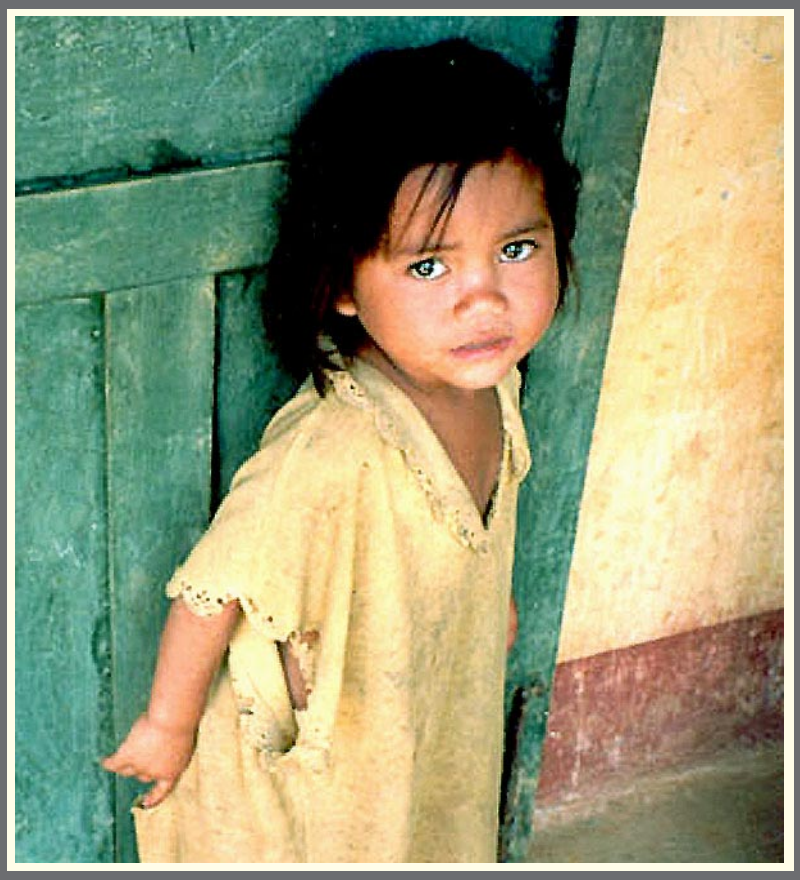

Long-Term Consequences of the Vietnam War

PUBLIC HEALTH

REPORT TO THE
ENVIRONMENTAL CONFERENCE ON
CAMBODIA • LAOS • VIETNAM

LONG-TERM CONSEQUENCES OF THE VIETNAM WAR

PUBLIC HEALTH

This is one in a series of reports produced in connection with the Environmental Conference on Cambodia, Laos and Vietnam which was held in Stockholm during 26-28 July 2002. The purpose of the conference was to review the long-term consequences of the Vietnam War, which also afflicted Laos and Cambodia.

Over a quarter-century has elapsed since the war's formal conclusion in 1975, and more than half the current population was born after that date. This means that an entire generation has now grown up in an environment exposed to the massive impact of modern warfare, so that it is now possible to study the long-term implications. Among its other effects, the Vietnam War left a legacy of environmental contamination and destruction that has yet to be thoroughly examined.

That legacy was the focus of the Stockholm conference, and the review of the war's long-term consequences was conducted by subcommittees for each of four main areas: ecosystems; public health; economic and social impacts; ethical, legal and policy issues.

The reports of the subcommittees, all of which are available on the conference web site, may be regarded as initial attempts to deal with highly complex issues for which significant categories of data are often lacking. Furthermore, the resources available for the project were extremely limited.

Accordingly, much remains to be done. It is hoped that the work of the subcommittees will stimulate further study and analysis of the Vietnam War's long-term consequences. The subcommittee reports and related information are available on the conference web site at:

www.nnn.se/environ.htm

The Environmental Conference on Cambodia, Laos and Vietnam was an initiative of Föreningen Levande Framtid ("Living Future Society"), a Swedish non-profit organization which assembled a steering committee of scientists and other experts to plan and organize the project.

The conference was made possible by financial contributions from Oxfam America, Oxfam Netherlands (NOVIB), Allan & Nesta Ferguson Charitable Trust (England), Swiss-Vietnam Association, American Friends Service Committee, Ford Foundation, Norwegian Red Cross Society, Swiss Red Cross Society, Umverteilen Foundation (Germany) and Sea Otter Productions (Sweden).

Revised 2006

Cover photo: Hatfield Consultants Ltd.

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“I don‘t know why the Americans wanted to come here and destroy everything
in this country and scatter us all. They made many things very strange here.
We worry about that. It is impossible not to think about what happened
in the war. They were bombing everyone, scaring everyone to death.
I have no idea why they were fighting here— none whatsoever.”

— young Vietnamese woman, following miscarriage, 1988

Tens of thousands have been injured by explosive devices left behind in Cambodia, Laos and Vietnam after the formal conclusion of the war. Many of the victims are children.

Long-Term Consequences of the Vietnam War

PUBLIC HEALTH

FOR THREE DECADES following the end of World War II, Vietnam was subjected to nearly continuous warfare as it struggled to free itself from foreign domination. During the latter stages, Laos and Cambodia were also drawn into the conflict.*

The most intensive period lasted from 1961 to 1975, when some 14 million metric tons of bombs and other explosives were discharged in the three countries, primarily in Vietnam. The bombing caused serious damage to the environment and heavy loss of human life. It also resulted in the impairment of public health services and severe disruption of family life.

Among the health effects of the war were widespread physical injuries to both the military and civilian populations. Nearly every Vietnamese family experienced at least one war-related death. A great many soldiers and civilians were mutilated and/or disabled, creating a major problem of rehabilitation. The suffering has continued since the end of the war, with extensive casualties from landmines and other unexploded ordnance (UXO) left behind. There is such a vast amount of UXO remaining in the landscape that it will continue to cause death and disability for many years to come.

In addition to the physical injuries, there was an increase in the frequency of certain infectious diseases, especially cholera, plague, malaria and tuberculosis. Infectious diseases were much more deadly in northern Vietnam, due mainly to inadequate supplies of antibiotics. Following the formal conclusion of the war in 1975, the incidence of communicable diseases decreased as public health services were gradually re-established.

An additional major health risk has been posed by herbicides and other chemicals sprayed during the war. Agent Orange was the most widely used defoliant, comprising 61 percent of the 72 million liters applied. Among the other herbicides used were agents Blue, White and Purple. In addition to being used for the defoliation of forests, herbicides were also applied to agricultural crops in order to reduce the food supply.

*For a concise review of this history, see the report on ethical, legal and policy issues; details on the conference web site at: **www.nnn.se/environ.htm**

It has been hypothesized that serious health problems have been caused to many of those who were exposed to Agent Orange* which contained dioxin, a highly toxic chemical whose negative health effects are well-documented. They include cancers, chloracne and birth defects such as spina bifida. However, there remains some uncertainty about the precise effects of Agent Orange dioxin on the populations of Vietnam and Laos, both of which were subjected to spraying during the war. Due primarily to a lack of reliable epidemiological studies, that uncertainty is especially great with regard to the suspected link between dioxin and birth defects.

Other major health effects of the war were widespread malnutrition and social-psychological problems, including those related to prolonged separation and the deaths of close relatives.

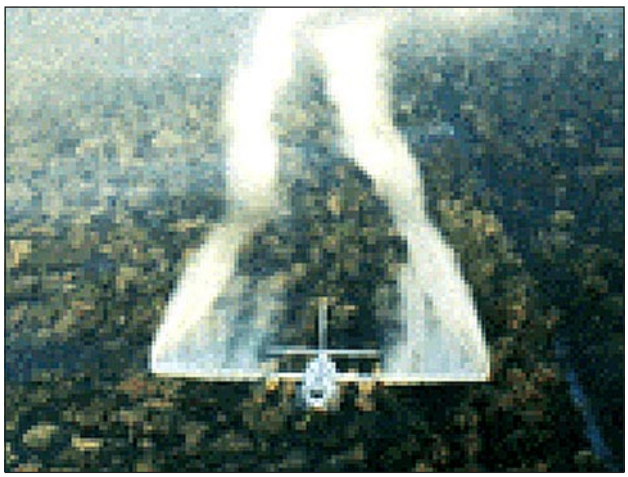
Although Cambodia and Laos have also been severely affected by the war and its continuing impact, the following account focuses on the experience of Vietnam, as it is the only one of the three countries for which significant amounts of data are currently available.

Ferocious bombing

Between 1961 and 1975, some 14 million tons of bombs and other explosives were dropped on the region. This was almost twice the amount used by the United States during all of World War II; in terms of energy released, it was equivalent to 328 Hiroshima A-bombs. Of this total, 79 percent was used in Vietnam, 16 percent in Laos, and 5 percent in Cambodia. (Source: Westing.)

In northern Vietnam, the resulting destruction caused serious environmental damage. Everything connected with human life was affected; even isolated rural homes and tiny bridges on minor roads were subjected to aerial attacks. In southern Vietnam, military operations were conducted to annihilate opposing forces, herd rural families into so-called "strategic hamlets", burn crops, and destroy vegetation by spraying chemicals.

The scale and ferocity of the attacks steadily escalated, and a wide variety of arms and munitions were used. They included: fragmentation, magnetic, butterfly, laser and incendiary bombs; suffocating and tear-producing substances; and defoliating herbicides.



Agent Orange being sprayed on forests of southern Vietnam

Fragmentation bombs exploded in the air above ground level, dispersing fragments in the form of steel marbles in a broad pattern. The fragmentation bombs were extremely harmful, inflicting multiple wounds on a large number of people.

Magnetic bombs landed on the ground without exploding, and were usually dropped at night in order to avoid detection. Explosions were triggered when any vehicle with steel components approached, killing and wounding the occupants.

Butterfly bombs were designed to catch on the branches and leaves of trees. They were leaf-colored and difficult to distinguish from natural leaves. Upon contact, they exploded to cause severe wounds, mainly to the upper body.

Napalm and phosphorous bombs did their work by burning, often leading to prolonged agony for the victims. CS gas (Ortho-chlorobenzalmalononitrile) was used for a variety of purposes, including the forced evacuation of tunnels.

Severe strains

Thirty years of nearly continuous warfare imposed severe strains on Vietnamese society, including shortages of vital materials, decimation and exhaustion of the workforce, and delayed progress in both education and public health.

Aircraft continually patrolled the skies in order to control all roads and rivers, block communications, paralyze normal activities, and oblige the people to remain in shelters through-

*Agent Orange, which got its name from the identifying orange stripes painted on the containers, was a 50/50 mixture of 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) and 2,4-dichlorophenxyacetic acid (2,4-D). Included in the mixture as an unintentional by-product were trace levels of the dioxin TCDD (2,3,7,8-tetrachlorodibenzo-*para*-dioxin), a substance known to be highly toxic to humans.

out the day. Production was severely impeded, and the wounded could not be promptly transported to medical facilities. Even at night, flares were used to illuminate large areas and hinder transportation.

Farmers working the fields and children on their way to school had to wear thick straw hats and vests as protection against fragmentation bombs. Forest workers had to avoid striking trees in order to prevent the detonation of butterfly bombs. Many hamlets with their bamboo houses and large areas of forest were burned to the ground with napalm and phosphorous bombs. Subterranean passages in southern Vietnam were the targets of smoke and gas, including tear gas. Laser bombs were used to destroy bridges and other targets with a high degree of accuracy.

The division of the country during the period from 1954-1975 also impaired normal functions of society. The heavily guarded demilitarized zone at the 17th parallel prevented economic, cultural or social exchanges between the two regions. Family members were often forced to endure prolonged separation from each other. Under such conditions, it was impossible to mobilize the natural and human resources for the benefit of the country as a whole.

Physical injuries

Physical injuries were most frequent among those who were unable to find protection in underground shelters. They included boatmen, vehicle operators, children on the way to school, housewives on the way to market, and farmers working the fields.

Almost every Vietnamese family experienced the death of at least one relative or close friend. The sex ratio of young men to young women during the war was only 0.72-0.88, reflecting the high wartime mortality rate. (Source: Do Nguyen Phuong.) The proportion of soldiers' widows varied from 8.7-12.4 percent. (Source: Ministry of Labor, Invalids & Social Affairs.)

Disabling injuries were, of course, even more widespread. Statistics from the Cam Lo District of Quang Tri Province indicate both the cause and type of war-related injuries in that area for the year 1972:

Cause of Injury	% of All Injuries
Rockets, bombs, bullets	66.24
Fragmentation bombs	7.75
Incendiary bombs	2.50
Underground burial	23.51

Type of Injury	% of Total
Head, face, neck	15.29
Thorax, back	10.48
Abdomen, pelvis	12.08
Upper limb	23.42
Lower limb	26.51
Entire body	12.22

Source: Quang Tri Province Department of Health

Of course, wartime injuries were not immediately healed when the fighting stopped. It has been estimated that approximately 13 percent of the Vietnamese population was disabled during the years immediately following the war (ca. 6,500,000 individuals at the time). In 2001, over a quarter-century later, there were still an estimated 50,000 victims requiring rehabilitation in northern Vietnam, alone. (Source: Do Nguyen Phuong.)

Photo: Hatfield Consultants Ltd.

UXO victim — Vietnam

Unexploded ordnance (UXO) kills and injures farmers as they plow and harrow fields, children tending buffaloes, and impoverished individuals gathering UXO as a means of livelihood.

According to available data, approximately 38,000 were killed and 64,000 wounded by UXO during the period from 1975 to 1998. At present (2002), about 180 individuals continue to be wounded by UXO every month. (Source: Ministry of Labor, Invalids & Social Affairs.)

The nature and distribution of casualties inflicted by UXO are illustrated by statistics from Quang Tri for the ten-year period from 1985-1994, during which 25 were killed and 449 were wounded in that province. The percentage distribution of injuries was as follows:

Type of Injury	Percentage
Loss of one upper limb	33.10
Loss of both upper limbs	0.86
Loss of one lower limb	41.60
Loss of both lower limbs	0.60
One upper & one lower limb	0.04
Loss of one eye	5.20
Total blindness	1.50
Psychosis	1.60
Serious head and/or stomach injuries	15.50

Source: Quang Tri Province Department of Health

No comparable figures from Cambodia are available at this time. But as regards Laos, nearly 12,000 UXO-related accidents have been reported since 1975, including 6000 deaths. At present, at least one documented UXO accident occurs somewhere in Laos every two days; but there is good reason to believe that such incidents are significantly underreported. Children account for over one-third of all casualties, and that proportion may be increasing.

Infectious diseases

As one might expect, three decades of war had devastating effects on Vietnam's economic base, in terms of both materials and technology. Hunger and poverty were pervasive, and Vietnam lacked the necessary resources for controlling environmental pollution, conducting immunization campaigns, supplying the population with vital medicines, etc. All of this greatly contributed to the spread of infectious and communicable diseases. There was a notable decrease in such diseases following the war, but exact statistics are not available.

Since the war ended and the country was reunified in 1975, the incidence of communicable disease has decreased due to a variety of factors, including: improvements in the material conditions of the populace; immunization campaigns; an increased supply of safe drinking water; efforts

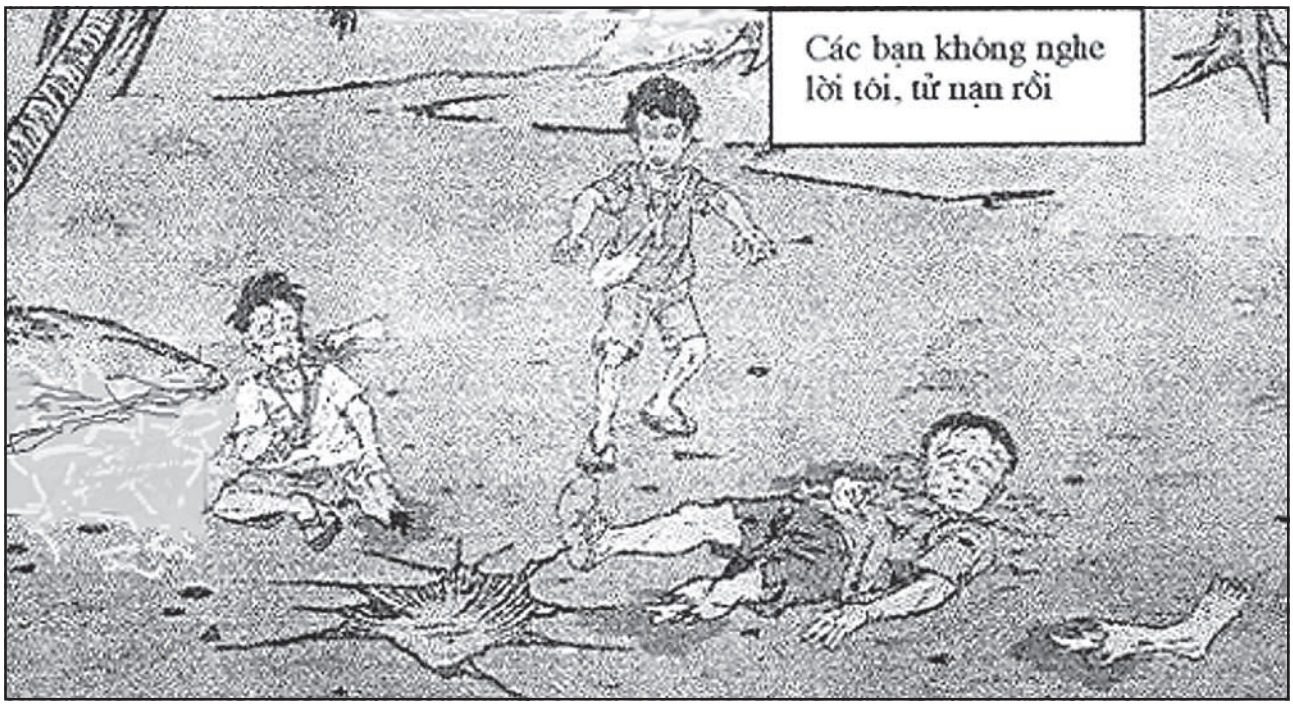


Illustration from booklet of Vietnam's UXO Awareness Education Project. The child in the center has arrived to find one of his friends gravely injured and the other dead in a pool of blood, a hand and foot severed by the blast of a "bombie" they had come across.

Principal Communicable Diseases

Cases per 100,000 Population, 1976-1985

Disease	1976	1980	1981	1982	1983	1984	1985
Cholera	43.4	23.1	7.0	1.3	9.8	0.4	2.5
Plague	2.4	1.9	5.2	5.8	3.9	0.3	0.1
Malaria	592.9	299.0	348.0	330.0	349.8	32.6	108.0
Lung tuberculosis	111.6	81.0	68.1	6.4	78.7	—	78.6

Source: Do Nguyen Phuong

to exterminate flies, mosquitoes and rats; expanded sewage treatment; and improved access to medications.

These and other factors have all contributed to the reduction and control of major epidemics. But progress has been very slow, since economic conditions in Vietnam are still quite difficult.

Cholera and bubonic plague are two serious diseases that have decreased markedly in recent years, as indicated by the following table:

Cases of Cholera and Plague
Per 100,000 Population

Disease	1976	1980	1999	2000
Cholera	43.40	23.10	0.30	0.23
Plague	2.40	1.90	0.26	0.05

Source: Vietnam Ministry of Health

The rate and severity of infectious diseases are believed to have followed a similar pattern in Cambodia and Laos, but no reliable data are currently available.

Health services

Three decades of war in Vietnam were followed by a punishing embargo that lasted nearly two decades more. During this time, economic, scientific and cultural exchanges with the outside world were very limited, as the country attempted to cope with numerous deprivations, including the lack of a properly functioning health-care system.

Nevertheless, Vietnam has made substantial progress in some areas, including the provision of basic health services. In 1964, for example, 11.11 percent of local communities lacked a health center. In 1999, that figure had declined to 6.9 percent. (Source: Do Nguyen Phuong.) There has also been a rapid increase in the training of new medical doctors, as indicated by the following table:

Medical Doctors per
100,000 Population in Vietnam

Year	1976	1996	1997	1998	1999	2000
M.D.s	19.0	45.7	45.7	49.6	51.3	53.6

Source: Vietnam Ministry of Health

Developments in other areas of the health system have been less favorable. Vietnam still has no capability to produce antibiotics, which are crucial to the treatment of infectious diseases. In 1975, the country could manufacture only 16 percent of the raw materials required for the production of pharmaceuticals and medical chemicals.

The capacity of pharmaceutical plants is still inadequate, and investments in production equipment are limited. In the year 2000, most pharmaceutical raw materials and 70 percent of prepared medicines were imported; domestic production of prepared medicines could meet only 30 percent of the demand.

In 1999, many local health centers still had difficulty sterilizing medical equipment because 65 percent had no autoclave, while 35 percent lacked cotton, alcohol and/or electricity. In addition, 43.7 percent lacked the necessary equipment to perform routine daily tasks, and 31.3 percent had no refrigerator for proper storage of vaccines. (Source for this and the two preceding paragraphs: Do Nguyen Phuong.)

A large body of evidence indicates that health services in Cambodia were almost completely destroyed, largely due to the policies and actions of the Khmer Rouge regime. No specific information is available for Laos, but it may be safely assumed that the massive bombing of that country would have had effects similar to those experienced by Vietnam.

Toxic chemicals

During 1961-1971, more than 72 million liters of defoliants and other herbicides were sprayed in southern Vietnam. The principal herbicide used was Agent Orange, which contained dioxin as a by-product of the manufacturing process. The structural, physical and chemical characteristics of dioxin have been clearly defined.

Many studies on the effects of dioxin on humans and animals have been conducted by scientists in the U.S., Germany, Canada, Japan and Vietnam. In 1974, a committee of the U.S. National Academy of Sciences released a report on the effects of herbicides in Vietnam which noted that trace amounts of dioxin had been shown to be extremely toxic in laboratory animals.

According to Gough, about 167 kilograms (368 pounds) of dioxin were sprayed on southern Vietnam during the war. Arthur H. Westing arrived at a similar figure, 170 kilograms.

In 2000, the U.S. Department of Veteran Affairs published a list of diseases linked to exposure to herbicides. There was sufficient evidence of linkages to four diseases: Hodgkin's disease, soft-tissue sarcoma, non-Hodgkin's lymphoma, and chloracne to establish an etiological link. There was also limited evidence for linkages to the following diseases: respiratory cancers, prostate cancer, multiple myeloma, peripheral neuropathy, porphyria cutanea tarda, type 2 diabetes, and spina bifida (in children of U.S. veterans).

In April of 2002, the San Francisco Court of Appeals granted a petition requiring the federal government to pay military benefits to U.S. veterans suffering from diabetes and prostate cancers which, the veterans claimed, had resulted from exposure to Agent Orange during the Vietnam War. According to attorney Bart Stichman, who submitted the petition on behalf of the veterans, more than 1200 veterans had developed prostate cancer and more than 10,000 type II diabetes since 1986. The compensation available to such veterans was increased by $24.5 million.

In 1971, while the war was still in progress, three scientists from Harvard University (M. Meselson, R. Baughman and J. Constable) demonstrated that fish in the Dong Nai River, the Saigon River and the Can Gio seacoast contained dioxin at levels from 18-814 ppt (parts per trillion), and that human breast milk contained levels as high as 1850 ppt.

In 1986, J. Constable and Hoang Trong Quynh collected a random sample of 120 human fat tissues from individuals in different provinces of southern Vietnam who had entered hospitals in Ho Chi Minh City for surgical operations. These fat samples were sent to laboratories in the U.S., Canada, Sweden, and Germany for dioxin analysis, and the results showed that the number of samples with concentrations of dioxin above background levels was 97 (81 percent).

Photo: Hatfield Consultants Ltd.

Extremely high levels of dioxin have been found in mothers' breast milk.

Although sprayed primarily from low-flying aircraft, Agent Orange was also dispersed from other types of vehicle, including boats, helicopters and armored cars. Helicopters and armored cars targeted areas surrounding military bases in order to remove plant cover for attacks by opposing forces. These sprayings were frequent and voluminous, which explains why high levels of dioxin are still found in human blood, animal and human fat tissue, and in soils at some of these sites more than three decades afterward. Of particular concern are those locations where drums of Agent Orange were stored.

Such sites are regarded as "hot spots", one example of which is the former A So airbase in the A Luoi District of Thua Thien Hue Province. A study conducted at that location in year 2000

by Vietnam's 10-80 Committee and Hatfield Consultants Ltd. of Canada found residual dioxin at levels as high as 898 ppt in soil, 51 ppt in fish, 82 ppt in ducks, and 31 ppt in pooled samples of blood from humans. They also found that people born in these areas after the spraying ceased had a mean of 33.4 ppt dioxin in their blood serum.

Researchers Le Cao Dai and Arnold Schecter found even higher levels of dioxin in some local residents near Bien Hoa air base. The levels they found were as high as 1,100,000 ppt in soils (presumably at the site of a spill) and 413 ppt in human blood. Dioxin levels were elevated in 95 percent of those tested, and the mean level for those born after the spraying stopped was 68.7 ppt. These were individual samples, not pooled as in the study at the A So airbase.

The sediments in nearby ponds were also found to have elevated dioxin levels, raising questions about the safety of eating fish taken from them.

In 1993 Bui Dai and his colleagues studied Vietnamese veterans who had been directly exposed to Agent Orange and commented on their high rates of digestive ailments, neural disease, skin disease and cancer. Comparisons with non-exposed controls showed statistically significant differences

In the same year (1993) Nguyen Can, Nguyen Thi Ngoc Phuong, Cung Binh Trung *et al*. made similar comments with regard to reproductive abnormalities. High rates of premature births, spontaneous abortions, still births, molar pregnancy, choriocarcinoma, birth defects and monstrous deformities were reported among women living in regions sprayed with toxic chemicals. These observers also reported unspecified medical problems among veterans exposed to toxic chemicals.

Nguyen Thi Ngoc Phong has commented on the incidence of birth defects, mental retardation and reproductive abnormalities among infants in the village of Khanh Hoi in the U Minh District of Ca Mau Province. She reports that the incidence of these problems among those born during 1964-1970, i.e. during the period of herbicide spraying, was two to three times greater than during the three decades prior to the start of spraying.

Hoang Dinh Cau and his colleagues, reporting in 2002 on their investigations of the children of veterans exposed to Agent Orange, commented that there was an increased incidence of birth defects in these children, and also in their second-generation offspring.

Epidemiological studies carried out by a number of Vietnamese scientists at different times in a variety of locations have resulted in their reaching similar conclusions— i.e. that those exposed to Agent Orange experience higher rates of cancer, reproductive abnormalities, birth defects, and other diseases, and that the increases are statistically significant.

In addition, it may be noted that many Vietnamese were more extensively and systematically exposed to Agent Orange than U.S. veterans of the war. There was also widespread malnutrition in Vietnam, prolonged psychological and social stress, and debilitating epidemic diseases. In some cases, however, Agent Orange dioxin is still believed to be a prominent feature of their health profiles.

As far as is known, it is not possible at present to make a definitive diagnosis of dioxin-related pathology (e.g. Agent Orange Syndrome or disease) solely on the basis of a physical examination or a pathological examination of tissues. There are three basic requirements for a valid diagnosis: a history of exposure (possibly, but not

Photo: Hatfield Consultants Ltd.

Sampling organisms in a contaminated area. High levels of dioxin have been found in fish, ducks and other animals associated with ponds like this.

necessarily, confirmed by chemical analysis); the presence of a disease known to be associated with dioxin; and relevant observations concerning the individual's occupation and family background.

Tear gas

CS tear gas (*ortho*-chlorobenzalmalononitrile) was widely used on the ground in Vietnam to drive people out of tunnels and other entrenched areas. CS was also discharged from helicopters in substantial quantities. The use of CS in warfare is now prohibited under the 1993 Chemical Weapons Convention.

Stocks of CS were left behind in many provinces of southern Vietnam. The chemical, still active, is stored in barrels that have been found in such unlikely places as a small college building, the cellar of a pagoda, and the bottom of a pond. Military forces may have disposed of the chemical in haphazard fashion before withdrawing. The barrels are rusting and the CS is slowly being released into the environment, with potentially harmful effects on human health. Restoration of CS-contaminated sites is a major problem in Vietnam.

At present, there is no reliable information regarding the use of chemicals in Cambodia. Recent disclosures have confirmed that herbicides, including Agent Orange, were used extensively in Laos; however, reliable data on possible health effects are not currently available.

Malnutrition

Adequate nutrition is one of the most fundamental requirements of human health. Malnutrition poses especially high risks to children, pregnant women and nursing mothers; their general state of health is a key indicator of any population's nutritional balance. Malnutrition is usually a major consequence of war, which often leads to increased poverty and interference with food supplies.

Malnutrition was a major problem in Vietnam during the three decades following World War II. Due to the disruption of both civil life and government administration, reliable data from that period are often lacking. But the table below, "Percent Malnourished at Birth", indicates that the situation has somewhat improved since the end of the war in 1975.

Percent Malnourished Children, Ages 0-5

Year	%
1985	51.5
1995	45.0
2000	33.8

Source: Vietnam Ministry of Health, 2000

Another indicator of prenatal nutrition is the mother's weight-gain during pregnancy. In developed countries, the average increase is 12 kilograms for rural women and 15 kilograms for urban women. By comparison, a 1985 survey conducted in Vietnam by the Nutrition Institute found an average weight-gain of only six kilograms for rural women and eight kilograms for urban women.

Malnutrition among children in the first year of life is often related to malnutrition in the prenatal period, caused by a shortage of nutrients to the mother during pregnancy. Birthweight is an indicator of malnourishment during the fetal period. In Vietnam, a birthweight of 2500 grams (ca. 5.5 pounds) is regarded as the average minimum to indicate adequate nutrition. The following figures suggest that the problem of prenatal malnutrition is still widespread in Vietnam.

Percent Malnourished at Birth
(Weight below 2500 grams)

Year	%
1985	18
1987	14

Yet another indicator is the production of milk by nursing mothers. During the 1980s, roughly 90 percent of Vietnamese mothers were unable to produce an adequate supply of breast milk during the first six months after birth, the period in which breast milk is the infant's only significant source of nutrition. (Source: Do Nguyen Phuong.)

Social-psychological consequences

The decades-long war left millions of widows and orphans, and the severe disruption of social life in general. Opportunities for marriage and child-bearing were significantly reduced.

The division of the country into northern and southern halves was a major cause of family separations. In 1954, a young wife may have left her husband in the south for regrouping in the north, in the belief that the family would be reunited after the national elections promised for 1956. When that promise was betrayed, she may

have been forced to wait 21 years until the country was finally reunited. By then, however, she was beyond the age of child-bearing, and the husband and wife had become strangers to each other.

Many marriages disintegrated under these and similar pressures, contributing to the other forms of psychic stress occasioned by the long war. Perhaps the most well-known syndrome is post-traumatic stress disorder (PTSD), which has affected both U.S. soldiers and much of the Vietnamese population.

Chronic PTSD is often a life-long ailment with a fluctuating course. Victims suffer from severe anxiety, painful recollections, mood swings, sleep disturbances and other nervous symptoms; they are also prone to cognitive impairments such as learning disability. PTSD is associated with an increased risk of psychosomatic disorders, depression, and narcotic abuse. It is very probable that many of these problems have indirect effects on the children of victims.

General awareness among the Vietnamese population of the lingering contamination of dioxin is a source of continuing distress and retraumatization—both as a reminder of the war, and as a source of anxiety about the risk of birth defects and other medical problems.

Mental and Behavioral Disorders
Per 100,000 Population

Year	Cases
1976	432
1980	25
1995	29
1998	14

Source: Vietnam Ministry of Health, 1998

Nevertheless, the frequency of mental and behavioral disorders has decreased in recent years, which may reflect an improvement in socio-economic conditions and a gradual process of psychic healing.

No specific information on malnutrition in Cambodia has been available to date. But it is believed that the devastation caused by the Khmer Rouge exceeded that resulting from aerial bombardment and the use of herbicides. In Laos, it may be assumed that the intensive bombing resulted in problems of malnutrition and social-psychological disturbance similar to those of Vietnam.

Psychological Impact of War

There has been no systematic research into the psychological effects of the Vietnam War on the affected populations. But one indication of the potential impact is provided by the reactions of children in New York to a terrorist attack on their city:

> "Tens of thousands of New York schoolchildren have experienced psychological problems since the September 11 [2001] attacks, according to the results of the biggest post-disaster study of its kind, released this week.
>
> "The New York board of education estimates that more than 107,000 pupils in the city's schools— 15% of the total— were suffering from agoraphobia, and 75,000 were suffering from post-traumatic stress disorder.
>
> "The schools' chancellor, Harold Levy, called the findings a 'wake-up call'. Students at schools near Ground Zero exhibited the worst symptoms, but those elsewhere were 65% more likely to be suffering from post-traumatic stress disorder after September 11 than before."
>
> — *The Guardian, 3 May 2002*

Of course, no direct comparison with the Vietnam War is possible. Among other things, the attack on New York City lasted less than an hour, resulting in the destruction of two large buildings and the deaths of ca. 2800 people. Vietnam, on the other hand, was subjected to thirty years of nearly continuous warfare, including the massive use of bombs, napalm, landmines and toxic chemicals; entire towns and city districts were levelled to the ground, and millions were killed or disabled.

Ameliorating the consequences of war

Although the Vietnam War officially ended over a quarter-century ago, its consequences continue to affect the populations of Cambodia and Laos and Vietnam. Assistance from the international community is crucial to improving living standards, including health services, and to developing a better understanding of the war's long-term consequences for public health.

Among the most urgent requirements are the following:

- dissemination of knowledge regarding the dioxin in Agent Orange and its effects on human health
- implementation of preventive measures, including the identification of high-risk subgroups requiring special care
- development of practical and simple preventive measures to reduce the risk of birth defects, including dietary supplements of folic acid and improved prenatal diagnosis
- establishment of social-support networks and educational programs to meet the needs of families that must cope with disabilities and psychic trauma
- regular health checkups for early detection and treatment of diseases
- family planning programs
- special care for disabled children
- medical or surgical treatment of all disabled, including rehabilitation
- expanded training in special education and the health professions
- special schools and rehabilitation centers for injured children, with a priority on preparation for suitable occupations
- social security, care and medical treatment to improve the living standards of victims.

Major efforts are also needed to remove the serious risks to public health posed by residual chemicals and munitions. This involves identifying the locations of UXO and toxic chemicals, especially hot spots. These harmful agents must then be neutralized and removed, and the sites restored so as to minimize the threat to human health.

Finally, there is a great and continuing need for expanded education and research in all areas of public health.

Although some progress has been made in recent decades, much still remains to be done. It is hoped that the international community will continue to support Cambodia, Laos and Vietnam in such efforts, and that the three countries will further develop their co-operation in order to deal with the many long-term consequences of the war.

Photo: John Constable

UXO training: Lao children performing ring dance to a song that conveys a message about the dangers of unexploded ordnance.

Appendix

Realities of Life in Vietnam

Diane Fox is an anthropologist from the United States who has spent many years in Vietnam. The following excerpt from one of her field interviews with a rural family reflects a reality shared by millions of Vietnamese.

When Mr. Binh comes in, he tells us that in 1972, before the Paris Agreements, he was a special forces soldier in reconnaissance in Tay Ninh, a heavily sprayed region in the south. Where he was stationed the trees were denuded of leaves; he lived in tunnels, "bare-headed, bare-footed, bare-chested"— "camouflaged by spreading mud on his body", interjects another man.

"We saw 200 liter barrels with yellow stripes," Mr. Binh tells me, "they had three yellow stripes. At that time, we thought whoever died, died at once, and whoever lived, lived whole".

Mr. Binh came home with many diseases: diseases of the skin, of the nervous system, of the circulatory system, of the digestive system.

"The very regrettable after-effects of that war you see in the first fetus my wife gave birth to," he tells us. "My wife, right here. It was like a monster, a monster in a fairy tale. You know, it didn't have a human shape. And a few minutes after it was born, it died. Very, very hard. And my very own wife has many illnesses, most of them women's illnesses. Women also bear the consequences of this war."

The couple's second child was slow witted. He "doesn't know anything", they explain; he just turns from side to side. Their third child, a daughter, was born epileptic and blind, with no pupils. Their fourth child was 16 at the time of the interview, and enrolled in school. After her daughter was born, Mrs. Ha said to herself, "Enough!" She didn't know if it was because of the war or because of fate, she says, but she went to be sterilized. The procedure, which involved inserting medicine into the fallopian tubes, led to many complications, much loss of blood, and repeated operations. As we spoke she was in pain, with one half of her stomach swollen.

"I only believe in science," she explains. "As for the traditional village healer, I don't dare believe, because my child's brain and eye are very, very important. Therefore, I totally and completely only believe in science. Science says she can't be cured. Then we must bear it, helplessly. What can we do? We can't do a thing."

"This all started from giving birth to children like this, and voluntarily going to be sterilized. Then I was unlucky and the consequence of sterilization was much illness. That made us spend a lot of money, money that a poor family doesn't have. . . very hard, very desperate. But it's all for my husband, all for my children, so I try to overcome the difficulties. Such a hard situation, but I still have to look after my husband, after my children. I know that my life is deeply entwined with his. I link my whole life with my husband and with my children, to 'carry the rivers and the mountains' to my last breath, and only because of war."

Mrs. Ha's brother says he wants to ask me just one more question. "In your country," he begins, "are there children like this?" He gestures around the room. I do not understand his implication, and cannot answer. "Children this strong, this tall, this big—or smaller?"

One of the women sitting on the bed laughs and says "I've seen on T.V. They are big. Vietnamese are the smallest."

Mrs. Ha's brother continues: "Our life here should be like that of our international friends. But because the war lasted far too long— all our lives— we lost the chance to study, because at 18 we left school and took up the gun. When the enemy was gone, we came back. . . back to feed our children, but there was not enough, so they are sickly and puny like this. You see?"

"These are the consequences of war," Mr. Binh explains. "What he is saying is that the consequences of war are very great. . . ."

Earlier Mrs. Ha has thanked me, and the American government, for paying attention to them and trying to help. When Mr. Binh again thanks me as a representative of the American

Photo: Diane Fox

Mrs. Ha (center) with one of her daughters and Mr. Binh

government, I explain that I do not represent the government, that I do not know if the government will help, but that I believe ordinary people will. Mrs. Ha's brother replies, "Because everything comes from the people, doesn't it?"

When he sees I am again not fully following his meaning, he explains: "Because if the people have sincere hearts and make demands on their government, most governments must execute those policies, because the government is for the people, isn't it?"

Mr. Binh has a request: "I want to ask you to say this to the American people. An unavoidable war broke out between our two countries. In reality, nobody wanted it. Now both sides understand each other, and the two countries are friends, and trade business. Close the past and open the future. The two countries circulate goods. They've exchanged ambassadors already. But what happened before— that is, the consequences of the bombs and bullets, and of the chemicals, outrages the Vietnamese people. Yes, because the result is not to kill a person at once, but the result waits for the children, and for the grandchildren.

"So I really hope the American people, together with the Vietnamese people, will demand that the American government not produce those chemicals any longer. Don't take them to make war with any other country. What is banned by international law should not be used. So stop using them.

"Yes. . . not just I myself in particular, or just the Vietnamese people in particular, but the whole world in general opposes these chemicals."

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About the Authors

Subcommittee on Public Health

Dr. Hoang Trong Quynh

During the war, Dr. Quynh was the head of a hospital located in an area sprayed with Agent Orange and observed at first hand the effects on humans and the environment. After the war, he served as permanent secretary of the national scientific committee established to study the consequences of toxic-chemical use. He has collaborated on the study of dioxin with scientists from the U.S., Canada, France and Japan, and is the co-author of numerous scientific articles resulting from that research. He is currently Director of the Center for Ecologically Sustainable Agriculture in Hanoi.

Dr. John Constable

Senior surgeon at Massachusetts General Hospital specializing in plastic and reconstructive surgery, Dr. John Constable is also an Associate Clinical Professor at Harvard Medical School. Dr. Constable first visited Vietnam in 1967 to evaluate the medical needs of children burned by napalm. He then participated in a seminal study of the American Association for the Advancement of Science on the effects of herbicides, in the course of which he collected the first human milk samples for dioxin-content analysis. He has since returned to Vietnam nearly every year to study the medical effects of herbicides and to assist in the development of the country's reconstructive surgery programs.

Prof. Nguyen Lan Dung

Professor Dung is Director of the Center of Applied Microbiology at Vietnam National University and chairman of a national programme for the application of advanced science and technology by rural households. His areas of expertise include public health, microbial ecology, and biological diversity, insecticides and fertilizers. Prof. Dung is also a member of Vietnam's National Assembly, and Vice President of the Vietnam Biological Society.

Prof. Barry Noller

Professor Noller, Deputy Director of the Australian National Research Centre for Environmental Toxicology, is an expert on environmental contaminants and their processes in tropical systems. He has long experience of such problems in the Asia-Pacific region, and is currently President of the Federation of Asian Chemical Societies. He has collaborated extensively with scientists in Vietnam, Europe and Australia on studies of dioxin contamination and its effects.

Prof. Dao Ngoc Phong

Professor Phong is currently Director of the Center for Environment and Health Studies, and Dean of the Department of Public Health at Hanoi Medical University. A leading authority on biological statistics and environmental epidemiology, Prof. Phong has conducted numerous studies on the environmental and health effects of the Vietnam War. Much of that work has been concerned with the incidence of malformations and other health problems in children of soldiers exposed to Agent Orange during the war.

Dr. Alastair W.M. Hay

Dr Alastair Hay is a chemical pathologist who has long been interested in the public health effects of defoliants used during the Vietnam War, an interest that has broadened to encompass all aspects of chemical warfare. He has written extensively on that and related issues in *Nature* and other journals. Dr Hay is now with the Molecular Epidemiology Unit at the University of Leeds, where his current research is on the identification of biomarkers for a wide range of conditions.

LONG-TERM CONSEQUENCES OF THE VIETNAM WAR

PUBLIC HEALTH

Among the many serious health effects of the Vietnam War were widespread physical injuries to both military personnel and civilians. A large proportion of the population was mutilated and/or disabled, creating a major problem of rehabilitation. The suffering has continued since the end of the war, with extensive casualties from landmines and other unexploded ordnance.

The war also resulted in large increases of infectious diseases, especially cholera, plague, malaria and tuberculosis. Other major health effects included widespread malnutrition and social-psychological problems, including those related to the deaths of close relatives. Nearly every family was affected.

An additional major health risk was and is posed by the vast quantities of toxic chemicals that were sprayed on forests and cropland. These and other effects of the war on public health comprise the subject of this report, one in a series produced for the Environmental Conference on Cambodia, Laos and Vietnam.

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