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Paul J. Taubman

Sherwin Rosen

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List of Participants

ECONOMIC ASPECTS OF HEALTH

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<u>Name</u>	<u>Affiliation</u>
Kenneth Arrow	Stanford University
Lee Benham	Washington University
Theodore Bergstrom	University of Michigan
Victor Fuchs	Stanford University
Michael Grossman	City University of New York Graduate Center
Jeffrey Harris	Massachusetts Institute of Technology
Willard Manning	RAND
Joseph Newhouse	RAND
Sherwin Rosen	University of Chicago
Mark Rosenzweig	University of Minnesota
David Salkever	Johns Hopkins University
Paul Schultz	Yale University
Robert Shakotko	Columbia University
Donald Shepard	Harvard School of Public Health
Paul Taubman	University of Pennsylvania



Healthiness, Education and Marital Status

ABSTRACT

In this paper we use data from the Retirement History Survey (RHS) to examine the relationship of some sociodemographic and economic variables to morbidity and mortality. Since the RHS is a longitudinal survey, we are able to study current health conditioned on prior health as well as the more usual unconditioned estimates. We find that health is related to education and marital status though the marital effects are much weaker when we condition for prior health. These effects persist when we control for income and use of medical facilities. An interesting finding is that married men seem to persist in the state of poor health rather than dying.

Professor Paul J. Taubman  
Department of Economics  
University of Pennsylvania  
3718 Locust Walk  
Philadelphia, Pennsylvania 19104

(215) 243-7708

Professor Sherwin Rosen  
Department of Economics  
University of Chicago  
1126 East 59th Street  
Chicago, Illinois 60637

(312) 753-4503



## I. Introduction and Summary

In this paper we have begun to explore the interrelationships of a number of health variables with themselves and several sociodemographic and economic variables for white men in the Retirement History Survey.

The dependent variables we use are categorical and are analyzed by fitting models with various degrees of interaction to frequency tables. Since nearly all the variables discussed in the text are statistically significant (as judged by likelihood ratio and Chi square tests), we will concentrate on the sign and the magnitude of the differences.

The health variables we concentrate on are those which ask an individual to compare his health with others of the same age and with himself at the time of the prior survey. We recognize that these are both subjective and not particularly finely grained questions. We think, however, the questions convey much information and are not biased by choices as are questions on days lost from work because of illness.<sup>1</sup> We also think that the pattern of empirical results is consistent with what would be expected from an unbiased, objective measure. The text is organized in terms of the results of each dependent variable. A better feel for the results and a more coherent story can be had by looking at the impacts of the various independent variables.

A person's education can affect his health because education is correlated with income, with consumption and life styles, with decision making ability, and with occupational and residential health risks. Thus it is not surprising that we, like others, find that the more educated are more likely to be in better health. As people age, the percentage in better health falls and the decrease (in terms of percentage points) is larger for the more educated.

The more educated can be in better health for a variety of reasons.

If the effects of education flow through the greater income of the more educated, then we would expect the education effect to vanish when we control for income etc. Yet the available evidence suggests that the education results are fairly robust to inclusion of other variables such as 1968 earnings, number of medical visits, amount of doctor bills, marital status and education. The effect of education on health is reduced only modestly when we control for spouse's education. This effect is not reduced further when we control for 1968 earnings of the head. When we condition on prior level of health, we are studying health deterioration functions. These functions need not be parallel. Health deteriorates slower for the more educated. Education, however, has little impact on improving health.

For married men we have examined the effect of spouse's education. The most educated women are more likely to have mates in better health compared to others than the least educated though the effect of spouse's education is not monotonic. Own education has bigger impacts than spouse's education. The impacts of spouse's education are changed very little when we condition on prior health and doctor bills.

Economists have often examined the effects of education. Marital status has not achieved such an intensive study by economists. There are reasons, however, for expecting marriage to be important. Divorce and widowhood can be associated with substantial stress. Also, spouses can provide physical and mental aid to one another. Of course severely ill people may not be able to marry or remarry. In any event, we find strong impacts of marital status on the level of health but smaller effects on health change. Married men are much more likely to remain alive in a worse health condition rather than dying. Divorced men have the worse health prospects.



## II. Model and Data

In the typical cross section study one relates the level of health to sociodemographic and economic variables such as marital status and education. As Grossman has shown, such an equation can be derived within an optimizing framework.

Our data source is unusual in that it follows people over time and thus has indicators of change in a person's health status over time as well as the level of health at each point in time. With this data it is possible to estimate the determinants of the change in health status conditioned on initial health status:

$$(1) \quad \Delta H = H_{t+1} - H_t = f(H_t, X, t)$$

where  $H_t$  is the level of health at time  $t$ , and

$X$  is a vector of personal characteristics.

In principal we can solve this difference equation given an initial condition,  $H_0$ , to obtain an equation for  $H_t$ .

$$(2) \quad H_t = G(H_0, X, t)$$

Equation (2) is the one usually estimated in a cross section with  $H_0$  treated as an (unobserved) random variable. The coefficients on  $X$  in (2) may be biased because of the omission of  $H_0$  which is generally not measured and because some components of  $X$  may be partially determined by  $H_0$  or intervening by health status. Our estimates of (2) are subject to the same difficulties.

Equation 1 can be thought of as a transform of a reduced form production function in which investments in health have been optimized out. Because we control for  $H$ , we eliminate a large share of the reverse causality running from  $H$  to  $X$ . We also control those omitted variables that remain constant from period to period. Because  $X$  also generally remains constant from period to period, what we are

measuring is the effect of X on the change in health not on its level. Therefore, these estimates are not quite comparable to those in the literature which estimate equation (2).

On average health deteriorates with age for different levels of X. This is shown in Figure 1. The usual cross-section study measures the distance CD. Our equation (1) measures the difference in the slopes at A and B. It is possible therefore that X has no effect in equation (1) but has an effect in equation (2); that is, the deterioration functions are parallel. This would imply that all the effects of X in equation (1) operate via prior health and that the effects do not cumulate during the life cycle.

In the work that follows we estimate equations (1) and (2) using three years of a panel survey 1969, 1971 and 1973. While the data at our disposal include crude indicators of life-cycle risks, such as occupation of longest job, we concentrate on the effects of marital status and education in this report. These are the main variants specified in X. However, we also examine the effects of spouse's schooling, income and medical expenditures on the evolution of health status over time.

The data to be used come from the Retirement History Survey (RHS). The Retirement History Survey commenced in 1969. In that year a random sample of some 11,000 men and women between the ages of 58 and 63 inclusive participated in a lengthy survey. The major areas in which data were collected include current and past labor force activity, current earnings and income, family structure, education, expenditure of various sorts, and health. The same people or their widows were reinterviewed every second year until 1979. We currently have the 1969, 1971 and 1973 waves.

The health data come in various forms. Several questions are subjective but don't reflect economic choices. For example in each

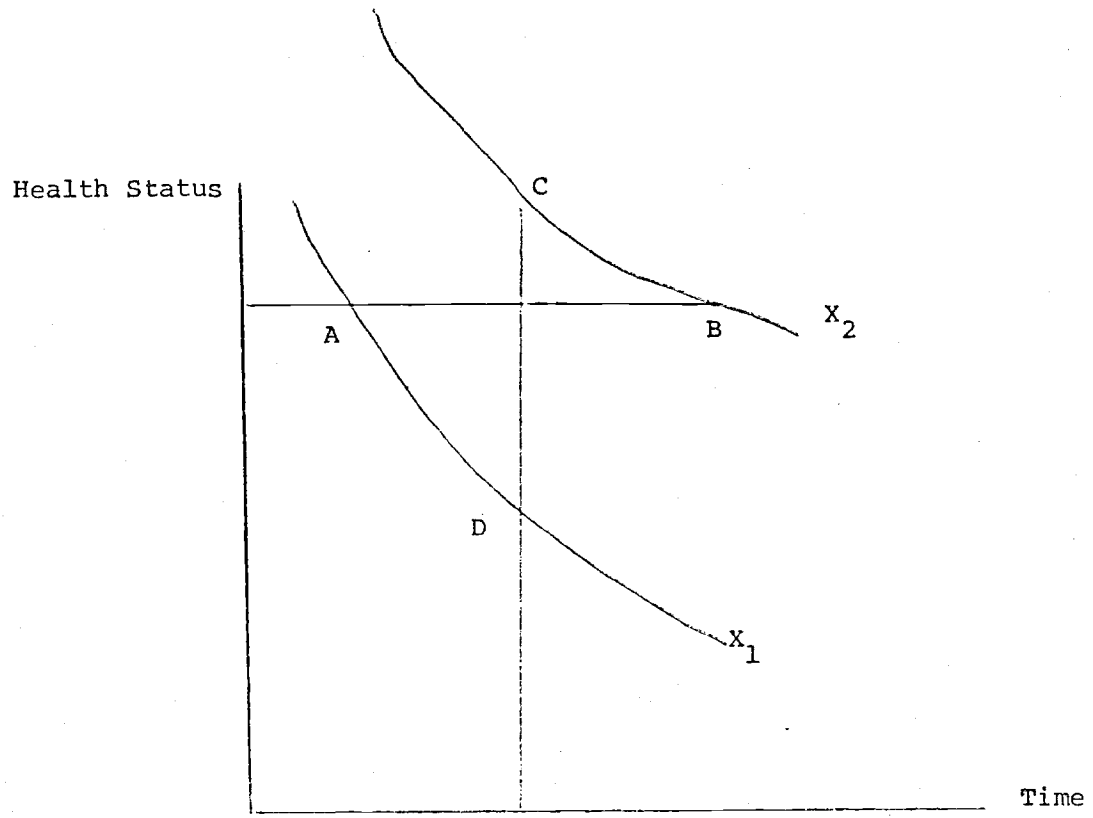


Figure 1

Hypothetical Health Deterioration  
Functions

interview, a person is asked how his health compares to others of the same age. In the post-69 waves, he is also asked how his health has changed during the last two years. There are also various potentially choice contaminated questions. For example, a person not at work is asked why and may respond "poor health." For our purposes this question can be contaminated because wage rates and available health benefits may influence whether a person of a given degree of healthiness chooses to work or to stay home.

The health status variables in level form has four possible responses: health better-than-others (the same age), same-as-others, and worse-than-others, and, for the 1971 and 1973 surveys, deceased. Given the nature of these questions, there are no easy identities in the difference between two successive levels and responses about change in health from one date to the next; therefore, we use both the levels and the changes in health.

With these categorical data the use of conventional regression methods requires arbitrary scaling of categories (better, same, worse, deceased). To eliminate this kind of arbitrary decision, we use instead a linear model based on contingency tables of three or four categories. (See Goodman). We analyze qualitative dependent variables by fitting models to frequency tables using the PF3 program in the BMDP package.

Any qualitative data model with three variables can be written as:

$$\ln F_{ijk} = \alpha \lambda^A + \beta \lambda^{AB} + \gamma \lambda^{ABC}$$

where  $F_{ijk}$  is the expected cell frequency,

$\lambda^A$  is a vector of means,

$\lambda^{AB}$  is a vector of 1st order interaction terms,

$\lambda^{ABC}$  is a vector of 2nd order interaction terms.

We can test for interactions of the various factors by restricting parameters to zero. The computational algorithm allows us to estimate the statistical significance of individual variables and their interactions. For the qualitative variables we present a selection of the estimated cell means and describe the significance and pattern of the results.

Means and variances of several variables are shown in table 1. We shall not dwell on this table, but it clearly indicates that health worsens with age. It also shows that there are wide variations in healthiness and medical expenditures. An obvious question, however, is whether the data are sufficiently trustworthy for analysis. In particular are individuals able to assess and give reasonably accurate accounts of: (1) the level in their health compared to others in the same age group; and (2) the change in their own health? Moreover we must ask if such crude categories as "better" and "worse" convey much information.

In making comparisons with others of the same age, people may well use the mode as the reference value. Since health need not be distributed symmetrically about the mode, there is no reason why the level variable need retain the same distribution over time and it is not illogical that more people pass to the unhealthy state as they age. Again deterioration in health with age seems likely. Thus it makes sense that the change in health becomes worse over time.

One can also judge the appropriateness of an empirical measure of a theoretical construct by the results obtained in empirical work. The results that follow will provide many instances in which the subjective health variables act the way one would expect a true health variable to behave.

To provide but one example, between 1969 and 1973 23% of those in worse health in 1969 died, while among those in better health only 7% died. Thus the data seem to give reasonable trends and levels.

### III. Health Compared to Others of the Same Age

We have fit a variety of models to individuals' 1969, 1971 and 1973 subjective evaluations of their health compared to others of the same age in the particular year.<sup>2</sup> Since the comparison group ages over the time period, the time series comparisons indicate how the distribution of health varies about a changing reference point. Table 2 shows that the shape of the health distribution changes systematically with age. Fewer people appear in the better than other health category in successive surveys. Apparently people do in fact use the mode as a reference point.

Some estimates of equation (2) are shown in Table 2 where the level of health in each survey year is related to education and marital status in 1969. We have used 0-8, 9-11, 12, 13-15, and 16+ as the education categories in our analysis but will omit some of these classifications in the tables for ease of presentation. Similarly we have used the marital status categories of married, widowed, divorced and single in the analysis though each is not always included in the tables. Qualitatively the results for education and marital status are similar to those found by other investigators.

The education and marital status vectors are statistically significant and have independent effects. The effects of education are quite large in each year. Consider for example married men (see table 2, panel 1). In 1969, the percentage of white men in better health than others rises from 28% to 47% as education goes from elementary

school to college completion. Comparable increases occur in the intervening categories. The pattern for worse health and death is the opposite for those in better health. The fraction in worse health than others fall sharply with education. In 1969 higher education is also associated with substantial reductions in the percentage in worse health than others, from 25% for married elementary school persons to 9% for college graduates. For married men in 1971, the fractions in the educational extremes falls from 23 to 10%. The effect of education is approximately the same in each year as is shown in the other two panels of table 2.

Now examine the effects of marital status as measured in 1969. Again, see table 2. In 1969, married men and widowers have very similar distributions at all education levels. (We do not know how long men have been widowed or divorced). Single (never married) men are less likely to be in better or in worse health than divorced men, while the latter are a bit less likely to be in better health but substantially more likely to be in worse health than others.

The patterns in the other two years are similar except that the disadvantage of single men in better health has narrowed and married men have a substantially lower death rate even though we suspect more complete reporting of death for this group.

To try to understand better why married men remain alive longer, we have examined that group in more detail. In all three years studied, own and spouse's education have statistically significant and independent impacts on health. In table 3, we present some estimated proportions taken from an equation which uses own and spouse's education without interactions.

For a given spouse's education level, there continues to be substantial positive effects of own education. For example if the

spouse has a 12th grade education, the percentage in better health in 1969 rises fairly steadily from 30 to 46% and the percentage in worse health falls uniformly from 21 to 9% as own education rises from elementary school to college graduate. These effects are only slightly smaller than those found in table 2.

For a given level of own education there is a definite tendency for the percentage in better health to increase with spouse's education, the jump between elementary and high school being particularly noticeable. There is even a more marked tendency for the percentage of those in poor health to decline as spouse's education increases - generally about 5 percentage points between elementary school student and college student spouse. However, the group with the lowest percentage in worse health are those whose spouse has 13-15 years of schooling (not shown).

An increase in one's own education is much more effective than an increase in spouse's education. For example going from elementary to college graduate in 1969 raises the fraction in better health by about 15 points for own education but by 7 points for spouse's education. Similarly the decline for worse health is about 14 and 6 points respectively.

As noted earlier, by 1971 the percentage with health better than others has fallen. The decrease in percentage points is approximately the same at all spouse's education levels. The decrease in health better than others shows up primarily as an increase in the "same" group with worse health down only slightly. The percentage decrease is very small and unrelated to either education variable.

In 1971, as in 1969, own education has a much larger impact on health than spouse's education. Moreover the effect of either variable is about the same in both years in percentage point terms.

By 1973 the percentage in better-health-than-others has fallen



even more at all education levels. The decrease, however, is more noticeable at higher levels of spouse's education. By 1973, the differential between spouse having 0 to 8 and 16-or-more years of schooling is only about 2 percentage points, while for own education the corresponding differential runs about 14 points. The percentage in worse health has generally declined slightly from 1971. The percentage who have died decrease slightly with either education measure.

#### IV. Health Levels Conditioned on Previous Health

The results to be discussed next examine variants of equation (1). Two measures of the dependent variable are used. Adding  $H_t$  to both sides of the equation gives us an equation relating  $H_{t+1}$  to  $H_t$  and  $X$ . We can then use health compared to others in two surveys. Alternatively we can relate a person's own change in health to health compared to others in a prior survey and to  $X$ .

Table 4 shows 1971 and 1973 health status respectively, cross-classified by education, marital status and health status in 1969. Table 5 conditions on 1971 health status rather than on 1969 health status. Before turning to the detailed results, we may briefly state the general conclusions: The direct effects of schooling are quite strong within given health status classifications; thus, the slopes of the health change functions illustrated in Figure 1 are different. The effects of marital status on the slopes of the health change function are less strong than those of education. However, there are indications that the presence of a spouse prolongs life by keeping an ill mate alive but in a state of ill health, people who would probably die if a spouse were absent.

Let us examine the effects of schooling first. Of those in better health in 1969 the fraction in better health in both 1971 and 1973 increases with the level of schooling (table 4). For example for

married men, the percentages for elementary and college graduates are 47 and 63% in 1971 and 41 and 52% in 1973. Conversely, for those in worse health in 1969 the fraction in worse health or dead in either 1971 or 1973 decreases with the level of schooling. For example for the same two educated groups, the estimated percentages are 66 and 58% in 1971 and 67 and 60% in 1973. The first of these examples suggests that the effects of education diminish as one ages.

Of course 1969 health status can be a poor conditioning variable for 1973 health. However we recomputed using 1971 health as the conditioning variable, the results in table 5 are very similar to the top panel of table 4 except for the divorced, who are much less likely to be found in better health in 1973. Furthermore the effects of schooling on 1973 health conditional on 1971 health status is somewhat smaller than the effect of schooling on 1971 health status conditional on the state of health in 1969. One might well expect this because only the more hardy individuals, whatever their background and circumstances, survive and so the population changes over time. The much greater differences in levels between the 1969-73 and 1969-71 comparisons shown in table 4 would be expected on purely statistical grounds since random events tend to kick one out of previous health status classifications as time marches on. Thus, if a married person was in better health in 1969 the probability of remaining in better health in 1971 is about .44. With no state dependence this would imply a probability of remaining in better health in 1973 or about .25 ( $= .47 \times .53$ ). Of course the significantly higher observed proportions of more than .4 suggest more persistence than independent distributions imply, but the point is clear that the proportions should decline over time.

Since deceased is an absorbing state while the other classifications are not, there is some ambiguity in examining the worse-than-

others and deceased categories, though surely the latter is the ultimate subclass of the former. These tables indicate a general worsening of health with age. They also suggest that recovery from worse health in 1969 to better health than others in subsequent years occurs very infrequently though at a slightly greater rate for the more educated. In almost every case the probability of recovery to the better-than-others state given a prior worse-than-others state is smaller than the probability of worse and/or deceased states given prior better-than-others state. For example for divorced men with an elementary school education, the recovery rate in 1971 is 5% while the deterioration rate (including dead) is 11%. Furthermore the difference between the off diagonal elements in the transition matrix increases over time. It is interesting to note that the more educated are more likely to recover if they start with worse health and are less likely to get ill or die if they start in better health.

Let us turn now to marital status differences. In the top panel of table 4 divorced and widowed men have the largest and smallest fractions who are in better health given prior better health. For elementary school students, the percentages of these groups are 50 and 43% respectively. The same pattern occurs in 1973 conditioned on 1971 health. In 1971 widowers and divorced men have somewhat larger proportions worse or dead given that they were initially worse than married or single men. However, by 1973 the widowers are on a par with both single men and married men, while the divorced have significantly more adverse experience.

Married men who start off in worse health have significantly smaller probabilities of subsequent death than other groups. It is well known from other studies that married men have higher survival rates than other men. The findings suggest that the presence of a spouse prolongs life even given illness.

The probability of recovery to better than average health starting from worse than average health appears to be independent of marital status in all comparisons. On the other hand the probability of going from better than average health to worse than average or dead is much larger for divorced males in table 5. There is a slight advantage for widowers in the 1971-73 comparison though widowers have worse experience than singles in 1969-71 and exhibit about the same effects in 1969-73.

It is well known that married men and more educated men earn more income and are generally wealthier than others. Therefore it is possible that the effects of education and marital status work through the effects of wealth and its attendant correlates of medical care and consumption patterns. To check on these possibilities we have examined 1969 health status by education, marital status, medical care, doctors' bills and earnings. The resulting table is too complex to be presented here. Briefly it shows (i) Those spending more on doctors tend to be in worse health. While hardly earth-shaking, this fact is worth mentioning more as a remark on the quality of the self-assessment of health status than on anything else. (ii) Those with lower incomes tend to be in worse health within any given education-marital status-medical expense category, though this might well reflect the well known fact that ill persons have lower propensities to work than those in good health, as well as the reverse causation. (iii) The effects of schooling and marital status are of the same order of magnitude within medical expense and income categories as between them. In sum, the results suggest independent life style or knowledge effects and not pure wealth effects alone.

Next we consider the results in tables 6 and 7 for the change in own health during the previous two years. In the top panel of table 6

we present some percentages for the 1969 to 71 change in health estimated from a model which includes 1969 health compared to others. The probability of health improving is independent of 1969 health level and marital status. The results for health worsening, however, are strongly related to 1969 health status and 1969 marital status. Those in worse health than others in 1969 are much more likely to have deteriorating health or to die over the following two years. The probability of death by 1971 for the various nonmarried groups are nearly identical given 1969 health. The probability of health worsening, however, is greater for divorced men than widowers or single men. For example among college graduates in worse health in 1969, the percentage whose health worsens is 35 and 29% for divorced, and single men respectively. Interestingly married men's health generally worsens at the same rate as divorced men but their death rates are much smaller. This finding again suggests that spouse's can keep sicker men alive for some period of time.

In the bottom panel of table 6, we present the estimated fractions for the 1971 to 1973 change in a model that conditions on 1969 health level. The corresponding estimates obtained from conditioning on 1971 health are given in table 7. In both instances the probability of one's own health improving is generally smaller than in the 1969 to 1971 period. In contrast to the 1969-71 interval the probability of health improving in the 1971-1973 interval is related to prior health status with those in better prior health more likely to improve. For example as shown in table 7 for married men who attended elementary school, the percentage with improving health is 13 and 10% if health in 1971 is better or worse than others respectively.

Single men have a slightly smaller fraction than married men

improving in health, a much smaller fraction with worsening health, a larger fraction dying though the sum of the last two categories are about the same for these marital groups. Divorced men are much more likely to die -- about 10 percentage points -- than married men, but have the same percentage whose health worsens.

Tables 6 and 7 condition change in own health on level of health compared to others. When we condition the 1971-73 change on the change in the prior two years, there is positive serial correlation. Those who improved between 1969 and 1971 are more likely to continue to improve and those worsening in health are more likely to worsen or die. The improvement rate, however, is much smaller than the deterioration rate. The results by marital status and education are similar to those presented above.<sup>3</sup>

Next we consider the effects of education in tables 6 and 7. For the improving group the largest differential is only 5 percentage points and most differentials are smaller. Yet the effect of education on the sum of the worsening and dead category is substantial. For example in the top panel of table 5, the estimates for married men in worse health in 1969 are 59 and 46% for elementary school and college graduates. For the 1971 to 1973 health change variable, the combined estimates for elementary school and college graduates in worse health in 1969 are 63% and 54% respectively. However, the death rates differ little by education which is contrary to most previous findings. Thus schooling primarily affects the conditional probability of health worsening.

### III. Conclusion

Our introduction summarizes our main empirical findings. Thus at this point we conclude by observing that self assessed health measures apparently yield useful information about the state of a person's health and that health at a point of time and its change over time are strongly related to education and marital status. Most of these effects persist even when we control for family income, use of medical resources, and previous health.

Table 1

## Sample Means or Proportions and Variances

	<u>Mean</u>	<u>Variance</u>
Married	.88	.10
Widowed	.04	.04
Divorced	.04	.03
Never Married	.05	.04
58 Years Old	.19	.15
59 Years Old	.17	.14
60 Years Old	.16	.14
61 Years Old	.17	.14
62 Years Old	.16	.14
63 Years Old	.15	.13
ED 0-8	.39	.24
ED 9-11	.20	.16
ED 12	.23	.18
ED 13-15	.09	.08
ED 16+	.10	.09
Death (1969-1973)	.15	.12
Number of Times medical care including hospital, 1968	10.03	174.07
Amount of Dr. Bills, 1968	62.6	289828.4
Amount of Dr. Bills, 1970	167.5	434808.4
Amount of Dr. Bills, 1972	89.7	177620.1



Table 1 (continued)

Sample Proportions

	Health 1969 compared to others same age	Health 1971 compared to others same age	Health 1973 compared to others same age		Health change 1969 to 1971	Health change 1971 to 1973
Better	.35	.29	.25	Improving	.12	.11
Same	.46	.49	.47	Same	.57	.52
Worse	.19	.18	.17	Worsening	.26	.26
Dead	-	.05	.11	Dead	.05	.11

Health compared to others in 3  
years by Education and Marital  
Status

	Education 0-8				Education 12				Education 16+			
	MAR <sup>a/</sup>	WID	DIV	SING	MAR	WID	DIV	SING	MAR	WID	DIV	SING
1969 Health compared to same age												
Better	.28	.28	.24	.19	.40	.40	.37	.29	.47	.47	.45	.36
Same	.47	.46	.37	.50	.46	.45	.40	.53	.44	.43	.39	.52
Worse	.25	.26	.39	.30	.14	.14	.23	.18	.09	.09	.16	.12
1971 Health compared to same age												
Better	.22	.20	.21	.18	.33	.30	.32	.28	.43	.40	.43	.37
Same	.50	.50	.43	.53	.49	.49	.43	.52	.43	.44	.38	.47
Worse	.23	.22	.27	.21	.13	.13	.15	.12	.10	.10	.12	.09
Dead	.04	.08	.09	.08	.05	.08	.10	.08	.04	.07	.08	.07
1973 Health compared to same age												
Better	.19	.19	.16	.16	.29	.27	.25	.23	.35	.34	.32	.29
Same	.47	.47	.33	.46	.40	.47	.35	.48	.46	.45	.35	.47
Worse	.23	.17	.27	.19	.13	.09	.16	.11	.10	.07	.13	.09
Dead	.11	.18	.23	.19	.10	.17	.23	.18	.08	.13	.19	.14

<sup>a/</sup> Marital status as of 1969

Married Men's<sup>a/</sup> Health Compared to Others in 3  
Years by Own and Spouse's Education

1969 Health	Own Education 0-8			Own Education 12			Own Education 16+		
	Spouse's Education			Spouse's Education			Spouse's Education		
	0-8	12	16+	0-8	12	16+	0-8	12	16+
Better	.26	.30	.33	.35	.40	.42	.41	.46	.49
Same	.46	.49	.46	.46	.47	.43	.46	.46	.43
Worse	.28	.21	.22	.19	.13	.14	.12	.08	.09
1971 Health									
Better	.20	.26	.26	.28	.34	.35	.37	.44	.44
Same	.50	.51	.49	.50	.49	.47	.46	.44	.42
Worse	.26	.19	.22	.16	.12	.14	.13	.09	.10
Dead	.04	.04	.04	.06	.05	.04	.04	.03	.03
1973 Health									
Better	.19	.24	.21	.25	.31	.28	.33	.39	.35
Same	.47	.47	.53	.47	.47	.52	.44	.43	.48
Worse	.24	.20	.17	.15	.13	.10	.14	.12	.09
Dead	.10	.08	.09	.12	.10	.10	.09	.07	.07

<sup>a/</sup> Marital status as of 1969.

Table 4

Level of Health in 1971 and 1973  
conditioned on 1969 health

22

	Married		Widower		Divorced		Single	
	Better 69	Worse 69	Better 69	Worse 69	Better 69	Worse 69	Better 69	Worse 69
ED 0-8								
Better 71	.47	.04	.43	.04	.50	.05	.45	.05
Worse 71	.07	.58	.07	.54	.06	.53	.05	.47
Dead 71	.03	.08	.05	.14	.05	.15	.04	.14
ED 12								
Better 71	.54	.07	.50	.05	.58	.07	.52	.07
Worse 71	.05	.48	.05	.44	.04	.43	.03	.37
Dead 71	.03	.11	.05	.19	.05	.20	.05	.19
ED 16+								
Better 71	.63	.09	.56	.08	.66	.10	.60	.09
Worse 71	.04	.47	.04	.43	.03	.41	.03	.36
Dead 71	.02	.11	.04	.18	.04	.19	.04	.19
ED 0-8								
Better 73	.41	.04	.40	.04	.40	.03	.37	.03
Worse 73	.09	.49	.06	.35	.10	.45	.07	.38
Dead 73	.07	.18	.11	.31	.15	.33	.12	.30
ED 12								
Better 73	.46	.05	.45	.05	.45	.04	.42	.04
Worse 73	.06	.38	.04	.26	.06	.34	.05	.28
Dead 73	.07	.23	.11	.36	.15	.40	.12	.36
ED 16+								
Better 73	.52	.06	.50	.06	.51	.05	.47	.05
Worse 73	.05	.39	.04	.26	.05	.35	.04	.29
Dead 73	.06	.21	.09	.33	.13	.37	.10	.33

Same-as-Others categories excluded. Column sums within each education class sum to 1.0 when Same is included.

Table 5

Level of Health in 1973<sup>a/</sup>  
 conditioned on 1971 health relative to others<sup>b/</sup>

	Married		Widower		Divorced		Single	
	Better 71	Worse 71	Better 71	Worse 71	Better 71	Worse 71	Better 71	Worse 71
ED 0-8								
Better 73	.48	.04	.49	.05	.44	.03	.42	.03
Worse 73	.09	.55	.05	.42	.12	.56	.09	.49
Dead 73	.04	.12	.05	.20	.10	.23	.07	.20
ED 12								
Better 73	.54	.06	.55	.06	.50	.04	.48	.04
Worse 73	.05	.44	.04	.32	.08	.45	.05	.38
Dead 73	.03	.14	.05	.23	.09	.28	.06	.24
ED 16+								
Better 73	.58	.08	.59	.08	.55	.05	.52	.05
Worse 73	.05	.31	.03	.31	.07	.45	.05	.38
Dead 73	.03	.20	.04	.20	.07	.26	.05	.21

Includes only those who were alive in 1971.  
 Marital Status Classified as of 1969.

<sup>a/</sup>Includes only those who were alive in 1971.

<sup>b/</sup>Marital Status Classified as of 1969.

Table 6

Change in Own Health 1969 to 71 and 1971 to 73  
 Conditioned on Level 1969 Level of Health

24

Education and change in Health in Health 69 to 71	Married <sup>a/</sup> Health in 1969 of others			Divorced Health in 1969 of others			Single Health in 1969 of others		
	Better	Same	Worse	Better	Same	Worse	Better	Same	Worse
ED 0 to 8 Own Health									
Improving	.11	.10	.10	.11	.10	.10	.10	.09	.10
Same	.67	.57	.30	.63	.53	.26	.71	.61	.34
Worsening	.19	.29	.51	.21	.31	.50	.15	.24	.42
Dead	.02	.03	.08	.05	.06	.15	.04	.06	.14
ED 16+ Own Health									
Improving	.14	.14	.15	.14	.13	.14	.12	.12	.14
Same	.72	.64	.38	.68	.60	.33	.75	.67	.41
Worsening	.12	.19	.36	.13	.20	.35	.09	.15	.29
Dead	.03	.04	.10	.05	.07	.18	.04	.06	.17
Education and change in Health 71 to 73									
ED 0 to 8 Own Health									
Improving	.14	.10	.08	.16	.11	.07	.10	.08	.06
Same	.58	.52	.29	.44	.38	.18	.66	.60	.36
Worsening	.22	.30	.45	.26	.34	.43	.15	.21	.33
Dead	.05	.08	.18	.14	.17	.31	.09	.11	.26
ED 16+ Own Health									
Improving	.12	.09	.08	.15	.11	.08	.09	.07	.06
Same	.67	.62	.39	.53	.47	.24	.73	.69	.44
Worsening	.15	.21	.35	.18	.25	.34	.10	.14	.24
Dead	.06	.08	.19	.13	.17	.34	.08	.10	.26

<sup>a/</sup> Marital status as of 1969.

Table 7

Change in Own Health 1971 to 73  
 Conditioned on Level 1971 Health<sup>b/</sup>

25

Education and change in Health 71 to 73	Married <sup>a/</sup> Health in 1971 cf others			Divorced Health in 1971 cf others			Single Health in 1971 cf others		
	Better	Same	Worse	Better	Same	Worse	Better	Same	Worse
ED 0 to 8 Own Health									
Improving	.13	.10	.10	.16	.12	.09	.10	.08	.08
Same	.62	.55	.28	.47	.40	.17	.70	.63	.36
Worsening	.22	.30	.50	.28	.38	.51	.16	.23	.41
Dead	.03	.04	.12	.08	.10	.23	.04	.05	.15
ED 16+ Own Health									
Improving	.12	.10	.11	.15	.12	.10	.09	.07	.09
Same	.70	.65	.38	.57	.50	.23	.77	.73	.46
Worsening	.15	.21	.40	.20	.28	.42	.10	.15	.31
Dead	.03	.04	.12	.08	.10	.24	.03	.05	.15

<sup>a/</sup> Marital status in 1969.

<sup>b/</sup> The known Dead in 1971 are not shown. The unknown dead in 1971 are in the same health as others category in 1971.

## NOTES

1. For example in work not reported in detail here, those who report themselves in worse health than others are much more likely to be working if they are more educated and presumably have higher wage rates.
2. When the health question is not answered and the person is alive, health is placed in the "same" category.
3. We have also fit a model relating the 1971-73 change to the 1969-71 change and the 1969 level. The results of the second order difference equation are similar to the first order model shown above.



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