R & S REPORT
Published by Research and Statistics Office
Hawaii State Department of Health
ISSUE NO. 53 JULY 1985

ASPECTS OF THE HEALTH OF HAWAII'S VIETNAM-ERA VETERANS REFLECTING THE IMPACT OF THE VIETNAM EXPERIENCE

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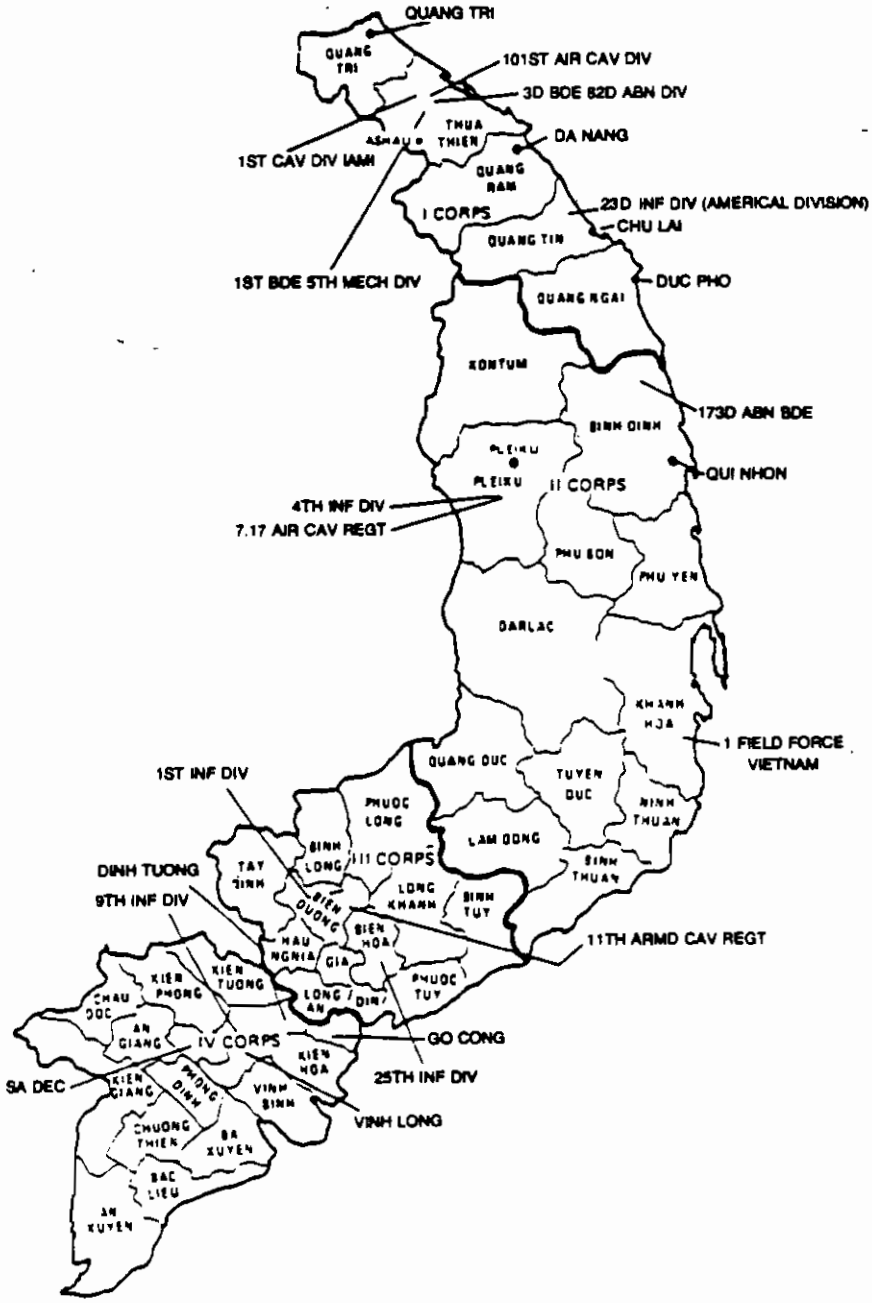

Aspects of the Health of Hawaii's Vietnam-Era Veterans Reflecting the Impact of The Vietnam Experience.

Will Rellahan, Ph.D.*

ABSTRACT

A survey of the health of 418 Vietnam-era veterans who live in Hawaii has determined that the health of those who have served in Vietnam is significantly different than the health of those who have not served in the Vietnam theatre. The differences in the health of the two groups is in a direction that suggests "injury" to those who have been in Vietnam.

INTRODUCTION

In order to "provide services to Vietnam veterans who have possibly been exposed to the chemical defoliant known as 'Agent Orange,' " (*1*) the Eleventh Legislature (1982) of the State of Hawaii directed the Department of Health to carry out a series of activities to determine, and draw attention to, the health status of Hawaii residents (including refugees from Indochina) who may have been exposed to herbicides in Vietnam, Laos, or Cambodia (Hawaii Revised Statues, Section 321, 261-271).

The activities which the Department of Health conducted under that mandate were described in 1983 in a report which included an analysis of an "Agent Orange Exposure Survey." In that survey (*2*), more than 1100 persons answered questions pertaining to their perception of their exposure to herbicides in Southeast Asia, their perceived health status, and preganancy outcomes that they or their consorts experienced. The report concluded: "Those persons perceiving exposure to herbicides reported more health problems and problem pregnancies than did those persons who were not certain about exposure or perceived themselves not to have been exposed to herbicides."

The Agent Orange Exposure Survey could not make definitive statements relating herbicide exposure to health problems owing to the fact that the survey obtained information solely from a self-selected group of veterans and refugees who requested survey forms and volunteered answers. The information that the survey collected may have been biased by an over-abundance of "truly ill" or "worried-well" respondents. In addition to this problem, the index of exposure to herbicides which the survey used was that of having the respondents attempt to recall the conditions of their possible exposure. Less than half the respondents were able to remember specific instances of exposure. The majority of the remaining respondents stated that they were unsure that they had been exposed to Agent Orange or other chemicals.

Responses to the survey indicated that the many Vietnam veterans were anxious about the impact that their Vietnam service might have had on their current health. Recognizing this widespread concern, the Department of Health recommended to the Twelveth Legislature that a second examination of

* Agent Orange Program, Office of Research and Statistics.

the health of Vietnam veterans be authorized. The new survey would involve a sample of veterans which had been collected in a random fashion, thus eliminating the bias of self-selection that had weakened the first survey. In addition, an attempt would be made to determine the degree of exposure of these veterans to chemicals in Vietnam more accurately than by a recall technique. That survey was directed by the Legislature, and took place in 1983-85.

STRUCTURE OF THE SURVEY

The structure of the second survey was outlined by a group of individuals, all of whom had some significant interest in studying the health of persons who had been in Indochina during the herbicide spraying, who met at the invitation of the Chief of the Research and Statistics Office of the Department of Health. These individuals represented the Health Surveillance System, the Medical Services and Crippled Children Services Branches of the Department of Health; the Outpatient Clinic and the Veterans Center of the Veterans Administration; the Veterans Affairs Branch of the Department of Social Services and Housing; the Vietnam Veterans of Hawaii; the University of Hawaii School of Public Health; the Cancer Center of Hawaii; the Hawaii Cooperative Health Statistics System (HCHSS) of the Research Corporation of the University of Hawaii; and the Honolulu Advertiser.

The advisory group recommended a retrospective cohort study involving both male veterans who had served in Vietnam and male veterans who had not been in Vietnam but had been in the military service during the years of the Vietnam conflict (3). These persons all would have had the same health status just prior to the point where some of them might have been exposed to herbicides in the Vietnam environment. The veterans were to be administered a health questionnaire which was derived, with some modifications, from one distributed by the Vietnam Veterans of America in an earlier attempt at the examination of the health status of Vietnam veterans on a national scale (4).

An exposure index for those Vietnam veterans in the sample could be established by showing an investigator the place or places on a map of Vietnam where they had been stationed. The investigator would find out, using a computer-stored record of herbicide spray missions called the "HERBS tape," whether or not a spray mission had been flown over the area in which the veteran had been stationed. Thus, three groups of veterans could have been identified: a non-Vietnam group which could not have been exposed to herbicides, and two Vietnam groups, one of which might have been exposed to herbicides and one of which probably had not been exposed to herbicides (5).

A comparison of the health problems of all three groups would determine if there was a relation between herbicide exposure (as indexed) and health status.

MODIFICATION OF THE STRUCTURE OF THE SURVEY

Within a short time, it became apparent that the proposed exposure index could not be used. None of the volunteers in a test group of ten

Vietnam veterans that were questioned about their precise area of service in Vietnam could locate that area on a large scale map of the districts in which they had served. It was evident that they knew only, for example, that they had "gone north out of Saigon for a couple of hours" or were "right around Chu Chi" or had been "dropped into Fire Base Delta near Pleiku." None of these areas could be identified with any degree of precision on the map which was keyed to the "HERBS tape" data. The "HERBS tape," therefore, could not be used in our hands, and no valid exposure index seemed to be available for the survey as it had been planned.

The survey advisory group decided to continue the health survey as a "Vietnam Experience" study rather than an "Agent Orange Exposure" study. It would use only two groups in the cohort -- the non-Vietnam service veterans in one group as a control, and the Vietnam service veterans in the second group. The study factor would become "Vietnam service" rather than "herbicide exposure." The results of the survey would now be analyzed only to determine whether service in Vietnam did or did not have an impact on the current health of Vietnam-service veterans. The Vietnam-veteran community, represented by the Vietnam Veterans of America and personnel from the Veterans Center, concurred with the decision to redirect the health survey.

SELECTION OF THE SAMPLE

The HCHSS agreed to provide to the survey office, using a computer-assisted telephone interview system which the HCHSS has been using for several years, a list of names, addresses and telephone numbers of a group of Vietnam-era veterans who were willing to participate in a health survey. The list of participants in the survey was obtained by what is known as "quota sampling" by a random digit telephone dialing technique (6). In this selection method, several thousand telephone numbers were dialed at random, and the respondents asked questions to determine whether they met eligibility requirements for inclusion in the sample. About one in twelve telephone calls produced an eligible respondent.

If the respondent was identified as a candidate for the survey population, his "Vietnam experience" status was stored in the HCHSS file, but not made a part of the record delivered to the survey office. In this manner, the person coding the responses to the health questionnaire was "blind" to the "Vietnam experience" factor of any particular respondent.

About 6,100 telephone calls to residents of Oahu were completed, using the interview shown as Appendix I of this report. (The search was limited to Oahu because of the initial plan to have respondents meet an interviewer to indicate his Vietnam-service area, and by the random digit dialing computer program which was limited to the island of Oahu.) A total of 550 Vietnam-era veterans was discovered, and 511 (93%) of these men agreed to participate in the survey.

The veterans were sent the health survey questionnaire shown as Appendix II of this report. If the veteran did not return the questionnaire after two weeks, he was sent a follow-up letter. A second follow-up letter was sent after another two-week delay. After a third two-week wait, a telephone call was made to the telephone number at which the veteran had

initially been contacted. This constituted the final follow-up attempt.

Owing to fiscal constraints, the survey had to be conducted during two fiscal years. The first questionnaires were mailed out in December, 1983 and the last questionnaire was returned in January, 1985. It has been shown that in mail and telephone surveys, the information obtained from late-responders is essentially the same as information returned from early responders (7). Thus, the quality of information that we obtained early in the collection is assumed to be similar to the quality of information that we obtained late in the collection.

A total of 418 responses (81% of those who agreed to participate in the survey) was received. These responses constitute the sample for the survey analysis. (The sample represents 1.4% of the 30,131 veterans of the Vietnam era who resided on Oahu and were counted in the 1980 Census of Population.) There were 93 men who had agreed to participate in the survey but who did not return medical questionnaires. The age and race distribution of the nonresponders was essentially the same as the age and race distribution of the responders. The response rate was high enough so that we assume a negligible nonresponse bias.

When all of the questionnaires had been returned, the responses were coded and the data reduced for electronic storage and retrieval. At this time, the "Vietnam-service" status code was transferred to each record. The data were tabulated for two groups: a "non-Vietnam experience" control group of 186 respondents (those whose Vietnam-era service had not been in Southeast Asia), and a "Vietnam experience" group of 232 respondents (those who had been stationed in Vietnam sometime between 1962 and 1972 -- the years of herbicide use in Southeast Asia).

RESULTS: DEMOGRAPHICS

Age of respondents.

The groups were divided into the seven age categories shown in Table 1. Using a common statistical technique (the "chi-square" test at the 0.05 level), it cannot be shown that there is more than a slight chance that there is a difference in the distribution of the ages in the two sample populations. Thus, there should be no particular difference in the health of the two groups due to diseases which may be age-related. (There may be a rare disease which is age-related, such as some form of cancer, which the survey would not discover owing to the size of this relatively small sample.)

Race.

"Race" was defined as being the race of the respondent's father, as the respondent stated it. The groups were divided into the five racial categories shown in Table 2. Due to the small number of Hawaiian, Black, and "Other" men, those veterans were included in a single group. Using the statistical test described above, it cannot be shown that there is more than a slight chance that any one racial group under- or over-represented in the sample populations. Thus, there should be no particular difference in the health of the two groups due to a race-specific disease.

Table 1	PRESENT AGE	
AGE GROUP	VETERAN STATUS	
	Non-Vietnam (n = 186)	Vietnam (n = 232)
Under 35	32	28
35 - 39	65*	94**
40 - 44	51	52
45 - 49	16	20
50 - 54	7	17
55 - 59	8	12
Over 60	7	9
	*Median age = 39.7 **Median age = 39.7	

It cannot be shown that any one age group is under-or-over-represented in either group of veterans

Table 2	RACE	
ETHNIC GROUP	VETERAN STATUS	
	Non-Vietnam (n = 186)	Vietnam (n = 232)
Caucasian	119	154
Japanese	36	39
Chinese	8	8
Filipino	14	13
Hawaiian, Black, and Other	9	18

It cannot be shown that any one racial group is under-or-over-represented in either group of veterans.

Present Occupation.

The groups were divided into the seven occupational groups shown in Table 3. There were only small numbers of "operators, laborers, helpers,

Table 3	PRESENT OCCUPATION	
OCCUPATION	VETERAN STATUS	
	Non-Vietnam (n = 186)	Vietnam (n = 232)
Managerial and Professional	47	39[a]
Technical, Sales, and Administrative Support	30	33
Service	16	25
Production, Craft, and Repair	21	27
Military	50	71[a]
Retired	9	17
Other*	13	20
	*Operators, Laborers, Helpers, Student, Homemakers, None or Not Stated.	

a - It cannot be shown that there are the same proportions of managerial/professional workers or military personnel among both groups of veterans.

students, or homemakers," so these were grouped together as "other" for statistical convenience. Using the common statistical test described above, the only occupations in which there seemed to be a difference between the

two service groups were in the "managerial or professional" or "military" classifications. Those veterans with Vietnam service seem to be under-represented in the former category, and over-represented in the latter (*8*). If one makes the not unreasonable assumption that both of those categories are "good health" biased, and thus identical, then there should be no particular difference in the health of the two veterans groups due to an occupation-specific disease. (*9*)

Once the demographics of the two groups had been demonstrated to be essentially the same, it could be assumed that those demographic factors did not bias the relative health profile of the two veterans groups as that profile was derived from the answers to the medical questionnaires that the veterans returned.

RESULTS: HEALTH STATUS AND HISTORY

Regular Exposure to Chemicals.

The answers that respondents gave when they were asked if they were ever regularly exposed to chemicals, fumes, dust, or radiation or if they used chemical substances regularly in gardening or their work are shown in Table 4 (*10*). Some health problems might be related to this exposure to chemicals and unrelated to the "Vietnam experience". Using the accepted statistical test described above, the conclusion is that there is only a slight chance that there might be a difference in the "chemical exposure" experience of the two groups. Thus, there should be no particular difference in the health of the two groups due to exposure to chemicals in their environment. (It should be noted that a few respondents answered "Agent Orange" or gave some other indication that they were aware of the herbicide controversy.)

Table 4 EXPOSURE TO CHEMICALS

CONDITION	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	number (n)	"Yes" answers	number (n)	*Expected no. of "Yes"*	Observed no. of "Yes"	
Regularly exposed to Chemicals, Fumes, Dust, or Radiation	185	48	226	*58*	68	No
Regular use of Chemical Substances	184	32	232	*40*	33	No

*There is only a small chance that this answer would change if the survey were done again.

Skin Problems.

Questions were asked about teen-age and adult-age acne, and about skin rash other than poison ivy, measles, or chicken pox. The collected responses are shown in Table 5. If one uses the common statistical test, the conclusion is that there is only a slight chance of a difference in the

experience of the two veterans groups with respect to acne, but that the Vietnam-veteran group probably has experienced more "skin rash with blister" than the other group. A disease called "chloracne" has been recognized as being "service connected" by the Veterans Administration (*11*), but our study did not ask for any clinical description of the "rash" of the respondents. So, it cannot be concluded that their problem is that which has been associated with herbicides. The larger proportion of Vietnam-service veterans with skin-rash problems might be a reflection of their service in the near-tropical climate of Vietnam, which is known to be "rash-productive."

Table 5 SKIN

CONDITION	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	n	Yes	n	Exp. no. of Yes	Obs. no. of Yes	
Did you ever have acne when you were a teenager?	186	87	232	*108*	114	No
Did you ever have acne as an adult?	183	38	227	*47*	50	No
Have you ever had a skin rash with blister except poison ivy, measles, or chicken pox?	181	37	226	*46*	79	Yes

*See footnote, Table 4

Digestive System.

The veterans were asked nine questions about their "digestive system." The questions also included ones about the liver and bladder. Responses are shown in Table 6. If one uses the common statistical test, one cannot show that there is more than a very small chance that the two groups gave the same responses to the nine questions taken together (X^2 = 173 for the table, $p < 0.01$). The Vietnam veterans indicated they had experienced weight loss, loss of appetite, nausea, diarrhea, jaundice, and oak-brown urine to a greater extent than the non-Vietnam veterans. The probability of a difference between the two groups in the frequency of reporting problems varied from large (X^2 = 10.7, $p < 0.01$) in the case of diarrhea to small (X^2 = 3.45, $p = 0.06$) in the case of jaundice.

The conclusion that is evident from Table 6 is that the "Vietnam service" experience may have contributed to all of the health problems of the type illustrated in the table.

General Health.

Under the rubric "general health," the veterans were asked several questions about naps, taste or smell, mental illness, or malaria. The responses of the groups are shown in Table 7. The commonly used statistical test indicates that there is only a slight possibilty that the answers of

Table 6 DIGESTIVE SYSTEM

CONDITION	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	n	Yes	n	Exp. no. of Yes	Obs. no. of Yes	
Have you lost 20 or more pounds without changing your diet?	184	8	231	10	22	Yes
Do you regularly experience loss of appetite?	185	9	231	11	24	Yes
Have you ever been repeatedly nauseous when you haven't had a flu or other sickness?	184	8	231	10	27	Yes
Are you regularly troubled with constipation?	184	7	230	8	18	No
Are you regularly troubled with diarrhea?	184	6	231	7	28	Yes
Have you ever had jaundice (yellow eyes and skin)?	185	7	231	8	19	Yes
Have you ever had hepatitis?	185	5	231	6	13	No
Has a doctor ever told you that you had cirrhosis of the liver?	185	3	231	3	2	No
Have you ever passed urine that is oak brown (coca-cola colored)?	185	5	230	6	20	Yes

*See footnote, Table 4

Table 7 GENERAL HEALTH

QUESTION	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	n	Yes	n	Exp. no. of Yes	Obs. no. of Yes	
Regular Naps?	184	34	230	42	49	No
Awake Rested?	185	144	226	175	152	Yes
Notice change in Taste or Smell?	186	15	228	18	47	Yes
Suffer Mental Illness or Breakdown?	185	4	227	4	7	No
Had Malaria?	182	6	227	7	14	No

*See footnote, Table 4

both groups were the same for the question on awakening rested, and for the question on noticing a change in taste or smell. Regular naps, and the absence of mental illness or breakdown, or malaria, were reported to the same extent by both groups.

It appears that the "Vietnam experience" factor has probably interfered with restful sleep after naps and probably produced a change in taste or smell in the Vietnam-service veterans.

"Emotional" problems.

A question was asked regarding the regular showing of depression, rage, anxiety (uptight), or irritableness. Responses of the groups are given in Table 8. There is only a very slight chance that the responses of both groups were the same. The Vietnam-service veterans show all these uncomfortable emotional symptoms more than the other veterans (X^2 = 288 for the total table, $p < 0.01$).

The table demonstrates that the "Vietnam experience" factor has produced uncomfortable emotional feelings in a larger than expected number of the Vietnam-service group. Other investigations have recognized this effect and the resulting condition has been termed a "post traumatic stress disorder" (*12, 13*)

Table 8 EMOTIONS

CONDITION	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	n	Yes	n	*Exp. no. of Yes*	Obs. no. of Yes	
Depression	186	11	230	*13*	41	Yes
Rage	186	5	230	*6*	21	Yes
Anxiety (uptight)	186	26	230	*32*	62	Yes
Irritable	186	17	230	*21*	64	Yes

*See footnote, Table 4

Neurological Symptoms.

The respondents were asked a series of nine questions about what might be categorized as "neurological symptoms." Responses to the section are shown in Table 9. In all cases (tiredness, headaches, nervous disorders, hearing loss, difficulty with memory or concentration, dizziness, faintness, fainting, and blurred vision), more of the of the Vietnam-service group reported these problems than would be expected based on the answers of the control group. It cannot be demonstrated with a common statistical test that this difference in reporting frequency is just accidental.

It must be concluded that the "Vietnam-experience" is associated with an excess of "neurological" symptoms of the type listed in Table 9.

Table 9	NEUROLOGICAL SYMPTOMS					
PROBLEM	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	n	Yes	n	*Exp. no. of Yes*	Obs. no. of Yes	
Tiredness	186	36	226	*43*	76	Yes
Headaches	186	29	226	*35*	68	Yes
Nervous disorders	186	8	224	*8*	26	Yes
Hearing loss	186	31	224	*37*	76	Yes
Difficulty with memory or concentration	186	15	225	*18*	59	Yes
Dizziness or light headedness	186	19	227	*23*	57	Yes
Feel faint	186	12	227	*14*	32	Yes
Fainted more than twice (not related to drinking)	186	1	227	*1*	9	Yes
Vision blurred (other than needing glasses)	184	10	227	*12*	38	Yes

*See footnote, Table 4

Libido.

The veterans were asked if there had been any sudden or dramatic change in their desire for sex. About 21% of the Vietnam-service group and 7% of the control group (Table 10) reported that there had been a change in that desire. It cannot be shown with a common statistical test that the three-fold difference between the two groups is accidental. It is notable that the direction of the change for both groups was dichotomous. It is also interesting that more of the Vietnam-service group reported both a greater increase and a greater decrease in a desire for sex.

It appears that the "Vietnam experience" had some impact on the libido of the Vietnam-service group as reflected by a sudden or dramatic change in their desire for sex, either increasing or decreasing that desire.

Table 10	LIBIDO				
QUESTION: Is there any sudden or dramatic change in your desire for sex?	VETERAN STATUS				Are the Groups Different?*
	Non-Vietnam (n = 186)		Vietnam (n = 230)		
	"Yes"	*Percent*	"Yes"	*Percent*	
Direction of Change: Change?	14	*7.5%*	49	*21.0%*	
Increase	5	*2.7*	18	*7.8*	Yes
Decrease	9	*4.8*	31	*13.5*	Yes

*See footnote, Table 4

Smoking and Drinking Habits

Veterans were asked if they smoked cigarettes or drank alcoholic beverages regularly. The Vietnam-service group contained more smokers and more alcoholic-beverage drinkers than the control group (Table 11). It cannot be shown with the common statistical test that this difference in behavior of the two groups is accidental. (For comparison purposes, it might be pointed out that a recent publication reports that about 31% of the adult males in Hawaii are regular smokers, about 32% of the adult males in Hawaii are "acute" drinkers, and about 22% of the adult males are "chronic" alcoholic beverage drinkers (*14*).)

The "Vietnam-experience" factor seems to have influenced the greater use of tobacco and alcoholic beverages in the Vietnam-service veterans.

Table 11 SMOKING and DRINKING HABITS

QUESTION	VETERAN STATUS				Are the Groups Different?*
	Non-Vietnam (n = 185)		Vietnam (n = 229)		
	Yes	Percent	Yes	Percent	
Do you smoke cigarettes?	49	26%	87	38%	Yes
Do you drink alcoholic beverages regularly?	60	32	95	41	Yes

*See footnote, Table 4

Stress Situations.

A question was asked to determine if the veterans had undergone any of four stressing situations in the last ten years. While it cannot be shown that there is a probable difference in the experience of the two groups with respect to unemployment or divorce (Table 12), a larger fraction (10/230) of the Vietnam-service group reported the death of a child or spouse than did those of the control group (2/186). It cannot be shown that this latter difference is due entirely to chance.

Table 12 STRESS SITUATIONS

SITUATION	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	n	Yes	n	*Exp. no. of Yes*	Obs. no. of Yes	
Unemployment	186	37	230	46	46	No
Divorce	186	36	230	46	44	No
Death of child or spouse	186	2	230	3	10	Yes

*See footnote, Table 4

Obviously, there is no model which could relate the death of a relative to the "Vietnam-experience." Nevertheless, the stress surrounding these deaths certainly must be considered to be a factor confounding the impact of the stress of the "Vietnam experience" on the Vietnam-service group. The number of respondents involved (10 and 2) is so small, however, that the contribution of this factor to the overall responses in other tables must be small. (In other words, if one omitted these stressed individuals from both groups, conclusions about other health differences between the two groups would not be changed.)

Muscle and Bone System.

The questionnaire examined "unusual tightening, numbness, pain, swelling, or stiffness" in twelve "joints," and asked four questions about the respondents' mobility (Table 13). More of the Vietnam-service group indicated skeletal "symptoms" than would have been expected based on the responses of the control group in all of the sixteen categories, but only in

Table 13 MUSCLE and BONE COMPLAINTS

SYMPTOMS IN JOINTS	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	n	Yes	n	Exp. no. of Yes	Obs. no. of Yes	
Hands	184	21	221	25	50	Yes
Fingers	184	26	222	31	59	Yes
Wrists	184	9	222	10	31	Yes
Elbows	184	16	223	19	30	No
Arms	185	14	222	16	39	Yes
Shoulders	184	23	224	28	64	Yes
Hips	184	11	216	12	19	No
Knees	185	23	222	27	50	Yes
Ankles	185	19	222	22	37	No
Feet	185	22	221	26	41	No
Toes	185	18	219	21	23	No
Neck	184	27	223	32	64	Yes
Do you need your hands to get out of a chair?	186	18	230	22	36	No
Do you have trouble climbing stairs without holding onto the railing?	186	5	231	6	21	Yes
Are you unable to do things which require holding your arms at shoulder level?	186	6	229	7	19	Yes
Do you have difficulty holding a pencil or pen (or other hand tools) for prolonged periods?	186	14	230	17	31	No

*See footnote, Table 4

nine of the categories did the difference seem other than random. The significantly different reports seemed to be of joints above the waist (neck, arms, hands, etc.) rather than below the waist (ankles, feet, toes). Muscular problems, such as relative difficulty climbing stairs or holding arms at shoulder level, were reported in excess by the "Vietnam experience" group.

The implication of Table 13 is that the "Vietnam experience" factor may have contributed to muscle and bone complaints and may have reduced the mobility of Vietnam-service veterans when compared with the control group. (X^2 for the entire table is greater than 250, $p < 0.01$). It is difficult to visualize a model where such an experience could pathologically affect the skeletal system. Such skeletal complaints may be related to the "post traumatic stess disorder" referred to above.

Past Medical History.

The veterans were asked to indicate if they had ever been told by a

Table 14 PAST MEDICAL HISTORY

CONDITION	VETERAN STATUS					Are the Groups Different?*
	Non-Vietnam		Vietnam			
	n	Yes	n	Exp. no. of Yes	Obs. no. of Yes	
Hay Fever	185	29	229	35	31	No
Diabetes	184	3	230	3	9	No
Asthma	185	18	229	22	17	No
Goiter (thyroid swelling)	185	3	229	3	3	No
Allergies of any type	182	34	229	42	48	No
Parasitic Infection (dysentery)	184	6	229	7	19	Yes
High Blood Pressure	185	36	230	44	57	No
Benign, Fatty Tumor or Cysts.	185	32	230	39	45	No
Heart Disease	185	10	228	12	19	No
Other Tumors or Cancer	184	4	224	4	10	No
Ulcer (stomach or intestine)	185	12	229	14	18	No
Major injury or disease of any other type (other than ones already described)	178	32	212	38	60	Yes
Epilepsy	184	0	228	0	0	No
Kidney Disease	185	6	230	7	15	No
Anemia	185	2	226	2	5	No
Sickle cell Anemia	185	0	228	0	0	No
Venereal Disease	185	17	230	21	21	No

*See footnote, Table 4

doctor that [illegible] any of seventeen "conditions." The reports of the veterans are s[illegible]ed in Table 14. It cannot be shown that there is any significant dif[illegible]e in the collected responses of the two groups. There were only two [illegible]ic difference in responses: for "dysentery" and "major injury (unspeci[illegible]or other disease."

A point [illegible]en made that if you search for a large enough number of differences in [illegible]dy, you are statistically bound to find one or two of these differenc[illegible]15). With that caveat in mind, it seems reasonable to suggest that, i[illegible]t, the two differences in past medical history that this survey noted [illegible]actually coincidental. The veterans were all healthy males prior to [illegible]r entry into the armed forces (or they would not have been accepted [illegible]embership), and that historical good health is reflected in the reporte[illegible]ion health histories.

The "Vi[illegible]-experience" factor should not have had an influence on the past medic[illegible]story of a person, and that non-impact is reflected in the data of Ta[illegible].

RESULTS: PREGNANCY OUTCOMES

Fertility Patt[illegible]and Pregnancy Outcomes.

Among t[illegible]remost concerns of Vietnam-service veterans has been that there is with[illegible] the possibility of increased risk for fathering babies born with birt[illegible]ects (16). The possibility of carrying some Vietnam-originating ve[illegible] within their bodies by Vietnam-service veterans was one of the health[illegible]tors which we attempted to examine in this study. A section of th[illegible]rvey was devoted to questions about problems associated with initiatin[illegible]egnancy, as well as problems resulting from the end-point of successful[illegible]iations. A summary of the answers to those questions is shown in Table [illegible]

About [illegible]of both groups reported that they had tried to have children, and [illegible]5% of both groups had discovered, as a result of a test, that they were [illegible]rile. The average number of births per father (2.2) in each group of [illegible]ans was the same. The number of stillbirths reported in each group was [illegible]ut one for every one hundred live births in the groups. The number of [illegible]carrages reported was about twelve per one hundred live births for the [illegible]ntrol group of veterans, and about nine per one hundred live births fo[illegible]e "Vietnam-service" group. The number of premature babies reported for e[illegible]f the two groups was about the same -- seven or eight per one hundred liv[illegible]rths.

Nineteen [illegible]the fathers in the control group, and twenty-one of the fathers in the [illegible]ietnam-service" group reported that they had had a baby with a "birth d[illegible]t." The number of birth defects per hundred live births in each group is [illegible]reater than might be expected based on national statistics (17), but this [illegible]sult is not unexpected, since the study included without proof any report [illegible]of a "birth defect." None of the reported defects were clinically confirmed.

It cannot be shown from the data in Table 15 that there are any differences in the fertility patterns and pregnancy outcomes of Vietnam-service veterans and the control group veterans, other than those which might have occurred by chance.

Table 15 FERTILITY PATTERNS and PREGNANCY OUTCOMES[a]

FACTOR COMPARED	VETERAN STATUS				Are the Groups Different?*
	Non-Vietnam (n = 186)[a]		Vietnam (n = 232)[a]		
	n	(%)	n	(%)	
Tried to have children	149	(80%)	200	(79%)	No
Sterile husband	8	(5)[b]	13	(7)[b]	No
Sterile wife	1	(1)[b]	7	(4)[b]	No
Husband able to initiate pregnancy	140	(94%)[b]	180	(90%)[b]	No
Number of live births	305		402		--
Births per husband	2.2		2.2		No
Stillbirths per hundred live births	1		1		No
Miscarriages per hundred live births	12		9		No
Fathers of children with birth defects	19	(14%)[c]	21	(12%)[c]	No
Children with birth defects	20		24		--
Children with birth defects per hundred live births	7		6		No
Birthweight of babies:					No
Small	46		77		
Medium	218		270		
Large	41		55		
Premature[d] babies per hundred live births	7		8		No

a - Pregnancy outcomes as reported. The outcomes were not clinically verified.
b - Of all who attempted to have children.
c - Of all fathers.
d - As reported by the respondents.
* - See footnote, Table 4.

Birth Defects.

The survey form asked for information about congenital malformations among the veterans and their wives which might have been passed to their children. As expected, the veterans were free of such defects, since those would have prevented them from entering the armed forces. Several veterans and several wives were listed as having malformed fingers or toes. One control and two Vietnam-service wives were reported to have "congenital heart defect (present at birth)", but the difference is not significant. There did not seem to be any pool of genetic defects, other than that

leading to malformed digits, supplying the progeny of the veterans groups.

The birth defects that were reported by the two groups of veterans are summarized in Table 16. The control-group babies were reported more often to have Down's syndrome, heart problems, or spina bifida. The Vietnam-service-group babies were reported more often to have cleft lip or palate, digital malformations, or "hearing" problems.

The number of birth defects reported for analysis is too small to demonstrate significant differences between the types of birth defects in the two groups of babies. Perhaps the digital malformations or the "hearing" problems checked by the Vietnam-service group deserve attention by themselves, but the data of Table 16 taken as a whole cannot be used to substantiate a statement that the Vietnam-service fathers reported more defects in their babies than the control group fathers.

Table 16 BIRTH DEFECTS*

DEFECT	Non-Vietnam Veteran Children (n=20)	Vietnam Veteran Children (n=24)
Down's Syndrome	3	0
Cleft Lip/Palate	2	3
Missing, Extra, or Deformed digits	2	6
Cancer	0	1
Heart	8	2
Digestive Tract	2	2
Spina Bifida	2	1
Skeletal	1	1
Hearing	0	5
"Other Defects"	7	9
Condition requiring special care	4	6
Total	31	36

*Using a commonly accepted statistical technique, it cannot be shown that there is a difference in the overall kinds of birth defects experienced by the two groups of babies.

DISCUSSION

The effect of the "Vietnam-experience" on the health of Hawaii's Vietnam-service veterans is a fit subject for study. If a veteran was harmed by that experience, then that harm remains as damage within the victim and should be considered to be a problem in public health. Finding such damage in a population is the function of an epidemiologic investigation. Determining the etiology of the injury or illness, and finding a treatment sufficient to restore the damaged person to the health status he or she enjoyed prior to the harmful experience, are problems to be faced only after the demonstration of the harm. This study asks two questions:

- Is the current health status of Vietnam-service veterans different than that of Vietnam-era veterans who were not in Vietnam?

- If a difference exists, is that difference due to the "Vietnam experience" defined as "service in Vietnam?"

Current health status.

The health survey results indicated that the two groups had similar medical histories. Both groups report regular exposure to environmental contaminants to the same extent. The proportions of each group that have had problems with acne are the same. The majority of each group reports that they take regular naps, have been free of "mental illness or breakdown" and have not had malaria (a disease which has been implicated in the etiology of certain birth defects). Neither group has experienced more unemployment or divorce than the other in the last ten years.

There was no difference in the number of birth defects reported for the children of either group. The analysis of "all birth defects" as a single category is a useful approach. However, there is the possibility that an effect in a single category might be missed even though the grouped data suggest no effect. Thalidomide would not, for example, have been detected as a cause of birth defects of the extremities had "all birth defects" been lumped together (*18*). Our study had so few birth-defect reports for the kinds of defects that were asked for in the questionnaire that definitive statements about risk for specific birth defects have not been made.

The birth-defect evidence in this report is consistent with that published in an important study of Vietnam veterans' risk for fathering babies with birth defects conducted by the Center for Disease Control (*15*). No evidence has yet been found to signal any damaging effect on newborn babies caused by some impact of a parents' service in Vietnam.

The Vietnam-service group reported "skin rash" to a greater extent than did the control group. There has been a considerable amount of attention paid in the newspapers and television in the last several years to the definition of "chloracne" as a symptom of "Agent Orange intoxication." The possibility exists that a greater report-rate of "skin rash" by the Vietnam-service veterans may have been inadvertently prompted by the popular discussion of the problem. The higher rate might also have an etiology related to the Vietnam climate. Nevertheless, these veterans seem to be burdened by skin problems when compared with their controls.

The Vietnam-service veterans reported more often than the controls that they had experienced one of a specified list of problems with their "digestive system," including the liver and bladder. The difference in the total of reports is significant, and should be considered a difficulty characteristic of the Vietnam-service group.

The Vietnam-service veterans report more depression, rage, anxiety, irritableness, and "neurological" symptoms than their counterparts. They

report substantial changes in thir desire for sex, both increased and decreased. They smoke and drink more than the controls (and more than the average adult male in Hawaii), facts which may be consistent with the observed "emotional" differences between the groups.

The Vietnam-service veteran group reported more deaths of relatives than did the controls, but this difference cannot be attributed to the "Vietnam-experience," lacking a suitable model. The difference in numbers of child or spouse deaths could confound the finding of "emotional" differences between the groups, if the instances were widespread. But they are not, and therefore this confounding factor can be of only marginal significance.

The Vietnam-service veterans reported muscle and bone complaints and mobility difficulties more often than did the control group. Non-specific "pain" was a problem reported by the veterans in the previous Agent Orange survey (*2*), and it may be that the reports in that previous survey were only reflecting a symptom of the "Vietnam experience."

Summary of Current Health Status.

The Vietnam-service group of veterans can be said to have currently a greater incidence of digestive, emotional, skeletal, and neurological problems of the type specified in the health survey. The results of the survey are not incisive enough to delineate specific medical problems that might be addressed, but the total picture is one of non-specific malaise in that group when compared to the control group.

The "Vietnam experience."

The two groups of veterans were alike with respect to age, sex, race, and current residence. They differed somewhat with respect to their current occupation, but the differences were in occupations that are presumed to have "good health" and therefore the groups should not contain people with different occupation-specific health problems. The significant difference between the groups is that one contained people who had served in Vietnam during the years of the conflict and one did not.

CONCLUSION

This survey, which examines various aspects of the current health of Hawaii's Vietnam-era veterans, demonstrates that the "Vietnam-experience" is related to some non-specific, generally injurious effect on the health of those residents of Hawaii who served in Vietnam. What that effect was, and what it is due to, has not been determined. The study reminds us of Bob Slocum in Heller's "Something Happened" (*19*) when he says, "Something must have happened to me sometime," and spends the remainder of his life being quietly puzzled by what that something could have been.

RECOMMENDATION

This report on the current health status of Vietnam-service veterans

living in Hawaii suggests that the veterans' health has been injured with respect to that of their peers by the "Vietnam-experience." The "signs and symptoms" of that experience, considered as a "disease", clearly need to be established before a "treatment" for it can be fashioned. The search for such signs and symptoms is being conducted currently by several large research organizations. The Veterans Administration and the Center for Disease Control are collaborating in an extensive, and probably definitive, study of the complex Agent Orange/Vietnam-service impact on veteran's health (20). This multi-million dollar study will be completed in 1990.

In addition, the United States Air Force has initiated its own "Vietnam-experience" study as a follow-up to the "Ranch Hand" mortality or morbidity studies that were published in 1984 (21).

These major research efforts have been designed to answer questions that still remain with epidemiologists, toxicologists, legislators, and veterans groups about the health of Vietnam veterans (and, as a result, about the health of Hawaii's Vietnam veterans). The studies, when completed, will have answered the important health questions in a much more significant way than could another Hawaii study conducted with limited funds. Continuation or extension of the Hawaii Agent Orange or Vietnam Experience surveys is therefore not recommended.

ACKNOWLEDGEMENTS

We wish to thank all of the four hundred and eighteen anonymous veterans of the Armed Forces who responded to our request for help in this health survey. Without their cooperation and willingness to answer some very personal questions, we could not have accomplished our task.

Dr. Thomas A. Burch, Chief of the Office of Research and Statistics of the Department of Health, served as director of the Agent Orange Program. Flora Kim Jones produced the tables for the report. T. Bain Henderson, of the Hawaii Cooperative Health Statistics System, directed the computer-assisted telephone interview program, and provided electronic data processing assistance. Dr. Elisabeth Anderson of the Department of Health and Dr. Robert Worth of the School of Public Health of the University of Hawaii were leading advisors in the development of the study plan and the study questionnaire. Shigeo Tengan and Jeanne Connelly gave valuable editorial assistance.

Lily Adams and Thomas Rau of the Vietnam Veterans of America, Steve Molnar of the Veterans Center, and Dr. William Vandervort of the Veterans Administration Pacific Outpatient Clinic are thanked for their continuous support of the Agent Orange Program.

FOOTNOTES

1. Cayetano BJ et al: "A Bill For An Act Relating to the Department of Health." Senate Bill No. 2470-82, Standing Committee Report No. 94-82, Committee on Health, March 1982.

2. Rellahan WL: "The Agent Orange Report. Activities Relating to Act 201, Eleventh Legislature, State of Hawaii (1982)." R & S Report #45, Research and Statistics Office, Hawaii State Department of Health (1983).

3. Female veterans were not included in the survey because of the small number of females who served in Vietnam and the resulting difficulty of adequately collecting statistically significant information on the health status of those persons. There is a statistical difficulty connected with interpreting the results in a small sample: rare problems that the Vietnam experience might have generated might be overlooked, or one chance occurance of a rare natural problem would assume a very large importance.

4. Stellman J: "Research Qustionnaire on Agent Orange." Veterans Education Project, Washington, D.C. (1980).

5. Stellman J and Stellman S: "Issues, Options, and Methodologies in the Determination of Exposure to Phenoxy-herbicides Among Vietnam Veterans. " Appendix J in Feinberg KR: "Report of the Special Master Pertaining To the Disposition of the Settlement Fund." Agent Orange Product Liability Litigation, United States District Court, Eastern District of New York , Chief Judge Jack B. Weinstein (1985).

6. Robison LL and Daigle A: "Control Selection Using Random Digit Dialing For Cases of Childhood Cancer." Am. J. of Epidemiology 120 164 (1984).

7. Siemiatycki J and Campbell S: "Nonresponse Bias and Early Versus All Responders in Mail and Telephone Surveys." Am. J. of Epidemiology 120 291 (1984).

8. Newell, Jr. GR: "Analysis of Major Demographic Statistics, Agent Orange Clinical Studies, FY '82,'83,'84." Texas Department of Health, Austin (1985). The Texas State Department of Health has been collecting information about Vietnam veterans and comparing this information with similar information collected about a matched group of people randomly selected from the Texas population. The under-representation of Vietnam veterans in the "managerial or professional" occupations category has been noted in their data.

9. Under a test assumption that the probable "good health" of men whose present occupation was given as "military" and their unequal distribution within the two groups might have influenced some of the conclusions concerning the relative health status of the two groups, cross-tabulations of the data were made from a data set in which the responses of all those men whose occupation was given as "military" had been eliminated. Tests of these "non-military-occupation" tables led to identical conclusions concerning the relative health status of the two groups for all the questionnaire factors.

10. In tables 4-14, the "expected number of 'yes' " answers for the Vietnam-service group is obtained by using the percentage of "yes" answers for the non-Vietnam-service group applied to the total number of answers recorded for the former group.

11. Fischmann AB: "VA Chloracne Task Force." Transcript of Proceedings, Advisory Committee on Health-Related Effects of Herbicides, Veterans Administration, Washington (1984).

12. Blank, Jr. AS: "Apocalypse Terminable and Interminable: Operation Outreach for Vietnam Veterans." Hosp. & Comm. Psych. 33 913 (1982).

13. Diagnostic and Statistical Manual of Mental Disorders, 3rd ed. American Psychatric Association, Washington, D.C. (1980).

14. "A Report on the Prevalence of Health Behavior Risk Factors in Hawaii - 1984." Risk Reduction Project, Health Promotion and Education Office, Hawaii Department of Health, Honolulu (in press).

15. Erickson JD et al: "Vietnam Veterans' Risks for Fathering Babies with Birth Defects." J. Am. Med. Association 252 903 (1984). The authors state: "In considering these findings, it must be kept in mind that many hypotheses were tested in this study, and some statistically significant differences were to be expected, even if no true differences in risk exist in the populations from which the ... case and control groups were drawn."

16. LaVecchio FA et al: "Agent Orange and Birth Defects." N. Eng. J. Med. 308 719 (1983).

17. Oakley, Jr. GP et al: "Temporal Trends in Reported Malformation Incidence for the United States - Birth Defects Monitoring Program." Morbidity and Mortality Weekly Report, Center for Disease Control 32 7 (1983). The malformation incidence rate at that time was 1.4 per hundred live births. Our study included such "birth defects" as "degeneration, seizures, slow learner, blue baby, lung defect, epilepsy, birthmark, hernia, and ear." Such reports were not included in the malformation study.

18. Saxen L: "Congenital Defects." Rinehart and Winston, New York (1969).

19. Heller J: "Something Happened." Alfred A. Knopf, Inc., New York (1966).

20. "Cohort Study of the Long-Term Health Effects of Military Service in Vietnam." in Protocol for Epidemiologic Studies of the Health of Vietnam Veterans, Center for Disease Control, Public Health Service, Atlanta (1983).

21. "Scripps to Study Viet-Service Effects." Honolulu Star-Bulletin, May 3, 1985; Lanthrop GD et al: "An Epidemiologic Investigation of Health Effects in Air Force Personnel Following Exposure to Herbicides." The Surgeon General, U. S. Air Force, USAF School of Aerospace Medicine (1984).

APPENDIX I. The Telephone Interview

You are using the "AGENT ORANGE" survey system. Follow the instructions which are presented on this screen. You will be prompted for certain kinds of information. You should enter the information requested by the computer. You must press the return key after each entry in order to continue.

PRESS THE RETURN KEY NOW IN ORDER TO CONTINUE.

DO YOU NEED A TELEPHONE NUMBER (y/n):

DIAL THE FOLLOWING TELEPHONE NUMBER AND PRESS THE RETURN KEY:

(xxx-xxxx)

1. NUMBER BUSY
2. NUMBER NOT IN SERVICE
3. RECORDING DEVICE ANSWERED PHONE
4. PARTY ANSWERED
5. NO ANSWER

ENTER CODE: (_)

YOU ENTERED THE RESPONSE (_). IS YOUR RESPONSE CORRECT? (y/n):

HELLO. IS THIS (recite number dialed)? (y/n):

I AM CALLING ABOUT A SURVEY BEING CONDUCTED BY THE HAWAII STATE DEPARTMENT OF HEALTH. WE ARE TRYING TO LOCATE POSSIBLE PARTICIPANTS FOR THIS SURVEY WHICH IS ABOUT THE HEALTH OF MEN WHO WERE IN THE ARMED SERVICES AT THE TIME OF THE VIETNAM WAR.

IS THERE AN ADULT MALE IN YOUR HOME? (y/n):

MAY I SPEAK TO THAT PERSON PLEASE? (y/n):

WERE YOU IN THE ARMED SERVICES BETWEEN 1962 and 1972? (y/n):

THE PURPOSE OF THE SURVEY WHICH THE DEPARTMENT OF HEALTH IS DOING IS TO COMPARE THE HEALTH OF THOSE MEN WHO SERVED IN VIETNAM WITH THE HEALTH OF MEN WHO WERE IN THE ARMED SERVICES AT THE TIME. WE HAVE JUST A FEW QUESTIONS WE WOULD LIKE TO ASK YOU AS PART OF OUR EFFORT TO LOCATE MEN TO PARTICIPATE IN THE DEPARTMENT OF HEALTH'S SURVEY. YOUR ANSWERS WOULD BE CONFIDENTIAL AND THE INTERVIEW WOULD TAKE ONLY A FEW MINUTES OF YOUR TIME. (y/n):

WHILE YOU WERE IN THE SERVICE WERE YOU IN VIETNAM? (y/n):

WHAT IS YOUR BIRTHDATE? (xx/xx/xx)

WHAT IS THE ETHNIC BACKGROUND OF YOUR FATHER? (xxxxx)

WHAT IS THE ETHNIC BACKGROUND OF YOUR MOTHER? (xxxxx)

WOULD YOU BE WILLING TO ANSWER SOME QUESTIONS ON YOUR HEALTH HISTORY? (y/n):

TO WHAT ADDRESS SHALL WE SEND THE QUESTIONNAIRE? (xxxx.....xxxx)

APPENDIX II

MEDICAL QUESTIONNAIRE

1. Name: _____ 2. Date of Birth: ____ Month ____ Day ____ Year

Address: _____

_____
City State Zip Code

3. What is the race of your father? ☐ Caucasian ☐ Black ☐ Japanese ☐ Chinese ☐ Filipino ☐ Hawaiian ☐ Other

4. What is your present occupation? _____

5. Were you ever regularly exposed to chemicals, fumes, dust or radiation?
☐ yes ☐ no

9. Do you use chemical substances regularly in gardening or your work?
☐ yes ☐ no

II. HEALTH HISTORY
The next series of questions is about your health history.

Skin Disorders

1. Did you ever have acne when you were a teenager? ☐ yes ☐ no -- go to question #2
See a physician? ☐ yes ☐ no

2. Did you ever have acne as an adult? ☐ yes ☐ no -- go to question #3
See a physician? ☐ yes ☐ no

3. Have you ever had a skin rash with blister except poison ivy, measles, or chicken pox?
☐ yes ☐ no -- go to question #4

Digestive System	No	Yes	Has it happened more than once?	a. Some time ago b. Couple of years ago. c. Recently
4. Have you lost 20 or more pounds without changing your diet?				
5. Do you regularly experience loss of appetite?				
6. Have you ever been repeatedly nauseous when you haven't had a flu or other sickness?				
7. Are you regularly troubled with constipation?				
8. Are regularly troubled with diarrhea?				
9. Have you ever had jaundice (yellow eyes and skin)				
10. Have you ever had hepatitis?				
11. Has a doctor ever told you that you had cirrhosis of the liver?				
12. Have you ever passed urine that is oak brown (coca-cola colored)?				

AGENT ORANGE PROGRAM
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General Health

13. How many hours do you normally sleep? _____

14. In addition, do you take regular naps? (at least 3 times per week) ☐ yes ☐ no

15. Do you usually wake up rested? ☐ yes ☐ no

16. Have you noticed a change in your sense of smell or taste? ☐ yes ☐ no -- go to question #17

Smell: ☐ increase ☐ decrease

Taste: ☐ increase ☐ decrease

17. Do you regularly (not just once in a while) show any of the following?

Check box: ☐ depression ☐ get into violent rage ☐ anxiety (uptight)

☐ irritable ☐ other _____ When did this begin? _____ Year

18. Have you ever suffered mental illnesses or breakdown? ☐ yes ☐ no

19. Did you ever have malaria? ☐ yes ☐ no If yes, when? _____

20. Have you at any time had a persistent problem with any of the symptoms below?

Please fill in boxes below.

Problem			Did you seek medical attention?	
a. Tiredness	☐ no	☐ yes --	☐ no	☐ yes
b. Headaches	☐ no	☐ yes --	☐ no	☐ yes
c. Nervous disorders	☐ no	☐ yes --	☐ no	☐ yes
d. Hearing loss	☐ no	☐ yes --	☐ no	☐ yes
e. Difficulty with memory or concentration	☐ no	☐ yes	☐ no	☐ yes
f. Dizziness or light headedness	☐ no	☐ yes	☐ no	☐ yes
g. Feel faint	☐ no	☐ yes	☐ no	☐ yes
h. Fainted more than twice (not related to drinking)	☐ no	☐ yes	☐ no	☐ yes
i. Vision blurred (other than needing glasses)	☐ no	☐ yes	☐ no	☐ yes

21. Is there any sudden or dramatic change in your desire for sex? ☐ yes ☐ no

Check box: ☐ increase ☐ decrease Can you remember the year it first began? _____

22. Do you smoke cigarettes? ☐ no ☐ yes -- About how many cigarettes a day? _____

Did you smoke previously and quit? ☐ no ☐ yes -- When (roughly) _____

23. Do you drink alcoholic beverages regularly? ☐ yes ☐ no

If yes, show how many glasses or shots each day. _____beer _____wine _____liquor

24. Have you undergone any of the following stress situations in the last 10 years:

☐ unemployment more than 3 months ☐ divorce ☐ death of child ☐ death of spouse

Muscle and Bone System

25. We want to know if you've experienced unusual tightening, numbness, pain, swelling, or stiffness in any of the following joints (not associated with exercise or exertion). Please fill in boxes below.

SYMPTOMS IN JOINTS		
a. hands	☐ yes	☐ no
b. fingers	☐ yes	☐ no
c. wrists	☐ yes	☐ no
d. elbows	☐ yes	☐ no
e. arms	☐ yes	☐ no
f. shoulders	☐ yes	☐ no
g. hips	☐ yes	☐ no
h. knees	☐ yes	☐ no
i. ankles	☐ yes	☐ no
j. feet	☐ yes	☐ no
k. toes	☐ yes	☐ no
l. neck	☐ yes	☐ no

m. Please answer the following questions:

	Yes	No
Do you need your hands to help you to get out of a chair?	☐	☐
Do you have trouble climbing stairs without holding onto the railing?	☐	☐
Are you unable to do things which require holding your arms at shoulder level (as when you carry heavy grocery bags in front of you?	☐	☐
Do you have difficulty holding a pencil or pen (or other hand tools) for prolonged periods?	☐	☐

III. PAST MEDICAL HISTORY

In this section we are interested in any problem you may have seen a physician for or which a doctor diagnosed. Therefore, we want to know if you have ever been told by a doctor that you had any of the following conditions? If so, indicate the year that the condition first began.

	Yes	No	Condition	a. Some time ago b. Couple of years ago, c. Recently
1.			Hay Fever	
2.			Diabetes	
3.			Asthma	
4.			Goiter (thyroid swelling)	
5.			Allergies of any type	
6.			Parasitic infection (dysentery)	
7.			High blood pressure	
8.			Benign, fatty tumors or cysts Type:	
9.			Heart disease	
10.			Other tumors or cancer Type:	
11.			Ulcer (stomach or intestine	
12.			Major injury or disease of any type (other than ones already described): Describe (include year).	
13.			Epilepsy	
14.			Kidney disease	
15.			Anemia	
16.			Sickle cell anemia	
17.			Venereal disease	

IV FAMILY HISTORY

We ask these questions because there is some concern about the relation between herbicide exposure and pregnancy outcomes.

1. Have you tried to have children? (check) ☐ yes ☐ no

2. Children's natural mother's year of birth: _____

3. Did your spouse ever experience difficulty in producing children? ☐ yes ☐ no

   Did you or your spouse see a doctor regarding this? ☐ yes ☐ no

   What was the diagnosis? _____

4. Have you/your wife been tested for sterility? ☐ yes ☐ no

---	Sterile	Not Sterile	Not tested
Husband			
Wife			

Parents' History

The following question deals with your health history and your childrens' mother's health history.

5. Were you or your childrens' natural mother BORN with any of the following conditions?

Condition	Father	Mother
a) Cleft palate/cleft lip	☐ yes ☐ no	☐ yes ☐ no
b) Clubfoot	☐ yes ☐ no	☐ yes ☐ no
c) Congenital heart defect (present at birth)	☐ yes ☐ no	☐ yes ☐ no
d) Missing fingers/toes	☐ yes ☐ no	☐ yes ☐ no
e) Extra fingers/toes	☐ yes ☐ no	☐ yes ☐ no
f) Deformed fingers/toes	☐ yes ☐ no	☐ yes ☐ no
g) Other	_____	_____

PREGNANCY HISTORY

For each pregnancy in which you are the father, provide the information requested below. For multiple births (e.g., twins), list each child on a separate line. Include all live births, still births, miscarriages, and therapeutic abortions.

CHILD NO.	What was the outcome of this pregnancy?				DATE	SEX (Check)		BIRTH WEIGHT	Was this child Premature?	For live births, is this child now living? (Check)	
	Live Birth	Still-birth	Miscarriage	Voluntary Abortion	Year	M	F	a. Small b. Medium c. Large		Yes	No
1											
2											
3											
4											

Did any of these children have birth defects? (check) ☐ Yes ☐ No

If yes, please check as many as apply to each child, using the same child number as used in the boxes above.

	CHILD NO.			
	1	2	3	4
Down's Syndrome (Mongolism)				
Clubfoot				
Cleft Lip/Palate				
TOES Missing toes				
Deformed toes				
Extra toes				
FINGERS Missing fingers				
Deformed fingers				
Extra fingers				
Heart Defect				
Defect of the Digestive System				
Spina Bifida Other Brain or Spine defects				
Condition Requiring Special Education or Care				
Cerebral Palsy				
Hearing Disorders				
Hip Abnormalities				
Other Skeletal defects (describe)				
Other (specify)				