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MEMORANDUM REPORT
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QUALITY OF LIFE MEASUREMENT AND ANALYSIS (QUAILMAN)

MARCH 1996

PREPARED BY
RESOURCE ANALYSIS DIVISION

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The purpose of the QUAILMAN Quick Reaction Analysis (QRA) was to evaluate the costs and benefits of selected Army quality of life programs. Quality of life (QOL) cost data was provided by the US Army Cost and Economic Analysis Center in thousands of constant fiscal year (FY) 96 dollars per soldier. QOL benefit data was drawn from several selected items of recent administrations of the Army Sample Survey of Military Personnel (SSMP) conducted biannually by the US Army Research Institute. Each selected SSMP item was related to some Army QOL issue such as government housing quality. Each respondent was asked to express his satisfaction or dissatisfaction with that issue based on his experience. The benefit was measured as the percentage of respondents who were satisfied with the issue. Generally, the SSMP data suggest that the overall quality of life in the Army may have declined recently, while the quality of life cost per soldier has increased. Specifically, there was a 10 percent drop in the percent satisfaction for the total Army population in the area of government housing quality over 2-1/2 years.

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QUALITY OF LIFE MEASUREMENT AND ANALYSIS

SUMMARY

THE REASON FOR PERFORMING THE QUICK REACTION ANALYSIS (QRA) was to provide planners of the fiscal year (FY) 1998 Program Objective Memorandum (POM) build with information about recent trends in the cost and benefits of selected Army Quality of Life (QOL) programs.

THE QRA SPONSOR was the Office of the Assistant Chief of Staff for Installation Management (ACSIM).

THE QRA OBJECTIVE was to evaluate the costs and benefits of selected Army Quality of Life programs in support of the FY 98 POM build.

THE SCOPE OF THE QRA will consider cost and benefit data. QOL cost data was provided in terms of cost per soldier in FY 96 current dollars by the US Army Cost and Economic Analysis Center (USACEAC). QOL benefit data was drawn from several selected items of recent administrations of the Army Sample Survey of Military Personnel (SSMP) conducted biannually by the US Army Personnel Office of the US Army Research Institute (ARI).

THE ASSUMPTION of this QRA is that the benefit data provided by ARI can be meaningfully matched to the cost data provided by USACEAC.

THE BASIC APPROACH was to:

(1) Estimate parameters of a standard statistical model relating cost and benefit data .

(2) Perform statistical tests of hypotheses about the parameters to determine if the parameters related to cost and/or time are statistically significant.

(3) Perform statistical tests of hypotheses about parameters of the model related to differences between total population effects and subpopulation effects where the subpopulations are selected from demographic variables collected as part of the SSMP.

(4) Present graphically some of the more important results.

THE PRINCIPAL FINDINGS AND OBSERVATIONS

(1) The SSMP data suggests that the overall quality of life in the Army may have declined recently, while the quality of life cost per soldier has increased.

(2) There is about a 10 percent drop in the satisfaction of the total Army population in the area of government housing quality over 2 1/2 years.

(3) It is not clear that the benefits as measured by the SSMP are totally dependent upon the cost.

(4) The Analysis Review Board, part of CAA's Total Quality Management Process, suggested that the sponsor might wish to explore conducting cost/benefit analyses at the installation level. For instance, there might be an increase in government housing quality satisfaction for an installation where housing was improved during the period.

THE QRA EFFORT was directed by Mr. Franklin Womack, Resource Analysis Division, US Army Concepts Analysis Agency (CAA).

COMMENTS AND QUESTIONS should be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-RA, 8120 Woodmont Avenue, Bethesda, MD 20814-2797.

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Quality of Life Measurement and Analysis (QUAILMAN)

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This report documents the results of the Quality of Life (QOL) Measurement and Analysis (QUAILMAN) Quick Reaction Analysis (QRA).

The purpose of this QRA was to generate a report to illustrate recent trends in costs and benefits of selected Army QOL programs. It was anticipated that these illustrations would be useful to planners in support of the fiscal year (FY) 98 Program Objective Memorandum (POM) build.

The QRA was sponsored by the Assistant Chief of Staff for Installation Management (ACSIM).

This report first describes the methodology used to conduct the QRA. The two main data inputs, benefits and costs, are described. Supplemental demographic variables are described. Finally, the analysis is presented in the form of graphs depicting (1) QOL benefits by time, (2) QOL benefits by cost, and (3) differences in QOL benefit responses by demographic factors.

Objective

The objective of this QRA is to evaluate the costs and benefits of selected Army Quality of Life programs (e.g., Family Housing) in support of the FY98 POM build.

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Approach

1. **Obtain benefit data from six semiannual administrations of the Sample Survey of Military Personnel (SSMP).**
2. **Match benefit characteristics of quality of life measured on the SSMP with cost data.**
3. **Analyze trends in cost and benefits for matched characteristics.**
4. **Analyze benefits by demographic factors.**
5. **Illustrate results of analysis using graphs and tables.**
6. **Document results in a memorandum report.**

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Benefit data was obtained from the Army Research Institute (ARI) in the form of questionnaire results. Cost data was provided by the Army Cost and Economic Analysis Center (USACEAC).

An initial meeting was held with the sponsor in order to plan the work of the study. The raw data for six recent surveys had been provided by ARI. At this time, the form, but not the substance, of the cost data was provided by USACEAC. At this meeting, the sponsor selected eight questionnaire items for use as benefit feedback variables. These eight items were matched to cost items supplied by USACEAC. Also, six demographic variables were selected from the questionnaire for use in determining differences in response from various subpopulations. The sponsor made the point that the benefits typically lag the cost by about 2 years.

The relevant benefit data was abstracted from six data bases provided by ARI and tabulated (Appendix C). Cost data were incorporated into these tables. These cost data were updated by USACEAC several times during the course of the study.

The original intent had been to model the benefit data as a function of cost. However, the cost data were not at hand early in the study. We therefore decided to work with the data at hand and to model the benefits data as a function of time and the selected demographic variables. The binary nature of the questionnaire responses, and the ultimate desire to predict future response, made the logistic regression model an appropriate research tool. Significant results from the modeling effort were graphed and appear later in this report.

As the study progressed, the final cost data update was received from USACEAC. A graphical analysis of the benefit feedback response variables versus the cost appear in this report.

Benefit Data

- **QOL items selected from the Sample Survey of Military Personnel (SSMP) administered by ARI twice each year**
- **Six sets of data from Spring 1992 to Fall 1994**
- **Answers provided in form of satisfied or dissatisfied response**

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The Sample Survey of Military Personnel (SSMP) is administered by ARI twice a year in the spring and fall. The survey gives Army personnel an opportunity to express their views about the Army. The results are used to assess current and planned Army services, policies, and programs.

A random sample of all permanent party, Active Component Army personnel is drawn to participate in each survey. The sample is drawn from the Standard Installation/Division Personnel System (SIDPERS) using the final one or two digits of social security numbers (SSNs).

The sample size represents about 10 percent of the officers and about 2 percent to 3 percent of the enlisted personnel. In Spring 1994, the sample size was chosen such that one could expect a sampling error of from ±1 to ± 3 percent. The survey was administered by the Personnel Survey Control Officer at each installation and overseas area.

The data collected are weighted up to Army strength for each individual rank. The Spring 1994 SSMP was weighted up to Army strength for end-April 1994 (based on the Deputy Chief of Staff for Personnel (DCSPER) 46, Part 1 report). Generally the data are weighted for gender and location (i.e., US Army Europe (USAREUR) versus elsewhere).

Items were selected for this study which seemed to relate to quality of life issues. Items selected either (1) expressed satisfaction or dissatisfaction with a particular facet of Army life based on the respondent's Army experience, or (2) expressed the rating of some quality of life such as high or low morale. In addition, the quality of life items selected for benefit analysis, six different demographic responses, were abstracted in order to determine differences in subpopulation responses. These included rank, age, ethnicity, gender, marital status, and location.

Items selected from SSMP to represent benefits

1. Satisfaction with Recreational Services.
2. Satisfaction with the quality of Army family programs.
3. Rate your current level of morale (low or high).
4. Satisfaction with overall quality of Army life.
5. Satisfaction with quality of government housing.
6. Satisfaction with amount of pay (basic).
7. Satisfaction with availability of government housing.
8. Satisfaction with VHA COLA.

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Eight questions were chosen from the SSMP to represent benefit responses.

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Demographic items selected from the SSMP

Total Army Population divided into subpopulations on the basis of :

1. Rank (6 groups)
2. Age (4 groups)
3. Ethnicity (5 groups)
4. Gender (2 groups)
5. Marital Status (2 groups)
6. Location (2 groups)

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Six demographic responses were abstracted from the SSMP to use as subpopulation groupings. The idea was to see if the subpopulation responses differed from those of the overall population in significant manner.

Rank subpopulations consisted of six groups as follows: (1) PV2 - SPC/CPL; (2) SGT - SSG; (3) SFC - SGM/CSM; (4) WO1 - WO5; (5) 2LT - CPT; and (6) MAJ - COL+.

Of note here is that the size of the sample for the WO1 - WO5 was smaller than the sample sizes of all the other rank subpopulations.

Age subpopulations were formed by dividing the age distribution of the sample into approximate quartiles: (1) 24 years or less; (2) 25 to 31 years; (3) 32 to 39 years; (4) 40 years or more.

Five ethnicity subpopulations were formed as follows: (1) White; (2) Black; (3) Hispanic; (4) Asian and Pacific Islander; (5) American Indian, Eskimo, or Aleut.

Of note in the ethnicity subpopulations is the small size of the samples with respect to the last three subpopulations and especially the size of the sample for the last subpopulation, American Indians.

Gender was divided into subpopulations of male and female.

Marital status was divided into subpopulations of single and married.

Current duty station location provided two subpopulations, CONUS and OCONUS.

Cost Data

- **Cost data obtained from the U.S. Army Cost and Economic Analysis Center.**
- **Cost is in cost per soldier in thousands of constant FY96 dollars.**
- **Total Cost broken down into subtotals for Facilities, People, Pay, and OSD funded.**

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Cost data was provided to this study by the US Army Cost and Economic Analysis Center. Each value was provided in thousands of constant FY 96 dollars per soldier. An overall QOL program's cost was provided by USACEAC. This was broken down into four main subtotals, and each division was further broken down. The main cost divisions and primary data sources were: (1) Facilities from the Office of the Chief of Staff for Installation Management (OACSIM), (2) People from Community Family Support Center (CFSC), (3) Pay with Pay Raise from ODCSPER, and (4) Office of the Secretary of Defense (OSD) funded programs from OSD.

Six SSMP responses (i.e., benefits) were ultimately matched to costs for analysis purposes. Two of the benefits were matched directly to the QOL total cost. The Facilities and the Pay with Pay Raise subtotals were matched to two other responses. The People subtotal was broken down into: (1) Morale, Welfare, and Recreation (MWR), (2) Child Care, (3) Youth Programs, and (4) Army Family Programs. The sum of (2), (3), and (4) was matched to a fifth response, and the MWR cost was matched to the last response.

Cost were provided for FY 89 through FY 95. Recall that the benefit data ran from Spring 92 to Fall 94. The cost data used in the study were to lead the benefit data by two years. FY 90 costs were matched to the benefits response of Spring 92. FY 91 costs were matched to benefit responses for Fall 92 and Spring 93. FY 92 costs were matched to benefit responses for Fall 93 and Spring 94. FY 93 costs were matched to the benefit responses for Fall 94.

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Cost matched with benefit items

Cost	Benefit
1. Total Quality of Life	1. Overall Quality of Life
2. Total Quality of Life	2. Your level of morale
3. Facilities	3. Quality of government housing
4. Pay with pay raise	4. Basic pay satisfaction
5. MWR	5. Recreation services
6. Family Program (child care, youth development, & Army Community Service (ACS))	6. Family programs

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Six of the eight benefits chosen from the SSMP were matched to costs with the assistance of the sponsor.

Logistic Regression Model in time and one demographic variable gender

$$\pi(T,G)=\frac{e^{\mu+\beta\cdot T+\alpha_1\cdot G_1+\alpha_2\cdot G_2+\gamma_1\cdot T\cdot G_1+\gamma_2\cdot T\cdot G_2}}{1+e^{\mu+\beta\cdot T+\alpha_1\cdot G_1+\alpha_2\cdot G_2+\gamma_1\cdot T\cdot G_1+\gamma_2\cdot T\cdot G_2}}$$

where $\pi(\mathrm{T},\mathrm{G})$ = percent satisfaction as a function of time T and gender G = $(\mathrm{G}_1, \mathrm{G}_2)$

G_1 = male

G_2 = female

$\mu,\beta,\alpha_1,\alpha_2,\gamma_1,\gamma_2$ coefficients of model, estimates determined from data

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There were two possible responses to each of the SSMP questions examined in this study. The two responses were: "I am satisfied with the particular facet of Army life" or "I am dissatisfied with this facet of Army life." At the same time that an individual respondent gave answers to the eight selected questions, he also described himself by characteristics such as rank, age, ethnicity, gender, marital status and present duty station (CONUS/ OCONUS). Each SSMP was administered at a particular time. A cost was expended upon each benefit. These variables are known as covariates.

A statistical model which is used to analyze binary responses in the presence of covariates is the logistic regression model. The illustrated model is the basic model used to analyze the data in the present study. The model shown is for the response as a function of time and gender. Eighty-four such models were fit to the study data. In each model fit, the response was one of the eight selected SSMP items. There were two covariates in each model. The first covariate was either time or cost. The second covariate was selected from the set of six demographic variables described above. The nature of the model and an extensive analysis of the data are presented in Appendix D.

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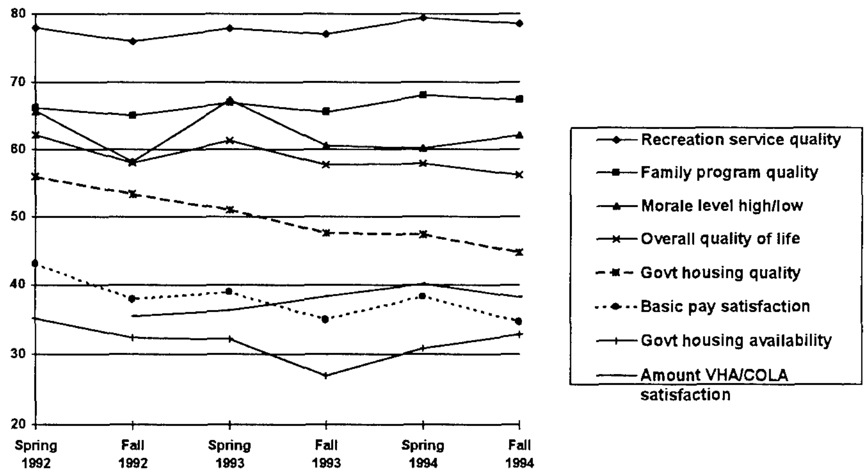
Benefits vs Time



SSMP Administration

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This is a graph of the percent satisfaction data for each benefit versus time. For each SSMP item examined, the graph depicts the percent satisfaction versus the date of administration (i.e., time) for the total population. The logistical regression model is used to test several statistical hypotheses about the various parameters of the model, as estimated from the data. The model parameters, μ and β, are total population parameters. The first test hypothesizes that the parameter of the model mean parameter, μ, is zero. A value of zero for μ in the logistic regression model means that the overall percent satisfaction is 50 percent. This test is rejected for every item except Government Housing Quality. Probably the most relevant test to this study is the test that hypothesizes that the parameter β is zero. This is the slope parameter, or trend in the case of time. The slope is a measure of the change in percent satisfaction with time. The test is rejected for every item except Family Programs. This means that there is a statistically significant trend in all the benefits except Family Programs. The signs of the estimates of β are all negative, except for Recreation Services Programs, which is positive, and Family Programs, which does not differ significantly from zero.

The greatest difference in percent satisfaction between Spring 1992 and Fall 1994 is found in the SSMP item, Government Housing Quality, which falls from 55.6 percent in Spring 1992 to 44.5 percent in Fall 1994. This is a difference of 10.1 percent.

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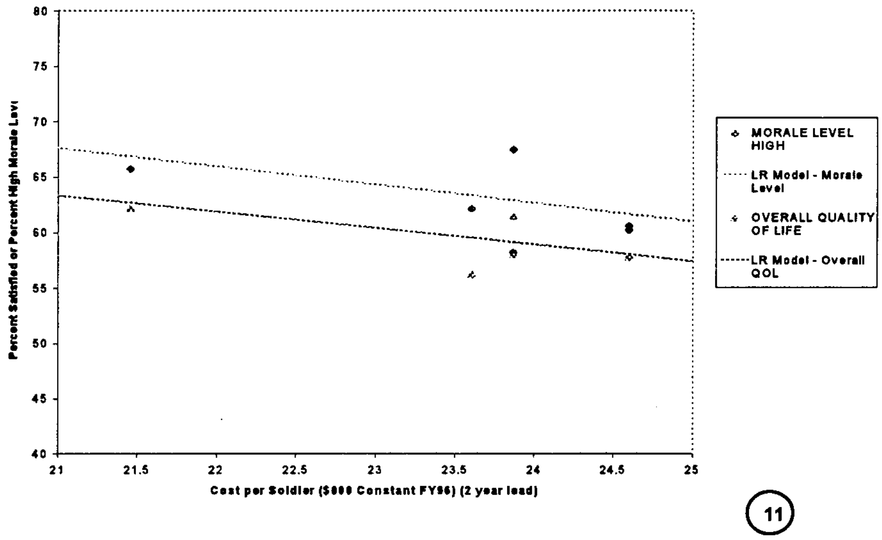
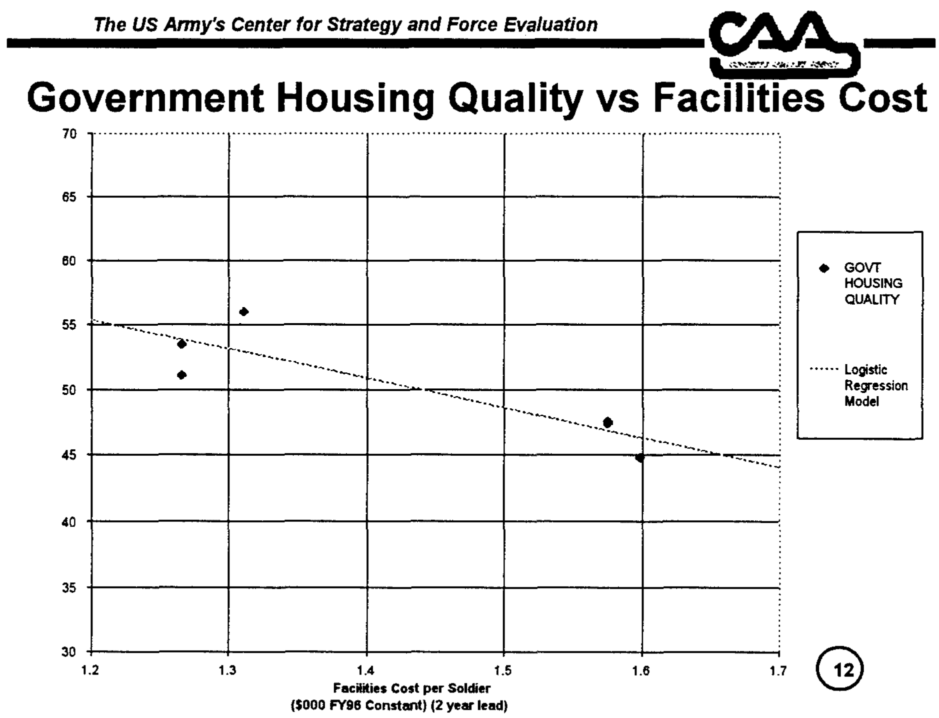
Quality of Life & Morale Level vs Cost



This graph depicts the percent satisfied response for two SSMP items, Overall Quality of Life (OQL) and Your Current Morale Level as a function of total cost per soldier in thousands of constant FY 96 dollars expended. The cost matched to these two items is the total QOL cost. The cost data leads the response data by 2 years. For example, FY 90 cost is matched against Spring 92 SSMP response. The response for Overall Quality of Life is percent satisfied, and for Your Current Morale Level the percent responding high as opposed to low. The distribution of cost data is very skewed. Notice that for five of the six cost points, the cost data centers about $24K, and there is only one point at about $21.5K. The point here is that the $21.5K point will have a higher leverage on any function fit to these points. Also notice that in some FYs, two response data points share the same cost.

The model fit to Overall Quality of Life gives a satisfaction of 62.5 percent for $21.5K and 58.9 percent for $24K. The model fit to Your Current Morale Level gives a high morale level of 66.8 percent for $21.5K and 61.8 percent for $24K. Notice that for both responses, OQL and Morale Level, the percent satisfaction, or percent high morale, decreases as cost increases.



This graph depicts the SSMP item, Satisfaction with Government Housing Quality versus Facilities Cost. The cost values center roughly about the two points \$1.3K and \$1.6K. The model fit to this item gives a 53.1 percent satisfied for \$1.3K and 46.4 percent satisfied for \$1.6K. Again there is a decrease in satisfaction for an increase in cost.

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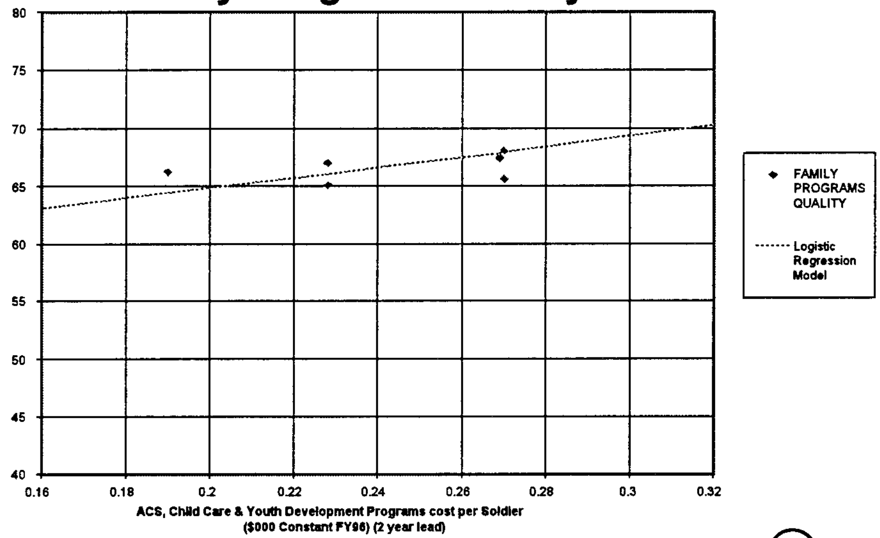
Family Programs Quality vs Cost



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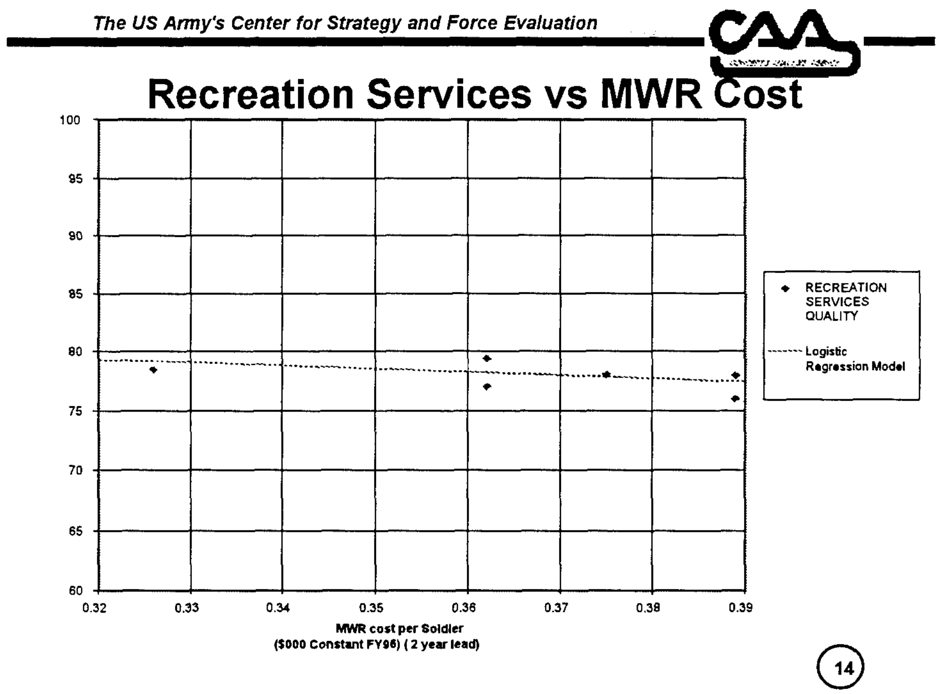
This graph depicts the SSMP item Satisfaction with Family Programs. The item is matched against the sum of the costs for Child Care, Youth Programs, and Army Family Program costs. The costs range from about $0.2K to $0.3K. The model fit to this data gives a 66.3 percent satisfied for $0.2K and 67.1 percent satisfied for $0.3K cost. This is the only item which shows an increase in satisfaction for an increase in cost.



This graph depicts the SSMP item Satisfaction with Recreation Services Programs. It is plotted against the MWR cost. The cost distribution for MWR ranges from about $ .32K to $.39K. The model fit to this data gives a 79.3 percent satisfaction for $ .32K and a 77.4 percent satisfaction for $.39K. This gives a decreased satisfaction with increased cost.

Note that when the independent variable for this item is changed from time to cost, the sign of the coefficient for time is positive and the coefficient for cost is negative. This is a result of the ordering in the cost. The MWR cost declined from a high of $ .389K in FY 91 to $ .326K in FY 93.

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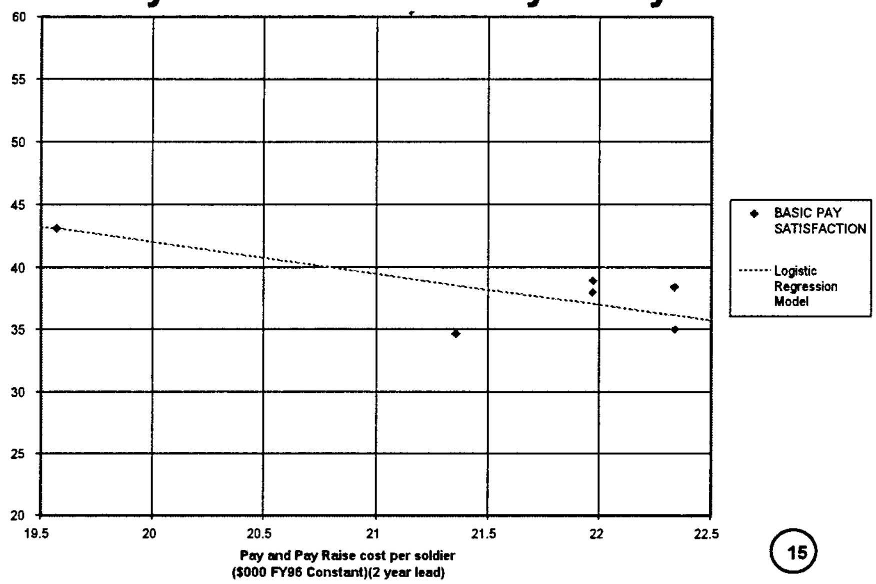
Basic Pay Satisfaction vs Pay & Pay Raise Cost



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This graph depicts the SSMP item Satisfaction with Basic Pay. It is plotted against cost of Basic Pay with Pay Raise. The cost for Pay and Pay Raise is skewed with one data point at roughly $19.5K and the remaining points centered at roughly $22K. It should be noted that this subtotal is a major proportion of the total OQL cost. The model fit to this data gives a 43.3 percent satisfied for $ 19.5K and 37.0 percent satisfied for $22K. Again there is less satisfaction as cost increases. This is really a paradox. When you pay your soldier more, he is less satisfied with the pay!

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Summary of Cost/Benefit Results

Year of Benefit	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
Year of Cost	FY90	FY91	FY91	FY92	FY92	FY93
SSMP ITEM						
OVERALL QUALITY OF LIFE						
% Satisfied	62.2	58.0	61.4	57.7	57.9	56.2
$ 000	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/LOW						
% High Morale	65.7	58.2	67.4	60.6	60.2	62.1
$ 000	21.46	23.87	23.87	24.60	24.60	23.61
BASIC PAY SATISFACTION						
% Satisfied	43.1	38.0	39.0	35.0	38.4	34.7
$ 000	19.970	21.969	21.969	22.338	22.338	21.357

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The next two charts summarize the benefit and cost data in a table for the overall population. The benefit data are percent satisfaction from each of six administrations of the SSMP from Spring 92 to Fall 94. The SSMP item category is listed on the left of the table. The numbers in parentheses are the year of the cost data used with each response. The cost is in thousands of constant FY 96 dollars per soldier. The years for the cost data lead the SSMP responses by at least 2 years. The cost data begin in FY 90 and end in FY 93. An expanded version of these tables is presented in Appendix C.

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Summary of Cost/Benefit Results

Year of Benefit	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
Year of Cost	FY90	FY91	FY91	FY92	FY92	FY93
SSMP ITEM						
GOVT HOUSING QUALITY						
% Satisfied	56.0	53.4	51.1	47.6	47.4	44.8
$ 000	1.313	1.265	1.265	1.575	1.575	1.598
FAMILY PROGRAMS QUALITY						
% Satisfied	66.2	65.1	67.0	65.6	68.0	67.4
$ 000	0.182	0.228	0.228	0.270	0.270	0.269
RECREATION SERVICES QUALITY						
% Satisfied	78.0	76.0	77.9	77.0	79.4	78.5
$ 000	0.375	0.389	0.389	0.362	0.362	0.326

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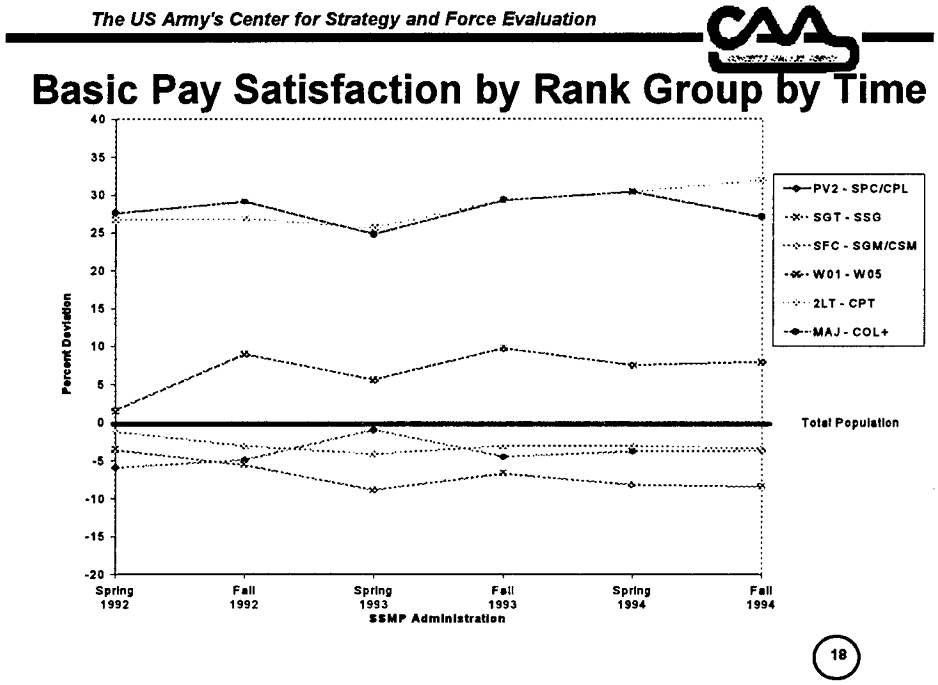
Subpopulation Analysis

Until now, we have looked at the total population. We now turn briefly to a discussion of how subpopulations, as defined by differences in rank, age, ethnicity, gender, marital status, and present duty station (CONUS/OCONUS) might differ from the total population. The logistical regression model is used to test several statistical hypotheses about the various parameters of the model, as estimated from the data. The model parameters α_j and γ_j (j =1 to m | for m subpopulations) are subpopulation parameters. The α_j measure the difference between the level of the subpopulation and the total population. The γ_j measure the difference between the slope for the subpopulation and the slope of the total population. Formal tests for these measures are fully discussed in Appendix D. In short, there were very few subpopulation slope differences which were significantly different from zero.

There were four significant subpopulation slope group variables (see Appendix D) associated with the 36 cost models fit. These consisted of two each for the SSMP items, Family Programs and Basic Pay Satisfaction. In the case of the Family Programs item, these two group variables involved slope differences in the marital status and location subpopulations. The model fit to the Family Programs item as a function of cost and marital status showed that over the cost range \$ .182K to \$.270K, the satisfaction increased for married respondents from 65.5 percent to 67.4 percent as cost increased. For single respondents over the same range, the model predicted that satisfaction would decrease from 67.7 percent to 64.1 percent. In the model fit to the Family Programs item as a function of cost and location of duty station (CONUS/OCONUS) over the same cost range, the satisfaction for CONUS located respondents decreased from 67.5 percent to 66.6 percent as cost increased, but for OCONUS-located respondents, the satisfaction increased from 61.3 percent to 67.6 percent as cost increased.

In the case of Basic Pay Satisfaction, there were also two slope group variables, ethnicity and rank, which had values significantly different from zero. In the case of ethnicity, the negative slope with respects to cost for the white subpopulation was slightly less negative than for the other four ethnic groups. In the case of ranks, the negative slope with respect to cost was slightly less for the subpopulation of PV2 - SPC/CPL and slightly more for the subpopulation SGT-SSG.



On the other hand, almost every group variable related to level differences between subpopulations was significantly different from zero. This means that there was a constant nonzero level difference between the subpopulations over all values of cost. In the main, the fits of the benefits versus time mirrored the fits of the benefits versus cost. The largest level differences were shown in the SSMP item Satisfaction with Basic Pay. The graph plotted here is representative of 77 out of the 84 models which had significant differences in the levels of one or more subpopulations and the total population. In fact, this graph shows both significant level and slope differences. The level differences are much more pronounced and can be recognized easily. The model estimates of the mean level for the total population is 37.7 percent. The model subpopulation mean levels are as follow: (1) PV2-SPC/CPL 34.1 percent, (2) SGT-SSG 31.0 percent, (3) SFC-SGM/CSM 35.0 percent, (4) WO1-WO5 44.9 percent, (5) 2LT-CPT 66.5 percent, and (6) MAJ-COL+ 66.1 percent. In addition to the significant level difference, the model also found two slope differences in this model which were significantly different from zero. The slopes of groups (2) and (5) differed from the slope of the total population for this model. The estimate of β (i.e., from logistic regression model) for the total population was -0.1217. The estimate of $\beta + \alpha_2$, the group (2) estimate, is -.02030, which indicates a slight decrease in the slope measure and a more vigorous dissatisfaction with basic pay with increasing time from this subpopulation than from the total population. On the other hand, the estimate of $\beta + \alpha_5$ is -0.0168, which almost neutralizes the slope of the total population. Thus, group (5) is much more satisfied with the basic pay than the total population, and this satisfaction increases throughout the period of Spring 1992 to Fall 1994.

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Limitations

1. Benefit data spans only two and one-half years.

2. Cost data defined at a very accumulated level.

3. Manpower, resources and deployment have been very turbulent during this period (i.e., downsizing, redeployment to Desert Storm, etc.).

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It is necessary that the same question be asked on consecutive administrations of the SSMP. The QOL questions used in this study have only appeared consecutively in the same form on the SSMP for the most recent administrations of SSMP (i.e., Spring 1992 to Fall 1994). In addition to spanning only the most recent past, the benefit data is obtained at twice the rate of the cost data. Cost data is annual and benefit data is semiannual. This causes two benefit data points, 6 months apart, to be matched to the same cost data point.

Cost data is defined per soldier for the total Army. If the cost data could be broken down to the same level as the benefit data, perhaps more meaningful insights could be obtained. The demographic data obtained for the benefit data is at the micro level, whereas the cost data provided is at the macro level of detail. This is quite a mismatch.

Data was collected during a turbulent period in which many factors, besides cost, could have influenced the benefit data. Chief among these were downsizing, redeployment to DESERT STORM, etc.

General Findings

1. **The SSMP data suggests that the overall quality of life in the Army may have declined recently, while the quality of life cost per soldier has increased.**

2. **There is an 11 percent drop in the satisfaction of the total Army population in the area of government housing quality over 2 1/2 years.**

3. **Overall QOL (-6%), morale level (-4%), and Basic Pay (-8%) had smaller, yet significant decreasing time trends over the same 2 1/2 years.**

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In general, the SSMP data suggest that the overall quality of life in the Army may have declined recently, while quality of life cost per soldier has increased. The only counterindication to this trend came in the area of Family Programs. The counterindication here occurs among married respondents who seem to be happy as time and cost increase.

The largest drop in satisfaction over the 2-1/2 year interval of the SSMP data came from the item about satisfaction with Government Housing. The drop for this item was 11 percent.

Other significant changes were obtained in overall quality of life, morale level, and basic pay.

General Findings

4. **Recreation Services (+1%) and Family Programs (+1%) show small increasing time trends over the 2 1/2 years.**

5. **It is not clear that the benefits as measured by the SSMP are totally dependent upon the cost.**

6. **The Analysis Review Board suggested it might be beneficial to the sponsor to conduct a cost/benefit analysis at the installation level in the future.**

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No significant changes were obtained for Recreation Services and Family Programs.

The Analysis Review Board convened at CAA suggested that the sponsor might wish to explore a cost/benefit analysis at the installation level. In regard to the Government Housing Satisfaction, it was felt that by looking at the installation level, the results might have changed for the better over some period in which recent housing enhancements were made at an installation.

Finally, it is not clear that the benefits as measured by the SSMP are totally dependent upon cost. Some more insight might have been gained if (1) the cost data were more detailed and (2) the SSMP data covered a larger time interval.

APPENDIX A

REQUEST FOR ANALYTICAL SUPPORT

PART 1

REQUEST FOR ANALYTICAL SUPPORT

1. Performing Directorate/ Division: RA	2. Account Number: 95147
3. Type Effort (Enter one): Q (S - Study, Q - QRA, P - Project, R - RAA, M - MMS) Mode (Contract=C):	4. Tasking (Enter one): V (F - Formal Directive, I - Informal, V - Verbal)

5. Title: Quality of Life Measurement and Analysis

6. Acronym: QUAILMAN	7. Date Request Received: 08/01/95	8. Date Due: 10/15/95

9. Requester/Sponsor (i.e., DCSOPS): ACSIM	10. Sponsor Division (i.e., SSW, N/A) RM

11. Impact on Other Studies, QRA, Projects, RAA: N/A

12. Product Required: Memorandum & Briefing

13. Estimated Resources Required:	a. Estimated PSM: 2.5	b. Estimated Funds:
c. Models Req'd:		d. Other:

14. Objective(s)/Abstract:
The sponsor is interested in knowing if there has been an improvement in the Army's quality of life (QOL) programs given that the costs of these programs have increased recently. The objective of this QRA is to evaluate the costs and benefits of selected Army Quality of Life programs (e.g., Family Housing) in support of the FY98 POM build.

15. Study Director/POC:	Last Name: WOMACK	First: FRANKLIN	Date: 08/11/95
	Signature: Franklin E. Womack		Phone#: 295-6930

GO TO BLOCK 20 *If this is A STUDY*. **See Tab C of the Study Directors' Guide for preparation of a Formal Study Directive.**

PART 2

16. Background/Statement of Problem*: The Army lacks information by which it can justify/evaluate the Army Quality of Life program.

17. Scope of Work*: This study will consider cost and benefit data. Quality of Life cost data will be provided in terms of cost per soldier developed by the U.S.Army Cost and Economic Analysis Center (CEAC). Quality of Life benefit data will be drawn from several selected items of recent adminstrations of the Army Sample Survey of Military Personnel (SSMP) conducted biannually by the U.S. Army Personnel Survey Office of the U.S. Army Research Institute (ARI).

18. Issues for Analysis*: How do QOL benefits relate to cost? Are the benefit and cost data comparable? Which demographic variables are of particular interest in relating benefits to cost ?

19. Milestones/Plan of Action*: Brief results to sponsor 10/15/95
Publish Memorandum Report 12/95

20. Division Chief Concurrence:	[signature]	Date: 9/1/95
21. Sponsor (COL/DA Div Chief) Concurrence:	[signature]	Date: 9-1-95

22. Sponsor Comments*:

CAA Form 233 (1 May 95)   * Continue on separate sheet   Previous editions Obsolete

APPENDIX B

QRA CONTRIBUTORS

QRA TEAM

a. QRA Director

Mr. Franklin E. Womack, Resource Analysis Division

b. Other Contributors

Ms. Tina H. Davis
Ms. Nancy M. Lawrence
Ms. Dana Unkle

c. Product Review Board

Mr. Ronald J. Iekel, Chairman

d. External Contributors

MAJ Steve Bryant (PC, DAIM-ZR)
Mr. Morris Peterson (PERI-RZD)
Mr. Bob Suchan (SFFM-CA-FI)

APPENDIX C

TABLE OF COST AND BENEFITS

This appendix provides a complete listing of cost and benefit data for four of the SSMP items and data for the total population only for the remaining four items studied in this QRA. Each SSMP item is identified in the first field. The second field identifies the total population or subpopulation to which the succeeding fields relate. The third field identifies one of four types of measurements. The first three measures are the percent satisfaction for a given administration of the SSMP and its upper and lower 95 percent confidence limits. The fourth measure is the cost per soldier (2-year lead) in thousands of constant FY 96 dollars.

The last six columns give the data for one of the specific SSMP administrations (Spring 1992 to Fall 1994).

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
OVERALL QUALITY OF	TOTAL POPULA	Upper 95% Confidence Limit	63.6	59.3	62.8	59.0	59.1	57.6
OVERALL QUALITY OF	TOTAL POPULA	Percent Satisfied Point Estimate	62.2	58.0	61.4	57.7	57.9	56.2
OVERALL QUALITY OF	TOTAL POPULA	Lower 95% Confidence Limit	60.8	56.7	60.1	56.4	56.7	54.8
OVERALL QUALITY OF	TOTAL POPULA	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	24 years or less	Upper 95% Confidence Limit	57.6	49.8	57.5	52.5	51.8	51.8
OVERALL QUALITY OF	24 years or less	Percent Satisfied Point Estimate	54.9	47.4	54.9	50.2	49.8	49.4
OVERALL QUALITY OF	24 years or less	Lower 95% Confidence Limit	52.2	45.1	52.4	47.9	47.8	46.9
OVERALL QUALITY OF	24 years or less	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	25 to 31 years	Upper 95% Confidence Limit	64.9	64.5	66.6	61.4	63.2	59.8
OVERALL QUALITY OF	25 to 31 years	Percent Satisfied Point Estimate	62.3	62.0	64.2	58.9	60.9	57.2
OVERALL QUALITY OF	25 to 31 years	Lower 95% Confidence Limit	59.8	59.5	61.7	56.4	58.6	54.5
OVERALL QUALITY OF	25 to 31 years	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	32 to 39 years	Upper 95% Confidence Limit	70.3	68.1	68.1	66.2	66.0	65.0
OVERALL QUALITY OF	32 to 39 years	Percent Satisfied Point Estimate	68.1	65.9	65.8	63.8	63.8	62.4
OVERALL QUALITY OF	32 to 39 years	Lower 95% Confidence Limit	65.9	63.6	63.6	61.3	61.5	59.8
OVERALL QUALITY OF	32 to 39 years	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	40 years or more	Upper 95% Confidence Limit	78.2	74.5	72.1	72.9	73.0	69.7
OVERALL QUALITY OF	40 years or more	Percent Satisfied Point Estimate	75.6	71.9	69.4	70.1	70.2	66.8
OVERALL QUALITY OF	40 years or more	Lower 95% Confidence Limit	73.0	69.3	66.8	67.2	67.5	63.9
OVERALL QUALITY OF	40 years or more	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
OVERALL QUALITY OF	WHITE	Upper 95% Confidence Limit	62.6	59.3	62.0	59.0	59.6	58.0
OVERALL QUALITY OF	WHITE	Percent Satisfied Point Estimate	60.8	57.7	60.2	57.3	58.2	56.3
OVERALL QUALITY OF	WHITE	Lower 95% Confidence Limit	59.0	56.0	58.5	55.7	521.5	54.5
OVERALL QUALITY OF	WHITE	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	BLACK	Upper 95% Confidence Limit	68.7	63.3	65.6	62.4	61.5	60.7
OVERALL QUALITY OF	BLACK	Percent Satisfied Point Estimate	65.9	60.6	63.0	59.6	58.9	57.7
OVERALL QUALITY OF	BLACK	Lower 95% Confidence Limit	63.2	58.0	60.4	56.8	56.4	54.6
OVERALL QUALITY OF	BLACK	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	HISPANIC	Upper 95% Confidence Limit	69.6	58.8	69.4	61.5	63.2	60.7
OVERALL QUALITY OF	HISPANIC	Percent Satisfied Point Estimate	65.4	54.5	65.3	57.5	59.5	56.3
OVERALL QUALITY OF	HISPANIC	Lower 95% Confidence Limit	61.2	50.2	61.2	53.4	55.8	51.9
OVERALL QUALITY OF	HISPANIC	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	ASIAN, PAC ISL	Upper 95% Confidence Limit	74.4	73.5	69.0	73.5	64.9	
OVERALL QUALITY OF	ASIAN, PAC ISL	Percent Satisfied Point Estimate	65.3	65.8	60.9	65.3	57.6	
OVERALL QUALITY OF	ASIAN, PAC ISL	Lower 95% Confidence Limit	56.1	58.1	52.7	57.1	50.3	
OVERALL QUALITY OF	ASIAN, PAC ISL	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	AMER IND, ESK	Upper 95% Confidence Limit	67.4	63.8	65.5	57.0	57.7	
OVERALL QUALITY OF	AMER IND, ESK	Percent Satisfied Point Estimate	55.4	53.8	53.9	46.7	48.6	
OVERALL QUALITY OF	AMER IND, ESK	Lower 95% Confidence Limit	43.4	43.7	42.2	36.5	39.6	
OVERALL QUALITY OF	AMER IND, ESK	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
OVERALL QUALITY OF	PV2 - SPC/CPL	Upper 95% Confidence Limit	55.9	49.1	56.2	51.3	51.4	50.4
OVERALL QUALITY OF	PV2 - SPC/CPL	Percent Satisfied Point Estimate	53.3	46.7	53.7	49.1	49.4	48.0
OVERALL QUALITY OF	PV2 - SPC/CPL	Lower 95% Confidence Limit	50.7	44.4	51.1	46.8	47.4	45.6
OVERALL QUALITY OF	PV2 - SPC/CPL	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	SGT - SSG	Upper 95% Confidence Limit	66.7	63.2	64.2	60.7	60.0	58.7
OVERALL QUALITY OF	SGT - SSG	Percent Satisfied Point Estimate	64.2	60.7	61.9	58.1	57.6	55.9
OVERALL QUALITY OF	SGT - SSG	Lower 95% Confidence Limit	61.8	58.2	59.5	55.5	55.2	53.0
OVERALL QUALITY OF	SGT - SSG	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	SFC - SGM/CSM	Upper 95% Confidence Limit	75.6	71.2	70.4	68.6	70.2	68.3
OVERALL QUALITY OF	SFC - SGM/CSM	Percent Satisfied Point Estimate	73.0	68.4	67.5	65.4	67.2	65.0
OVERALL QUALITY OF	SFC - SGM/CSM	Lower 95% Confidence Limit	70.3	65.6	64.6	62.2	64.2	61.8
OVERALL QUALITY OF	SFC - SGM/CSM	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	W01 - W05	Upper 95% Confidence Limit	72.9	71.0	73.3	71.1	70.5	66.7
OVERALL QUALITY OF	W01 - W05	Percent Satisfied Point Estimate	69.3	67.6	70.0	67.4	66.9	62.7
OVERALL QUALITY OF	W01 - W05	Lower 95% Confidence Limit	65.8	64.1	66.7	63.6	63.2	58.6
OVERALL QUALITY OF	W01 - W05	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	2LT - CPT	Upper 95% Confidence Limit	78.4	78.9	79.1	77.2	77.2	76.3
OVERALL QUALITY OF	2LT - CPT	Percent Satisfied Point Estimate	76.5	76.7	77.1	75.2	75.1	74.0
OVERALL QUALITY OF	2LT - CPT	Lower 95% Confidence Limit	74.7	74.5	75.2	73.1	72.9	71.7
OVERALL QUALITY OF	2LT - CPT	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	MAJ - COL+	Upper 95% Confidence Limit	81.6	80.3	79.1	79.3	79.6	73.4
OVERALL QUALITY OF	MAJ - COL+	Percent Satisfied Point Estimate	79.4	77.8	76.7	77.0	77.1	70.6
OVERALL QUALITY OF	MAJ - COL+	Lower 95% Confidence Limit	77.2	75.3	74.3	74.8	74.7	67.8
OVERALL QUALITY OF	MAJ - COL+	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
OVERALL QUALITY OF	MALE	Upper 95% Confidence Limit	63.4	59.0	62.5	59.3	58.6	57.1
OVERALL QUALITY OF	MALE	Percent Satisfied Point Estimate	61.9	57.6	61.0	57.9	57.3	55.5
OVERALL QUALITY OF	MALE	Lower 95% Confidence Limit	60.4	56.2	59.6	56.4	56.1	54.0
OVERALL QUALITY OF	MALE	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	FEMALE	Upper 95% Confidence Limit	69.0	65.3	67.7	59.5	65.2	64.0
OVERALL QUALITY OF	FEMALE	Percent Satisfied Point Estimate	65.0	61.4	64.2	56.5	61.8	60.4
OVERALL QUALITY OF	FEMALE	Lower 95% Confidence Limit	61.1	57.5	60.8	53.4	58.4	56.8
OVERALL QUALITY OF	FEMALE	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	CONUS	Upper 95% Confidence Limit	63.2	59.2	62.8	58.9	58.4	57.6
OVERALL QUALITY OF	CONUS	Percent Satisfied Point Estimate	61.7	57.8	61.2	57.4	57.1	56.0
OVERALL QUALITY OF	CONUS	Lower 95% Confidence Limit	60.2	56.4	59.7	55.9	55.8	54.3
OVERALL QUALITY OF	CONUS	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	OCONUS	Upper 95% Confidence Limit	66.7	62.1	64.8	62.2	64.9	59.7
OVERALL QUALITY OF	OCONUS	Percent Satisfied Point Estimate	63.6	58.8	61.9	59.2	62.2	57.0
OVERALL QUALITY OF	OCONUS	Lower 95% Confidence Limit	60.5	55.5	59.0	56.1	59.5	54.3
OVERALL QUALITY OF	OCONUS	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	SINGLE	Upper 95% Confidence Limit	59.3	52.9	58.2	53.6	54.7	53.9
OVERALL QUALITY OF	SINGLE	Percent Satisfied Point Estimate	56.8	50.6	55.8	51.3	52.8	51.6
OVERALL QUALITY OF	SINGLE	Lower 95% Confidence Limit	54.3	48.3	53.5	49.1	50.8	49.3
OVERALL QUALITY OF	SINGLE	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610
OVERALL QUALITY OF	MARRIED	Upper 95% Confidence Limit	67.3	64.3	66.5	63.4	62.9	60.8
OVERALL QUALITY OF	MARRIED	Percent Satisfied Point Estimate	65.6	62.8	64.9	61.8	61.4	59.1
OVERALL QUALITY OF	MARRIED	Lower 95% Confidence Limit	63.9	61.2	63.3	60.1	59.9	57.4
OVERALL QUALITY OF	MARRIED	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.460	23.870	23.870	24.600	24.600	23.610

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
GOVT HOUSING QUALI	TOTAL POPULA	Upper 95% Confidence Limit	57.7	55.0	52.7	49.2	48.9	46.5
GOVT HOUSING QUALI	TOTAL POPULA	Percent Satisfied Point Estimate	56.0	53.4	51.1	47.6	47.4	44.8
GOVT HOUSING QUALI	TOTAL POPULA	Lower 95% Confidence Limit	54.3	51.7	49.4	45.9	45.9	43.1
GOVT HOUSING QUALI	TOTAL POPULA	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	24 years or less	Upper 95% Confidence Limit	60.3	57.3	57.1	50.1	51.8	52.4
GOVT HOUSING QUALI	24 years or less	Percent Satisfied Point Estimate	56.6	53.8	53.3	46.7	48.8	48.9
GOVT HOUSING QUALI	24 years or less	Lower 95% Confidence Limit	52.9	50.3	49.5	43.4	45.9	45.4
GOVT HOUSING QUALI	24 years or less	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	25 to 31 years	Upper 95% Confidence Limit	58.2	55.9	52.4	50.5	49.0	46.3
GOVT HOUSING QUALI	25 to 31 years	Percent Satisfied Point Estimate	55.1	53.0	49.4	47.5	46.3	43.1
GOVT HOUSING QUALI	25 to 31 years	Lower 95% Confidence Limit	52.1	50.0	46.5	44.5	43.6	40.0
GOVT HOUSING QUALI	25 to 31 years	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	32 to 39 years	Upper 95% Confidence Limit	58.0	55.7	53.3	50.2	48.0	45.4
GOVT HOUSING QUALI	32 to 39 years	Percent Satisfied Point Estimate	55.5	53.1	50.7	47.3	45.4	42.5
GOVT HOUSING QUALI	32 to 39 years	Lower 95% Confidence Limit	52.9	50.4	48.0	44.5	42.7	39.5
GOVT HOUSING QUALI	32 to 39 years	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	40 years or more	Upper 95% Confidence Limit	59.5	58.3	55.9	54.0	54.9	48.6
GOVT HOUSING QUALI	40 years or more	Percent Satisfied Point Estimate	56.3	55.2	52.7	50.6	51.7	45.2
GOVT HOUSING QUALI	40 years or more	Lower 95% Confidence Limit	53.2	52.1	49.5	47.1	48.5	41.7
GOVT HOUSING QUALI	40 years or more	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
GOVT HOUSING QUALI	WHITE	Upper 95% Confidence Limit	54.3	53.7	52.8	48.1	47.9	45.5
GOVT HOUSING QUALI	WHITE	Percent Satisfied Point Estimate	52.1	51.7	50.7	46.1	46.0	43.4
GOVT HOUSING QUALI	WHITE	Lower 95% Confidence Limit	50.0	49.7	48.6	44.0	44.2	41.3
GOVT HOUSING QUALI	WHITE	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	BLACK	Upper 95% Confidence Limit	64.0	62.0	54.1	56.8	52.8	51.5
GOVT HOUSING QUALI	BLACK	Percent Satisfied Point Estimate	60.8	58.7	50.9	53.3	49.7	47.8
GOVT HOUSING QUALI	BLACK	Lower 95% Confidence Limit	57.6	55.4	47.6	49.8	46.5	44.1
GOVT HOUSING QUALI	BLACK	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	HISPANIC	Upper 95% Confidence Limit	68.6	55.9	59.7	52.8	55.3	52.5
GOVT HOUSING QUALI	HISPANIC	Percent Satisfied Point Estimate	63.9	50.6	54.6	47.9	50.7	47.1
GOVT HOUSING QUALI	HISPANIC	Lower 95% Confidence Limit	59.1	45.2	49.6	43.0	46.1	41.8
GOVT HOUSING QUALI	HISPANIC	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	ASIAN, PAC ISL	Upper 95% Confidence Limit	72.9	63.0	53.9	54.8	56.5	
GOVT HOUSING QUALI	ASIAN, PAC ISL	Percent Satisfied Point Estimate	63.5	54.5	44.2	44.4	47.8	
GOVT HOUSING QUALI	ASIAN, PAC ISL	Lower 95% Confidence Limit	54.1	45.9	34.5	34.0	39.2	
GOVT HOUSING QUALI	ASIAN, PAC ISL	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	AMER IND, ESK	Upper 95% Confidence Limit	63.1	68.3	68.5	43.3	56.8	
GOVT HOUSING QUALI	AMER IND, ESK	Percent Satisfied Point Estimate	51.2	56.7	58.2	31.8	46.0	
GOVT HOUSING QUALI	AMER IND, ESK	Lower 95% Confidence Limit	39.3	45.1	47.8	20.4	35.3	
GOVT HOUSING QUALI	AMER IND, ESK	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
GOVT HOUSING QUALI	PV2 - SPC/CPL	Upper 95% Confidence Limit	60.7	57.7	55.9	49.3	53.8	51.2
GOVT HOUSING QUALI	PV2 - SPC/CPL	Percent Satisfied Point Estimate	57.2	54.2	52.1	46.0	50.9	47.8
GOVT HOUSING QUALI	PV2 - SPC/CPL	Lower 95% Confidence Limit	53.7	50.7	48.3	42.8	48.1	44.4
GOVT HOUSING QUALI	PV2 - SPC/CPL	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	SGT - SSG	Upper 95% Confidence Limit	59.5	55.4	52.6	50.3	46.0	45.5
GOVT HOUSING QUALI	SGT - SSG	Percent Satisfied Point Estimate	56.6	52.5	49.8	47.3	43.2	42.3
GOVT HOUSING QUALI	SGT - SSG	Lower 95% Confidence Limit	53.7	49.7	46.9	44.2	40.5	39.1
GOVT HOUSING QUALI	SGT - SSG	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	SFC - SGM/CSM	Upper 95% Confidence Limit	59.6	57.2	55.7	51.0	49.8	46.2
GOVT HOUSING QUALI	SFC - SGM/CSM	Percent Satisfied Point Estimate	56.4	53.9	52.3	47.3	46.4	42.5
GOVT HOUSING QUALI	SFC - SGM/CSM	Lower 95% Confidence Limit	53.2	50.6	48.9	43.5	42.9	38.8
GOVT HOUSING QUALI	SFC - SGM/CSM	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	W01 - W05	Upper 95% Confidence Limit	53.3	54.1	51.2	54.3	46.1	49.0
GOVT HOUSING QUALI	W01 - W05	Percent Satisfied Point Estimate	49.0	49.9	47.1	49.8	41.8	44.4
GOVT HOUSING QUALI	W01 - W05	Lower 95% Confidence Limit	44.7	45.8	43.0	45.2	37.5	39.8
GOVT HOUSING QUALI	W01 - W05	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	2LT - CPT	Upper 95% Confidence Limit	54.2	58.6	55.7	54.3	54.7	49.5
GOVT HOUSING QUALI	2LT - CPT	Percent Satisfied Point Estimate	51.6	55.5	52.9	51.4	51.7	46.3
GOVT HOUSING QUALI	2LT - CPT	Lower 95% Confidence Limit	49.1	52.4	50.0	48.6	48.8	43.1
GOVT HOUSING QUALI	2LT - CPT	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	MAJ - COL+	Upper 95% Confidence Limit	57.2	54.4	53.7	55.0	54.5	49.2
GOVT HOUSING QUALI	MAJ - COL+	Percent Satisfied Point Estimate	54.2	51.0	50.5	52.0	51.2	45.9
GOVT HOUSING QUALI	MAJ - COL+	Lower 95% Confidence Limit	51.3	47.7	47.3	48.9	47.9	42.5
GOVT HOUSING QUALI	MAJ - COL+	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
GOVT HOUSING QUALI	MALE	Upper 95% Confidence Limit	58.1	55.5	53.5	50.0	49.4	47.1
GOVT HOUSING QUALI	MALE	Percent Satisfied Point Estimate	56.4	53.8	51.7	48.3	47.9	45.2
GOVT HOUSING QUALI	MALE	Lower 95% Confidence Limit	54.6	52.1	49.9	46.5	46.3	43.4
GOVT HOUSING QUALI	MALE	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	FEMALE	Upper 95% Confidence Limit	57.8	55.2	50.7	46.5	48.3	46.1
GOVT HOUSING QUALI	FEMALE	Percent Satisfied Point Estimate	53.0	50.0	46.1	42.5	43.9	41.4
GOVT HOUSING QUALI	FEMALE	Lower 95% Confidence Limit	48.3	44.7	41.5	38.4	39.5	36.8
GOVT HOUSING QUALI	FEMALE	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	CONUS	Upper 95% Confidence Limit	56.0	54.1	51.5	47.4	47.9	47.4
GOVT HOUSING QUALI	CONUS	Percent Satisfied Point Estimate	54.1	52.3	49.6	45.6	46.3	45.3
GOVT HOUSING QUALI	CONUS	Lower 95% Confidence Limit	52.3	50.5	47.7	43.7	44.6	43.2
GOVT HOUSING QUALI	CONUS	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	OCONUS	Upper 95% Confidence Limit	63.4	60.1	58.2	59.0	54.3	46.7
GOVT HOUSING QUALI	OCONUS	Percent Satisfied Point Estimate	59.9	56.4	54.9	55.4	51.3	43.7
GOVT HOUSING QUALI	OCONUS	Lower 95% Confidence Limit	56.5	52.7	51.7	51.9	48.3	40.8
GOVT HOUSING QUALI	OCONUS	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	SINGLE	Upper 95% Confidence Limit	56.9	52.2	51.7	45.5	48.7	46.3
GOVT HOUSING QUALI	SINGLE	Percent Satisfied Point Estimate	53.5	48.7	48.3	42.4	45.9	43.0
GOVT HOUSING QUALI	SINGLE	Lower 95% Confidence Limit	50.1	45.1	45.0	39.3	43.1	39.7
GOVT HOUSING QUALI	SINGLE	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598
GOVT HOUSING QUALI	MARRIED	Upper 95% Confidence Limit	58.9	56.7	54.1	51.3	49.6	47.5
GOVT HOUSING QUALI	MARRIED	Percent Satisfied Point Estimate	57.1	54.9	52.2	49.4	47.9	45.5
GOVT HOUSING QUALI	MARRIED	Lower 95% Confidence Limit	55.2	53.0	50.3	47.4	46.2	43.5
GOVT HOUSING QUALI	MARRIED	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Housing	1.313	1.265	1.265	1.575	1.575	1.598

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
GOVT HOUSING AVAIL	TOTAL POPULA	Upper 95% Confidence Limit	36.7	33.8	33.6	28.3	32.1	34.5
GOVT HOUSING AVAIL	TOTAL POPULA	Percent Satisfied Point Estimate	35.2	32.4	32.2	27.0	30.9	32.9
GOVT HOUSING AVAIL	TOTAL POPULA	Lower 95% Confidence Limit	33.6	30.9	30.7	25.6	29.6	31.4
GOVT HOUSING AVAIL	TOTAL POPULA	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	24 years or less	Upper 95% Confidence Limit	38.0	29.8	31.6	25.3	29.7	34.8
GOVT HOUSING AVAIL	24 years or less	Percent Satisfied Point Estimate	34.5	26.9	28.5	22.7	27.3	31.8
GOVT HOUSING AVAIL	24 years or less	Lower 95% Confidence Limit	31.1	24.0	25.4	20.1	25.0	28.8
GOVT HOUSING AVAIL	24 years or less	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	25 to 31 years	Upper 95% Confidence Limit	36.6	34.1	34.3	28.0	31.5	32.1
GOVT HOUSING AVAIL	25 to 31 years	Percent Satisfied Point Estimate	33.9	31.5	31.7	25.6	29.2	29.4
GOVT HOUSING AVAIL	25 to 31 years	Lower 95% Confidence Limit	31.1	28.9	29.1	23.2	26.9	26.7
GOVT HOUSING AVAIL	25 to 31 years	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	32 to 39 years	Upper 95% Confidence Limit	38.3	39.2	37.1	33.9	35.7	39.2
GOVT HOUSING AVAIL	32 to 39 years	Percent Satisfied Point Estimate	35.9	36.8	34.6	31.4	33.4	36.4
GOVT HOUSING AVAIL	32 to 39 years	Lower 95% Confidence Limit	33.5	34.3	32.2	28.8	31.0	33.7
GOVT HOUSING AVAIL	32 to 39 years	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	40 years or more	Upper 95% Confidence Limit	40.5	41.3	40.4	35.5	43.0	41.7
GOVT HOUSING AVAIL	40 years or more	Percent Satisfied Point Estimate	37.5	38.3	37.5	32.5	39.9	38.4
GOVT HOUSING AVAIL	40 years or more	Lower 95% Confidence Limit	34.6	35.3	34.6	29.5	36.9	35.1
GOVT HOUSING AVAIL	40 years or more	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
GOVT HOUSING AVAIL	WHITE	Upper 95% Confidence Limit	35.1	33.3	34.5	28.9	32.4	34.2
GOVT HOUSING AVAIL	WHITE	Percent Satisfied Point Estimate	33.1	31.6	32.7	27.3	30.8	32.3
GOVT HOUSING AVAIL	WHITE	Lower 95% Confidence Limit	31.2	29.8	30.8	25.6	29.3	30.4
GOVT HOUSING AVAIL	WHITE	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	BLACK	Upper 95% Confidence Limit	40.6	38.9	35.2	31.2	34.9	40.5
GOVT HOUSING AVAIL	BLACK	Percent Satisfied Point Estimate	37.5	35.9	32.3	28.2	32.1	37.1
GOVT HOUSING AVAIL	BLACK	Lower 95% Confidence Limit	34.4	32.8	29.4	25.2	29.3	33.7
GOVT HOUSING AVAIL	BLACK	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	HISPANIC	Upper 95% Confidence Limit	46.4	34.1	35.3	29.4	35.5	34.0
GOVT HOUSING AVAIL	HISPANIC	Percent Satisfied Point Estimate	41.5	29.6	30.8	25.4	31.6	29.4
GOVT HOUSING AVAIL	HISPANIC	Lower 95% Confidence Limit	36.7	25.1	26.2	21.3	27.6	24.8
GOVT HOUSING AVAIL	HISPANIC	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	ASIAN, PAC ISL	Upper 95% Confidence Limit	41.3	32.2	39.2	32.5	38.4	
GOVT HOUSING AVAIL	ASIAN, PAC ISL	Percent Satisfied Point Estimate	33.3	24.7	32.0	24.4	30.6	
GOVT HOUSING AVAIL	ASIAN, PAC ISL	Lower 95% Confidence Limit	25.4	17.2	24.7	16.3	22.9	
GOVT HOUSING AVAIL	ASIAN, PAC ISL	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	AMER IND, ESK	Upper 95% Confidence Limit	43.1	56.8	41.5	25.4	32.4	
GOVT HOUSING AVAIL	AMER IND, ESK	Percent Satisfied Point Estimate	28.8	46.1	28.7	16.9	23.6	
GOVT HOUSING AVAIL	AMER IND, ESK	Lower 95% Confidence Limit	14.5	35.3	15.9	08.4	14.7	
GOVT HOUSING AVAIL	AMER IND, ESK	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
GOVT HOUSING AVAIL	PV2 - SPC/CPL	Upper 95% Confidence Limit	36.4	30.1	31.7	23.9	29.3	33.3
GOVT HOUSING AVAIL	PV2 - SPC/CPL	Percent Satisfied Point Estimate	33.2	27.2	28.6	21.5	27.0	30.4
GOVT HOUSING AVAIL	PV2 - SPC/CPL	Lower 95% Confidence Limit	30.0	24.2	25.5	19.1	24.7	27.5
GOVT HOUSING AVAIL	PV2 - SPC/CPL	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	SGT - SSG	Upper 95% Confidence Limit	38.4	35.6	33.8	29.5	30.9	34.7
GOVT HOUSING AVAIL	SGT - SSG	Percent Satisfied Point Estimate	35.7	33.0	31.3	26.8	28.5	31.8
GOVT HOUSING AVAIL	SGT - SSG	Lower 95% Confidence Limit	33.1	30.4	28.8	24.2	26.0	28.9
GOVT HOUSING AVAIL	SGT - SSG	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	SFC - SGM/CSM	Upper 95% Confidence Limit	39.8	41.1	39.8	35.5	40.5	41.6
GOVT HOUSING AVAIL	SFC - SGM/CSM	Percent Satisfied Point Estimate	36.8	38.0	36.6	32.1	37.2	38.0
GOVT HOUSING AVAIL	SFC - SGM/CSM	Lower 95% Confidence Limit	33.7	34.9	33.4	28.7	33.9	34.5
GOVT HOUSING AVAIL	SFC - SGM/CSM	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	W01 - W05	Upper 95% Confidence Limit	42.4	39.9	42.0	40.6	37.7	40.9
GOVT HOUSING AVAIL	W01 - W05	Percent Satisfied Point Estimate	38.4	36.0	38.2	36.3	33.7	36.5
GOVT HOUSING AVAIL	W01 - W05	Lower 95% Confidence Limit	34.4	32.2	34.4	32.1	29.8	32.1
GOVT HOUSING AVAIL	W01 - W05	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	2LT - CPT	Upper 95% Confidence Limit	39.1	39.0	39.1	36.3	42.0	39.4
GOVT HOUSING AVAIL	2LT - CPT	Percent Satisfied Point Estimate	36.8	36.3	36.6	33.8	39.3	36.5
GOVT HOUSING AVAIL	2LT - CPT	Lower 95% Confidence Limit	34.5	33.5	34.1	31.3	36.6	33.6
GOVT HOUSING AVAIL	2LT - CPT	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	MAJ - COL+	Upper 95% Confidence Limit	39.8	39.4	40.4	36.7	40.6	37.9
GOVT HOUSING AVAIL	MAJ - COL+	Percent Satisfied Point Estimate	37.1	36.3	37.4	34.0	37.6	34.8
GOVT HOUSING AVAIL	MAJ - COL+	Lower 95% Confidence Limit	34.3	33.3	34.5	31.2	34.6	31.7
GOVT HOUSING AVAIL	MAJ - COL+	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
GOVT HOUSING AVAIL	MALE	Upper 95% Confidence Limit	37.4	33.8	33.4	29.0	32.6	34.2
GOVT HOUSING AVAIL	MALE	Percent Satisfied Point Estimate	35.7	32.3	31.8	27.6	31.2	32.6
GOVT HOUSING AVAIL	MALE	Lower 95% Confidence Limit	34.1	30.8	30.3	26.1	29.9	30.9
GOVT HOUSING AVAIL	MALE	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	FEMALE	Upper 95% Confidence Limit	35.4	37.2	39.0	25.8	31.9	39.5
GOVT HOUSING AVAIL	FEMALE	Percent Satisfied Point Estimate	31.1	32.6	34.9	22.8	28.3	35.3
GOVT HOUSING AVAIL	FEMALE	Lower 95% Confidence Limit	26.7	28.1	30.8	19.7	24.6	31.1
GOVT HOUSING AVAIL	FEMALE	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	CONUS	Upper 95% Confidence Limit	33.1	32.5	31.6	26.8	30.5	33.0
GOVT HOUSING AVAIL	CONUS	Percent Satisfied Point Estimate	31.4	31.0	29.9	25.3	29.0	31.2
GOVT HOUSING AVAIL	CONUS	Lower 95% Confidence Limit	29.8	29.4	28.3	23.8	27.6	29.4
GOVT HOUSING AVAIL	CONUS	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	OCONUS	Upper 95% Confidence Limit	48.5	40.3	41.7	37.0	40.1	40.2
GOVT HOUSING AVAIL	OCONUS	Percent Satisfied Point Estimate	45.0	36.8	38.6	33.8	37.3	37.4
GOVT HOUSING AVAIL	OCONUS	Lower 95% Confidence Limit	41.5	33.3	35.5	30.5	34.4	34.6
GOVT HOUSING AVAIL	OCONUS	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	SINGLE	Upper 95% Confidence Limit	40.7	34.1	39.0	29.5	34.3	38.7
GOVT HOUSING AVAIL	SINGLE	Percent Satisfied Point Estimate	37.5	30.9	35.9	26.7	31.8	35.5
GOVT HOUSING AVAIL	SINGLE	Lower 95% Confidence Limit	34.2	27.7	32.7	24.0	29.3	32.3
GOVT HOUSING AVAIL	SINGLE	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086
GOVT HOUSING AVAIL	MARRIED	Upper 95% Confidence Limit	36.2	34.3	32.6	28.5	31.8	33.9
GOVT HOUSING AVAIL	MARRIED	Percent Satisfied Point Estimate	34.5	32.7	31.0	26.9	30.3	32.2
GOVT HOUSING AVAIL	MARRIED	Lower 95% Confidence Limit	32.7	31.1	29.4	25.4	28.9	30.5
GOVT HOUSING AVAIL	MARRIED	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (BAQ Sub	2.391	2.724	2.724	2.142	2.142	2.086

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
MORALE LEVEL HIGH/L	TOTAL POPULA	Upper 95% Confidence Limit	67.4	59.8	69.0	62.2	61.6	63.8
MORALE LEVEL HIGH/L	TOTAL POPULA	Percent Satisfied Point Estimate	65.7	58.2	67.4	60.6	60.2	62.1
MORALE LEVEL HIGH/L	TOTAL POPULA	Lower 95% Confidence Limit	64.0	56.6	65.8	59.0	58.7	60.4
MORALE LEVEL HIGH/L	TOTAL POPULA	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	24 years or less	Upper 95% Confidence Limit	60.9	48.7	62.2	55.6	53.9	55.4
MORALE LEVEL HIGH/L	24 years or less	Percent Satisfied Point Estimate	57.5	45.7	59.1	52.8	51.4	52.4
MORALE LEVEL HIGH/L	24 years or less	Lower 95% Confidence Limit	54.2	42.7	56.0	50.0	49.0	49.4
MORALE LEVEL HIGH/L	24 years or less	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	25 to 31 years	Upper 95% Confidence Limit	68.9	63.5	71.3	63.4	64.3	65.2
MORALE LEVEL HIGH/L	25 to 31 years	Percent Satisfied Point Estimate	65.7	60.4	68.4	60.4	61.5	61.9
MORALE LEVEL HIGH/L	25 to 31 years	Lower 95% Confidence Limit	62.6	57.4	65.4	57.4	58.7	58.6
MORALE LEVEL HIGH/L	25 to 31 years	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	32 to 39 years	Upper 95% Confidence Limit	75.4	72.2	78.8	71.6	70.2	75.9
MORALE LEVEL HIGH/L	32 to 39 years	Percent Satisfied Point Estimate	72.8	69.4	76.3	68.8	67.5	72.9
MORALE LEVEL HIGH/L	32 to 39 years	Lower 95% Confidence Limit	70.2	66.7	73.8	65.9	64.8	69.9
MORALE LEVEL HIGH/L	32 to 39 years	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	40 years or more	Upper 95% Confidence Limit	82.3	77.7	80.5	76.2	79.5	80.6
MORALE LEVEL HIGH/L	40 years or more	Percent Satisfied Point Estimate	79.6	74.6	77.6	73.1	76.5	77.4
MORALE LEVEL HIGH/L	40 years or more	Lower 95% Confidence Limit	76.9	71.6	74.7	70.0	73.5	74.3
MORALE LEVEL HIGH/L	40 years or more	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
MORALE LEVEL HIGH/L	WHITE	Upper 95% Confidence Limit	66.4	58.6	66.4	60.5	60.9	62.3
MORALE LEVEL HIGH/L	WHITE	Percent Satisfied Point Estimate	64.2	56.6	64.3	58.5	59.1	60.2
MORALE LEVEL HIGH/L	WHITE	Lower 95% Confidence Limit	62.1	54.6	62.2	56.4	57.3	58.0
MORALE LEVEL HIGH/L	WHITE	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	BLACK	Upper 95% Confidence Limit	71.9	64.6	74.1	67.8	66.8	70.2
MORALE LEVEL HIGH/L	BLACK	Percent Satisfied Point Estimate	68.6	61.2	71.1	64.5	63.8	621.5
MORALE LEVEL HIGH/L	BLACK	Lower 95% Confidence Limit	65.3	57.7	68.0	61.2	60.8	63.2
MORALE LEVEL HIGH/L	BLACK	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	HISPANIC	Upper 95% Confidence Limit	75.1	64.0	79.1	70.4	67.0	70.7
MORALE LEVEL HIGH/L	HISPANIC	Percent Satisfied Point Estimate	70.1	59.2	74.7	65.8	62.8	65.6
MORALE LEVEL HIGH/L	HISPANIC	Lower 95% Confidence Limit	65.0	54.3	70.3	61.2	58.5	60.5
MORALE LEVEL HIGH/L	HISPANIC	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	ASIAN, PAC ISL	Upper 95% Confidence Limit	82.1	88.5	83.0	78.0	69.0	
MORALE LEVEL HIGH/L	ASIAN, PAC ISL	Percent Satisfied Point Estimate	72.8	80.1	74.0	68.5	60.3	
MORALE LEVEL HIGH/L	ASIAN, PAC ISL	Lower 95% Confidence Limit	63.5	71.7	65.0	59.0	51.6	
MORALE LEVEL HIGH/L	ASIAN, PAC ISL	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	AMER IND, ESK	Upper 95% Confidence Limit	76.5	63.9	88.0	59.8	59.2	
MORALE LEVEL HIGH/L	AMER IND, ESK	Percent Satisfied Point Estimate	61.7	52.3	75.0	50.0	48.6	
MORALE LEVEL HIGH/L	AMER IND, ESK	Lower 95% Confidence Limit	46.8	40.7	61.9	40.1	38.0	
MORALE LEVEL HIGH/L	AMER IND, ESK	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
MORALE LEVEL HIGH/L	PV2 - SPC/CPL	Upper 95% Confidence Limit	58.2	45.6	60.9	52.2	52.0	52.9
MORALE LEVEL HIGH/L	PV2 - SPC/CPL	Percent Satisfied Point Estimate	54.9	42.6	57.7	49.5	49.6	49.9
MORALE LEVEL HIGH/L	PV2 - SPC/CPL	Lower 95% Confidence Limit	51.7	39.7	54.6	46.8	47.2	47.0
MORALE LEVEL HIGH/L	PV2 - SPC/CPL	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	SGT - SSG	Upper 95% Confidence Limit	71.7	66.6	72.3	65.8	62.6	67.6
MORALE LEVEL HIGH/L	SGT - SSG	Percent Satisfied Point Estimate	68.7	63.4	69.5	62.6	59.6	64.1
MORALE LEVEL HIGH/L	SGT - SSG	Lower 95% Confidence Limit	65.7	60.3	66.7	59.4	56.6	60.6
MORALE LEVEL HIGH/L	SGT - SSG	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	SFC - SGM/CSM	Upper 95% Confidence Limit	81.9	78.9	83.7	78.3	79.5	84.1
MORALE LEVEL HIGH/L	SFC - SGM/CSM	Percent Satisfied Point Estimate	78.9	75.7	80.7	74.8	76.2	80.8
MORALE LEVEL HIGH/L	SFC - SGM/CSM	Lower 95% Confidence Limit	76.0	72.5	77.6	71.2	72.8	77.5
MORALE LEVEL HIGH/L	SFC - SGM/CSM	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	W01 - W05	Upper 95% Confidence Limit	79.6	73.3	82.0	77.6	78.7	74.5
MORALE LEVEL HIGH/L	W01 - W05	Percent Satisfied Point Estimate	75.6	69.0	78.4	73.3	74.4	69.6
MORALE LEVEL HIGH/L	W01 - W05	Lower 95% Confidence Limit	71.7	64.7	74.7	68.9	70.1	64.8
MORALE LEVEL HIGH/L	W01 - W05	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	2LT - CPT	Upper 95% Confidence Limit	81.7	81.0	81.4	79.1	79.9	80.4
MORALE LEVEL HIGH/L	2LT - CPT	Percent Satisfied Point Estimate	79.7	78.4	79.1	76.7	77.4	77.6
MORALE LEVEL HIGH/L	2LT - CPT	Lower 95% Confidence Limit	77.7	75.8	76.7	74.3	74.9	74.9
MORALE LEVEL HIGH/L	2LT - CPT	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	MAJ - COL+	Upper 95% Confidence Limit	81.9	81.0	81.1	79.0	79.1	81.2
MORALE LEVEL HIGH/L	MAJ - COL+	Percent Satisfied Point Estimate	79.4	77.9	78.3	76.2	76.1	78.2
MORALE LEVEL HIGH/L	MAJ - COL+	Lower 95% Confidence Limit	76.8	74.9	75.5	73.5	73.1	75.1
MORALE LEVEL HIGH/L	MAJ - COL+	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
MORALE LEVEL HIGH/L	MALE	Upper 95% Confidence Limit	68.5	60.6	70.3	64.0	62.8	65.0
MORALE LEVEL HIGH/L	MALE	Percent Satisfied Point Estimate	66.7	58.9	68.6	62.2	61.3	63.2
MORALE LEVEL HIGH/L	MALE	Lower 95% Confidence Limit	65.0	57.2	66.8	60.5	59.8	61.4
MORALE LEVEL HIGH/L	MALE	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	FEMALE	Upper 95% Confidence Limit	62.3	57.4	63.0	52.5	55.7	59.4
MORALE LEVEL HIGH/L	FEMALE	Percent Satisfied Point Estimate	57.0	52.3	58.5	48.7	51.4	54.7
MORALE LEVEL HIGH/L	FEMALE	Lower 95% Confidence Limit	51.6	47.2	54.0	44.8	47.1	50.1
MORALE LEVEL HIGH/L	FEMALE	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	CONUS	Upper 95% Confidence Limit	67.7	61.0	69.9	63.2	61.8	64.5
MORALE LEVEL HIGH/L	CONUS	Percent Satisfied Point Estimate	65.9	59.3	68.1	61.4	60.3	62.5
MORALE LEVEL HIGH/L	CONUS	Lower 95% Confidence Limit	64.1	57.6	66.4	59.7	58.7	60.6
MORALE LEVEL HIGH/L	CONUS	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	OCONUS	Upper 95% Confidence Limit	68.9	58.4	68.5	60.1	62.7	64.2
MORALE LEVEL HIGH/L	OCONUS	Percent Satisfied Point Estimate	65.1	54.3	64.8	56.4	59.5	60.9
MORALE LEVEL HIGH/L	OCONUS	Lower 95% Confidence Limit	61.3	50.2	61.1	52.8	56.2	57.6
MORALE LEVEL HIGH/L	OCONUS	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	SINGLE	Upper 95% Confidence Limit	62.2	53.1	62.1	56.5	55.7	57.3
MORALE LEVEL HIGH/L	SINGLE	Percent Satisfied Point Estimate	59.2	50.2	59.2	53.8	53.4	54.5
MORALE LEVEL HIGH/L	SINGLE	Lower 95% Confidence Limit	56.1	47.3	56.3	51.1	51.0	51.6
MORALE LEVEL HIGH/L	SINGLE	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61
MORALE LEVEL HIGH/L	MARRIED	Upper 95% Confidence Limit	71.6	65.6	74.3	66.9	66.2	69.2
MORALE LEVEL HIGH/L	MARRIED	Percent Satisfied Point Estimate	69.7	63.6	72.4	64.9	64.4	67.2
MORALE LEVEL HIGH/L	MARRIED	Lower 95% Confidence Limit	67.7	61.7	70.5	62.9	62.6	65.1
MORALE LEVEL HIGH/L	MARRIED	Total Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	21.46	23.87	23.87	24.60	24.60	23.61

SSMP ITEM	Population or Subpopulation	Measure	Spring 1992	Fall 1992	Spring 1993	Fall 1993	Spring 1994	Fall 1994
BASIC PAY SATISFACT	TOTAL POPULA	Upper 95% Confidence Limit	44.5	39.3	40.3	36.1	39.5	36.0
BASIC PAY SATISFACT	TOTAL POPULA	Percent Satisfied Point Estimate	43.1	38.0	39.0	35.0	38.4	34.7
BASIC PAY SATISFACT	TOTAL POPULA	Lower 95% Confidence Limit	41.7	36.8	37.7	33.8	37.3	33.4
BASIC PAY SATISFACT	TOTAL POPULA	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (Pay with	19.970	21.969	21.969	22.338	22.338	21.357
FAMILY PROGRAMS Q	TOTAL POPULA	Upper 95% Confidence Limit	67.8	66.7	68.5	67.2	69.4	69.1
FAMILY PROGRAMS Q	TOTAL POPULA	Percent Satisfied Point Estimate	66.2	65.1	67.0	65.6	68.0	67.4
FAMILY PROGRAMS Q	TOTAL POPULA	Lower 95% Confidence Limit	64.6	63.6	65.4	64.0	66.6	65.7
FAMILY PROGRAMS Q	TOTAL POPULA	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars)	0.182	0.228	0.228	0.270	0.270	0.269
		(Sum of Child Care, Youth Programs and ARMY Family Programs)						
RECREATION SERVICE	TOTAL POPULA	Upper 95% Confidence Limit	79.3	77.1	79.0	78.2	80.4	79.7
RECREATION SERVICE	TOTAL POPULA	Percent Satisfied Point Estimate	78.0	76.0	77.9	77.0	79.4	78.5
RECREATION SERVICE	TOTAL POPULA	Lower 95% Confidence Limit	76.8	74.8	76.7	75.9	78.4	77.3
RECREATION SERVICE	TOTAL POPULA	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (MWR Su	0.375	0.389	0.389	0.362	0.362	0.326
AMOUNT VHA/COLA S	TOTAL POPULA	Upper 95% Confidence Limit		36.9	37.7	39.9	41.5	39.8
AMOUNT VHA/COLA S	TOTAL POPULA	Percent Satisfied Point Estimate		35.5	36.3	38.4	40.2	38.3
AMOUNT VHA/COLA S	TOTAL POPULA	Lower 95% Confidence Limit		34.1	34.9	37.0	38.9	36.8
AMOUNT VHA/COLA S	TOTAL POPULA	Cost per Soldier (2 Year Lead) $K (96 Constant Dollars) (VHA Subtotal)		0.422	0.422	0.369	0.369	0.357

APPENDIX D

QUAILMAN ANALYSIS

D-1. ANALYSIS OBJECTIVES. There were several objectives of the analysis. The primary objective was to determine how a 2-year leading cost affects each of the chosen SSMP items. Because of the delay in obtaining cost data initially, the study substituted time as a surrogate for cost. In addition to looking at the effects of cost and time, the total population was divided into subpopulations using six demographic factors collected as part of the SSMP administration. The objective in this case was to determine if the differential effects of the subpopulations differed significantly from those of the total population. The six demographic factors used to divide the total population into subpopulations were rank, age, ethnicity, gender, marital status, and location of present duty station (i.e., CONUS or OCONUS).

D-2. THE STATISTICAL ANALYSIS. Statistical analysis begins with data and model (i.e., regression or analysis of variance, etc.). The statistician tentatively entertains a particular model based on such items as (1) the experimental conditions, (2) the sample, and (3) nature of the response (i.e., measurement of a continuous variable such as SAT scores or binary responses such as yes and no answers on a questionnaire). The formal tools of analysis are estimation and hypothesis testing. The data is used to estimate unknown parameters for the selected model. There are usually questions which the analysis has engaged to answer. Often these questions can be couched in the form of a statistical hypothesis about parameters of the model. When this is the case, the statistician uses the data to test these hypotheses. The chance of making a wrong decision is always involved in these tests, but the statistician tries to minimize its effect by (1) carefully designing the experiment, (2) ensuring that the sample reflects the target population, (3) making sure that the experiment is controlled as well as possible, and (4) making proper use of such tools as randomization in cases where control is difficult. A statistical analysis can have several end states. In all of these end states, we will have used the data to answer some questions or obtain an estimate of some unknown or unmeasured quantity.

D-3. THE NATURE OF QUAILMAN DATA

a. Each SSMP item consisted of two possible responses (i.e., discounting no response). In seven of the eight SSMP items investigated by this study, the individual responses were satisfied or dissatisfied. In the eighth SSMP item considered, Your Current Morale Level, the individual response was either high or low. For each of these items, the response can be interpreted as a binary response. For each of these SSMP items, a random variable is defined to map the response sample space (e.g., dissatisfied or satisfied) into the real numbers 0 or 1. Without loss of generality, we will call this random variable Y. Y can pertain, in turn, to any of the eight SSMP items investigated. An assignment of 0 is made to Y if the response is dissatisfied or low in the case of Morale Level. An assignment of 1 is made to Y if the response is satisfied or high in the case of Morale Level. A typical statistical model used to represent binary data is the binomial distribution. For this model, we assume that the n responses $y_1, y_2, \ldots, y_n$ are observations of n independent random variables $Y_1, Y_2, \ldots, Y_n$, with parameters $p_1, p_2, \ldots, p_n$. Without more information, a possible model might be that all n responses come from a common binomial distribution with index n and parameter p. The task then would simply be to estimate the value of the parameter p which best fits the data.

b. In addition to measuring the response of each individual on the several selected items of the SSMP, we have additional information on each observation which, in general, are called covariates. The covariates are time, cost, rank, age, ethnicity, gender, marital status, and location. Perhaps the most familiar model for evaluating the effects of covariates on a response variable is linear regression. In linear regression we seek to find the mean value of the random variable Y_i conditioned on a set of covariates. This model might appear as follows:

$$E(Y_i|x_i) = \beta_0 + \beta_1 x_i \tag{1}$$

where x_i is the single covariate. The i^{th} observation might be expressed by the following equation;

$$Y_i = \beta_0 + \beta_1 x_i + e_i \tag{2}$$

The task is to find estimates b_0 and b_1 of the coefficients β_0 and β_1. The linear regression model is not satisfactory to use when binary response variables are involved.

D-4. THE LOGISTIC REGRESSION MODEL. An appropriate model in the case of binary response variables is the logistic regression model. Basically there are two differences between the regression model and the logistic regression model. In the logistic regression model, the conditional mean E(Y|x) is bounded between 0 and 1 and the distribution of errors, the e_i's, are binomially distributed, rather than normally distributed, as assumed in the linear regression model. The logistic regression model expresses a quantity referred to as the logit as a linear function of the covariates. The logit is the natural logarithm of another quantity called the odds ratio. The odds ratio is defined as the ratio of the probability of satisfaction, p, to the probability of dissatisfaction, 1-p, where p is the parameter of the binomial distribution. In the context of this study, the term probability of satisfaction is synonymous with term percent satisfaction. In the logistic regression model, p is not constant, but is conditional on the covariate pattern (i.e., the set of x_i's for a particular observed y_i). A useful notation to show this dependency of p on the x_i's is the pi notation, $\Pi(x) = E(Y|x)$. In this notation x stands for all covariates in the model. The form of the logistic regression model is as follows;

$$\Pi(x) = \frac{\exp(\beta_0 + \beta_1 x)}{1 + \exp(\beta_0 + \beta_1 x)} \tag{3}$$

In this notation, the odds ratio is expressed as $\Pi(x) / (1 - \Pi(x))$. If one takes the natural logarithm of this odds ratio, one obtains the logit. This leads to an expression similar to that of equation (1) for the linear regression model as follows:

$$\ln\{\Pi(x)/[1-\Pi(x)]\} = \beta_0 + \beta_1 x \tag{4}$$

D-5. DESCRIPTION OF THE LOGISTIC REGRESSION MODEL USED FOR QUAILMAN

a. The study did not initially obtain the cost data which was desirous. Therefore, time of administration of the SSMP was used as a surrogate. At this time, eight SSMP items were selected. Six demographic variables were chosen to render subpopulation studies. Two variables, time and one demographic variable, were modeled at one time. Forty-eight logistic regression models of the same basic design were fit to the data. Later, the associated cost data became available for six of the SSMP items. Two variables, cost and one demographic variable, were modeled at one time. The cost data gave rise to 36 logistic regression models fit to the data. In sum, 84 different fits of the same basic logistic regression model were made to the data.

b. The basic model (i.e., equation 5 below) is similar to an analysis of covariance model. The variable time or cost is continuous. Time will be represented by the variable T in the model below. For a similar cost model, one should just substitute C for T. In the model, time and cost have been centered. The values of time have also been scaled. A value is centered by subtracting its mean from it. A value is scaled by dividing each centered value by a constant. The values of time and cost are centered. If it is assumed that all the time points have equal samples, the total population percent satisfied can be calculated with the one model parameter μ. Otherwise, the parameter μ would represent a percent satisfied at the natural origin, and one or more additional parameters would be needed to calculate the total population percent satisfied at the center of mass of the samples. It is not true that the time points have equal samples. Restrictions and crossing of time or cost with group variables are discussed below which remedy this problem. Time is scaled to make it equivalent to the actual time interval in years between the first and last administrations of the SSMP used in this study. The six cycles of the SSMP data ranged from Spring 1992 through Fall 1994 at intervals of 6 months. The natural order time set is (1,2,3,4,5,6). The mean of this set is 3.5. The centered time set is (-2.5,-1.5,-.5,+.5,+1.5,+2.5). Dividing this set by the constant 2 incorporates the units of years into the set. The scaled T set (-1.25,-.75,-.25,+.25,+.75,+1.25) was used in the model. The centered cost used depended upon the matching of a cost to each SSMP item. Table D-1 matches the mean cost with each of the six SSMP items which were cost analyzed. The indicated value was subtracted from each actual cost in the modeling.

Table D-1. Centering Cost Used for SSPM Item

Centering cost	SSMP item
23.668	Overall Quality of Life
23.668	Your Current Morale Level
21.657	Basic Pay
1.432	Government Housing Quality
.367	Recreation Programs
.241	Family Programs

c. One demographic group variable is included in each model. A group variable is a row vector of indicator variables. One indicator variable is assigned to each subpopulation. For instance, there are six rank indicator variables. These are (1) R1 - ranks PV2 to SPC/CPL, R2 - ranks SGT to SSG, R3 -ranks SFC to SGM/CSM, (4) R4 - ranks WO1 to WO5, (5) R5 - ranks 2LT to CPT, and (6) R6 - ranks MAJ to COL^+. Each individual response is assigned a six-element row vector consisting of exactly one and five zeroes. The generic row vector (R1,R2,R3,R4,R5,R6) is defined as (1,0,0,0,0,0) for a PVT and (0,0,0,1,0,0) for a warrant officer. In the example below, the group variable R will be used to indicate rank. If a particular respondent to a survey is assigned a value of one for the indicator variable R5, and zeros for R1 R2,R3,R4, and R6, then we can assume that his rank was either second lieutenant, first lieutenant, or captain. After we have estimated the parameter values of the model, we substitute a value of one for a particular indicator variable and zeroes for the other five, to predict a percent satisfaction for a member of that particular subpopulation In the subsequent tables, A, E, G, M, or L are used to represent the demographic group variables age, ethnicity, gender, marital status, and location, respectively. They may be substituted below for R in the generic basic model. In addition, the continuous variable T or C is completely crossed (i.e., interaction terms are formed) with the group variable to render estimates of differential changes in slopes for the subpopulations in the model. The generic model contains an overall population mean term, μ. Note that the basic equation's right-hand side is expressed in terms of a logit. The expected percent satisfaction (i.e., $E(Y|T,R) = \Pi(T,R)$) is obtained in two steps. First, substitute for a specific time and rank into the left-hand side of equation (5) below. Second, substitute this solution into the left-hand side of equation (3) above. The basic model for time and rank is as follows;

$$\ln(\Pi(T,R)/(1-\Pi(T,R)) = \mu + \beta\, T + \alpha_1\, R1 + \alpha_2\, R2 + \alpha_3\, R3 + \alpha_4\, R4 + \alpha_5\, R5 + \alpha_6\, R6$$
$$+ \gamma_1\, T\bullet R1 + \gamma_2\, T\bullet R2 + \gamma_3\, T\bullet R3$$
$$+ \gamma_4\, T\bullet R4 + \gamma_5\, T\bullet R5 + \gamma_6\, T\bullet R6 \quad (5)$$

D-6. THE LIKELIHOOD FUNCTION. The basic model has been specified above for all of the chosen SSMP items as a function of time and rank. This accounts for eight models. A basic model for each of the other 76 models may be generated by letter substitution, described above in equation (5), and by deleting all terms where the variable number (i.e., 4 in R4) exceeds the number of subpopulations for a given demographic variable. For example, in a gender model, one would delete the terms G3,...,G6 and T•G3,...,T•G6. Gender has only two subpopulations (i.e., male and female). The restriction equations (see below) would also be appropriately modified. Once the basic equation is specified, the task is to solve the likelihood equations for the unknown parameters (i.e., μ, β, $\alpha_1,\ldots,\alpha_6,\gamma_1,\ldots,\gamma_6$). The method of estimating the parameters is called maximum likelihood. If the reader is familiar with linear regression, he will recall that maximum likelihood estimates of the parameters are equivalent to least squares estimates. In logistic regression, the principle of maximum likelihood estimates a set of parameters which maximizes the log likelihood function specified as follows:

$$L(\beta) = \Sigma \{y_i \ln[\Pi(x_i)] + (1-y_i) \ln[\, 1- \Pi(x_i)]\} \quad (6)$$

and ß in L(ß) represents all of the parameters in the model (i.e., μ, ß, $\alpha 1,...,\alpha 6, \gamma 1,...,\gamma 6$). The summation is over all survey responses. The log likelihood function is maximized by differentiating L(ß) with respect to each parameter in the model and setting the results equal to zero. The resulting likelihood equations are nonlinear in the parameters and must be solved iteratively by a Newton-Raphson type algorithm. Several commercial software packages provide algorithms to solve these equations and give estimates for the parameters μ, ß, $\alpha 1,...,\alpha 6, \gamma 1,...,\gamma 6$. In this study, the logistic regression procedure provided by SPSS was employed.

D-7. PARAMETER RESTRICTIONS. The basic model (i.e., equation 5) is an over-parameterized model. The rank (i.e., matrix rank) of the likelihood equations is less than the number of unknowns. Certain restrictions must be put on the model in order to obtain a unique solution to the likelihood equations. Most designed experiments exploit the concept of balanced data. For the basic model given in equation 5 above, balanced data would imply that the samples obtained for each rank at each time would be equal. As indicated above, we know this is not a fact. Another set of equally valid restrictions are discussed in a passing manner in books on experimental design such as those of Scheffe (i.e., Ref 4, p 60) and Searle (i.e., Ref 5, p 373). It is necessary to use this set of restrictions in order to have the estimates with the intended definitions. In the case of balanced data, the Σ restrictions are added to the normal equations. By default, SPSS and other standard packages use the Σ restrictions. The Σ restrictions require that the coefficients for all indicator variables in a group sum to zero (i.e., $\alpha 1 + \alpha 2 + \alpha 3 + \alpha 4 + \alpha 5 + \alpha 6 = 0$). The following alternative restriction for unbalanced data suggested by Scheffe and Searle is used:

$$J_1\alpha 1 + J_2\alpha 2 + J_3\alpha 3 + J_4\alpha 4 + J_5\alpha 5 + J_6\alpha 6 = 0$$

and $$J_1\gamma 1 + J_2\gamma 2 + J_3\gamma 3 + J_4\gamma 4 + J_5\gamma 5 + J_6\gamma 6 = 0$$

where J1, J2, J3, J4, J5, and J6 are the sums of the variables R1, R2, R3, R4, R5, and R6 respectively. In other words, J4 is the number of survey respondents who were warrant officers, etc.

D-8. QUAILMAN TEST OF HYPOTHESES. The basic model provides a mechanism to test several hypotheses of interest to the study. The parameter μ in the model estimates the log odds ratio for the total population. The null hypothesis is $\mu = 0$. The alternative hypothesis is $\mu \neq 0$. Note that a log odds ratio of zero corresponds to an overall mean percent satisfaction of 50 percent. The parameter ß in the model estimates the change in log odds due to time or cost depending upon which is being modeled. In either case, ß estimates the change in log odds for a change in one unit of time or cost. The unit of time used in modeling is 1 year, and the unit of cost is 1,000 FY 96 constant dollars per soldier. The null hypothesis is ß = 0. The alternative hypothesis is ß ≠ 0. The null hypothesis that $\alpha 1 = \alpha 2 = \alpha 3 = \alpha 4 = \alpha 5 = \alpha 6 = 0$ is tested in a model of rank. The alternative hypothesis is that some $\alpha_j \neq 0$. If this test is rejected, it is possible that one or more important contrasts may be different from zero. A contrast (Ref: i.e., Scheffe, Ref 4, p 66) is a linear function of the parameters, such that the sum of the coefficients is zero.

Certain desirable contrasts were designed into the basic model based on the set of restrictions assumed to solve the likelihood equations. These designed contrasts measure the difference in level between the percent satisfaction of a subpopulation and the total population. A significant contrast will tell us that the subpopulation percent satisfaction is significantly different from the total population percent satisfaction. Each significant α_j estimate measures the difference in level for the jth rank. Note that not all of the contrasts tested will be independent, since 1 degree of freedom is lost due to the restriction on the model. The null hypothesis that $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = 0$ is tested in a model including rank. The alternative hypothesis is that some $\gamma_j \neq 0$. Again, if this test is rejected, certain designed contrasts can be tested. The designed contrasts measure the difference in trend between the subpopulation and the total population. A significant contrast will tell us that the trend in the subpopulation is different from that in the total population. Each significant γ_j estimate measures the difference in trend for the jth rank.

D-9. SIGNIFICANCE AND P-VALUE. In hypothesis testing there is always the question of picking a significance level for the test. Formerly, this was done prior to an experiment. Some commonly chosen significance levels are 5 percent and 1 percent. The significance level is the probability of rejecting the null hypothesis when it is actually true (i.e., type I error). However, lately, especially with the advent of computers, it has become commonplace to quote the p value for a given test. The p value has essentially the same definition as the significance level except that it is not preselected. Also, there is the related question of how to distribute error when making a series of unplanned comparisons. In these circumstances, it is appropriate to set an experiment-wise error rate. This is the probability of falsely rejecting at least one comparison in an experiment with multiple comparisons. Many of the tests made in this study are not necessarily independent tests, which is another good reason to set some kind of experiment-wise error rate. An experiment-wise error rate might well be appropriate for the group tests for both level and trend. With this in mind, there are 21 subpopulations on which each SSMP item is being evaluated. These are rank = 6, age = 4, ethnicity =5, gender =2, marital status =2, and location = 2, which total 21. A level difference and a trend difference are being determined for each subpopulation. One method of determining experiment-wise error rate is to apply the Bonferroni inequality. If one assumes a 5 percent experiment-wise error rate on these 42 comparisons and applies the Bonferroni inequality, each individual comparison would have an adjusted significance level of 0.12 percent or a p-value of 0.0012. In interpreting the following analysis from each of the 84 regression models, this level is a suggested level as a cutoff for determining if one of the group comparisons or the derived contrasts should be deemed practically significant. In any case, the p-value will be reported for each test made.

D-10. THE WALD TEST AND STATISTIC. The Wald test is one test used to test the hypotheses concerning the parameters of logistic regression models for large sample sizes. It is asymptotically equivalent to the likelihood ratio test under the null hypothesis and is favored by statistical computing packages because it is simpler to compute. For large sample sizes and a categorical variable, the distribution of the Wald statistic converges asymptotically to the chi-square distribution with m-1 degrees of freedom for m categories. For continuous (i.e., time or cost) variables, where one parameter or one contrast is being evaluated, the number of degrees of freedom is 1. The results of the Wald test will be used extensively in the following tables to explain the logistic regression models used to analyze the QUAILMAN data.

D-11. THE TOTAL POPULATION ANALYSIS RESULTS

a. Two parameters, the mean level (μ) and the trend (β), in the basic model pertain to the total population. The null hypothesis for the former is $\mu = 0$. Table D-3 gives the results of the mean level tests for each of the 84 models' fit. They are ordered by descending value of mean level. They break naturally by SSMP item suborderings. The SSMP item abbreviations are shown in Table D-2.

Table D-2. Abbreviations for SSMP Items

Abbreviation	refers to SSMP item
FAM	Satisfaction with Family Programs
GHA	Satisfaction with Government Housing Availability
GHQ	Satisfaction with Government Housing Quality
OQL	Satisfaction with Overall Quality of Life
PAY	Satisfaction with Basic Pay
REC	Satisfaction with Recreation Programs
VHA	Satisfaction with VHA COLA
YCM	Your Current Morale Level (High/Low)

Within each of the items, the estimates differ slightly because of the differing number of responses for a particular demographic variable. The estimate given is the mean logit. One can obtain the predicted percent satisfaction for a model by applying the results of equation (5) and then (3) above. For example, the first estimated logit for the Recreation SSMP item and the model considering Time and Rank is 1.2701. Applying equation (5) gives the following results:

substituting $\mu = 1.2701$, $T = 0$ and $R1 = R2 = R3 = R4 = R5 = R6 = 0$ in (5) one obtains

$\ln(\Pi(T,R)/(1-\Pi(T,R)) = 1.2701$ and from (3)

$$\Pi(x=REC) = \frac{\exp(\mu)}{1+\exp(\mu)} = \frac{\exp(1.2701)}{1+\exp(1.2701)} = .7808$$

and the mean percent satisfaction in Recreation programs predicted by this model is 78.08 percent. This is the best point estimate for the logit and in turn the percent satisfaction. Confidence limits for this estimate may be constructed using this estimate and its standard error. From Table D-3, the standard error for the estimate of $\mu = 1.2701$ in the first line of the table is 0.0102. The general formula for computing confidence intervals for an estimated logit is as follows:

$$\mu \pm z_{(1-\alpha/2)} \times SE(\mu) \tag{7}$$

Here z is the usual symbol denoting a standard normal distribution. $z_{(1-\alpha/2)}$ is the upper $z_{(1-\alpha/2)}$ point of the random variable z if $Pr(z > z_{(1-\alpha/2)}) = \alpha/2$. A usual value for α is 0.05, and $(1-\alpha) \times 100 = 95$ percent confidence intervals are constructed. The upper $z(1-\alpha/2)$ point for $\alpha = 0.05$ is 1.96. Therefore, the 95 percent confidence interval on the logit in the first line of the table is as follows:

$$\mu \pm z_{(1-\alpha/2)} \times SE(\mu) = 1.2701 \pm 1.96 \times 0.0102 = (1.2501, 1.2901)$$

where 1.2501 is the lower bound of the interval and 1.2901 is the upper bound. This confidence interval on the logit can be transformed into a 95 percent confidence interval on the percentage satisfaction by substituting the bounds into equation (3). The lower bound is constructed as follows:

$$\Pi(x=REC) = \frac{\exp(\mu)}{1+\exp(\mu)} = \frac{\exp(1.2501)}{1+\exp(1.2501)} = .7773$$

Substituting the upper bound logit, 1.2901, one obtains .7842. Therefore, the best point estimate of the percent satisfaction of the total population in the recreation programs from this model is 78.08 percent, with a 95 percent confidence interval of 77.73 percent to 78.42 percent.

b. For each of the 84 models, the standard error of the estimate is given. The Wald statistic for a 1 degree of freedom parameter is simply the square of the ratio of the estimate to its standard error. Thus, in the first line of the Table D-3, the Wald statistic is approximately equal to $(1.2701/0.0102)^2 = 15505.1327$. This value is less precise than the one given in the table because more significant figures are used when calculating the table value. The Wald statistic for this hypothesis has an approximate chi-square distribution with one degree of freedom (df). For the example, in the first line, one would reject the null hypothesis that $\mu = 0$, with the probability (p-value) of less than 5.0×10^{-5} (i.e., 0.00005) that the null hypothesis is true. Only the SSMP item Government Housing Quality seems to have a mean which is not significantly different from zero. As noted above, this means that the estimated mean percent satisfaction for this item is about 50 percent.

Table D-3. Results of Hypothesis Test on Mean Level Parameters (page 1 of 2 pages)

SSMP ITEM	T/C	DEMOGRAPHIC VARIABLE	μ ESTIMATE	Std. Err	Wald Statistic	df	p value
REC	TIME	RANK	1.2701	.0102	15555.4600	1	.0000
REC	COST	RANK	1.2694	.0102	15593.6100	1	.0000
REC	TIME	LOCATE	1.2607	.0101	15623.1800	1	.0000
REC	TIME	AGE	1.2597	.0101	15606.9200	1	.0000
REC	COST	LOCATE	1.2593	.0101	15653.1700	1	.0000
REC	TIME	MAR ST	1.2587	.0101	15613.1000	1	.0000
REC	COST	AGE	1.2585	.0101	15648.3300	1	.0000
REC	COST	MAR ST	1.2579	.0101	15653.2000	1	.0000
REC	TIME	GENDER	1.2552	.0100	15620.3700	1	.0000
REC	TIME	ETHNIC	1.2547	.0100	15587.8300	1	.0000
REC	COST	ETHNIC	1.2543	.0100	15641.8700	1	.0000
REC	COST	GENDER	1.2543	.0100	15657.8100	1	.0000
FAM	TIME	RANK	0.6926	.0111	3884.2430	1	.0000
FAM	COST	RANK	0.6911	.0111	3876.5620	1	.0000
FAM	TIME	MAR ST	0.6889	.0111	3872.3860	1	.0000
FAM	TIME	AGE	0.6888	.0111	3869.0280	1	.0000
FAM	TIME	GENDER	0.6884	.0111	3869.5930	1	.0000
FAM	COST	LOCATE	0.6880	.0111	3869.8040	1	.0000
FAM	TIME	LOCATE	0.6879	.0111	3865.0270	1	.0000
FAM	TIME	ETHNIC	0.6878	.0111	3860.1010	1	.0000
FAM	COST	AGE	0.6873	.0111	3860.9860	1	.0000
FAM	COST	MAR ST	0.6873	.0111	3865.1800	1	.0000
FAM	COST	GENDER	0.6869	.0111	3862.3840	1	.0000
FAM	COST	ETHNIC	0.6861	.0111	3849.9870	1	.0000
YCM	TIME	RANK	0.5417	.0112	2329.7190	1	.0000
YCM	COST	RANK	0.5405	.0112	2322.3080	1	.0000
YCM	TIME	AGE	0.5252	.0110	2273.8050	1	.0000
YCM	COST	AGE	0.5241	.0110	2267.4120	1	.0000
YCM	TIME	MAR ST	0.5145	.0109	2234.0420	1	.0000
YCM	COST	MAR ST	0.5132	.0109	2226.8910	1	.0000
YCM	TIME	ETHNIC	0.5100	.0108	2220.7580	1	.0000
YCM	TIME	GENDER	0.5091	.0108	2215.8520	1	.0000
YCM	COST	ETHNIC	0.5085	.0108	2211.3200	1	.0000
YCM	COST	GENDER	0.5079	.0108	2209.1150	1	.0000
YCM	TIME	LOCATE	0.5073	.0108	2208.9130	1	.0000
YCM	COST	LOCATE	0.5051	.0108	2183.7970	1	.0000
OQL	COST	RANK	0.3803	.0087	1913.4150	1	.0000
OQL	TIME	RANK	0.3789	.0087	1895.4960	1	.0000
OQL	COST	AGE	0.3702	.0086	1860.1250	1	.0000
OQL	TIME	AGE	0.3683	.0086	1838.1070	1	.0000
OQL	COST	MAR ST	0.3656	.0085	1837.1430	1	.0000
OQL	TIME	MAR ST	0.3639	.0085	1817.0630	1	.0000
OQL	COST	LOCATE	0.3631	.0085	1819.8670	1	.0000
OQL	COST	GENDER	0.3628	.0085	1825.7440	1	.0000
OQL	COST	ETHNIC	0.3622	.0085	1816.0180	1	.0000
OQL	TIME	LOCATE	0.3612	.0085	1805.0390	1	.0000
OQL	TIME	ETHNIC	0.3610	.0085	1800.9950	1	.0000
OQL	TIME	GENDER	0.3610	.0085	1803.4580	1	.0000

Table D-3. Results of Hypothesis Test on Mean Level Parameters (page 2 of 2 pages)

SSMP ITEM	T/C	DEMOGRAPHIC VARIABLE	μ ESTIMATE	Std. Err	Wald Statistic	df	p value
GHQ	COST	ETHNIC	0.0061	.0104	0.3427	1	.5583
GHQ	COST	GENDER	0.0057	.0104	0.2972	1	.5856
GHQ	COST	AGE	0.0056	.0104	0.2906	1	.5898
GHQ	COST	LOCATE	0.0056	.0104	0.2892	1	.5907
GHQ	COST	MAR ST	0.0056	.0104	0.2913	1	.5894
GHQ	COST	RANK	0.0055	.0104	0.2767	1	.5989
GHQ	TIME	LOCATE	0.0021	.0104	0.0410	1	.8395
GHQ	TIME	GENDER	0.0019	.0104	0.0322	1	.8577
GHQ	TIME	MAR ST	0.0017	.0104	0.0279	1	.8673
GHQ	TIME	RANK	0.0017	.0104	0.0262	1	.8715
GHQ	TIME	AGE	0.0016	.0104	0.0243	1	.8761
GHQ	TIME	ETHNIC	0.0013	.0105	0.0159	1	.8998
PAY	COST	LOCATE	-0.4859	.0084	3313.5840	1	.0000
PAY	COST	MAR ST	-0.4862	.0084	3335.0720	1	.0000
PAY	COST	GENDER	-0.4869	.0084	3337.6860	1	.0000
PAY	COST	AGE	-0.4888	.0085	3341.5680	1	.0000
PAY	COST	ETHNIC	-0.4891	.0084	3351.6080	1	.0000
PAY	TIME	MAR ST	-0.4893	.0084	3361.5330	1	.0000
PAY	TIME	LOCATE	-0.4897	.0084	3363.3930	1	.0000
PAY	TIME	GENDER	-0.4898	.0084	3360.9330	1	.0000
PAY	TIME	ETHNIC	-0.4918	.0085	3372.5150	1	.0000
PAY	TIME	AGE	-0.4919	.0085	3369.3780	1	.0000
PAY	COST	RANK	-0.4968	.0087	3278.4100	1	.0000
PAY	TIME	RANK	-0.5007	.0087	3308.8640	1	.0000
VHA	TIME	GENDER	-0.5220	.0111	2216.3690	1	.0000
VHA	TIME	AGE	-0.5224	.0111	2218.5460	1	.0000
VHA	TIME	ETHNIC	-0.5226	.0111	2220.2760	1	.0000
VHA	TIME	MAR ST	-0.5239	.0111	2222.9660	1	.0000
VHA	TIME	LOCATE	-0.5243	.0111	2223.9730	1	.0000
VHA	TIME	RANK	-0.5273	.0112	2232.2090	1	.0000
GHA	TIME	MAR ST	-0.7641	.0106	5198.5440	1	.0000
GHA	TIME	GENDER	-0.7642	.0106	5198.9080	1	.0000
GHA	TIME	ETHNIC	-0.7656	.0106	5204.1630	1	.0000
GHA	TIME	AGE	-0.7674	.0106	5207.6020	1	.0000
GHA	TIME	RANK	-0.7688	.0106	5215.0830	1	.0000
GHA	TIME	LOCATE	-0.7689	.0106	5216.8030	1	.0000

c. The second hypothesis concerning the total population has to do with the change in percent satisfaction as a function of time. The null hypothesis is that the trend parameter $\beta = 0$. Table D-4 gives the results of the trend tests for each of the 84 models' fit. The table was ordered by estimated slope value. Initially after ordering, slope estimates of two items were mixed. The ordering was slightly corrected in order to segregate the list by item and the time/cost variable. Within each subordered group, the estimates differ slightly because of differing number of responses for different demographic variables. Probably the most evident characteristic of the collective set of 84 trends is that 60 of them are negative. One would logically assume that if time and especially cost were increasing, satisfaction would also be increasing. Only 10 of the remaining 24 trend coefficients are significantly different from zero. On the other hand, all but 2 of the 60 negative estimates are significantly different from zero. One can obtain the predicted mean percent satisfaction for a given SSMP cycle with a time model or the mean percent satisfaction for a given cost with a cost model by applying the results of equation (5) and then (3) above. We will continue with our example from above, the Recreation SSMP item and the model considering Time and Rank. The results for this model are located in the fifth line of the third group in Table D-4. The estimate of β is 0.0366. This estimate has a p-value of 0.0020. It will be noted that this value is greater than our individual comparison value of 0.0012 and thus would not be considered significantly different from zero under this criteria. We might like to know the model predicted mean percent satisfaction for the first and last SSMP cycles (i.e., Spring 1992 and Fall 1994). To obtain the results for Spring 1992, and remembering that we are working with a centered time value, we will apply equation (5) to get the following results:

substituting $\mu = 1.2701$, $T = -1.25$, and $R1 = R2 = R3 = R4 = R5 = R6 = 0$ in (5) one obtains

$$\ln(\Pi(T,R)/(1-\Pi(T,R)) = \mu + \beta\, T = 1.2701 + 0.0366 \times (-1.25) = 1.22435$$

Confidence limits can be constructed for this value. From Table D-3, the s.e.(μ) = .0102 and s.e.(β) = .0118. The correlation coefficient $\rho(\mu,\beta) = .0961$. Note that correlation coefficients are calculated for all parameters by the software but have not been presented in this text because of the extensive tables necessary for 84 models. However, they are available from the author if it is necessary to calculate any extensive number of confidence limits.

The first step is to calculate the variance of the estimate as follows:

$$\begin{aligned} \mathrm{Var}(\ln(\Pi(T,R)/(1-\Pi(T,R))) &= \mathrm{Var}\,(\mu + \beta\, T) \\ &= \mathrm{Var}(\mu) + T^2\mathrm{Var}(\beta) + 2T\rho(\mu,\beta)\mathrm{Var}(\mu)^{1/2}\mathrm{Var}(\beta)^{1/2} \\ &= (.0102)^2 + (-1.25)^2(.0118)^2 + 2(-1.25)(.0961)(.0102)(.0118) = 2.92686 \times 10^{-4} \end{aligned}$$

The s.e.($\ln(\Pi(T,R)/(1-\Pi(T,R))$) is the square root of $\mathrm{Var}(\ln(\Pi(T,R)/(1-\Pi(T,R)))$ which is 0.0171. The 95 percent confidence interval at T = -1.25 is as follows:

$$\begin{aligned} &\mu + \beta\, T \pm z_{(1-\alpha/2)} \times \text{s.e.}(\mu + \beta\, T) \\ &= 1.22435 \pm 1.96 \times 0.0171 = (\,1.1908,\ 1.2579\,) \end{aligned}$$

where 1.1908 is the lower bound of the interval and 1.2579 is the upper bound. This confidence interval on the logit can be transformed into a 95 percent confidence interval on the percentage satisfaction by substituting the bounds into equation (3). The lower bound is constructed as follows:

$$\Pi(x{=}REC) = \frac{\exp(\mu + \beta\, T)}{1 + \exp(\mu + \beta\, T)} = \frac{\exp(1.1908)}{1 + \exp(1.1908)} = .7668$$

Substituting the upper bound logit, 1.2579, one obtains .7787. Therefore, the best point estimate of the percent satisfaction of the total population in Spring 1992 for the recreation programs from this model is 77.28 percent with a 95 percent confidence interval of 76.68 percent to 77.87 percent. Likewise, for Fall 1994, the estimated logit is 1.31585 and s.e.($\mu + \beta\, T$) for $T = +1.25$ is 0.0187. The 95 percent confidence bounds on the Fall 1994 logit are (1.2791, 1.3526). The resulting percent satisfaction of the total population in Fall 1994 for the recreation programs using this model is 78.85 percent, with a 95 percent confidence interval of 78.22 percent to 79.46 percent.

d. The estimates of trend in time models or slope in cost models, ß, their standard error, and the resulting Wald statistic are given for each of the 84 models constructed. We consider all p-values less than or equal to our per comparison cutoff in reaching the following conclusions. Using this criteria, the estimate of ß is significantly different from 0 for 40 of the 48 time models and 28 of the 36 cost models. Notable exceptions were all 12 models of Family programs (i.e., all p-values exceed 0.01) and 4 of the 12 Recreation programs models (i.e., (TIME & RANK, TIME & LOCATE, COST & LOCATE, and COST & ETHNIC all have p-values exceeding 0.0012). These facts for a specific model are summarized in the p-value column. Two additional columns are provided by the software output which might be of use. The column labeled "R" is the partial correlation of the trend or slope with the dependent variable, percent satisfaction. The last column, labeled "EXP(ß)", is the factor by which the percent satisfaction odds change when the time in a time model increases by 1 year or cost in a cost model increases by 1,000 constant FY 96 dollars per soldier. A factor greater than one would lead to an increased odds ratio, a factor less than one would lead to a decreased odds ratio. For example, in the Recreation Program - Rank model which we have been illustrating above, the factor is 1.0373. The implication of this factor is that an increase in time of 1 year results in an increase in the Recreation Program - Rank model satisfaction odds ratio by a factor of 1.0373. For example, in the Recreation Program - Rank model discussed above, the estimated mean logit was 1.2701. The odds ratio for the total population mean is $\exp(1.2701) = 3.5612 = \Pi(T,R)/(1-\Pi(T,R) = .7808 / .2192$ = percent satisfied/percent dissatisfied. This is the total population mean at $T = 0$ or midway between the Spring and Fall administration of the SSMP. If time is increased to $T = +1.25$ (i.e., Fall 1994), then the odds ratio will increase by $(1.0373)^{1.25} = 1.04684$ (i.e., the factor in the last column per unit increase in time raised to the 1.25 power). Therefore, the new odds ratio for the total population in Fall 1994 is $1.04684 \times 3.5612 = 3.7280 = .7885/.2115$ within roundoff error. This is the value we just obtained above for the estimate in Fall 1994.

Table D-4. Results of Hypothesis Test on Trend Parameters (page 1 of 2 pages)

SSMP ITEM	T/C	DEMOGRAPHIC VARIABLE	b ESTIMATE	Std. Err	Wald Statistic	df	p value	R	EXP(b)
FAM	COST	ETHNIC	0.5144	0.3313	2.4115	1	.1204	.0029	1.6727
FAM	COST	AGE	0.4866	0.3310	2.1614	1	.1415	.0018	1.6268
FAM	COST	MAR ST	0.4712	0.3308	2.0292	1	.1543	.0008	1.6020
FAM	COST	GENDER	0.4334	0.3309	1.7154	1	.1903	.0000	1.5425
FAM	COST	RANK	0.4000	0.3325	1.4473	1	.2290	.0000	1.4919
FAM	COST	LOCATE	0.3788	0.3313	1.3073	1	.2529	.0000	1.4606
VHA	TIME	RANK	0.0851	0.0150	32.1206	1	.0000	.0245	1.0889
VHA	TIME	AGE	0.0837	0.0149	31.4098	1	.0000	.0242	1.0873
VHA	TIME	MAR ST	0.0821	0.0150	30.1284	1	.0000	.0237	1.0856
VHA	TIME	GENDER	0.0821	0.0149	30.2312	1	.0000	.0237	1.0855
VHA	TIME	ETHNIC	0.0813	0.0149	29.6002	1	.0000	.0235	1.0847
VHA	TIME	LOCATE	0.0728	0.0150	23.4417	1	.0000	.0207	1.0755
REC	TIME	AGE	0.0407	0.0117	12.0600	1	.0005	.0128	1.0415
REC	TIME	MAR ST	0.0391	0.0117	11.1680	1	.0008	.0122	1.0399
REC	TIME	GENDER	0.0381	0.0117	10.6577	1	.0011	.0119	1.0388
REC	TIME	ETHNIC	0.0377	0.0117	10.4194	1	.0012	.0117	1.0384
REC	TIME	RANK	0.0366	0.0118	9.5609	1	.0020	.0111	1.0373
REC	TIME	LOCATE	0.0279	0.0118	5.6465	1	.0175	.0077	1.0283
FAM	TIME	ETHNIC	0.0332	0.0129	6.6030	1	.0102	.0099	1.0337
FAM	TIME	AGE	0.0330	0.0129	6.5209	1	.0107	.0098	1.0335
FAM	TIME	MAR ST	0.0330	0.0129	6.5272	1	.0106	.0098	1.0335
FAM	TIME	GENDER	0.0313	0.0129	5.9045	1	.0151	.0091	1.0318
FAM	TIME	RANK	0.0300	0.0130	5.3650	1	.0205	.0084	1.0305
FAM	TIME	LOCATE	0.0299	0.0129	5.3477	1	.0207	.0084	1.0303
YCM	TIME	AGE	-0.0441	0.0128	11.8669	1	.0006	-.0142	0.9569
YCM	TIME	MAR ST	-0.0459	0.0127	13.1516	1	.0003	-.0151	0.9552
YCM	TIME	ETHNIC	-0.0461	0.0126	13.4460	1	.0002	-.0153	0.9549
YCM	TIME	GENDER	-0.0469	0.0126	13.9281	1	.0002	-.0156	0.9542
YCM	TIME	LOCATE	-0.0513	0.0126	16.6661	1	.0000	-.0173	0.9500
YCM	TIME	RANK	-0.0528	0.0130	16.3864	1	.0001	-.0172	0.9486
OQL	COST	ETHNIC	-0.0534	0.0078	47.3203	1	.0000	-.0241	0.9480
OQL	COST	LOCATE	-0.0540	0.0078	48.4249	1	.0000	-.0244	0.9474
OQL	COST	AGE	-0.0543	0.0078	48.1680	1	.0000	-.0243	0.9471
OQL	COST	MAR ST	-0.0555	0.0078	51.0598	1	.0000	-.0251	0.9460
OQL	COST	GENDER	-0.0565	0.0077	53.2727	1	.0000	-.0256	0.9451
OQL	COST	RANK	-0.0617	0.0079	60.2281	1	.0000	-.0273	0.9402
GHA	TIME	LOCATE	-0.0551	0.0123	19.9206	1	.0000	-.0186	0.9464
GHA	TIME	ETHNIC	-0.0590	0.0123	23.0953	1	.0000	-.0202	0.9427
GHA	TIME	GENDER	-0.0611	0.0123	24.8592	1	.0000	-.0210	0.9407
GHA	TIME	AGE	-0.0616	0.0123	25.1114	1	.0000	-.0211	0.9402
GHA	TIME	MAR ST	-0.0619	0.0123	25.4778	1	.0000	-.0213	0.9400
GHA	TIME	RANK	-0.0650	0.0123	27.8461	1	.0000	-.0223	0.9371

Table D-4. Results of Hypothesis Test on Trend Parameters (page 2 of 2 pages)

SSMF ITEM	T/C	DEMOGRAPHIC VARIABLE	b ESTIMATE	Std. Err	Wald Statistic	df	p value	R	EXP(b)
YCM	COST	AGE	-0.0657	0.0100	42.9260	1	.0000	-.0290	0.9364
YCM	COST	ETHNIC	-0.0659	0.0099	44.6005	1	.0000	-.0296	0.9362
YCM	COST	MAR ST	-0.0676	0.0099	46.4397	1	.0000	-.0302	0.9347
YCM	COST	GENDER	-0.0679	0.0099	47.4609	1	.0000	-.0305	0.9344
YCM	COST	LOCATE	-0.0716	0.0099	52.6010	1	.0000	-.0322	0.9309
YCM	COST	RANK	-0.0722	0.0102	49.7161	1	.0000	-.0313	0.9304
CQL	TIME	ETHNIC	-0.0796	0.0099	64.8153	1	.0000	-.0284	0.9234
CQL	TIME	LOCATE	-0.0800	0.0099	65.4025	1	.0000	-.0285	0.9231
CQL	TIME	AGE	-0.0804	0.0100	64.9666	1	.0000	-.0284	0.9227
CQL	TIME	MAR ST	-0.0808	0.0099	66.2728	1	.0000	-.0287	0.9224
CQL	TIME	GENDER	-0.0819	0.0099	68.7402	1	.0000	-.0293	0.9213
CQL	TIME	RANK	-0.0908	0.0101	80.5217	1	.0000	-.0317	0.9132
PAY	COST	LOCATE	-0.0931	0.0098	90.2210	1	.0000	-.0332	0.9111
PAY	COST	MAR ST	-0.0973	0.0098	99.5215	1	.0000	-.0349	0.9072
PAY	COST	AGE	-0.0976	0.0098	99.1456	1	.0000	-.0349	0.9071
PAY	COST	GENDER	-0.0984	0.0098	101.5646	1	.0000	-.0353	0.9063
PAY	COST	ETHNIC	-0.0986	0.0098	101.3541	1	.0000	-.0353	0.9061
PAY	COST	RANK	-0.1049	0.0100	109.3855	1	.0000	-.0367	0.9004
PAY	TIME	LOCATE	-0.1081	0.0099	120.2344	1	.0000	-.0385	0.8976
PAY	TIME	MAR ST	-0.1111	0.0098	127.6993	1	.0000	-.0397	0.8948
PAY	TIME	AGE	-0.1112	0.0099	126.8074	1	.0000	-.0395	0.8948
PAY	TIME	GENDER	-0.1129	0.0098	131.5074	1	.0000	-.0403	0.8932
PAY	TIME	ETHNIC	-0.1160	0.0099	138.2100	1	.0000	-.0413	0.8904
PAY	TIME	RANK	-0.1217	0.0101	143.8627	1	.0000	-.0421	0.8854
GHQ	TIME	ETHNIC	-0.1761	0.0121	212.6253	1	.0000	-.0639	0.8386
GHQ	TIME	LOCATE	-0.1774	0.0121	215.7841	1	.0000	-.0644	0.8375
GHQ	TIME	GENDER	-0.1780	0.0121	217.8376	1	.0000	-.0647	0.8370
GHQ	TIME	MAR ST	-0.1783	0.0121	218.5528	1	.0000	-.0648	0.8367
GHQ	TIME	RANK	-0.1793	0.0121	220.8982	1	.0000	-.0651	0.8358
GHQ	TIME	AGE	-0.1795	0.0121	221.5831	1	.0000	-.0652	0.8357
GHQ	COST	ETHNIC	-0.8862	0.0691	164.5392	1	.0000	-.0561	0.4122
GHQ	COST	MAR ST	-0.8863	0.0690	164.8504	1	.0000	-.0562	0.4122
GHQ	COST	LOCATE	-0.8895	0.0690	166.0587	1	.0000	-.0564	0.4109
GHQ	COST	GENDER	-0.8920	0.0690	167.1192	1	.0000	-.0566	0.4098
GHQ	COST	AGE	-0.8981	0.0690	169.3684	1	.0000	-.0570	0.4074
GHQ	COST	RANK	-0.8985	0.0690	169.4702	1	.0000	-.0570	0.4072
REC	COST	LOCATE	-1.4522	0.4847	8.9776	1	.0027	-.0107	0.2341
REC	COST	ETHNIC	-1.5400	0.4825	10.1889	1	.0014	-.0125	0.2144
REC	COST	GENDER	-1.5685	0.4820	10.5899	1	.0011	-.0128	0.2084
REC	COST	MAR ST	-1.5727	0.4833	10.5867	1	.0011	-.0128	0.2075
REC	COST	RANK	-1.5905	0.4887	10.5915	1	.0011	-.0128	0.2038
REC	COST	AGE	-1.6154	0.4840	11.1379	1	.0008	-.0122	0.1988

D-12. THE SUBPOPULATION ANALYSIS RESULTS

a. The results of the subpopulation analysis are summarized in Table D-5 for time and Table D-6 for cost. Each line of these tables refers to (1) an SSMP item, (2) a demographic variable group (α_j's in the basic model), or an interaction between time or cost and the demographic variable in the model (γ_j's in the basic model). The lists are ordered from smallest p-value to largest p-value. The Wald statistic, its degrees of freedom, and the p-value are given for each demographic group. The Wald statistic is asymptotically chi-square distributed with m-1 degrees of freedom where there are m subpopulations in the group. A significant p-value on this test indicates that there is a subpopulation difference either in level or in trend for time models, or in cost for cost models, depending on the description of the group given in the second column. It appears from these tables that level differences are much more prevalent in the data than trend and slope differences. Although the trends and slopes are in general significantly different for the total population, there does not appear to be much change in slope or trend due solely to subpopulations. If one uses the 0.0012 criteria proposed above as a cutoff for determining practical significance, there are 8 out of 48 time by demographic interactions and 4 out of 36 cost by demographic interactions which are significantly different from zero. The significant time interactions in order of increasing p-value are (1) REC-Ethnic (i.e., Table D-5, first page, fifth line from bottom), (2) VHA-Locate, (3) PAY-Rank, (4) PAY-Ethnic, (5) GHA- Ethnic, (6) GHQ-Rank, (7) REC-Locate, and (8) FAM-Mar St. (i.e., Table D-5, second page, fifteenth line from top). The significant cost interactions are (1) FAM-Locate (i.e., Table D-6, first page, tenth line from the bottom), (2) PAY-Rank, (3) FAM-Mar St. and (4) PAY-Ethnic (i.e., Table D-6, first page, bottom line). Three of the interactions, (1) PAY-Rank, (2) PAY-Ethnic, and (3) FAM-Mar St., are significant when considering either cost or time.

b. The significance of level changes due to subpopulations shows in general just the opposite pattern. Using the same 0.0012 cutoff criteria for the level changes, there are only four level changes in the time models and four level changes in the cost models which are not significantly different from zero. The level changes which do not differ significantly from zero are for the time models (1) FAM-Locate (i.e., Table D-5, second page, fifteenth line from the bottom), (2) FAM-Mar St., (3) REC-Gender, (4) GHA-Gender (i.e., Table D-5, second page, bottom line) and for the cost models (1) FAM-Mar St. (i.e., Table D-6, second page, fifth line from the top), (2) FAM-Locate, (3) PAY-Mar St., and (4) REC-Gender (i.e., Table D-6, second page, fifteenth line from the bottom). Three out of these four, (1) FAM- Locate, (2) FAM- Mar St., and (3) REC-Gender, are not significantly different from zero in both the time and cost models.

Table D-5. Summary of Subpopulation Analysis for Time Models (page 1 of 3 pages)

SSMP ITEM	SUBPOPULATION/ INTERACTION WITH TIME	WALD STATISTIC	DF	P VALUE
BASIC PAY	RANK	3110.3167	5	.0000
OVERALL QUALITY OF LIFE	RANK	1938.1945	5	.0000
YOUR MORALE	RANK	1872.6329	5	.0000
YOUR MORALE	AGE	1070.7652	3	.0000
OVERALL QUALITY OF LIFE	AGE	1062.4838	3	.0000
YOUR MORALE	MARITAL STATUS	523.2656	1	.0000
OVERALL QUALITY OF LIFE	MARITAL STATUS	483.5927	1	.0000
BASIC PAY	AGE	449.4992	3	.0000
RECREATION PROGRAMS	RANK	444.3765	5	.0000
VHA COLA	RANK	386.9183	5	.0000
GVMT HOUSING AVAILABILITY	LOCATION	272.4294	1	.0000
VHA COLA	LOCATION	233.5166	1	.0000
GVMT HOUSING AVAILABILITY	RANK	222.3611	5	.0000
BASIC PAY	ETHNICITY	215.5381	4	.0000
RECREATION PROGRAMS	LOCATION	188.6736	1	.0000
FAMILY PROGRAMS	RANK	183.5286	5	.0000
GVMT HOUSING AVAILABILITY	AGE	175.8842	3	.0000
RECREATION PROGRAMS	AGE	160.8449	3	.0000
VHA COLA	MARITAL STATUS	160.1259	1	.0000
YOUR MORALE	GENDER	150.3850	1	.0000
RECREATION PROGRAMS	MARITAL STATUS	139.0513	1	.0000
YOUR MORALE	ETHNICITY	127.6841	4	.0000
BASIC PAY	GENDER	112.1107	1	.0000
GVMT HOUSING QUALITY	ETHNICITY	73.2537	4	.0000
OVERALL QUALITY OF LIFE	ETHNICITY	57.0170	4	.0000
GVMT HOUSING QUALITY	LOCATION	56.7349	1	.0000
GVMT HOUSING QUALITY	MARITAL STATUS	48.3547	1	.0000
BASIC PAY	LOCATION	43.6749	1	.0000
VHA COLA	ETHNICITY	39.6045	4	.0000
FAMILY PROGRAMS	AGE	38.9650	3	.0000
VHA COLA	GENDER	37.1803	1	.0000
RECREATION PROGRAMS	TIME by ETHNICITY	36.5737	4	.0000
VHA COLA	AGE	35.8961	3	.0000
VHA COLA	TIME by LOCATION	35.7149	1	.0000
BASIC PAY	TIME by RANK	35.1036	5	.0000
GVMT HOUSING QUALITY	GENDER	28.9270	1	.0000

Table D-5. Summary of Subpopulation Analysis for Time Models (page 2 of 3 pages)

SSMP ITEM	SUBPOPULATION/ INTERACTION WITH TIME	WALD STATISTIC	DF	P VALUE
GVMT HOUSING QUALITY	RANK	27.8171	5	.0000
OVERALL QUALITY OF LIFE	GENDER	23.4619	1	.0000
FAMILY PROGRAMS	GENDER	17.0699	1	.0000
FAMILY PROGRAMS	ETHNICITY	24.6666	4	.0001
GVMT HOUSING AVAILABILITY	ETHNICITY	24.3269	4	.0001
BASIC PAY	TIME by ETHNICITY	22.7353	4	.0001
GVMT HOUSING QUALITY	AGE	21.4340	3	.0001
OVERALL QUALITY OF LIFE	LOCATION	14.6673	1	.0001
RECREATION PROGRAMS	ETHNICITY	22.1934	4	.0002
GVMT HOUSING AVAILABILITY	TIME by ETHNICITY	21.3761	4	.0003
YOUR MORALE	LOCATION	12.0727	1	.0005
GVMT HOUSING AVAILABILITY	MARITAL STATUS	11.9475	1	.0005
GVMT HOUSING QUALITY	TIME by RANK	21.5528	5	.0006
RECREATION PROGRAMS	TIME by LOCATION	11.6736	1	.0006
FAMILY PROGRAMS	TIME by MARITAL STATUS	11.0654	1	.0009
FAMILY PROGRAMS	TIME by LOCATION	10.3516	1	.0013
GVMT HOUSING QUALITY	TIME by ETHNICITY	15.2144	4	.0043
GVMT HOUSING QUALITY	TIME by LOCATION	7.1365	1	.0076
GVMT HOUSING AVAILABILITY	TIME by LOCATION	7.0854	1	.0078
RECREATION PROGRAMS	TIME by AGE	11.3535	3	.0100
OVERALL QUALITY OF LIFE	TIME by RANK	14.1344	5	.0147
FAMILY PROGRAMS	LOCATION	5.8866	1	.0153
FAMILY PROGRAMS	MARITAL STATUS	5.8615	1	.0155
BASIC PAY	TIME by MARITAL STATUS	5.7368	1	.0166
GVMT HOUSING AVAILABILITY	TIME by RANK	12.4510	5	.0290
GVMT HOUSING AVAILABILITY	TIME by AGE	8.5972	3	.0352
FAMILY PROGRAMS	TIME by GENDER	3.9096	1	.0480
OVERALL QUALITY OF LIFE	TIME by ETHNICITY	9.5306	4	.0491
OVERALL QUALITY OF LIFE	TIME by MARITAL STATUS	3.7172	1	.0539
FAMILY PROGRAMS	TIME by ETHNICITY	9.0671	4	.0594
FAMILY PROGRAMS	TIME by RANK	10.4823	5	.0625
YOUR MORALE	TIME by ETHNICITY	8.8028	4	.0662
BASIC PAY	TIME by LOCATION	3.2678	1	.0707
BASIC PAY	MARITAL STATUS	2.7056	1	.1000
RECREATION PROGRAMS	TIME by GENDER	2.4592	1	.1168
GVMT HOUSING AVAILABILITY	GENDER	2.4464	1	.1178

Table D-5. Summary of Subpopulation Analysis for Time Models (page 3 of 3 pages)

SSMF ITEM	SUBPOPULATION/ INTERACTION WITH TIME	WALD STATISTIC	DF	P VALUE
YOUR MORALE	TIME by RANK	8.6054	5	.1256
GVMT HOUSING AVAILABILITY	TIME by GENDER	2.2835	1	.1308
VHA COLA	TIME by AGE	5.6074	3	.1324
GVMT HOUSING QUALITY	TIME by AGE	5.4473	3	.1418
OVERALL QUALITY OF LIFE	TIME by AGE	4.8258	3	.1850
VHA COLA	TIME by RANK	7.2312	5	.2037
BASIC PAY	TIME by GENDER	1.4344	1	.2310
GVMT HOUSING QUALITY	TIME by MARITAL STATUS	1.0820	1	.2983
VHA COLA	TIME by ETHNICITY	4.5260	4	.3395
VHA COLA	TIME by GENDER	.7575	1	.3841
RECREATION PROGRAMS	TIME by RANK	4.9345	5	.4236
RECREATION PROGRAMS	GENDER	.4681	1	.4939
BASIC PAY	TIME by AGE	1.4850	3	.6857
FAMILY PROGRAMS	TIME by AGE	1.4020	3	.7051
OVERALL QUALITY OF LIFE	TIME by LOCATION	.1424	1	.7059
OVERALL QUALITY OF LIFE	TIME by GENDER	.1234	1	.7254
GVMT HOUSING AVAILABILITY	TIME by MARITAL STATUS	.1166	1	.7306
RECREATION PROGRAMS	TIME by MARITAL STATUS	.1006	1	.7511
GVMT HOUSING QUALITY	TIME by GENDER	.0654	1	.7982
YOUR MORALE	TIME by GENDER	.0625	1	.8026
YOUR MORALE	TIME by LOCATION	.0450	1	.8320
YOUR MORALE	TIME by AGE	.7290	3	.8666
VHA COLA	TIME by MARITAL STATUS	.0117	1	.9139
YOUR MORALE	TIME by MARITAL STATUS	.0014	1	.9702

Table D-6. Summary of Subpopulation Analysis for Cost Models (page 1 of 2 pages)

SSMP ITEM	SUBPOPULATION/ INTERACTION WITH COST	WALD STATISTIC	DF	P VALUE
BASIC PAY	RANK	3100.6099	5	.0000
OVERALL QUALITY OF LIFE	RANK	1945.8014	5	.0000
YOUR MORALE	RANK	1513.1517	5	.0000
YOUR MORALE	AGE	1070.4612	3	.0000
OVERALL QUALITY OF LIFE	AGE	1070.3119	3	.0000
YOUR MORALE	MARITAL STATUS	524.2753	1	.0000
OVERALL QUALITY OF LIFE	MARITAL STATUS	491.7717	1	.0000
BASIC PAY	AGE	458.9796	3	.0000
RECREATION PROGRAMS	RANK	446.7693	5	.0000
BASIC PAY	ETHNICITY	238.2912	4	.0000
RECREATION PROGRAMS	LOCATION	206.9172	1	.0000
FAMILY PROGRAMS	RANK	185.0611	5	.0000
RECREATION PROGRAMS	AGE	157.9199	3	.0000
YOUR MORALE	GENDER	150.3850	1	.0000
RECREATION PROGRAMS	MARITAL STATUS	137.9215	1	.0000
YOUR MORALE	ETHNICITY	124.7580	4	.0000
BASIC PAY	GENDER	109.2362	1	.0000
GVMT HOUSING QUALITY	ETHNICITY	80.3009	4	.0000
OVERALL QUALITY OF LIFE	ETHNICITY	59.9401	4	.0000
GVMT HOUSING QUALITY	LOCATION	55.0468	1	.0000
GVMT HOUSING QUALITY	MARITAL STATUS	47.1564	1	.0000
BASIC PAY	LOCATION	43.1021	1	.0000
FAMILY PROGRAMS	AGE	39.6191	3	.0000
GVMT HOUSING QUALITY	GENDER	29.5113	1	.0000
GVMT HOUSING QUALITY	RANK	28.2146	5	.0000
OVERALL QUALITY OF LIFE	GENDER	22.5625	1	.0000
FAMILY PROGRAMS	COST by LOCATION	21.3641	1	.0000
FAMILY PROGRAMS	GENDER	16.8532	1	.0000
YOUR MORALE	LOCATION	16.6951	1	.0000
BASIC PAY	COST by RANK	27.2146	5	.0001
FAMILY PROGRAMS	ETHNICITY	24.9847	4	.0001
GVMT HOUSING QUALITY	AGE	20.6013	3	.0001
OVERALL QUALITY OF LIFE	LOCATION	12.9294	1	.0003
RECREATION PROGRAMS	ETHNICITY	20.5153	4	.0004
FAMILY PROGRAMS	COST by MARITAL STATUS	11.1315	1	.0008
BASIC PAY	COST by ETHNICITY	18.6833	4	.0009

Table D-6. Summary of Subpopulation Analysis for Cost Models (page 2 of 2 pages)

SMF ITEM	SUBPOPULATION/ INTERACTION WITH COST	WALD STATISTIC	DF	P VALUE
RECREATION PROGRAMS	COST by ETHNICITY	17.2347	4	.0017
RECREATION PROGRAMS	COST by LOCATION	7.4784	1	.0062
GVMT HOUSING QUALITY	COST by ETHNICITY	13.0431	4	.0111
GVMT HOUSING QUALITY	COST by RANK	14.7968	5	.0112
FAMILY PROGRAMS	MARITAL STATUS	5.6302	1	.0177
FAMILY PROGRAMS	COST by GENDER	5.6021	1	.0179
BASIC PAY	COST by MARITAL STATUS	5.3688	1	.0205
OVERALL QUALITY OF LIFE	COST by ETHNICITY	11.5232	4	.0213
FAMILY PROGRAMS	LOCATION	4.4031	1	.0359
FAMILY PROGRAMS	COST by ETHNICITY	9.1433	4	.0576
BASIC PAY	MARITAL STATUS	3.1122	1	.0777
OVERALL QUALITY OF LIFE	COST by AGE	6.4161	3	.0930
FAMILY PROGRAMS	COST by RANK	8.7771	5	.1181
GVMT HOUSING QUALITY	COST by LOCATION	2.4029	1	.1211
RECREATION PROGRAMS	COST by AGE	4.8225	3	.1853
YOUR MORALE	COST by LOCATION	1.5625	1	.2113
OVERALL QUALITY OF LIFE	COST by RANK	7.0613	5	.2158
BASIC PAY	COST by AGE	3.9684	3	.2649
RECREATION PROGRAMS	COST by MARITAL STATUS	.9594	1	.3273
OVERALL QUALITY OF LIFE	COST by GENDER	.5876	1	.4433
BASIC PAY	COST by LOCATION	.5552	1	.4562
RECREATION PROGRAMS	GENDER	.5429	1	.4612
FAMILY PROGRAMS	COST by AGE	2.2305	3	.5260
OVERALL QUALITY OF LIFE	COST by MARITAL STATUS	.3746	1	.5404
GVMT HOUSING QUALITY	COST by AGE	2.0847	3	.5550
GVMT HOUSING QUALITY	COST by MARITAL STATUS	.2973	1	.5856
BASIC PAY	COST by GENDER	.2637	1	.6076
RECREATION PROGRAMS	COST by GENDER	.2536	1	.6167
OVERALL QUALITY OF LIFE	COST by LOCATION	.2148	1	.6430
YOUR MORALE	COST by GENDER	.1837	1	.6682
YOUR MORALE	COST by MARITAL STATUS	.1626	1	.6868
YOUR MORALE	COST by ETHNICITY	1.9309	4	.7485
YOUR MORALE	COST by RANK	2.6665	5	.7511
YOUR MORALE	COST by AGE	.7381	3	.8642
GVMT HOUSING QUALITY	COST by GENDER	.0138	1	.9065
RECREATION PROGRAMS	COST by RANK	.9720	5	.9648

c. For those instances in which a group variable is significant, it is productive to investigate what are called 1 degree of freedom contrasts. These contrasts can tell us which one of the subpopulations is causing the difference in level or slope for a particular group variable whose Wald test indicates that one or more subpopulation levels or slopes differ from that of the total population level or slope. These contrasts will be described in Tables D-8 through D-21. Table D-7, a key table to Tables D-8 through D-21 which shows the independent variables, is also provided. Each of the 84 models is presented. The organization of the models is (1) the models with time and then (2) the models with cost. Within each major group of models (i.e., time or cost), the models are grouped by SSMP item. The lowest level of ordering is by demographic variable.

d. The first model displayed (i.e., Table D-8) is the Overall Quality of Life Model with covariates time and rank. The basic model, discussed in equation (5) above, is as follows:

$$\ln(\Pi(T,R)/(1-\Pi(T,R)) = \mu + \beta\, T + \alpha_1\, R1 + \alpha_2\, R2 + \alpha_3\, R3 + \alpha_4\, R4 + \alpha_5\, R5 + \alpha_6\, R6$$

$$+ \gamma_1\, T \bullet R1 + \gamma_2\, T \bullet R2 + \gamma_3\, T \bullet R3$$

$$+ \gamma_4\, T \bullet R4 + \gamma_5\, T \bullet R5 + \gamma_6\, T \bullet R6 \qquad (5)$$

The estimates of the parameters for the Overall Quality of Life model with covariates time and rank as listed in the table are as follows:

$\mu = .3789$, $\beta = -.0908$, $\alpha_1 = -.3778$ $\alpha_2 = .0172$, $\alpha_3 = .3668$, $\alpha_4 = .3440$, $\alpha_5 = .7617$,
$\alpha_6 = .7983$, $\gamma_1 = .0374$, $\gamma_2 = -.0410$, $\gamma_3 = -.0316$, $\gamma_4 = -.0063$, $\gamma_5 = .0313$, $\gamma_6 = -.0519$.

In Table D-8, the group variable for Rank in the QOL model was significantly different from zero (i.e., Wald statistic = 1938.2 with 5 df and p-value of less than 5×10^{-5}). An examination of the entry for this model in Table D-8 indicates that five of the six levels of rank (i.e., all except R2 - SGT to SSG) have a level significantly different from the level of the overall population. Also in Table D-5, the group variable Time by Rank was not significantly different from zero using our cutoff criteria of 0.0012. The group variable Time by Rank had a Wald Statistic = 14.1 with 5 degrees of freedom and a p-value of 0.0147. The estimates of μ (i.e., Table D-3, first page, last group, second line) and β (i.e., Table D-4, second page, second group, bottom line) in the QOL model with time and rank are both significantly different from zero. The Wald statistics are 1895.5 and 80.5 for the estimates of μ and β, respectively. Therefore, the analysis of this model is as follows. The estimates of μ and β are significantly different from zero, and the estimates of the parameters α_1, α_3, α_4, α_5, and α_6, for the rank indicator variables R1, R3, R4, R5, and R6 are significantly different from zero. The mean levels of these subpopulations differ significantly from the total population mean level. The change in time of the percent satisfaction is adequately explained by the slope β.

e. One should definitely look at the contrasts associated with the significant interaction terms described above. There were four group variables for which cost interacted significantly with a demographic group variable. These were (1) FAM-Mar St., (2) FAM-Locate, (3) PAY-Rank, and (4) PAY-Ethnic. Looking at the contrasts within the group variable FAM-Mar St., one observes that as the cost of the Family Programs increases from $ 182K to $ 270K, there is a model predicted increase of 1.9 percent in the satisfaction of married respondents from 65.5 percent satisfied to 67.4 percent satisfied. On the other hand, as the cost for the Family Programs is increased over the same range, there is a model predicted decrease in the satisfaction of single respondents of 2.9 percent from 67 percent satisfied to 64.1 percent satisfied. Looking at the contrasts within FAM-Locate, one observes a similar interaction. In the case of CONUS-located respondents, there is a 0.9 percent decrease from 67.5 percent satisfied to 66.6 percent satisfied. Over the same range of cost, there is a model predicted increase of 6.3 percent from 61.3 satisfied to 67.6 satisfied among OCONUS-located respondents.

f. Looking at the cost interactions with PAY-Rank, one can identify two of the six rank indicator variables which have a slope significantly different (i.e., at p value less than or equal to 0.0012) from zero. The first rank indicator variable R1 - PV2-SPC/CPL contrast indicates that the slope for this group is slightly less negative than for the total population (-.4556 for group R1 vs -.4968 for the total population). The value of the contrast for R2- SGT-SSG indicates that the slope for this group is more negative than the slope for the total population (-.5661 for group R2 vs -.4968 for the total population). The other four contrasts, R3, R4, R5, and R6, are not significantly different from zero. Looking at PAY-Ethnic cost interaction contrasts, there is only one significant contrast. The value of the White ethnic contrast, E1, indicates that the slope for the White subpopulation is slightly less negative than for the total population (-.4571 for group E1 vs -.4891 for the total population). The other four contrasts E2, E3, E4, and E5 are not significantly different from zero.

g. On the other hand, almost every group variable related to level differences between subpopulations was significantly different from zero. This means that there was a constant nonzero level difference between the subpopulations over all values of cost. In the main, the fits of the benefits versus time mirrored the fits of the benefits versus cost. The largest level differences were shown in the SSMP item Satisfaction with Basic Pay. The graph plotted as slide 18 in the scripted briefing section is representative of 77 out of the 84 models which had significant differences in the levels of one or more subpopulations and the total population. In fact, this graph shows both significant level and slope differences. The level differences are much more pronounced and can be recognized easily. The model estimates of the mean level for the total population is 37.7 percent. The model subpopulation mean levels are as follows: (1) PV2-SPC/CPL 34.1 percent, (2) SGT-SSG 31.0 percent, (3) SFC-SGM/CSM 35.0 percent, (4) WO1-WO5 44.9 percent, (5) 2LT-CPT 66.5 percent, and (6) MAJ-COL+ 66.1 percent. In addition to the significant level difference, the model also found two slope differences which were significantly different from zero. The slopes of groups (2) and (5) differed from the slope of the total population for this model. The estimate of b (i.e., from logistic regression model) for the total population was -0.1217. The estimate of $b + a_2$, the group (2) estimate, is -.02030, which indicates a slight decrease in the slope measure and a more vigorous dissatisfaction with basic pay with increasing time from this subpopulation than from the total population. On the other hand, the estimate of $b + a_5$ is -0.0168, which almost neutralizes the slope of the total population. Thus, group (5) is much more satisfied with the basic pay than the total population, and this satisfaction increases throughout the period of Spring 1992 to Fall 1994.

h. As indicated above, nearly all of the level group variables were significantly different from zero, indicating that there are many level contrasts significantly different from zero. The PAY-Rank level increases are the largest of the level differences. They have been graphically represented in the main body of this report. The remaining level increases are just too numerous to detail explicitly. However, any of the 84 models can be analyzed in the same manner by analyzing the estimates of μ (i.e., Table D-3) and β (i.e., Table D-4) to determine if the estimates of level and slope are significantly different from zero. Next, one should examine the results for the group variables in Tables D-5 for time or D-6 for cost to determine if any single contrast is significantly different from zero. Finally, if the test for either or both of the group variables is rejected, then one should examine the contrasts in the appropriate tables pertaining to a particular SSPM item, one for time and one for cost selected from Tables D-8 through D-21.

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Table D-7. Key to the Logistic Regression Equation (page 1 of 3 pages)

INDEPENDENT VARIABLES:

TIME (code: T)

Time (T) is measured in years. T is centered among the six SSMP cycles. The following table may be used for substitutions into the equations. Substitute value at left for a value at right. Generally, T may be obtained by subtracting 1993.75 from a date of SSMP administration or 1991.75 from the Fiscal Year in which an expenditure is made.

T	SSMP Cycle	FY of expenditure
-1.25	Spring 1992	1990.5
-0.75	Fall 1992	1991.0
-0.25	Spring 1993	1991.5
+0.25	Fall 1993	1992.0
+0.75	Spring 1994	1992.5
+1.25	Fall 1994	1993.0

COST (code: C)

Cost (C) is measured in thousands of constant FY 96 dollars per soldier. C is centered about the mean of the cost at the times of the six SSMP administrations. Moreover each of the six equations has a different mean cost. The following table shows the mean cost used in fitting these equations. To substitute a real cost into these equations, one should subtract the appropriate value in the table from the real cost first.

Centered Cost	SSMP Item
23.668	Overall Quality of Life
23.668	Your Current Morale Level
21.657	Basic Pay
1.432	Government Housing Quality
.367	Recreation Programs
.241	Family Programs

RANK (code: R)

Rank is a group variable. It is used only in the equations in which the code letter R appears. Substitute a 1 in the equation for the rank subpopulation for which a percent satisfaction prediction is desired. All other subpopulations besides the desired subpopulation receive the value of zero.

Rank Indicator Variable	Rank Group represented
R1	PV2-SPC/CPL
R2	SGT-SSG
R3	SFC-SGM/CSM
R4	WO1-WO5
R5	2LT-CPT
R6	MAJ-COL+

Table D-7. Key to the Logistic Regression Equation (page 2 of 3 pages)

AGE (code: A)

Age is a group variable. It is used only in the equations in which the code letter A appears. Substitute a 1 in the equation for the age subpopulation for which a percent satisfaction prediction is desired. All other subpopulations besides the desired subpopulation receive the value of zero.

Age Indicator Variable	Age Group represented
A1	24 or less
A2	25 to 31
A3	32 to 39
A4	40 or more

ETHNICITY (Code: E)

Ethnicity is a group variable. It is used only in the equations in which the code letter E appears. Substitute a 1 in the equation for the ethnic subpopulation for which a percent satisfaction prediction is desired. All other subpopulations besides the desired subpopulation receive the value of zero.

Ethnic Indicator Variable	Ethnic Group represented
E1	WHITE
E2	BLACK
E3	HISPANIC
E4	ASIAN PAC ISL
E5	AMER IND ESKIMO ALEUT

GENDER (Code: G)

Gender is a group variable. It is used only in the equations in which the code letter G appears. Substitute a 1 in the equation for the gender subpopulation for which a percent satisfaction prediction is desired. All other subpopulations besides the desired subpopulation receive the value of zero.

Gender Indicator Variable	Gender Group represented
G1	MALE
G2	FEMALE

Table D-7. Key to the Logistic Regression Equation (page 3 of 3 pages)

MARITAL STATUS (Code: M)

Marital Status is a group variable. It is used only in the equations in which the code letter M appears. Substitute a 1 in the equation for the marital status subpopulation for which a percent satisfaction prediction is desired. All other subpopulations besides the desired subpopulation receive the value of zero.

Marital Status Indicator variable	Marital Status Group represented
M1	NOT MARRIED
M2	MARRIED

LOCATION (Code: L)

Location (i.e., present duty station) is a group variable. It is used only in the equations in which the code letter L appears. Substitute a 1 in the equation for the location subpopulation for which a percent satisfaction prediction is desired. All other subpopulations besides the desired subpopulation receive the value of zero.

Location Indicator variable	Location Group represented
L1	CONUS
L2	OCONUS

Table D-8. Overall Quality of Life Equations (with time) (page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.3789	.0087	1895.496	1	.0000		
T	-.0908	.0101	80.5217	1	.0000	-.0317	.9132
R			1938.195	5	.0000		
R1	-.3778	.0100	1433.737	1	.0000	-.1355	.6853
R2	.0172	.0131	1.7149	1	.1903	.0000	1.0174
R3	.3668	.0254	208.5266	1	.0000	.0515	1.4431
R4	.3440	.0570	36.4518	1	.0000	.0210	1.4105
R5	.7617	.0315	586.3856	1	.0000	.0866	2.1419
R6	.7983	.0413	373.5795	1	.0000	.0690	2.2218
T by R			14.1344	5	.0147		
T by R1	.0374	.0116	10.4268	1	.0012	.0124	1.0381
T by R2	-.0410	.0154	7.1200	1	.0076	-.0081	.9598
T by R3	-.0316	.0294	1.1528	1	.2830	.0000	.9689
T by R4	-.0063	.0666	.0091	1	.9241	.0000	.9937
T by R5	.0313	.0366	.7322	1	.3922	.0000	1.0318
T by R6	-.0519	.0481	1.1628	1	.2809	.0000	.9494
Constant	.3683	.0086	1835.107	1	.0000		
T	-.0804	.0100	64.8666	1	.0000	-.0284	.9227
A			1062.4838	3	.0000		
A1	-.3261	.0108	904.9218	1	.0000	-.1076	.7218
A2	.0736	.0133	30.4727	1	.0000	.0191	1.0764
A3	.2475	.0159	242.8867	1	.0000	.0556	1.2809
A4	.5078	.0292	302.4774	1	.0000	.0622	1.6616
T by A			4.8258	3	.1850		
T by A1	.0215	.0126	2.9052	1	.0883	.0034	1.0217
T by A2	.0004	.0154	.0008	1	.9773	.0000	1.0004
T by A3	-.0139	.0185	.5671	1	.4514	.0000	.9862
T by A4	-.0570	.0338	2.8405	1	.0919	-.0033	.9446
Constant	.3610	.0085	1800.995	1	.0000		
T	-.0796	.0099	64.8153	1	.0000	-.0284	.9234
E			57.0170	4	.0000		
E1	-.0280	.0066	17.8808	1	.0000	-.0143	.9724
E2	.0784	.0157	25.0478	1	.0000	.0172	1.0816
E3	.0156	.0294	.2816	1	.5956	.0000	1.0157
E4	.1365	.0572	5.6882	1	.0171	.0069	1.1463
E5	-.3602	.0692	27.1138	1	.0000	-.0179	.6976
T by E			9.5306	4	.0491		
T by E1	.0224	.0077	8.5379	1	.0035	.0092	1.0226
T by E2	-.0402	.0182	4.8727	1	.0273	-.0061	.9606
T by E3	-.0172	.0330	.2707	1	.6029	.0000	.9830
T by E4	-.0671	.0662	1.0252	1	.3113	.0000	.9351
T by E5	-.1065	.0820	1.6876	1	.1939	.0000	.8990

Table D-8. Overall Quality of Life Equations (with time)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.3610	.0085	1803.458	1	.0000		
T	-.0819	.0099	68.7402	1	.0000	-.0293	.9213
G			23.4619	1	.0000		
G1	-.0155	.0032	23.4186	1	.0000	-.0166	.9846
G2	.1107	.0229	23.4186	1	.0000	.0166	1.1171
T by G			.1234	1	.7254		
T by G1	-.0013	.0037	.1235	1	.7253	.0000	.9987
T by G2	.0093	.0265	.1235	1	.7253	.0000	1.0094
Constant	.3639	.0085	1817.063	1	.0000		
T	-.0808	.0099	66.2728	1	.0000	-.0287	.9224
M			483.5927	1	.0000		
M1	-.2375	.0108	486.5460	1	.0000	-.0788	.7886
M2	.1491	.0068	486.5457	1	.0000	.0788	1.1608
~~T by M~~			3.7172	1	.0539		
T by M1	.0241	.0125	3.7171	1	.0539	.0047	1.0244
T by M2	-.0151	.0078	3.7171	1	.0539	-.0047	.9850
Constant	.3612	.0085	1805.039	1	.0000		
T	-.0800	.0099	65.4025	1	.0000	-.0285	.9231
L			14.6673	1	.0001		
L1	-.0180	.0047	14.9063	1	.0001	-.0129	.9821
L2	.0612	.0159	14.9063	1	.0001	.0129	1.0631
T by L			.1424	1	.7059		
T by L1	-.0020	.0053	.1491	1	.6994	.0000	.9980
T by L2	.0069	.0178	.1491	1	.6994	.0000	1.0069

Table D-9. Government Housing Quality Equations (with time)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.0017	.0104	.0262	1	.8715		
T	-.1793	.0121	220.8932	1	.0000	-.0651	.8358
R			27.8171	5	.0000		
R1	.0559	.0152	13.5875	1	.0002	.0150	1.0575
R2	-.0577	.0141	16.8209	1	.0000	-.0169	.9439
R3	-.0103	.0262	.1551	1	.6937	.0000	.9897
R4	-.1247	.0611	4.1677	1	.0412	-.0065	.8827
R5	.0616	.0325	3.6036	1	.0577	.0056	1.0636
R6	.0272	.0399	.4641	1	.4957	.0000	1.0275
T by R			21.5528	5	.0006		
T by R1	.0298	.0174	2.9369	1	.0866	.0043	1.0302
T by R2	-.0567	.0163	12.0430	1	.0005	-.0140	.9445
T by R3	-.0426	.0302	1.9888	1	.1585	.0000	.9583
T by R4	.0773	.0707	1.1934	1	.2747	.0000	1.0803
T by R5	.0926	.0378	6.0134	1	.0142	.0098	1.0970
T by R6	.0884	.0459	3.7046	1	.0543	.0057	1.0925
Constant	.0016	.0104	.0243	1	.8761		
T	-.1795	.0121	221.5831	1	.0000	-.0652	.8357
A			21.4340	3	.0001		
A1	.0547	.0168	10.5556	1	.0012	.0129	1.0562
A2	-.0380	.0150	6.3780	1	.0116	-.0092	.9627
A3	-.0386	.0166	5.3874	1	.0203	-.0081	.9622
A4	.0751	.0301	6.2457	1	.0124	.0091	1.0780
T by A			5.4473	3	.1418		
T by A1	.0377	.0194	3.7964	1	.0514	.0059	1.0384
T by A2	-.0112	.0174	.4142	1	.5198	.0000	.9889
T by A3	-.0327	.0193	2.8784	1	.0898	-.0041	.9678
T by A4	.0227	.0346	.4314	1	.5113	.0000	1.0230
Constant	.0013	.0105	.0159	1	.8998		
T	-.1761	.0121	212.6253	1	.0000	-.0639	.8386
E			73.2537	4	.0000		
E1	-.0663	.0084	62.0018	1	.0000	-.0341	.9358
E2	.1397	.0185	57.1067	1	.0000	.0327	1.1499
E3	.0790	.0353	5.0062	1	.0253	.0076	1.0822
E4	.0396	.0702	.3189	1	.5722	.0000	1.0404
E5	-.1341	.0862	2.4218	1	.1197	-.0029	.8745
T by E			15.2144	4	.0043		
T by E1	.0327	.0097	11.3502	1	.0008	.0135	1.0332
T by E2	-.0340	.0214	2.5275	1	.1119	-.0032	.9666
T by E3	-.1090	.0397	7.5567	1	.0060	-.0104	.8967
T by E4	.0015	.0814	.0004	1	.9849	.0000	1.0015
T by E5	-.1454	.1013	2.0606	1	.1511	-.0011	.8647

Table D-9. Government Housing Quality Equations (with time)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.0019	.0104	.0322	1	.8577		
T	-.1780	.0121	217.8376	1	.0000	-.0647	.8370
G			28.9270	1	.0000		
G1	.0199	.0037	28.4458	1	.0000	.0226	1.0201
G2	-.1556	.0292	28.4458	1	.0000	-.0226	.8559
T by G			.0654	1	.7982		
T by G1	.0011	.0043	.0605	1	.8057	.0000	1.0011
T by G2	-.0083	.0337	.0605	1	.8057	.0000	.9918
Constant	.0017	.0104	.0279	1	.8673		
T	-.1783	.0121	218.5528	1	.0000	-.0648	.8367
M			48.3547	1	.0000		
M1	-.1203	.0173	48.1422	1	.0000	-.0299	.8867
M2	.0442	.0064	48.1421	1	.0000	.0299	1.0452
T by M			1.0820	1	.2983		
T by M1	.0207	.0199	1.0847	1	.2976	.0000	1.0209
T by M2	-.0076	.0073	1.0847	1	.2977	.0000	.9924
Constant	.0021	.0104	.0410	1	.8395		
T	-.1774	.0121	215.7841	1	.0000	-.0644	.8375
L			56.7349	1	.0000		
L1	-.0467	.0062	56.8770	1	.0000	-.0326	.9543
L2	.1347	.0179	56.8772	1	.0000	.0326	1.1442
T by L			7.1365	1	.0076		
T by L1	.0187	.0070	7.2105	1	.0072	.0100	1.0189
T by L2	-.0539	.0201	7.2105	1	.0072	-.0100	.9475

Table D-10. Government Housing Availability Equations (with time)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	-.7688	.0106	5215.093	1	.0000		
T	-.0650	.0123	27.8461	1	.0000	-.0223	.9371
R			222.3611	5	.0000		
R1	-.1723	.0150	131.2489	1	.0000	-.0499	.8417
R2	-.0239	.0147	2.6465	1	.1038	-.0035	.9764
R3	.2154	.0267	65.2947	1	.0000	.0349	1.2404
R4	.2159	.0611	12.4862	1	.0004	.0142	1.2410
R5	.2183	.0318	47.2279	1	.0000	.0295	1.2440
R6	.2007	.0399	25.2470	1	.0000	.0212	1.2222
T by R			12.4510	5	.0290		
T by R1	-.0106	.0173	.3756	1	.5400	.0000	.9894
T by R2	-.0422	.0170	6.1237	1	.0133	-.0089	.9587
T by R3	.0621	.0307	4.0877	1	.0432	.0063	1.0641
T by R4	.0182	.0711	.0655	1	.7980	.0000	1.0184
T by R5	.0765	.0370	4.2852	1	.0384	.0066	1.0795
T by R6	.0385	.0462	.6933	1	.4050	.0000	1.0392
Constant	-.7674	.0106	5207.602	1	.0000		
T	-.0616	.0123	25.1114	1	.0000	-.0211	.9402
A			275.8842	3	.0000		
A1	-.1427	.0167	72.8429	1	.0000	-.0370	.8670
A2	-.0678	.0154	19.3440	1	.0000	-.0183	.9344
A3	.1388	.0171	65.9075	1	.0000	.0351	1.1489
A4	.2546	.0303	70.5729	1	.0000	.0364	1.2899
T by A			8.5972	3	.0352		
T by A1	-.0043	.0194	.0487	1	.8254	.0000	.9957
T by A2	-.0416	.0178	5.4651	1	.0194	-.0082	.9592
T by A3	.0288	.0198	2.1058	1	.1467	.0014	1.0292
T by A4	.0675	.0349	3.7291	1	.0535	.0056	1.0698
Constant	-.7656	.0106	5204.163	1	.0000		
T	-.0593	.0123	23.0953	1	.0000	-.0202	.9427
E			24.3269	4	.0001		
E1	-.0311	.0084	13.6850	1	.0002	-.0150	.9694
E2	.0864	.0188	21.1737	1	.0000	.0192	1.0902
E3	.0184	.0362	.2567	1	.6124	.0000	1.0185
E4	-.0677	.0740	.8372	1	.3603	.0000	.9346
E5	-.1345	.0880	2.3378	1	.1263	-.0026	.8742
T by E			21.3781	4	.0003		
T by E1	.0226	.0097	5.4416	1	.0197	.0081	1.0228
T by E2	-.0068	.0217	.0982	1	.7540	.0000	.9932
T by E3	-.1471	.0403	13.2993	1	.0003	-.0148	.8632
T by E4	.1547	.0845	3.3504	1	.0672	.0051	1.1673
T by E5	-.2039	.1029	3.9311	1	.0474	-.0061	.8155

Table D-10. Government Housing Availability Equations (with time)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	-.7642	.0106	5199.908	1	.0000		
T	-.0611	.0123	24.8592	1	.0000	-.0210	.9407
G			2.4464	1	.1178		
G1	.0061	.0039	2.4460	1	.1178	.0029	1.0061
G2	-.0454	.0291	2.4460	1	.1178	-.0029	.9556
T by G			2.2835	1	.1308		
T by G1	-.0068	.0045	2.2674	1	.1321	-.0023	.9932
T by G2	.0505	.0336	2.2674	1	.1321	.0023	1.0518
Constant	-.7641	.0106	5198.544	1	.0000		
T	-.0619	.0123	25.4778	1	.0000	-.0213	.9400
M			11.9475	1	.0005		
M1	.0636	.0184	11.9807	1	.0005	.0139	1.0657
M2	-.0211	.0061	11.9806	1	.0005	-.0139	.9792
T by M			.1186	1	.7306		
T by M1	.0073	.0212	.1176	1	.7317	.0000	1.0073
T by M2	-.0024	.0070	.1176	1	.7317	.0000	.9976
Constant	-.7689	.0106	5216.803	1	.0000		
T	-.0551	.0123	19.9206	1	.0000	-.0186	.9464
L			272.4294	1	.0000		
L1	-.0963	.0058	271.9516	1	.0000	-.0722	.9082
L2	.3037	.0184	271.9519	1	.0000	.0722	1.3548
T by L			7.0854	1	.0078		
T by L1	.0175	.0066	7.0955	1	.0077	.0099	1.0176
T by L2	-.0551	.0207	7.0955	1	.0077	-.0099	.9464

**Table D-11. Your Current Morale Level Equations (with time)
(page 1 of 2 pages)**

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.5417	.0112	2329.719	1	.0000		
T	-.0528	.0130	16.3864	1	.0001	-.0172	.9486
R			1872.632	5	.0000		
R1	-.5112	.0128	1606.965	1	.0000	-.1815	.5998
R2	.0660	.0175	14.2673	1	.0002	.0159	1.0682
R3	.7159	.0343	434.7050	1	.0000	.0942	2.0461
R4	.4733	.0755	39.3149	1	.0000	.0277	1.6052
R5	.7339	.0399	338.0192	1	.0000	.0830	2.0833
R6	.7033	.0506	193.3290	1	.0000	.0627	2.0205
T by R			8.6054	5	.1256		
T by R1	.0200	.0148	1.8216	1	.1771	.0000	1.0202
T by R2	-.0556	.0205	7.3845	1	.0066	-.0125	.9459
T by R3	.0620	.0396	2.4563	1	.1171	.0031	1.0640
T by R4	-.0024	.0878	.0007	1	.9786	.0000	.9977
T by R5	-.0016	.0462	.0011	1	.9730	.0000	.9984
T by R6	.0064	.0595	.0119	1	.9133	.0000	1.0064
Constant	.5252	.0110	2273.805	1	.0000		
T	-.0441	.0128	11.8669	1	.0006	-.0142	.9569
A			1070.7852	3	.0000		
A1	-.4007	.0137	850.2094	1	.0000	-.1319	.6699
A2	.0093	.0173	.2864	1	.5926	.0000	1.0093
A3	.3786	.0206	336.5191	1	.0000	.0828	1.4602
A4	.6530	.0377	299.7453	1	.0000	.0782	1.9213
T by A			.7280	3	.8666		
T by A1	.0087	.0160	.2982	1	.5850	.0000	1.0086
T by A2	-.0167	.0201	.6915	1	.4056	.0000	.9835
T by A3	.0041	.0241	.0284	1	.8662	.0000	1.0041
T by A4	.0047	.0435	.0117	1	.9139	.0000	1.0047
Constant	.5100	.0108	2220.758	1	.0000		
T	-.0461	.0126	13.4460	1	.0002	-.0153	.9549
E			127.6841	4	.0000		
E1	-.0896	.0086	108.7991	1	.0000	-.0468	.9143
E2	.1509	.0202	56.0068	1	.0000	.0333	1.1629
E3	.1774	.0364	23.7006	1	.0000	.0211	1.1941
E4	.3150	.0743	17.9918	1	.0000	.0181	1.3703
E5	-.1891	.0850	4.9498	1	.0261	-.0079	.8277
T by E			8.8028	4	.0662		
T by E1	.0006	.0099	.0031	1	.9557	.0000	1.0006
T by E2	.0191	.0234	.6667	1	.4142	.0000	1.0193
T by E3	.0171	.0409	.1746	1	.6761	.0000	1.0172
T by E4	-.2432	.0848	8.2328	1	.0041	-.0113	.7841
T by E5	-.0338	.0980	.1185	1	.7304	.0000	.9668

Table D-11. Your Current Morale Level Equations (with time) (page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.5091	.0108	2215.852	1	.0000		
T	-.0469	.0126	13.9281	1	.0002	-.0156	.9542
G			150.3850	1	.0000		
G1	.0466	.0038	151.9930	1	.0000	.0555	1.0477
G2	-.3597	.0292	151.9930	1	.0000	-.0555	.6979
T by G			.0625	1	.8026		
T by G1	.0011	.0044	.0609	1	.8050	.0000	1.0011
T by G2	-.0084	.0340	.0609	1	.8050	.0000	.9916
Constant	.5145	.0109	2234.042	1	.0000		
T	-.0459	.0127	13.1516	1	.0003	-.0151	.9552
M			523.2656	1	.0000		
M1	-.3111	.0136	523.4340	1	.0000	-.1034	.7326
M2	.1970	.0086	523.4341	1	.0000	.1034	1.2178
T by M			.0014	1	.9702		
T by M1	-.0006	.0158	.0017	1	.9672	.0000	.9994
T by M2	.0004	.0100	.0017	1	.9672	.0000	1.0004
Constant	.5073	.0108	2208.913	1	.0000		
T	-.0513	.0126	16.6661	1	.0000	-.0173	.9500
L			12.0727	1	.0005		
L1	.0205	.0059	12.2635	1	.0005	.0145	1.0207
L2	-.0700	.0200	12.2635	1	.0005	-.0145	.9323
T by L			.0450	1	.8320		
T by L1	-.0014	.0066	.0470	1	.8285	.0000	.9986
T by L2	.0049	.0225	.0470	1	.8285	.0000	1.0049

Table D-12. Recreation Programs Equations (with time) (page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	1.2701	.0102	15555.46	1	.0000		
T	.0366	.0118	9.5609	1	.0020	.0111	1.0373
R			444.3765	5	.0000		
R1	-.1975	.0116	290.4118	1	.0000	-.0685	.8208
R2	.0164	.0155	1.1100	1	.2921	.0000	1.0165
R3	.0295	.0290	1.0341	1	.3092	.0000	1.0299
R4	.1907	.0681	7.8368	1	.0051	.0098	1.2101
R5	.5375	.0386	193.9960	1	.0000	.0559	1.7117
R6	.4866	.0495	96.7174	1	.0000	.0393	1.6267
T by R			4.9345	5	.4236		
T by R1	.0152	.0134	1.2833	1	.2573	.0000	1.0154
T by R2	-.0317	.0181	3.0643	1	.0800	-.0042	.9688
T by R3	-.0170	.0336	.2561	1	.6128	.0000	.9832
T by R4	-.0458	.0796	.3311	1	.5650	.0000	.9552
T by R5	.0529	.0448	1.3905	1	.2383	.0000	1.0543
T by R6	.0259	.0575	.2024	1	.6528	.0000	1.0262
Constant	1.2597	.0101	15606.92	1	.0000		
T	.0407	.0117	12.0600	1	.0005	.0128	1.0415
A			160.8449	3	.0000		
A1	-.1588	.0126	158.9670	1	.0000	-.0505	.8531
A2	.1126	.0160	49.5967	1	.0000	.0278	1.1192
A3	.0738	.0187	15.6462	1	.0001	.0149	1.0766
A4	.1207	.0332	13.1702	1	.0003	.0135	1.1282
T by A			11.3535	3	.0100		
T by A1	-.0187	.0147	1.6302	1	.2017	.0000	.9815
T by A2	.0502	.0185	7.3801	1	.0066	.0094	1.0515
T by A3	.0029	.0217	.0182	1	.8927	.0000	1.0029
T by A4	-.0923	.0385	5.7379	1	.0166	-.0076	.9119
Constant	1.2547	.0100	15587.83	1	.0000		
T	.0377	.0117	10.4194	1	.0012	.0117	1.0384
E			22.1934	4	.0002		
E1	.0334	.0077	18.5944	1	.0000	.0164	1.0339
E2	-.0403	.0182	4.8970	1	.0269	-.0069	.9605
E3	-.1112	.0337	10.8534	1	.0010	-.0120	.8948
E4	-.0843	.0655	1.6568	1	.1980	.0000	.9191
E5	-.0282	.0818	.1191	1	.7300	.0000	.9722
T by E			36.5737	4	.0000		
T by E1	.0424	.0090	22.3753	1	.0000	.0182	1.0433
T by E2	-.1200	.0212	32.0399	1	.0000	-.0221	.8869
T by E3	-.0288	.0378	.5798	1	.4464	.0000	.9716
T by E4	.1406	.0758	3.4404	1	.0636	.0048	1.1510
T by E5	.0624	.0969	.4148	1	.5195	.0000	1.0644

Table D-12. Recreation Programs Equations (with time)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	1.2552	.0100	15620.37	1	.0000		
T	.0381	.0117	10.6577	1	.0011	.0119	1.0388
G			.4681	1	.4939		
G1	-.0026	.0038	.4661	1	.4948	.0000	.9974
G2	.0183	.0268	.4661	1	.4948	.0000	1.0185
T by G			2.4592	1	.1168		
T by G1	.0069	.0044	2.4833	1	.1151	.0028	1.0069
T by G2	-.0491	.0311	2.4833	1	.1151	-.0028	.9521
Constant	1.2587	.0101	15613.10	1	.0000		
T	.0391	.0117	11.1680	1	.0008	.0122	1.0399
M			139.0513	1	.0000		
M1	-.1474	.0125	139.0691	1	.0000	-.0473	.8629
M2	.0941	.0080	139.0690	1	.0000	.0473	1.0987
T by M			.1006	1	.7511		
T by M1	.0046	.0145	.1011	1	.7505	.0000	1.0046
T by M2	-.0029	.0093	.1011	1	.7505	.0000	.9971
Constant	1.2607	.0101	15623.18	1	.0000		
T	.0279	.0118	5.6465	1	.0175	.0077	1.0283
L			188.6736	1	.0000		
L1	.0728	.0053	189.8922	1	.0000	.0553	1.0755
L2	-.2471	.0179	189.8922	1	.0000	-.0553	.7810
T by L			11.6736	1	.0006		
T by L1	-.0205	.0060	11.8558	1	.0006	-.0127	.9797
T by L2	.0696	.0202	11.8558	1	.0006	.0127	1.0721

Table D-13. Family Program Equations (with time)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.6926	.0111	3984.243	1	.0000		
T	.0330	.0130	5.3650	1	.0205	.0084	1.0335
R			193.5286	5	.0000		
R1	-.1178	.0162	52.5426	1	.0000	-.0326	.8889
R2	-.0589	.0145	16.5074	1	.0000	-.0175	.9428
R3	.0289	.0268	1.1581	1	.2819	.0000	1.0293
R4	.0965	.0653	2.1837	1	.1395	.0023	1.1013
R5	.3194	.0405	62.1844	1	.0000	.0356	1.3763
R6	.4126	.0455	82.3429	1	.0000	.0412	1.5107
T by R			10.4823	5	.0625		
T by R1	.0485	.0188	6.6338	1	.0100	.0094	1.0497
T by R2	-.0443	.0169	6.8409	1	.0089	-.0101	.9566
T by R3	.0220	.0311	.5003	1	.4794	.0000	1.0222
T by R4	-.0269	.0768	.1226	1	.7262	.0000	.9735
T by R5	.0206	.0478	.1854	1	.6669	.0000	1.0208
T by R6	-.0463	.0530	.7636	1	.3822	.0000	.9548
Constant	.6888	.0111	3869.028	1	.0000		
T	.0330	.0129	6.5209	1	.0107	.0095	1.0335
A			38.9650	3	.0000		
A1	-.0855	.0185	21.4333	1	.0000	-.0202	.9180
A2	.0103	.0161	.4095	1	.5222	.0000	1.0104
A3	.0015	.0170	.0074	1	.9313	.0000	1.0015
A4	.1615	.0316	26.0662	1	.0000	.0225	1.1752
T by A			1.4020	3	.7051		
T by A1	.0016	.0217	.0051	1	.9429	.0000	1.0016
T by A2	.0117	.0187	.3903	1	.5321	.0000	1.0117
T by A3	.0019	.0199	.0088	1	.9253	.0000	1.0019
T by A4	-.0411	.0366	1.2653	1	.2607	.0000	.9597
Constant	.6878	.0111	3860.101	1	.0000		
T	.0332	.0129	6.6030	1	.0102	.0093	1.0337
E			24.6666	4	.0001		
E1	-.0091	[illegible]	.9990	1	.3176	.0000	.9909
E2	.0508	.0190	7.1221	1	.0076	.0104	1.0521
E3	-.0344	.0372	.8558	1	.3549	.0000	.9662
E4	.0289	.0735	.1543	1	.6944	.0000	1.0293
E5	-.3711	.0869	18.2381	1	.0000	-.0185	.6900
T by E			[illegible]	4	.0594		
T by E1	.0262	.0106	6.1234	1	.0133	.0093	1.0266
T by E2	-.0418	.0222	3.5585	1	.0592	-.0057	.9591
T by E3	-.0722	[illegible]	2.9830	1	.0841	-.0046	.9303
T by E4	-.0202	[illegible]	.0566	1	.8120	.0000	.9800
T by E5	.1180	.1026	1.3249	1	.2497	.0000	1.1253

Table D-13. Family Program Equations (with time)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.6884	.0111	3869.593	1	.0000		
T	.0313	.0129	5.9045	1	.0151	.0091	1.0318
G			17.0699	1	.0000		
G1	-.0157	.0038	16.7956	1	.0000	-.0177	.9844
G2	.1361	.0332	16.7956	1	.0000	.0177	1.1457
T by G			3.9096	1	.0480		
T by G1	.0087	.0044	3.8913	1	.0485	.0063	1.0088
T by G2	-.0758	.0384	3.8913	1	.0485	-.0063	.9270
Constant	.6869	.0111	3672.386	1	.0000		
T	.0330	.0129	6.5272	1	.0106	.0098	1.0335
M			5.9615	1	.0155		
M1	-.0552	.0228	5.8284	1	.0158	-.0090	.9463
M2	.0128	.0053	5.8283	1	.0158	.0090	1.0129
T by M			11.0694	1	.0009		
T by M1	-.0885	.0266	11.0330	1	.0009	-.0138	.9153
T by M2	.0206	.0062	11.0330	1	.0009	.0138	1.0208
Constant	.6879	.0111	3865.027	1	.0000		
T	.0299	.0129	5.3477	1	.0207	.0084	1.0303
L			5.9966	1	.0153		
L1	.0148	.0061	5.9921	1	.0144	.0092	1.0150
L2	-.0494	.0202	5.9921	1	.0144	-.0092	.9516
T by L			10.[illegible]16	1	.0013		
T by L1	-.0222	.0069	10.4046	1	.0013	-.0133	.9780
T by L2	.0739	.0229	10.4046	1	.0013	.0133	1.0767

Table D-14. Basic Pay Equations (with time)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	-.5007	.0087	3308.864	1	.0000		
T	-.1217	.0101	143.8627	1	.0000	-.0422	.8854
R			3110.3167	5	.0000		
R1	-.1603	.0101	252.0365	1	.0000	-.0559	.8519
R2	-.2985	.0135	492.3435	1	.0000	-.0763	.7419
R3	-.1187	.0243	23.9353	1	.0000	-.0166	.8881
R4	.2963	.0524	31.9476	1	.0000	.0194	1.3449
R5	1.1872	.0283	1759.205	1	.0000	.1483	3.2778
R6	1.1702	.0365	1030.727	1	.0000	.1135	3.2227
T by R			35.1036	5	.0000		
T by R1	.0343	.0117	8.5061	1	.0035	.0090	1.0349
T by R2	-.0813	.0158	26.6136	1	.0000	-.0275	.9219
T by R3	-.0207	.0282	.5366	1	.4639	.0000	.9795
T by R4	.0902	.0612	2.1704	1	.1407	.0015	1.0944
T by R5	.1049	.0329	10.1541	1	.0014	.0201	1.1106
T by R6	.0182	.0425	.1837	1	.6682	.0000	1.0184
Constant	-.4919	.0085	3369.378	1	.0000		
T	-.1112	.0099	126.8074	1	.0000	-.0395	.8948
A			449.4992	3	.0000		
A1	-.1300	.0109	143.0863	1	.0000	-.0420	.8781
A2	-.0333	.0132	6.3153	1	.0120	-.0075	.9673
A3	.0563	.0153	13.6428	1	.0002	.0121	1.0579
A4	.5114	.0262	381.3963	1	.0000	.0689	1.6676
T by A			1.4850	3	.6857		
T by A1	.0115	.0127	.8204	1	.3651	.0000	1.0116
T by A2	.0020	.0154	.0175	1	.8947	.0000	1.0020
T by A3	-.0200	.0178	1.2531	1	.2630	.0000	.9802
T by A4	-.0033	.0305	.0115	1	.9146	.0000	.9967
Constant	-.4916	.0085	3372.515	1	.0000		
T	-.1160	.0099	138.2100	1	.0000	-.0413	.8904
E			215.5381	4	.0000		
E1	.0855	.0067	162.9[illegible]	1	.0000	.0449	1.0892
E2	-.2248	.0157	204.8[illegible]	1	.0000	-.0504	.7987
E3	.0229	.0290	.6223	1	.4302	.0000	1.0231
E4	.0036	.0564	.0041	1	.9489	.0000	1.0036
E5	-.0770	.0703	1.2003	1	.2733	.0000	.9259
T by E			22.7353	4	.0001		
T by E1	.0269	.0078	12.0258	1	.0005	.0122	1.0273
T by E2	-.0606	.0183	10.9550	1	.0009	-.0106	.9412
T by E3	.0439	.0326	1.8134	1	.1781	.0000	1.0448
T by E4	-.1650	.0656	6.3249	1	.0119	-.0074	.8479
T by E5	-.1335	.0832	2.5761	1	.1085	.0027	.8750

Table D-14. Basic Pay Equations (with time)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	-.4898	.0084	3360.933	1	.0000		
T	-.1129	.0096	131.5074	1	.0000	-.0403	.8932
G			112.1107	1	.0000		
G1	-.0327	.0031	111.7276	1	.0000	-.0371	.9678
G2	.2340	.0221	111.7276	1	.0000	.0371	1.2636
T by G			1.4344	1	.2310		
T by G1	.0043	.0036	1.4308	1	.2316	.0000	1.0043
T by G2	-.0309	.0258	1.4308	1	.2316	.0000	.9696
Constant	-.4893	.0084	3361.533	1	.0000		
T	-.1111	.0098	127.6993	1	.0000	-.0397	.8948
M			2.7056	1	.1000		
M1	-.0176	.0107	2.7121	1	.0996	-.0030	.9826
M2	.0112	.0068	2.7121	1	.0996	.0030	1.0112
T by M			5.7368	1	.0166		
T by M1	.0297	.0124	5.7493	1	.0165	.0068	1.0302
T by M2	-.0189	.0079	5.7493	1	.0165	-.0068	.9813
Constant	-.4897	.0084	3363.393	1	.0000		
T	-.1081	.0099	120.2344	1	.0000	-.0385	.8976
L			43.6749	1	.0000		
L1	-.0304	.0046	44.3839	1	.0000	-.0230	.9701
L2	.1043	.0157	44.3839	1	.0000	.0230	1.1099
T by L			3.2678	1	.0707		
T by L1	.0094	.0052	3.3561	1	.0670	.0041	1.0095
T by L2	-.0324	.0177	3.3561	1	.0670	-.0041	.9651

Table D-15. VHA COLA Equations (with time)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	-.5273	.0112	2232.229	1	.0000		
T	.0951	.0150	32.1236	1	.0000	.0245	1.0999
R			396.9183	5	.0000		
R1	.0255	.0148	3.0025	1	.0832	.0045	1.0260
R2	-.1755	.0160	120.0595	1	.0000	-.0485	.8390
R3	-.1848	.0303	37.0942	1	.0000	-.0264	.8313
R4	.0853	.0660	1.6733	1	.1958	.0000	1.0891
R5	.4675	.0330	200.9710	1	.0000	.0630	1.5959
R6	.4119	.0424	94.2744	1	.0000	.0429	1.5097
T by R			7.2312	5	.2037		
T by R1	-.0052	.0199	.0677	1	.7948	.0000	.9948
T by R2	-.0170	.0216	.6271	1	.4321	.0000	.9831
T by R3	.1025	.0403	6.4527	1	.0111	.0094	1.1079
T by R4	-.0708	.0888	.6360	1	.4251	.0000	.9316
T by R5	-.0094	.0443	.0449	1	.8324	.0000	.9907
T by R6	-.0415	.0572	.5245	1	.4689	.0000	.9594
Constant	-.5224	.0111	2218.546	1	.0000		
T	.0937	.0149	39.4098	1	.0000	.0242	1.0973
A			35.8961	3	.0000		
A1	.0576	.0158	13.2305	1	.0003	.0149	1.0592
A2	-.0117	.0167	.4900	1	.4839	.0000	.9884
A3	-.0958	.0189	25.7202	1	.0000	-.0217	.9086
A4	.0971	.0328	8.7433	1	.0031	.0116	1.1020
T by A			5.6074	3	.1324		
T by A1	.0011	.0213	.0026	1	.9576	.0000	1.0011
T by A2	-.0374	.0224	2.7775	1	.0956	-.0039	.9633
T by A3	.0090	.0255	.1237	1	.7250	.0000	1.0090
T by A4	.0880	.0442	3.9612	1	.0466	.0063	1.0920
Constant	-.5226	.0111	2220.276	1	.0000		
T	.0813	.0149	29.6092	1	.0000	.0235	1.0847
E			39.6045	4	.0000		
E1	.0357	.0085	17.6177	1	.0000	.0175	1.0363
E2	-.0867	.0202	18.3620	1	.0000	-.0181	.9169
E3	-.0816	.0410	3.9559	1	.0467	-.0062	.9216
E4	.2643	.0715	13.6766	1	.0002	.0153	1.3026
E5	-.1328	.0917	2.0991	1	.1474	-.0014	.8756
T by E			4.5260	4	.3395		
T by E1	.0090	.0116	.5997	1	.4387	.0000	1.0090
T by E2	-.0453	.0277	2.6730	1	.1021	-.0037	.9557
T by E3	.0477	.0550	.7517	1	.3859	.0000	1.0489
T by E4	.1096	.0941	1.3567	1	.2445	.0000	1.1158
T by E5	-.0650	.1211	.2879	1	.5916	.0000	.9371

Table D-15. VHA COLA Equations (with time)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp (B)
Constant	-.5220	.0111	2216.369	1	.0000		
T	.0821	.0149	30.2312	1	.0000	.0237	1.0855
G			37.1803	1	.0000		
G1	-.0250	.0041	37.6605	1	.0000	-.0267	.9753
G2	.1816	.0296	37.6605	1	.0000	.0267	1.1991
T by G			.7575	1	.3841		
T by G1	.0047	.0054	.7568	1	.3843	.0000	1.0047
T by G2	-.0342	.0393	.7568	1	.3843	.0000	.9664
Constant	-.5239	.0111	2222.966	1	.0000		
T	.0821	.0150	30.1284	1	.0000	.0237	1.0856
M			160.1259	1	.0000		
M1	.2012	.0159	159.9597	1	.0000	.0561	1.2229
M2	-.0979	.0077	159.9597	1	.0000	-.0561	.9068
T by M			.0117	1	.9139		
T by M1	-.0023	.0213	.0117	1	.9140	.0000	.9977
T by M2	.0011	.0104	.0117	1	.9140	.0000	1.0011
Constant	-.5243	.0111	2223.973	1	.0000		
T	.0728	.0150	23.4417	1	.0000	.0207	1.0755
L			233.5166	1	.0000		
L1	-.0978	.0064	231.6525	1	.0000	-.0677	.9068
L2	.2863	.0186	231.6524	1	.0000	.0677	1.3315
T by L			35.7149	1	.0000		
T by L1	-.0502	.0084	35.2751	1	.0000	-.0258	.9511
T by L2	.1469	.0247	35.2751	1	.0000	.0258	1.1582

Table D-16. Overall Quality of Life Equations (with cost)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.3803	.0087	1913.415	1	.0000		
C	-.0617	.0079	60.2231	1	.0000	-.0273	.9402
R			1945.8014	5	.0000		
R1	-.3795	.0100	1449.721	1	.0000	-.1363	.6842
R2	.0194	.0131	2.1960	1	.1384	.0016	1.0196
R3	.3661	.0254	207.9130	1	.0000	.0514	1.4422
R4	.3448	.0569	36.6698	1	.0000	.0211	1.4117
R5	.7621	.0314	587.2448	1	.0000	.0866	2.1427
R6	.7996	.0423	375.3238	1	.0000	.0692	2.2246
C by R			7.0613	5	.2158		
C by R1	.0094	.0091	1.0682	1	.3014	.0000	1.0094
C by R2	-.0179	.0121	2.2049	1	.1376	-.0016	.9822
C by R3	-.0378	.0236	2.5504	1	.1103	-.0027	.9629
C by R4	.0338	.0532	.4025	1	.5258	.0000	1.0344
C by R5	.0432	.0291	2.2050	1	.1376	.0016	1.0441
C by R6	.0189	.0383	.2440	1	.6214	.0000	1.0191
Constant	.3702	.0086	1860.125	1	.0000		
C	-.0543	.0078	48.1680	1	.0000	-.0243	.9471
A			1073.3119	3	.0000		
A1	-.3276	.0108	915.3775	1	.0000	-.1082	.7206
A2	.0749	.0133	31.5998	1	.0000	.0195	1.0778
A3	.2481	.0159	244.5762	1	.0000	.0558	1.2816
A4	.5086	.0292	304.0817	1	.0000	.0622	1.6630
C by A			6.4161	3	.0930		
C by A1	-.0100	.0099	1.0243	1	.3115	.0000	.9900
C by A2	.0283	.0120	5.5214	1	.0188	.0067	1.0287
C by A3	-.0051	.0145	.1242	1	.7246	.0000	.9949
C by A4	-.0367	.0270	1.8447	1	.1744	.0000	.9640
Constant	.3622	.0085	1816.019	1	.0000		
C	-.0534	.0078	47.3203	1	.0000	-.0241	.9480
E			59.9401	4	.0000		
E1	-.0277	.0066	17.6186	1	.0000	-.0142	.9726
E2	.0816	.0156	27.2151	1	.0000	.0180	1.0850
E3	.0040	.0295	.0181	1	.8930	.0000	1.0040
E4	.1380	.0572	5.8243	1	.0158	.0070	1.1479
E5	-.3586	.0691	26.9415	1	.0000	-.0179	.6986
C by E			11.5232	4	.0213		
C by E1	.0176	.0059	8.8406	1	.0029	.0094	1.0178
C by E2	-.0268	.0141	3.6129	1	.0573	-.0045	.9736
C by E3	-.0590	.0244	5.8477	1	.0156	-.0070	.9427
C by E4	.0166	.0528	.0987	1	.7533	.0000	1.0167
C by E5	-.0214	.0658	.1058	1	.7449	.0000	.9788

Table D-16. Overall Quality of Life Equations (with cost)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.3628	.0085	1825.744	1	.0000		
C	-.0565	.0077	53.2727	1	.0000	-.0256	.9451
G			22.5625	1	.0000		
G1	-.0152	.0032	22.4336	1	.0000	-.0162	.9849
G2	.1083	.0229	22.4336	1	.0000	.0162	1.1144
C by G			.5878	1	.4433		
C by G1	.0023	.0030	.6151	1	.4329	.0000	1.0023
C by G2	-.0167	.0213	.6151	1	.4329	.0000	.9834
Constant	.3656	.0085	1837.143	1	.0000		
C	-.0555	.0078	51.0598	1	.0000	-.0251	.9460
M			491.7717	1	.0000		
M1	-.2395	.0109	495.4092	1	.0000	-.0795	.7870
M2	.1504	.0068	495.4089	1	.0000	.0795	1.1623
C by M			.3748	1	.5404		
C by M1	-.0060	.0098	.3764	1	.5395	.0000	.9940
C by M2	.0038	.0061	.3764	1	.5395	.0000	1.0038
Constant	.3631	.0085	1819.867	1	.0000		
C	-.0540	.0078	48.4249	1	.0000	-.0244	.9474
L			12.9294	1	.0003		
L1	-.0169	.0047	12.9702	1	.0003	-.0119	.9832
L2	.0575	.0160	12.9702	1	.0003	.0119	1.0592
C by L			.2148	1	.6430		
C by L1	-.0019	.0041	.2090	1	.6475	.0000	.9981
C by L2	.0064	.0240	.2090	1	.6475	.0000	1.0064

Table D-17. Government Housing Quality Equations (with cost)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.0055	.0104	.2767	1	.5989		
C	-.8985	.0693	169.4702	1	.0000	-.0570	.4072
R			28.2148	5	.0000		
R1	.0573	.0151	14.3773	1	.0001	.0155	1.0590
R2	-.0573	.0140	16.6453	1	.0000	-.0168	.9444
R3	-.0112	.0261	.1847	1	.6673	.0000	.9888
R4	-.1271	.0611	4.3309	1	.0374	-.0067	.8807
R5	.0579	.0325	3.1824	1	.0744	.0048	1.0596
R6	.0259	.0398	.4240	1	.5150	.0000	1.0263
C by R			14.7968	5	.0112		
C by R1	.0729	.1004	.5280	1	.4675	.0000	1.0757
C by R2	-.2114	.0929	5.1825	1	.0228	-.0079	.8094
C by R3	-.2611	.1729	2.2800	1	.1310	-.0023	.7702
C by R4	.4398	.4031	1.1905	1	.2752	.0000	1.5524
C by R5	.3940	.2142	3.3832	1	.0659	.0052	1.4829
C by R6	.6027	.2633	5.2384	1	.0221	.0079	1.8271
Constant	.0056	.0104	.2906	1	.5898		
C	-.8981	.0690	169.3834	1	.0000	-.0570	.4074
A			20.6013	3	.0001		
A1	.0536	.0168	10.1977	1	.0014	.0126	1.0551
A2	-.0368	.0150	6.0293	1	.0142	-.0098	.9639
A3	-.0384	.0166	5.3640	1	.0206	-.0081	.9623
A4	.0738	.0300	6.0399	1	.0140	.0088	1.0766
C by A			2.0847	3	.5550		
C by A1	.0768	.1113	.4754	1	.4905	.0000	1.0798
C by A2	.0067	.0994	.0045	1	.9463	.0000	1.0067
C by A3	-.1419	.1097	1.6722	1	.1960	.0000	.8677
C by A4	.1550	.1987	.6083	1	.4354	.0000	1.1676
Constant	.0061	.0104	.3427	1	.5583		
C	-.8862	.0691	164.5392	1	.0000	-.0561	.4122
E			80.3009	4	.0000		
E1	-.0699	.0084	69.3377	1	.0000	-.0361	.9324
E2	.1421	.0184	59.4674	1	.0000	.0334	1.1527
E3	.0967	.0350	7.6536	1	.0057	.0105	1.1016
E4	.0379	.0700	.2920	1	.5889	.0000	1.0386
E5	-.1265	.0866	2.1240	1	.1450	-.0016	.8812
C by E			13.0431	4	.0111		
C by E1	.0903	.0558	2.6228	1	.1053	.0035	1.0946
C by E2	.0348	.1223	.0811	1	.7758	.0000	1.0354
C by E3	-.5547	.2357	5.5365	1	.0186	-.0083	.5743
C by E4	.2670	.4629	.3327	1	.5641	.0000	1.3060
C by E5	-1.4667	.5729	6.7529	1	.0094	-.0096	.2307

Table D-17. Government Housing Quality Equations (with cost) (page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.0057	.0104	.2972	1	.5856		
C	-.8920	.0690	167.1192	1	.0000	-.0566	.4098
G			29.5113	1	.0000		
G1	.0201	.0037	29.1149	1	.0000	.0229	1.0203
G2	-.1572	.0291	29.1149	1	.0000	-.0229	.8545
C by G			.0138	1	.9065		
C by G1	.0029	.0247	.0135	1	.9076	.0000	1.0029
C by G2	-.0224	.1928	.0135	1	.9076	.0000	.9779
Constant	.0056	.0104	.2913	1	.5894		
C	-.8863	.0690	164.8504	1	.0000	-.0562	.4122
M			47.1564	1	.0000		
M1	-.1198	.0173	47.1696	1	.0000	-.0296	.8880
M2	.0436	.0064	47.1696	1	.0000	.0296	1.0446
C by M			.2973	1	.5856		
C by M1	.0627	.1150	.2972	1	.5857	.0000	1.0647
C by M2	-.0230	.0422	.2972	1	.5857	.0000	.9772
Constant	.0056	.0104	.2892	1	.5907		
C	-.8895	.0690	166.0587	1	.0000	-.0564	.4109
L			55.0469	1	.0000		
L1	-.0460	.0062	55.3342	1	.0000	-.0322	.9550
L2	.1327	.0178	55.3344	1	.0000	.0322	1.1419
C by L			2.4029	1	.1211		
C by L1	.0634	.0409	2.3964	1	.1216	.0028	1.0654
C by L2	-.1827	.1180	2.3965	1	.1216	-.0028	.8330

Table D-18. Your Current Morale Level Equations (with cost)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.5405	.0112	2322.308	1	.0000		
C	-.0722	.0102	49.7161	1	.0000	-.0313	.9304
R			1913.152	5	.0000		
R1	-.5133	.0127	1621.492	1	.0000	-.1823	.5985
R2	.0694	.0175	15.7784	1	.0001	.0168	1.0718
R3	.7131	.0343	432.6031	1	.0000	.0940	2.0403
R4	.4754	.0755	39.6878	1	.0000	.0278	1.6086
R5	.7357	.0399	340.2291	1	.0000	.0833	2.0868
R6	.7039	.0506	193.8297	1	.0000	.0627	2.0216
C by R			2.6665	5	.7511		
C by R1	.0010	.0116	.0071	1	.9327	.0000	1.0010
C by R2	-.0233	.0161	2.0834	1	.1489	-.0013	.9770
C by R3	.0158	.0313	.2538	1	.6144	.0000	1.0159
C by R4	.0402	.0696	.3339	1	.5634	.0000	1.0411
C by R5	.0264	.0363	.5274	1	.4677	.0000	1.0267
C by R6	.0190	.0465	.1677	1	.6822	.0000	1.0192
Constant	.5241	.0110	2267.412	1	.0000		
C	-.0657	.0100	42.9260	1	.0000	-.0290	.9364
A			1070.4612	3	.0000		
A1	-.4006	.0137	850.9109	1	.0000	-.1320	.6699
A2	.0096	.0173	.3051	1	.5807	.0000	1.0096
A3	.3792	.0206	338.4705	1	.0000	.0831	1.4611
A4	.6503	.0376	296.5359	1	.0000	.0780	1.9161
C by A			.7391	3	.8642		
C by A1	-.0060	.0126	.2293	1	.6320	.0000	.9940
C by A2	.0089	.0156	.3234	1	.5696	.0000	1.0089
C by A3	.0066	.0188	.1239	1	.7249	.0000	1.0066
C by A4	-.0185	.0345	.2694	1	.5936	.0000	.9816
Constant	.5085	.0108	2211.320	1	.0000		
C	-.0659	.0099	44.6005	1	.0000	-.0296	.9362
E			124.7560	4	.0000		
E1	-.0884	.0086	106.1478	1	.0000	-.0461	.9154
E2	.1508	.0201	56.1357	1	.0000	.0333	1.1628
E3	.1696	.0366	21.5263	1	.0000	.0200	1.1848
E4	.3106	.0738	17.6933	1	.0000	.0179	1.3642
E5	-.1829	.0853	4.5984	1	.0320	-.0073	.8329
C by E			1.9309	4	.7485		
C by E1	-.0032	.0077	.1713	1	.6790	.0000	.9968
C by E2	.0157	.0181	.7518	1	.3859	.0000	1.0158
C by E3	.0021	.0303	.0050	1	.9437	.0000	1.0021
C by F4	-.0166	.0675	.0604	1	.8059	.0000	.9835
C by E5	-.0947	.0839	1.2742	1	.2590	.0000	.9097

Table D-18. Your Current Morale Level Equations (with cost)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.5079	.0108	2209.115	1	.0000		
C	-.0679	.0099	47.4609	1	.0000	-.0305	.9344
G			150.3850	1	.0000		
G1	.0466	.0038	151.6024	1	.0000	.0554	1.0477
G2	-.3593	.0292	151.6024	1	.0000	-.0554	.6981
C by G			.1837	1	.6682		
C by G1	.0015	.0035	.1908	1	.6623	.0000	1.0015
C by G2	-.0119	.0271	.1908	1	.6623	.0000	.9882
Constant	.5132	.0109	2226.891	1	.0000		
C	-.0676	.0099	46.4397	1	.0000	-.0302	.9347
M			524.2753	1	.0000		
M1	-.3114	.0136	524.6273	1	.0000	-.1036	.7324
M2	.1972	.0086	524.6273	1	.0000	.1036	1.2180
C by M			.1626	1	.6868		
C by M1	-.0050	.0124	.1644	1	.6851	.0000	.9950
C by M2	.0032	.0078	.1644	1	.6851	.0000	1.0032
Constant	.5051	.0108	2183.797	1	.0000		
C	-.0716	.0099	52.6010	1	.0000	-.0322	.9309
L			16.6851	1	.0000		
L1	.0241	.0059	16.7815	1	.0000	.0174	1.0244
L2	-.0825	.0201	16.7815	1	.0000	-.0174	.9208
C by L			1.5625	1	.2113		
C by L1	.0065	.0052	1.5431	1	.2142	.0000	1.0065
C by L2	-.0221	.0178	1.5431	1	.2142	.0000	.9782

Table D-19. Recreation Programs Equations (with cost) (page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	1.2694	.0202	15593.61	1	.0000		
C	-1.5905	.4887	10.5915	1	.0011	-.0125	.2039
R			446.7693	5	.0000		
R1	-.1992	.0116	296.7674	1	.0000	-.0693	.8194
R2	.0193	.0155	1.5522	1	.2128	.0000	1.0195
R3	.0302	.0290	1.0895	1	.2966	.0000	1.0307
R4	.1913	.0681	7.8965	1	.0049	.0098	1.2109
R5	.5353	.0385	193.5831	1	.0000	.0559	1.7079
R6	.4853	.0494	96.6513	1	.0000	.0393	1.6246
C by R			.9720	5	.9648		
C by R1	.0781	.5567	.0197	1	.8884	.0000	1.0812
C by R2	-.0713	.7468	.0091	1	.9239	.0000	.9312
C by R3	.5151	1.3774	.1398	1	.7085	.0000	1.6737
C by R4	2.1204	3.2017	.4386	1	.5078	.0000	8.3348
C by R5	-1.2274	1.8423	.4439	1	.5053	.0000	.2931
C by R6	-.2502	2.3690	.0112	1	.9159	.0000	.7787
Constant	1.2585	.0101	15646.33	1	.0000		
C	-1.6154	.4840	11.1379	1	.0008	-.0122	.1988
A			157.9199	3	.0000		
A1	-.1574	.0126	156.5354	1	.0000	-.0502	.8544
A2	.1096	.0159	47.3571	1	.0000	.0272	1.1159
A3	.0739	.0186	15.7484	1	.0001	.0150	1.0767
A4	.1241	.0332	13.9620	1	.0002	.0140	1.1322
C by A			4.8225	3	.1853		
C by A1	.3755	.6043	.3861	1	.5344	.0000	1.4557
C by A2	-1.3071	.7898	2.6830	1	.0895	-.0038	.2706
C by A3	.0098	.8975	.0001	1	.9915	.0000	1.0099
C by A4	2.6569	1.5701	2.8633	1	.0906	.0038	14.2521
Constant	1.2543	.0100	15641.87	1	.0000		
C	-1.5400	.4825	10.1889	1	.0014	-.0115	.2144
E			20.5153	4	.0004		
E1	.0313	.0077	16.4432	1	.0001	.0153	1.0318
E2	-.0351	.0182	3.7255	1	.0536	-.0053	.9655
E3	-.1112	.0334	11.0790	1	.0009	-.0122	.8947
E4	-.0812	.0657	1.5274	1	.2165	.0000	.9220
E5	-.0282	.0817	.1193	1	.7298	.0000	.9722
C by E			17.2347	4	.0017		
C by E1	-.9095	.3741	5.9095	1	.0151	-.0080	.4027
C by E2	2.8170	.8789	10.2726	1	.0014	.0116	16.7258
C by E3	.9232	1.6735	.3071	1	.5792	.0000	2.5530
C by E4	-8.5605	3.2380	6.9989	1	.0082	-.0090	.0002
C by E5	1.6126	3.9131	.1698	1	.6803	.0000	5.0157

Table D-19. Recreation Programs Equations (with cost)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	1.2543	.0100	15657.81	1	.0000		
C	-1.5685	.4820	10.5899	1	.0011	-.0118	.2084
G			.5429	1	.4612		
G1	-.0028	.0038	.5579	1	.4551	.0000	.9972
G2	.0200	.0268	.5579	1	.4551	.0000	1.0202
C by G			.2506	1	.6167		
C by G1	-.0890	.1778	.2504	1	.6168	.0000	.9149
C by G2	.6331	1.2652	.2504	1	.6168	.0000	1.8834
Constant	1.2579	.0101	15653.20	1	.0000		
C	-1.5727	.4833	10.5887	1	.0011	-.0118	.2075
M			137.9215	1	.0000		
M1	-.1468	.0125	138.3382	1	.0000	-.0471	.8635
M2	.0937	.0080	138.3382	1	.0000	.0471	1.0983
C by M			.9594	1	.3273		
C by M1	-.5879	.6002	.9594	1	.3273	.0000	.5555
C by M2	.3754	.3832	.9594	1	.3273	.0000	1.4555
Constant	1.2593	.0101	15653.17	1	.0000		
C	-1.4522	.4847	8.9776	1	.0027	-.0107	.2341
L			206.9172	1	.0000		
L1	.0748	.0052	203.8011	1	.0000	.0573	1.0777
L2	-.2539	.0178	203.8010	1	.0000	-.0573	.7758
C by L			7.4784	1	.0062		
C by L1	.6730	.2461	7.4801	1	.0062	.0094	1.9601
C by L2	-2.2848	.8354	7.4801	1	.0062	-.0094	.1018

Table D-20. Family Program Equations (with cost)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.6911	.0111	3876.562	1	.0000		
C	.4000	.3325	1.4473	1	.2293	.0000	1.4919
R			165.0611	5	.0000		
R1	-.1193	.0162	54.0760	1	.0000	-.0331	.9876
R2	-.0584	.0145	16.2903	1	.0001	-.0174	.9433
R3	.0296	.0268	1.2174	1	.2699	.0000	1.0300
R4	.0982	.0652	2.2630	1	.1325	.0024	1.1031
R5	.3191	.0404	62.4783	1	.0000	.0357	1.3759
R6	.4153	.0455	83.3363	1	.0000	.0414	1.5148
C by R			8.7771	5	.1181		
C by R1	1.0123	.4801	4.4462	1	.0350	.0072	2.7520
C by R2	-1.1776	.4356	7.3101	1	.0069	-.0106	.3080
C by R3	.6786	.8051	.7103	1	.3993	.0000	1.9710
C by R4	-.2758	1.9916	.0192	1	.8898	.0000	.7589
C by R5	.6525	1.2202	.2859	1	.5928	.0000	1.9203
C by R6	-.4236	1.3769	.0947	1	.7583	.0000	.6546
Constant	.6873	.0111	3860.996	1	.0000		
C	.4866	.3310	2.1614	1	.1415	.0019	1.6268
A			39.6191	3	.0000		
A1	-.0862	.0184	21.8343	1	.0000	-.0205	.9174
A2	.0091	.0161	.3218	1	.5705	.0000	1.0092
A3	.0034	.0170	.0388	1	.8439	.0000	1.0034
A4	.1614	.0316	26.0664	1	.0000	.0225	1.1751
C by A			2.2305	3	.5260		
C by A1	-.2717	.5582	.2369	1	.6265	.0000	.7621
C by A2	.0753	.4781	.0248	1	.8749	.0000	1.0782
C by A3	.5743	.5097	1.2695	1	.2599	.0000	1.7759
C by A4	-1.0806	.9450	1.3082	1	.2527	.0000	.3393
Constant	.6861	.0111	3849.987	1	.0000		
C	.5144	.3313	2.4115	1	.1204	.0029	1.6727
E			24.9847	4	.0001		
E1	-.0090	.0091	.9681	1	.3251	.0000	.9910
E2	.0515	.0190	7.3212	1	.0068	.0106	1.0528
E3	-.0375	.0373	1.0153	1	.3136	.0000	.9631
E4	.0297	.0734	.1635	1	.6860	.0000	1.0301
E5	-.3724	.0868	18.3987	1	.0000	-.0186	.6891
C by E			9.1433	4	.0576		
C by E1	.7241	.2714	7.1204	1	.0076	.0104	2.0629
C by E2	-.9694	.5667	2.9263	1	.0871	-.0044	.3793
C by E3	-2.1806	1.0440	4.3624	1	.0367	-.0071	.1130
C by E4	-.5567	2.2352	.0620	1	.8033	.0000	.5731
C by E5	1.1163	2.7190	.1686	1	.6814	.0000	3.0537

Table D-20. Family Program Equations (with cost)
(page 2 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	.6869	.0111	3862.384	1	.0000		
C	.4334	.3309	1.7154	1	.1903	.0000	1.5425
G			16.8532	1	.0000		
G1	-.0156	.0038	16.7055	1	.0000	-.0176	.9845
G2	.1357	.0332	16.7055	1	.0000	.0176	1.1453
C by G			5.6021	1	.0179		
C by G1	.2729	.1153	5.6010	1	.0180	.0087	1.3137
C by G2	-2.3662	.9998	5.6010	1	.0180	-.0087	.0938
Constant	.6873	.0111	3865.180	1	.0000		
C	.4712	.3308	2.0292	1	.1543	.0008	1.6020
M			5.6302	1	.0177		
M1	-.0541	.0228	5.6199	1	.0178	-.0087	.9473
M2	.0126	.0053	5.6199	1	.0178	.0087	1.0127
C by M			11.1315	1	.0008		
C by M1	-2.2941	.6876	11.1319	1	.0008	-.0139	.1009
C by M2	.5340	.1601	11.1320	1	.0008	.0139	1.7058
Constant	.6680	.0111	3869.804	1	.0000		
C	.3788	.3313	1.3073	1	.2529	.0000	1.4606
L			4.4031	1	.0359		
L1	.0128	.0061	4.4094	1	.0357	.0071	1.0129
L2	-.0426	.0203	4.4095	1	.0357	-.0071	.9583
C by L			21.3641	1	.0000		
C by L1	-.8269	.1789	21.3732	1	.0000	-.0202	.4374
C by L2	2.7512	.5951	21.3732	1	.0000	.0202	15.6608

Table D-21. Basic Pay Equations (with cost)
(page 1 of 2 pages)

Variable	B	S.E.	Wald	df	Sig	R	Exp(B)
Constant	-.4968	.0087	3278.410	1	.0000		
C	-.1049	.0100	109.3855	1	.0000	-.0367	.9004
R			3100.6099	5	.0000		
R1	-.1607	.0101	254.9037	1	.0000	-.0563	.8516
R2	-.2951	.0134	485.1224	1	.0000	-.0777	.7445
R3	-.1212	.0242	25.0205	1	.0000	-.0172	.8858
R4	.2939	.0524	31.4684	1	.0000	.0192	1.3416
R5	1.1822	.0283	1748.182	1	.0000	.1478	3.2616
R6	1.1683	.0364	1028.930	1	.0000	.1134	3.2164
C by R			27.2146	5	.0001		
C by R1	.0412	.0116	12.5936	1	.0004	.0115	1.0420
C by R2	-.0693	.0155	20.1093	1	.0000	-.0151	.9330
C by R3	-.0317	.0281	1.2754	1	.2588	.0000	.9688
C by R4	.1249	.0625	3.9967	1	.0456	.0050	1.1331
C by R5	.0276	.0338	.6674	1	.4139	.0000	1.0280
C by R6	.0270	.0434	.3891	1	.5328	.0000	1.0274
Constant	-.4888	.0085	3341.568	1	.0000		
C	-.0976	.0098	99.1456	1	.0000	-.0349	.9071
A			458.9796	3	.0000		
A1	-.1306	.0108	144.9966	1	.0000	-.0423	.8776
A2	-.0331	.0132	6.2846	1	.0122	-.0073	.9674
A3	.0567	.0152	13.8914	1	.0002	.0122	1.0584
A4	.5124	.0261	384.4878	1	.0000	.0692	1.6692
C by A			3.9684	3	.2649		
C by A1	-.0076	.0126	.3660	1	.5452	.0000	.9924
C by A2	.0225	.0152	2.1891	1	.1390	.0015	1.0227
C by A3	-.0253	.0177	2.0585	1	.1514	-.0009	.9750
C by A4	.0254	.0306	.6899	1	.4062	.0000	1.0257
Constant	-.4891	.0084	3351.608	1	.0000		
C	-.0986	.0098	101.3541	1	.0000	-.0353	.9061
E			208.2912	4	.0000		
E1	.0854	.0067	163.3806	1	.0000	.0449	1.0891
E2	-.2185	.0156	195.9864	1	.0000	-.0493	.8037
E3	.0034	.0292	.0138	1	.9064	.0000	1.0034
E4	.0075	.0560	.0180	1	.8931	.0000	1.0076
E5	-.0735	.0702	1.0977	1	.2948	.0000	.9291
C by E			18.6833	4	.0009		
C by E1	.0320	.0076	17.9527	1	.0000	.0141	1.0325
C by E2	-.0481	.0177	7.4141	1	.0065	-.0082	.9530
C by E3	-.0551	.0306	3.2512	1	.0714	-.0040	.9464
C by E4	-.0850	.0658	1.6665	1	.1967	.0000	.9185
C by E5	-.1276	.0844	2.2849	1	.1306	-.0019	.8802

Table D-21. Basic Pay Equations (with cost)
(page 2 of 2 pages)

Constant	-.4869	.0084	3337.686	1	.0000		
C	-.0984	.0098	101.5646	1	.0000	-.0353	.9063
G			109.2362	1	.0000		
G1	-.0324	.0031	110.1919	1	.0000	-.0368	.9681
G2	.2321	.0221	110.1919	1	.0000	.0368	1.2613
C by G			.2637	1	.6076		
C by G1	.0019	.0037	.2583	1	.6113	.0000	1.0019
C by G2	-.0133	.0262	.2583	1	.6113	.0000	.9868
Constant	-.4662	.0084	3335.072	1	.0000		
C	-.0973	.0098	99.5215	1	.0000	-.0349	.9072
M			3.1122	1	.0777		
M1	-.0187	.0106	3.0897	1	.0788	-.0037	.9815
M2	.0119	.0068	3.0897	1	.0788	.0037	1.0120
C by M			5.3686	1	.0205		
C by M1	.0285	.0123	5.3288	1	.0210	.0065	1.0289
C by M2	-.0181	.0078	5.3286	1	.0210	-.0065	.9821
Constant	-.4859	.0084	3313.584	1	.0000		
C	-.0931	.0098	90.2210	1	.0000	-.0332	.9111
L			43.1021	1	.0000		
L1	-.0302	.0046	43.5105	1	.0000	-.0228	.9702
L2	.1036	.0157	43.5105	1	.0000	.0228	1.1092
C by L			.5552	1	.4562		
C by L1	-.0036	.0051	.5455	1	.4602	.0000	.9962
C by L2	.0130	.0176	.5455	1	.4602	.0000	1.0131

APPENDIX E

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APPENDIX F

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GLOSSARY

ABBREVIATIONS, ACRONYMS, AND SHORT TERMS

α	(1) A subpopulation proportional difference parameter in the logistic regression model. (2) The probability of rejecting the null hypothesis when in fact it is true.
β	The total population slope or trend parameter in the logistic regression model.
γ	A subpopulation slope or trend diference parameter in the logistic regression model.
μ	(1) The total population proportion parameter in the logistic regression model. (2) A population mean parameter.
$\pi(x)$	The conditional mean of a random variable Y given x when the logistic distribution is used. In the QRA, Y is the percent satisfaction on an SSMP item and x is one or more of the covariates defined within.
A1	Indicator variable indicating age at last birthday, 24 or less
A2	Indicator variable indicating age at last birthday, 25 through 31
A3	Indicator variable indicating age at last birthday, 32 through 39
A4	Indicator variable indicating age at last birthday, 40 or more
ACSIM	Assistant Chief of Staff for Installation Management
ACS	Army Community Service
analysis of covariance	A statistical model which combines the methods of the analysis of variance and regression analysis. It employs the indicator independent variable from the analysis of variance and the continuous variable from regression analysis.
ARI	US Army Research Institute
benefit	Something derived from the consumption of a good or a service. In this QRA, a measure of satisfaction in some facet of Army life as measured by the SSMP.

binomial distribution	For discrete random variable y. If an event has probability p of occurring at any trial, the probability of y occurring in m independent trials is: $$f(y)=\binom{m}{y}p^{y}(1-p)^{m-y}$$ with parameters p and m.
Bonferroni inequality	A crude bounds which relates the experiment-wise error rate to the probability of making an error in each individual comparison of a multiple comparisons experiment. $1 - P\{F\} \geq 1 - \Sigma \alpha_i$ where $P\{F\}$ = The probability that at least one error is made in a multiple comparison experiment and α_i = the probability of an error on an individual comparison.
CAA	US Army Concepts Analysis Agency
centering	Subtracting some value from a data set, usually its mean.
CFSC	Community Family Support Center
confidence interval	Upon repeated sampling, with a given probability, an interval which includes the true value of the parameter.
contrast	A linear combination of unknown parameters in a statistical linear model such that the scalars sum to zero.
CONUS	continental United States
COST	Cost variable used in this QRA. Unit of measure is cost per soldier in thousands of constant FY 96 dollars
cost	The expenditure of funds to produce a good or service. In this QRA, the monies expended by the Army in a given year in terms of cost per soldier on some good or service.
covariate	An independent variable.
DCSPER	Deputy Chief of Staff for Personnel
e	The base of the system of natural logarithms ($e \approx 2.71828$)

E1	Indicator variable indicating white ethnicity
E2	Indicator variable indicating black ethnicity
E3	Indicator variable indicating Hispanic ethnicity
E4	Indicator variable indicating Asian or Pacific Islander ethnicity
E5	Indicator variable indicating American Indian, Eskimo or Aleut ethnicity
experiment-wise error rate	The probability of falsely rejecting one individual comparison in a multiple comparison experiment.
FAM	SSMP Item which asks, "Based on your Army experience, how satisfied or dissatisfied are you with the quality of Army family programs?"
FY	fiscal year
G1	Indicator variable indicating male gender
G2	Indicator variable indicating female gender
GHA	SSMP Item which asks, "Based on your Army experience, how satisfied or dissatisfied are you with the availability of government housing?"
GHQ	SSMP Item which asks, "Based on your Army experience, how satisfied or dissatisfied are you with the quality of government housing?"
group variable	A vector construct used in statistical analysis to represent the category membership of a single observation. For example, gender has two categories (i.e., male and female). If John Smith participated in the sample, he would be coded as a male by the two element vector (1,0) and Mary Doe would be coded as a female with the vector (0,1).
hypothesis	A statistical hypothesis is a hypothesis concerning the parameters of a probability distribution. The statistical hypothesis under test is referred to as the null hypothesis. An alternative hypothesis specifies some value(s) for the parameters different from those under test.
independent	(1) Random variables are statistically independent if their joint probability density function can be expressed as the product of nonnegative functions of each of the random variables alone. (2) A set of vectors is said to be linearly dependent if there exist scalars not all zero such that their linear combination is equal to zero. If there does not exist such a set, then the vectors are linearly independent.

indicator variable	One element of a group variable which takes on values 0 or 1. It corresponds to one of a finite number of usually mutually exclusive and exhaustive categories into which a group variable can be divided. For example, the group variable gender can be divided into two categories (i.e., male and female). In this QRA, the indicator variable G1 corresponds to the category male. If G1 takes on the value 1 in a particular instance, it may be referring to (1) a male respondent in the survey, or (2) the subpopulation of males when substituted into a logistic regression model. When the respondent is not a male or we are referring to the female subpopulation in a logistic regression model, the value of G1 is 0.
interaction	A combined effect of two individual factors which is different from the sum of their separate effects.
L1	Indicator variable indicating CONUS duty station
L2	Indicator variable indicating OCONUS duty station
leverage	In linear regression, a point in the space of the independent variables which is far from the rest the data. Such a point will have a strong influence on estimation of parameters.
likelihood function	Associated with each random variable X, there is a probability function $P(X\|\xi)$ where ξ represents the known parameters of the probability function. Given a fixed set of observations for a random variable, then it is appropriate to contemplate the various values of ξ which gave rise to this set. The likelihood function $L(\xi\|X)$ has the same form as $P(X\|\xi)$, but now X is fixed and ξ is unknown.
linear regression	A model of the random variable Y whose conditional expectation, $E(Y_i \| x_i) = \beta_0 + \beta_1 x$, $Y_i = \beta_0 + \beta_1 x + e_i$, with e_i assumed to be independent and identically normally distributed with mean zero and unknown variance σ^2. The unknown parameters are β_0, β_1, and σ^2. The x is a fixed covariate. The parameters β_0, β_1, and σ^2 are usually obtained by maximizing the likelihood function which is equivalent to obtaining least squares estimates of the parameters.
logistic regression	A model of a discrete random variable Y which takes two values (i.e., 0 and 1). The conditional mean of Y given a set of covariates is bounded by zero and one. The error distribution is assumed to be binomial.
logit	The natural logarithm of the odds ratio.

M1	Indicator variable indicating a respondent who is not presently married (i.e., single, divorced, or widowed).
M2	Indicator variable indicating a respondent who is married.
model	A hypothetical expression of how observed data were generated. A statistical model is generally expressed in a mathematical form and usually consist of systematic and random components.
MWR	Morale, Welfare, and Recreation
normal distribution	A continuous random variable x with probability density function as follows: $$f(x)=\frac{1}{\sigma\sqrt{2\pi}}e^{\left[-\frac{(x-\mu)^2}{2\sigma^2}\right]}$$ with parameters μ and σ^2, the mean and variance, respectively.
OACSIM	Office of the Assistant Chief of Staff for Installation Management
OCONUS	outside continental United States
ODCSPER	Office of the Deputy Chief of Staff for Personnel
odds ratio	The ratio of the probability of a favorable occurrence to the probability of an unfavorable occurrence.
OSD	Office of the Secretary of Defense
OQL	SSMP Item which asks, "Based on your Army experience, how satisfied or dissatisfied are you with the overall quality of Army life?"
parameter	An expression which occurs in the definition of a probability distribution or a statistical model such as the parameters in a regression model.
PAY	SSMP Item which asks, "Based on your Army experience, how satisfied or dissatisfied are you with the amount of pay (basic)?"
POM	Program Objective Memorandum
probability	A basic concept which is either undefinable expressing in some way a "degree of belief" or a limiting frequency in an infinite random series.

QOL	quality of life
QRA	quick reaction analysis
QUAILMAN	Quality of Life Measurement and Analysis
R1	Indicator variable indicating ranks PV2 through SPC/CPL
R2	Indicator variable indicating ranks SGT through SSG
R3	Indicator variable indicating ranks SFC-SGM/CSM
R4	Indicator variable indicating all warrant officier ranks
R5	Indicator variable indicating ranks 2LT through CPT
R6	Indicator variable indicating ranks MAJ and above
random variable	A quantity which may take any of the values of a specified set with a specified probability.
REC	SSMP Item which asks, "Based on your Army experience, how satisfied or dissatisfied are you with the recreational services?"
response	A dependent variable
restriction	An equation expressing one parameter as a linear combination of the remaining parameters. Restrictions are used in overparameterized systems of equations (i.e., systems with more unknowns than equations) to obtain a solution. Restrictions may be thought of as equality constraints.
sample space	The set of sample points corresponding to all possible samples.
SIDPERS	Standard Installation/Division Personnel System
SPSS	Statistical Package for the Social Sciences
SSMP	Sample Survey of Military Personnel

SSMP item	One of the 10 questions chosen by this QRA as pertaining to Army quality of life issues. The questions selected have been asked in the same form on the six administrations of the SSMP (Spring 1992 to Fall 1994) used in this QRA. In the survey, four levels of satisfaction (i.e. very satisfied, satisfied, dissatisfied, and very dissatisfied) are used. These responses were collapsed into the categories satisfied and dissatisfied for this QRA.
SSN	social security number
standard normal distribution	A normal probability distribution of a random variable z with $\mu = 0$ and $\sigma^2 = 1$.
TIME	One of six consecutive administrations of the SSMP used for this QRA (i.e., TIME = 1 corresponds to Spring 1992 through TIME = 6 corresponds to Fall 1994).
USACEAC	US Army Cost and Economic Analysis Center
USAREUR	US Army Europe
VHA	(1) Veterans Housing Allowance; (2) SSMP Item which asks, "Based on your Army experience, how satisfied or dissatisfied are you with the amount of VHA/COLA?"
YCM	SSMP item which asks, "How would you rate <u>your</u> current level of morale?" Possible responses were very high, high, moderate, low, or very low. For the purposes of this QRA, very high and high were collapsed into a high category, low, and very low into a low category, and the moderate response was omitted