

Safety Assessment of Mosquito Insecticides Flawed

CDC and EPA proclamations of pesticide safety not supported

by Jay Feldman

With the frenzy to douse communities with mosquito insecticides, in response to the perceived threat of Zika in the United States, public officials took to the airwaves this summer and fall with proclamations of pesticide safety. There is no question that public officials and residents face challenges in defining the problem or potential problem associated with the transmission of Zika and its threat to the public's health, especially newborns, the appropriate insect management response and the efficacy associated with it, and a fair assessment of the health implications associated with exposure to pesticide spraying, one common control strategy.

A perceived public health threat emerges

As the threat of Zika emerged in Brazil and spread throughout South and Latin America and Puerto Rico, the link to microcephaly (small head size leading to developmental disorders) in newborn children created justifiable fear, especially among pregnant women whose babies in the womb were understood to be at highest risk for adverse effects associated with the virus. Data on the cause and extent of the threat has since confounded the experts, raising critical issues of the most reasonable and health-protective ways of combatting insect-borne viruses as they emerge, such as West Nile Virus and now Zika.

While the programs advanced by the Centers for Disease Control and Prevention (CDC) and the U.S. Environmental Protection Agency (EPA), including prevention techniques, such as removing standing water that serves as breeding areas, use of repellents and screens on windows, massive spray programs became a centerpiece of the attack against the spread of Zika. In fact, spray programs escalated in cases where Zika was not detected in mosquitoes, but was identified in humans—begging the question of mode of virus transmission. Without extensive monitoring for infected mosquitoes, the distinction between nuisance and disease carrying mosquitoes is blurred. Meanwhile, the decision to

expose large populations, young, old, and infirm, to spray programs with neurotoxic chemicals that breakdown to chemicals that are also as or more hazardous, in itself raises a serious public health threat.

Government agencies proclaim pesticides safe

The issue of transparency of information on pesticide hazards, when decision makers advance widespread chemical use and exposure, is paramount, according to public health advocates. Gina McCarthy, administrator of EPA, urged the widespread spraying, saying, "It can be done safely and effectively and is perhaps the most important tool we can use right now to change the trajectory." Based on this advice, local officials, who make the decision on mosquito management practices, for the most part embraced spraying as the sensible approach. Naled became the pesticide of choice because of mosquito resistance to the popular synthetic pyrethroid insecticides. The Governor of Puerto Rico and the Mayor of San Juan rejected the idea of spraying Naled over people and their homes. CDC proclaims on its website, "EPA-registered insecticides are used for aerial spraying. EPA-registered insecticides have been studied for their effectiveness and safety when used according to label instructions." During the height of the aerial spraying of the organophosphate insecticide Naled, Tom Frieden, M.D., director of the CDC, told NBC News, "Aerial spraying is an effective addition to mosquito control on the ground. In fact, it's been the most effective tool."

The extent of the virus threat

We know now that the development of microcephaly resulting from fetal exposure to Zika alone is not clearly correlated. Citing World Health Organization (WHO) figures, in October, the *Washington Post* reported that, of the 2,175 cases of microcephaly reported, 75% are from a specific region of Brazil, suggesting that there are a combination of factors leading to the disease. Importantly, from a public health perspective, the number of cases of microcephaly associated with the virus is also not as high as feared. According to WHO's October 20, 2016 *Situation Report on Zika, Microcephaly and Guillain-barré Syndrome*, while Brazil documented 310,061 cases of Zika and 2,033 cases of congenital illness, including microcephaly, Columbia identified 104,691 cases of Zika and 46 instances of the illness. So, in retrospect, there is still a lot to learn and the calculation on widespread chemical exposure in the context of less hazardous mosquito management techniques becomes even more complex.



Photo: aerial spraying of mosquitoes
June 15, 2013, over Joint Base
Charleston Weapons Station, S.C.
U.S. Air Force photo by Senior
Airman Dennis Sloan.

Nevertheless, with the virus spreading relatively quickly, communities geared up for spray programs as a preventive measure nationwide. An area of Miami was identified as an area of local transmission of the virus after several infected mosquitoes were found. Up until then, the infections were understood to have occurred as a result of travelers with the virus returning to the U.S. It was also determined that the virus could be transmitted through sexual activity. Still, the vast majority of cases of Zika virus in humans in the U.S. were identified by the CDC as “travel-related.”

Accurate information needed to inform decisions

As the confluence of events raised public concerns about mosquitoes and pesticides, Beyond Pesticides wrote a letter and sent out a press release urging EPA to immediately alert local and state mosquito control officials, elected officials, and the public throughout the U.S. to the fact that EPA’s key data reviews on the safety of widely used mosquito control pesticides, including Naled and synthetic pyrethroids, are outdated and incomplete, while the scientific literature raises safety concerns. In a September letter to EPA, Beyond Pesticides said, “As local and state officials implement mosquito abatement programs to address the Zika virus, it is critical that they have complete transparent safety information that they are not currently getting from the Environmental Protection Agency (EPA).”

Beyond Pesticides continues, “This information, specific to residential exposure to the insecticides Naled and its main degradation product dichlorvos (DDVP), as well as synthetic pyrethroids, is necessary for officials on the ground to make fully informed decisions and for public right to know.”

Deficiencies in EPA safety assessment

According to EPA documents, the agency did not meet a planned 2015 deadline for a final review decision evaluating residential exposure to Naled, a neurotoxic organophosphate insecticide that is currently being used in community mosquito spraying, and its highly toxic breakdown product DDVP. In addition to the toxic properties of Naled, EPA has stated in review documents that it “has determined that the adverse effects caused by dichlorvos [DDVP] that are of primary concern to human health are neurological effects related to inhibition of cholinesterase activity.” There is also “suggestive” evidence of DDVP’s carcinogenicity, as well as concerns associated with its neurotoxicity, mutagenicity, and reproductive impacts.

Similarly, EPA has recognized in its documents that synthetic pyrethroids, including permethrin and phenothrin (sumithrin), must also have their assessments updated and completed, calling into question safety statements from EPA and CDC. Several pyrethroids are associated with cancer, hormone disruption, and reproductive effects, and thus have hazard and exposure concerns regarding widespread application for mosquito control. Phenothrin, for instance, “lacks acute, chronic, and developmental neurotoxicity studies that are required to fully evaluate risks to infants and children,” and for permethrin there are outstanding concerns regarding its developmental neurotoxicity.

According to EPA’s final work plan, published in 2009, the agency

planned to begin public comment on a registration review decision for Naled in 2014, with a final decision in 2015. “Given the widespread use of Naled in South Florida. . . and other states and territories over fears of the spread of the Zika virus, it is imperative that an updated risk assessment be presented for public review and comment, especially since there are important outstanding data and concerns regarding Naled/DDVP exposures to residential bystanders,” Beyond Pesticides told EPA.

The use of Naled in a South Carolina community in August resulted in the death of two million bees. In 2012, the European Union banned Naled, citing “potential and unacceptable risk” to human health and the environment.

Efficacy of spraying questioned

In light of the identified hazards and unknown effects of exposure to both Naled/DDVP and synthetic pyrethroids, Beyond Pesticides urges local and state officials to consider more closely the lack of efficacy associated with massive spray programs. Researchers question the efficacy of spray programs for adult mosquitoes, especially given the biology of the targeted mosquito, *Aedes aegypti*. This mosquito stays close to its breeding sites in residential areas and inside homes, suggesting that community spray programs are the least effective control measure.

Beyond Pesticides encourages an integrated approach to mosquito management that focuses on prevention through public education encouraging frequent removal of standing water, larviciding, and use of repellents. If prevention measures are enforced, the need to spray should be extremely limited, and balanced against the potential public health impacts of hazardous pesticides.

Moving forward

This will not be the last time that local officials, encouraged by state and federal agencies, will consider massive spray programs to combat an insect-borne illness. In fact, with global climate change, the expectation is that the U.S. will see more of it. The community goal needs to be more rigorous attention to the management of breeding areas or source reduction, and biological controls. Source reduction is not an easy problem to resolve, but it takes a community commitment to work with residents on identifying areas around homes that are breeding areas, such as gutters, piles of leaves, flower pots, tires, and other areas that collect water. Working with community residents to install screens on windows and doors will go a long way in preventing mosquito bites. Encouraging habitat for insects and birds becomes increasingly important as a way of attracting predatory organisms that feed on mosquitoes or their larvae, including fish, frogs and tadpoles, dragonflies, spiders, birds, and bats. Protecting and enhancing the ecosystem is a theme that is critical to eliminating an increasing reliance on toxic chemicals in communities nationwide.

Download a copy of the letter that Beyond Pesticides sent to EPA and the agency’s response here: <http://bit.ly/2cFHThg>. For more information on mosquito management, see www.beyondpesticides.org/mosquito.