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## Agent Orange: Birth defects plague Vietnam; U.S. slow to help

### U.S., Vietnam split over whether defoliants used in war are to blame

By Jason Grotto

Tribune reporter

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DONG NAI PROVINCE, Vietnam

*Part 3 of a Tribune investigation finds that the role of defoliants in Vietnam's high rate of birth defects remains a contentious question decades after U.S. spraying missions ended. [Complete coverage >>](#)*

The sun beats down on Dao Thi Kieu's straw hat as she hunches over thin strands of bright green rice plants, pulling them from beds submerged in muddy water and replanting them elsewhere.

These are the same paddies Kieu tended as a teenager during the Vietnam War, and she still remembers the planes that came in the mornings to spray Agent Orange and other defoliants while she worked.

"I was about 16 when I saw the planes flying overhead, and I saw the spraying until I was married," said Kieu, 58. "It smelled like ripe guava. No trees could survive. It made my clothes wet."

Her vivid memories are supported by data from spraying missions analyzed by the Tribune, which show at least seven sorties that dispensed nearly 13,000 gallons of defoliants passed over Kieu's fields.



Since then, the story of Kieu's life can be told with simple, heartbreaking math. She had eight children. Seven of them were born with severe deformities. Of those, five died before age 8. She also lost her husband, who served in the U.S.-backed South Vietnamese army, to cancers associated with herbicide exposure.

Decades after the Vietnam War ended, the most contentious question surrounding the use of defoliants by the U.S. military is the impact on the health of untold numbers of Vietnamese.

At the heart of the controversy is the suspected link between the herbicides and birth defects in Vietnam, where more than 5 out of every 100 children are born with some form of physical or mental abnormality, a fourfold increase since the start of the war, according to Vietnamese scientists.

The U.S. government spent \$13.7 billion last year on disability payments for more than 1 million Vietnam veterans, many of whom were exposed to herbicides. Millions more have been spent compensating veterans' families whose children were born with birth defects. But U.S. officials bristle at acknowledging connections between the defoliants and illnesses in Vietnam.

Since the countries normalized relations in 1995, Congress has allocated at least \$125 million to fight HIV/AIDS in Vietnam, whose infection rate ranks 67th worldwide. About \$46 million has been provided to help Vietnamese who lost limbs from unexploded bombs dropped by the United States.

Yet, since the war ended 35 years ago, Congress has set aside just \$6 million to assist Vietnam with herbicide-related issues, despite evidence that large numbers of civilians in the south -- people in whose name the war was fought -- were exposed to defoliants that have since been outlawed in the U.S.

Private philanthropies -- including the Ford Foundation, the Gates Foundation and Atlantic Philanthropies -- have provided nearly three times more money than the U.S. to help the Vietnamese overcome health and environmental damage brought on by the herbicides.

During the war, U.S. officials assured the Republic of Vietnam that the defoliants were harmless. The South Vietnamese government, in turn, sought to convince its citizens that the chemicals were safe. Vietnamese soldiers went so far as to douse themselves in the chemicals and even drink them with water, according to documents from the National Archives.

"Civil servants and cadres explain to the people there the harmlessness of the defoliation by spraying defoliant on the body and water and drinking it before the people," said an October 1963 report from the South Vietnamese government.

Like U.S. soldiers, Vietnamese citizens used empty herbicide barrels for showers and barbecues. Believing the chemicals were harmless, South Vietnamese soldiers often sold empty barrels containing as much as five gallons of herbicide residue to civilians in such places as Da Nang and Bien Hoa, government records state.

But many of the compounds weren't safe. They were contaminated with the most toxic man-made chemical known, the dioxin TCDD. The contaminant was an unintended byproduct of the manufacturing process used by U.S. chemical companies to produce an ingredient found in Agents Orange, Purple, Green and Pink -- compounds that made up more than 65 percent of the nearly 20 million gallons of herbicides released in Vietnam.

Scientists have tied dioxin to more than a dozen illnesses, including cancer, Parkinson's disease and crippling congenital disorders.

"I never met a hormone system that dioxin didn't like to disrupt," said Dr. Linda Birnbaum, director of the National Institute of Environmental Health Sciences and a leading dioxin expert. "It has widespread effects in nearly every vertebrate species at nearly every stage of development."

### **Early warnings**

As a young obstetrician during the war, Dr. Nguyen Thi Ngoc Phuong brought hundreds of healthy babies into the world in Tu Du Hospital, home to Vietnam's largest maternity ward, in Saigon, now Ho Chi Minh City.

Then, in 1968, two years after U.S. forces expanded the use of herbicides by millions of gallons, Phuong said she delivered a baby born without a brain or a spinal cord.

In the next few months, she said, she delivered dozens of infants with equally severe deformities, three or four a week -- babies born with organs on the outside, with no arms, no legs, no eyes.

"It was very horrible for me and my colleagues," she said, her voice cracking as she wiped away tears. "The first case happened on my duty. I didn't show the mother because I was afraid she would go into shock. But the father and other family members demanded to see, and it was horrible."

Finally, she went to friends who wrote for one of the Saigon newspapers. Stories of birth defects linked to the U.S. war in Vietnam soon began to emerge, sparking a bitter controversy that continues today.

The U.S. military ended the herbicide program, known as Operation Ranch Hand, in 1971 after a study for the National Institutes of Health found that a chemical in some of

the compounds caused birth defects in laboratory animals. Soon after, the U.S. surgeon general halted the domestic use of the chemical, known as 2,4,5-T. Later it became widely known that 2,4,5-T was contaminated with a highly dangerous form of dioxin, TCDD.

A diabolical toxin that attaches itself to the fat cells of humans and animals, TCDD can remain in the body for decades. Scientists think that once present, it binds with cell proteins known as Ah receptors, which can then trigger a series of molecular events that affect cellular growth, potentially leading to cancer and other illnesses. Researchers also hypothesize that dioxin's impact on the receptors can alter the regulation of genes, leading to changes in a person's DNA.

Multiple genetic and environmental factors can affect a person's reaction to TCDD, and scientists say health effects depend on genetic predisposition, the manner and amount of exposure and other factors that researchers haven't fully figured out.

In the case of birth defects, dozens of experiments show that laboratory animals exposed to TCDD have higher rates of birth defects, with dose and timing affecting risk. In humans, scientists have found some correlations between exposure and defects but have yet to prove a cause-and-effect relationship. Animal research suggests that the chemical can affect reproduction by corrupting sperm and interfering with hormones that regulate the development of fetuses.

The U.S. Department of Veterans Affairs in 2003 began providing disability compensation to the children of female Vietnam veterans if they suffer from any of 18 birth defects -- including the first deformity Phuong encountered four decades ago, known as anencephaly.

Male veterans' children are compensated for one defect: spina bifida, a condition in which some vertebrae in the spine are not fully formed, leading to a host of difficulties including paralysis, fluid in the brain, bowel control problems and learning disabilities.

Figuring out how and why children are born with birth defects remains painfully complicated. There can be multiple factors at play, many of which are never known, making the job of isolating one culprit difficult, if not impossible.

What is becoming clear, however, is that people -- especially women -- who are exposed to even trace amounts of TCDD, which scientists measure in parts per trillion, have a higher risk of bearing children with birth defects.

### **Conflicting views**

The controversy over Agent Orange's impact in Vietnam stands at the crossroads of science and politics, a messy affair rife with hard feelings and stubborn assumptions on

both sides.

Birth defects are the most emotionally charged part of the disagreement, with some Vietnamese claiming nearly every child born with a deformity is a victim of Agent Orange, while U.S. officials demand definitive proof that defoliants are to blame for any birth defect.

"The Vietnamese authorities, particularly at the local level, tend to lump all of these birth defects together and talk about them being related to Agent Orange," said Michael Marine, the U.S. ambassador to Vietnam from 2004 to 2007. "At the same time, I didn't think the U.S. side was tackling this with enough vigor. It was politically toxic to deal with."

As evidence of the large-scale impact of the herbicides, the Vietnamese point to a study by Columbia University professor emeritus Jeanne Stellman, published in the peer-reviewed journal *Nature*, that estimated 2.1 million to 4.8 million Vietnamese civilians were exposed to the chemicals during the war.

Still, some U.S. officials view accusations that the defoliants caused widespread birth defects in Vietnam as a centrally controlled propaganda campaign founded on scant scientific evidence.

"We believe the (Vietnamese government) will never permit research that in any way might discredit its two-decade long propaganda campaign, i.e., Agent Orange/dioxin is to blame for a huge range of serious health problems -- especially birth defects and mental retardation," said a 2003 memo from the U.S. Embassy in Hanoi.

U.S. officials point to a host of other possible reasons for the high rate of congenital deformities, including malnutrition, a lack of iodine in the diet of pregnant mothers, even alcoholism.

Much of the contentious political rancor is captured inside Tu Du Hospital, which cares for dozens of children with some of the most severe deformities. Many were abandoned at birth and spend their days studying and playing while undergoing physical therapy and other treatments to overcome their disabilities.

The hospital and the children treated there have become symbols of Agent Orange's lingering impact, even though in many cases little is known about whether and how their parents may have been exposed.

In 1968, Phuong and her colleagues began collecting dozens of fetuses and deformed babies who did not survive, storing them at Tu Du in large jars filled with formaldehyde. Foreign news reports about the herbicides often feature images of the jars, again despite a lack of hard evidence about what caused the deformities.

As the Tribune conducted interviews overseas, it was clear that some Vietnamese citizens are quick to blame the defoliants for health problems even when documenting exposure is difficult or the facts make direct exposure impossible. Some who said they were exposed didn't join the military until long after the spraying missions had ceased; others operated in areas where little or no spraying took place.

Still, the Tribune saw many children at Tu Du and elsewhere in Vietnam who suffer from birth defects and illnesses that science has linked to dioxin exposure. In many cases, data on wartime spraying missions supports their parents' stories of exposure to herbicides.

### **Parents' burdens**

Tram Thi Shu has a 6-year-old son, Ho Cong Duc, who looks more like he's 6 months old. His blue veins are visible beneath his translucent skin. The boy is thin and pale; his breathing is raspy and labored. Shu believes his illnesses, as well as her daughter's seizures, are due to her exposure to defoliants.

"I remember seeing the plane fly over the back of my head," said Shu, 43, who grew up in Quang Nam province. "After it left, all of the leaves from the trees fell down. We were wet because of the spray. I don't remember exactly how many times it happened, but my mother said it was at least three times."

Data from spraying missions in Quang Nam show nearly 24,000 gallons of Agent Orange and 21,000 gallons of Agent Blue -- which contained arsenic -- were sprayed within two miles of Shu's village.

"I am very worried for my son," Shu said. "If I can live longer than him, it will be OK. But if I pass away, I don't know who will take care of him."

And then there's Dao Thi Kieu, who has lost a husband as well as five children.

Her husband, Lam Ba Trung, served in the U.S.-backed South Vietnamese army along the 17th Parallel in Quang Tri province, where U.S. and South Vietnamese forces sprayed more than 700,000 gallons of herbicides to destroy enemy crops and defoliate dense jungles.

He died in 2004 at 60 after a seven-year battle with lung and throat cancer, illnesses the Institute of Medicine and the U.S. Department of Veterans Affairs link to defoliants used during the war.

Like many Vietnamese citizens, Kieu and her husband spent years blaming themselves for their children's suffering.

"We thought that maybe we had done something bad in a past life," she said, her voice beginning to break. "That's why my husband became a vegetarian."

Almost every day, Kieu rises at 3 a.m. to care for her two surviving disabled daughters, Lam Kim Lien, 39, and Lam Ngoc Huong, 35.

Without the benefit of physical therapy, neither is able to walk, talk or even hold a spoon. Their misshapen, skeletal bodies and cropped hair make them look much younger, while their gaunt, expressionless faces reflect lives spent on a small wooden bed covered with a straw mat.

The couple's only healthy child, Lam Ngoc Nhan, 20, was born after Kieu and Trung waited 10 years to try again, an important detail considering dioxin levels are cut in half in human beings after about 7 1/2 years; the chemical also passes out of the body as mothers breast feed.

Kieu tends her rice paddies until dusk and then returns home to bathe and feed Lien and Huong. A diminutive woman with an iron resolve, Kieu is well-respected in her village for struggling through hardships, giving her a sense of pride amid all the pain.

But her strength melts away as she speaks about the difficulties she faces and her hopes for the future.

"I don't know what to say. To find justice?" she said, tears streaming from her dark eyes. "I lost five children and a husband. I have two children with disabilities. There are days when I come back from work, and I am so tired I cannot lift up my children."

[jgrotto@tribune.com](mailto:jgrotto@tribune.com)

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