The Impact of Agent Orange on Third and Fourth Generation Exposure Victims

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Abstract

Agent Orange, an herbicide mixture used during the Vietnam War, has relatively little conclusive research compared to other medical topics. During the war, it was discovered that the herbicide mixture had produced a by-product known as 2,3,7,8 tetrachlorodibenzo-p-dioxin, also known as TCDD. TCDD is known to be a toxic endocrine disruptor that can alter the growth of hormones and tissue production. Exposure to a chemical agent such as TCDD has the potential to cause transgenerational effects in females (Flaws et al., 2019). When examining Agent Orange impacts, the research field has lacked coverage regarding the impacts from the chemical on third and fourth generation exposure victims. This review aimed to highlight any connections between these generations and any hereditary effects from Agent Orange. Using a correlational quantitative study, the results did not evaluate the initial objective but instead revealed connections between United States Vietnamese War veterans and second generational females. It was found that endocrine disruption (unbalance in hormones due to chemical exposure) and reproductive abnormalities were commonly connected within second generational females. This suggested that people directly exposed the chemical may have passed on hormone-production imbalances, ultimately leading to reproductive abnormalities in second generational women. By analyzing the gap and finding new correlations, this research provides valuable insight that may benefit future studies on Agent Orange.

Introduction

Due to its ability to incapacitate a large number of enemy combatants, chemical warfare can be viewed as an effective strategy for disabling an opposing force. However, the ethics behind the usage of harsh chemicals remain controversial, especially in regard to chemical impacts on civilian populations. In the case of the Vietnam War, the United States military resorted to chemical warfare in August of 1962 to 1971, according to the Institute of Medicine (US) Committee to Review the Health Effects in Vietnam Veterans of Exposure to Herbicides (1994). One of the most infamous chemicals is the herbicide mixture Agent Orange. The utilization of the mixture has created controversy due to its impacts on the Vietnamese ecosystem,

Vietnamese War veterans, and the civilians of Vietnam. The topic has largely been overlooked over the years, leading to a general lack of awareness regarding the event itself. Despite numerous studies conducted by researchers on this matter, the issue remains unresolved.

Literature Review

Historical Contextualization

Over 50 years ago, a 20-year conflict took place between the United States and Vietnam that severely impacted both nations. The Vietnamese army leveraged jungle terrain by operating deadly tunnels and traps throughout the territory. In order to gain an advantage, the United States resorted to the use of chemical warfare intending to, "cut the Ho Chi Minh trail of weapons, supplies and medication", "facilitate surveillance of roads, coastlines and waterways", "to destroy the rice paddies, depriving the guerillas of food and aid" (Lavallard, 2017) according to Marie-Hélène Lavallard, a member of the Franco-Vietnamese Friendship. One of the most widely known chemicals used was Agent Orange; a herbicide and dioxin mixture that was named for its orange hue. According to the U.S Government Accountability Office, the Department of Defense (DOD), "11.22 million gallons of Agent Orange" was sprayed in Vietnam. (Young et al., 2004). The mass use of the herbicide resulted in severe damage to the jungles in Vietnam, giving the U.S. a military advantage. Debates have emerged over the years regarding the broader impacts of chemical damage, extending beyond environmental concerns. Scholars, scientists, and researchers have speculated on the ethics of chemical warfare and its medical effects. Jeanne Mager Stellman and Steven D. Stellman, from the Mailman School of Public Health at Columbia University, address these issues in their study, "Agent Orange during the Vietnam War: the lingering issue of its civilian and military health impact", that the dioxin TCDD (2.3,7,8 Tetrachlorodibenzodioxide) is the by-product of 2,4 dichlorophenoxy acetic acid and 2,4,5- trichlorophenoxyacetic and contaminated the mixture (Stellman et al., 2003). Furthermore, studies claim that the dioxin is highly toxic and can contaminate soil for extensive lengths of time, unlike the main components of the mixture. (Banout et al., 2014)

Since the end of the war, research has focused on identifying health impacts related to Agent Orange. Both Vietnamese citizens and veterans have reported illnesses believed to be linked to the chemical. Exposure to dioxin can occur through contaminated food, water, direct contact with affected tissues, or inhalation of the substance. (Palmer, 2007). Nonetheless, it is difficult to identify whether or not exposed victims can pass possible health effects to later generations and if the chemical has raised risks of maternal issues. It is important to recognize the lasting impacts of events from years ago and to determine how they affect current generations.

TCDD is known to have a longer half-life than the main herbicides in the substance (Banout et al., 2014). Dioxin, the most toxic congener of the mixture, seeped into the soil in order to prevent growth of vegetation. With the mass amount of Agent Orange used, the dioxin may still be evident in certain areas of Vietnam. A study conducted in 2014, “Agent Orange footprint still visible in rural areas of central Vietnam " by Jan Banout and her colleagues, evaluated the environmental footprint Agent Orange had left on Vietnam’s soils, climate, waterways, and vegetation. Though levels were low, there were levels of dioxins still present in the country. It was found that Agent Orange has left an environmental footprint, and the health risks still may remain within the vegetation and plant eating animals. Furthermore, the “concentrations of TCDD as high as 1000 mg/kg were found in soil and sediment samples more than 30 years after Agent Orange sprays” (Banout et al., 2014). With water contamination, organisms–such as fish–may be contaminated with small amounts of the chemicals. If consumed by humans, the contamination of Agent Orange in humans continues even if it is in small amounts.

Coming in physical contact with substances such as Agent Orange can lead to medical issues within the human tissue, skin, and lungs. Dioxins can be traced back to various medical concerns even though it is extremely hard to prove. Health conditions that arise may vary from minimal to extreme: cancer risk, immune deficiency, reproductive and developmental abnormalities, central and peripheral nervous system pathology, endocrine disruption, decreased pulmonary functions and bronchitis, altered serum testosterone level, eyelid pathology, nausea, vomiting, loss of appetite, skin rashes, hypertrichosis, liver damage, elevated serum cholesterol and triglycerides, and enamel hypomineralization of permanent first molars in children (Banout et al., 2014). Although definitive evidence of these correlations is difficult to obtain, dioxin can be associated with a plethora of medical complications. The consistent presence of these conditions specific to areas of Vietnam has led many researchers to conclude that the chemical mixture has left an imprint on the people of Vietnam. It is observed that the chemical will enter the human tissue which can alter cell growth and hormones in the cell (Palmer, 2007). Results from animal testing studies indicated that TCDD can increase or enhance the growth of cancer according to Lisa M. Baumann Kreuziger, Gobind Tarchand, Vicki A. Morrison from University of Minnesota and the Veterans Affair Medical Center (Baumann et al., 2014). Some studies indicate that Agent Orange can cause increased risks of pregnancy failures or deformities in children. Le Thi Nham Tuyet, an author, and Annika Johansson, a Swedish researcher from Karolinska Institutet Medical University, studied the reproductive health of Agent Orange exposure victims or the wives of soldiers exposed to Dioxins.

In total, 30 women had 148 pregnancies in which under 10 percent resulted in miscarriages and 14 percent in stillbirths or premature births. Out of the rest of the successful births, 14 children had passed at early ages and 66 percent of the children had obtained a physical or mental disability (Johansson et al., 2001). These women present similar experiences; an increase of miscarriages, birth defects, and disabilities have raised questions regarding what aspects of the body Agent Orange can affect. However, there have been very few studies to correlate these incidents and Agent Orange because it is difficult to trace dioxin to these health concerns.

Despite decades of studies, the question persists; To what extent has Agent Orange impacted the health of third and fourth generation exposure victims? Many children in the Northern parts of Vietnam have experienced fatal health conditions or are born with life altering disabilities. Many suspect that the mass exposure of Agent Orange in Vietnam could be responsible for these occurrences. Though the last spray of Agent Orange took place over fifty years ago, speculation lingers on whether or not health conditions regarding Agent Orange can be passed down from parent to child and if it will continue to be inherited. It is seen that there is still an abnormal amount of physically and mentally disabled children in certain regions of Vietnam without a definite cause. This study will cover the awaited gap on whether or not Agent Orange is responsible for these birth defects and whether or not impacts of Agent Orange are hereditary.

Research Problem

When a chemical warfare agent has the ability to produce long-term adverse effects on the environment or living organisms–specifically humans–it is critical to investigate the degree of damage that can be or has been done. Michael G. Palmer of the University of Western Australia describes Agent Orange as "the world's largest dioxin contamination" (Palmer, 2007). The scale of this chemical warfare incident must be assessed to prevent similar events in the future. Jeanne Mager Stellman and colleagues, in their study "The extent and patterns of usage of Agent Orange and other herbicides in Vietnam," estimated that 2.1 to 4.8 million people were directly exposed to the chemical mixture during the ten years of spraying (Stellman et al., 2003). Direct contact with such chemicals can lead to various health issues, highlighting the need to research its long-term effects, including potential harm to third and fourth generation victims even over 50 years later.

Purpose of the Study

The purpose of this study was to evaluate the extent to which Agent Orange has impacted the countries involved post war. The research targeted the grandchildren and great grandchildren of first-generation

Agent Orange victims–third and fourth generation victims–in order to indicate any correlation between Agent Orange exposure and the inheritance of any medical conditions from previous Agent Orange victims. The issue at hand has failed to gain true recognition from the public, which indicates the need for more research regarding the subject.

Methodology

Study Design

This study used quantitative correlational research to address this question: *To what extent has Agent Orange impacted the health of third and fourth generation exposure victims?* The goal of this research is to identify the intensity of Agent Orange and how it has impacted exposure victims' quality of life over the years. The quantitative research will be conducted to evaluate the speculation about Agent Orange's footprint and where it stands today. By evaluating the extent of damage that chemical warfare is able to cause, researchers will be able to determine how possible effects can be avoided in future events.

Correlational research involves data collection to determine whether a link exists between two or more variables. For example, a study examining the connection between Agent Orange and prostate cancer used a quantitative method to observe these ties (Chamie et al., 2008). The study's numerical correlations influenced the choice of this method, which is used when two variables are suspected to impact each other. In this case, the research analyzes the correlation between Agent Orange exposure and the health of its victims, including potential impacts on future generations. The data collected shows numerical relationships between variables, unlike qualitative research, which focuses on material embedded in the data. A survey tailored to the research participants—divided into two groups with 8-9 questions each—was used to gather the statistics. However, this research does not explore the cause of the correlations but rather identifies the presence or absence of relationships between the variables. By using this method, the study can detect common trends in the health of exposure victims and related impacts.

Participants

The responses for this study were collected from two distinct groups: Agent Orange exposure victims and their families (Group 1), and doctors specializing in health conditions suspected to be linked to Agent Orange (Group 2).

Group 1 consisted of Agent Orange exposure victims and their families. Participants were contacted through the Agent Orange organization, veteran organizations, and support groups contacted via email, phone, and social media. It was crucial to obtain responses from individuals with direct involvement with the herbicide, as their input

would help compare the ratio of impacted versus non-impacted victims. A tailored survey (Appendix C) was administered to this group, with questions specific to their experiences and positions as victims or family members of victims. Of the responses collected, 58.9% were from family members, 17.7% were U.S. Vietnam War veterans, and 17.6% were parents or guardians of children suspected to be impacted by Agent Orange.

Group 2 consisted of doctors specializing in fields such as oncology, urology, medical toxicology, and women's health—specialties relevant to conditions suspected to be linked to Agent Orange. These doctors were identified through websites, and their facilities were contacted by the researcher. They were selected for their expertise in evaluating the potential damage caused by exposure to toxic chemicals. The survey for this group (Appendix B) was designed with questions pertinent to their medical knowledge of the suspected health conditions linked to Agent Orange exposure. The doctors' input was critical for assessing the medical aspects of the potential long-term effects of the herbicide.

In total, the survey received 18 responses, with the majority coming from Group 1, representing family members of exposure victims, veterans, and parents/guardians of children suspected of being affected by Agent Orange.

Relationship/Connection to Agent Orange Chart

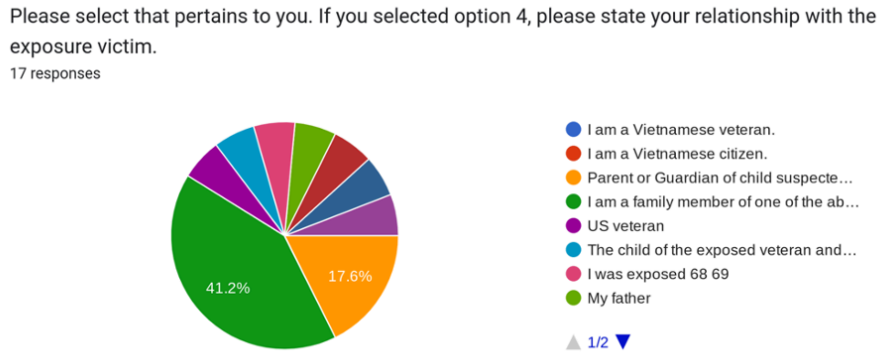

FIGURE 1. Survey Respondent Breakdown

Procedure

The original plan of data collection was to conduct interviews to gather data, however, the method of inquiry was changed to a survey due to time constraints–recommended by the Institutional Review Board. After approval was gained from the Institutional Review Board, surveys made from Google Form were produced to prepare for data

collection. Once the Survey was completed, the researcher began identifying and contacting potential participants to complete the Google Form. The researcher distributed the survey by reaching out to each organization, hospital, or doctor through email or phone call. Phone calls were made to doctors in order to gather their emails since emails are not listed in their medical profiles. However, the phone numbers listed with the doctors were linked to the facility that they worked at. Once on the phone call, the researcher was directed to a nurse or the person in charge of answering phone calls. A majority of the consultants or nurses suggested that the researcher send them the email intended for the doctor, and they would forward that to the original recipient.

Organizations that involved Agent Orange were found through websites and contacted through the emails provided on the website. In this email, the recipient was briefed on the study and asked to provide participants that were appropriate for the study. In both emails that were delivered to each group of participants, the survey link was attached to the email for easy access to the survey. Additionally, the researcher reached out to people correlated with Agent Orange through social media platforms. Many Agent Orange support groups were present on some particular platforms. The admin of each group was contacted in order to gain permission to publish the survey within the group. Once approval was given, the researcher forwarded the survey to the group and allowed the people of the social media groups to participate in the study. Before an individual could complete the survey, a general consent form was presented on the first section of the survey (See in Appendix A). If the participant did not select the checkbox that agreed to the terms of the survey, they were not able to continue onto the survey. All participants were informed about their confidentiality regarding their information in the study. Each individual would not be exploited and would remain anonymous. In total, 18 people had participated and completed the survey(s); 18 exposure victims (100%), 0 doctors (0%).

Ethical Considerations

Throughout the study, ethical aspects of data collection and subject participation were taken into consideration to allow the participants to be confident in their security and their position in the research. Prior to data collection, ethics training was completed, and approval for the study was obtained from the Institutional Review Board. Both processes allowed for the security of the study and the confidence of all subjects included in this research. All information that may allow for the participants to be identifiable has been eliminated from the study to ensure protection of each participant. Additionally, all responses and proof of consent to the survey were documented for security purposes (Palmer et. al, 2015).

Results

After reviewing the applying the correlational method of quantitative data analysis to this experiment, there were three different trends that had appeared in the survey responses.

Agent Orange Connection Statistics

Once the participants consented to taking the survey, they were asked contextualizing questions that reviewed their connection to Agent Orange. Each participant was asked of their link to Agent Orange and their gender. Table 1 (displayed below) represents a correlation of the participants; By distinguishing the participants' gender, correlations regarding sex specific medical conditions could be determined or distinguish any health impacts that were shared regardless of gender. Identifying the participants' role in Agent Orange exposure would gain insight on medical effects on different generations of exposure victims.

Gender	US Vietnam War Veteran	Family Of Exposure Victim
Male	4	0
Female	0	13
Unknown	0	1

TABLE 1. Connection to Agent Orange
**Footnote: The "Unknown" row refers to the option in the survey as "Prefer not to say". (Appendix B)*

The majority of the survey respondents were women, and 12 (66.7% of participants) reported that they were the daughters of United States Vietnamese War Veterans. The 4 men that answered to the survey (27.8%) claimed that they had a role in the Vietnam War that led them to direct Agent Orange exposure. From this data, it can be inferred that female children of United States War Veterans had reported impacts of Agent Orange. One of the respondents had decided to keep their gender confidential, however, they reported being a family member of an Agent Orange exposure victim.

Trends in Medical Conditions

Health Conditions	Male (N=4)	Female (N=13)	Other (N=1)
Cancer/Cancer Risk	**4**	**3**	**0**
Immune deficiency	**0**	**6**	**1**
Reproductive abnormalities	**0**	**8**	**0**
Endocrine disruptors	**1**	**6**	**1**
Central and peripheral nervous system pathology	**1**	**3**	**0**
Liver Damage	**0**	**4**	**0**
Endometriosis	**0**	**3**	**0**

TABLE 2. Medical Correlation and Trends
**Footnote: Percentage Range: 22.2% to 44.4%*

Table 2 demonstrates the most common medical conditions that the participants shared. Participants were given an array of health impacts (Cancer risk, immune deficiency, reproductive abnormalities (miscarriages, stillbirths, etc.), developmental abnormalities (disabilities), central and peripheral nervous system pathology, endocrine disruption, decreased pulmonary fungus and bronchitis, altered serum testosterone level, eyelid pathology, nausea and/or vomiting, loss of appetite, skin rashes, hypertrichosis, liver damage, elevates serum cholesterol, triglycerides, enamel hypomineralization of permanent first molars in children, prostate cancer, respiratory cancers, soft tissue sarcomas) that were believed to be in correlation to Agent Orange (Banout et al., 2014) and were given the option to include any specific conditions that were not listed in the list provided. The most common health conditions that were selected were cancer or risk of cancer, immune deficiency, reproductive abnormalities, endocrine disruption, central and peripheral nervous system pathology, and liver damage.

Results demonstrate that many female respondents shared various health conditions. The men that participated in the study also shared a similar condition to each other. The most common of the selections was “reproductive abnormalities” in women.

Commonalities in Previous Agent Orange Research

Toward the end of the survey, questions consisted of subjects that were previously studied: repeated health conditions, complications with conceiving children, and disabilities. Reproductive issues had been recorded for first generation mothers and fathers who struggled to conceive which was presumed to be a result of Agent Orange exposure (Johannson et al., 2001). Additionally, disabilities were commonly recorded as a product of Agent Orange exposure from first to second generation (Johansson et al., 2001). Repeated health impacts is the basis of the study in order to recognize the medical aspect of Agent Orange exposure.

Question	%	N
Repeated health conditions (post Vietnam War)		
Yes	72.2%	13
No	16.7%	2
Unsure/Other	11.1%	3
Issues conceiving Children		
Yes	58.8%	10
No	23.5%	4
Unsure/Other	17.7%	3
History of disabilities (post Vietnam War)		
Yes	70.6%	12
No	23.5%	4
Unsure/Other	5.9%	1

TABLE 3. Common Issues Found In Agent Orange Families
**Footnote: Appendix B*

Over half of the participant population answered “Yes” to each of these questions. The majority of the participants were second generations which indicates that second generation victims are also impacted by health conditions that the first generation was faced with.

Limitations

A significant aspect of this research to analyze are the restrictions and limitations that followed throughout the research process. The main limitation to address in this study was difficulty in seeking a certain demographic of participants. Initially, two different surveys were

formed for two demographics; One section consisted of doctors or medical professionals and the other being exposure victims. Though exposure victims were contacted and participated in the study, experts and doctors had not responded to their survey (see Appendix B) when contacted. This resulted in the first survey (Doctor's survey) having no responses and their anticipated participation was not included in the research. Their role for the original route of the study was to analyze the possibility of chemical intoxication from a medical perspective rather than a personal perspective (exposure victim), ultimately heighting the credibility of the findings. Furthermore, another issue occurred regarding the demographic of the research. The researcher had anticipated to gain responses from Vietnamese citizens in order to create a balance and to compare any differences between the American participants and the Vietnamese citizen participants. However, Vietnamese participants were difficult to contact due to a lack of communication opportunities. The researcher did attempt to reach out to organizations in hopes that the organizations could direct the researcher to Vietnamese Agent Orange exposure victims.

Discussion

The purpose of this study was to examine any correlations between Agent Orange exposure and the health conditions of third and fourth generation victims. The initial anticipation, prior to analysis, was that the targeted demographic would share or display health conditions that have been associated with dioxin exposure (Banout et al., 2014). The research conducted in this study, however, gained a shift concerning the population that the data came from. There was a lack of third and fourth generation participants compared to the number of first- and second-generation participants acquired. Though there have been previous studies published that focused on earlier generation exposure victims, new information has arisen within this demographic. The results of the study have revealed correlations between F1 (generation 1) males and F2 females (generation 2).

Primarily, a correlation appeared within the contextual questions in the survey. Out of the 18 responses gathered from this survey, 66.7% of those subjects were second generation and female. During the Vietnam War, women had not been assigned to any military hostilities or conflict; Only men were subject to combat in this particular fight. In prior research, Males exposed to TCDD have caused paternal impacts on second generations. More specifically, studies have shown that exposure to the chemical can alter the gender ratio of their offspring. The men exposed to TCDD had indicated a lower male to female ratio, resulting in an increased probability of a female offspring (Mocarelli et al, 2000).

Furthermore, common correlations appeared between genders and the medical conditions reported. Out of the health conditions most commonly selected, The males of the study (first generation) had selected less health conditions of the options, however, all had selected the "cancer/cancer risk" response. The second generational women had many common health conditions, the highest being reproductive abnormalities, endocrine disruptors, and immune deficiency. All medical issues selected are capable of being inherited.

Additionally, disabilities, repeated health conditions, and reproductive issues are all common amongst research studies regarding Agent Orange. As previously stated, each question that regarded disabilities, repeated health conditions, and reproductive issues had resulted in over half of the participant population answering "Yes" (meaning the conditions were acquired by them or family). Reproductive difficulties, along with the increase in disabilities, are common topics that are tied to the discussion of Agent Orange. Various second-generation females reported these issues in their own lives. An additional, text entry option was provided for any subject in the instance that they had any commentary in correlation to Agent Orange. Many respondents focused on disabilities in connection with their children or grandchildren. A first generation male had a female child with various birth abnormalities that greatly impacted her life. Another first-generation male expressed that their daughter and granddaughter had adopted breast cancer. No second generational men were mentioned in this portion.

When taking into account all the correlations found, one major factor can be noted. Two common health issues were reported by second generational females: Endocrine disruption and reproductive abnormalities. Endocrine disruptors are exogenous chemicals (compounds found from external factors) or chemical mixtures that interfere with the human's endocrine system (Flaws et al., 2019); Agent Orange applies to this category of chemical compounds. The endocrine system is responsible for the release of hormones from glands located in various parts of the human body. Endocrine disruptors are capable of impacting the ovaries, the uterus, and the female's reproductive system overall. Previous studies have concluded that females in a transgenerational (effects inherited through the germline) manner are susceptible to reproductive abnormalities (Flaws et al., 2019). From this, it can be concluded that Agent Orange is capable of setting the endocrine system into an unbalance, which can then contribute to infertility or reproductive issues in females. 17.6% of the participant population shared both reproductive abnormalities and endocrine disruption, all being female in the second generation.

Conclusion

While this study could not conclusively find that TCDD directly caused

certain health conditions, it found a strong correlation between first-generation male veterans and second generation females with health issues. F2 generation females commonly experience endocrine disruption which then can impact their reproductive organs. This is important to investigate due to the common assumption that Agent Orange has contributed to infertility issues.

Future Studies and Implications

Despite any limitations throughout the study, the investigation conducted is able to contribute to the knowledge of Agent Orange. Additionally, it is capable of noticing potential health impacts that need to be further studied to better understand the uncertainty that remains regarding Agent Orange. Though the research is not able to provide a definite clarity about recent generational victims, it is able to uncover a correlation between second generation female exposure victims and their fathers who came into direct contact with the herbicide. After over fifty years since the war, advances in medical knowledge should be made to prevent the use of warfare such as Agent Orange in any future conflict.

Moreover, this certain study did appear to introduce a possible continuation into the topic of TCDD exposure. The only second-generation respondents in the survey were female. Though there are second generation male exposure victims, the unbalance of gender for this study may be caused due to a lowered male to female ratio in exposure victims. TCDD reduces sperm carrying the Y chromosome of surviving or fertilizing (Pohjanvirta et al., 2019) and Agent Orange's harmful by-product was this dioxin. There has been prior research pertaining to this topic; however, more internal investigation should be conducted in order to understand how the chemical can alter the ratio. Though it is difficult to pinpoint, future studies may be capable of filling this gap with proper research. In addition, further studies can be conducted to investigate epigenetic modifications from dioxin exposure and its impact on the citizens of Vietnam. Studies have shown that the environmental alterations contribute to gene function and an investigation into epigenetic changes post-Vietnam War may further the understanding of chemical contamination. Therefore, research in the medical and environmental scopes of Agent Orange must be continued to advance the knowledge of chemical warfare and its impacts on various generations.

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Appendices Table of Contents

Appendix A

Standard Consent form

Note: Researcher's name and any identifiable information is crossed out. This form was used consistently with each individual participant.

Individual Consent Form

[redacted]

Title of the Study: Impacts of Agent Orange; Third and Fourth Generation Victims

Researcher Name(s): [redacted]

[redacted]

The general purpose of this research is to investigate whether or not Agent Orange has contributed to various health conditions within families previously exposed to the mixture. Participants in this study will be asked to answer a set of survey questions regarding the study. Data from this study will be used in a student thesis that presents the findings of the research, as well as an oral defense presentation to the instructor of Advanced Placement Capstone Research, as well as a board that is created in response to the content of the study. Findings of the research have the potential to be published in a scholarly journal.

I hereby give my consent to participate in this research study. I acknowledge that the researcher has provided me with:

A. An explanation of the study's general purpose and procedure.
B. Answers to any questions I have asked about the study procedure.

I understand that:

A. My participation in this study will take approximately 15 minutes
B. Participating in this research may result in emotional discomfort or distress when discussing the topic or worry concerning confidentiality.
C. The potential benefits of this study include educational benefits and extended knowledge of chemical warfare.
D. I will not be compensated for participating in this study
E. My participation is voluntary, and I may withdraw my consent and discontinue participation in the study at any time. My refusal to participate will not result in any penalty or disadvantage.
F My responses in this study will be kept confidential, to the extent permitted by law. The data will be stored in a secure location on a password protected computer in the researcher's personal room located in the researcher's residence for 7 years, will be available to the researcher, and research reports will only present findings on a group basis, with direct quotes but without any personally identifying information. A pseudonym will be used when referring to information or data.

Name (printed): _____

Signature: _____ Date: _____

Appendix B

Survey 1

1. Were you or a family member(s) exposed to Agent Orange during the Vietnam War? May elaborate in the "Other" option if needed.
2. Please select what pertains to you. If you selected option 4, please state your relationship with the exposure victim.
3. Are you male or female?
4. How old are you?
5. If any, select health conditions you have in the options below. If a health condition that you have is not listed, please list it in the "Other" option.
6. Have any earlier family members (that were exposed to Agent Orange) developed any health issues?
    a. If you selected "Yes" in the previous question, please list the health issue(s) in the text box below
7. Have there been any repeated medical conditions with family members post Vietnam War?
8. Has there been any issues conceiving a child or with your parents conceiving a child?
9. Has there been a history of disabilities within your family that

appeared post Vietnam War?
10. If there are any other concerns or issues you would like to state, please elaborate in the text box below.

Appendix C

Survey 2

1. What field of medicine do you specialize in?
2. Where did you complete your education?
3. Are you familiar with Agent Orange?
4. Does Agent Orange exposure pose risks regarding human health?
5. The options listed below are conditions that are suspected to be linked to Agent Orange. Please select any possible health conditions that may be linked to Dioxin exposure. If there are any other conditions that are not listed, please elaborate in the "Other" option as well.
6. Could exposure to toxic materials, such as Agent Orange, be passed down from parent to child? You may elaborate if needed in the "Other" option.
7. Could exposure to certain chemicals, such as Agent Orange, cause repeated health effects of later generations? You may elaborate if needed in the "Other" option.
8. Could health conditions that resulted from Agent Orange become hereditary and effect third and fourth generations (grandchildren and great-grandchildren of exposure victims)? You may elaborate if needed in the "Other" option.