# What is the disease potential in Michigan for current and potential invasive mosquito species?

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It's a hot Michigan evening, and I sit on the front porch of my family's home. Streaks of pink and gold spread across the sky as dusk approaches. I hear the drone of a lawn mower, and the scent of freshly cut grass fills my nostrils. Then a more prevalent sound, a whining hum, interrupts my peaceful contemplations. I feel a forceful prick in my arm as a mosquito pokes its sharp proboscis into my skin. A swift swat soon ends his evening escapade. As I exit the porch and stride towards my house's glowing windows, I think of how thankful I am that I don't have to worry about contracting serious diseases like malaria or yellow fever from mosquitoes. Yet, this thought is merely a delusion of many Americans. Contrary to popular belief, mosquitoes are a dangerous force of disease in Michigan. There is a great possibility for disease from current and potential invasive mosquitoes through breeding environments, insecticide resistance, and invasive species.

Like humans, mosquitoes thrive in a nurturing environment. Mosquitoes' ability to carry disease depends upon their health and productivity. Thanks to Michigan's damp springs and dry summers, Michigan mosquitoes live in a breeding ground paradise. According to Professor Michael Kaufman, the disease-bearing mosquitoes, *Culex pipiens,* prefer Michigan's hot dry summers, and have been reproducing earlier because of the climate (Bush). The *Culex* is one of the most notable carriers of West Nile Virus (WNV), a serious disease passed through birds, mosquitoes, and mammals. Through increased productivity, the mosquitoes intensify their ability to spread disease. In 2011, the Michigan Department of Community Health recorded

thirty-four cases of W in Michigan including two fatalities. Michigan's abundance of wetlands and ponds encourages mosquito reproduction, since they lay their eggs on stagnant bodies of water ("Biology"). Basically, more mosquitoes means a greater spread of disease. This creates current and potential problems for Michigan mosquito-carried sicknesses. Mosquitoes live from four days to one month ("Mosquito Life Cycle"). Therefore, their long life-span gives an infected mosquito plenty of time to pass disease between humans. Because of Michigan's ideal breeding grounds, the potential for mosquito passage of disease is abundant. Scientists have formulated various combatants for the mosquito attack, but they have found that insecticides are the most effective.

Although farmers and the general public use insecticides to ward off mosquitoes, the usage of these chemicals has led to another problem: insecticide resistance. Studies show that some mosquitoes grow tolerant of insecticides within a few years after the initial chemical usage. The Centers for Disease Control and Prevention documented one hundred twenty-five mosquitoes as resistant to insecticides ("Anopheles"). Mosquitoes' tolerance of chemicals impedes humans' ability to regulate and dispose of virus-carrying breeds. During the Global Malaria Eradication Campaign, pesticide resistance played a major role in mosquitoes' tolerance to chemicals ("Anopheles"). In Africa and India, attempts to treat malaria by killing mosquitoes have been hindered by the mosquitoes' growing resistance to repellents ("Malaria"). Between the years 1938 and 1984, four hundred and forty new insect species became resistant to DDT ("Pesticide Resistance"). Researchers are scrambling for new insecticides that will effectively diminish the mosquito population ("Malaria"). Because of mosquitoes' growing resistance to insecticides, their ability to spread disease is steadily increasing. This increase permits growth in mosquito population, including invasive species.

To the untrained eye, all mosquitoes look alike, however, Michigan alone contains sixty different mosquito species ("Mosquitoes of Michigan"). Because of the wide range of mosquitoes, invasive mosquito species are prevalent. Mosquitos pass diseases by biting an infected organism and then passing that virus onto its next meal. "Some mosquitoes are vectors for diseases. This means they can transmit diseases from one human or animal to another. Typically, the diseases are caused by viruses or tiny parasites. For example, a mosquito that bites an infected human or animal can pick up a virus along with the blood meal. The mosquito and virus do not harm one another but the virus reproduces inside the mosquito. Later, the mosquito can pass the viruses to other humans when biting them" ("Diseases"). A dangerous potential invasive mosquito of Michigan is the Asian Tiger Mosquito. This black and white striped insect is mainly in the Southeastern U.S., but they are gradually migrating North and West. Although Michigan's borders remain unpenetrated, if the Tiger Mosquitoes continue to expand at their current rate, it will not be long before Michiganders are swatting Tiger Mosquitoes. The Asian Tiger Mosquito is easily frightened when it bites its victim, so they often visit various sources for one meal. In addition, they feed during the day rather than at the common mosquito feeding times (dusk and dawn). Therefore, the combination of multiple victims and preying during humans' active hours allows the Tiger Mosquito to spread disease much more quickly between organisms. The Tiger Mosquito carries diseases such as dengue fever, encephalitis, yellow fever, heartworm, Eastern equine encephalomyelitis, and Cache virus ("Mosquitoes with Black"). Both adaptable and hearty, Tiger Mosquitoes pose a potential problem to humans ("Invasive"). The mosquitoes could also potentially carry an incurable joint and muscle disease, the Chikungunya virus. Although researchers have not detected the virus in Tiger Mosquitoes yet, scientists believe there is a serious potential for the mosquito to become a carrier of the

virus. They breed vigorously in warm stagnant water (Mozes), and since they were initially identified in the U.S. in 1985, Tiger Mosquitoes have spread across twenty-six states, and as far north as Chicago ("Invasive"). Although the Tiger Mosquito has recently gained the most attention, it is not the only invasive disease-carrier. In March 2013, America's rate of malaria reached its highest in forty years, according to the CDC. The rise in malaria is mainly caused by the invasive mosquito species *Anopheles* and *Culex* ("Invasive"). Both the *Anopheles* and *Culex* inhabit Michigan ("Mosquito Species"), and their presence in the mitten causes some citizens to worry. *Culex* mosquitoes favor industrialized breeding grounds ("Types") such as ponds, storm drains, pools, bird baths, flower pots, tree holes, and abandoned tires. Their preferred breeding grounds lie in close proximity to human activity, thus increasing the potential for infection of humans through mosquito bites. Another invasive species of Michigan, *Aedes japonicus*, carries West Nile Virus and remains active between May and November, creating a lengthy feeding season, and therefore an extended time-period for spread of viruses. *Ae. japonicus* is surprisingly hearty, able to withstand distance dispersal, temperate winters, and organic concentrations ("Aedes japonicus"). The combination of potential and current invasive Michigan mosquito species creates great potential for the spread of disease.

Although they appear small, mosquitoes have immense power: the power of passing disease or death to their victims through their painful bite. As stated by Christine Todd Whitman, former Administrator of the Environmental Protection, "Anyone who thinks that they are too small to make a difference has never tried to fall asleep with a mosquito in the room" (*Brainy quotes*). Despite their small size, mosquitoes possess a serious threat to human health. Because of their excessive breeding, tolerance to repellants, and influx of invasive species in Michigan, mosquitoes are an issue that cannot be ignored. It is essential that Michigan citizens

become aware of the current and potential danger of disease associated with invasive mosquitoes. An uninformed citizen is a citizen in danger of contracting disease. The presence of mosquitoes is just another usual sight on a Michigan summer evening, but they have immense potential for the spread of disease.

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