

# Involving urban communities in controlling dengue fever in Latin America

*Research shows that an integrated approach to dengue control—focusing on ecological, biological, and social factors—can reduce vector densities while empowering communities to tackle the conditions that put them at risk.*

## Results of ecohealth interventions in Brazil

Brazil accounts for nearly 60% of dengue cases in Latin America.

2013 surveys carried out in Fortaleza found that dengue mosquito populations increased in the rainy season by approximately:

- 30% in areas treated through ecohealth measures vs. 500% in areas treated with conventional spraying

Dengue is a worldwide public health concern. Traditionally found in the tropics and sub-tropics, its range is spreading, with recent outbreaks in France, Croatia, and Florida. According to the World Health Organization (WHO), nearly half of the world's population is now at risk. In severe cases, this flu-like illness can take a lethal form—Dengue Hemorrhagic Fever.

In Latin America and the Caribbean, more than 2 million cases were reported in 2013. In addition to the public health threat it poses, dengue costs these economies billions of dollars each year.

The *Aedes aegypti* mosquito that transmits the virus lives in urban habitats and breeds mostly in man-made containers, such as water tanks, wash basins, and even abandoned tires. With no vaccine or treatment for dengue, efforts to combat the disease depend on effective mosquito control.

## Research: targeting productive water containers

IDRC has long supported the WHO's Tropical Disease Research (TDR) program. Since 2008, TDR has implemented a research project focusing on the ecological, biological, and social factors driving two high-priority vector-borne diseases in Latin America: Chagas and dengue. Dengue studies were carried out in five cities: Acapulco, Mexico; Fortaleza, Brazil; Girardot, Colombia; Machala, Ecuador; and Salto, Uruguay. In each of these cities, standard vector control consists mainly



In Colombia, small family businesses are manufacturing site-specific tools such as curtains and fitted screens to protect homes and water containers from *Aedes aegypti*.

of insecticide spraying, typically done without community participation. The research aimed to test more effective ways of targeting mosquito breeding sites, and mobilizing communities to eliminate them.

In each city, teams first mapped the urban ecosystem, vector ecology, and the social context affecting the proliferation of breeding sites, including the role played by gender.

Researchers worked with a cross-section of stakeholders to analyze the local situation and build consensus on interventions. In this way, they co-designed local responses to the risk of dengue, using a range of simple techniques that could be largely implemented by local groups.

Since the 1940s, surveys of mosquito larvae have been the primary tool in dengue vector surveillance. Mosquitoes lay their eggs in stagnant water. The eggs hatch into larvae before emerging as pupae on the water's surface. Adult mosquitoes then emerge from the pupae and take to the air. As part of the situational analysis, researchers collected and compared seasonal data on the presence of *Aedes aegypti* pupae in water containers, using cluster randomized controlled trials.

Though mosquitoes breed in a wide variety of containers, not all are “productive.” The project confirmed the importance of counting pupae—not just the earlier larval stages—to identify the riskiest kinds of water container. For example, the highest rates of infestation with immature stages of *A. aegypti* were in tires, small pots, and cans. But pupal surveys showed that larger containers, mostly tanks or barrels, produced the most adult mosquitoes. Production was greatest when water containers were outdoor, uncovered, unused, and filled with rainwater—especially in the dry season.

Researchers then worked with communities and local health authorities to implement measures to reduce mosquito breeding and limit human exposure: emptying or covering water containers; cleaning up yards and public areas; installing window and door screens; and using insecticide treatments on curtains and container covers in heavily infested areas, for example.

### Results: a sustainable investment in reducing risk

Although it took time to mobilize communities—particularly where social cohesion was weak—the strategy proved effective and feasible, with high potential to be scaled up. Targeting the most productive container types was also more cost-effective than targeting all containers.

*... in areas where ecohealth interventions were applied, pupal infestation rates increased by only 30%. In contrast, areas treated through conventional spraying saw infestation rates 500% higher ...*

The new control measures had a decisive impact on vector densities. In Fortaleza, for example, mosquito counts are typically higher in the rainy season. But surveys carried out in 2013 found that, in areas where ecohealth interventions were applied, pupal infestation rates increased by only 30%. In contrast, areas treated through conventional spraying saw infestation rates 500% higher in the rainy season, as measured by the pupae per person index.

Communities embraced the new tools and approaches, and in some areas, benefited from economic spinoffs. In Girardot, Colombia, and Acapulco, Mexico, family enterprises produced treated window screens and curtains that were locally designed and used by community organizations. Strategies of empowering communities, such as involving schoolchildren in Ecuador to promote vector control at home, were highly visible and widely accepted.



WHO/IDRC

**Limiting the spread of dengue fever depends on emptying or covering water containers in which vector mosquitoes breed.**

With Brazil, Mexico, and Colombia planning to scale up these successful interventions, some 250,000 households will benefit. In Brazil, which accounts for most dengue cases on the continent, implementation is already being extended to two other cities, with funding from the Ministry of Health. Research has been published internationally, and a network of eight Latin American research institutions is advancing ecohealth knowledge into new and innovative areas.

*The project, “Towards Improved Chagas and Dengue Disease Control through Innovative Ecosystem Management and Community-Directed Interventions,” was funded by the International Development Research Centre through the Ecosystems and Human Health program. Since 1996, IDRC has supported multidisciplinary research that looks at the interactions between ecosystems, social dynamics and human health.*

---

#### Ecosystems and Human Health

International Development Research Centre  
PO Box 8500, Ottawa, ON Canada K1G 3H9  
Phone: +1 613 236 6163 | [www.idrc.ca/ecohealth](http://www.idrc.ca/ecohealth)

[idrc.ca](http://idrc.ca)