



February 27, 2019

**Written Testimony In Support Of
SB 270 Pesticides – Use of Chlorpyrifos – Prohibition
Submitted to: Maryland Senate Education, Health, and
Environmental Affairs Committee**

Honorable Chairman and Members of the Committee,

My name is Lesliam Quirós-Alcalá and I am an Assistant Professor at the Maryland Institute of Applied Environmental Health at the University of Maryland, School of Public Health. I am also on the Scientific Advisory Board for the Children’s Environmental Health Network, a national multi-disciplinary non-governmental organization whose mission is to protect children from environmental health hazards.

I am an environmental health scientist by training with expertise in children’s environmental health, exposure assessment, occupational health, and environmental epidemiology. For over a decade, my research has focused on studying exposures to environmental chemicals, including pesticides, in children and other vulnerable populations, and the potential effects of these exposures on human health.

I am submitting this testimony in strong support of SB 270 to prohibit the use of chlorpyrifos and other insecticides containing chlorpyrifos in the state of Maryland based on my prior work and the weight of the evidence from several peer-reviewed scientific studies.

Prior to joining the faculty at the University of Maryland in 2014, I conducted research with colleagues at the Center for Environmental Research and Children’s Health (CERCH) at the University of California at Berkeley. The Center is one of the initial vanguard Centers of Excellence in Children's Environmental Health and Disease Prevention Research jointly funded in 1998 by the U.S. Environmental Protection Agency (EPA) and the National Institutes of Environmental Health Sciences (NIEHS) to study the effects of chemicals on children’s health.

Over the last 20 years, CERCH has led the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) study. The CHAMACOS study enrolled 601 pregnant women between 1999-2001 living in an agricultural community in Salinas Valley, CA to study the effects of pesticides, including chlorpyrifos, (and other chemicals) on children’s health. Researchers have assessed chemical exposures in the CHAMACOS cohort during pregnancy and childhood and have been following the children for 19 years. Data from the CHAMACOS study has been instrumental in contributing to the scientific literature on the potential adverse effects of chemicals on children’s health.

Based on research findings from the CHAMACOS study and other peer-reviewed studies, one of the major concerns with chlorpyrifos is its potential to affect children’s neurodevelopment.

Chlorpyrifos belongs to a class of pesticides known as organophosphate (OP) pesticides. OP pesticides have a common mechanism of toxicity and are designed to affect the central nervous system. Chlorpyrifos inhibits an enzyme (acetylcholinesterase) which regulates nerve impulses in the body. Most people are exposed to chlorpyrifos through their diet by eating fruits and vegetables (e.g., apples, broccoli, grapes) that have been treated with this pesticide. Exposures may also occur by inhalation or skin absorption when applying chlorpyrifos; working in agricultural fields, golf courses, or other areas treated with chlorpyrifos; and by living or going to school near treated sites.¹⁻³

Evidence from the CHAMACOS study indicates that exposure to OP pesticides, including chlorpyrifos, during pregnancy is associated with increased risk of mental, motor, and behavioral problems in children, including:

- Abnormal reflexes in infants (abnormal reflexes suggest neurological problems) ⁴
- Poor mental development among preschoolers⁵
- Attention problems and hyperactive behavior at age 5 years⁶
- Poor mental development at age 7 years (e.g., decreases in IQ points, working memory, processing speed, verbal comprehension, and perceptual reasoning.) ^{2, 7}

Similar findings have been documented in other studies led by other U.S. researchers at other universities, including Columbia and Mt. Sinai, as well as researchers in other countries in both urban and farmworker pediatric populations.^{3, 8-10} Overall, these peer-reviewed studies have shown that exposure to OP pesticides, including chlorpyrifos, during pregnancy is associated with mental, motor, and behavioral problems in children. Specifically, abnormal reflexes in infants; mental and motor delays among preschoolers; decreases in working and visual memory, processing speed, verbal comprehension, perceptual reasoning, and IQ among school-aged children; and increased risk of symptoms or diagnoses of attention-deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD).³ A recent study also showed that children with high levels of chlorpyrifos in umbilical cord blood had an increased risk of altered brain structure.¹¹

Altogether, these peer-reviewed studies indicate that outcomes associated with exposure to OP pesticides like chlorpyrifos during pregnancy are consistent and persistent, with associations observed from early infancy into late childhood.

The majority of OP pesticide studies linking exposure to altered neurodevelopment have relied on objective measures of exposure generated according to scientifically established protocols and reported similar findings.

Accurate measurement of exposure is critical in any human study trying to establish an association between an exposure to an environmental agent and a particular health outcome. OP pesticide studies in the literature have assessed exposures in various ways, including by directly measuring OP pesticides or their breakdown products in biological samples (urine, blood) to quantifying nearby pesticide use by geographically linking home addresses with pesticide use reporting databases available.³ Objective measures of exposure have been used and generated according to scientifically established protocols in the vast majority of studies reporting a link between OP pesticides and altered neurodevelopment. These measures have also been obtained independently of the child's outcome.

It is also important to highlight that previous studies have been conducted in different pediatric populations (e.g., urban and farmworker children) and geographic locations, and have also used varying methods of measuring pesticide exposure. It is these differences that bolster the weight of the scientific evidence that OP pesticides like chlorpyrifos are likely detrimental to children's brains. *Despite these study differences, a large number of these peer-reviewed studies have shown similar consistent findings spanning from early to late childhood.*

Scientists in academia and the U.S. EPA agree that low level exposures to chlorpyrifos are of great concern and present a clear risk to children's health.

Based on findings from peer-reviewed human studies, EPA scientists concluded that there is "sufficient evidence that there are neurodevelopmental effects occurring at chlorpyrifos exposure levels below those required to cause acetylcholinesterase inhibition."¹² That is, reliance of acetylcholinesterase inhibition for regulatory purposes to assess the potential health risks of OP pesticides in children masks the serious threat that OP pesticides pose on children's developing brains.

In 2016, EPA scientists also concluded that based on current labeled uses in the U.S., exposure to chlorpyrifos from either food or drinking water alone could lead to unacceptably high exposures and that some women of reproductive age, infants, and children consume levels of chlorpyrifos that exceed those considered acceptable for these vulnerable stages.¹²

Continued used of chlorpyrifos puts vulnerable and marginalized populations at risk of adverse health effects, representing an environmental justice concern

Farmworkers and their families, and residents living in agricultural rural communities characterized by poverty and limited access to basic resources are at an elevated risk of experiencing higher exposures to chlorpyrifos, placing them at an increased risk of adverse health effects. Exposures may occur from working in agricultural fields treated with chlorpyrifos and living or going to schools in close proximity to treated fields. Pesticide exposures may also occur when farmworkers bring pesticides into the home on their clothing or shoes.^{13, 14}

Data from the CHAMACOS study and ancillary CERCH studies show that:

- (1) pregnant women living in an agricultural community experience significantly higher exposures to chlorpyrifos and other pesticides compared to pregnant women from the U.S. general population;¹⁵
- (2) living in close proximity to agricultural fields where chlorpyrifos is applied while pregnant is associated with lower IQ in children at school-age;²
- (3) pesticides used solely in agriculture are found in residences in agricultural communities¹⁶

Comprehensive steps are critical to protect our children and other vulnerable populations so they can become thriving contributing members of our society as the potential health effects of chlorpyrifos also represent an economic burden to our state and our nation.

The economic costs associated with neurodevelopmental problems cannot be ignored. It is estimated that, on average, it costs twice as much to educate a child with learning or developmental disabilities in the U.S. compared to the costs associated with educating children without these disabilities.¹⁷ A recent analysis in the European Union reported that *annual costs* linked to the loss of IQ points and learning disabilities due to chemical exposures, including OP pesticides, were estimated to be \$169.43 billion dollars.¹⁸ The potential detrimental health effects of the OP pesticide chlorpyrifos place children and other vulnerable populations at a clear disadvantage, limiting their ability to become contributing members of our society and resulting in economic consequences to our state and our nation.

In summary, the science is clear and consistent: chlorpyrifos is putting the health of our children and other vulnerable populations at risk.

I strongly support the passage of Senate Bill 270 to ban all uses of chlorpyrifos in the state of Maryland and urge our decision makers to not dismiss the use of sound science and the current weight of the evidence in decision-making to promote and ensure public health.

Sincerely,



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