Mitigating Plastic Litter Will Significantly Reduce Mosquito-Borne Disease

Researchers have shown that in coastal Kenya the mosquito species *Aedes aegypti* — the primary carrier of viruses like dengue, yellow fever, chikungunya and Zika — breeds in plastic litter. By creating systems to remove this plastic pollution, policy makers can significantly reduce deadly mosquito-borne diseases, improving public health, the economy, and the environment.

Executive Research Summary

On the Kenyan coast, litter is prevalent and abundant, accumulating in neighborhoods, open lots, gutters, around homes, and in public spaces. Plastics and some rubbers — a large portion of the waste — take centuries to decompose. Tires, buckets, jerrycans, soda bottles, and other similar materials remain as persistent forms of pollution, damaging ecosystems for decades. These environmental impacts are well known, but scientists now understand plastics have serious consequences on human health.

Over time, plastic litter accumulates water from rain showers and moisture in the air, creating small pools of resting water in bottles and other water-tight materials. Researchers from the Technical University of Mombasa and Stanford University recently discovered that these small pools are major breeding grounds for *Aedes aegypti*, the species of mosquito responsible for transmitting dangerous viruses like dengue, yellow fever, chikungunya, and Zika. Over 24 months, the researchers took 22,144 samples from water captured in plastic litter and found these small pools of standing water to contain significant numbers of mosquito larvae. These breeding grounds yield large numbers of mosquitoes — with close proximity to human-dwellings, they spread viruses and cause substantial, avoidable illness throughout Kenyan coastal communities.

“If we create systems to eliminate plastic litter, we will prevent a large number of unnecessary disease cases and deaths.”

Dr. Desiree LaBeaud

**LEAD RESEARCHER, STANFORD UNIVERSITY**

Key Points

When water accumulates in plastic litter, it creates ideal breeding grounds for *Aedes aegypti*, the species of mosquito responsible for transmitting viruses like dengue, yellow fever, chikungunya, and Zika.

Because plastics do not decompose and there are no proper public disposal methods for them in coastal Kenya, plastic litter accumulates.

By creating ideal mosquito-breeding habitats, plastic litter substantially increases viral disease transmission.

Mosquito-borne viruses are a major public health concern, causing economic strain by resulting in fewer working members of society and an over-burdened health system.

Creating systems for proper plastics disposal solves two problems with one solution: improving public health by reducing disease transmission and eliminating local pollution.

Mosquito-Borne Viral Diseases Have Major Health Impacts

* Dengue • Yellow Fever • Zika • Chikungunya

• Over 50% of people in coastal Kenya are regularly exposed to dengue and chikungunya.

• Recent research shows these viruses will soon have a larger public health impact than malaria due to climate change.

• More than 10% of febrile illness in Kenya is due to mosquito-borne viral infections, but goes undiagnosed.
**Step by Step: How to Intervene**

**Plastics Do Not Decompose**
Unlike paper or organics, plastics do not decompose on their own. Because they are watertight and do not degrade, they are a significant source of pollution and create many small pools of water.

**Plastic Litter Accumulates**
Because of a lack of effective public disposal systems and various challenges in the plastic recycling industry, plastic waste accumulates near human dwellings.

**Mosquitoes Reproduce in Plastic Litter in Great Numbers**
The small pools of water created in plastic litter are ideal breeding grounds for mosquitoes. With these convenient breeding grounds, mosquitoes reproduce in great numbers and infest urban areas.

**Mosquitoes Spread Deadly Diseases**
With mosquito populations increasing, particularly in densely populated urban areas, disease transmission increases dramatically and causes unnecessary illness and death.

**Opportunity: Bolster Existing Waste Disposal Systems**
By easing restrictions and supporting already existing waste collection and recycling activities in the area, we can reduce plastic litter and eliminate human-made mosquito breeding grounds.

**Outcome: Healthy People, Clean Streets, and Economic Growth**
With less trash there are fewer mosquitoes, and with fewer mosquitoes comes reduced viral disease transmission, as well as more people able to work and contribute to the local economy.

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“**When we remove plastic litter, we not only improve local environments — we improve human health, beautify our community, support local entrepreneurs, and boost tourism. Everyone stands to gain.**”

**Dr. Francis M. Mutuku**

*Lead Researcher, Technical University of Mombasa*