquito life cycle begins with a mosquito egg hatching when it is exposed to water. The larvae emerge and enter the water, living there while molting several times until they form pupae. The pupa does not feed until it emerges as an adult mosquito which is capable of flying as soon as the outer part of its body hardens. Aedes aegypti, as does not feed until it emerges as an adult mosquito which is capable of living there while molting several times until they form pupae. The pupa when it is exposed to water. The larvae emerge and enter the water.

Figure 1. Dengue Cases in Sri Lanka 2010-2017. Source: epid.gov.lk (note that data is still coming in for each week, even 3 months after it ends)

Figure 2. Mosquito Life Cycle. Source http://www.cdc.gov

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Recommendations for Control of Dengue (and Other Mosquito-borne Illnesses)

In many parts of the world, mosquito control is fundamental and takes the form of chemical application by spraying, fumigation, burning leaves and herbs or using nets. These are all generally good methods and relatively low cost approach to prevention that needs to be continued. Another method that has value is to prevent the re-introduction of mosquitoes into areas which had been cleared or eliminate standing water deposits. Additionally, preventing a Dengue patient from being bitten by another mosquito is a critical step in preventing the cycle from being completed. Sequestering patients is often difficult to do when there is an epidemic of patients in countries with limited medical facilities, but some approach must be taken to deal with this issue. Novel approaches to treatment such as ayurvedic and plant extracts should also be seriously considered and funded to identify potential immunotherapies. In Buddhist countries like Sri Lanka, it is also a challenge to implement mosquito eliminating strategies when segments of the population believe in a no kill approach to all life forms, includes those of mosquitoes and other vectors of human illness. Educating the population is thus a critical step in the success of mosquito control.

**Figure 3. Recommendations for Control of Mosquito-borne Illnesses**

- Control mosquito population
- Use nets
- Apply repellant
- Protect infected individuals from further bites
- Treat patients with immune boosting substances
- Treat patients with anti-virals

Controlled Kill at Harborage Sites

During the egg phase, Aedes can survive a moisture free-state (desiccation) for months, which makes mosquito control a challenge. A concerted effort to eradicate mosquitoes can be made by facilitating the mosquitoes in laying their eggs in monitored containers of water which will be dried out, water used to wet a plant or directly poured onto the ground in a manner that does not feed a stream, or create a reservoir. This is a controlled kill of the mosquito larvae by separating it from the water it needs to complete its life cycle. Although this approach is a very low cost strategy, unless executed with a timed, observant precision it bears some risks. However, the potential impact on mosquito populations could be significant from the execution of a carefully thought out plan of action, education and communication with the help of the public to fight the cycle illness from mosquitoes.

**Figure 4. Strategy for Eliminating Dengue**

Vector Control
- Eliminate mosquito vectors
- Deactivate viral antigens in human hosts

Treatment
- Antiviral therapies
- Immune-modulate therapies

Prevention
- Education and awareness
- Vaccine development and adoption

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References

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