Chapter XVII

INDIVIDUAL HEALTH ASSESSMENT

1. Personal Habits and Characteristics

The personal characteristics of the Ranch Hand and comparison individuals were obtained from the in-home questionnaire. The areas of tobacco, alcohol, and marijuana use, personal and family income, education, religion, active duty, retired/separated status, and risk-taking behavior received particular attention. The number of Ranch Hand and comparison group individuals reporting a listing of past traumatic injuries, poisonings, and/or toxic effects (ICD-9-CM Codes 960-999) were also determined.

The smoking and alcohol use habits of the study subjects are displayed in Table XVII-1.

Table XVII-1
HISTORY OF TOBACCO AND ALCOHOL USE AMONG THE STUDY PARTICIPANTS

Habit	Group: Original Comparisons Yes (%)	Original Comparisons No	Ranch Hand Yes (%)	Ranch Hand No	All Comparisons Yes (%)	All Comparisons No
Current Use of Cigarettes	313 (40.5%)	459	478 (45.7%)	567	484 (39.6%)	739
	P = 0.03				P = 0.003	
Past History of Cigarettes	552 (72.3%)	212	758 (73.2%)	278	861 (71.1%)	350
	P = 0.67				P = 0.28	
Past History of Cigar Use	92 (11.9%)	680	99 (9.5%)	942	141 (11.5%)	1081
	P = 0.10				P = 0.12	
Past History of Pipe Use	157 (20.4%)	613	200 (19.4%)	829	246 (20.2%)	970
	P = 0.62				P = 0.64	
Past History of Marijuana Use	22 (2.8%)	750	53 (5.1%)	992	62 (5.1%)	1160
	P = 0.02				P = 1.00	
Current Use of Alcohol	447 (58.6%)	316	609 (58.9%)	425	694 (57.3%)	518
	P = 0.89				P = 0.43	
Past History of Alcohol Use	478 (63.0%)	281	635 (62.2%)	386	773 (64.7%)	421
	P = 0.74				P = 0.21	

The mean number of cigarettes currently smoked and the mean number of alcohol-containing drinks consumed per day by those currently reporting use of these substances were determined. Similarly, the mean pack-years, cigar-years, pipe-years, drink-years and marijuana joint-years were determined for the groups in the study. These data are presented in Table XVII-2.

Table XVII-2

MEAN USE OF TOBACCO PRODUCTS AND ALCOHOL
IN THOSE REPORTING USE OF THESE SUBSTANCES

	Mean Usage Level					
	Original Comparisons		Ranch Hand		All Comparisons	
Substance	Mean	(Median)	Mean	(Median)	Mean	(Median)
Cigarettes per day (current use)	28.28	(30)	27.21	(25)	27.72	(30)
Cigarette pack-years (cumulative)	23.47	(20.12)	23.89	(20.91)	22.92	(19.58)
Cigar-years (cumulative)	21.26	(8.11)	19.12	(9.38)	20.80	(7.33)
Pipe-years (cumulative)	26.96	(6)	26.32	(7.23)	26.26	(5.71)
Marijuana Joint-years (cumulative)	7.60	(2.52)	7.12	(3.54)	8.26	(2.88)
Alcohol drinks per day (current use)	2.33	(2)	2.35	(2)	2.38	(2)
Drink-years (cumulative)	36.48	(26.31)	40.48	(24.23)	34.87	(25.08)

In most of the cumulative measurements (e.g., pack-years) the median level of use was lower than the mean level, indicating that the heavy users of these substances skewed the distributions. However, in the measurements of current use, there was little evidence for this effect.

The median income levels of the Ranch Handers and the original comparison were the same with personal income ranging from $20,000 - $24,999 and total family income ranging from $30,000 - $34,999. The median personal income of the entire comparison group was also in the $20,000 - $24,999 range, but the median family income remained in this same category.

The educational backgrounds of the groups were not significantly different. Religious preferences of the groups were also similar. These data are shown in Tables XVII-3 and XVII-4.

Table XVII-3

EDUCATIONAL BACKGROUND BY GROUP

	Group					
	Original Comparisons		Ranch Hand		All Comparisons	
Educational Level	Number	(%)	Number	(%)	Number	(%)
High School/GED	430	(55.63)	580	(55.50)	661	(54.01)
Associate Degree	53	(6.86)	67	(6.41)	96	(7.84)
BA/BS Degree	152	(19.66)	197	(18.85)	249	(20.34)
Graduate Degree	132	(17.07)	187	(17.89)	206	(16.83)
Unknown	6	(0.78)	14	(1.34)	12	(0.98)
		P = 0.78				P = 0.48

Table XVII-4

RELIGIOUS PREFERENCE BY GROUP

Religion	Group: Original Comparisons Number	(%)	Ranch Hand Number	(%)	All Comparisons Number	(%)
Protestant	699	(66.89)	531	(68.69)	816	(66.68)
Catholic	218	(20.86)	162	(20.96)	263	(21.49)
Jewish	9	(0.86)	12	(1.55)	16	(1.31)
Other	34	(3.25)	20	(2.59)	49	(4.00)
None	85	(8.13)	48	(6.21)	80	(6.54)
		P = 0.29				P = 0.50

The current military status of each individual was determined as either active duty, retired, separated, reserve status, or deceased, and there were no statistically significant differences between the Ranch Handers and the subset of original comparisons (P = 0.23); however, there was a significant difference (P = 0.01) between the Ranch Handers and the total comparison group. These data are presented in Table XVII-5.

Table XVII-5

MILITARY STATUS BY GROUP

Military Status	Group: Original Comparisons Number	(%)	Ranch Hand Number	(%)	All Comparisons Number	(%)
Active Duty	113	(14.64)	153	(14.66)	184	(16.74)
Retired	420	(54.40)	515	(49.33)	593	(53.96)
Separated	196	(25.39)	305	(29.21)	247	(22.47)
Reserve Forces	39	(5.05)	64	(6.13)	69	(6.28)
Deceased*	4	(0.52)	7	(0.67)	6	(0.55)
		P = 0.23				P = 0.01

*Deceased subsequent to the physical examination.

Risk-taking behavior patterns were assessed by a series of questions (i.e., "Have you participated three or more times in .....activity?") that emphasized participation in potentially dangerous recreational activities. These data are tabulated in Table XVII-6.

Table XVII-6

RISK-TAKING BEHAVIOR BY GROUP

Activity	Group: Original Comparisons Yes (%)	Original Comparisons No	Ranch Hand Yes (%)	Ranch Hand No	All Comparisons Yes (%)	All Comparisons No
Scuba Diving	88 (11.40)	684	103 (9.87)	941	155 (12.68)	1067
		P = 0.29			P = 0.04	
Auto, Boat or Motorcycle Racing	77 (9.97)	695	132 (12.64)	912	140 (11.46)	1082
		P = 0.08			P = 0.39	
Acrobatic Flying	25 (3.24)	747	29 (2.78)	1015	39 (3.19)	1183
		P = 0.57			P = 0.57	
Sky Diving	12 (1.55)	760	14 (1.34)	1030	29 (2.37)	1193
		P = 0.71			P = 0.07	
Hang Gliding	4 (0.52)	768	6 (0.57)	1038	13 (1.06)	1209
		P = 0.87			P = 0.20	
Mountain Climbing	35 (4.53)	737	61 (5.84)	983	63 (5.16)	1159
		P = 0.22			P = 0.47	
One or More Risk-taking activities	172 (22.3)	601	253 (24.2)	792	308 (25.2)	916
		P = 0.33			P = 0.60	

Only in motor vehicle racing (automobile, boats and motorcycles) was there a borderline suggestion of a difference in risk-taking behavior between the Ranch Handers and the original comparison subset. In contrast, there was a statistically significant difference between the Ranch Handers and the entire comparison group in scuba diving (P = 0.04) and a borderline difference (P = 0.07) in sky diving. In both of these instances, the comparisons had higher rates of participation. In combining all activities, there was no significant difference in risk-taking behavior between the Ranch Handers and the original or entire comparison group.

Table XVII-7 contains the distribution of reported past injuries and poisonings by ICD code for each group. Conditional unadjusted chi-square testing reveals no significant group differences in these distributions.

Table XVII-7

DISTRIBUTION OF REPORTED INJURIES AND POISONINGS BY GROUP

	Group		
Injury (ICD Code)	Original Comparisons	Ranch Hand	All Comparisons
Fractures, Dislocations, Sprains (800-848)	11	11	17
Intracranial, chest; abdominal and pelvic injuries; open wounds; nerve and spinal cord injuries (850-897; 925-929; 950-957)	3	4	8
Late effects; superficial injuries and contusions; burns (905-924; 940-949)	5	2	6
Traumatic complications (958-959)	5	9	8
Poisonings, toxic effects; other specified causes (960-989)	3	0	4
	P = 0.23		P = 0.31

2. Health Abnormalities Detected at Physical Examination

Throughout previous chapters, health of the participants has been assessed in a variety of interrelated ways. Normal-abnormal categorizations, or continuously distributed clinical variables have been defined organ system by isolated organ system, categorized into physical, mental, reproductive, biochemical, and machine-results parameters, all of which were qualified by overall historic and diagnostic impressions. This research approach has not been suitable to assess total individual health. Since such a task would involve complete listings of all past abnormalities and current normalities-abnormalities by individual, these citations would exceed the scope of this report. This chapter section attempts to assess the overall health of individuals in three ways: the summation of abnormalities of major components of each of the 12 organ systems; the summation of a weighted score of the same abnormalities; and a summary count of medical codes for historical disease and disease suspected/detected at the physical examination.

a. Summation of Individual Abnormalities

In 8 of the 12 clinical areas, virtually all individuals were found to have complete examination data, and all of the selected parameters of individual health could be evaluated. Table XVII-8 provides the number of Ranch Hand and original comparison group individuals with incomplete data who were not included in the tabulation for each organ system.

Table XVII-8

DISTRIBUTION OF INDIVIDUALS WITH INCOMPLETE DATA
OMITTED FROM ANALYSIS OF INDIVIDUAL HEALTH

Organ System	Ranch Hand	Comparison
General Health	8	6
Malignancy	0	0
Reproductive	473	352
Neurological	31	19
Psychological	4	0
Hepatic	0	0
Dermatology	0	0
Cardiovascular	4	3
Hematologic	0	0
Pulmonary	5	3
Renal	0	0
Endocrine	9	3

The assessment of the reproductive system is based solely on the sperm count. Those individuals noncompliant for the collection of semen or those having had vasectomies or orchiectomies were excluded from this analysis. In the psychologic, hepatic and neurologic clinical areas, there were sufficient numbers of individuals with missing data to warrant separate analyses of individuals with complete data and individuals with partial data. The data and results of the analysis of abnormalities by organ system are presented in Table XVII-9. As noted for the psychologic, neurologic and hepatic data, subset analyses were accomplished.

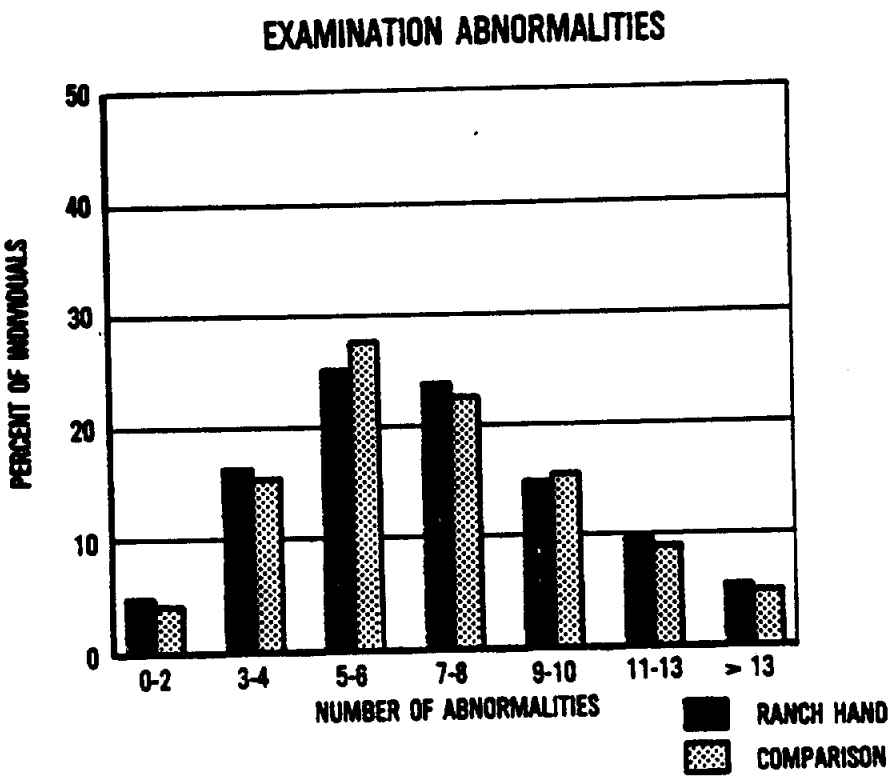
Table XVII-9

COUNT DATA
NUMBER OF HEALTH ABNORMALITIES BY ORGAN SYSTEM AND GROUP
(UNADJUSTED FOR MATCHING VARIABLES OR RISK FACTORS)

Organ System	Group	Number of Abnormalities						Unadjusted P Values
		0	1	2	3	4	5-6	
General Health	RH	791	228	18	-	-	-	0.27
	C	573	186	8	-	-	-	
Malignancy	RH	997	48	0	-	-	-	0.01
	C	755	17	1	-	-	-	
Reproductive	RH	374	198	-	-	-	-	0.34
	C	263	158	-	-	-	-	
Neurological		0	1	2	3	4-9		
(Full Data Subset)	RH	113	268	238	126	84		0.17
	C	112	179	186	92	57		
(Subset with 1 Missing Parameter)	RH	59	64	36	20	6		0.79
	C	40	46	27	9	6		
Psychological		0	1	2	3	4	5-6	
(Full Data Subset)	RH	341	301	121	10	-	-	0.29
	C	243	234	75	3	-	-	
(Subset with 1 Missing Parameter)	RH	143	114	11	-	-	-	0.38
	C	129	83	6	-	-	-	
Hepatic								
(Full Data Subset)	RH	184	206	143	68	26	3	0.45
	C	134	134	94	54	18	7	
(Subset with 3 Missing Parameters)	RH	114	134	90	44	29	4	0.27
	C	74	115	77	42	24	0	
Dermatologic	RH	470	575	-	-	-	-	0.97
	C	347	426	-	-	-	-	
Cardiovascular	RH	491	324	151	53	16	6	0.92
	C	365	232	117	42	12	2	
Hematologic	RH	428	432	147	35	3	-	0.59
	C	341	311	98	20	3	-	
Pulmonary	RH	655	289	52	32	12	-	0.05
	C	463	232	56	15	4	-	
Renal	RH	1002	42	1	-	-	-	0.70
	C	740	31	2	-	-	-	
Endocrine	RH	787	207	36	6	-	-	0.20
	C	551	182	33	4	-	-	

These data demonstrate statistically significant group differences only for malignancy (a result of the identified increase in skin cancer in the Ranch Hand Group) and in pulmonary function (due to more abnormalities in the comparison group). All other analyses were not statistically significant. The reader is cautioned that the data in Table XVII-9 are crude counts, unadjusted for the matching variables or risk factors known to affect organ system parameters. The number of abnormalities per organ system may be considered a crude index of severity. All individuals and their abnormality counts were summed, regardless of the degree of completeness of their data. The frequency distribution of these abnormalities is shown in Figure XVII-1.

Figure XVII-1

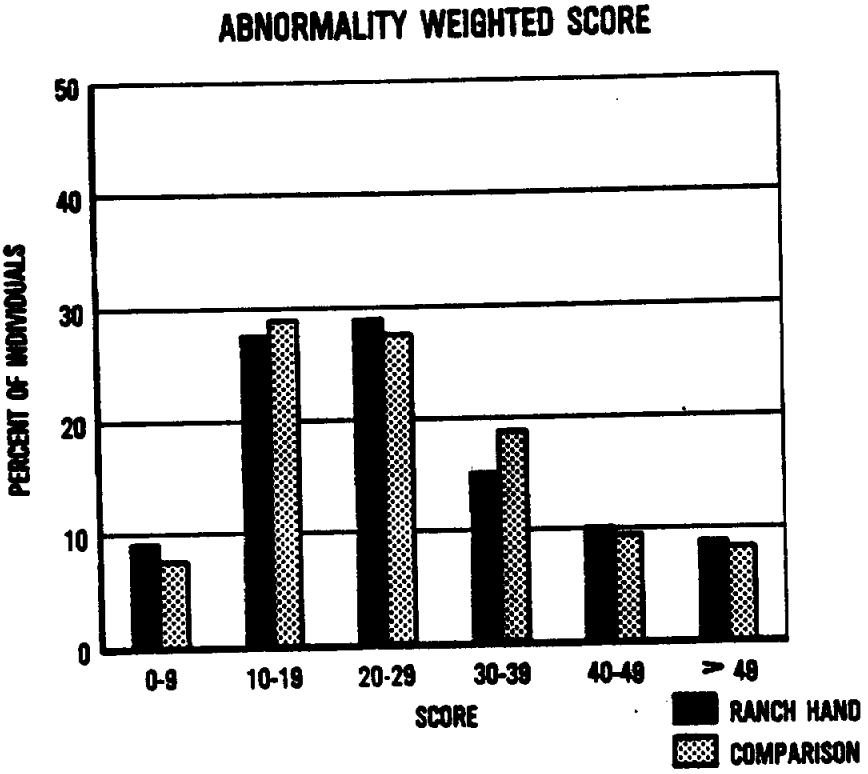


There was a maximum of 61 abnormalities in this analysis. The median number of abnormalities in both the Ranch Hand and comparison groups was seven. There were 0.96% of the Ranch Handers and 1.55% comparison individuals who had no abnormalities, and 2.58% and 2.07%, respectively, with 16 or more abnormalities. Log linear analysis of these distributions revealed no differences between the groups for numbers of abnormalities or degree of completeness of data (P values of 0.26 and 0.59, respectively).

b. Weighted Score of Individual Abnormalities

The count of abnormalities (Table XVII-9) was subjected to a weighting scale of 1 to 10 depending on the clinical seriousness of each abnormality. While such weighting is arbitrary, the resulting data serve as a complementary analytic technique to the basic count of abnormalities in which, for example, acne is considered to be equivalent to systemic cancer or a major ECG abnormality. The assignment of a weight to each abnormality was made before organ system results were known. Appendix VII contains a listing of all parameters and their relative weight scores for each organ system. The weighted score histogram is depicted in Figure XVII-2.

Figure XVII-2



Scores between zero and nine were achieved by 9.09% of the Ranch Handers and 7.24% of the comparisons, with 8.80% of the Ranch Handers and 8.02% of the comparisons scoring above 50 (out of a maximum possible score of 236). The median score was in the 20 to 24 range for both groups. The weighted score analysis showed statistical significance for cancer, again due to the aggregation of skin cancer in the Ranch Hand group. Statistical differences of interest were noted for renal disease (P = 0.09), general health (P = 0.114), and hepatic disease (P = 0.11). The relevance of these P values is minimal in view

of the predominantly negative analyses observed in the clinical chapters. All weighted scores were combined across clinical areas and no statistically significant differences were noted (P = 0.20).

From these analyses on crude and weighted abnormalities, it is clear that there were not significantly more ill or more severely ill individuals in the Ranch Hand group than in the comparison group.

c. Physical Examination Diagnostic Codes

The diseases or conditions listed by the diagnostician in the diagnostic summary of the review of systems, the medical history, and the physical examination were coded according to the 9th ICD-CM manual. These diseases were coded as being reported by history, or suspected or actually diagnosed conditions. One individual could account for more than one diagnosed disease or condition. The diagnostician listed 219 suspected diseases among the 1045 Ranch Handers and 160 suspected conditions in the 773 original comparisons (P = 0.91). In both groups, there were 0.21 suspected diagnoses per individual. Similarly, 1949 definitive diagnoses were made in the Ranch Handers and 1437 in the original comparisons yielding an average of 1.87 diagnoses per Ranch Hander and 1.86 per comparison individual (P = 0.96). While the mean numbers of suspected and definitive diagnoses were essentially the same in both groups, the mean number of diseases and conditions reported by the participants were different in the two groups. There were 113 diseases reported by history in the Ranch Handers, but only 57 in the comparisons (mean number of conditions of 0.11 per person and 0.07 per person (P = 0.02), respectively). The similarity in diagnosed and suspected conditions in the two groups parallels the findings in the analysis of examination abnormalities. The difference in reported conditions may reflect differential reporting, or actual difference in past health. However, if past illness was different in the two groups, these experiences have apparently not resulted in long-term sequelae detected at the examination.

3. Summary

The anecdotal comments of the examining physicians and psychologists suggested that the study participants were remarkably healthy both physically and mentally for a group of mid-aged men. These comments were made about the entire group of participants based on the medical experience of each examiner, without knowledge of which individuals were Ranch Handers and which were comparisons. The statistical analyses discussed in this chapter support the clinical impressions of the examiners.

Both the Ranch Handers and the original comparisons had somewhat similar health habits, although significantly more Ranch Handers are current cigarette smokers and more had reported smoking marijuana in the past. The two groups were also similar in risk-taking activities, religion, education, income, and military status.

The distribution of identified health abnormalities by individual, and the weighted scores of these abnormalities were not significantly different in the Ranch Hand and comparison groups. Similarly, the mean number of diagnoses per individual at the conclusion of the examination was not different in the two groups.

Overall, the health of individuals in the two groups appears to be quite comparable. As individuals, they seem to be in quite good health for men of their age. These findings and observations are most likely a result of the healthy worker effect, previously noted in the baseline mortality study.