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5 STUDY SELECTION AND PARTICIPATION

5.1 INTRODUCTION

In this chapter, 1997 follow-up and cumulative study compliance are reviewed. Refusal rates are compared between Ranch Hands and Comparisons, as are the reasons for refusal. Reasons for refusal also are examined by age, race, and rank to detect any differences in refusal rates. All noncompliant Original Comparisons were to be replaced by Comparisons appropriately matched on age, race, rank, and self-reported health status. Adherence to the replacement strategy as defined in the study protocol (1) is assessed, and the health status of noncompliant Original Comparisons is compared to their Replacement Comparisons. Differences in the perception of health are evaluated by group, age, race, rank, and 1997 compliance status. Among fully compliant study participants, self-reported health status is compared. Because perception of health may differ between Ranch Hands and Comparisons, medication use and work loss are compared as possible surrogate measures of actual health status.

Throughout this chapter, several terms are used to describe veterans who did not participate in the 1997 examination. These terms include “passive refusal,” “hostile refusal,” and “final refusal.” An individual who communicated a desire not to have any contact with or from the Air Force Health Study (AFHS) under any circumstances was classified as “hostile.” Veterans who were classified as hostile in the past were not invited to the 1997 examinations (see Section 5.5.2.2). A veteran was classified as a “passive refusal” if he was scheduled for a physical examination but broke the appointment twice. He also could be classified as a passive refusal for other reasons, such as inability to contact him directly because of the presence of a “gatekeeper” (see Sections 5.5.2.1 and 5.5).

A veteran who was classified as hostile, or had refused to participate twice—passively or otherwise—was classified as a “final refusal.” Prior to the second refusal, a “refusal conversion” attempt was made. The refusal conversion consisted of an attempt, made by a specially trained person, to convince the veteran to participate. If this conversion attempt failed, the veteran was classified as a final refusal.

5.2 FACTORS KNOWN OR SUSPECTED TO INFLUENCE STUDY PARTICIPATION

A multitude of factors may influence study participation. These may be broadly classified as health, logistics, demographic, operational, or publicity factors. For example, health factors are thought to include self-perception of health as well as demonstrable health indicators, such as medication use and work-days lost due to illness or injury. Logistics factors include distance to the examination site, reluctance to spend time away from family or job, income, and occupation. Demographic factors include flying status, age, race, or military duty status (active, retired, separated). Operational factors include any aspect of study operation that may cause differential compliance, such as differential treatment of participants during scheduling, physical examination, interview, or debriefing. Publicity factors are related to national attitudes and media presentations regarding the Agent Orange (Herbicide Orange) issue, the Vietnam War, veterans’ health care, or health care in general. In addition, these considerations may influence Ranch Hands differently than Comparisons.

The decision to volunteer for this study is complex, making statistical assessment of compliance bias difficult and necessarily crude in that many of the factors contributing to self-selection cannot be measured directly. Instead, compliance bias was investigated at the 1997 follow-up with respect to self-perception of health, medication use, and work loss. Medication use and days lost from work due to

illness or injury were obtained from questionnaire and physical examination data and, therefore, were available only for fully compliant participants. In 1997, as in 1992, no partial compliance (defined as compliant to the questionnaire and noncompliant to the physical examination) occurred because both the physical examination and the questionnaire were administered at the examination site.

5.3 REPLACEMENT PROTOCOL

During the design phase of the AFHS, the authors of the study protocol anticipated that a loss of participants between follow-up examinations would pose the greatest threat to study validity. In particular, they expected differential compliance, with relatively more Ranch Hands choosing to return to the study than Comparisons and with health differences of unknown character between noncompliant Ranch Hands and noncompliant Comparisons. To partially correct the situation, the study design specified that noncompliant Comparisons would be replaced by Comparisons with the same values of the matching variables (age, race, and military occupation at the baseline examination) and the same health perception. Military occupation was stratified into the following five categories: (1) flying officer—pilot, (2) flying officer—non-pilot, (3) non-flying officer, (4) flying enlisted, and (5) non-flying enlisted (also referred to as enlisted groundcrew). In this way, the Replacement Comparisons would serve as surrogates for Comparisons who refused to participate. This method of replacement would tend to reduce bias resulting from refusal in the Comparison group and would maintain group size. No corresponding strategy for the Ranch Hands was possible because all living Ranch Hands had been identified and invited to participate.

The first Comparison in each randomized matched set who was asked to participate in the baseline questionnaire and physical examination was identified as the Original Comparison for his respective Ranch Hand (in accordance with the study protocol). If the Original Comparison was noncompliant, a “Replacement” Comparison was invited in his place. Noncompliance was determined if any of the following three conditions were met:

1. The Comparison refused to participate.
2. The Comparison was partially compliant (completed the baseline questionnaire but did not complete the baseline physical examination).
3. The Comparison was unlocatable.

Replacement Comparisons were identified as such in the database to satisfy the study protocol requirement that they be matched with the refusing Original Comparisons (also known as refusals) based on self-reported health (excellent, good, fair, or poor). Of course, in the case of an unlocatable Original Comparison, matching with regard to self-reported health was not possible. Original Comparisons who were partially compliant were replaced, but deceased Original Comparisons were not.

During the 1985 examination, a telephone questionnaire was administered to refusals and their potential replacements. This questionnaire served as the basis for health-matching required by the study protocol, and assessed self-perception of health, days lost from work due to illness, and medication use. Although the study protocol is not explicit on this point, it implies that the decision to include or exclude the replacements from the study should be based only on this health contrast. At the 1987 follow-up examination, instead of using a telephone questionnaire, refusals were asked during the scheduling process for their self-perception of health. During the 1992 and 1997 follow-up examinations, schedulers requested a current perception of health (compared to others their age) from all participants contacted by telephone. Health-matching of replacements was not used during the baseline examination but was implemented during the 1985, 1987, 1992, and 1997 follow-up examinations. Replacement Comparisons

were matched to noncompliant Original Comparisons with respect to age, race, rank, and military occupation at all examinations.

5.4 1997 FOLLOW-UP SCHEDULING AND REPLACEMENT OPERATION

5.4.1 Scheduling Strategy

The scheduling process included the following three objectives:

1. To maximize participation rates (in both the present and future follow-up studies)
2. To ensure that Ranch Hands and Comparisons were recruited using the same procedures and with the same effort
3. To ensure that, whenever possible, each Ranch Hand had at least one compliant Comparison who was matched with that Ranch Hand on age, race, and military occupation.

These objectives led to a set of conflicting priorities: maximizing participation rates meant giving each potential participant every opportunity and encouragement to participate, without being so persistent as to lose the cooperation of unwilling respondents in future follow-up examinations. This careful approach had to be balanced against the need to quickly identify noncompliant Comparisons. Until these noncompliant Comparisons were removed from the scheduling process, they could not be replaced. In general, prospective participants were contacted for scheduling in random order; however, priority was given to certain potential participants who needed to be contacted early in the scheduling period. These included the following:

- Veterans who live overseas, because they would be more difficult to contact and require more advance time to make travel arrangements
- Passive refusals or “no-shows” for previous physical examinations.

During the first 2 months of scheduling, an attempt was made to contact all veterans invited to previous examinations. In addition, all previously invited veterans were sent a refrigerator magnet that stated the date that scheduling would begin and the toll-free number of the scheduling operation.

Although every reasonable attempt was made to contact eligible veterans, accommodate unusual schedules, and convert refusals, experience in past examinations had shown that certain types of potential participants ultimately would not schedule appointments. To continue with the replacement of Comparisons, these cases needed to be closed early. Therefore, the following rules were observed to limit the number of calls to certain types of individuals who were not likely to participate:

- An individual classified as hostile to the study in previous follow-up examinations was not contacted in 1997.
- An individual who was extremely hostile in his refusal to initial scheduling contacts was coded as a final refusal with no refusal conversion attempts.
- If the scheduler did not get an answer on the telephone after eight attempts, a registered letter was sent to that individual. If there was direct evidence that the letter was received at the proper address and the individual did not respond to the registered letter, he was considered a passive refusal.
- An individual who broke two examination appointments (“passive refusal”) was considered a final refusal.

- An individual who equivocated about attending the physical examinations twice during the first two contacts was considered a first refusal.
- One refusal conversion attempt was made for all first refusals.

Some potential participants were particularly difficult to reach because of the presence of a “gatekeeper” who did not allow the schedulers to speak directly to the potential participant. A potential participant was designated as a final passive refusal after a minimum of three contacts with a gatekeeper and failure to reach the participant by other means. These contact methods included varying calling times, leaving messages, or sending a certified letter. Up to eight gatekeeper contacts were allowed if the scheduling supervisor decided additional attempts were still warranted (e.g., if an individual had previously scheduled and canceled, if it seemed reasonable that he might reschedule). After these gatekeeper contacts had been exhausted, the individuals were designated as final passive refusals and, if eligible for replacement, replaced. Potential participants who were designated as final refusals at any stage in the scheduling process were provided with the toll-free number for the study and allowed to volunteer to participate at any time.

The percentage of persons completing the 1997 physical examination is plotted by calendar date in Figure 5-1 for Ranch Hands, Original Comparisons, Replacement Comparisons, and all Comparisons. These patterns are similar to those seen at previous follow-up examinations and reflect the study protocol specification that scheduling be random with respect to group. Completion rates are similar between Ranch Hands and Original Comparisons. Replacement Comparisons completed the physical examinations later in the scheduling process, as would be expected.

5.4.2 Replacement Strategy

All Comparisons who had been invited to participate in the baseline, 1985, 1987, or 1992 studies were invited to participate in the 1997 examination. If no previously invited Comparisons for a particular Ranch Hand agreed to participate in 1997, schedulers attempted to recruit a replacement. These replacements were selected from a set of up to 10 candidate Comparisons, matched by age, race, rank, and military occupation, whose self-reported health status in 1997 matched that of the noncompliant Original Comparison for a given Ranch Hand. Health status was recorded in four categories: excellent, good, fair, or poor. If a willing, health-matched participant was not found in the matched set, self-reported perceptions of health status were dichotomized into “excellent or good” and “fair or poor” categories, and these dichotomized health statuses were matched. If this second method for identifying a suitable replacement failed, no replacement was made.

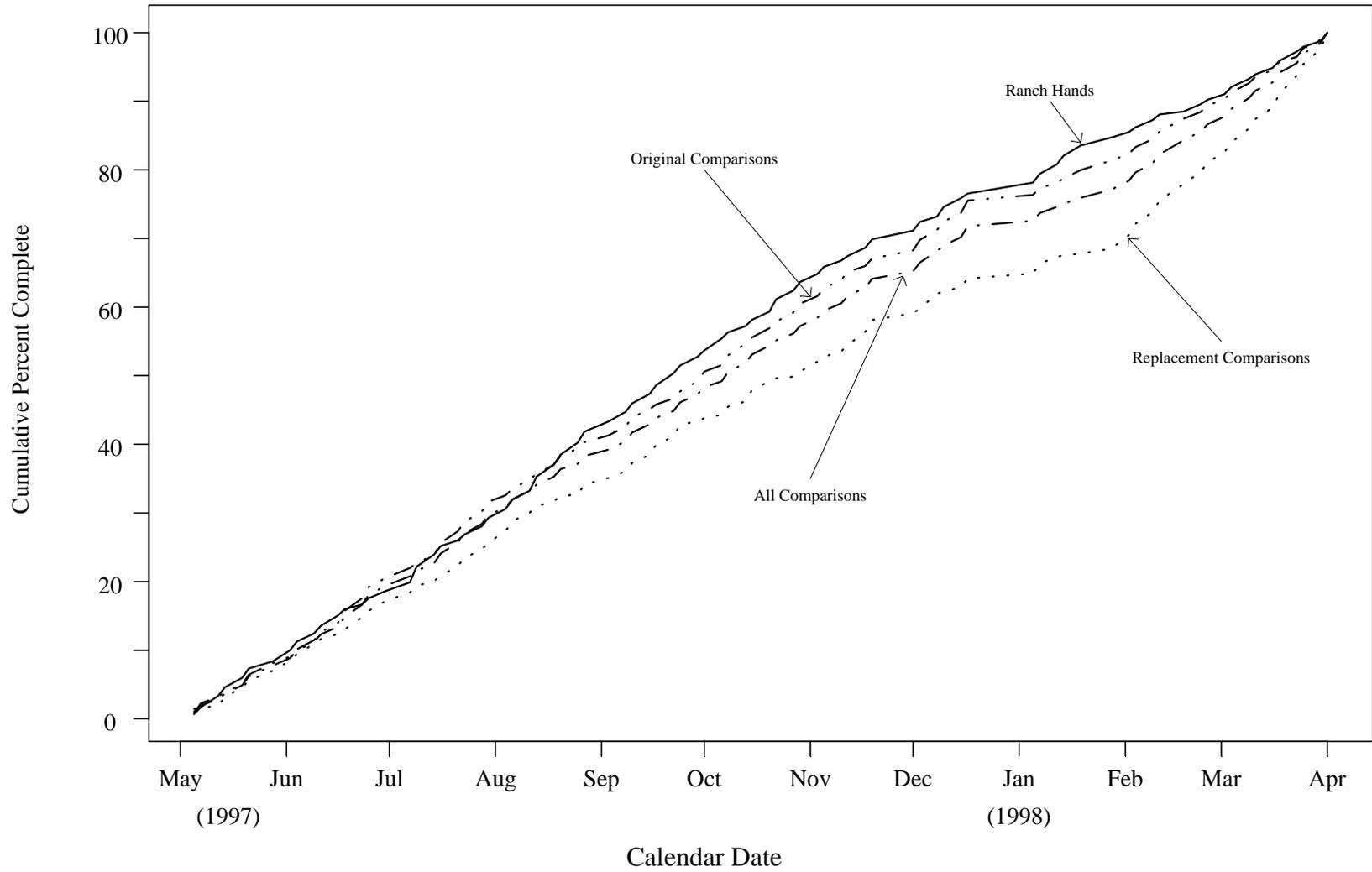


Figure 5-1. Cumulative Percent Completed Physical Examination by Calendar Date

There were two exceptions to the replacement strategy. First, the study protocol required that the noncompliant Original Comparisons report their health status during the scheduling effort so that they could be used to recruit Replacement Comparisons with the same health status. On occasion, Original Comparisons refused to speak with the scheduler or respond to questions. In these cases, a Replacement Comparison for the Original Comparison was recruited in the order in which he was listed in the randomized matched set. This strategy also was used for unlocatable and hostile Original Comparisons. Second, as specified in the study protocol, no replacement was made if all formerly invited Comparisons in a matched set were deceased.

5.5 COMPLIANCE

Of the 1,101 eligible Ranch Hands, 870 (79.0%) participated in the 1997 follow-up examination, while 839 (72.8%) of the 1,151 eligible Original Comparisons participated. Of the 768 Replacement Comparisons eligible for the 1997 follow-up, 412 (53.6%) chose to attend the examination. Table 5-1 provides compliance counts for Ranch Hands, all Comparisons as a group, and Original and Replacement Comparisons. Appendix C contains tables that describe these counts by compliance at the baseline examination. Table C-1 provides counts for the Ranch Hands. Total Comparison counts are summarized in Table C-2. Original Comparison counts are presented in Table C-3, and Replacement Comparison counts are provided in Table C-4.

In Table 5-1 and Appendix C, the “New to Study” rows include potential Replacement Comparisons who were found to be deceased when contact was attempted. The same deceased potential replacements are then accounted for in the rows marked “Died.” Undefined categories are indicated by dashes. For example, in the Appendix C tables, dashes are shown when partially compliant participants at the baseline examination could not be partially compliant at a later examination. Partial compliance only occurred when a participant agreed to the baseline questionnaire but refused to attend the physical exam. As stated previously, no partial compliance occurred in 1992 or 1997 because both the baseline questionnaire and physical examination were given at the same site. As shown in Appendix C, Tables C-1 and C-2, 86 percent (819 of 949) of living Ranch Hands and 87 percent (976 of 1,116) of living Comparisons who were fully compliant at the baseline examination returned for the 1997 follow-up examination.

Table 5-2 describes the newly compliant participants in terms of their compliance at previous examinations. Two Ranch Hands, 9 Original Comparisons, and 69 Replacement Comparisons were fully compliant and examined for the first time at the 1997 follow-up examination. One Original Comparison and 52 Replacement Comparisons had not been invited previously to participate. The one Original Comparison who had not been invited previously to participate replaced an Original Comparison who was reclassified as a Ranch Hand (see Section 5.5.1). Two Ranch Hands, seven Original Comparisons, and five Replacement Comparisons had been previously invited and had refused to participate in one or more previous examinations.

Table 5-1. Compliance by Group and Examination Year

Time Period	Disposition	Group			
		Ranch Hands	All Comparisons	Original Comparisons	Replacement Comparisons
Baseline		1,209	1,666	1,235	431
1985 Examination	Eligible	1,209	1,666	1,235	431
Between Baseline & 1985 Examination	New to Study	9	73	17	56
	Died	(19)	(26)	(21)	(5)
	Remaining Eligible	1,199	1,713	1,231	482
	Subject Unlocatable	(39)	(65)	(48)	(17)
	Refused	(134)	(326)	(220)	(106)
	Partially Compliant	(9)	(30)	(9)	(21)
	Fully Compliant	1,017	1,292	954	338
1987 Examination	Eligible	1,199	1,713	1,231	482
Between 1985 & 1987 Examinations	New to Study	4	33	4	29
	Died	(15)	(16)	(13)	(3)
	Remaining Eligible	1,188	1,730	1,222	508
	Subject Unlocatable	(20)	(47)	(31)	(16)
	Refused	(171)	(358)	(242)	(116)
	Partially Compliant	(1)	(27)	(11)	(16)
	Fully Compliant	996	1,298	938	360
1992 Examination	Eligible	1,188	1,730	1,222	508
Between 1987 & 1992 Examinations	New to Study	(0)	83	2	81
	Died	(39)	(52)	(33)	(19)
	Remaining Eligible	1,149	1,761	1,191	570
	Subject Unlocatable	(12)	(56)	(15)	(41)
	No Health-Match	--	(11)	--	(11)
	Refused	(184)	(414)	(264)	(150)
	Fully Compliant	953	1,280	912	368
1997 Examination	Eligible	1,149	1,761	1,191	570
Between 1992 & 1997 Examinations	New to Study	(0)	236	2	234
	No Health-Match in 1992	--	(11)	--	(11)
	Died	(48)	(67)	(42)	(25)
	Remaining Eligible	1,101	1,919	1,151	768
	Subject Unlocatable	(4)	(29)	(10)	(19)
	No Health-Match	--	(91)	--	(91)
	Refused	(227)	(548)	(302)	(246)
	Fully Compliant	870	1,251	839	412

Table 5-2. Participants Newly Compliant in 1997 and Their Previous Compliance Pattern

Previous Compliance Pattern				Ranch Hands	Original Comparisons	Replacement Comparisons	Grand Total
Baseline	1985	1987	1992				
Partial	Refused	Refused	Refused	2	2	0	4
Partial	Refused	Unlocated	Refused	0	1	0	1
Partial	Refused	Unlocated	Unlocated	0	0	1	1
Partial	Unlocated	Unlocated	Refused	0	1	0	1
Partial	Unlocated	Unlocated	Unlocated	0	1	0	1
Refused	Partial	Refused	Refused	0	0	1	1
Refused	Refused	Refused	Refused	0	2	0	2
Refused	Refused	Refused	Unlocated	0	1	0	1
			Refused	0	0	3	3
			Unlocated	0	0	11	11
			No Health-Match	0	0	1	1
			New 1997	0	1	52	53
Total				2	9	69	80

5.5.1 Corrections to Previously Reported Study Compliance Totals

Some changes were made to the historical cell counts shown in Table 5-1 (and the tables in Appendix C) so that they now differ from compliance tables presented during previous examinations (in particular, Tables 5-1 through 5-4 of the 1992 follow-up report). The differences are due to the following independent events:

1. One Original Comparison, who had been fully compliant since the baseline examination, was reclassified as a Ranch Hand. This participant was discovered to be part of stateside testing of Operation Ranch Hand and was assigned, on temporary duty, to the unit that transported Operation Ranch Hand equipment to SEA. This participant also was eligible as a Comparison because of a later assignment. The Ranch Hand assignment took precedence over the assignment as a Comparison. This change affects Tables 5-1, C-1, C-2, and C-3.
2. In the 1992 follow-up report, 3 Original Comparisons and 27 Replacement Comparisons who were new to the study since the baseline examination were classified as refusals for the 1985 follow-up examination. These numbers have been revised to indicate that 4 Original Comparisons and 26 Replacement Comparisons who were new to the study since the baseline examination were refusals at the 1985 follow-up examination. This change was due to the misclassification of one Original Comparison as a Replacement Comparison. This change affects Tables 5-1, C-3, and C-4.
3. In the 1992 follow-up report, two Original Comparisons and four Replacement Comparisons who were new to the study since the baseline examination were classified as partially compliant for the 1985 follow-up examination. These numbers have been revised to indicate that one Original Comparison and five Replacement Comparisons who were new to the study since the baseline examination were partially compliant for the 1985 follow-up examination. This change was due

to the misclassification of one Replacement Comparison as an Original Comparison. This change affects Tables 5-1, C-3, and C-4.

4. In the 1992 follow-up report, 5 Original Comparisons and 28 Replacement Comparisons who were new to the study since the baseline examination were classified as new to the study between the 1985 and 1987 follow-up examinations. These numbers have been revised to indicate that 4 Original Comparisons and 29 Replacement Comparisons who were new to the study since the baseline examination were new to the study between the 1985 and 1987 follow-up examinations. This change was due to the misclassification of one Replacement Comparison as an Original Comparison. This change affects Tables 5-1, C-3, and C-4.
5. In the 1992 follow-up report, two Original Comparisons and five Replacement Comparisons who were new to the study since the baseline examination were classified as unlocatable at the 1987 follow-up examination. These numbers have been revised to indicate that one Original Comparison and six Replacement Comparisons who were new to the study since the baseline examination were unlocatable at the 1987 follow-up examination. This change was due to the misclassification of one Replacement Comparison as an Original Comparison. This change affects Tables 5-1, C-3, and C-4.
6. In the 1992 follow-up report, 4 Original Comparisons and 78 Replacement Comparisons who were new to the study since the baseline examination were classified as new to the study between the 1987 and 1992 follow-up examinations. In addition, three Replacement Comparisons who were new to the study since the baseline examination were classified as deceased between the 1987 and 1992 follow-up examinations. These numbers have been revised to indicate that 2 Original Comparisons and 81 Replacement Comparisons who were new to the study since the baseline examination were new to the study between the 1985 and 1987 follow-up examinations. In addition, the number of Replacement Comparisons who were new to the study since the baseline examination and classified as deceased between the 1987 and 1992 follow-up examinations has been revised from three to four. This change was due to the misclassification of two Replacement Comparisons as Original Comparisons and the addition of one deceased Replacement Comparison to the “New to Study” classification. This change affects Tables 5-1, C-2, C-3, and C-4.
7. In the 1992 follow-up report, 2 Original Comparisons and 27 Replacement Comparisons who were new to the study since the baseline examination were classified as unlocatable for the 1992 follow-up examination. These numbers have been revised to indicate that no Original Comparisons and 29 Replacement Comparisons who were new to the study since the baseline examination were unlocatable at the 1992 follow-up examination. This change was due to the misclassification of two Replacement Comparisons as Original Comparisons. This change affects Tables 5-1, C-3, and C-4.
8. In the 1992 follow-up report, 8 Original Comparisons and 44 Replacement Comparisons who were new to the study since the baseline examination were classified as refusals for the 1992 follow-up examination. These numbers have been revised to indicate that 6 Original Comparisons and 46 Replacement Comparisons who were new to the study since the baseline examination were refusals at the 1992 follow-up examination. This change was due to the misclassification of two Replacement Comparisons as Original Comparisons. This change affects Tables 5-1, C-3, and C-4.

5.5.2 Analysis of Refusals

Of the 1,101 Ranch Hands and 1,919 Comparisons eligible for the 1997 follow-up examination, 227 Ranch Hands and 548 Comparisons (302 Original and 246 Replacement) chose not to attend. Their reasons for refusal are summarized in Table 5-3. The 91 “no health-match” potential Replacement Comparisons included in Table 5-1 are not shown in Table 5-3. They also are not used in the analysis of refusals that follows because they were willing to participate but were excluded by the specifications of the study protocol.

Table 5-3. Reasons for Refusal by Group

Reason	Ranch Hands		Original Comparisons		Replacement Comparisons		Total	
	n	% ^a	n	% ^a	n	% ^a	n	% ^a
Health Reasons	42	3.8	38	3.3	28	3.6	108	3.6
Job Commitment	33	3.0	49	4.3	55	7.2	137	4.5
No Time	26	2.4	35	3.0	39	5.1	100	3.3
Travel Distance, Family	14	1.3	21	1.8	21	2.7	56	1.9
Confidentiality	5	0.5	3	0.3	2	0.3	10	0.3
Financial Hardship	1	0.1	1	0.1	0	0.0	2	0.1
Passive Refusal	23	2.1	24	2.1	18	2.3	65	2.2
Hostile	55	5.0	96	8.3	49	6.4	200	6.6
Fear of Physical Exam	1	0.1	1	0.1	1	0.1	3	0.1
Dissatisfaction with USAF	1	0.1	6	0.5	0	0.0	7	0.2
Dissatisfaction with AFHS	3	0.3	4	0.3	4	0.5	11	0.4
Dissatisfaction with Previous Exam	5	0.5	5	0.4	1	0.1	11	0.4
Other	18	1.6	19	1.7	28	3.6	65	2.2
Total	227	20.6	302	26.2	246	32.0	775	25.7
Total Invited	1,101		1,151		768		3,020	

^a Percent of persons invited.

Table 5-3 shows that a greater percentage of Comparisons than Ranch Hands refused, and a greater percentage of Replacement Comparisons than Original Comparisons refused (32.0% vs. 26.2%). Of the total invited, nearly the same percentages of Ranch Hands, Original Comparisons, and Replacement Comparisons refused due to health reasons (3.8%, 3.3%, and 3.6%, respectively). The percentages were also nearly the same for passive refusals (2.1%, 2.1%, and 2.3%, respectively). More Replacement Comparisons than Ranch Hands or Original Comparisons declined due to “job commitments” or “no time.” More Original Comparisons were hostile refusals (8.3%) than either Replacement Comparisons (6.4%) or Ranch Hands (5.0%).

Table 5-4 summarizes reasons for refusal by group, age, rank, and race. Reasons for refusal have been collapsed to the following five categories:

1. Health (health reasons)
2. Logistics (job commitment, no time or interest, travel distance or family constraints, confidentiality, or financial hardship)
3. Passive (passive refusal)
4. Hostile (hostile refusal)
5. Other (fear of physical examination; dissatisfaction with the U.S. Air Force, U.S. Government, the AFHS, or previous examinations; or other reasons).

Table 5-4. Reasons for Refusal by Group, Age, Rank, and Race

Category	Total Refusals	Reason for Refusal										Unadjusted p-Value
		Health		Logistics		Passive		Hostile		Other		
		n	%	n	%	n	%	n	%	n	%	
Ranch Hand	227	42	18.5	79	34.8	23	10.1	55	24.2	28	12.3	0.092
Comparison	548	66	12.0	226	41.2	42	7.7	145	26.5	69	12.6	
Birth Year <1942	389	85	21.9	128	32.9	20	5.1	103	26.5	53	13.6	<0.001
Birth Year ≥1942	386	23	6.0	177	45.8	45	11.7	97	25.1	44	11.4	
Officer	248	29	11.7	81	32.7	18	7.3	94	37.9	26	10.5	<0.001
Enlisted	527	79	15.0	224	42.5	47	8.9	106	20.1	71	13.5	
Black	46	7	15.2	17	37.0	7	15.2	9	19.6	6	13.0	0.463
Non-Black	729	101	13.9	288	39.5	58	8.0	191	26.2	91	12.5	
Total	775	108		305		65		200		97		

Note: Percentages represent the percent of total refusals.

Age, rank, and race have been dichotomized for analysis purposes (born before 1942 and born in or after 1942; officer and enlisted; Black and non-Black, respectively). Without adjustment for age, rank, or race, the association between reason for refusal and group was not significant ($p=0.092$). There was a significant association between reason for refusal and age ($p<0.001$) and between reason for refusal and rank ($p<0.001$). Younger participants were less likely to refuse for health reasons than older participants (6.0% vs. 21.9%). Younger participants were more likely to refuse passively (11.7% vs. 5.1%) or for logistics reasons (45.8% vs. 32.9%). Officers were more likely to be hostile refusals than enlisted men (37.9% vs. 20.1%) and were less likely to refuse because of logistics reasons than enlisted men (32.7% vs. 42.5%). No significant association was found between reason for refusal and race ($p=0.463$).

A test of association between reason for refusal and group (adjusted for age, rank, and race) was performed and found to be not significant ($p=0.132$). The adjusted association between reason for refusal and age was significant ($p<0.001$), as was the association between reason for refusal and rank ($p<0.001$). No significant association was found for race ($p=0.521$).

5.5.2.1 Passive Refusals

A potential participant was classified as a passive refusal if he was scheduled for a physical examination but broke the appointment twice. A potential participant also was classified as a passive refusal for other reasons, including the inability to contact the participant directly because of the presence of a “gatekeeper” (see Section 5.5). Although passive refusal was the most common type of refusal (second only to hostile attitude) during the 1992 study, this type of refusal was far less prevalent in the 1997 follow-up. Passively refusing Ranch Hands, Original Comparisons, and Replacement Comparisons accounted for only 8.4 percent of the refusals (65 passive refusals, 775 total refusals) (see Table 5-3).

5.5.2.2 Hostile Refusals

Hostile refusals accounted for approximately 25 percent of both refusing Ranch Hands and refusing Comparisons. As shown in Table 5-5, 197 veterans were classified as hostile refusals during the 1992 physical examination process. Five additional veterans were added to the list of hostile individuals after the 1992 report was completed to bring the total to 202 individuals. Of these five, two were previously designated as refusals for the 1992 examination because of no interest in the AFHS, and three were dissatisfied with previous examinations. Between the 1992 and 1997 examinations, this list of 202 veterans was reviewed and some individuals were re-designated as refusals that should be contacted for the 1997 follow-up examination. Some hostile individuals on this list also contacted the Air Force and expressed a desire to participate in the 1997 follow-up examination. Consequently, 17 veterans were removed from the list of hostile individuals. Three of these previously hostile veterans participated in the 1997 follow-up examination, and the remaining 14 veterans refused to participate in the 1997 examination. Six additional veterans on the list of hostile individuals died between the 1992 and 1997 follow-up examinations. The list of 202 hostile individuals was therefore reduced to 179 veterans that were not to be contacted by schedulers for the 1997 examination. During the course of the 1992 examination, 21 additional veterans were designated as “newly” hostile individuals, resulting in a total of 200 veterans designated as hostile for the 1997 follow-up examination, as shown in Table 5-5.

5.5.2.3 Reasons for Refusal Across AFHS Examinations

The reasons for refusal for the baseline, 1987, 1992, and 1997 examinations are shown in Table 5-5, and are presented separately for Ranch Hands and Comparisons. The reasons for refusal to participate in the 1985 examination are not addressed in Table 5-5 because the data were not collected in a manner consistent with that in the other examinations. In 1985, the data were collected verbatim as part of the record of telephone contacts. Therefore, no meaningful comparisons can be made between the 1985 study data on refusals and other years. Table 5-5 shows a slight but consistent increase in total refusals across time. Of particular note is the steady increase in refusals for health reasons. Passive refusals decreased in the 1997 examination. This may be attributable to the aggressive efforts to maintain communication with veterans who were expected to become passive refusals.

Table 5-5. Reasons for Refusal by Group and Year

Reason	Baseline				1987				1992				1997			
	Ranch Hands		Comparisons		Ranch Hands		Comparisons		Ranch Hands		Comparisons		Ranch Hands		Comparisons	
	n	% ^a														
Fear of Physical Exam	6	0.5	6	0.4	1	0.0	4	0.2	0	0.0	3	0.2	1	0.1	2	0.1
Job Commitment	29	2.4	80	4.8	32	2.7	61	3.5	31	2.7	53	3.0	33	3.0	104	5.4
Dissatisfaction with USAF	5	0.4	0	0.0	10	0.8	11	0.6	6	0.5	10	0.6	1	0.1	6	0.3
No Time	53	4.4	154	9.3	28	2.4	79	4.6	13	1.1	50	2.8	26	2.4	74	3.9
Travel Distance, Family	4	0.3	21	1.3	5	0.4	17	1.0	8	0.7	17	1.0	14	1.3	42	2.2
Confidentiality	11	0.9	15	0.9	1	0.1	4	0.2	1	0.1	2	0.1	5	0.5	5	0.3
Health Reasons	10	0.8	7	0.4	11	0.9	16	0.9	19	1.7	21	1.2	42	3.8	66	3.4
Passive Refusal	9	0.7	15	0.9	40	3.4	78	4.5	41	3.6	96	5.5	23	2.1	42	2.2
Dissatisfaction with Previous Exam	n/a	0.0	n/a	0.0	0	0.0	1	0.1	3	0.3	5	0.3	5	0.5	6	0.3
Financial Hardship	n/a	0.0	n/a	0.0	1	0.1	1	0.1	2	0.2	2	0.1	1	0.1	1	0.1
Hostile	n/a	0.0	n/a	0.0	n/a	0.0	n/a	0.0	58	5.0	139	7.9	55	5.0	145	7.6
Dissatisfaction with AFHS	n/a	0.0	3	0.3	8	0.4										
Other	0	0.0	3	0.2	42	3.5	88	5.1	2	0.2	16	0.9	18	1.6	47	2.4
Total	127		3010		171		360		184		414		227		548	
Total Invited	1,207		1,657		1,188		1,730		1,149		1,761		1,101		1,919	

^a Percent of persons invited to participate.

5.5.3 Replacement Comparisons

As stated previously, matching replacements for refusing Original Comparisons based on health status, as well as age, race, rank, and occupation, was maintained at the 1997 follow-up. The reported health status of new replacements was obtained at the time of telephone scheduling. At the 1997 follow-up, 412 Replacement Comparisons were fully compliant (see Table 5-1). The health-matching results for the 52 Replacement Comparisons invited to the study for the first time in 1997 (see Table 5-2) and their replaced Original Comparisons are summarized in Table 5-6.

Table 5-6. Self-reported Health Status of Original Comparisons and Their Replacements

Replacement's Reported Health	Original Comparison's Reported Health					Total
	Excellent	Good	Fair	Poor	Unknown ^a	
Excellent	7	2	0	0	3	12
Good	2	22	0	0	6	30
Fair	0	0	3	1	4	8
Poor	0	0	0	0	0	0
Unknown	0	0	0	0	2	2
Total	9	24	3	1	15	52

^a Includes 11 hostile respondents and 4 respondents who reported "Don't Know" for health status; one Replacement Comparison replaced a Replacement Comparison instead of an Original Comparison.

Thirty-two of the 52 Replacement Comparisons were matched perfectly on health status to the Original Comparisons. Five additional Replacement Comparisons were matched according to the dichotomized health status indicated in the study protocol. Fifteen Original Comparisons (labeled "Unknown") refused to give a self-perception of health or said they did not know how their health compared with that of others. The health status of these 15 Replacement Comparisons is shown in Table 5-6.

At the 1997 follow-up, 421 Original Comparisons were either deceased or noncompliant (see Table 5-7). The entire matched set of replacement candidates for each noncompliant Original Comparison was reviewed to determine if the appropriate replacement strategy was followed. Results are presented in Table 5-7. Of the 421 noncompliant (refusing, unlocatable, or deceased) Original Comparisons at the 1997 follow-up, 284 compliant replacements were found. Ninety-nine matched sets were closed because all previously invited Comparisons were deceased and, consistent with the protocol, no replacements were to be contacted, or because all replacements were contacted and no replacements were found that were willing to participate or were able to be health-matched. No Replacement Comparisons were contacted for 11 of the noncompliant Original Comparisons. A review of the record of telephone calls showed that all 11 had declined late in the scheduling process. For 27 of the noncompliant Original Comparisons, some replacements, but not all, were contacted and none complied. A review of the cohort of the 27 Original Comparisons, where replacement contact was not fully exhausted, showed that the Original Comparison or one or more of the Replacement Comparisons also had declined late in the process.

Table 5-7. Matched Set Compliance of Noncompliant Original Comparisons

Matched Set Compliance	Original Comparison's Compliance			
	Refusal	Unlocatable	Deceased	Total
At Least One Compliant Replacement	250	10	24	284
All Contacted Replacements Noncompliant and No Uncontacted Comparisons Remain in the Matched Set or All Previously Contacted Comparisons are Deceased	16	0	83	99
All Contacted Replacements Noncompliant and Other Uncontacted Comparisons Remain in the Matched Set	25	0	2	27
No Replacement Comparisons Contacted	11	0	0	11
Total	302	10	109	421

5.6 MATCHING OF SELF-REPORTED HEALTH STATUS

5.6.1 Self-reported Health Status of Refusals

Of the 775 refusals, reported health status, as obtained by telephone at the time of scheduling, was available for a total of 423 Ranch Hands and Comparisons. Table 5-8 summarizes their responses. Data were obtained from 125 (55.1%) of 227 refusing Ranch Hands and 298 (54.4%) of 548 refusing Comparisons. Among the 423 refusals responding to the health status question, there was no significant association between group and reported health ($p=0.155$).

Table 5-8. Reported Health Status of Refusals

Reported Health Status	Group				Total		p-Value
	Ranch Hands		Comparisons		n	%	
	n	%	n	%			
Excellent	33	26.4	97	32.6	130	30.7	0.155
Good	64	51.2	152	51.0	216	51.1	
Fair	27	21.6	42	14.1	69	16.3	
Poor	1	0.8	7	2.3	8	1.9	
Total	125		298		423		

Note: Does not include 47 Ranch Hands and 107 Comparisons who reported "Don't Know" or refused to answer health status, and does not include 55 Ranch Hands and 143 Comparisons who were hostile.

Ideally, compliance bias between the groups should be assessed by comparing the health of refusing veterans to fully compliant participants with adjustment for the matching variables. The only current data available on the refusing veterans are self-reported responses to the health status question asked during the scheduling procedure. These data are missing for all hostile refusals. Almost three-quarters

(48 of 65, or 73.8%) of the passive refusals did not give their reported health status during scheduling. A summary of reported health status for 17 passive refusals that reported their health status during scheduling is shown in Table 5-9.

Table 5-9. Reported Health Status of Passive Refusals

Reported Health Status	Group						Total	%
	Ranch Hands		Original Comparisons		Replacement Comparisons			
	n	%	n	%	n	%		
Excellent	0	0.0	1	25.0	1	20.0	2	11.8
Good	6	75.0	2	50.0	3	60.0	11	64.7
Fair	2	25.0	1	25.0	1	20.0	4	23.5
Poor	0	0.0	0	0.0	0	0.0	0	0.0
Total	8		4		5		17	

Note: Does not include 15 Ranch Hands, 20 Original Comparisons, and 13 Replacement Comparisons who reported “Don’t Know” for health status.

A test of association between reported health status and group, age, rank, compliance, and race was performed, and the results are shown in Table 5-10. For analysis purposes, reported health status was classified into two categories: excellent or good, and fair or poor. The covariates age, rank, compliance, and race were dichotomized (born before 1942 and born in or after 1942; officer and enlisted; fully compliant and refusal; Black and non-Black, respectively). No significant association was found between race and reported health status ($p=0.824$). Without adjustment, age ($p<0.001$), rank ($p<0.001$), and compliance ($p<0.001$) were associated significantly with reported health. Ranch Hands were more likely to report fair or poor health than were Comparisons (14.1% vs. 11.1%). Enlisted men were more likely to report fair or poor health than were officers (15.1% vs. 7.6%). As expected, refusals (18.2%) and older participants (14.9%) were more likely to report fair or poor health than were fully compliant (11.0%) or younger participants (9.1%).

The association between reported health status and group, adjusted for age, rank, compliance, and race was significant ($p=0.011$). The adjusted association between reported health status and compliance was statistically significant ($p<0.001$), as were the adjusted associations between health status and age ($p<0.001$) and rank ($p<0.001$).

Table 5-11 shows the reported health status versus compliance separately by group. For both Ranch Hands and Comparisons, significantly more refusals reported fair or poor health ($p=0.007$ and $p=0.001$, respectively) than fully compliant participants. A higher percentage of compliant Ranch Hands reported fair or poor health (12.9%) than compliant Comparisons (9.7%). When adjusted for age, race, and occupation, the relation between health status and compliance did not change significantly with group ($p=0.876$). This result showed that the difference in health status between refusals and fully compliant participants was similar between Ranch Hands and Comparisons.

Table 5-10. Reported Health Status by Group, Age, Rank, Compliance, and Race

Group	Total	Reported Health Status				Unadjusted p-Value
		Excellent/Good		Fair/Poor		
		n	%	n	%	
Ranch Hand	963	827	85.9	136	14.1	0.028
Comparison	1,509	1,342	88.9	167	11.1	
Birth Year <1942	1,351	1,150	85.1	201	14.9	<0.001
Birth Year ≥1942	1,121	1,019	90.9	102	9.1	
Officer	935	864	92.4	71	7.6	<0.001
Enlisted	1,537	1,305	84.9	232	15.1	
Fully Compliant	2,049	1,823	89.0	226	11.0	<0.001
Refusal	423	346	81.8	77	18.2	
Black	144	125	86.8	19	13.2	0.824
Non-Black	2,328	2,044	87.8	284	12.2	
Total	2,472	2,169		303		

Table 5-11. Reported Health Status by Group

Group	Compliance Status	Total	Reported Health Status				p-Value
			Excellent/Good		Fair/Poor		
			n	%	n	%	
Ranch Hand	Fully Compliant	838	730	87.1	108	12.9	0.007
	Refusal	125	97	77.6	28	22.4	
Comparison	Fully Compliant	1,211	1,093	90.3	118	9.7	<0.001
	Refusal	298	249	83.6	49	16.4	

5.6.2 Self-reported Health Status of Fully Compliant Participants

Tables 5-12 through 5-14 summarize the reported health status, medication use, and work loss of the 2,121 fully compliant participants at the 1997 follow-up examination. Table 5-12 summarizes the reported health status of participants fully compliant to the 1997 physical examination. Among fully compliant participants, a marginally significant association was found between reported health at the time of scheduling and group (Ranch Hand, Comparison) ($p=0.076$). More Ranch Hands reported their health as fair (12.9%) than did Comparisons (9.7%).

Table 5-12. Reported Health Status of Fully Compliant Participants

Reported Health Status	Group				Total	%	p-Value
	Ranch Hands		Comparisons				
	n ^a	%	n ^a	%			
Excellent	287	34.2	440	36.3	727	35.5	0.076
Good	443	52.9	653	53.9	1,096	53.5	
Fair	108	12.9	118	9.7	226	11.0	
Poor	0	0.0	0	0.0	0	0.0	
Total	838		1,211		2,049		

^a Does not include 32 Ranch Hands and 40 Comparisons who answered “Don’t Know.”

Table 5-13. Reported Medication Use of Fully Compliant Participants

Medication Use	Group				Total	%	p-Value
	Ranch Hands		Comparisons				
	n ^a	%	n	%			
Yes	512	58.9	688	55.0	1,200	56.6	0.081
No	357	41.1	563	45.0	920	43.4	
Total	869		1,251		2,120		

^a One Ranch Hand did not report on medication use.

Table 5-14. Reported Work Loss of Fully Compliant Participants

Work Loss	Group				Total	%	p-Value
	Ranch Hands		Comparisons				
	n	%	n	%			
Yes	105	16.7	148	16.5	253	16.6	0.968
No	524	83.3	750	83.5	1,274	83.4	
Total	629		898		1,527		

Note: Does not include the following: 22 unemployed (9 Ranch Hands, 13 Comparisons)
564 retired (231 Ranch Hands, 333 Comparisons)
8 who did not answer (1 Ranch Hand, 7 Comparisons).

A marginally significant association was found between reported use of medication and group ($p=0.081$). As shown in Table 5-13, a greater percentage of Ranch Hands (58.9%) reported medication use than did Comparisons (55.0%). Use of medication increased in both groups since 1992; however, that increase was parallel. In 1992, 44.1 percent of Ranch Hands and 40.4 percent of Comparisons reported medication use compared to 58.9 percent and 55.0 percent, respectively, in 1997. Table 5-14 shows reported work loss for fully compliant Ranch Hands and Comparisons. The difference between the two groups narrowed from 1992, and no significant association was found between work loss and group ($p=0.968$) in 1997.

5.7 CONCLUSION

Although more Comparisons than Ranch Hands refused to participate in the 1997 follow-up examination, there is no significant difference in the reasons for refusal among the two groups. The reasons for refusal differed with age and rank but did not differ significantly for race. Logistics and health reasons were the most common reasons for refusal, although there were a substantial number of veterans deemed hostile from whom a reason for refusal was not determined. In replacing noncompliant Original Comparisons, either compliant replacements were found or no replacement was necessary (e.g., the Original Comparison was deceased and no Replacement Comparison had been contacted previously) for approximately 91 percent of the cases.

Self-reported health status differed with group, age, rank, and compliance status, but not with race, among those reporting health status. Ranch Hands, older participants, enlisted men, and refusals were more likely to report fair or poor health. Ranch Hands reported fair or poor health more often than did Comparisons. In both groups veterans who refused were more likely to report fair or poor health than those who were fully compliant. This pattern of Ranch Hands reporting poorer health has been observed since the baseline examination. Using work loss and medication use as more objective indicators of health than health perception, Ranch Hands reported a slightly higher use of medications, but no difference was seen in reported work loss between Ranch Hands and Comparisons. A further analysis of self-perception of health, as reported by fully compliant participants at the 1997 follow-up examination, is given in Chapter 9, General Health Assessment.

In summary, the results of these analyses suggested that Ranch Hands may be reporting poorer health than Comparisons and that these group differences are present for both fully compliant participants and refusals. This holds true even after accounting for rank and age differences. In addition, the difference in the percentage of fully compliant participants and refusals reporting fair or poor health was similar for Ranch Hands and Comparisons.

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