More than two-thirds of mosquitoes tested showed strong resistance to public health insecticides.

Every summer, vector control teams throughout the country work to minimize the mosquito population in their areas. After all, mosquitoes aren't just the uninvited guests at your backyard barbecue that leave you with itchy, red bumps; they can spread diseases including Zika, West Nile, St. Louis encephalitis, dengue fever, yellow fever and chikungunya.

So, what happens when those control methods become less effective? That’s a question the state of Texas is facing now.

"Recent threats to public health from mosquito-borne viruses, particularly Zika virus, have brought to light the critical importance of knowing where potential vector mosquito populations occur and understanding how to effectively control them," said Steve Presley, director of The Institute of Environmental and Human Health (TIEHH) at Texas Tech University, chair of the Department of Environmental Toxicology, a professor of disease
Researchers: Widely Used Mosquito Control Insecticides Are Becoming Less Effective | Texas Tech Today | TTU

While West Nile virus transmission is attributable to other kinds of mosquitoes, two specific species, the Asian tiger mosquito (Aedes albopictus) and the yellow fever mosquito (Aedes aegypti), are responsible for transmission of Zika, chikungunya, dengue and yellow fever viruses. Since 2016, TIEHH researchers collaborating with entomologists from various jurisdictions and funded by the Texas Department of State Health Services have worked to determine where these two species are and how well methods to control them are working.

First, the researchers conducted a surveillance program in more than 30 counties of the Texas Panhandle. The findings confirmed the previously known existence of one or both species in eight counties and found each species in five new counties.

Then, they began to examine the mosquitoes' resistance to insecticides statewide. In each of the last four years, the researchers collected Aedes albopictus and Aedes aegypti eggs from 50 jurisdictions throughout Texas. After rearing the eggs to adults, the researchers exposed the mosquitoes to insecticides commonly used in their home jurisdictions. If the mosquitoes died, it indicated that species was still susceptible to that particular insecticide. Survival indicated that the mosquitoes have developed insecticide resistance.

"We found that 68% of mosquito populations tested exhibited strong resistance to commonly used public health insecticides, 16% of mosquitoes tested exhibited some minor degree of resistance to those same insecticides, and 16% of mosquitoes exhibited no resistance and were fully susceptible to those same insecticides," Presley said.

The researchers reported their results to each jurisdiction and, if resistance was found, they recommended the jurisdiction change to a different type of pesticide to better control the mosquito population.

But the research is ongoing. The next step is to determine how the mosquitoes have become resistant to the insecticides – whether they have begun to metabolize the chemicals or genetically mutated to adapt – and how widely spread the problem is.