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The Legacy of War: A Holistic Analysis of Socio-Economic and Healthcare Resources for People Affected by Agent Orange In Việt Nam

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The Legacy of War: A Holistic Analysis of Socio-Economic and Healthcare Resources for People Affected by Agent Orange In Việt Nam

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The pursuit of addressing a topic that has changed the entire trajectory of lives around the central and southern regions of Việt Nam is a project that must be handled with sensitivity toward families and individuals directly and indirectly affected by Agent Orange and various other Rainbow Herbicides/Dioxin. I would like to express my gratitude toward the members of the Việt Nam Association for Victims of Agent Orange/Dioxin (VAVA), specifically the Đà Nẵng chapter (DAVA), for allowing me to conduct interviews of employees and veterans who work alongside those with disabilities from regions heavily sprayed with dioxin. I also would like to thank my study abroad program director Dr. Duong Van Thanh for connecting me with this organization and arranging meetings with English-speaking employees. I could not have seen the real-life circumstances of these families and individuals without visiting.
Abstract

The war between the United States of America and Northern Việt Nam lasting from 1955 to 1975 did not end with the removal of American troops from Vietnamese soil, but it rears its ugly head daily in the lives of those affected by Agent Orange and other various Rainbow Dioxins utilized as herbicides. This paper delves into the enduring legacy of the Resistance War Against America, specifically focusing on the socio-economic and medical ramifications for families and individuals affected by Agent Orange that persist half a century after its prohibition. The study scrutinizes the disparities in aid between American veterans and Vietnamese civilians, shedding light on the inadequacies in addressing the long-term consequences of toxin exposure. Through interviews with the Việt Nam Association for Victims of Agent Orange and visits to daycare facilities for people affected by dioxin, this project advocates for a paradigm shift in the allocation of funds, urging a redirection of resources towards the well-being of affected Vietnamese civilians rather than primarily channeling aid into remediation projects and disability policies. By exploring alternative avenues, such as community-based financial initiatives and educational programs, the paper suggests a more equitable distribution of aid that addresses the holistic needs of those impacted by the aftermath of herbicidal warfare.
Chapter I. Introduction

I. Problem Statement

Between the 1960s and early 1970s, the United States launched Operation Ranch Hand, an initiative designed to defoliate Northern Vietnamese military grounds to improve observation and destroy enemy crops by spraying herbicides throughout the central and southern regions of the country. The War Remnants Museum in Hồ Chí Minh City serves as the largest memorial for the usage of Agent Orange and the impact that its toxic properties have had on the health of people living in those affected areas. Before beginning this project, I heard about changes that will be made to the Agent Orange exhibit in this museum by 2025 through USAID. I was told that millions of dollars would be spent to adapt the sector into “From Foes to Friends” which will focus on how the United States has attempted to make up for the usage of herbicidal warfare by providing generous donations amounting to over $496.3 million in the past 16 years. The new exhibit will display “mine/unexploded ordnance action, environmental remediation, and support for persons with disabilities”. Upon listening to these changes that the Vietnamese government has already approved, I was drawn toward investigating how these funds were and are being allocated concerning the lives of people directly affected by Agent Orange.

II. Study Objective

The primary objective of this study is to comprehensively assess and analyze the enduring consequences of herbicidal warfare in Vietnam, particularly the impact of Agent Orange, on individuals and families. The study aims to investigate the socio-economic challenges affected individuals and families face, including limitations in education, employment, and access to essential services. I will examine the long-term medical ramifications
of herbicidal exposure on multiple generations and will evaluate the disparities in financial and medical aid between American veterans and Vietnamese civilians. My goal is to create a holistic picture of dioxin exposure in the modern day by incorporating historical background, chemical effects, the reality of the lives of people affected by Agent Orange, the effectiveness of humanitarian interventions, and the funds associated with them. The purpose of this paper is to highlight alternative resource allocation strategies that prioritize the well-being of affected Vietnamese civilians, advocating for a shift from a remediation-focused approach to a more grassroots framework with wraparound services. By achieving these objectives, the study seeks to contribute valuable insights into the ongoing challenges faced by affected communities and advocate for economic changes that address the needs of those impacted by the legacy of herbicidal warfare in Việt Nam.

III. Hypothesis

Despite the banning of Agent Orange and other rainbow herbicides 50 years ago, the enduring legacy of herbicidal warfare in Việt Nam continues to significantly impact the socio-economic and physical well-being of affected individuals and families. The lack of effective support systems and limited acknowledgment from the U.S. government exacerbates the challenges faced by the Vietnamese population, hindering their ability to overcome the long-term consequences of exposure. A more equitable distribution of financial resources, coupled with a shift in focus from remediation projects to holistic well-being, has the potential to ameliorate the ongoing struggles faced by affected communities in Việt Nam.
IV. Scope and Limitations

The scope of this study encompasses a comprehensive examination of the enduring consequences of herbicidal warfare, particularly the use of Agent Orange during the Việt Nam War. The study focuses on multiple dimensions, including socio-economic challenges, medical implications, disparities in aid between American veterans and Vietnamese civilians, and the ongoing Americanization of Vietnamese law. The temporal scope extends over 50 years pre- and post-herbicide banning. Specifically, the study delves into historical background, chemical properties, medical ramifications, socio-economic impact, types of aid, disparities in resource allocation and potential improvements, and legal dimensions. The study summarizes a broad understanding of the persisting challenges faced by those affected by herbicidal warfare and advocates for prioritizing holistic welfare for individuals and emphasis upon inter-organizational collaboration.

Due to the wide scope of this study, numerous limitations exist that may impact the depth of the research including time and geographical constraints, language barriers, sensitivity, availability of data, policy dynamics, and ethical considerations. The study is constrained by a limited timeframe of one month, impacting the depth of the investigation and the ability to conduct extensive fieldwork, interviews, and collect nuanced data. The research is hindered by my lack of proficiency in the Vietnamese language, limiting my ability to engage directly with affected individuals, local communities, and non-English speaking sources within Việt Nam. This language barrier may have led to potential gaps in understanding cultural differences and obtaining first-hand perspectives. Limited access to certain information, reluctance from individuals to share their experiences, or potential cultural barriers may have impacted the accuracy and completeness of the interviews. The study heavily relies on the availability and
accuracy of existing data, and potential gaps or inconsistencies in historical records affected my ability to draw comprehensive conclusions. I faced challenges in obtaining a representative sample due to geographical constraints, potentially resulting in a skewed representation of certain regions and communities. The study does not capture the full spectrum of policy dynamics and political considerations surrounding the legacy of herbicidal warfare. Given the sensitive nature of the topic, ethical considerations regarding the privacy and well-being of study participants was carefully navigated, highly impacting the depth of information that could be gathered and reported. Acknowledging these limitations is crucial for interpreting the study's findings accurately and ensuring that its recommendations are contextualized within the constraints of the research scope and methodology.

Chapter II. Methodology

I. Research Sources

This project has been compiled from a variety of reputable sources for secondary quantitative data collection in addition to 5 orally-conducted, semi-structured interviews with employees and war veterans collaborating with non-profit organizations designated to distribute aid to those affected by dioxin in Việt Nam. By combining historical data in relation to the Resistance War, modern-day geographic maps and demographic information, and subjective first-hand experiences with the reality of Agent Orange in the lives of Vietnamese families today, this paper aims to identify correlations between expenses, disabilities, and spray zones across the country while recognizing the manner in which aid distribution could be reevaluated to better support the economic and healthcare needs of the target population. The interviews contribute to a case study of qualitative data gathered at a non-profit organization named Đà Nẵng Association
for Victims of Agent Orange. The names of those interviewed will remain anonymous given the sensitivity of this subject matter and the critical information and testimonies that interviewees shared with me.

Relevant socio-economic factors in consideration include family income, access to education, occupation, healthcare benefits, and geographic location. Factors of Agent Orange taken into account include the density of gallons sprayed per kilometer of land over a set period of time. This study displays spatial analysis using GIS Mapping of Herbicide Reporting System (HERBS) data released by the United States Department of Defense Military Assistance Command – Việt Nam (MACV) which outlines Operation Ranch Hand flights.

It is important to recognize the role of correlation versus causation with a contextual understanding in this study. There is strong evidence that Agent Orange is a core cause of numerous diseases and chronic illnesses identified by the Veterans’ Association, however, it remains impossible to name Agent Orange as the sole reason for the contraction of any of these disabilities and deformities due to the nature of the symptoms presented across the population exposed to Agent Orange in contrast to the unaffected population. However, it is naïve to disregard the strong correlations between Agent Orange exposure and multiple diseases and genetic mutations shown through animal testing studies that are not recognized yet by the Veterans’ Association as being caused by dioxin.

II. Primary Data Population and Population Size

There are two populations in this study including the 14 organizations providing non-medical assistance currently to people affected by Agent Orange in Việt Nam and the estimated 3 million people affected by Agent Orange today in Việt Nam,³ around 400,000 of
which have suffered permanent injury or death from exposure, and at least 150,000 of which are children born with serious congenital defects.

III. Primary Sample and Sample Size

The primary data in this project comes from a case study of one predominant organization named Đà Nẵng Association for Victims of Agent Orange in Đà Nẵng, Việt Nam that assists 5,000 people, including 30 people who were affected by Agent Orange and come in every day to the main center I visited. There are 10 workers at this center and 2 executives that I spoke with. I also interviewed 2 volunteers and 1 American veteran who was physically affected by Agent Orange and works with this organization.

IV. Sampling Technique

Due to difficulty in contacting organizations who were willing to let me visit, convenience sampling was used to find this organization. Additionally, one stipulation was that there must be one English-speaking person in attendance who served either as a translator or the interviewee.

V. Tools for Data Collection and Analysis

The sources of my secondary quantitative data come from extensive online databases known as JSTOR as well as the National Institute of Health (NIH) and the Nature science journal. Additionally, some data has come from the Herbicide Reporting System (HERBS) database released by the USA Department of Defense Military Assistance Command, Việt Nam (MAC-V) in 1970. Through semi-structured interviews at the Đà Nẵng Association for Victims...
of Agent Orange (DAVA) with employees and veterans, I recorded experiences with funding efforts and distribution of resources for people affected by Agent Orange. The method utilized throughout this paper to analyze data combines a qualitative story of the lives of those affected contextualized by a quantitative and anecdotal history to paint a well-rounded picture of the reality at hand.

Chapter III. Comprehensive Literature Review

I. Background Information Focus and Purpose

The comprehensive literature review provides a foundation about the history of the Resistance War Against America (Việt Nam War), Agent Orange’s usage, chemical makeup, and medical effects, a timeline of policies for herbicide elimination and legal repercussions, and the access to resources for those impacted by dioxin. This basis is necessary to depict the socio-economic struggles faced by affected families and individuals today, unraveling the persistent challenges they encounter, including limited access to education, employment, and essential healthcare services. Moreover, the investigation uncovers the stark differences in the assistance provided by the United States, emphasizing the disproportionate focus on veterans compared to the insufficient support extended to Vietnamese civilians. The study examines the continued lack of official acknowledgment by the U.S. government regarding the extent of its responsibility in the aftermath of the war. Ultimately, this background information serves as the bedrock underneath my qualitative experiences in order to call for increased transparency, accountability, and collaboration between the two nations to ensure that affected individuals receive the support and recognition they rightfully deserve. This paper aims to contribute to a
broader dialogue on the enduring consequences of the Việt Nam War, advocating for a reevaluation of current policies and the establishment of a comprehensive framework that prioritizes the well-being and rights of all individuals affected by the usage of Agent Orange and related herbicides.

II. Historical Background of Resistance War

The Resistance War Against America, commonly known to Americans as the Việt Nam War, unfolded from 1955 to 1975, marking a tumultuous chapter in United States and Southeast Asian relations.5 Originating from the Vietnamese struggle for independence and reunification against French colonial rule, the conflict escalated with the direct involvement of the United States. During the height of U.S. intervention between 1965 and 1973, the war witnessed a massive deployment of American military forces, reaching approximately 536,100 troops at its peak in 1969.5 The U.S. aimed to counter the spread of communism in Southeast Asia, supporting the government of South Việt Nam against the communist forces of North Việt Nam. This war on communism was rooted in the Red Scare and Cold War era, a period of public hysteria and anxiety about the rise of socialist and communist ideologies in the United States whilst fearing the “domino theory” which hypothesized that if communism took over in Việt Nam, it would upend nearby democracies.6 The war, however, garnered fierce resistance from the North Vietnamese and the Việt Cộng, the National Liberation Front group based in the South.5 The resistance was marked by guerrilla warfare, strategic mobility, and a staunch commitment to national unity, epitomized by Hồ Chí Minh's call for a "people's war."7
Hồ Chí Minh Thought

Hồ Chí Minh Thought, named after the revolutionary leader and founder of the Democratic Republic of Việt Nam, represents a extensive ideology that guided the North Vietnamese Army during the Việt Nam War. Hồ Chí Minh's philosophy synthesized Marxist-Leninist principles with Vietnamese nationalism, emphasizing the importance of achieving independence through revolutionary and collective means. His leadership advocated for the unity of the people, the importance of the proletariat, and a flexible approach. The Northern Vietnamese Army was characterized by its resilience, guerrilla warfare tactics, and dedication to the cause of national liberation. These soldiers often faced technologically superior adversaries yet demonstrated adaptability, reflecting the core principles of Hồ Chí Minh in their pursuit of a unified country. Hồ Chí Minh is now widely affectionately regarded as Uncle Hồ or Bác Hồ throughout Việt Nam.

Battles from Beginning to End

In the early stages, the Việt Cộng employed guerrilla warfare tactics, posing a formidable challenge to the technologically superior U.S. and South Vietnamese forces. The Battle of Điện Biên Phú in 1954 marked a turning point, leading to French withdrawal and the division of Việt Nam. As the conflict escalated, major engagements like the Tet Offensive in 1968 showcased the Việt Cộng and North Vietnamese Army's capacity for large-scale conventional warfare, surprising opposing forces. The U.S. gradually increased its military presence, but the tactics employed by the North Vietnamese and Việt Cộng, coupled with widespread anti-war sentiment, led to a shift in dominance. The Vietnamization policy sought to transfer military responsibilities to the South Vietnamese, culminating in the fall of Sài Gòn in 1975, signaling the end of the war and the victory of the communist forces. The Việt Nam War stands as a complex tapestry of
battles and strategic maneuvers that underscored the challenges of asymmetrical warfare and the eventual triumph of the North Vietnamese forces.

**Protests**

As more information dissented from the narrative in support of the war, protests arose across the globe to the role the United States was playing in Việt Nam’s civil war. The first major protests began in 1964 at the University of Michigan\(^8\) and escalated alongside the deployment of more troops and increased offensives, leading to massive anti-war demonstrations in San Francisco in 1967 and more than 500,000 people marching throughout Washington D.C. in 1971.\(^5\) Throughout widespread displays of opposition, many American students and people across Europe, Africa, South America, and Asia marched to promote pacifism and challenge militarist campaigns and the American veteran draft. The U.S. military draft usurped 2.2 million American men out of 27 million eligible men between 1964 and 1972.\(^5\) About 500,000 American men became “draft dodgers” by fleeing to Canada.\(^5\)

**Americanization and Vietnamization**

Lyndon B. Johnson, the 36th President of the United States from 1963 to 1969, played a pivotal role in the Việt Nam War.\(^9\) Initially inheriting the conflict from President John F. Kennedy, Johnson grew U.S. involvement significantly. Under his administration, the number of American troops in Việt Nam surged, reaching over 500,000 by 1969.\(^6\) Johnson's decisions, notably the Gulf of Tonkin Resolution in 1964, granted him broad war powers, intensifying U.S. military engagement without a formal declaration of war from Congress.\(^6\) Despite implementing domestic reforms through his "Great Society" programs, Johnson's presidency is largely defined by the Việt Nam War, and he faced growing opposition as the conflict spiraled.\(^9\) The war's toll on
American lives and resources, coupled with social and political unrest, contributed to Johnson's decision not to seek re-election in 1968, marking a critical juncture in both his presidency and the trajectory of the Việt Nam War.\(^9\)

When Richard Nixon became president of the United States in 1969, Vietnamization was employed on a large scale to reduce American involvement in the war by transferring all military responsibilities to the South Vietnamese army as an increase of unpopular support for the war created deep rifts in American society. There was a reduction from the peak of around 550,000 troops in 1969 to 69,000 by 1972.\(^10\) Nixon contrasted Johnson’s Americanization tactics with the slogan “peace with honor” throughout the Việt Nam Theater including Laos, Cambodia, and adjacent waters of the South China Sea.\(^10\) However, as the Americans expanded political bases into rural areas, organized local elections, and implemented social reforms and economic development initiatives, the military devised a bombing campaign and ground invasion of neutral Cambodia whilst claiming it was necessary to maintain pressure.\(^10\) Afterwards, once the Americans fully pulled out by the end of 1972, several Southern offensives highlighted their poor performance and heavy reliance on the U.S. air power.\(^11\) The January 1973 Paris Peace Accords with North leaders to withdraw the remaining troops in 60 days in exchange for an immediate ceasefire, return of American prisoners of war, and promise to recognize legitimacy of the South Vietnamese government ultimately resulted in the South Vietnamese fall to communist forces in 1975.\(^12\)

**Consequences of War**

The conflict's devastating toll on human lives is staggering, with estimates suggesting that over 2 million Vietnamese civilians, 1.1 million North Vietnamese and Việt Cộng fighters,
and 200,000 to 250,000 South Vietnamese soldiers lost their lives during the war while an estimated “800,000 orphaned children [roamed] the streets” and 500,000 South Vietnamese women “became prostitutes during the war” to earn more in a week than their family could in a year. The United States experienced significant losses as well, with approximately 58,300 American soldiers listed at The Việt Nam Veterans’ Memorial in Washington D.C. who were killed or missing in action and over 300,000 wounded. South Korea lost over 4,000 soldiers, Thailand with 350, Australia had more than 500, and New Zealand lost around 36 lives. The war also resulted in immense destruction, particularly through the widespread use of herbicides such as Agent Orange, affecting over 4.5 million acres of Việt Nam and accounting for 6% of its total land area. 25 million acres of farmland, 12 million acres of forests, and 500,000 acres of crops were destroyed or damaged. 21 million bomb craters were formed in South Việt Nam, destroying “thousands of buildings and [damaging] 4,000 villages, and occasionally [hit] schools, churches, and hospitals” as well as many dams and canals that provided irrigation for farmland. Meanwhile, ecosystems were vastly affected by herbicides with seeped into the soil and groundwater. The economic cost for the U.S. reached an estimated $850 billion adjusted for modern-day inflation by the war's conclusion.

III. Agent Orange and Its Usage

Operation Ranch Hand

Operation Ranch Hand was a large-scale herbicidal campaign during the Việt Nam War that left an indelible mark on the landscape and the lives of those exposed to its toxic aftermath. Approximately 6 million acres of land in South Việt Nam were sprayed with herbicides, most
notably Agent Orange which was named after the orange stripe that encircled the 55 gallon drums it was stored within.\textsuperscript{17}

![Figure 2. 55 Gallon Drum of Agent Orange\textsuperscript{18}](image)

Between 19 and 20.2 million gallons of herbicides were sprayed by U.S. Air Forces between 1962 and 1971, 11 million gallons of which was Agent Orange and 4 million of which was Agent Blue.\textsuperscript{17} 1.6 million gallons were documented to be applied to base perimeters, roadways, and communication lines by helicopter and sprayings from riverboats, trucks, or backpacks.\textsuperscript{17} 2\% was used for defoliation of military base perimeters and 9\% used to destroy “unfriendly” crops to reduce enemy food supplies.\textsuperscript{19} This extensive defoliation effort had far-reaching consequences, impacting not only the immediate environment but also the health of individuals across generations. The estimated number of American veterans who were exposed to these herbicides stands around 2.7 million with many facing debilitating health issues as a result.\textsuperscript{17} Shockingly, the toll on Vietnamese civilians is even more staggering, as it is estimated that up to 4.8 million individuals who were directly affected by the herbicidal campaign, resulting in widespread health challenges and socio-economic hardships.\textsuperscript{20}
Herbicides were used for decades in American agriculture and there was debate and legal implications surrounding use of these chemicals for war. President Ngô Đình Diệm of South Việt Nam requested that President John F. Kennedy approve the usage on aerial herbicide spraying in Việt Nam in 1961, leading to policy debate between its efficiency and frugality versus alienating the U.S. and barbarism, however, the operation was approved in January 1962 as limitations gradually dissipated.21 There were two major goals of this project which were to defoliate the Vietnamese jungle to improve observation and build military infrastructure as well as to starve enemy forces.17

In terms of the sheer volume of dioxin unleashed during the operation, an estimated 400 pounds of dioxin was disseminated across the targeted areas.22 Formations of three to five C-123 cargo planes would be suited with 1,000 gallons of herbicide each to fly over highways, railroads, and jungle, spreading the chemical for 9 years.17 Additionally, UH-1 and H-34 helicopters, boats, and hand-spraying techniques were utilized.17

These statistics underscore the magnitude of the environmental and human impact of Operation Ranch Hand, illuminating the urgency for comprehensive measures to address the repercussions for both American veterans and Vietnamese civilians affected by this chapter in history.

Research on Herbicides

When the Việt Nam War commenced, the deployment of herbicides, particularly Agent Orange, was regarded as a tactical solution to strip the dense vegetation that provided cover for the Việt Cộng insurgents. Initially, the chemical was perceived as a relatively harmless defoliant, however, as the conflict progressed, concerns began to surface regarding the potential health and
environmental ramifications of Agent Orange. Dow, Monsanto, and various other companies were forced by the U.S. government to produce Agent Orange under the U.S. Defense Production Act of 1950. From 1954 onwards, studies have confirmed the toxicity of both herbicides used in Agent Orange. In 1962, the Monsanto Chemical Company and the President’s Science Advisory Committee reported that Agent Orange's TCDD could be toxic. In 1965, the Bionetic Research Laboratories found that 2,4,5-T, a component of Agent Orange, caused malformations in test animals. Subsequent studies linked exposure to Agent Orange with a range of serious health issues, including various cancers, birth defects, and neurological disorders. The National Institute of Health showed proof of 2,4,5-T byproducts of TCDD causing cancer in mice and independent research projects demonstrated similarities between animal testings and human exposure. The American Association for the Advancement of Science called for the end of herbicides containing 2,4,5-T in 1969. Agent Orange was eliminated from military use shortly after, but Agent White continued to be used without dioxin, however, it took almost 4 months to defoliate what Agent Orange did in hours. By May of 1970, defoliation missions ceased and all crop destruction ended by 1971. Agent Blue and White continued to be used around base perimeters, then the remaining 2.2 million gallons of Agent Orange were moved to Johnston Island Atoll and incinerated.

The acknowledgment of these adverse effects led to a paradigm shift in understanding, prompting increased scrutiny and eventually spurring extensive research into the long-term consequences of Agent Orange exposure, both among military personnel and the civilian population in Việt Nam. The evolving awareness of Agent Orange's hazardous nature marked a critical turning point in public discourse, policy considerations, and the eventual recognition of the herbicide's profound impact on human health and the environment.
The United States Air Force conducted an epidemiologic study called Project Ranch Hand II to evaluate the health effects of chemical exposure in 1979. The U.S. government spent approximately $143 million on the program which concluded by 1984 that there was “insufficient evidence to support a cause and effect relationship between herbicide exposure and adverse health in the Ranch Hand group at [that] time” while disclosing medical findings and calling for a follow-up.

Follow-ups include the Việt Nam Era Retrospective Observational Study (VE-HEROes) and the Center for Disease Control Veterans Health Studies which used military records and self-reported exposure to identify exposure and TCDD levels, showing that those who directly handled or sprayed herbicides were the ones impacted more by bladder and prostate cancers in particular. A ProPublica analysis from 2016 “found that the odds of having a child born with birth defects were more than a third higher for veterans exposed to Agent Orange than for those who weren’t”.

Rainbow Herbicides

Beyond Agent Orange, a spectrum of rainbow herbicides, including Agent Blue, Agent White, and Agent Purple, was employed during the Việt Nam War for defoliation and crop destruction. These herbicides contained various chemical compounds such as arsenic-based substances, picloram, and cacodylic acid. The impact of these herbicides has been linked to soil degradation, water contamination, and adverse health effects. The deployment of rainbow herbicides exemplifies the broader ‘ecocide’ and humanitarian challenges associated with chemical warfare during the conflict, underscoring the necessity of international agreements and ethical considerations when employing chemical agents in armed conflicts. Agents Pink, Purple, and Green stopped being used by 1964 because they contained three times as much TCDD as
Agent Orange. Regardless, by 1965, the U.S. military did not need presidential authority to spray Agent Orange so it was used extensively.

Production Cessation and Impact

Production of Agent Orange ended in 1971 at Monsanto and was banned by the U.S. Despite the cessation of use, up to 4 million Vietnamese people were affected, 400,000 of which have been estimated to have died as a result, and at least 150,000 children have been born with serious birth defects. Over 300,000 U.S. veterans have been estimated to have died from exposure as well. The toxin was sprayed up to 20 times the concentration manufacturers recommended for killing plants.

Geographical Display of Usage

Herbicide spraying began in 1962 and dramatically increased during 1967. Between 1968 and 1971, 6,500 spraying missions were carried out in an area of about 1.5 million hectares, which represents about 10% of South Việt Nam. Around one-third was sprayed more than once and about 52,000 hectares was sprayed over 4 times. The rainbow herbicides were sprayed in forested and farmland regions throughout central and southern Vietnam, decimating plant and animal life for a kilometer within days of application. Especially, forests near the demarcation zone and at the junction between Cambodia, Laos, and South Vietnam, mangroves in the Mekong Delta, and shipping channels southeast of Hồ Chí Minh City were effected. Additionally, Quảng Trị, southeastern Vietnam, and the Central Highlands along the coast were heavily sprayed. Hotspots include the Đà Nẵng Air Base, Biên Hòa Air Base 25 kilometers from
Hồ Chí Minh City, and Phú Cát Air Base in Quy Nhơn because the chemicals were stored in bulk in these locations.\textsuperscript{31}

![Chloropleth plot of Việt Nam for June 1969 showing intensity of exposure using the E4 model.\textsuperscript{32}}](image)

**Environmental Impact**

The vast majority of studies have focused on American veterans’ health, but there is a lack of research on the long-term effects of Agent Orange on soil, water, air, plants, and animals. Since defoliation campaigns cleared entire forests, it is clear that this severely impacted the wildlife and plant life in these regions, however, the extent to which the environment is still impacted 50 years later is unclear. A study conducted in 2014 took samples from soil, sediments, fish, and farm animals from the area of Phong Mỹ that was affected by Agent Orange between 1968 and 1971. Researchers found that polychlorinated dioxins/furans (PCDD/PCDF) levels in soil and sediments were relatively low between 0.05 and 5.1 pg WHO-toxic equivalents/g for soil and 0.7 and 6.4 pg WHO-toxic equivalents/g for sediments, however, the PCDD/PCDF in
poultry “exceeded the maximum permissible limit of dioxin content per unit fat mass” and in some cases, 2,3,7,8-TCDD “represented more than 90% of the total PCDD/PCDF” implying that Agent Orange was the main source.29 “Contamination of surface water and sediments, soil, and surface of plants” represent the beginning of the food chain.29 Thus, the lipophilic character of dioxins leads to “bio-accumulation in adipose tissues of animals…, and subsequently also of people”.29 In water supplies, dioxin accumulates in sediment and aquatic life, devastating local water sources. In soil, the compound persists, affecting agricultural areas and posing risks to food safety. The lingering presence of dioxin in Việt Nam echoes the need for sustained remediation efforts.

**Correlation Between Exposed Communities and Disability**

Between 1974 and 2016, numerous studies have been conducted in the United States to evaluate the correlation between Việt Nam War veterans and having children with congenital deformities and diseases. Maternal connections to exposure have proven to have a slightly higher likelihood of contributing to congenital birth defects in offspring than paternal exposure.33 Most studies conducted have been limited by small sample groups and congenital anomalies related to confounding factors such as maternal behaviors and delivery complications.33 Additionally, in multiple studies, “inherently low rates of certain birth defects made determining statistical significance difficult”.33 CDC studies and a Boston Hospital study linked neural tube defects to exposure.33 In 2000, a Veterans’ Affairs study linked stillbirth, spontaneous abortion, low birth weight, and birth defects such as spina bifida and anencephaly to children of female Việt Nam soldiers with higher prevalence, however, the Congress recognized this link yet did not attribute it to Agent Orange exposure.33 Through a meta-analysis of 22 studies including 13 Vietnamese
and 9 non-Vietnamese studies, Anh D Ngo summarized that there is a relative risk of birth defects associated with exposure to Agent Orange of 1.95 with a 95% confidence interval [1.59-2.39] with “substantial heterogeneity across studies” and a relative risk of 3 given a 95% confidence interval (2.19-4.12) in Vietnamese studies than non-Vietnamese studies at 1.29 with a 95% confidence interval (1.04-1.59).\(^{34}\) Since most data in the Việt Nam public health record is only recorded in Vietnamese, it is difficult to include these surveys and studies in this paper due to the language barrier and difficulty in evaluation of their validity. Citizens’ self-reported exposure and causal links drawn have been highly criticized often due to lack of verification through hospital records.\(^{33}\)

V. Chemical Properties and Medical Ramifications of Dioxin

Chemical Classification

Agent Orange is a 50:50 ratio mixture of butoxyethanol esters of 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) that produce an unintended byproduct of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD).\(^{35}\) Agent Blue is dimethylarsinic acid, a salt of cacodulic acid, and Agent White is a mixture of 2,4-D and picloram.\(^{35}\) Agent Pink, Purple, and Green contained up to 3 times as much traces of TCDD as Agent Orange. Each of the 6 Rainbow Herbicides contained carcinogenic polychlorinated dibenzo-p-dioxins between arsenic in Blue and the defoliating agent 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in the rest of the Agents which are both now banned from herbicide manufacturing.\(^{35}\)

The half-life of dioxin depends on its environment where it is 11 to 15 years in human bodies, sometimes up to 20 years. Depending on soil type and depth of penetration, the sun
breaks down dioxin in 1 to 3 years on leaf and soil surfaces but half-life can be more than 100 years for dioxin buried under the surface or in the “sediment of river and other bodies of water”.

![Table 1. Use of Military Herbicides in Vietnam (1961-1971)](image)

Chemical Properties

Polychlorinated dibenzo-p-dioxins are chlorinated hydrocarbons made up of 2 benzene rings that are connected by oxygen atoms. They are toxic byproducts of “industrial incineration, combustion, and chemical manufacturing” when burning chlorine with carbon and hydrogen. The number of chlorine atoms and their positions in the molecule determine the toxicity of the dioxin. Dioxins are nonpolar, water insoluble, oil soluble, lipophilic, and stable chemicals that break down very slowly. TCDD is a colorless, crystalline solid with no odor at room temperature and is a member of the dibenzo-p-dioxin family of isomers.

<table>
<thead>
<tr>
<th>Property</th>
<th>Characteristic of TCDD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>322</td>
</tr>
<tr>
<td>Melting Point</td>
<td>305-306°C</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>446.5°C</td>
</tr>
</tbody>
</table>
Impact on DNA

Dioxin exposure may lead to DNA damage and cellular stress through a variety of processes that are intervened or disturbed. There is highly contested evidence that TCDD causes chromosomal translocations. TCDD is potentially genotoxic, teratogenic, and carcinogenic. Through zebrafish and rodent toxicology studies, a wide range of toxic effects that TCDD can have on different organ systems have been presented.

TCDD exposure in zebrafish has been shown to affect heart development through disrupted and increased methylation of DNA in genes that control cardiomyocyte maturation. Studies have reported changes in heart morphology, altered heart rate, and disruptions in the expression of cardiac development genes which may link TCDD exposure to congenital heart disease. Methylation changes have been linked to reproductive dysfunctions and congenital malformations in animal models as well as induction of sperm DNA methylation in gonads of 3 generations. Also, acute exposure to TCDD by “injection leads to inhibition of caudal fin regeneration in zebrafish”.

Dioxin can bind to DNA at specific sites called dioxin xenobiotic response elements (DREs) disrupting endocrine signaling in rodents, thus affecting the function of hormones such as the aryl hydrocarbon receptor (AhR) which plays a key role in mediating TCDD's effects. AhR activation with TCDD treatments in mice have shown “hepatic lipid accumulation, immune cell infiltration, and periportal fibrosis with bile duct proliferation”, pointing to the liver as a target organ. Exposure can cause hepatotoxicity, including fatty liver changes, inflammation, and necrosis and modulation of cytokine production. TCDD exposure in rodents has been shown
to have adverse effects on reproduction and development, leading to decreased fertility, changes in the estrous cycle, mammary cancer, and developmental abnormalities in offspring.\textsuperscript{44} In rats, TCDD leads to “embryo- and fetotoxicity” but the effects on embryos is likely due to maternal toxicity during gestation rather than teratogenicity.\textsuperscript{45}

Exposure has been associated with neurotoxic effects in rodents, including alterations in behavior, changes in neurotransmitter levels, and effects on neural development. Mice studies have shown that low exposure throughout gestation “was sufficient to cause specific behavioral and structural brain phenotypes in offspring” such as “microtubule polymerization in developing postnatal hippocampus” alterations leading to “abnormal morphology of neuronal dendrites that persists into adulthood”.\textsuperscript{46} Rodent studies have shown that TCDD exposure can affect the skin, leading to chloracne, a characteristic skin condition associated with dioxin exposure.\textsuperscript{47} TCDD “acts as a tumor promoter” and leads to tumors of the liver, thyroid, lung, skin, and oral cavity in rodents.\textsuperscript{48}

**Presumptive Medical Effects**

According to the World Health Organization, short-term exposure can cause “skin lesions and altered liver function while long-term exposure can impair the immune system, the developing nervous system, the endocrine system, and reproductive functions”.\textsuperscript{49} General symptoms can include fatigue, headache, weakness, dizziness, convulsions, comas, muscle jerking, seizures, abdominal pain, hypotension, nausea, and myotonia. Chronic exposure have resulted in several types of cancer and TCDD has been classified as a known human carcinogen but claims that TCDD does not affect genetic material.\textsuperscript{49} The WHO says that developing fetuses are highly sensitive to exposure which may cause miscarriages.\textsuperscript{49}
The Cleveland Clinic suggests that “children born of veterans who had Agent Orange exposure may have spina bifida, other neural tube defects and neuroblastomas, or other congenital disorders” since the “parent’s reproductive organs and cells” were damaged, impacting the growth and development of their children.\textsuperscript{4}

The United States Veterans' Association recognizes 19 cancers and other health problems as presumptive diseases associated with Agent Orange exposure. These diseases include AL amyloidosis, chloracne, diabetes mellitus type 2, hypertension, hypothyroidism, ischemic heart disease, monoclonal gammmopathy of undetermined significance (MGUS), Parkinsonism/Parkinson’s disease, early-onset peripheral neuropathy, and porphyria cutanea tarda. The acknowledged cancers are bladder, chronic B-cell leukemia, Hodgkin’s disease, multiple myeloma, non-Hodgkin’s lymphoma, prostate, respiratory, and some soft tissue sarcomas.\textsuperscript{50}

Controversial Medical Effects

There are many other conditions and congenital birth defects that are attributed to Agent Orange exposure by the Vietnamese government and various non-profits that aid people affected by dioxin in Việt Nam. The United States government does not claim responsibility for these directly and has denied many claims that certain disabilities are not linked to the dioxin. Since psychological and neurological disabilities are difficult to analyze in animal testing, learning disabilities and other mental disorders cannot be proven as a direct result of dioxin exposure. Oral clefts, hypospadias, digestive tract issues, and neuroblastomas have been associated with dioxin as well. Also, achondroplasia/dwarfism, limb deformities, sensory loss such as blindness,
aphasia, and deafness, paraplegia, Down Syndrome, and kyphosis are sometimes attributed to Agent Orange in affected areas but are not recognized by the United States.

IV. Legal Implications of Dioxin for U.S. Government

Lawsuits

In 1979, U.S. Veterans filed a class action lawsuit against Agent Orange chemical manufacturers including Dow and Monsanto claiming that veterans and their families suffer from health problems due to exposure and that the manufacturers were negligent for producing a dioxin-laced chemical. As a result, in 1984, there was a settlement that the manufacturers would pay $180 million to veterans and their families who were exposed then died or became ill. The Agent Orange Settlement Fund was founded, distributing $197 million in cash payments to around 52,000 American veterans and $74 million to social service programs for 239,000 veterans.

The Agent Orange Act of 1991 was signed into law and established a process for determining what are presumptive illnesses due to herbicide exposure and who deserves compensation. The service connection is made if a veteran can demonstrate that they “served in Việt Nam between January 9, 1962 and May 7, 1975, and have a disease or condition associated with herbicide exposure”.

On behalf of the Việt Nam Association for Victims of Agent Orange, several Vietnamese citizens filed a U.S. lawsuit against Agent Orange chemical manufacturers in 2004 for aiding violations of international law and war crimes. U.S. courts dismissed the Vietnamese case and the U.S. supreme court later refused to review it in 2005 since the court claimed that the herbicide was used to “protect troops against ambush and not as a weapon of war against human
populations". In 2006, the U.S. and Vietnamese presidents met and addressed Agent Orange residues in Việt Nam for the first time publicly, agreeing “that further joint efforts to address the environmental contamination near former dioxin storage sites would make a valuable contribution to the continued development of their bilateral relationship”. In 2007, U.S. Congress appropriated $3 million to address the remediation of dioxin hotspots in Việt Nam and support public health programs which would be handled by USAID. Blue Water Navy Việt Nam Veterans Act of 2019 passed and extended benefits for American veterans with service connection to the conditions specified as exposure-related. The Veterans' Association expanded presumptive conditions in 2021 to 19 conditions from 14 previously.

**Debate Over Geneva Convention and War Crime Status**

The U.S. defeated most resolutions condemning the use of Agent Orange, arguing that it was not a chemical or biological weapon, therefore, it does not qualify as a violation of the Geneva Convention. The U.S. argued that Agent Orange was a herbicide and a defoliant used to destroy plant crops and to deprive the enemy of concealment. Most notably, the 1925 Geneva Protocol “prohibits the use of chemical and biological weapons in war”, however, the U.S. had not approved the Geneva Protocol. Furthermore, its use has been deemed a violation of the prohibition of chemical warfare as stipulated in Article 23 of the Hague Convention of 1907 but the U.S. claimed defoliants do not apply.

The indiscriminate deployment of this herbicide containing dioxin as a defoliant violated international norms and now has been prohibited by Article II of the 1976 Environmental Modification Convention which states that “each state party to this convention undertakes not to engage in military or any other hostile use of environmental modification techniques having
widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other state party”. ⁶⁰

**US Agency for International Development (USAID) and Congressional Funding**

Since the 2006 meeting between President Bush and President Nguyễn Minh Triết, Congress has “allocated $496.3 million to help the Vietnamese address the environmental and health impacts of Agent Orange”.¹ Initially in 2007, $3 million was given and $30 million was allotted by 2017, then $50 million was allocated in 2023, demonstrating an annual upward trend.¹ The majority of these funds have been given to fund environmental remediation programs which account for $336 million. These remediation programs pertain to the air base hotspots where the Rainbow herbicides were stored such as Đà Nẵng and Biên Hòa. Health-related activities primarily refer to “rehabilitation support, develop[ing] disability policy, and [promoting] disability rights in Việt Nam”.¹ In 2007, the U.S. government and the government of Việt Nam initiated the U.S.-Việt Nam Environmental Remediation of Dioxin Contamination Project supported by USAID and it aims to address the environmental impacts of dioxin by cleaning up contaminated sites. The acknowledgment of the project itself reflects a recognition of the consequences of Agent Orange in Việt Nam.
Table 2. Congress Appropriations To Address Agent Orange/Dioxin Issues in Việt Nam for fiscal years 2007-21

The focus has been on remediation efforts, healthcare, and generalized support rather than direct compensation for individuals affected. The U.S. government has acknowledged the environmental and health consequences of the use of Agent Orange in Việt Nam but has not accepted legal responsibility for the health ramifications on civilians to the extent activists and affected individuals have sought after. USAID has specified that these projects are for people with disabilities “‘regardless of cause’, rather than target only those believed by the Vietnamese government and social organizations to be Agent Orange victims”.¹ There has been purposeful ambiguity in this lack of specificity to “sidestep the difficult – and in some cases impossible – task of identifying the cause of a particular individual’s disability and has avoided treating one
group of people with a particular disability differently from others with the same disability”.

Previously, the language used in the Congress Appropriations was inconspicuous, but there was an “implicit understanding between Hanoi and Washington… to mitigate the health and disability effects of Agent Orange in Vietnam”. However, as of 2022, the U.S. Consolidated Appropriations Act called for the “$15,000,000 [to be] made available for health and disability programs to assist persons with severe physical mobility, cognitive, or developmental disabilities that may be related to the use of Agent Orange and exposure to dioxin” and was adapted in 2023 with $30 million to include unexploded ordnance accidents.

**Air Base Remediation Programs**

The thermal remediation process of areas affected by dioxin works by excavating and hauling contaminated soils and sediments to a treatment structure where it is treated through thermal desorption technology, “heating the soils and sediments to a high temperature” around 335°C (above the melting point) “where the dioxins are destroyed”. Carbon dioxide, water, and chloride are the products while the soil and sediments are reused for industrial and commercial purposes. The Phú Cát Airport clean-up was contained in 2012, however, levels remain a serious threat to public health. The Đà Nẵng Airport Remediation Program began in 2013 and lasted until 2018. It cost $110 million to treat over 90,000 cubic meters of contaminated soils and sediments. The Biên Hòa Airbase Area Project excavation work began in 2020 and is planned to take 10 years to complete 408,500 cubic meters of soil remediation at an estimated cost of $450 million.
Health and Disability Support

USAID has supported programs providing healthcare services and assistance to individuals affected by the consequences of exposure to Agent Orange. USAID has played a role in advocating for policy change and working with the Vietnamese government and other stakeholders to develop and implement support for affected individuals and communities through destigmatization, accessibility standards, and employment opportunities. The Việt Nam Disability Project (VDP) focuses on areas sprayed with Agent Orange and is being deployed in 2 phases between 2016 and 2025 with $86 million of funding throughout 8 provinces where around 99,000 people suffer from severe mobility and intellectual disabilities.¹

14 organizations including 7 Vietnamese NGOs “received over $58 million from funding appropriated by Congress for Agent Orange-related disability and health programs”, “more than three-quarters of [which]... supported the medical needs of people with disabilities”.¹ These interventions include rehabilitation, prosthetic and orthotic services, physical, occupational, and speech therapy, and adaptve equipment.¹ The remaining fourth of the funds supported “disability rights and inclusion” and “implementation of Vietnamese policies related to people with disabilities”.¹ USAID has 7 main partners including Humanity and Inclusion, Việt Nam Assistance for the Handicapped, the Center for Creative Initiative in Health and Population, the Center for Social Initiatives Promotion, the Center for Community Health Research and Development, Action to the Community Development Institute, and the Institute for Population, Health, and Development while organizations such as VAVA, Project RENEW, and the Fund for Genetic Counseling and Disabled Children (FGCDC) “are receiving subgrants from the main implementing partners”.¹
Economic Support

The primary focus of USAID has been remediation programs and rehabilitation needs, “training caregivers and providing them with peer counseling and psychological support, improving policy implementation and access to public services and transportation”, and “promoting disability rights and social inclusion”. It is important to note that many of the conditions that are correlated with dioxin exposure are chronic or congenital and cannot be cured, therefore, medical attention is not the main concern for these individuals and their families. Many people affected by Agent Orange require a full-time caregiver in their family which eliminates multiple members of the family from the workforce, often leading to economic stress. USAID has a few “pilot projects for income-generation activities” such as access to “working capital, equipment, and scholarships to support around 100 families” in 3 provinces through Disability Research and Capacity Development Center and one through the Research Center for Inclusion that aids 30 families. Also, USAID buttresses “10 companies in south central Việt Nam to promote inclusive employment, as well as a recently announced project to spur job creation” in Bạc Liêu.

American Veteran Aid

In comparison to the initiatives by USAID for Vietnamese civilians that avoids direct compensation avenues, the Veterans' Association gives between $40,000 and $42,000 tax-free per year to veterans who have a presumptive disease and were employed in a region with Agent Orange usage.
VI. Support for People Affected by Agent Orange

Timeline

Over the past 50 years, support for people affected by Agent Orange in Việt Nam has evolved given geopolitical dynamics, the evolving understanding of the consequences of herbicidal warfare, and the persistent efforts of various stakeholders. Initially in the 1970s and 1980s, there was limited recognition of the health and environmental consequences of Agent Orange exposure with the focus was often on the immediate aftermath of the war rather than the long-term impacts but now increasing acknowledgment has manifested in the U.S. government’s contribution to remediation efforts and humanitarian assistance programs.

Non-Governmental Organizations

VAVA, Project RENEW, Quảng Trị Agent Orange and Disabled People’s Association, Action to the Community Development Institute, Center for Sustainable Development, Fund for Genetic Counseling and Disabled Children, Children of Vietnam, Việt Nam Red Cross, VietHealth, and Việt Nam Assistance for the Handicapped are the predominant NGOs providing aid to people affected by Agent Orange throughout Việt Nam.
<table>
<thead>
<tr>
<th>Organization</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vietnam Association of Victims of Agent Orange (VAVA)</strong> active nationwide</td>
<td>A membership organization with chapters throughout Vietnam down to the commune level. VAVA advocates for the rights of those impacted by Agent Orange and mobilizes resources to support them. Types of support include monthly stipends, low- or no-interest loans, livelihood support, home renovations, scholarships, and specialized schools or care centers for children with disabilities.</td>
</tr>
<tr>
<td><strong>Hà Nam Association of Victims of Agent Orange active in Hà Nam</strong></td>
<td>Provincial chapter of VAVA that provides support to soldiers who fought in the south of Vietnam and their families that have been impacted by Agent Orange. Support is in the form of income generation, home construction and renovations, scholarships, and nursing care.</td>
</tr>
<tr>
<td><strong>Project RENEW active in Quảng Trị</strong></td>
<td>A Vietnamese organization supporting disabled victims of landmines and Agent Orange in addition to conducting its primary mission of removing unexploded ordnance and conducting mine risk education. It provides direct nonmedical support through home renovations, income generation, revolving loans for animal husbandry, scholarships, and vocational training. It also provides some medical support, including rehabilitation services and assistive devices.</td>
</tr>
<tr>
<td><strong>Quảng Trị Agent Orange and Disabled People’s Association active in Quảng Trị</strong></td>
<td>Since 2007, this organization has supported those believed to be Agent Orange victims. It provides income generation through animal husbandry, scholarships, and bicycles; coordinates support groups and caregiver training; and educates people with disabilities about their rights.</td>
</tr>
<tr>
<td><strong>Action to the Community Development Institute (ACDC) active in Quảng Trị</strong></td>
<td>A Vietnamese NGO established in 2011 for and run by persons with disabilities to support their quality of life. ACDC’s work includes improving the legal framework and policies impacting people with disabilities, removing social and physical barriers, removing stigma, and raising the local capacity of government agencies and organizations of disabled persons to support the needs of people with disabilities.</td>
</tr>
<tr>
<td><strong>Center for Sustainable Development active in Quảng Trị and Thừa Thiên–Huế</strong></td>
<td>A Vietnamese NGO that works with disadvantaged communities to improve their quality of life. It conducts livelihood programs for people with disabilities and builds disaster resilience.</td>
</tr>
<tr>
<td><strong>Fund for Genetic Counseling and Disabled Children active in Thừa Thiên–Huế</strong></td>
<td>A Vietnamese NGO that provides a variety of support for people with disabilities and their families, including medical care and rehabilitation, early detection and early intervention, assistive devices, specialized education, scholarships, and income generation.</td>
</tr>
<tr>
<td><strong>Children of Vietnam active in Đà Nẵng, Quảng Nam, and Quảng Ngãi</strong></td>
<td>An American NGO with an office in Danang that provides comprehensive services to children with disabilities. Children of Vietnam works closely with local government counterparts and families to support the provision of health care and rehabilitation, education, nutrition, livelihood support, home renovations, and social integration for children, including those impacted by Agent Orange.</td>
</tr>
<tr>
<td><strong>Đà Nẵng Association of Victims of Agent Orange (ĐAVA) active in Đà Nẵng</strong></td>
<td>Local chapter of VAVA that raises funds to support and advocate for victims of Agent Orange in Đà Nẵng. ĐAVA operates a day care center and vocational training program for children and youths with disabilities.</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Organization Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quảng Nam Red Cross active in Quảng Nam</td>
<td>In 1999, the Vietnam Red Cross was the first organization to start a fund to support victims of Agent Orange. The Quảng Nam Red Cross supports people with disabilities and their families, depending on their specific needs. Although primarily providing livelihood support through animal husbandry or by assisting small businesses, it also supports home renovations, scholarships, caregiver training, and adaptive equipment, and it funds travel to access specialized surgery.</td>
</tr>
<tr>
<td>VietHealth active in Tây Ninh</td>
<td>A Vietnamese NGO that has received funding from USAID to provide early detection and early intervention for children with disabilities under the age of six. This includes conducting screenings and assessments to detect barriers to learning and mobility; training health professionals, educators, and social service staff in early identification and intervention; promoting social inclusion; providing support for rehabilitation services; specialized education; and teaching parents to provide home-based education and rehabilitation.</td>
</tr>
<tr>
<td>Vietnam Assistance for the Handicapped (VNAH) active in Tây Ninh</td>
<td>A US-based NGO that is a long-time recipient of Leahey War Victims Fund and USAID funding to support persons with disabilities. VNAH has provided technical assistance to help the Vietnamese develop their Law on Disabilities and the policies needed to support the law. It supports vocational training and helps persons with disabilities obtain employment and improve their livelihoods. VNAH also builds and equips rehabilitation centers and provides capacity building and training for the staff of rehabilitation and health centers providing services to persons with disabilities. Other direct support has included funding home improvements and sanitation for people with disabilities.</td>
</tr>
<tr>
<td>Tây Ninh Association of Victims of Agent Orange active in Tây Ninh</td>
<td>Provincial chapter of VAVA that provides livelihood support, monthly stipends, home improvements, and physical rehabilitation to those impacted by Agent Orange in Tây Ninh.</td>
</tr>
<tr>
<td>Đồng Nai Association of Victims of Agent Orange active in Đồng Nai</td>
<td>Provincial chapter of VAVA that provides home improvements, scholarships, low-interest loans, monthly stipends, and emergency funding for certified victims of Agent Orange in Đồng Nai.</td>
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</table>

Table 3. Non-Governmental Organizations Providing Dioxin-Related Disability Assistance in Việt Nam

**Vietnamese Governmental Aid for People Affected**

Việt Nam has implemented various policies to support and promote the rights and inclusion of people with disabilities. The Law on Persons with Disabilities was enacted in 2010 and aims to protect the rights of people with disabilities by addressing issues such as healthcare, education, employment, accessibility, and social welfare while emphasizing non-discrimination and provisions for the integration of people with disabilities into mainstream society. There is a quota law “requiring all forms of business to hire 3% of their workforce as disabled employees” or pay a fine. Also, the National Action Plan for Persons with Disabilities (2012-2020) outlines specific strategies and initiatives to implement the Disability Law effectively and employ 250,000 people with disabilities. The Inclusive Education Policy aims to integrate children with disabilities into mainstream schools and includes efforts for training teachers to support inclusive
classrooms and adapting educational materials to meet the needs of these students. There are affirmative action measures in the public sector and efforts to create a more inclusive job market in the private sector. Accessibility standards have been adopted to improve public infrastructure, transportation, and communication.

The Vietnamese government identifies more than 31 types of birth defects as being associated with Agent Orange. Monthly stipends are given to soldiers from North Việt Nam and their offspring who have health effects from exposure. Around 350,000 Vietnamese civilians receive these stipends which are 2,055,000 dong ($87.48) if children are certified as “having particularly severe disabilities” and 1,233,000 dong ($52.49) if having a severe disability. For civilians not involved in the military, monthly stipends range between $23 and $38.40 per person while caregivers may receive $15.40 per month and these are given to nearly 1.1 million people. There is free national health insurance for these individuals but transportation costs to medical centers and additional fees still hinder many families. People with disabilities are eligible to receive “free or reduced tuition as well as scholarships for school expenses” from the Vietnamese government.

**Types of Interventions by NGOs**

Interventions are often collaborative between governmental agencies, NGOs, and international partners. Key types of programs include environmental remediation, healthcare aid and rehabilitation, vocational and caregiver training, accessibility improvements and technology, public awareness and legal advocacy, daycares and education, economic support, and research and data collection.
In response to the far-reaching consequences of Agent Orange exposure in Vietnam, a multifaceted approach has been implemented to provide aid to affected individuals and communities. One critical facet involves vocational and caregiver training programs. Organizations like VAVA and the Việt Nam Red Cross offer training initiatives to equip affected individuals with employable skills, fostering economic independence and self-sufficiency. Some support projects include “training families in animal husbandry and helping them purchase pigs, cows, and water buffalo to breed”, setting up or “[expanding] at-home business… or a repair shop”, while others “provide seed money or grants that may need to be matched by the family” and low- or no-interest loans.¹ Microloans for home construction cost up to 50 million dong ($2,150) while income-generation programs “range from 8 to 20 million dong ($340-860) per family”.¹ These programs not only empower those directly impacted but also contribute to the overall resilience of their families.

Another essential component of aid focuses on accessibility improvements and mobility technology. NGOs such as the East Meets West Foundation work to enhance living conditions for those affected by Agent Orange, providing assistive devices and making physical spaces more accessible through the distribution of wheelchairs and other mobility aids, construction of accessible bathrooms, building or repairing housing, “digging wells”, and “building ramps”.¹

Additionally, raising awareness about the consequences of Agent Orange exposure is crucial in dispelling myths and misinformation. VAVA and the Việt Nam Women's Union actively engage in awareness campaigns to disseminate better understanding of the challenges faced by affected individuals and communities. Legal advocacy plays a pivotal role in addressing the rights of those affected such as when VAVA stood with Vietnamese civilians to sue chemical manufacturers and seek compensation and accountability. Also, ongoing research and data
collection efforts are instrumental in understanding the consequences of dioxin for compensation and preventing the same mistake from ever occurring again. Organizations invest in rigorous research to monitor health trends, collect data, and inform evidence-based interventions. For example, the Agent Orange Record is a library of empirical data and extensive research funded by the Ford Foundation to capture some of the effects of Agent Orange on veterans and the Việt Nam Theater.68

Daycares, education programs, and peer support groups collectively work toward improving living conditions and providing holistic support. Siblings of people with disabilities are sometimes given scholarships “in order to encourage” their disabled sibling to remain in school which costs around $100 to $250 per family.1 Also, bicycles and internet access can be donated to support education opportunities.1

Wraparound services for people affected by Agent Orange exposure in Việt Nam emphasize a holistic approach to addressing the multidimensional needs of individuals and cost “approximately $1,000 per family” while intertwining physical, mental, social, and economic well-being indicators.1 NGOs conduct home visits to identify “the level of disability and [their] constraints” whilst evaluating the “quality of housing and sanitation, the monthly income of the family, and the amount of support received from other family members and government or nongovernmental programs”.1 Then, they ask what would best benefit their family and reassess periodically after implementation to improve support systems.1

Based on comparisons of income and changes in family behavior toward people affected by Agent Orange after a year of receiving NGO aid, raising cattle, funds “used to expand or support an existing home-based business rather than to launch a new business”, organizations
with pre-existing large networks of volunteers, mentors, and support groups, and wraparound services appear to be most effective in poverty alleviation and benefitting quality of life.¹

Chapter III. Research Findings

I. My Experience at DAVA

I spent two weeks of my month-long Independent Study Project in Đà Nẵng, Việt Nam to contextualize and give a face to the historical, medical, and financial aspects of the legacy of Agent Orange that I have outlined throughout this study. By interviewing employees and veterans involved at the Đà Nẵng Association for Victims of Agent Orange (DAVA), a subchapter of VAVA, I was able to see firsthand how these aid techniques are being executed.

I immersed myself in the haunting accounts of Agent Orange, absorbing the facts and figures that painted a grim picture of its impact. However, it was not until I encountered those who bore the physical and emotional scars of its devastating legacy that the gravity of my study truly manifested. Meeting people severely disabled as a result of its usage brought a profound humanization to the words on the webpages I had been reading. Agent Orange was etched into the lines around their eyes, the movement of their fingers, and the words off their lips. A hushed history hidden from my American high school textbooks stood before me, a living reminder of the atrocities my home country had bestowed upon theirs. Bridging the gap between historical documentation and the enduring human experience, Agent Orange, once confined to the realm of my computer screen, now pulsed with life and joy through the indomitable spirits of those who continue to grapple with its intergenerational consequences.
II. Interviews and Observations

DAVA Facility #1

Upon entering the primary daycare and vocational training facility run by DAVA, I was met with a United States veteran who had served in Đà Nẵng during the war due to the draft despite opposition to militarism. He explained that the Red Scare and having to hide under desks at school during missile threats from Cuba and Russia throughout his education had taught his generation to not fully question resistance against the Domino theory. He had worked in the Vietnamization era and filled out documentation to gradually send home troops, recording casualties and those missing in action, counseling soldiers who had acquired heroin addictions while in service, and working in transferring the unit over to the South Vietnamese government. He told me that by working in administration, it was “better to use a 16-pound typewriter than a MS16”. He had been diagnosed with prostate cancer some years ago, received compensation from the Veterans' Association, and decided to move to Đà Nẵng to be “a voice for those who don’t have one” but who have suffered from the same dioxin exposure as him. Since the organization often runs out of funds or needs to spread them thinly, this veteran has often gathered donations from fellow veterans, friends, or from his own wallet to provide assistance to this facility for the past decade. When the walls were falling apart, he outsourced $7,000 as he was receiving chemotherapy treatments to rebuild them, however, after only 2 years, signs of moisture damage from humidity are appearing again. He would frequently mention to me how government connections in the United States and Việt Nam seemed fruitless; there is a “red tape” from funding and it feels like a telephone game to reach someone who has proper authority to distribute additional funds.
He outlined the history of the war from his perspective and looked me in the eye, then solemnly expressed “the war’s over, but the effects of it are not”. He told me the story behind becoming involved over the years at this organization and how the people there had become equivalent to his family and closest friends whilst praising the resilience many of them had borne. I asked him about the dog tags that he proudly wore across his neck. He replied that they served as a constant reminder of the war and a conversation starter to discuss the differences between the individual American soldier and the heads of the American military. He said that neither he nor any of his fellow soldiers knew anything about the effects of Agent Orange even by the time that he was stationed near the Đà Nẵng Airport, a hotspot, in 1971 while dioxin was slowly being banned. His acquaintances would fly C-123s and spray the chemical, and the veteran confessed that many unintended areas were affected since these sprayings were dependent on temperature, time of day, altitude, velocity, wind direction, and speed, all contributing to the drift factor. One of his best friends from the army woke up one day a few years later, stepped out of bed, and broke his leg, then ended up dying from a severe form of cancer a few decades later. He was sure that this was a direct result of dioxin exposure since they had lived for years right on top of defoliated land, surrounded by these barrels. He said that two-thirds of soldiers do not live past 70 years of age and could list out cancers that nearly all of his acquaintances had acquired after the war.

We sat in small chairs next to the incense-making room and were frequently greeted and hugged by our companions that were receiving vocational training at the facility. With arms spread out and smiles just as wide, warmhearted exchanges were passed despite the opposition between our countries only a few decades ago. These young men and women received training in creating incense sticks to sell at the center’s streetside shop or to use sewing machines to craft
kimonos that are exported to Japan. Out of the 30 people that attend the care center on a daily basis, about half spend their days in the daycare room where they are given toys such as legos, remote control cars, and printed outlines to color in and play with. Most of these people were unable to attend public schools due to mental illnesses, learning retention disabilities, and need for a full-time caregiver. The daycare was often unstaffed because of a lack of faculty funds and the attendees were sometimes left to their own devices for segments of the day. The designation of which of the 3 rooms, incense, kimonos, or playroom, that they were assigned is based on their learning capabilities and physical status. Stipends may be allocated based on a protocol of individual’s handicap and family financial situation. A majority of the attendees live on the outskirts of the city and are picked up by buses each day from local terraces outside Đà Nẵng city. A man who has paraplegia and a deficit in controlling one of his hands volunteers as a coordinator and was given an impressive three-wheeled motorbike in which he could use a ramp to put his wheelchair on a platform, connect a cable to the chair, and drive to and from the center. There are two other main centers in Đà Nẵng run by DAVA and center #2 is designed for medical attention, distributing vitamins, and sauna-based detoxification methods.
Most of the attendees are second and some are third generation with parents or grandparents who were directly exposed to dioxin, some in the North Vietnamese army and many having multiple siblings with disabilities as well. Việt Nam also recognizes a fourth generation claiming distinct correlations between veterans and civilians in affected regions’ descendants having higher disability rates, however, the U.S. has not acknowledged this cohort’s claims. Their ancestors had been fighting directly against the same military strongholds that stationed the man I was interviewing long ago, yet this tumultuous past indicated no resemblance in their dynamic now. Some of the veteran’s best friends are the former president of DAVA who was a North Vietnamese courier and a young man with a short stature who has achondroplasia and whose father was a North Vietnamese soldier. A woman with Down Syndrome commonly came over to say hello, and after a few times, the veteran told me how her grandmother had been a sympathizer for Northern soldiers and used her basement during the war to house them. When the Americans discovered this hideout, they shot them all and she was killed. Her grandmother is now a woman war hero with a statue erected in her likeness to commemorate her martyrdom and bravery in name of the revolution.
I spoke with a volunteer from Italy that comes in biweekly who netted out the reality behind the lives of the people helped by this organization. He discussed the volume of visitors they have received from over 20 countries including representatives from the E.U., students from Japan and South Korea, athletes from the University of Michigan, travelers from Australia and India, as well as locals and former Navy veterans. Despite the genuine enthusiasm that accompanied each encounter, the volunteer poignantly remarked on the transient nature of these visits. Visitors, no matter how well-intentioned, were fleeting presences, here today and gone tomorrow. The impermanence of these connections weighed heavily on the attendees, who, in forming bonds, found themselves repeatedly bidding farewell. As we continued our conversations throughout the week, I contemplated my own role—a transient observer like those before me, here to witness their circumstances, yet destined to fly home to resume my separate life. Through the creation of this paper, my aim is to embed their livelihoods in a lasting context, ensuring that my time there is not merely a memory of a quick passerby but lives on as a perpetually documented reminder—a digital footprint echoing the sentiment of their welcoming and cheerful dispositions, their adversities, and their resilience.
DAVA Headquarters

While in Đà Nẵng, I also interviewed one of the executives of DAVA alongside a secretary that served as a translator. I asked them in a semi-structured interview about the layout of their organization, programs, fundraising efforts, and challenges. They serve a community primarily affected by 17 recognized visual, hearing, mobile, and intellectual disabilities that families often have more than one person suffering from. Requirements for rehabilitation programs, vocational training, and daycare consist of a diagnosis of one of these conditions, congenital deformities, or illnesses and that their family lived in an area sprayed between 1961 and 1971. We discussed these contingencies and how many families have moved in the past 50 years and may no longer live in affected regions but are not being given aid by organizations funded by the U.S. because of their new location. Additionally, many soldiers who live in northern regions came home after the war and being exposed to Agent Orange, then they had children who had higher rates of disability likely due to dioxin’s effect on sperm maturation.

When I asked about fundraising, they suggested the same dilemmas as the veteran had mentioned and how they are primarily run by locals’ individual charity with some international help from various organizations, a portion of their funds are from the Vietnamese government, and the U.S., despite ties to their parent organization VAVA, “just gives support to airport detoxification, not to people affected by Agent Orange in Đà Nẵng”. After the COVID-19 pandemic, DAVA has faced a financial burden and is focused on fundraising efforts, continuing their current programs, teaching each generation about generating an income, and building a community.

DAVA gives small monthly stipends for the more disabled population but they “just take care of those who can walk and talk” in their daycare and vocational facilities. Besides incense
and kimonos, they also teach their attendees how to make chiffon flowers and sell them to locals. Their programs serve as peer support groups to improve mental health and sense of community. DAVA hopes to change the stigmatization surrounding disabilities so that it is not perceived by the community nor affected individuals as debilitating and that they are able to learn, work, and sustain themselves eventually.

Figure 7. DAVA Headquarters in Đà Nẵng

Chapter IV. Discussion & Conclusion

I. Summary of Results

The Resistance War Against America between the United States allied with the South Vietnamese versus the North Vietnamese army was laced with hostility, civilian and military deaths, and mass destruction of land throughout the central and southern regions of Việt Nam for 9 years. Once Vietnamization took place and President Nixon approved the Paris Peace Accords of 1973, the Southern Vietnamese army was quickly usurped by communist guerrilla tactics under Hồ Chí Minh Thought by 1975. Throughout the war, the United States had been deploying fighter planes to spray 19 million gallons of rainbow herbicides across 6 million acres, including 11 million gallons of Agent Orange which contained the chemical TCDD, a carcinogenic dioxin,
to increase visibility through dense vegetation and destroy enemy crops. Since its prohibition in 1971, Agent Orange has been found to cause numerous cancers, neurological, hepatic, skin, and cardiogenic deformities in animal tests. Over 300,000 U.S. Veterans and 400,000 Vietnamese civilians are estimated to have developed a severe disease or die as a direct or indirect result of dioxin exposure. There are many correlation studies regarding their children as well and it is theorized that neural tube deformities and limb paralysis may be congenital birth defects associated with maternal exposure.

Due to a series of lawsuits from the Veterans’ Association on the primary manufacturers of the herbicides, Dow and Monsanto, American veterans settled for over $200 million in aid in 1984, however, when VAVA and Vietnamese civilians sued them in 2004 for international war crimes, their claims were quickly dismissed. The United States claims that the usage of the rainbow herbicides was not meant to be a weapon, therefore, it does not violate the Geneva Convention. The U.S. began funding environmental remediation projects on air base hotspots in Việt Nam in 2007 after diplomatic relations strengthened and congress has appropriated more funds each year, now incorporating health and rehabilitation programs and policy formation. An estimated $496 million has been allotted to USAID, an American organization in charge of distributing funds to Vietnamese associations, three-fourths of which is for two major remediation projects and the rest of which is mostly spent on rehabilitation programs. American veterans are eligible to receive $40,000 to $42,000 per year if they are diagnosed with a dioxin-related disease, however, USAID refrains from direct compensation for Vietnamese civilians. A small percentage of funding has been allocated for economic development for these affected families but these are still pilot programs.
The Vietnamese government has already made policy shifts to create barrier-free environments for disabled persons, they give scholarships, and they provide free healthcare. Most of the people affected by Agent Orange have chronic, congenital, and incurable conditions, therefore, healthcare is not their major concern anyway, but rather their and their families’ livelihood. According to the national multidimensional poverty indices used by the Vietnamese government to “identify poor households” for social assistance programs, “households with disabilities are twice as likely to live in multidimensional poverty than are households without disabilities” especially in rural areas due to lack of access to education, sanitation, and housing quality.1 A family with one disabled member can increase “cost of living by as much as 12 percent” and children with parents having disabilities lead to lower enrollment rate.1 According to the table below, it would cost around $73 million to provide each person who may be affected by Agent Orange with a severe disability who lives in poverty $1,000.

<table>
<thead>
<tr>
<th>Beneficiaries</th>
<th>Estimated population</th>
<th>$500 per person</th>
<th>$1,000 per person</th>
</tr>
</thead>
<tbody>
<tr>
<td>All people with severe disabilities</td>
<td>1,798,000</td>
<td>$899,000,000</td>
<td>$1,798,000,000</td>
</tr>
<tr>
<td>People with severe disabilities living in poverty</td>
<td>348,812</td>
<td>$174,406,000</td>
<td>$348,812,000</td>
</tr>
<tr>
<td>People who may be Agent Orange victims with severe disabilities</td>
<td>379,440</td>
<td>$189,720,000</td>
<td>$379,440,000</td>
</tr>
<tr>
<td>People who may be Agent Orange victims with severe disabilities living in poverty</td>
<td>73,611</td>
<td>$36,805,500</td>
<td>$73,611,000</td>
</tr>
</tbody>
</table>

Table 3. Estimated Nationwide Funding Needed for Nonmedical Support throughout Vietnam1

Note: Population estimates are calculated using the 2016 Household Survey estimate of 6.2 million people with disabilities in Vietnam, of whom 29 percent have “severe” or “particularly severe” disabilities and 80 percent live in rural areas. Of people with disabilities, 19.4 percent were living below the official poverty line; among rural households, this figure was 22.4 percent. Potential Agent Orange victims are calculated using the Aspen Institute’s estimate, based on its Danang research, which found that 10.2 percent of people with disabilities are Agent Orange victims and 60 percent of identified victims have severe disabilities. The resulting estimate is close to the number of Vietnam Association of Victims of Agent Orange members and the number of people receiving Agent Orange subsidies from the Vietnamese government.
The Đà Nẵng Association for Victims of Agent Orange (DAVA) is implementing programs to promote inclusive education by adapting school environments and teaching methods to accommodate the needs of students with disabilities, ensuring equal access to education, providing necessary support services, and fostering an inclusive learning environment. Vocational training programs such as incense-making, sewing kimonos, and crafting chiffon flowers are specifically designed for people with disabilities to enhance their skills and improve employability to facilitates economic independence, empowers individuals with disabilities to enter the workforce, and reduce unemployment rates among this demographic. Establishing community-based rehabilitation programs that provide support services, therapies, and social integration activities for people with disabilities within their local communities increases social inclusion, improves physical and mental well-being, and provides ongoing support at the community level. In addition, DAVA provides transportation and stipends to alleviate financial pressure off of these recipients and their families. Despite all of these endeavors, this organization struggles economically themselves to maintain faculty, repair their facilities, and continue providing the same level of aid to each person nevermind increase their mission. Most of the organization’s funding stems from local’s individual charity and some governmental aid, but the COVID-19 pandemic stifled their fundraising efforts.

II. Future Improvements to Study

Given the limitations listed for this study, I believe there could be numerous potential improvements to be made such as a having a wider timeframe in order to conduct more interviews with NGOs aiding people affected by Agent Orange, overcoming the language barrier by hiring a formal translator if able to generate the funds, and formally sorting through
Vietnamese public records to create a statistical analysis to evaluate disability rates in regions sprayed with Agent Orange.

III. Conclusion

The attendees of the daycare that I visited for two weeks primarily faced congenital birth defects such as learning disabilities, sensory loss, Down Syndrome, paraplegia, and various other structural deformities and diseases. They were always enthusiastic to hug, greet each other, and smile in spite of our language barrier between English and Vietnamese. Spending time at this facility and learning about some of their stories and about their parents’ or grandparents’ positions in the Resistance War gave life to the historical background and medical repercussions of Agent Orange that I had researched beforehand. I became very passionate about their socio-economic status and the situations’ their families faced without multiple members being able to generate a sustainable income.

Based on the annual increases in budget from the U.S. being allocated toward regions affected by Agent Orange, more of these funds could be given to organizations such as DAVA that work not only in meta-policy installations but that also incorporate holistic and grassroots approaches to benefit the well-being of individuals affected by dioxin exposure. The United States has designated $50 million to USAID Việt Nam in 2023 and it would cost an estimated $73 million to give every person living in poverty that is suspected to have severe disabilities from toxin exposure $1,000. These funds could alleviate financial burdens through the provision of vocational training to generate a sustainable income, microloans to sustain small family businesses, or purchase of livestock.
Remediation projects and healthcare aid are necessary for USAID to prioritize, however, these efforts do not help the people already living with untreatable diseases. The legacy of Agent Orange will never be erased through sifting through the soil, but these people will live on in poverty due to the inability to support their families if not given more opportunities. In relativity to USAID budgets in other countries in 2022, Israel was given $3.3 billion, Afghanistan was $1.4 billion, Jordan was $1.6 billion, Ethiopia was $1.4 billion, and Egypt was given $1.3 billion. Although $500 million in 15 years seems substantial, Việt Nam is the 39th largest recipient of aid globally from the United States, and I hope one day more of this budget could extend to the livelihood of the people who bear the legacy of the Việt Nam war 50 years after its cessation laced in their genetic code.
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