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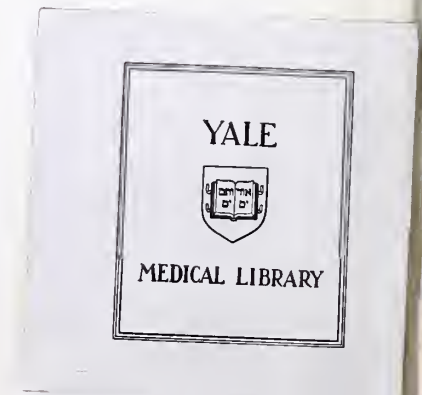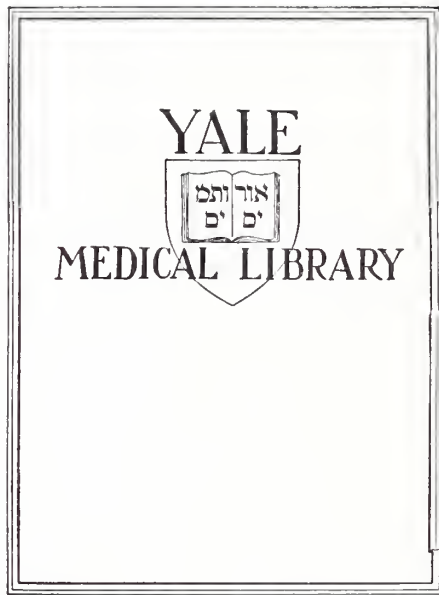# ATHEROSCLEROTIC CARDIOVASCULAR DISEASE IN THE ELDERLY

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PSYCHO-SOCIAL RISK FACTORS

IN THE DEVELOPMENT OF

ATHEROSCLEROTIC CARDIOVASCULAR

DISEASE IN THE ELDERLY

BY

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CHAPTER 1

LITERATURE REVIEW

Introduction

Illness has been considered to be integrally related to life situations since ancient times. During the past three decades investigations have been made into the nature of the possible relationships by numerous works in many different fields. The impact of such studies often did not cross professional boundaries. Recently, however, the work of physicians, epidemiologists, psychologists, sociologists and others have come together to form a relative cohesive body of knowledge.

Unfortunately, elderly populations have often not been investigated and situations which particularly affect the aged have been ignored. The present study is an attempt to partially rectify these circumstances. It begins to define factors which may predict which elderly populations are at higher risk for the development of atherosclerotic cardiovascular disease.

Literature Review

The idea that increased illness is associated with specific life situations has received a great deal of attention in the recent literature (28, 41, 51). Independent variables under investigation have ranged from specific life events, such as bereavement and relocation, to chronic life conditions, such as social class and the presence of social support systems. The outcomes investigated have been equally varied. Workers have examined total mortality, general measures of morbidity and cause specific morbidity and mortality.

Retrospective and prospective methods have been employed on a variety of populations distinguished by age, sex, race, socio-economic status (SES) and many other characteristics. An exhaustive review of such a literature is beyond the scope of this article. Selected studies will be presented which are illustrative of some of the salient issues which have been raised and some of the conclusions which have been drawn. In addition, problems encountered when relating these studies to specific populations, e.g., the elderly, will be discussed.

Bereavement has been one of the most intensely studied of the specific life events which may affect health outcome. Rees and Lutkins (46) showed that in a semi-rural, stable British population, close relatives (i.e. spouse, parent, child or sib) of people who died had a seven-fold increase in the risk of dying themselves during the first year of bereavement (4.76 percent vs. 0.68 percent, p < .001), when compared to a set of controls matched for age and sex. Those at highest risk were found to be the widows, with a ten-fold increase in the mortality rate (p < .01). The mean age of the relatives who died in the study was 69.75 ± 14.7 years and the authors presented some evidence to suggest increased mortality for the "relatively younger" bereaved group. Although exact limits were not given for the range of this younger group, it appeared from one of the graphs in the paper that it did not extend below age 60.

McNeill (30), using vital statistics for all of Connecticut, has also demonstrated significantly increased mortality rates among the

conjugally bereaved. For males, the increase was seen only during
the first six months following the death of a spouse and only in the
under 60 age group (p < .001). For females the increase was signi-
ficant during the second year following bereavement but only for
the under 54 year old group (p < .01). The comparisons were made to
the expected mortality rates for the entire state.

Parkes, Benjamin and Fitzgerald (38) followed 4,486 widowers,
55 years or older for 9 years. The widowers were identified from the
death certificates of their wives. It was found, in this prospective
study, that in the first six months of bereavement 213 men died whereas
the expected number was 153 as calculated from the death rates of
married men. This difference was significant at the p = .001 level.
After six months, no significant differences were found.

The data reported above was only concerned with total mortality.
McNeill (3) in addition commented on cause specific mortality and was
able to demonstrate increased deaths due to "suicide and accidents"
(p < .001) and "diseases of the heart" (p < .001) for males under
60 in the first six months of bereavement. For females under 60 during
this time there was also a significant excess of deaths from "malignant
neoplasms". For the second six months and continuing into the second
year, both males and females under 60 had increased death rates from
"cirrhosis and alcoholism" (p < .001). In the over 60 group, males showed
no increased mortality from any cause while over 60 females had an
increased risk of dying from "diabetes" (p < .05) and "accidents and
suicides" (p < .05).

Parkes et. al. (38), in the paper referred to above, also commented

on the cause specific mortality in their study. They found that
the only significant increase was found in the "coronary thrombosis
and other arteriosclerotic heart diseases" category (p < .001).
Although the total cohort examined was over 55, no breakdown by
age was given for the above statistics.

These studies would appear to imply that there is an increased
mortality associated with bereavement and that the closer an
individual was to the person who died, the greater he was at risk.
The McNeill study suggested that males were only at greater risk
for a short time after the event while females showed effects for
up to two years. In addition, it appeared that a large amount of
the increased mortality was due to cardiovascular disease. Lastly,
two studies suggested that there was an inverse relationship between
age and the excess mortality of bereavement.

The studies concerning the morbidity of bereavement have been
less conclusive. Part of the problem is due to differing methodological
approaches. Definitions of morbidity have included the presence of
medical, psychiatric and psychosomatic illnesses. Especially trouble-
some has been difficulty in distinguishing between illness behavior
and actual disease. In addition there has been disagreement as to the
time period after the death which should be considered when bereavement
associated health effects were examined. Clayton (6) has taken the
position that symptoms should manifest themselves within four months
and that consultation should be sought within one year. On the other
hand, the above mortality studies have shown effects leading to death
up to two years after the event. In the present review only studies
which deal with non-psychiatric morbidity will be examined.

Parkes (36) studied the medical records of 44 widows aged 38-81 (mean = 60.2) whose husbands had died in any one of eight London private physicians' practices. To be included in the study, the widows had to be treated by their husbands' physician for a period of not less than two years prior to and 18 months subsequent to the death of their spouses. Using the first 18 months of the pre-death period as a control, he was able to demonstrate a significant increase in the number of consultations for the bereaved per a six month period. Those 65 and older saw their physicians for medical complaints while the below 65 group saw them for psychiatric complaints. There were three hospitalizations, all for bereaved woman. Of the specific illnesses examined, only "arthritic and muscular" conditions showed a significant increase after bereavement. No conditions showed decreases during this time. Clayton (6) argued that the widows in this study were merely deferring consultations during their husbands' illnesses and thus showed a rebound effect after bereavement. She cited as evidence for this the decreased rate of consultations for the six months prior to the death event, which Parkes did not consider as part of his control period. Parkes anticipated such a question and stated that no differences were found between the widows of those patients whose deaths were expected and those whose deaths were not expected, although no data were given.

Madison and Viola (31) studied the health of a group of widows, using a case control strategy and self-reporting, for the 13 months after bereavement. Their study involved both a Boston, Mass. sample of 132 cases, 98 controls and a Sydney, Australia sample of 243 cases, 101 controls. Young widows in particular were picked and the average

age was about 50 for both groups. The compliance rate was only
about 50 percent of the total group contacted. No socio-demographic
data was given for the group who refused to participate. Outcome
was measured using a differential scale which gave more weight
to (1) symptoms occurring for the first time or which were
substantially more troublesome, (2) medical consultations and
(3) "major diseases such as asthma". Using this system, it was
shown that 21.2 percent of the Boston sample and 32.1 percent of
the Sydney sample had a marked worsening of their health in the
13 month period. This was significant to the $p < .01$ and $p < .001$
levels respectively when compared to the controls. The results imply
that an actual deterioration in health was occurring among the
bereaved. However, the study was subjective and retrospective. No
standardized clinical assessments were made. Also, the non-medically
indicated use of physicians could not be ruled out.

Parkes (37) studied a group of 22 London widows under the age of
65 referred to him by general practitioners, who had agreed to
participate in a study of the health of such women. Only widows
who were willing to be interviewed by Parkes were referred. In
general, the widows were considered for participation because they
had consulted with their private physicians in the first month
following the death of their spouse. As Clayton pointed out (6),
this probably eliminated from the study the "most well" group of widows.
At least 16 widows who were eligible for inclusion in the study were
not referred for a variety of reasons. This group was not compared to
the study group except to mention that the referring GP's said that their

grief reactions were "typical". The study group was followed for
the 13 months following their bereavement. Parkes found that six
(27.2 percent) of the bereaved had definite deteriorations in
their health as documented by direct interviews when compared to
their pre-bereaved state. No comment was made on the specific types
of illnesses involved. No hospitalizations were noted. In
addition, a close correlation was found between measures of irritation
and anger and the self-reported health states of the widows. This
finding appears particularly important when viewing the results of
Madison and Viola's work.

The results of the clinical morbidity of bereavement studies have
pointed to increases in general measures of morbidity. Only the
Parkes study (36) documented an increased number of a particular
group of illnesses. No note was made of increases in cardiovascular diseases.
Most studies dealt with relatively younger groups of subjects although
Parkes, in the same study, showed that consultations for widows over
65 were made for medical conditions. Finally the distinction between
illness behavior and actual disease presented a problem of interpretation.

Relocation is another of the specific life events which has been
studied for its effects on health outcome, especially for a geriatric
population. The results of these studies have been less clear than
those of the bereavement work.

Several studies have shown a clear increase in the mortality for
relocated institutionalized geriatric patients. In 1959, Aldrich
and Mendkoff (1) studied 182 patients in the Chicago Home for Incurables
who were forced to move due to the closing of the institution.
Originally 233 patients had been present in the Home but 51 died before
relocation occurred. One hundred eighty of the remaining 182 patients

were followed after transfer. At one year, an overall mortality
rate of 32 percent was found. This was compared to an anticipated
rate which was calculated by examination of the medical records of
the institution for the ten years prior to the relocation event.
It was found that in every age group, except for those over 90,
there was a substantial increase in mortality. In addition, it
was found that the initial three months of the post-relocation period
had the highest mortality.

Similar results were found in another case control study in
a California hospital (25). Killian studied 600 geriatric patients
at the Stockton State Hospital who were moved to a variety of other
facilities in the state. The author examined three groups: (1)
Those who were sent to other state hospitals (79 patients), (2)
Those who went to other extramural facilities (65 patients), and
(3) Those who stayed at the Stockton hospital (109 patients). Each
group was matched with an equal number of controls by age and
sex. A review of the hospital records for the four months following
relocation showed the following results: The mortality rates for
groups 1 and 2 were 5 and 9 times higher, respectively, than the
rates for the corresponding controls, although only one death had
occurred in each of the control groups. For group 3, the patients
who had stayed in the same institution, no increase in mortality was
found.

The two studies reported above probably represent the best data
available on the mortality of relocation. Other studies, however,
have not duplicated these results. Ogren and Linn (34) studied 41
male patients transferred from one nursing home to another and

compared their health to a group of 41 patients who were not moved. After six months it was found that the non-relocatees had a higher death rate (31.7 percent vs. 19.7 percent) than those who moved, although the difference was not significant. Originally, however, 62 patients had been transferred but 21 were dropped from the analysis because of readmission to a hospital in the interval between changes in nursing homes. The mortality rate of this group was unknown, thus the increase in the death rate for the non-relocatees may have been spurious. However, even if 12 of the 21 died, the mortality rate for the relocatees would have only equaled the mortality for the non-relocatees.

Goldfarb (12) studied three groups of patients moved from a nursing home. The cases were moved forcibly while a voluntary group of relocatees were one control group and subjects who remained at the home were a second control group. The overall mortality rates for the three groups were similar (28 percent vs. 38 percent vs. 27 percent). However, when the groups were broken down by various indicators of possible mortality (high risk group with 3/5 indicators of high mortality, low risk group 3/5 indicators of low mortality) it was found that only subjects who were in the high risk group and who were forcibly relocated had substantially higher mortality rates. One problem with the analysis was that only six persons fell into both of these categories. Of these, four (66.7 percent) died. Mortality rates in the other five groups ranged from 7 percent to 36 percent. The authors consider the idea that relocation may be a precipitating event for mortality in those persons who were predisposed to it for a number of reasons.

A similar conclusion was reached by Markson and Cumming (32). They studied a group of 494 psychiatric patients over the age of 65 who were forced to move from a New York State institution. They compared their mortality rates to that of two control groups. The first was an inpatient group of 140 patients who did not move; the second was an out patient group of 35. Mortality rates were 9.1 percent, 8.6 percent, 5.7 percent respectively. Because of the lack of striking differences, the authors concluded that the increased mortality rates shown in other studies may have been due to pre-existent patient characteristics, but that relocation, per se, did not put a healthy elderly patient at increased risk of mortality.

The studies cited above have demonstrated conflicting results regarding the mortality of relocation. Some have suggested increased mortality overall, some have showed increased mortality for those predisposed to illness, while others have showed no difference in mortality rates. All the populations reported on, however, have been institutionalized, which in itself may be considered a major stress (24). Institutionalized populations have been discussed, however, because few, if any, studies have dealt with the medical morbidity and mortality of relocation in the non-institutionalized (22). When considering the results of studies dealing with institutionalized patients, two variables must be kept in mind, as Kasl has pointed out (22). One, there may be a self selection process at work. That is, only those people who were already sick or debilitated were admitted and secondly, the hospital environment may itself be detrimental to health. Kasl feels that the first of these variables may be the more significant.

The above review has referred to the health outcomes associated

with two specific life events, bereavement and relocation. Using
a similar conceptual approach, that is that life events affect health,
a number of workers have viewed the subject in a more holistic
manner. They have examined a series of recent changes in the lives
of subjects using a weighted scale and then investigated the health
outcomes for those persons with differing total scores. The best
known of this type of scale is that of Holmes and Rahe (21) who
devised the Social Readjustment Rating Scale (SRRS).

The original work consisted of asking 394 predominantly middle
class (82.0 percent) U.S. subjects, aged below 30 to over 60 (206
below 30, 137 between 30 and 60, 51 over 60) to rate a series of
common and uncommon, positive and negative life events, known
collectively as the Schedule of Recent Experience (SRE), as to
the "relative degree of necessary readjustment...the intensity and
length of time necessary to accommodate a life event" that each
required. Marriage was arbitrarily set at 500. The results were
the SRRS, which ranged from 11 ("Minor violations of the law")
to 100 ("Death of a spouse") after each value was divided by 10.
The values were called "Life Change Units" or LCU's. In subsequent
papers ratings done by people of the U.S. aged 19-30 were correlated
with ratings by Swedes aged 20-25. A U.S. group, aged 25-29 was also
compared to a Japanese group. Correlations between both were over
$r = .9$ (42). Using the original ratings and groups from the sub
cultures of the U.S., specifically Mexican and Black Americans,
correlations of $r = .77$ and $r = .82$ respectively were found (26).

Many of the studies done with the SRRS have used Navy personnel.

In early retrospective studies, 2,000 Navy people were asked to report their life changes and health histories over the previous ten years. Rahe and his colleagues (43) reported that those subjects with fewer than 150 LCU's for any particular year had generally good health the following year. For those with LCU totals between 150 and 300, about 50 percent reported some sickness the next year and for those with totals greater than 300, over 70 percent developed some illness the following year. The question of differential memory in a study going back ten years is a major question when considering interpretation.

Prospective studies were also carried out. Two thousand, five hundred U.S. navy personnel aged 17-30 were asked about life events in the six months prior to their duty aboard ship. Responders were divided into quartiles. Those in the lowest quartile developed a mean of 1.4 illnesses in the next six months aboard ship while those in the highest quartile had 2.1 recorded illnesses in the six months aboard ship, a statistically significant difference.

In a retrospective study in Finland (45) a Finnish version, standardized in Finland, of the SRRS was used to rate the life events of 292 nearly consecutive subjects under 65 in the Helsinki Ischemic Heart Disease Register who survived definite MI's. Complete information was collected from the survivors in 95 percent of the sample. Over the same period 286 subjects under 65 who died suddenly from coronary heart disease (CHD) were identified from the Registry and the SRE was completed by a spouse or close relative for 226 or 79 percent. In both cases those subjects with evidence of prior illness, said to be generally

of cardiovascular origin, were separated from those with no
evidence of prior disease. LCU totals were computed for the
six months immediately prior to the coronary event and were compared
to the totals for the same period one year prior to that. It was
found that in the surviving group with no evidence of prior disease,
29 percent showed a markedly increased pre-infarction LCU totals,
35 percent had moderate increases, and 36 percent had no change.
In the sudden death group with no evidence of prior disease, the
corresponding figures were 38 percent, 33 percent and 29 percent.
Again, it must be emphasized that the matter of differential recall,
on the part of the survivors and especially on the part of relatives
of those who died, to "justify" illness is a matter which considerably
clouds the picture. Reference is made to the retrospective study
which "demonstrated" that mothers of children born with Downes
syndrome had a significantly increased number of traumatic events
in their first trimester of pregnancy. The study was conducted before
the genetic nature of the syndrome was elucidated.

Rahe also addressed the "classical" risk factors for cardiovascular
disease in his Helsinki study. A statistically significant difference
was found between the coronary death heavy smokers (67 percent of
whom had marked LCU total changes) and the coronary death moderate
smokers (21 percent of whom had marked elevations). This suggested
that recent life events may act as precipitating factors for sudden
death in the population studied. Indeed, the idea that a clustering
of life events represents a "crisis" which will have "etiologic
significance as a necessary, but not sufficient cause of illness" (20)
that is, acts as a precipitating event, is central to the author's

thinking on the subject. They have postulated faulty adaptive efforts on the part of the organism which lower "bodily resistance" and thus leave it open to disease onset as a mechanism (20). Subjective assessments of the stresses are not considered.

The above is only a small sampling of the ways in which the SRRS has been used. Unquestionably the scale has been useful and has been shown to have predictive value for future illnesses when used prospectively. At the same time, many questions concerning the SRRS have been raised. Rahe himself reported (44) correlations from .26 to .90 in the test-retest reliability of the instrument. He attributed such variations to the differences in interval times, sample characteristics and the complexity of the questions used. As Sarason et. al. (47) have concluded, the reliability of the SRRS is low. Rabkin and Struening (41) have pointed out that group differences in work using the SRRS are often reported only in terms of percentages or else exclusively as p values and that variations in any particular sample are often not considered. They also argue that, given the large samples used, the differences, while significant, may not be clinically useful. Another issue, raised by Dohrendwend and Dohrendwend (10), is that the SRE contains a series of items which may more properly be classified as symptoms of illness rather than recent life events and that this spuriously inflates the relationship between events and illness. While this last point is a serious flaw if one is thinking in terms of etiology, it is very useful if one wants to identify populations at risk.

In addition to these systematic issues, the SRRS may have limited usefulness in specific populations. For example, in an elderly population

the instrument may be limited in the following ways: (1) The
number of people aged 60 and over who participated in the standardiz-
ation of the scale was small and correlations with this age group
have not been done. (2) The scale was devised using a middle class
sample and showed deviations when compared to U.S. groups who differed
socio-culturally. (3) The use of marriage as a standard event
may not be as meaningful in a population which is farther away
from it than in a population which is closer to it. (4) The bereave-
ment evidence cited on preceeding pages has suggested that bereave-
ment (highest rated of the stresses on the SRRS) may not have the
mortality associated with it in the over 65 age group that it has in
the under 65 age group. (5) The scale lacks items which may be of
particular importance to the aged such as increasing social
isolation and physical infirmity. Similar issues could be raised
for any number of other populations.

Thus, although the SRRS is widely used and has shown predictive
value, great care should be exercised when interpreting the results
of studies employing it, especially retrospective studies and those
considering an elderly population.

Hinkle and his associates are another of the major investigators
of the relationships between life situations and illness. In contrast
to Rahe, however, Hinkle emphasizes the primary role of predisposing
conditions and the secondary role of life events when considering
illness onset (10). Indeed he has said that, on the basis of some of
his studies in progress, "New cases of CHD rarely if ever occur
except among men who have some combination of hyperlipidemia,
abnormalities of carbohydrate metabolism, hypertension, cigarette

smoking, and a family history of the disease" (13).

Illustrative of Hinkle's thinking on the subject of the relation-
ship between life situations and illness was a study conducted among
a group of people who lived in relatively unchanging environments.
The subjects were a group of career telephone operators in New
York City (15, 16, 18), a generally homogeneous group of 336 semi-
skilled women who had worked continuously, for 20 years or more, with
the same firm in the same city at the same general job. The
period under investigation was the period of employment from their
mid 20's to their mid 40's.

Because the operators were covered by a sickness benefit program
they were able to afford the average level of health care in their
community. Accurate records were kept of all illnesses and all
contact with medical personnel. Using these medical records, the
frequencies and kinds of illnesses for each woman were investigated.
When the distribution of illnesses within the group had been established,
the 20 women with the greatest number of days of sickness disability
and the 20 women with the fewest number of days of sickness disability
were selected and each was examined and interviewed at length.

The results showed that there was a great variation in the amount
of illness experienced by individuals. It was found that the
distribution could not be explained by the assumption of random
occurrence of illness among the operators. Rather, it was best
described only if it was assumed that some people had a much greater
likelihood of becoming ill than others. The distribution showed a
number of people with a great amount of sickness at one end and very
little at the other. Those who were "sicker" were found to have more

major and minor illnesses, more organ systems involved and
diseases from a greater number of causes. It was also found
that the illnesses were distributed throughout the 20 year
period, but that they tended to occur in clusters, especially
in the "sicker" members of the group. It was found that the
"healthy" operators were generally satisfied with their lives
and jobs and that the "sicker" ones were not. Retrospective
life histories suggested that in the sicker groups, clusters of
illnesses occurred during periods when the individuals experienced
increased demands and frustrations from their social environment.
These demands were viewed as subjectively stressful. On the other
hand, many of the members of the healthy group had experienced
similar types of demands and frustrations but did not view
them as stressful.

The above study was one in which the subjects involved were not
exposed to a change in their environment. In addition, Hinkle and
his associates have conducted a series of studies among people whose
environments have changed radically (14, 16, 18). The same types of
patterns were observed. From these studies Hinkle has drawn three
major conclusions (13): (1) Exposure to change in the total social
environment may lead to a change in health status if a) the person
has a pre-existing susceptibility to illness and he perceives the
change as important or b) there is a significant change in the
physical environment, including exposure to disease causing agents.
(2) Exposure to change in the total social environment may lead to
no change in health status is a) the person has no pre-existing
susceptibility or does not view the change as important and b) there

is no significant change in the physical environment. (3) If
a change in the total social environment is not associated with a
change in the total physical environment then the affect of the
change in social environment on health cannot be defined in terms
of its "objective" qualities.

Hinkle's work raises the question of what chronic life situations
may affect one's susceptibility to illness, perhaps, as Rabkin
and Struening have suggested (41), by affecting one's perceptions
of the events as threatening. The latter authors suggested that social
isolation or lack of a social support system may be a major factor in
determining increased risk to illness. As defined by Caplan (5)
social support systems "consist of enduring interpersonal ties to a
group of people who can be relied upon to provide emotional sustenance,
assistance and reassurence in times of need, who provide feedback and
who share standards and values". Because social isolation may work
mechanistically by affecting one's perceptions of events, it would
logically be important only in the presence of such stressful events.

Cassel (3) has taken such a position. The converse would also be
true. In the presence of strong support systems, recent life events
would not have the impact on health that they would have in the absence
thereof. Although he has not formulated the problem as such, it would
seem that Hinkle's work would support such a position.

Nuckolls, Cassel and Kaplan (33) have directly addressed this question.
A prospective study of 170 white primagravida women married to enlisted
men was conducted in a military hospital. A self-administered instrument
was used at the time of prenatal registration to measure the subjects'
assessment of their social support system. At 32 weeks of gestation, each

subject completed Holmes and Rahe's SRE. The outcome measured whether the total course of the pregnancy was normal or complicated. The results showed that neither the life change score alone nor the social support score alone predicted complications. When considered together, however, 90 percent of the women with high life change scores but low social support scores developed complications while only 33 percent of women with equally high life change scores but also high social support scores experienced complications. Social support scores were not significant in the absence of high life change scores. It could be argued that a military related population, which moves a great deal, would be particularly sensitive to a lack of social support. Nevertheless, the results show support of the notion that social isolation may play a predisposing role in the prediction of disease outcome.

Holmes (19) in some early work on tuberculosis, also addressed this question. He found considerably higher rates of the disease in groups which formed distinct minorities in their communities and that these groups experienced higher rates of residential and oc-cupational mobility than non-tuberculous groups. That is, tuberculosis was more frequent in persons who lacked human groups with whom they could interact, who were socially marginal (4). It also seemed unlikely that the differential rates could be explained by differential exposure to the tubercle bacillus.

Fowler and McCaller (11) have addressed the issue of correlation between a number of socio-demographic variables, including an index of social contacts outside the home, and morale among a large sample of

the aged in Boston. Using a probability sample of over 6,000 addresses from the Boston Standard Metropolitan Statistical Area, all people 65 and over were located and interviewed. This yielded 1,330 interviews. The index of social contact included three components: (1) having a close personal friend outside the home, (2) attending religious services at least once a month and (3) belonging to at least one formal organization. The index was a simple counting of the criteria each respondent met. The results showed that many of the variables, such as age, immigrant status and education had no effect on morale. Two factors had clear independent significant relationships to self-reported morale. The first was the number of social contacts a subject had. Those with none had worse morale than those with one who in turn had worse morale than those with two or more. The second variable which showed a relationship was median family income where a definite cut off was seen at $4,000 per year. Increases up to that point were associated with significant increases in morale, while above that point no differences were found. In addition it was found that the interviewer's rating of the condition of the subject's housing was significantly related to morale for those whose incomes were below $4,000 per year, but not for those whose incomes were over that figure.

Although no considerations were made for prior morale of the group and the study did not deal directly with health outcome, the results were interesting. If one subscribes to the hypothesis that the relationship of health to life situations is mediated by subjective evaluations, the above results would imply possibly worse health outcome for the conditions

considered.

The Fowler study suggested that another of the chronic life situations, economic deprivation, was associated with low morale among the urban aged. It presented evidence, that only relatively severe financial hardship, i.e. incomes under $4,000 per year seemed to be implicated. Some of the epidemiological studies of cardiovascular disease imply that the same thing may be true when considering the interaction between these conditions. Kjelsberg and Stammler, as reported in Stammler's major review article on the epidemiology of atherosclerotic coronary heart disease (5) showed that white males between the ages of 45 and 54 in Chicago in 1953 with incomes below $2,000 per year had a significantly increased mortality from ASCHD which was not seen in any other income group. Kent, et. al., (23) surveyed the number of deaths from arteriosclerotic heart disease in 83 of the 89 health areas in Manhattan, each with a population of about 25,000, in the years 1949-1951. They found that there was an inverse relationship between the age-adjusted death rates and the median health area income. That is, those areas with high income tended to have low death rates and visa versa. The authors suggest that this type of epidemiological study was useful because it established a frame of reference within which the experience of the individual could be examined.

Lillianfield (29) measured socio-economic status by means of median rentals of census tracts in Baltimore in 1956 and again used mortality from arteriosclerotic heart disease as the outcome. Initially, he found no association. When he added deaths from all other forms of "myocardial degeneration" he was able to demonstrate an inverse

relationship between SES and coronary death rates. Lew (27)
reported on a comparison of the death rates from arteriosclerotic
heart disease between the "industrial" and "ordinary" policy
holders of the Metropolitan Life Insurance Company for white males
in 1953. "Industrial" policy holders were considered to represent
lower SES groups while "ordinary" policy holders were considered
to represent higher SES groups. It was found that for those under
65, SES was inversely related to death rates, while for those over
65 this was not the case.

The above studies all dealt with some measure of financial
deprivation related to mortality data. A similar trend has been
seen when considering the morbidity of heart disease. The 1935-36
National Health Survey of the U.S. Public Health Service conducted
one of the largest scale morbidity studies ever undertaken (52).
Self reports were used to investigate specific causes of disability.
Eight hundred thousand families were contacted in 83 cities and 23
rural areas. In large cities representative sampling techniques were
used while in smaller cities entire populations were enumerated. Three
specific criteria were used to define disability: (1) inability to
perform usual activities on the day of the canvas, (2) illness leading
so such inability for seven or more days in the previous year and (3)
hospitalization for one or more days in the previous year (2). Cardio-
vascular diseases were not specifically addressed; categorization
was for "degenerative diseases" w hich were said to include "cardio-
vascular diseases". When data for the median family income was reviewed
for urban whites, it was seen that in every age group those earning
less than $1,000 per year or on "relief" had a significantly increased

number of days of disability. It should be noted that in 1935-36
65 percent of the population contacted had median family incomes
of below $1,500 per year.

The above study did not specifically address atherosclerotic
cardiovascular disease and thus the generality of the data to that
entity is doubtful. In 1953-55 the Commission on Chronic Illness
condicted a several stage study of morbidity in Baltimore (8).
In the first stage, interviews were conducted in 4,000 households,
involving about 12,000 people, which represented a random sample of
the city. In the second stage, a 3-4 hour clinical interview was made
of a sub group of the original population, with the data being
weighted to represent the entire population. The families were
broken down into four median income groups. The clinical data for
all heart disease showed moderately increased rates for the lowest
income group. The clinical data specifically for coronary artery
disease and angina showed a rate of 45/1000 population for the below
$2,000 per year group while for the other three income groups rates
ranged from 20.3/1000 to 21.7/1000. The data for "hypertensive
heart disease" showed similar increases in morbidity in the low
income groups. Several criticisms of the data for the latter three
specific categories have been raised (2). First, the rates were
not age adjusted. Second, the number of cases was small. Third, no
control for race was made. Since non-whites were primarily in the
below $2,000 per year group, this would have decreased the income
differences for hypertensive heart disease for whites because of higher
hypertensive rates for non-whites. For CAD and angina, however,
the data for whites alone would have shown increased differences.

Data has been presented that low income was associated, in cross-sectional studies, with increased morbidity and mortality from what is now called atherosclerotic coronary heart disease. Numerous objections can be raised when viewing these studies. In several, measures were used to assess financial hardship, such as median rental of census traits, which were not necessarily accurate. That is, the "purity" of the various samples could not be known. Second, for several of the studies self-reporting was used. Thus the term "heart disease" may be a more general term for some people than for others. Indeed, in a study by the Hospital Insurance Plan of New York of its membership in 1952, the following statement was made: "Thus, it may be that "Heart Disease" when reported by persons with little education is a far more general term, encompassing a variety of conditions than when the same term is used by a person of more schooling" (9). If schooling was related to SES in the group studied, this would introduce a systematic bias. Third, strict clinical criteria were often not used because general measures of morbidity such as days of disability or hospitalization were used. At times the outcome measured was morbidity due to total heart disease rather than specific entities. The above speak to the need for a prospective study, using strict clinical assessments in a well defined population to determine to what extent income and similar measures of financial situation are related to the incidence of atherosclerotic disease.

In summary, the present literature review has demonstrated that there are a series of life events and conditions that have been

associated in a number of ways with many types of health outcomes, often with a bad prognosis. A series of suggestions have been made concerning the nature of the relationship of the psycho, social, economic and recent life events to each. Many populations have been investigated with varying degrees of association having been shown.

In addition, the review has shown many deficiencies if one's interests center around the relationship of the life situation to the morbidity of atherosclerotic disease in the elderly. Some of the chronic life conditions such as social isolation have been investigated neither for the elderly nor for atherosclerotic disease. The difficulties in the financial situation studies have been ennumerated above. In addition, very few have dealt with the elderly in an intensive manner, but rather as a small sample in larger studies. For example, subjective evaluations of financial status have not been examined. In the recent life event literature the research has been directed toward the institutionalized in the case of relocation. In the case of bereavement, studies have often been aimed at younger populations and used mortality or total morbidity as outcomes. Indeed Shock (48) noted that "Unfortunately and unintentionally older persons have largely been excluded from psychosomatic investigations even though theprevalence of disease in them is high, the number of bodily systems affected is larger than for younger people and the capacity to adapt to difficult life events is probably reduced." In addition Rabkin and Struening (41) have pointed out that despite the presence of "multi-causal, comprehensive and interactive" conceptual models of illness onset, researchers have continued to look merely at the linear relationship between recent life events and illness without

considering mediating variables such as social support systems.
Cobb (7) has stressed similar issues. Paykel (40) and others have
suggested that the future of research on stress related illnesses
lies in the study of specific events rather than global scales.

In view of these suggestions and criticisms a study is proposed
which will examine three hypotheses:

1. That elderly groups exposed to a series of specific
    psycho-social-economic factors will show an increased
    incidence of atherosclerotic cardiovascular disease.

2. That when the groups are separated into those individuals
    who experienced the acute events and those who have
    been exposed to the chronic conditions, the former will
    show no evidence of increased prior atherosclerotic
    disease while the latter will.

3. That groups who were exposed to the chronic conditions and
    who moved will show an increased incidence of disease
    which will not be explainable on the basis of the simple
    addition of the individual risks involved.

The Relocation Study which was undertaken in Connecticut from
1971-1975 affords a chance to test these hypotheses. Methods will
be presented in Chapter 2 and results in Chapter 3.

CHAPTER 2

METHODS

The data in this project was generated in the Relocation Study, principal investigators Drs. A. Ostfeld and S. Kasl conducted in Connecticut from 1971-1975. The overall methodology will first be briefly discussed and then a more detailed discussion will be made of the methods used in the present component of this study.

THE RELOCATION STUDY

The two principal aims of the Relocation Study were (1) to attempt to define the health and psychosocial correlates and consequences of forced relocation in an elderly population, and (2) to further the current state of knowledge of psychosocial stresses and health consequences to the elderly. The prospective method of epidemiology was used to study a cohort of elderly people as they went through the stages of relocation. A comparison cohort of controls who did not move were studied in a similar manner. Variables which were assessed included physical and social environment, attitudes toward relocation, daily activities, social adjustment, and indices of psychological and physical states.

The Setting:

The basic research strategy of the relocation study was to make use of an ongoing "natural experiment", i.e., forced relocation of an elderly population. Most requests for relocation in the New Haven area were processed by the New Haven Redevelopment Agency including the Family Relocation Office, the Welfare Department, and the New Haven Housing Authority. The original plan was to only use persons relocated in New Haven. By October, 1971, it became evident that this was not

possible for a number of reasons. For example, the New Haven re-
location rate had been reduced by two-thirds. Several sources were
investigated and eventually the housing authorities of Hartford and
West Haven were contacted and agreed to participate in the study.
Both cities were building large housing units for the elderly.

The Sample:Cases:

The same method for case/control selection was used in all
three cities. The housing authorities of the three cities maintain
lists of persons awaiting relocation. When the housing projects were
completed, the lists were obtained. All people 62 or older were
approached for inclusion in the study. Reasons for moving included:
Redevelopment (26.2 percent), Eviction (9.3 percent), on Old Age
Assistance (24.4 percent), financial hardship (32.9 percent), both
on Old Age Assistance and Redevelopment (1.3 percent). Excluded from
the study were all people forced to move because of ill health. This
was done in order not to bias the results which included viewing a
change in health status as one of the outcomes. Also excluded were the
elderly who were forced to move but who did so outside official channels
because of the difficulties in identifying them. Discussion with the
housing authorities, and a search of demolition records indicated that
this group was approximately 30 percent of the elderly involuntarily
relocated.

Possible subjects were contacted by trained interviewers. Two
hundred, fifty-nine people were approached and 208 (80.31 percent)
completed or partially completed the first interview. Those who refused
to participate were contacted at each follow up interview and twelve

agreed to become subjects. In addition, five controls moved early
in the study and were made subjects. This totaled to 225 cases.

Controls:

Controls were matched for age, sex, race and area of residence.
A detailed, reproducible method was used for obtaining controls for
each subject. The procedure is included in the appendix. Two
hunred eighty controls were approached and 178 (63.6 percent) agreed
to participate. However, then five later moved and were included as
cases. This left 173 controls. Thirty-five of the controls who
refused were then randomly selected, contacted, and asked to complete a
brief questionnaire which included age, sex, marital status, occupation,
subjective evaluation of health, length of residence at current address,
owner or renter status, education and source of income. Ninety percent
of this group completed this form. Analysis showed that those controls
who refused and those who participated did not differ significantly
with respect to these variables.

The Interview: Timing and Completion Data

The cases were interviewed just prior to or just after relocation,
at two to three months, at one year and at two years following relocation.
Controls were done at corresponding times. If a subject refused to be
interviewed initially for one of the follow-ups, he was contacted three
more times. Then, and only then was he considered a definite refusal.
He remained, however, an active participant in the study and was
contacted at the next follow-up period. One hundred eighty-three of
the 398 subjects (46.0 percent) completed all four interviews (110 cases,
73 controls).

Those in the total sample and those who completed all four interviews differed in none of the socio-demographic parameters measured.

Interview Structure:

All interviews were conducted in the home of the subject. The interview itself was totally structured and varied in the length from one to three hours with an average of one and a half hours. The questionnaire obtained information on many physical, psychological, social and medical variables in the subject's life. Included was a detailed medical history for a number of chronic medical conditions and a brief physical exam which looked for residual effects of cerebrovascular disease. The interviewers then made assessments, according to set criteria, of the presence or absence of the conditions involved. Nearly identical information was obtained at each interview for the time elapsing since the prior interview, while the initial interview covered the time prior to the start of the study. In addition two blood pressure measurements were taken and a blood sample for twelve biochemical tests was obtained at the end of each interview.

Interviewer Training:

Each interviewer underwent a brief training period which included observing elderly people in group settings, taking of blood pressures, drawing bloods and administration of the questionnaire to non-subjects.

Because medical judgments were involved, an attempt was made to compare the interviewer's judgment with that of a physician. Elderly people who were not a part of the study were given the medical section of the questionnaire, once by an interviewer and once by a physician, in random order. Each interviewer saw at least two people also seen by

the physician. The people so interviewed were patients in the
Continuing Care Unit of the Yale-New Haven Hospital and were picked
by a physician not on the staff of the Relocation Study. No more
than several days were allowed to elapse between the two interviews
and the forms were returned to a third party who evaluated the
percent agreement.

Fourteen health conditions were assessed as to their presence
or absence according to the data obtained from the questionnaire.
There were twenty-six assessments of interviewer-physician agreement
made over the course of the study. In eleven of these there was
100 percent agreement, in ten there was disagreement on one condition
and in five, disagreement on two conditions.

Medical Record Data:

Summaries were made of any hospitalizations which a subject
indicated that he or she had undergone once the study was underway,
and death certificates were obtained for all those subjects who had
died during the course of the study.

RISK FACTOR STUDY

The present component of the Relocation Study involved an
attempt to define two sets of psycho-social-economic factors which
may affect the incidence of the acute manifestations of atherosclerotic
disease processes in the elderly. The two sets of factors under investiga-
tion were those that represented chronic conditions and those that
represented acute events. Chronic factors were viewed as long standing
conditions such as social isolation and financial hardship which may
affect one's susceptibility to illness. Acute events were viewed as

those occurrences in the subject's life which could be pinpointed
in time and which may influence the timing of illness onset.
Incidence of the acute manifestation of atherosclerotic disease
processes referred to the new occurrences of events, such as a
myocardial infarction which represented the manifestation of a long
term, on-going, atherosclerotic process.

Definition of Independent Variables:

The independent variables, i.e., the total collection of life
conditions under consideration, were culled from the questions asked
at the initial interview. (See results section for the specific
independent variables used). The selection of the specific variables
was based on three factors: (1) Data was available only for those
variables included in the questionnaire. That is, the choices were
limited to what had been asked. (2) Several of the conditions/
events included were those which had been used in many of the previous
life events schedules in the literature (21, 35, 39).
(3) A common sense approach was used which especially took into
account the elderly, lower economic class, nature of the population
being studied. In some instances several of the original variables
were combined to create derived variables which would more specifically
define populations at risk. The independent variables selected
included those which were originally both categorized and continuous.
Each variable was then dichotomized into postulated high or low risk
situations.

Definition of Dependent Variables:

The outcomes or dependent variables in the study were a series of four medical diagnostic evaluations of atherosclerotic conditions made by the interviewers at the end of each session. These included the following conditions: Angina Pectoris, Myocardial Infarction, Stroke and Peripheral Atherosclerosis. A measure of total Atherosclerotic Disease which ascertained whether any of the conditions had occurred was also used as an outcome. Specific criteria were used for the diagnostic judgments (see appendix). Each condition was assessed in one of three mutually exclusive groups. An evaluation was made that a condition was (1) present or absent, (2) probable, possible or absent, or (3) possible or absent. Every condition was assigned to only one of these groups and never to the other two.

Included in the analyses were only those subjects who had no evidence of the specific conditions under consideration at the start of the study (initial interview). For the Atherosclerotic Disease category, subjects were included only if they had no prior evidence of any of the four specific conditions. A subject was considered to have developed a condition if, at any time during the course of the study, he had a possible, probable or present assessment made. To be considered as having developed Atherosclerotic Disease, a positive assessment was needed on only one of the four conditions. Only those subjects who had completed all four questionnaires were included in the study.

Contingency tables were constructed which examined the possible interaction between the dependent and independent variables.

<u>Atherosclerotic Prior Health Scale</u>:

The Atherosclerotic Prior Health Scale (ATHPHS) was developed
to examine the health status of the subjects in the study prior to
its beginning. The utility in doing this was seen as twofold:
(1) It would help to delineate whether or not those subjects ex-
periencing the events/conditions under investigation had increased
prior general atherosclerotic disease and would thus allow for control
of this variable. (2) It would offer an avenue of approach to the
question of overall health status of the subjects in the acute
and chronic condition groups.

The ATHPHS was developed using the same four diagnoses which had
been referred to previously. The scale was designed to take two
factors into consideration: (1) the severity of the condition, and
(2) whether a present, probable or possible evaluation had been made.
Only conditions assessed at the first interview were included. The
conditions were first divided in two groups based only on severity:
more severe, rated arbitrarily at 5: MI, Stroke. Less severe, rated
at 3: Angina, Peripheral Atherosclerosis. An attempt was then made
to differentiate between "present", "probable", and "possible" evalua-
tions. Conditions with "present" and "probable" evaluations were kept
at the original value, while conditions with "possible" evaluation were
downrated by one point.

The ATHPHS became the following:

Stroke--probable   5   MI--possible   4
                              Stroke--possible

Angina--probable
Peripheral Atherosclerosis--present   3

Each subject received a composite score using the above
values and the data from the initial interview. Contingency
tables were constructed which ascertained the number of subjects
in each category of the independent variables which fell above
the median value of the ATHPHS and the number which fell below.

Further Analyses:

The sub group for each independent variable ·which had no
prior evidence of atherosclerotic disease, as determined by the
ATHPHS, was then further investigated. It was attempted to determine
whether these relatively healthy subjects had any increased incidence
of disease over the course of the study. Using this group, con-
tingency tables were constructed which examined the number of
people in each of the independent variables who developed illness.
An attempt was also made to ascertain if those subjects who had
experienced any of the chronic conditions which were postulated as
risk factors and who had also been relocated were at higher risk
of developing illness than either of those two situations would
have predicted alone. Relocation was picked to demonstrate possible
interaction because it was the event for which the study had originally
been designed and was the best controlled of the acute events investigated.

The entire sample was first divided into Relocatees and Non-
Relocatees. The prior analyses which included examining the health
outcomes and prior health status of the subjects in the postulated
risk categories were repeated. This generated 3-way contingency tables.

Since it had been determined that Relocatees and Non-Relocatees
had significantly different monthly incomes and it was felt that income

may affect the experience of the relocation process, it was decided to divide the sample into a group whose income fell above the median and one whose income fell below. The health outcomes of each subject in the high and low income group was again determined after the sample had been divided into Relocatees and Non-Relocatees.

Statistical Tests:

Three types of statistical tests were used in the Risk Factor Study. For all 2x2 matrices, excluding the median test used with the ATHPHS, Fishers Exact Test was used. For analyses which involved the ATHPHS, chi-square with the Yates Correction was used. Finally, a test which yielded a t statistic was used to measure the interaction between 2x2 probability tables. (49, p. 495).

For all tests a p value < .05 was taken as evidence of a significant association while a value .10 > p > .05 was taken as indicating borderline significance.

CHAPTER 3

RESULTS

The results of the Risk Factor Study will be presented in two sections. Section I examined the entire sample. In Section II, the sample was broken down into Relocatees and Non-Relocatees before any other manipulations were undertaken.

In the initial section, socio-demographic data was ascertained at the start. Next, three main statistical analyses were undertaken. The first involved a comparison of the health status of those subjects who were postulated at high risk to those postulated at low risk for each independent variable. The second examined the nature of the prior atherosclerotic health status of the subjects in each risk category. The third compared the health outcomes for the subjects in each risk variable with no prior evidence of atherosclerotic disease.

In the second section, socio-demographic data for the Relocatees and Non-Relocatees was first compared. Again three main analyses were undertaken. The first investigated the health outcome for those subjects exposed to the chronic conditions or situations with no prior evidence of disease. The second examined the prior health status of the subjects exposed to each chronic variable. The last investigated whether a subject had an increased risk of developing an illness if he was exposed to both a chronic condition and was relocated.

The sections were used to examine the hypotheses of the study in the following manner: The first hypothesis, which postulated an increased rate of illness for those subjects exposed to specific

risk factors was investigated using the data from Sections I
and II which concerned itself with the health outcomes of the
subjects in each risk variable. The second hypothesis, which
postulated a difference in the distribution of illness for the
subjects exposed to the acute events and the subjects who ex-
perienced the chronic conditions was investigated using the data
from Sections I and II which was concerned with the prior health
status of the individuals in the study.

The third hypothesis, which postulated an increased risk of
disease for any subject who was both relocated and exposed to a
detrimental chronic condition used the data from Section II
which approach the question of interaction.

A probability level of $p < .05$ was considered significant,
while a level of $.10 > p > .05$ was considered borderline or
suggestive of an association. Due to the large amount of data
generated, only the data that fell into the above two categories
was presented. For other associations the initials n.s. were
used to indicate that the association was neither significant
nor borderline.

SECTION I: THE ENTIRE SAMPLE·

Part A: Socio-Demographic Background

Socio-demographic data was presented for the sample involved
in the analyses, i.e., subjects who completed all four interviews
and compared to the original total cohort. There were no significant

differences for any of the parameters investigated between the
two groups (Table I).

In general, the characteristics of the population studied
showed a group composed of elderly white females who were living
on low levels of income. About 65 percent of the group was female
while almost three-fourths were white. The mean age of those in
the study was 71.88 years with a S.D. = 6.30 years. The mean
monthly income per person was $192.00 with a S.D. = $105.65.
Approximately one fourth of the group was married while another
60 percent was either divorced, widowed or separated. Most
subjects were born in the United States with 30 percent coming from
Connecticut. Of those born in the United States, the majority
of their parents were also born in the United States. Greater
than 30 percent of those studied had children and nearly 95 percent
of the sample was Protestant or Catholic. More than 60 percent
had six or less years of education. Over 90 percent had worked at
least five years during their lifetime. Lastly, the majority of
the people in the study rented their dwellings while a small number
owned their own homes.

Part B: A Comparison of the Medical
                Diagnostic Evaluations for Subjects
                In Each Postulated Risk Category

The atherosclerotic diagnostic evaluations, or outcomes, used
in this section were enumerated on page 34 of the Methods section.
Their total incidence over the course of the study were presented
in Table II. Of particular note was the large incidence of disease

TABLE I

SOCIO-DEMOGRAPHIC CHARACTERISTICS FOR ENTIRE STUDY AND FOR THOSE WHO COMPLETED ALL FOUR INTERVIEWS

ENTIRE SAMPLE	ENTIRE SAMPLE		COMPLETED ALL FOUR INTERVIEWS		SIGNIFICANCE
Sex					
Male	130	32.7%	62	33.9%	$x_c^2 = .004$ ns
Female	268	67.3%	121	66.1%	
Race					
White	297	74.6%	132	72.1%	$x_c^2 = .284$ ns
Non-White	101	25.4%	51	27.9%	
Age					
N	398		183		
Range	60-96		60-92		
Mean	72.07		71.88		t = .841 ns
Median	72.00		72.00		
S.D.	6.61		6.30		
Marital Status					
Married	105	26.4%	47	25.7%	$x^2 = 0.666$
Widowed	194	48.7%	85	46.5%	df = 3 ns
Divorced or Separated	58	14.6%	31	16.9%	
Never Married	41	10.3%	20	10.9%	
Place of Birth					
Connecticut	114	29.2%	53	31.7%	$x^2 = 1.25$
USA	191	48.8%	73	43.7%	df = 2 ns
Foreign	86	22.0%	41	24.6%	
Father's Birthplace					
USA	155	57.4%	72	59.5%	$x_c^2 = 0.07$ ns
Foreign	115	42.6%	49	40.5%	
Mother's Birthplace					
USA	158	58.1%	75	60.0%	$x_c^2 = 0.062$ ns
Foreign	114	41.9%	50	40.0%	

ENTIRE SAMPLE	ENTIRE SAMPLE		COMPLETED ALL FOUR INTERVIEWS		SIGNIFICANCE
Have Any Children?					
Not Married	39	10.2%	21	11.5%	$x^2 = 0.689$
Yes	269	70.2%	131	71.6%	df = 2 ns
No	75	19.6%	31	16.9%	
Religion					
Protestant	152	39.8%	74	42.3%	$x^2 = 0.287$
Catholic	199	52.1%	89	50.9%	df = 2 ns
Other	31	8.1%	12	6.8%	
Education					
None	5	1.3%	2	1.1%	$x^2 = 0.289$
6 Years or Less	235	60.8%	107	59.4%	df = 3 ns
7-12 Years	117	30.3%	58	32.2%	
More Than 12 Years	30	7.7%	13	7.2%	
Monthly Income Per Person					
N	350		169		
Range	61-over 998		75-998		
Mean	196.94		192.20		t = 0.47 ns
Median	176.00		172.00		
S.D.	107.52		105.65		
Worked at Least 5 Years?					
Yes	348	93.5%	166	92.2%	$x_c^2 = 0.08$ ns
No	25	6.7%	14	7.8%	
Do You Own or Rent Your Home?					
Own	53	14.4%	15	10.7%	$x_c^2 = 1.36$
Rent	316	85.6%	134	89.9%	

TABLE II

INCIDENCE OF ATHEROSCLEROTIC CONDITIONS
OCCURRING DURING COURSE OF STUDY COMBINING
PROBABLE, POSSIBLE AND PRESENT EVALUATIONS

Angina	12.1%
Myocardial Infarction	6.3%
Stroke	12.0%
Peripheral Atherosclerosis	13.7%
Atherosclerotic Disease	32.2%

over the relatively short two-year period. Over 30 percent of
the sample developed some form of Atherosclerotic Disease, while
nearly 15 percent and 12 percent developed evidence of Peripheral
Atherosclerosis and Stroke respectively. Greater than 12 percent
of the sample developed Angina and about 6 percent had MI's. This
was data for those people with no prior evidence of the specific
condition in question, or any atherosclerotic condition in the
case of Atherosclerotic Disease.

Subjects in each of the postulated risk variables were analysed
with respect to the incidence of these same set of five outcomes,
(Table III). In Table III the question or questions asked of the
subject were copied exactly as printed in the questionnaires, and
thus, as they were asked. When more than one question was combined
or when data from one question depended on data from a previous
question or questions, these were also shown. The manner in which
the question was broken down was then presented with the number of
subjects who fell into each category. The first category presented
was always the postulated high risk category while the next category
was the postulated low risk one. Data pertaining to those variables
which could be pinpointed to a specific period in time was presented
first and labeled "acute". Subsequently, data was presented for
those variables better considered long term conditions which were
labeled "chronic".

Relocation was the original stress under consideration. Those
who moved were considered at high risk (60.1 percent) and those who

did not were considered at low risk. The Relocatees tended to have increased incidence of two atherosclerotic conditions, Angina and Stroke, both of which nearly reached significance. As will be shown later, however, (Table XII) it was found that Relocatees had a significantly higher prevalence of stroke prior to the start of the study. This area was further investigated and will be discussed later in this chapter.

In order to further investigate the effects of relocation, it was decided to examine the subjects who moved within a year prior to the start of the study to look for similar trends and possible longer term consequences. Unfortunately, only a small part of the total subject population fell into this category (4.9 percent). No significant or borderline associations were found.

Conjugal bereavement, separation and divorce have traditionally been considered very stressful events. Due to the small numbers of subjects in each of these categories, however, the three had to be combined. The total cohort was dichotomized into those who were recently widowed, divorced or separated and those who were still married. The high risk group comprised 9.6 percent of the total. It was found that those at high risk developed significantly more Angina and more total Atherosclerotic Disease.

Another situation which in the past has been investigated as possibly stressful was retirement. The group was dichotomized into those subjects who had retired within two years (42.9 percent) prior to the start of the study and those who were still working. The number

of people in each category, however, was small, 12 and 16
respectively. This was most probably due to the elderly nature
of the population. No significant or borderline associations
were found.

Two variables dealt with the immediate financial situation
of the subjects. The first considered the subjects needing to cut
back on expenses in the three months prior to the start of the
study. Those who did were considered at high risk (28.2 percent)
while those who did not were considered at low risk. No significant
or borderline associations were found.

The second of the immediate financial variables dealt with a
subject's need to sell any of his possessions to raise cash. Only a
small number (4.8 percent) had done this. It was found that they
developed significantly more Angina over the course of the study
than those who did not.

Two variables dealt with increasing physical infirmity, a
problem of special importance to the elderly. The first ascertained
whether the subject had had any trouble with his eyesight recently
and the second considered trouble with his hearing. Both affirmative
answers were postulated to put the subject at high risk (37.4 percent
and 27.1 percent respectively). Subjects in both of these situations
were found to have no significant or borderline associations in the
increased incidence of disease.

It was considered impossible to determine, with four variables,
whether they represented acute events or chronic situations
due to the manner in which the questions were asked. For example, it
was asked whether the subject had trouble with his eyes recently, not

<u>only</u> recently, Thus, those with long term problems could not
be distinguished from those with only recent problems. Accordingly,
the variables were labeled "indeterminate".

In summary, for subjects who experienced the acute events under
investigation, associations with increased disease were shown for
the Relocatees, for whom the best set of controls were incorporated
into the study, and for the recently bereaved, divorced, or separated
who, it has been postulated (21), had undergone the most stress.
Subjects in the medically related indeterminate variables, i.e.,
those experiencing hearing and eyesight troubles, showed no increased
illness. The subjects who were in the presumably worse financial
situation of having to sell their possessions, showed a significant
increase in incidence of disease, while those who had to cut back
on their expenses did not.

Next, subjects were investigated who were exposed to a series
of long term, chronic conditions. They were broken down into four
groups: Those who lacked social interaction, were in bad financial
situations, had experienced specific situations in their personal
backgrounds and who lived in bad home conditions.

In the first of these categories, subjects who lacked social
interaction, six specific questions were considered. The first of
these pertained to the existance of a confidante, that is, someone
in whom the subject had complete trust. Those who had no confidante
or no contact were considered at high risk (14.7 percent). No
significant or borderline associations with outcome were found.

Because of the small number of persons (21) in the above category

TABLE III

A COMPARISON OF THE MEDICAL DIAGNOSTIC EVALUATIONS FOR SUBJECTS IN EACH POSTULATED RISK CATEGORY

ACUTE EVENTS

Was the subject relocated during the course of the study?

Relocated = Reloc	110	60.1%
Non Relocated = N Reloc	73	39.9%

Fisher Exact Test was used.

Angina

	Relocation	
	Reloc	N Reloc
YES	15.9	6.3
NO	84.1	93.8
	88	64

Exact Test = 0.056

Stroke

	Relocation	
	Reloc	N Reloc
YES	16.9	7.2
NO	83.1	92.8
	83	69

Exact Test = 0.060

Myocardial Infarction	n.s.
Peripheral Atherosclerosis	n.s.
Atherosclerotic Disease	n.s.

****

How long have you yourself, lived here (pre-relocation address) at this address--in this home?

Less than one year = LT 1yr	9	4.9%
More than one year = GT 1yr	174	95.1%

Fisher Exact Test was used.

No significant or borderline associations.

****

Are you now married, widowed, divorced, separated or have you never been married?
(If "widowed", "divorced", or "separated":) When did this take place?

The question relates to the amount of time widowed, divorced or separated.

1-2 yrs DWS = LT 2yrs	5	9.6%
Still married = MARR	47	90.4%

Fisher Exact Test was used to make the statistical evaluations of significance.

Angina

	LT 2yrs	MARR
	50.0	5.0
	50.0	95.0
	4	40

Exact Test = .036

Atherosclerotic Disease

	LT 2yrs	MARR
	100.0	31.4
	0	68.6
	4	51

Exact Test = .015

Myocardial Infarction	n.s.
Stroke	n.s.
Peripheral Atherosclerosis	n.s.

****

TABLE III CONTINUED

INDETERMINATE CONDITIONS

Let's talk about the job you had most of your life.
Are you still working there?
When did you stop working there?
Why did you stop working there?

Forced to retire because of age?
Decided.................age?
Forced..................
Decided.................health?
Forced..................health?
Forced..................other?
Decided.................other?

Have you had any other job since you stopped working at the job you
had most of your life?
Are you still working there?
When did you stop working there?
Why did you stop working there?   (same categories as above)

Are you currently employed?

This category was broken down into those people who had retired within
two years of the start of the study, as ascertained by the above
questions, and who had not done so for health reasons, and those
who were still working.

Less than 2 years = LM 2yrs   12   42.9%
Still Working   = WRKG   16   57.1%

Fisher Exact Test was used.

No significant or borderline associations.
****

Have you (and your husband/wife) had to cut expenses in any way
during the last three months?

If yes; what did you cut back on? Food? Clothing? Entertainment?
Household supplies? Transportation? Medicine? Everything?

This category was broken down into those people who had to cut back
on food, clothing, medicine, and everything and those who did not.

YES   46   28.2%
NO   117   71.8%

Fisher Exact Test was used.

No significant or borderline associations.
****

In the past three months, have you had to sell any of your possessions
in order to get more cash?

YES   8   4.8%
NO   159   95.2%

Fisher Exact Test was used.

		Sell Poss	
		YES	NO
		---	---
Angina	YES	42.9	7.4
		57.1	89.9
		7	138

Exact Test = 0.036

Myocardial Infarction   n.s.
Stroke   n.s.
Peripheral Atherosclerosis n.s.
Atherosclerotic Disease   n.s.

****

TABLE III   CONTINUED

Have you any trouble with your eyesight recently?

YES   64   37.4%
NO   107   62.6%

Fisher Exact Test was used.

No significant or borderline associations.
****

Have you any trouble with your hearing recently?

YES   46   27.1%
NO   124   72.9%

Fisher Exact Test was used.

No significant or borderline associations.
****

CHRONIC CONDITIONS

Is there one person that you feel particularly close to--that is, somebody that you can be completely yourself with and in whom you have complete trust and confidence?

How often do you see him/her?
How often do you talk on the telephone or write to him/her?

This category was broken down into those people who have no confidante or one with whom they have no contact and those who do have a confidante.

NONE   21   14.7%
Has Confidante   122   85.3%

Fisher Exact Test was used.

No significant or borderline associations.
****

About how many people do you consider close friends?
About how often do these friends come to visit you here?
About how often do you go to visit with these friends in their homes?

This category was broken down into those people who have no contact with their friends and those who do.

NONE   11   7.5%
SOME   136   92.5%

Fisher Exact Test was used.

No significant or borderline associations.
****

About how many people do you consider close friends?
How many of these close friends live right in the neighborhood?

NONE or ONE = LE1   40   23.0%
More than 1 = GT1   134   77.0%

Fisher Exact Test was used.

No significant or borderline associations.
****

Of all your neighbors, about how many do you know well enough to call on?

NONE Or ONE = LE1   71   43.3%
More than 1 = GT1   93   56.7%

Fisher Exact Test was used.

No significant or borderline associations.
****

TABLE III   CONTINUED

About how many people do you consider close friends?

None or one = LE1   40   23.0%
More than one = GT1   134   77.0%

Fisher Exact Test was used.

Angina

	LE1	GT1	
YES	20.0	8.6	ET=.079
NO	80.0	91.4	
	30	116	

MI

	LE1	GT1	
YES	12.5	4.1	ET=.089
NO	87.5	95.9	
	32	123	

Stroke

	LE1	GT1	
YES	25.0	8.8	ET=.021
NO	75.0	91.2	

Peripheral Atherosclerosis   n.s.
Atherosclerotic Disease   n.s.

****

About how often do your neighbors come to visit you here?
About how often do you go to visit them in their homes?

This category was broken down into those people who had no contact with their neighbors and those who had some.

NONE   28   19.3%
SOME   117   80.7%

Fisher Exact Test was used.

Neighbor Contact

		NONE	SOME	
Angina	YES	26.9	5.8	ET = 0.005
	NO	73.1	94.2	
		26	103	

Mycardial Infarction   n.s.
Stroke   n.s.
Peripheral Atherosclerosis   n.s.
Atherosclerotic Disease   n.s.

****

Do you receive any assistance, allowances, or gifts from members or your family?

NO   141   84.9%
YES   25   15.1%

Fisher Exact Test was used.

Family Income

		NO	YES	
Angina	YES	13.3	0.0	ET = 0.051
	NO	86.7	100.0	
		120	23	

Myocardial Infarction   n.s.
Stroke   n.s.
Peripheral Atherosclerosis   n.s.
Atherosclerotic Disease   n.s.

****

TABLE III CONTINUED

Monthly Income Per Person

Less than median   = LT MED   82   48.5%
Greater than or equal to median = GE MED   87   51.5%

Fisher Exact Test was used.

Individual Monthly Income

		LT MED	GE MED	
Peripheral Atherosclerosis	YES	7.0	18.1	ET = .055
	NO	93.0	81.9	
		57	72	

Angina   n.s.
Myocardial Infarction   n.s.
Stroke   n.s.
Atherosclerotic Disease   n.s.

****

Do you have any savings or stocks and bonds set aside?

	Savings	
	NO	YES
NO	100	58.8%
YES	70	41.2%

Fisher Exact Test was used.

	Savings		
	NO	YES	
Stroke	YES	18.1	4.8
	NO	81.9	95.2
		63	63

ET = 0.013

Savings

	NO	YES	
Atherosclerotic Disease	40.8	21.1	ET = .042
	59.2	78.9	
	49	38	

Angina   n.s.
Myocardial Infarction   n.s.
Peripheral Atherosclerosis   n.s.

****

At the end of the month, are you able to save money? able to break even? using up savings? going into debt?

This category was broken down into those people who were going into debt or using savings and those who were able to save money or break even.

Debt or using savings = DEBT   33   19.9%
                      = MANAGE   133   80.1%

Fisher Exact Test was used.

    No significant or borderline associations.

****

Do you own or rent your home?

Rent   134   89.9%
Own   15   10.1%

Fisher Exact Test was used.

    No significant or borderline associations.

****

TABLE III   CONTINUED

How difficult is it for you (and your spouse) to live on your present total family income? Would you say it is not a problem? it is somewhat of a problem? it is very difficult? it is just about impossible?

This category was broken down into those people who found it about impossible or very difficult and those who said it was not a problem or only somewhat of a problem.

Difficult = DIFF	47	28.8%
Manage = MANAGE	116	71.2%

Fisher Exact Test was used.

How Difficult on Income

		DIFF	MANAGE	
	YES	14.6	1.0	ET = .003
MI				
	NO	85.4	99.0	
		41	105	

Angina	n.s.
Stroke	n.s.
Peripheral Atherosclerosis	n.s.
Atherosclerotic Disease	n.s.

****

Were both of your parents alive and present while you were growing up, that is until you were 16 years old?

Fisher Exact Test was used.

Parents Alive Until 16

		NO	YES	
	YES	10.3	1.0	ET = 0.011
MI				
	NO	89.7	99.0	
		58	98	

Parents Alive Until 16

		NO	YES	
	YES	44.8	26.7	ET = .072
Atherosclerotic Disease	NO	55.2	73.3	
		29	60	

Angina	n.s.
Stroke	n.s.
Peripheral Atherosclerosis	n.s.

****

Would you say that you spent most of your childhood in a city or suburb, small town or rural area?

This category was dichotomized into those people who had spent their childhoods in rural areas and those who had not.

Rural Childhood = YES		42	23.1%
= NO		140	76.9%

Fisher Exact Test was used.

No significant or borderline associations.

****

Is the house/apartment/room in which you are living adequately heated during the winter?
Is your house/apartment/room infested by mice, rats, insects, or other vermin?
Are all the windows intact?
Are the walls and ceilings in sound condition?
Are the floors in sound condition?
Is the plumbing in working order?

This category was broken down into two parts: Those who answered any question negatively, were said to have Bad Home Conditions. Those who answered non-negatively were said to have Good Home Conditions.

BAD	88	51.8%
GOOD	82	48.2%

TABLE III CONTINUED

Fisher Exact Test was used.

Home Conditions

Peripheral Atherosclerosis		BAD	GOOD	
	YES	22.0	6.5	
	NO	78.0	93.5	ET .027
		71	66	

Angina   n.s.
Myocardial Infarction   n.s.
Stroke   n.s.
Atherosclerotic Disease   n.s.

****

and its very specialized nature, i.e., "someone in whom you have complete trust", it was felt that another situation which examined the same general type of data would be helpful. The number of close friends a subject had was chosen and was broken down into the number of subjects with none or one (23.0 percent) and those with more than one close friend. A significant association was found between those at postulated high risk and the incidence of stroke in the study period. In addition, this same group was shown to develop borderline more Angina and borderline more MI's.

While the above situation dealt with the number of close friends, it said nothing about the subject's contact with them. Friend Contact dealt with this aspect. It was broken down into those subjects who never saw their friends (7.5 percent) and those who did. No significant or borderline associations were demonstrated.

The next set of circumstances dealt with the subject's social interaction in his particular neighborhood. The first examined the number of close friends who lived in the neighborhood w hile the second looked at the number of neighbors the subject felt he knew well enough to call on. Both were dichotomized into a high risk group, persons with none or one friend or neighbor (23.0 percent and 43.3 percent respectively) and a low risk group, those with more than one friend or neighbor. No significant or borderline associations were found for either. The third of the neighborhood social interaction situations examined a similar situation to the second. Instead of investigating the number of neighbors the subject knew well enough to call on, in this situation, actual neighbor contact was investigated.

Those who never visited their neighbors or who never had their
neighbors visit them (19.3 percent) were postulated at high risk
and compared to those who had some contact. The isolated subjects
developed very significantly (p < .005) more Angina.

In general, subjects who lacked social interactions showed
no significant increased associations with illness except for those
with no close friends and no contact with their neighbors, which
both showed strong associations. When viewing the Friend/Neighbor
dichotomy, it was interesting to note that it was presence or absence
of close friends which appeared to be related to disease while it
was contact with neighbors that was so associated.

The next group of variables dealt with various aspects of the
financial situation of the subjects. One variable, however, could
be considered to fall into both the social interaction and financial
categories: Whether or not the subject received any type of
financial support from his family. Those who did not receive support
(84.6 percent) were postulated at high risk in both categories.
They showed less interaction with their family unit and had one less
source of income. It was found that these people developed significantly
more Angina over the course of the study.

Individual Monthly Income was the first of the strictly financial
variables to be considered. The median monthly income for the total
sample was $172.00 per person. This is approximately $2,064 per
person per year, a very low sum. The subjects were divided into those
whose income fell below the median (48.5 percent) and those whose
income was greater than or equal to the median. This dichotomization

was obviously not between the poor and the rich but rather between the more poor and the less poor. It was found that those whose income fell below the median (postulated high risk) developed significantly less Peripheral Atherosclerosis. No explanation will be made for this apparent contradiction at the present time, but the problem will be again discussed when prior health status is controlled for.

Another measure of financial situation was deemed to be the absence or presence of some form of savings. Those who had no savings (58.8 percent) were felt to be at high risk. It was found that this group developed significantly more Strokes and total Atherosclerotic Disease.

The next variable dealt with the monthly financial status of the subject. It was dichotomized into those who were either going into debt or using their savings at the end of each month (19.9 percent) and those who were breaking even or saving money. It was interesting to note that the majority of people, even with a median individual yearly income of about $2,000, felt that they were able to manage. This variable was included in the chronic condition group because it was felt that it represented a life situation despite the fact that it asked specifically about monthly status. No significant or borderline associations were found.

Owner or renter status was considered another variable with which financial situation could be assessed. Renters (89.9 percent) were considered less well off and thus at postulated risk, while owners were considered at postulated low risk. No significant or borderline associations were found.

The last financial variable used was a subjective assessment on the part of those included in the study of how difficult it was to live on their income. Again, as with the Monthly Financial Status variable, and for the same reasons, this was considered a chronic situation. People who said it was impossible or very difficult (28.8 percent) were differentiated from those who felt it was only somewhat of a problem or no problem. It was found that the former group developed very significantly more MI's (p = .003) than the latter group.

It can be seen that subjects who experienced financial difficulties, as assessed in several different ways, developed significantly more illness. Of these individuals, those who lacked savings and who felt they experienced difficulty living on their income were the most strongly affected.

The next two variables dealt with the personal background of the subject. The first examined those who had one or both parents die before the age of 16 (36.8 percent) as compared with those who had had both parents alive until that age. The former were considered at high risk and were found to develop significantly more MI's and borderline more total Atherosclerotic Disease.

The second personal background variable dichotomized the sample into those who spent their childhood in a rural setting (23.1 percent) and those who did not. It was felt that the change to an urban environment, where the study was conducted, would represent a major change in lifestyle and thus the rural group was postulated at high risk. No significant or borderline associations were found.

The final variable examined was viewed as a measure of the physical surroundings of the subjects. A series of six questions were asked which related to the condition of the apartment/house in which they lived. A subject was considered to have bad home conditions if any question was answered in the negative direction (51.8 percent) and good home conditions if none were answered negatively. The former were felt to be a high risk and developed significantly more Peripheral Atherosclerosis.

In conclusion, in this first analysis the incidence of illness of the subjects experiencing a series of events/conditions was compared to the incidence of illness for those subjects who had not. A number of the former group was found to have developed significantly more disease while one of the latter had. The direction of the assocations, however, was unclear due to the lack of knowledge of the prior health status of the subjects in the various groups. This question was addressed using the Atherosclerotic Prior Health Status Scale.

Part C: Atherosclerotic Prior

Health Status Scale

The subjects in each of the risk categories were examined to determine their health status prior to the start of the study, using the ATHPHS as described on page 35. These ATHPHS employed the prior prevalence data of the various medical diagnostic evaluations as ascertained from the initial interview. This data is presented in Table IV. As was seen with the incidence data for the same conditions,

TABLE IV

PREVALENCE OF ATHEROSCLEROTIC CONDITIONS AT INITIAL INTERVIEW

	Probable	Possible	Present
Angina	4.1%	7.5%	
Myocardial Infarction		14.9%	
Stroke	1.7%	8.1%	
Peripheral Atherosclerosis			6.2%
Atherosclerotic Disease		30.9%	

the sample had a high proportion of subjects with some form of
prior atherosclerotic disease (30.9 percent). The number of
people with evidence of prior MI was nearly 15 percent while for
Stroke it was nearly 10 percent. Angina and Peripheral Atherosclerosis
showed a prior prevalence of nearly 12 percent and about 6 percent
respectively.

The analysis using the ATHPHS in the various risk categories
was implemented by use of a median test   (49, p. 124).
For each category of the risk factors it was determined how many
subjects had values less than or equal to the median, that is,
better health and how many had values greater than the median, that
is, worse health. Since the median for every variable was 0.00,
the number of subjects above the median also represented the prior
prevalence of Atherosclerotic Disease outcome.

For the acute risk variables (Table V) it was found that
there were no significant or borderline differences in the
atherosclerotic prior health status of the subjects who had ex-
perienced any of the events under consideration and those who had
not.

For the indeterminate variables, it was found that subjects who
were having trouble with their eyesight scored significantly higher
on the ATHPHS (p = .02). No other significant associations were found.

In the chronic condition categories, no significant differences
were found for the socially isolated group. In the financial group,
those subjects with no savings scored significantly higher on the
ATHPHS (p = .018). In addition those subjects who said they were

TABLE V

COMPARISON OF THE ATHEROSCLEROTIC PRIOR HEALTH STATUS
OF THE SUBJECTS IN EACH POSTULATED RISK CATEGORY

Relocation

		Reloc.	Non Rel.	
ATHPHS	GT MED	32.7	27.4	$x^2_c = .363$
	LE MED	67.3	72.6	ns
		110	73	

Time At Present Address

		LT 1yr	GT 1yr	
ATHPHS	GT MED	11.1	31.6	$x^2_c = .865$
	LE MED	88.9	68.4	ns
		9	174	

Recent D.S.W.

		LT 2yrs	MARR	
ATHPHS	GT MED	20.0	34.0	$x^2_c = .018$
	LE MED	80.0	66.0	ns
		5	47	

Retirement

		LT 2yr	WRKG	
ATHPHS	GT MED	16.7	12.5	$x^2_c = .583$
	LE MED	83.3	87.5	ns
		12	16	

Cut Back On Expenses

		YES	NO	
ATHPHS	GT MED	32.6	33.3	$x^2_c = .009$
	LE MED	67.4	66.7	ns
		46	117	

Sell Possessions

		YES	NO	
ATHPHS	GT MED	12.5	33.3	$x^2_c = .709$
	LE MED	87.5	66.7	ns
		8	159	

Eyesight Problems

		YES	NO	
ATHPHS	GT MED	43.8	25.2	$x^2_c = 5.47$
	LE MED	56.3	74.8	$p = .02$
		64	107	

Hearing Problems

		YES	NO	
	GT MED	34.8	31.5	$x^2_c = .052$
ATHPHS	LE MED	65.2	68.5	ns
		46	124	

Confidante

		NO	YES	
ATHPHS	GT MED	33.3	30.3	$x^2_c = .000$
	LE MED	66.7	69.7	ns
		21	122	

Family Income

		NO	YES	
	GT MED	29.1	44.0	$x^2_c = 1.559$
ATHPHS	LE MED	70.9	56.0	ns
		141	25	

Number Close Friends

		LE1	GT1	
ATHPHS	GT MED	25.0	32.1	$x^2_c = .435$
	LE MED	75.0	62.9	ns
		40	134	

Individual Monthly Income

		LTMED	GEMED	
	GT MED	32.9	28.7	$x^2_c = .129$
ATHPHS	LE MED	67.1	71.3	ns
		82	87	

TABLE V CONTINUED

Friend Contact

		NONE	SOME	
ATHPHS	GT MED	54.5	30.9	$x_c^2 = 1.627$ ns
	LE MED	45.5	69.1	
		11	136	

Savings

		NO	YES	
ATHPHS	GT MED	40.0	21.4	$x_c^2 = 5.668$
	LE MED	60.0	78.6	p = .018
		100	70	

Number Close Friends In Neighborhd.

		LE1	GT1	
ATHPHS	GT MED	28.0	33.8	$x_c^2 = .414$ ns
	LE MED	72.0	66.2	
		107	68	

Monthly Financial Status

		DEBT	MANAGE	
ATHPHS	GT MED	36.4	31.6	$x_c^2 = .101$ ns
	LE MED	63.6	68.4	
		33	133	

Neighbors Know Well Enough to Call On

		NONE	SOME	
ATHPHS	GT MED	23.9	35.5	$x_c^2 = 2.015$ ns
	LE MED	76.1	64.5	
		71	93	

Own or Rent

		RENT	OWN	
ATHPHS	GT MED	35.1	26.7	$x_c^2 = .132$ ns
	LE MED	64.9	73.3	
		134	15	

Neighbor Contact

		NONE	SOME	
ATHPHS	GT MED	32.1	32.5	$x_c^2 = .036$ ns
	LE MED	67.9	67.5	
		28	117	

How Difficult on Income

		DIFF	MANAGE	
ATHPHS	GT MED	42.6	28.4	$x_c^2 = 2.424$
	LE MED	57.4	71.6	p = .120
		47	116	

Parents Alive to 16

		NO	YES	
ATHPHS	GT MED	35.9	29.1	$x_c^2 = .589$ ns
	LE MED	64.1	70.9	
		64	110	

Home Conditions

		BAD	GOOD	
ATHPHS	GT MED	38.6	24.4	$x_c^2 = 3.344$
	LE MED	61.4	75.6	p = .068
		88	82	

Rural Childhood

		YES	NO	
ATHPHS	GT MED	40.5	27.9	$x_c^2 = 1.859$ ns
	LE MED	59.5	72.1	

having difficulty living on their income tended to score higher
on the ATHPHS. Although this finding was neither significant
nor borderline (p = .128), there was a suggestion that it represented
a trend in that direction.

Of the personal background and physical surrounding variables,
it was found that those subjects with bad home conditions scored
borderline higher on the ATHPHS.

The striking finding in the above data was that the absence
of savings was a significant indicator of both the increased prior
prevalence and increased incidence of total Atherosclerotic Disease.
In addition, those subjects with bad home conditions tended to have
worse prior health and had a significant increase in their incidence
of Peripheral Atherosclerosis. A similar condition could be said
to exist for those subjects who found it difficult to live on their
income. They tended to have worse prior health status and developed
significantly more MI's. An unresolved question was whether the
finding of an increased incidence of a specific atherosclerotic
condition was related to the increased prior prevalence of total
Atherosclerotic Disease.

Part D: A Comparison of the Medical

            Diagnostic Evaluations for Subjects In

        Each Postulated Risk Category With No Prior

            Evidence of Atherosclerotic Disease

It was decided to address this question in a systematic manner
by first selecting those people with no prior evidence of atherosclerotic

disease, as determined by the ATHPHS, and then determining their health outcomes for each risk category.

It was found that the incidence for the entire sample of the various atherosclerotic conditions under consideration for those subjects with no prior evidence of disease differed minimally for the incidence for the entire study (Table VI and Table II). Socio-demographic data for this group revealed no significant differences for any of the parameters investigated from that of the group which completed four interviews.

The health outcomes for the subjects in each risk category with no prior evidence of disease is presented in Table VII.

In the acute/indeterminate category, Relocatees still developed increased incidences of both Angina and Stroke with approximately the same level of significance. This eliminated the possibility that the association with Stroke had been an artifact of increased prior prevalence. The recently bereaved, divorced or separated continued to show increased rates of both Angina and total Atherosclerotic Disease, although the former association was now only borderline. Subjects at postulated high risk in the following variable categories continued to show no evidence of increased risk of disease: Time at Present Residence, Retirement, Cut Back on Expenses, Hearing and Eyesight Problems. Those who had to sell their possessions were still found to develop significantly more Angina.

In the chronic condition section subjects considered at high risk because of lack of social interaction as measured by the Confidante, Friend Contact and Number of Neighbors Knows Well Enough to Call On variables continued to show no increased propensity to develop

TABLE VI

INCIDENCE OF ATHEROSCLEROTIC CONDITIONS FOR THOSE
SUBJECTS WITH NO PRIOR EVIDENCE
OF ATHEROSCLEROTIC DISEASE

Angina	13.2%
Myocardial Infarction	5.2%
Stroke	9.7%
Peripheral Atherosclerosis	11.9%
Atherosclerotic Disease	32.2%

TABLE   VII

A SUMMARY OF THE COMPARISON OF THE MEDICAL DIAGNOSTIC
EVALUATIONS FOR THOSE SUBJECTS IN EACH POSTULATED RISK
CATEGORY WITH NO EVIDENCE OF PRIOR ATHEROSCLEROTIC DISEASE

Relocation

Reloc	72	57.6%
N Reloc	53	42.4%

Angina		Reloc	N Reloc			Stroke		Reloc	N Reloc	
	YES	17.7	7.7	ET = .095			YES	14.5	3.8	ET = .052
	NO	82.3	92.3				NO	85.5	96.2	
		62	52					62	52	

Time at Present Residence

LT 1 yr	8	6.4%
GT 1 yr	117	93.6%

No significant or borderline associations.

Recent DSW

LT 2 yr	4	11.8%
MARR	30	88.2%

Angina		LT2yr	MARR			ATH DIS		LT2yr	MARR	
	YES	50.0	7.1	ET = .067			YES	100.0	27.3	ET = .015
	NO	50.0	92.9				NO	0.0	72.7	
		4	28					4	22	

Retirement

LT 2 yr	10	41.7%
WRKG	14	58.3%

No significant or borderline associations.

Cut Back on Expenses

YES	31	28.4%
NO	78	71.6%

No significant or borderline associations.

Sell Any Possessions

YES	7	6.2%
NO	106	93.8%

Angina		YES	NO	
	YES	50.0	10.9	ET = .029
	NO	50.0	89.1	
		6	101	

Eye Problems

YES	36	31.0%
NO	80	69.0%

No significant or borderline associations.

Hearing Problems

YES	30	26.1%	No significant or borderline associations.
NO	85	73.9%	

TABLE VII CONTINUED

Confidante

None	14	14.1%
Has Confid.	85	85.9%

No significant or borderline associations.

Number of Close Friends

LE1	29	24.4%
GT1	90	75.6%

Angina		LE1	GT1			MI		LE1	GT1	
	YES	25.0	8.2	ET = .037			YES	16.0	2.3	ET = .023
	NO	75.0	91.8				NO	84.0	97.7	
		24	85					25	86	

Friend Contact

NONE	4	4.1%
SOME	95	95.9%

No significant or borderline associations.

Number Close Friends in Neighborhood

LE1	75	62.5%
GT1	45	37.5%

Stroke		LE1	GT1			MI		LE1	GT1	
	YES	13.4	2.3	ET = .045			YES	8.7	0.0	ET = .051
	NO	86.6	97.7				NO	91.3	100.0	
		67	43					69	43	

Number Neighbors Knows Well Enough To Call On

LE1	54	47.4%
GT1	60	52.6%

No significant or borderline associations.

Neighbor Contact

NONE	19	19.4%
SOME	79	80.6%

Angina		NONE	SOME	
	YES	26.3	6.6	ET = .026
	NO	73.7	93.4	

TABLE VII CONTINUED

Family Income

NO	99	87.6%
YES	14	12.4%

No significant or borderline associations.

Individual Monthly Income

LT MED	58	50.0%
GE MED	58	50.0%

No significant or borderline associations.

Savings

NO	60	52.2%
YES	55	47.8%

Stroke		NO	YES			ATH		NO	YES	
	YES	17.2	2.0	ET = .008		DIS	YES	40.8	21.1	ET = .042
	NO	82.8	98.0				NO	59.2	78.9	
		58	51							

Monthly Financial Status

DEBT	21	18.8%
MANAGE	91	81.3%

No significant or borderline associations.

Own or Rent

RENT	87	88.8%
OWN	11	11.2%

No significant or borderline associations.

How Difficult on Income

DIFF	27	24.6%
MANAGE	83	75.5%

MI		DIFF	MANAGE	
	YES	13.0	1.3	ET = .036
	NO	87.0	98.7	
		23	78	

TABLE VII CONTINUED

Parents Alive To 16

| | NO | 41 | 34.5% |
| | YES | 78 | 65.5% |

		NO	YES					NO	YES	
Angina	YES	21.1	9.3	ET = .078	ATH DIS	YES	44.8	26.7	ET = .072
	NO	78.9	90.7			NO	55.2	73.3	
							29	60	

Rural Childhood

| | YES | 25 | 20.2% |
| | NO | 99 | 79.8% |

		YES	NO	
MI	YES	13.6	3.2	ET = .084
	NO	86.4	96.8	
		22	93	

Home Conditions

| | BAD | 54 | 46.5% |
| | GOOD | 62 | 53.5% |

		BAD	GOOD	
PERIPH. ATHER.	YES	20.0	3.6	ET = .011
	NO	80.0	96.4	
		45	55	

illness. Those subjects with no close friends in the neighborhood showed a significantly increased risk of developing both Stroke and MI, while previously neither association had been found. Those subjects with no close friends in general were found to be at significantly higher risk for developing both Angina and MI, while previously those associations had only been suggestive. In the former analysis it had been found that subjects with no close friends were at significantly higher risk to develop Stroke. This association was not found. Those people with no neighbor contact continued to develop significantly more Angina.

For the financial variables it was found that the association between those subjects with an individual income above the median and increased peripheral atherosclerosis which had appeared to be opposite to the direction predicted by the hypothesis was abolished. No difference in health outcome was found for those subjects. In addition, those subjects who received income from their families did not differ in health outcome from those who did not. The previous increased incidence of Angina was not found. Subjects who were going into debt at the end of each month and who rented their homes showed no increased risk of disease. People without savings were still at significantly higher risk to develop both Stroke and total Atherosclerotic Disease while those who found it difficult to live on their income continued to show evidence of a significant increase in the incidence of Myocardial Infarction.

In the personal background and physical surrounding groups, it was found that subjects whose parents died before 16 were at borderline higher risk to develop Atherosclerotic Disease in general and Angina in particular . The prior significant increase in the number of MI's

was not found. Subjects with rural childhoods who previously had appeared to show no effects, now demonstrated a borderline increase in the risk of developing an MI. Those with bad home conditions still developed significantly more Peripheral Atherosclerosis.

By controlling for evidence of prior atherosclerotic disease, few changes were noted in the number or types of increased risks which had previously been demonstrated. Those conditions which tended to be indicators of increased prior atherosclerotic disease (lack of savings, difficulty living on one's income, bad home conditions) were found to continue to predict for groups at high risk for development of disease when subjects who evidenced prior disease were eliminated from the analyses.

Indeed, in the sample with no evidence of prior disease, groups which developed any particular condition were not highly correlated with groups who developed any other condition. That is, any particular subject usually developed only one condition over the course of the study (Table VIII).

In summary, for the acute/indeterminate, no different associations were found or established ones lost. In the social interaction group, the observation that the presence or absence of friends vs. neighborhood contacts was important was strengthened by the significant associations between lack of close friends in neighborhood and Stroke and MI which had not previously been present, while subjects who lacked neighbors they knew well enough to call on and who had no contact with their neighbors did not change. In the financial group the one observation that was not in accord with the postulated direction of the stress/disease interaction was abolished. In the Personal

COMPARISON OF THE INTERACTION OF EACH ATHEROSCLEROTIC CONDITION WITH EVERY OTHER ATHEROSCLEROTIC CONDITION

FOR THOSE SUBJECTS WITH NO PRIOR EVIDENCE OF DISEASE

MI

Angina		YES	NO	
	YES	25.0 7.1 (1)	12.7 92.9 (13)	14 ET=.438
	NO	75.0 3.3 (3)	87.3 96.7 (89)	92
		4	102	

Stroke

Angina		YES	NO	
	YES	0.0 0.0 (0)	14.1 100.0 (14)	14 ET=.207
	NO	100.0 11.5 (11)	85.9 88.5 (89)	96
		11	99	

Periph. Athero.

Angina		YES	NO	
	YES	25.0 27.3 (3)	9.2 72.7 (8)	11 ET=.129
	NO	75.0 10.2 (9)	90.8 89.8 (79)	88
		12	87	

Stroke

MI		YES	NO	
	YES	0.0 0.0 (0)	4.4 100.0 (4)	4 ET .5
	NO°	100.0 9.9 (10)	95.6 90.1 (91)	101
		10	95	

Periph. Athero.

MI		YES	NO	
	YES	8.3 33.3 (1)	2.5 66.7 (2)	3 ET=.343
	NO	92.7 12.2 (11)	97.5 87.8 (79)	90
		12	81	

Periph. Athero.

Stroke		YES	NO	
	YES	9.1 9.1 (1)	11.4 90.9 (10)	11 ET .5
	NO	90.9 11.4 (10)	88.6 88.6 (78)	88
		11	88	

Background/Physical Surroundings groups, essentially no changes were found.

SECTION II: EXAMINATION OF THE ENTIRE SAMPLE
                BY RELOCATION/NON-RELOCATION

Part A: Socio-Demographic Data

When the socio-demographic data for the entire study was broken down by Relocation/Non-Relocation, one significant difference was found (Table IX). The difference between the groups was that of income. The Relocatees were receiving significantly less income per person than the Non-Relocatees (p <.01). This can most probably be explained by the definition of the Relocatees. The major reasons for Relocation included being on Old Age Assistance and financial difficulties. In addition, there were set levels of income which could not be exceeded if people were to be moved into public housing. The latter fact may also have affected the reporting of income. Although strict confidentiality was assurred, some of the Relocatees may have underestimated their income.

Thus, in general, those who were relocated were not significantly different on any major socio-demographic characteristic except monthly income from those who were not. In analyses which compared the two groups, this difference was taken into consideration.

When comparing the socio-demographic data for those Relocatees vs. Non-Relocatees with no prior evidence of atherosclerotic disease (Table X) the above difference in income was again appreciated. In addition, however, Relocatees had a higher chance of being born outside the United States. This was the first time any sub group

TABLE IX

COMPARISON OF SOCIO DEMOGRAPHIC CHARACTERISTICS
OF RELOCATEES AND NON RELOCATEES

	Relocation		Non Relocation		Significance
Sex					
Male	37	33.6%	25	34.5%	$x^2_c = .005$
Female	73	66.4%	48	65.75%	ns
Race					
White	81	73.6%	51	69.9%	$x^2_c = .151$
Non White	29	26.4%	22	30.1%	ns
Age					
N	110		73		t = 0.931
Range	60-86		60-92		ns
Mean	72.25		71.329		
Median	72.00		70.00		
S.D.	5.74		7.026		
Marital Status					
Married	26	23.6%	21	28.8%	$x^2 = 2.069$
Widowed	55	50.0%	30	41.1%	df = 3
Divorced or Separated	19	17.3%	12	16.4%	ns
Never Married	10	9.1%	10	13.7%	
Place of Birth					
Connecticut	30	30.0%	23	34.3%	$x^2 = 2.66$
USA (other)	41	41.0%	32	47.8%	df = 2
Foreign	29	29.0%	12	17.9%	ns
Father's Birthplace					
USA	37	55.2%	35	64.8%	$x^2_c = 0.778$
Foreign	30	44.8%	19	35.2%	ns
Mother's Birthplace					
USA	41	57.8%	34	63.0%	$x^2_c = 0.164$
Foreign	30	42.2%	20	37.0%	ns

	Relocation		Non Relocation		Significance
Children					
Not Married	6	8.3%	9	17.0%	$x^2 = 3.25$
Yes	50	69.4%	37	69.8%	df = 2
No	16	22.2%	7	13.2%	ns
Religion					
Protestant	27	40.9%	19	37.3%	$x^2 = .648$
Catholic	37	56.1%	29	56.9%	df = 2
Other	2	3.0%	3	5.9%	ns
Education					
None	2		0		$x^2 = 4.21$
6 Years or Less	40		25		df = 3
7-12 Years	24		21		ns
More Than 12 Years	4		7		
Individual Monthly Income					
N	67		49		t = 3.07
Range	93.00-320.00		78.00-998.00		df = 50
Mean	168.28		237.34		p < .01
Median	158.00		191.00		
S.D.	53.83		157.44		
Worked at Least 5 Years?					
Yes	63	90.0%	47	88.7%	$x^2_c = 0.003$
No	7	10.0%	6	11.3%	ns
Own or Rent Home?					
Rent	53	89.8%	34	87.2%	$x^2_c = 0.006$
Own	6	10.2%	5	12.8%	ns

TABLE X

COMPARISON OF SOCIO DEMOGRAPHIC CHARACTERISTICS FOR RELOCATEES
VS NON RELOCATEES WITH NO PRIOR EVIDENCE OF ATHEROSCLEROTIC DISEASE

	Relocatees		Non-Relocatees		Significance
Sex					
Male	24	33.3%	19	35.8%	$x_c^2 = 0.010$
Female	48	66.7%	34	64.2%	ns
Race					
White	59	81.9%	39	73.6%	$x_c^2 = 0.814$
Non White	13	18.1%	14	26.4%	ns
Age					
N	72		53		t = 1.33
Range	61-86		60-87		ns
Mean	72.21		71.11		
Median	72.00		70.00		
S.D.	5.49		7.19		
Marital Status					
Married	17	23.6%	13	24.5%	$x^2 = 3.78$
Widowed	37	51.4%	25	47.2%	df = 3
Divorced or Separated	13	18.1%	6	11.3%	ns
Never Married	5	6.9%	9	17.0%	
Place of Birth					
Connecticut	18	28.1%	20	41.7%	$x^2 = 7.97$
Other USA	23	35.9%	22	45.8%	df = 2
Foreign	23	35.9%	6	12.5%	p < .02
Father's Birthplace					
USA	23	54.8%	29	69.0%	$x_c^2 = 1.26$
Foreign	19	45.2%	13	31.0%	ns
Mother's Birthplace					
USA	26	57.8%	27	64.3%	$x_c^2 = 0.161$
Foreign	19	42.2%	15	35.7%	ns

	Relocation		Non Relocation		Significance
Children					
Not Married	11	10.5%	10	13.7%	$x^2 = 2.39$
Yes	72	68.6%	54	74.0%	df = 2
No	22	21.0%	9	12.3%	ns
Religion					
Protestant	46	45.1%	28	38.4%	$x^2 = 3.53$
Catholic	52	51.0%	37	50.7%	df = 2
Other	4	3.9%	8	11.9%	ns
Education					
None	2	1.9%	0	0.00%	$x^2 = 3.83$
6 Years or Less	65	60.7%	42	57.5%	df = 3
7-12 Years	35	32.7%	23	31.5%	ns
MORE Than 12 Years	5	4.7%	8	11.0%	
Individual Monthly Income					
N	102		67		t = 3.095
Range	93.50-379.00		75.00-998		p < .01
Mean	169.20		227.20		
Median	161.00		191.00		
S.D.	54.62		146.9		
Worked at Least 5 Years?					
Yes	100	92.6%	66	91.7%	$x_c^2 = 0.003$
No	8	7.4%	6	8.3%	ns
Own or Rent Home?					
Own	9	9.7%	6	10.7%	$x_c^2 = .006$
Rent	84	90.3%	50	89.3%	ns

in the present study was so differentiated and was most
probably due to chance distribution in a sample which had
been continually reduced in size from the original.

Part B: A Comparison of the Medical Diagnostic
             Evaluations for Those Subjects with No Prior
             Evidence of Atherosclerotic Disease in Each
             Postulated Chronic Risk Category

This set of analyses compared the health outcomes of the
subjects exposed to the chronic life situations and those who were
not after the sample had been divided into Relocatees and Non-
Relocatees. In order to control for prior atherosclerotic disease,
only those subjects with no prior evidence of illness were used
in the analyses. The results are presented in Table XI.

In the social interaction group, for the Relocatees, subjects
who had previously shown no higher risk of developing illness
(those in the Confidante, Friend Contact, Number of Neighbors
Knows Well Enough to Call On and Family Income high risk categories)
continued to show no increased evidence of disease. Those subjects
with no close friends continued to be at higher risk to develop
both MI and Angina, but somewhat less so. Those with no close
friends in the neighborhood again developed more Stroke but not
more MI's. Those individuals with no neighbor contact still were
at significantly higher risk to develop Angina.

For the Non-Relocatees, those subjects with no contact with
their friends, who knew no neighbors they could call on and who

TABLE XI

A SUMMARY OF THE COMPARISON OF THE MEDICAL DIAGNOSTIC EVALUATIONS FOR THOSE SUBJECTS
IN EACH POSTULATED RISK CATEGORY WITH NO
EVIDENCE OF PRIOR ATHEROSCLEROTIC DISEASE FOR RELOCATEES AND NON RELOCATEES

RELOCATION   NON RELOCATION

Confidante

No significant or borderline
associations

		NO	YES	
MI	YES	40.0	0.0	ET = .012
	NO	60.0	100.0	
		5	37	

Number Close Friends

		LE1	GT1	
Angina	YES	31.3	9.8	ET = .060
	NO	68.8	90.2	
		16	41	

		LE1	GT1	
Periph Ath.	YES	50.0	10.3	ET = .040
	NO	50.0	89.7	
		6	39	

		LE1	GT1	
MI	YES	17.6	2.2	ET = .060
	NO	82.4	97.8	
		17	45	

		LE1	GT1	
Stroke	YES	22.2	0.0	ET =.028
	NO	77.8	100.0	
		9	43	

RELOCATION   NON RELOCATION

Friend Contact

No significant or borderline associations.

Number Close Friends In Neighborhood

		LE1	GT1	
Stroke	YES	20.0	4.3	ET = .093
	NO	80.0	95.7	
		35	23	

No significant or borderline
associations.

Neighbor Contact

		NONE	SOME	
Angina	YES	50.0	7.3	ET = .010
	NO	50.0	92.7	

No significant or borderline
associations.

Individual Monthly Income

No significant or borderline associations.

Savings

		NO	YES	
Stroke	YES	22.9	4.5	ET = .066
	NO	77.1	95.5	
		35	22	

No significant or borderline
associations.

TABLE XI CONTINUED

Savings (continued)

		NO	YES
Ath	YES	45.2	20.0
Dis	NO	54.8	80.0
		31	15

ET = .090

Monthly Financial Status

No significant or borderline associations.

Own or Rent

No significant or borderline associations.

How Difficult on Income

		DIFF	MANAGE
MI	YES	18.2	0.0
	NO	81.8	100.0
		11	44

ET = .038

No Significant or borderline
associations.

Parents Alive to 16

		NO	YES
Angina	YES	33.3	11.4
	NO	66.7	88.6
		18	44

ET = .050

		YES	NO
MI	YES	0.0	10.5
	NO	100.0	89.5
		43	19

ET = .091

Parents Alive to 16 (continued)

	NO	YES
Ath.	60.0	26.5
Dis.	40.0	73.5
	15	34

ET = .029

Rural Childhood

No significant or borderline associations.

Home Conditions

		BAD	GOOD
Periph.	YES	13.3	0.0
Ath.	NO	86.7	100.0
		30	25

ET = .081

		BAD	GOOD
Periph.	YES	33.3	6.7
ATH.	NO	66.7	97.3
		15	30

ET = .033

	BAD	GOOD
Ath.	50.0	14.8
Dis.	50.0	85.2
	14	27

ET = .023

received no income from their families did not show increased

risk of disease, as had been the case previously. Those with

no confidante were found to be at significantly increased risk

to develop MI. This association had not been seen previously.

Alternatively, those people with no close friends, friends in

the neighborhood and with no contact with their neighbors showed

no increased risk of illness, which had not been the case when

the entire sample was considered. Those subjects with no close

friends developed significantly more Peripheral Atherosclerosis

and Stroke, while for the Relocatees with no friends, the

associations had been with MI and Angina, as they had been when

the entire sample was considered.

In the financial group, for the Relocatees, subjects with

low incomes, who were going into debt each month and renters

continued to have no increased risk of illness. Subjects who

lacked savings again showed evidence of increased incidence of

both Stroke and total Atherosclerotic Disease, but less so. Those

who found it difficult to live on their income were again found to

be at higher risk for MI.

For the Non-Relocatees, subjects with financial hardships

as measured by any of the criteria in the study, showed no increased

risk of disease.

Finally, in the personal background and physical surroundings

group, for the Relocatees, subjects with rural childhoods showed no

increased risk of disease w hile previously they had shown a borderline

association with increased MI. Subjects whose parents had died before

16 showed an increased risk of developing Angina and total

Atherosclerotic Disease. Those with bad home conditions were

again found to be at higher risk to develop Peripheral Atherosclerosis.

The latter three associations were stronger than those seen

when the entire sample was examined.

For the Non-Relocatees, subjects with rural childhoods

demonstrated no increased risk of disease. Individuals whose

parents had died before 16 tended to develop more MI's, an

association not seen previously, while those with bad home

conditions were again found to be at significantly increased

risk for Peripheral Atherosclerosis and also for total Atherosclerotic

Disease, an association which had not previously been seen.

The nature of the differences between the data for the

Relocatees and Non-Relocatees and thus an estimation of the

effects of relocation on those subjects exposed to the chronic

conditions, will be statistically approached in the last part of

this section.

The general conclusions from the data within each relocation

group will be discussed after Part C.

Part C: Atherosclerotic Prior Health

Status of the Subjects

Exposed to the Chronic Life Situations

The next analysis of the study involved examining the prior

health status, using the ATHPHS, of the subjects who experienced

the chronic life situations. (Table XIII)

TABLE   XII

<u>COMPARISON OF THE PREVALENCE OF ATHEROSCLEROTIC CONDITIONS</u>
<u>AT THE INITIAL INTERVIEW FOR RELOCATEES AND NON RELOCATEES</u>

	<u>Relocatees</u>	<u>Non Relocatees</u>	
Angina	11.0%	12.3%	
Myocardial Infarction	14.6%	15.5%	
Stroke	15.0%	2.7%	$x^2_c = 5.84$
Peripheral Atherosclerosis	6.4%	6.0%	$p < .02$
Atherosclerotic Disease	33.3%	27.4%	

TABLE XIII

ATHEROSCLEROTIC PRIOR HEALTH STATUS OF SUBJECTS IN EACH CHRONIC CONDITION CATEGORY BY RELOCATION AND NON RELOCATION

RELOCATION   NON RELOCATION

Confidante

ATHPHS		NONE	HAS CONF			ATHPHS		NONE	HAS CONF	
	GT MED	35.7	33.8	ET > .5			GT MED	35.7	33.8	ET > .5
	LE MED	64.3	66.2				LE MED	64.3	66.2	
		14	68					7	54	

Number Close Friends

ATHPHS		LE1	GT1			ATHPHS		LE1	GT1	
	GT MED	12.5	39.7	ET = .011			GT MED	43.8	21.4	ET = .075
	LE MED	87.5	60.3				LE MED	56.2	78.6	
		24	78					16	56	

Friend Contact

ATHPHS		NONE	SOME			ATHPHS		NONE	SOME	
	GT MED	62.5	34.7	ET = .124			GT MED	33.3	26.2	ET > .5
	LE MED	37.5	65.3				LE MED	66.7	73.8	
		8	75					3	61	

RELOCATION   NON RELOCATION

Number Close Friends In Neighborhood

ATHPHS		LE1	GT1			ATHPHS		LE1	GT1	
	GT MED	30.2	37.5	ET = 0.228			GT MED	25.0	28.6	ET = .472
	LE MED	69.8	62.5				LE MED	75.0	71.4	
		63	40					44	28	

Number Neighbors Knows Well Enough to Call On

ATHPHS		LE1	GT1			ATHPHS		LE1	GT1	
	GT MED	27.9	37.3	ET = .230			GT MED	17.9	33.3	ET = .124
	LE MED	72.1	62.7				LE MED	82.1	66.7	
		43	51					28	42	

Neighbor Contact

ATHPHS		NONE	SOME			ATHPHS		NONE	SOME	
	GT MED	46.7	33.3	ET = .248			GT MED	15.4	31.4	ET = .217
	LE MED	53.3	66.7				LE MED	84.6	68.6	
		15	66					13	51	

TABLE XIII CONTINUED

RELOCATION   NON RELOCATION

Family Income

		NO	YES
ATHPHS	GT MED	32.5	35.7
	LE MED	67.5	64.3
		83	14

ET > .5

		NO	YES
ATHPHS	GT MED	24.1	54.5
	LE MED	75.9	45.5
		58	11

ET = .051

Individual Monthly Income

		LT MED	GE MED
ATHPHS	GT MED	31.6	35.6
	LE MED	68.4	64.4
		57	45

ET = .416

		LT MED	GE MED
ATHPHS	GT MED	36.0	21.4
	LE MED	64.0	78.6
		25	42

ET = .155

Savings

		NO	YES
ATHPHS	GT MED	42.2	24.2
	LE MED	57.8	75.8
		64	33

ET = .063

		NO	YES
ATHPHS	GT MED	36.1	18.9
	LE MED	63.9	81.1
		36	37

ET = .083

RELOCATION   NON RELOCATION

Monthly Financial Status

		DEBT	MANAGE
ATHPHS	GT MED	40.0	34.2
	LE MED	60.0	65.8
		20	76

ET = .408

		DEBT	MANAGE
ATHPHS	GT MED	30.8	28.1
	LE MED	69.2	71.9
		13	57

ET = .5

Own or Rent

		RENT	OWN
ATHPHS	GT MED	36.9	33.3
	LE MED	63.1	66.7
		84	9

ET = .5

		RENT	OWN
ATHPHS	GT MED	32.0	16.7
	LE MED	68.0	83.3
		50	6

ET = .402

How Difficult on Income

		DIFF	MANAGE
ATHPHS	GT MED	51.9	28.8
	LE MED	48.1	71.2
		27	66

ET = .032

		DIFF	MANAGE
ATHPHS	GT MED	30.0	28.0
	LE MED	70.0	72.0
		20	50

ET = .5

TABLE   XIII CONTINUED

RELOCATION   NON RELOCATION

Parents Alive to 16

		NO	YES	
ATHPHS	GT MED	44.4	28.8	ET = .086
	LE MED	55.6	71.2	
		36	66	

		NO	YES	
ATHPHS	GT MED	25.0	29.5	ET = .445
	LE MED	25.0	70.5	
		28	44	

Rural Childhood

		YES	NO	
ATHPHS	GT MED	37.9	30.9	ET = .318
	LE MED	62.1	69.1	
		29	81	

		YES	NO	
ATHPHS	GT MED	46.2	23.7	ET = .101
	LE MED	53.8	76.3	
		13	59	

Home Conditions

		BAD	GOOD	
ATHPHS	GT MED	41.0	26.3	ET = .102
	LE MED	59.0	73.7	

		BAD	GOOD	
ATHPHS	GT MED	33.3	22.7	ET = .240
	LE MED	66.7	77.3	

It was found for the Relocatees that subjects with no
close friends had a significantly decreased prevalence of prior
atherosclerotic disease. No explanation can be offered for this
apparent reversal of prediction, especially in view of the data
that the Non-Relocatees had a borderline increased prevalence of
prior disease. Again for the Relocatees, those who found it
subjectively difficult to live on their monthly·incomes had a
significantly increased prior prevalence of disease. Those with
no savings, whose parents were not alive to age 16 and who had
bad home conditions all had borderline increases in the prevalence
of prior atherosclerotic disease.

For the Non-Relocatees, those receiving income from their
families showed an increased prevalence of prior atherosclerotic
conditions. This apparent reversal of prediction can most easily
be explained by assuming that those who were sick needed support
from their families to live more than those who were not. Thus,
those who were receiving family income would show a worse prior
health status. Borderline associations were demonstrated between
subjects with no friends, no savings and rural childhoods and worse
prior atherosclerotic disease.

In summary, the above analyses by Relocation/Non-Relocation,
as had been the case with the entire sample, imply that subjects
with no savings, with bad ho me conditions and those who found it
subjectively difficult to live on their incomes tended to demonstrate
both worse prior health and to be at increased risk to develop new
disease. In addition, the present analysis suggest that subjects
whose parents died before 16 should be added to that list. Subjects

with no close friends were not easily categorized. Relocatees
had better prior health while Non-Relocatees had worse prior
health and both groups showed increased incidence of new disease
over the course of the study.

Part D: Comparison of the Relocation
                and Non-Relocation Data

The nature of the differences between the Relocation and
Non-Relocation analyses and thus an estimation of the effects of
relocation on subjects exposed to the chronic situations, was
examined. Because the Relocatees differed from the Non-Relocatees
in monthly income and it was felt that one's level of income would
affect the subjective evaluation of the relocation experience,
this variable was controlled for by first breaking the entire
sample into those whose income fell above the median income for
the group and those whose income fell below. Although the group
also differed with respect to place of birth, when the sample was
broken down into United States and foreign born, the latter category
was too small to make analysis possible. Thus, t his difference
was not systematically investigated. Three-way contingency tables
were constructed which investigated the health status of the
subjects exposed to the chronic conditions and Relocation for the
high income group and the low income group. In most cases no
interactions were found. Significant interactions are presented
in Table XIV. If an interaction existed for subjects experiencing
both the chronic conditions and Relocation in which neither the
combination of the two postulated high risk groups nor the combination

of the two postulated low risk groups showed the greatest incidence of disease, the tables were considered uninterpretable using the hypothesis under investigation in the present study. Such tables were not presented. Often the N in such tables was very low.

For the low income group Relocatees with no close friends and with no close friends in their neighborhoods each showed an increased risk of developing Angina which could not be fully explained by the added risk of being moved (p < .01 and p < .05 respectively). In the high income group, Relocatees with no close friends in their neighborhoods exhibited the same type of increased risk for Stroke (p < .01). In addition, Relocatees with no savings, whose parents died before 16 and with no neighbor contact all showed borderline increased risks of developing conditions which could not be explained by the simple addition of the individual risks.

In summary there was no general indication of interaction or synergy for subjects exposed to the chronic life situations and Relocation. For several of the groups, however, this was not the case.

TABLE XIV

SUMMARY OF THE SIGNIFICANT AND BORDERLINE INTERACTIONS BETWEEN
RELOCATEES AND NON RELOCATEES FOR THE ASSOCIATIONS BETWEEN THE
CHRONIC CONDITION VARIABLES AND MEDICAL DIAGNOSTIC
EVALUATIONS FOR THOSE SUBJECTS
WITH NO PRIOR EVIDENCE OF ATHEROSCLEROTIC DISEASE

Percentages in cells refer to the number of subjects in both categories
under consideration who developed the specific outcome.

Low Income Group

		Reloc	N Reloc	Outcome Considered
Number Close Friends	LE1	36.4 4/11	0.0 0/3	Angina
	GT1	0.0 0/21	7.7 1/13	$t = 2.71$, $p < .01$
Number Close Friends In Neighborhd.	LE1	21.1 4/19	0.0 0/8	Angina
	GT1	0.0 0/13	12.5 1/7	$t = 2.24$, $p < .05$

		Reloc	N Reloc	
Savings	NO	35.7 5/14	0.0 0/9	Stroke
	YES	9.1 1/11	0.0 0/23	$t = 1.72$, $.10 > p > .05$
Savings	NO	57.1 8/14	14.3 1/7	Atherosclerotic Disease
	YES	20.0 2/10	23.8 5/21	$t = 1.91$, $.10 > p > .05$
Parents Alive To 16	NO	44.4 4/9	0.0 0/10	Stroke
	YES	12.5 2/16	0.0 0/22	$t = 1.73$, $.10 > p > .05$
Parents Alive To 16	NO	30.0 3/10	10.0 1/10	Peripheral Atherosclerosis
	YES	0.0 0/16	15.0 3/20	$t = 1.83$, $.10 > p > .05$

High Income Group

		Reloc	N Reloc	Outcome Considered
Close Friends In Neighborhd.	LE1	33.3 5/15	0.0 0/20	Stroke
	GT1	0.0 0/8	0.0 0/12	$t = 2.74$, $p < .01$
Neighbor Contact	NONE	50.0 2/4	0.0 0/7	Angina
	SOME	6.3 1/16	9.1 2/20	$t = 1.99$, $.10 > p > .05$

CHAPTER 4

DISCUSSION OF RESULTS

As documented in the Results section (Table I) those who completed all four interviews were not significantly different from the entire sample with regard to age, sex, race, marital status, place of birth, religion, education, presence of children, income, working history or ownership status. Thus, the socio-demographic make-up of the sample was not altered by the selection of those who had completed all four interviews.

In addition it was found that the group which completed four interviews and who had no evidence of prior atherosclerotic disease also did not differ in any of the above mentioned characteristics from the group which only completed the four interviews, i.e., the initial group examined in the present study.

The first hypothesis of the study under consideration was that subjects who experienced a series of psycho-social-economic conditions would develop an increased incidence of atherosclerotic disease over the two-year course of the study. Table VII in general supports this hypothesis for a number of the events/conditions investigated.

Relocation was the event which the study was designed to examine and which occurred at its beginning. Thus, immediate as well as long term effects should have been evident. The findings of significantly more Strokes and borderline more Angina among the Relocatees suggested the presence of stress related effects. Table VIII shows that the subjects who developed strokes were not highly correlated with those who developed Angina. Thus, the above results were probably not two aspects of the same association. Indeed, for the entire study group with no prior evidence of disease, no two of the conditions under investigation were highly correlated with each other.

The other acute event which was highly associated with outcome was recent conjugal bereavement, divorce or separation. Although the N for this analysis was only 5 and thus all conclusions drawn were tentative, it appeared significant that four of the subjects had no prior evidence of disease and all of them developed some form of Atherosclerotic Disease over the course of the study. Both of the findings, that effects of bereavement were apparent more than two years after the event and that an elderly population showed very strong effects, are at odds with the evidence previously cited in the Introduction. This would make the small sample size particularly important when interpreting these results. On the other hand, none of the studies referred to dealt with a group which was similar to the elderly urban poor of the present study.

While Relocation appeared to be a significant stress, subjects who had spent a short time at their residence at the time of the initial interview did not develop significantly more disease. Several reasons can be given for this: (1) The total N in the population was 9 (4.9 percent), compared to 72 for the Relocatees, making results of statistical analyses tenuous. (2) The subjects at postulated high risk may have moved up to one year prior to the start of the study and thus any immediate effects would have been missed.

The recently retired group also showed no significant associations with outcome. Similar factors to those cited above were probably at work. The total N under investigation was only 28 with 12 (43 percent) retired and 16 (57 percent) working. This may have an artifact of the interviewing structure. A large number of questions were asked relating to work status. This may have led to inaccuracies in assessing

the actual number of people working and retired. In addition, the population was, in general, an elderly, retired one. A third factor was again related to the time at which the event occurred. The high risk group could have retired up to two years prior to the start of the study and thus immediate or short term effects would have been missed.

In the indeterminate group, only subjects who had to sell their possessions were at increased risk for disease. Again, there were only 8 subjects at postulated high risk. However, when compared to the Cut Back on Expenses variable, which had 46 subjects in the high risk group and no significant associations, there was some suggestion of a stress effect. Those subjects who had to sell their possessions and were presumably in a worse financial situation developed more disease than those who only had to cut back on their expenses.

For the medically related variables, subjects with hearing and eyesight difficulties showed no increased risk of disease. This was somewhat of a surprise, especially in the latter category. Eyesight Problems were found to be an indicator of prior disease in the subjects who experienced them (Table V). They are also a well known manifestation of atherosclerotic disease. Because of these facts, it was assumed that they would be a predictor of increased risk of disease. They were not, even in the analysis which did not control for prior disease. The lack of association may have been due to the non-specific nature of the question which included any eye problems, thus diluting out atherosclerotic effects.

In conclusion, for the acute events and indeterminate conditions, there seemed to be some evidence for associations between some of the

postulated high risk groups and disease outcome. It appeared that those conditions which traditionally or logically would be considered more stressful were related to increased incidence of disease. For subjects experiencing several of the categories no significant associations were found, although numbers of subjects and timing of events make some of the analyses suspect. Angina appeared to be the condition most commonly related to subjects experiencing the acute events, although the associations in general were not as strong as with the other outcomes.

For the chronic condition variables, there also appeared to be evidence to support the idea of increased incidence of disease for those subjects considered at risk. In the social interaction group, several interesting comparisons could be made. When subjects with no confidantes were compared to subjects with no close friends, the former group showed no significant difference in health outcome while the latter group was shown to be at significantly higher risk for the development of Angina and MI. This discrepancy can most probably be attributed to the exact wording of the questions. A confidante was said to relate to someone in whom the subject had complete trust and confidence. This was most often probably taken to mean a spouse and so lack of confidante probably referred to prior bereavement rather than a condition of social isolation, which would be better examined by the presence or absence of close friends. Thus, the effects of lack of a social confidante may have been diluted by prior bereavement, the effects of which were no longer evident.

It was also interesting to explore the possible dichotomy between the total social sphere with which the subject interacted and the

more limited neighborhood social group. Absence of close friends
was highly correlated with the increased incidence of two independent
atherosclerotic conditions, while the absence of neighbors knows
well enough to call on was not highly associated with any. This
suggested that lack of presence of acquaintances in the restricted
group was not as important as lack of friends in one's total social
sphere. That is, the Neighbors Knows Well Enough to Call On variable
did not measure the same nature of social interaction as the Number of
Close Friends variable.

Subjects with no close friends in the neighborhood could be seen
as a subset or the intersection of the two above variables. They developed
significantly more Stroke and MI. This tended to support the idea that
it was the nature of the friend relationship or the lack thereof rather
than the nature of the acquaintance relationship which had predictive
value when considering the incidence of atherosclerotic disease.

In the two social contact variables, the Friend Contact one had only
four subjects in the postulated high risk category, making any analyses
unreliable. Lack of Neighbor Contact, however, was found to be
significantly correlated with Angina. This suggested that, while the
presence or absence of acquaintances was unrelated to disease outcome,
actual evidence of social interaction with one's acquaintances may be
related to illness outcome.

For those variables which deal directly with the financial situation,
some evidence supported the first hypothesis of the study. Subjects with
no savings and who found it difficult to live on their incomes were both
at higher risk for disease. An interesting finding was that subjects with
incomes below the median for the sample did not develop increased disease

while those with no savings did. This may have been due to the differing chronicity of the conditions that the two variables measured. Lack of savings implied that either over a large portion of the subject's life he had been unable to put money away or that one or more catastrophic events had consumed his savings. Lack of savings could be thought of as a more long term state of financial hardship. Individual Monthly Income referred to the amount of income the subject was receiving at the time of the initial interview. While his income may have been low, this may have referred to a recent circumstance. In addition, Relocatees may have underestimated their income because of the financial restrictions to be relocated, thus diluting out possible effects.

The idea of the importance of chronic exposure to financial difficulty in predicting disease outcome was also supported by the finding that the prior atherosclerotic health status of those with no savings was worse than those with savings but that no difference was found for those subjects who differed by income.

There is, however, another interpretation to the savings/income data. The total incidence of Atherosclerotic Disease for the study was an enormous 32 percent over the two year period (Table VI). Previous evidence, cited in the Introduction, showed that urban dwellers living on very low incomes had a significantly increased mortality secondary to ASHD when compared to the general urban population. Although no comparisons were made in the present study to other populations and morbidity rather than mortality was assessed, the nearly one-third figure would seem in accord with that data. Perhaps the lack of difference seen for the lower vs. upper values of the income group was because such a difference would be too small to be significant when compared

to the overall large incidence of atherosclerotic disease. The idea

of Savings as a measure of chronicity, however, would still be valid.

Renters did not show evidence of increased incidence of atherosclerotic

disease, but had a small N (12) in the high risk category which made

analyses suspect.

It would appear that the Monthly Financial Status and How

Difficult on Income variables would be comparable ones in which an

objective vs. a subjective evaluation of financial situation was made.

However, because of the wording of the questions this was not the

case. The postulated high risk group of the former variable included

those who were going into debt and those who were using their savings.

The postulated high risk group in the latter variable were finding it

impossible or very difficult to exist on their income. These were

probably not equivalent categories. While acknowledging this situation,

this is some suggestion that it is the subjective assessment of difficulty

coping that is related to illness as opposed to the more "objective"

In the personal background category subjects at high risk in both

of the variables showed borderline increased risk of disease. This

was not, in general, the case when subjects exposed to other chronic

conditions showed changes in their health outcome. This situation

suggested that the associations observed may not be due to stress

related effects. On the other hand, both of the variables deal with

conditions which occurred when the subject was very young compared

to a median age of 70 for the study population. The fact that any

effect was evident up to 45 years after the event may be significant.

The question of exposure for the two high risk groups to different

classically medical etiologic agents and enduring personality

characteristics should be especially raised for these two variables, as in general they should for all of the variables investigated previously. However, these aspects were not investigated in the present study.

Further evidence to support the idea that the associations seen in the personal background category were due to chance was the result of the analysis which employed the ATHPHS. No difference was found between the high risk group and the low risk group with respect to prior health. This question will be further examined later in the chapter.

Subjects with bad home conditions developed significantly more Peripheral Atherosclerosis. Again the question of exposure of this group to different etiological agents should be raised.

Evidence has been presented which suggested that for some of the chronic condition variables there appeared to be an increased incidence of atherosclerotic conditions among those subjects postulated at high risk. As with the acute event variables, subjects exposed to those conditions that logically appeared more severe, such as lack of involvement in the total social sphere, and/or more chronic, e.g., lack of savings, developed more disease. Unlike the acute and indeterminate categories, however, the majority of the associations and the vast majority of the significant associations for the subjects who experienced the chronic situations were with the "more serious" conditions: Stroke and MI rather than Angina and Peripheral Athero-sclerosis. This may suggest a dichotomy between short term effects leading to less severe illness and long term effects progressing to more severe disease in an atherosclerotic disease continuum.

The second hypothesis of the study predicted that when the sample was divided into groups of subjects who experienced acute events and groups who experienced chronic conditions, the former would demonstrate no increased prior atherosclerotic disease while the latter would.

It was found that the subjects who experienced the acute events showed no increased prior disease. Of the subjects in the indeterminate category, only those with eyesight problems had evidence of significant prior illness. This association was expected because of the nature of the eyes as a sensitive barometer of atherosclerotic disease. Subjects with hearing problems did not evidence increased prior disease and hearing is not considered to be a sensitive indicator of atherosclerotic disease. Again, except for the Relocation variable, consideration of sample size should be kept in mind when viewing the results.

For the socially isolated groups no increased incidence of prior disease was found, even for those subjects who were found to be at significantly increased risk of developing disease during the course of the study.

For subjects who were having financial difficulties, it was found that those who lacked savings had a significantly increased prevalence of prior atherosclerotic disease and that subjects who felt that they were having difficulty living on their incomes showed some trend to increased prior disease ($p = .128$). In addition, subjects in these two categories were the only ones of the financially burdened groups who were shown to be at increased risk of disease over the course of the study. For these two variables there may exist some evidence to

suggest that long term factors may be associated with both an increased prior prevalence and incidence of atherosclerotic disease.

In the personal background/physical surroundings categories only the presence of bad home conditions was borderline associated with an increase in prior disease. This suggested that it, too, may be related to both increased incidence and prior prevalence of disease. There was no indication that subjects who experienced the other situations in this group had any increased prior disease.

For the socially isolated groups and the subjects at risk in the personal background categories who showed increased risk of disease during the study but not increased prior disease, several factors should be considered. Perhaps the ATHPHS was not a sufficiently sensitive measure of disease to pick up differences in the prior health status of the two groups. That is, perhaps the effects being investigated were of small magnitude, as evidenced by the borderline nature of several of the associations, and that only by eliminating all evidence of prior disease did the effects become evident. Except for the associations between those whose parents died before 16 and Atherosclerotic Disease, all of the associations in question were with specific conditions, while the ATHPHS dealt with all the conditions thus diluting out possible effects.

Some evidence has been presented that several of the chronic conditions, especially for subjects in bad financial situations, were related to both increased prior prevalence as well as increased incidence of atherosclerotic conditions. For the acute events no evidence was found for increased prior prevalence of disease for those subjects at postulated high risk.

Some additional light was thrown on the above questions when the entire sample was broken down by the Relocation groups. In Table XIV it can be seen that the variables which, in the above analyses, had been identified as indicators of increased prior prevalence of disease (Savings, How Difficult on Income, Home Conditions) continued to show this tendency for one or both of the Relocation groups. In addition, Table XI showed that the same variables predicted for increased incidence of disease during the course of the study and in the same Relocation group for which they had predicted increased prior prevalence, with one exception: Home Conditions was found to predict for increased incidence of disease in both groups.

Further investigation of the Home Conditions variable yielded some interesting results. When the sample was broken down by Relocation/Non-Relocation it was found that Relocatees with bad home conditions had borderline worse prior health status at the start of the study than those with good home conditions (Table XIII; p = .102), while t his was not the case for Non-Relocatees with bad home conditions. In the follow up period (Table XI) for those with no prior disease, the Relocatees with bad home conditions showed only a borderline increase in Peripheral Atherosclerosis (p = .081), while Non-Relocatees with bad home conditions showed significant increases in the incidence of Peripheral Atherosclerosis (p = .033) and total Atherosclerotic Disease (p = .023). Thus, the event of relocation by possibly improving the living conditions of those who moved and thus decreasing the stress of living under poor conditions decreased the morbidity which had previously been shown to be present for this group.

When considering the entire sample, there had been a series
of conditions which had predicted for increased incidence but
not increased prior prevalence of disease. Of these it was found
(Table XIV) that Relocatees whose parents were not alive to 16
and Non-Relocatees with rural childhoods, both evidenced increased
prior atherosclerotic disease. The former also showed significantly
increased incidence of Angina and Atherosclerotic Disease for the
Relocatees while the latter showed no significant or borderline
associations for the Non-Relocatees.

For subjects with no close friends contradictory results were
obtained. Non-Relocatees with no close friends showed borderline
increased prior disease and significant increase in the incidence of
Stroke and Peripheral Atherosclerosis. Relocatees with no friends,
however, showed significantly less incidence of prior disease while
a borderline increase in the incidence of Angina and MI. No ex-
planation can be offered for this apparent contradiction.

It was also found that Non-Relocatees with no family income had
less evidence of prior disease than those who received support from
their families. This was most easily explained by assuming that those
people who were sicker depended more on their families for support than
people who were not sick. When prior disease was controlled for, no
significant or borderline differences in the incidence of disease for
the two groups were found.

Thus, Parents Alive to 16 may possibly be added to the list of
predictors of both increased prior prevalence and increased incidence
of atherosclerotic disease. Number of Close Friends presented an
enigma and could not be considered in this same group.

The third hypothesis of the Risk Factor Study stated that subjects who were both relocated and exposed to a chronic risk factor would develop more disease than would be predicted on the basis of simple addition of the individual risks involved.

The sample was divided into low income groups and high income groups to control for the possible effects of income on the relocation experience.

In the low income group, in general, there was not sufficient evidence to reject the null hypothesis. Two of the socially isolated groups, however, did evidence more than additive risks. The outcome in both cases was Angina.

In the high income group evidence was also generally lacking to reject the null hypothesis. There was only one situation in which there was strong evidence of interaction, while there were several instances of borderline interactions. Relocatees with no close friends in the neighborhood developed more Strokes than could be accounted for by additive risks. This was the same group who had shown an interaction with Angina in the low income group.

It was ascertained (data incorporated into Table XIV) that subjects who were exposed to the chronic conditions and who did not move showed no increased risk for development or disease; subjects who were exposed to the chronic conditions and who moved, demonstrated border-line increased risks, except for two groups which were found to show significant increased risks. The chronic situations were therefore considered predisposing conditions because they did not lead to increased disease when they acted alone. Relocation was considered a pre-cipitating event because it brought on disease in subjects who would

have remained disease free otherwise.

In summary, no general evidence was presented to support the third hypothesis. However, subjects exposed to two of the life situations showed significant added risk for the development of illness which could not be explained by the added risk of Relocation alone, while subjects exposed to several other situations shared trends in that direction. These situations were considered pre-disposing conditions and Relocation was considered a precipitating event. Angina and Stroke were the health outcomes for which these phenomena were demonstrated most clearly.

When the Risk Factor Study was viewed methodologically, several issues were raised. No attempt was made to ascertain the independence of the risk variables from each other. That is, there was no attempt to correlate the risk factors themselves. Because many of the chronic independent variables approached different aspects of the same life situation, e.g., social isolation, correlations were bound to be high among some of them. It is felt that a measure of such correlations should be made before any further work is undertaken with the present data.

The conditions/events under investigation in the present study were viewed solely as factors which could identify populations at risk for disease. No etiological or causal relationships were implied. The use of correlative measures would be useful in this area as well. Variables which were significantly associated with disease and highly correlated with each other could be identified. Factors which were common to these variables could then be identified and thus, the question of causality could be approached.

Another methodological question raised by the study was the question of whether significant relationships between the independent variables and outcome were found only because of the large number of analyses undertaken. That is, were the null hypotheses rejected when in fact no real differences existed? Two points in particular seem pertinent. Firstly, the present study was designed as a screening study in which a large number of psycho-social-economic factors were considered. For many of the variables, the null hypothesis could not be rejected. It was only for those variables which clearly demonstrated significant associations that the null hypotheses were rejected. Secondly, although a large number of significant and borderline associations were found, all, except one went in the direction postulated by the various hypotheses or were easily explainable. These hypotheses were formulated prior to any data analysis.

If the associations were due only to chance, a larger number of significant or borderline associations should have been found which contradicted the hypotheses. Since this was not the case, it can probably be said that for those null hypotheses which were rejected, there was sufficient evidence to do so.

Lastly, the question of adequacy of controls for the postulated risk factors must be raised. In general, the only independent variable for which known adequate matched controls were included in the study was Relocation. For this variable, good socio-demographic evidence was presented and controlled for, when feasible, when differences arose. For the other variables under investigation this was not the case. It should

be repeated that the present study was only a large screening study
which was meant to indicate what direction future research should take.

The one place, however, where adequate control was achieved
was with respect to the prior health status of each group. Each
category for every variable was compared and analyses were carried out
which used only those subjects with no prior evidence of disease. This
presumably abolished the influence that prior health had on the
outcomes.

A related issue was the sample size in several of the categories.
Because the entire sample was broken up several ways, and the small nature
of some of the categories initially, at times the N for any particular
cell of a contingency table became very small. This was generally noted
when the results were discussed. In addition, Fishers Exact Test was
used to determine statistical significance. This test is considered
more accurate than other determinations of statistical significance when
dealing with small sample sizes.

Conclusions:

A relatively homogeneous group of elderly urban poor were investigated
for possible associations between specific psycho-social-economic
risk factors and morbidity due to atherosclerotic disease. This was done
by means of structured interviews which elicited data on possible risk
factors in a reproducible way and used specific clinical assessments
in the determination of atherosclerotic disease. The risk factors were
made at varying times over the next two years. A weighted scale was
used to determine overall health status of the subjects at the start of
the study.

The results show that a number of the risk factors contained subjects who showed significant increases in the incidence of one or more atherosclerotic conditions when prior health status was controlled for if either the entire sample was considered as when it was first divided in Relocatees and Non-Relocatees.

The subjects who experienced the acute events showed no evidence of increased prior disease while subjects exposed to the chronic situations did. Every group, except one, which showed increased prior disease also showed increases in the incidence of disease over the course of the study. In addition, several of the groups which showed no increase in prior disease, showed increases over the course of the study.

Lastly, subjects in several of the chronic condition variables who were also relocated showed an incidence of disease which could not be accounted for by the simple addition of the two risks involved. These situations were considered predisposing conditions and Relocation was considered a precipitating event.

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APPENDIX A

PROCEDURE FOR OBTAINING CONTROLS

Group-Matching

1. Go the the first house to the right of the house from which we obtained our case. (To the right as you face the house).

2. If there is no elderly person there, proceed to the right. (Every house or apartment must be accounted for--this may mean several trips to the same address until you have verified who are the occupants of each dwelling unit).

3. If there is no house to the right--e.g., there is a vacant lot, a commercial establishment, etc.--proceed to the first house that is on the right. If there is an apartment above a commercial establishment be sure and try there.

4. If the first house on the right is a multi-dwelling unit, start on the bottom floor and work your way up to find an elderly control. However, if any apartment along the way is not accounted for you must return some other time.

5. If you come to the end of the block without locating a control, go to the first house to the left of the case's house and then proceed to the left.

6. If the case's house is on the corner, and there are no houses to the right, go to the left.

7. If the first elderly person you locate is married, get the names of both members of the couple.

8. Make use of information from neighbors who are willing to provide you with information on a number of houses or apartments.

9. Locate controls who are 60 years of age or older.

10. Locate several elderly people for each address of a case. (That way if someone refuses to participate in our study we will have someone else to contact. If more than one case comes from the same address, locate even more elderly).

11. For each elderly person that is located, try and get the following information:

    a. full name with correct spelling.
    b. Address
    c. telephone number (if possible)--or whether or not they have a phone.
    d. age.

APPENDIX B

Medical Questionnaire

Directions: Now I would like to ask some questions about your health in general.

1. When was the last time you talked with a doctor or a nurse about your health?

   During past three months ___
   3 - 12 months ago ___
   1 - 5 years ___
   5+ years ago ___
   Denies any contact ___

2. Has a doctor or a nurse ever said that you had:

   a. Heart Attack   No ___ Yes ___
   b. Heart trouble of any kind   No ___ Yes ___

   (1) Do you take any medicine or pills for your heart trouble?

   No ___ (Skip to 2.c)
   Yes ___

   (If "yes" ask:)

   (2) Do you know what the medication is or why you take it?

   No ___
   Yes ___ (If "yes" specify:)

   (3) Do you take a pill that you place under your tongue, that you swallow, or do you do both?

   Under tongue ___   Swallow ___   Both ___

   No ___ (If respondent says yes
   Yes ___ to one or more)

   c. Stroke? Blood clot in the brain? Brain Hemorrhage? Apoplexy?
   No ___ (skip to e)
   Yes ___

   d. Sugar in your water? Sugar in your blood? Diabetes?
   No ___
   Yes ___

   What did the doctor or nurse tell you to do about it?

   Nothing ___
   Diet only ___
   Medicine by mouth ___
   Insulin only ___
   Other ___   If "other" specify ___

   e. High Blood Pressure?

   No ___ Yes ___

   Do you take any medicine or pills for your high blood pressure?

   No ___ Yes ___

   f. Any other serious trouble with your health?

   No ___ Yes ___

   (If "yes" "What the trouble was, when it happened, and how it has progressed?)

   _____
   _____
   _____

   g. Do you take any other medicines or pills?

   Yes ___ No ___ (Skip to Q.3)

   If "yes":) Do you know what they are for?

   No ___ Yes ___ (If "yes" specify:

3. Do you ever feel pain, discomfort, or pressure in your chest?

   No ___ (If no, skip to question 4)
   Yes ___

   a. Where do you usually feel the ___ ? (Use S's word for it. Have S point out the area).

   Directly under the breastbone or on both sides of the chest ___
   On one side of the chest only ___
   OTHER ___ Specify ___

   b. About how long does the ___ usually last?

   Less than 30 seconds ___
   30 seconds to 30 minutes ___
   More than 30 minutes ___

   c. Does the ___ usually happen after eating or while you are lying down?

   No ___
   Yes ___ (If respondent says "yes" to either after eating or while lying down or "yes" to both.)

   d. Does the ___ usually happen when you exercise or walk in the cold windy weather?

   No ___
   Yes ___ (If respondent says "yes" to either when exercising or walking or "yes" to both)

c. Does belching or taking bicarbonate of soda usually help make the _____ go away?

No _____

Yes _____

f. Does resting usually make the _____ go away?

No _____

Yes _____

4. Do your legs hurt or cramp sometimes?

No _____ (If "no" skip to question 5)

Yes _____

a. Does this happen when you are walking or when you are resting?

Resting _____ (Skip to Q. 5)

Walking _____ (Ask Q. 4b)

Both resting and walking _____ (Skip to Q.5)

b. When you stop walking, does the pain go away in a couple of minutes or does it last longer?

Two minutes _____

Longer than 2 minutes _____

5. Do you ever have dizzy spells? (Do you ever have spells when you feel swimmy headed?)

No _____ (If "no" skip to question 6)

Yes _____

a. Do things seem to move round and round or do things stay steady?

Steady _____

Move _____

6. Do you ever blackout or faint? (Do you ever fall out or have the blind staggers?)

No _____

Yes _____ (If "no" skip to Q. 7)

Describe _____

7. Are both ankles sometimes swollen at bedtime?

No, (neither ankle or only one ankle) _____

Yes, (only if both ankles) _____

8. Can you go to sleep lying flat or do you have to be propped up to go to sleep?

Propped up _____ Flat _____

9. Do you ever wake up because you are short of breath?

No _____ Yes _____

10. Do you often get mixed-up because you forget things?

No _____ Yes _____

11. Are there times when you have trouble getting words to come out right?

No _____ (If "no" skip to Q. 12) Yes _____

a. Describe _____

12. Have you ever thought you were going to have a nervous breakdown or that you had emotional problems?

No _____ (If "no" skip to Q. 13) Yes _____

a. Did you go to see someone about it?

No _____ Yes _____

13. TO BE OBSERVED NOT ASKED: (Does S visibly have trouble moving any part of his body?)

No _____

Yes _____ amputation, fracture, deformity

Yes, other _____ Specify _____

a. Have you ever had trouble moving part of your body? (Have you ever lost the exercise of any part of your body?)

No _____ (If "no" skip to Q. 14) Yes _____

b. What part of your body was it?

Feet or legs _____

Fingers, hands or arms _____

Head or neck _____

Back _____

Other _____ (Specify)

c. (Describe the trouble) _____

d. What did the doctor say the trouble was?

No M.D. _____
Stroke _____
Arthritis _____
Other _____ Specify _____

e. Did it come on quickly (within hours) or slowly?

Quickly _____ Slowly _____

f. Has it gotten better, worse, or stayed about the same?

Better _____
Worse _____
About the same _____

g. Does it hurt to move your _____? (Or to have it moved?)

No _____ Yes _____

14. Do you have pains or bad feelings in your stomach?

No _____ Yes _____

If "yes: Describe _____

15. Is your appetite less now than it was about a year ago?

No _____ Yes _____

16. Have you had feelings of nausea and/or vomiting recently?

No _____
Yes - Nausea only _____
Yes - Nausea and vomiting _____

17. Have you had any trouble with your bowels recently?

No _____ (If "no" skip to Q. 18) Yes _____

a. What trouble?

Constipation _____
Frequent stools _____
Black stools _____
Bloody stool _____
Other _____ Specify _____

18. Have you had any trouble passing your water recently?

No _____ (If "no", skip to Q. 19) Yes _____

a. Have you had a "burning" feeling? No _____ Yes _____

b. Have you wanted to go all the time? No _____ Yes _____

c. Have you had "trouble starting the stream"? No _____ Yes _____

19. Have you had any trouble with your eyesight recently?

No _____ (If "no" skip to Q. 20) Yes _____

a. Describe _____

20. Have you had any trouble with your hearing recently?

No _____ (If "no" skip to Q. 21) Yes _____

a. Describe _____

21. Have you had any skin rash or skin trouble lately? No _____ Yes _____

22. Do you usually cough first thing in the morning in bad weather? (Exclude clearing throat or one cough)

No _____ (If "no" skip to Q.24) Yes _____

If yes, do you cough like this most days at least 3 months of the year?

No _____ Yes _____

23. Is the cough usually productive? (Do you bring up phlegm?)

No _____ (If "no" skip to Q.24) Yes _____

a. What color is the mucus? White, grey or blackish _____
Yellow or green _____
Other _____

Specify _____

b. How often is it this color -- always, usually or occasionally?

Always _____
Usually _____
Occasionally _____

24. During the past or present winter, have you been troubled by shortness of breath while walking?

No _____ (If "no" go to Q. 25)

Yes _____

a. (If "yes") Do you get short of breath while working or dressing?

No _____ Yes _____

25. During the past year did you ever stay at least one night in a hospital, nursing home, or sanitarium?

No _____ (If "no" skip to Q. 26)

Yes _____

a. What was the reason?

Stroke _____
Heart Attack _____
Accident _____
Tumor or growth _____
Operation _____
Other _____

b. Was there any other time in the past year that you stayed at least one night in a hospital, nursing home or sanitarium?

No _____ (If "no" skip to Q. 26)

Yes _____

c. What was the reason?

Stroke _____
Heart Attack _____
Accident _____
Tumor or growth _____
Operation _____
Other _____

26. During the past year, have you visited a clinic or a doctor's office?

No _____ (If "no" skip to Q. 27)

Yes _____

a. How many times?

Once _____
Twice _____
Three + _____
Times

---

27. During the past year, has a nurse or homemaker come to your home?

No _____ (If "no" skip to Q. 28)

Yes _____

a. How many times?

Once _____
Twice _____
Three + _____
Times

28. During the past year, about how many days did you have to stay in bed for all or most of the day because of your health?

Days _____ (for any number greater than 0 ask 27a.)

a. Why? _____

29. Have you had any other trouble with your health during the past year?

No _____ Yes _____

a. Not even something small that didn't really trouble you?

No _____ (If "no" go to Q. 30)

Yes _____

b. What was the trouble?

Upper respiratory infection, minor G-I discomfort or irregularity, minor injury _____

Other _____

Inquire _____

30. When you need a doctor, where do you usually go?

_____

_____

34. Would you say that your health compared to most people of your age is

    much better _____
    somewhat better _____
    about the same _____
    somewhat worse _____
    much worse _____

35. How is your health today, compared to when you were 50?

    Much better _____
    somewhat better _____
    about the same _____
    somewhat worse _____
    much worse _____

36. In the past few years, are there any activities you have had to reduce or give up because of your health?

    no _____
    yes _____

If yes, what are they? _____

_____

_____

---

30 a. About how far away is (his office/the clinic) ?

    _____ blocks/miles

b. How do you get there?

    _____ Walk
    _____ Car
    _____ Public Transportation

c. How long does it take for you to get there?

d. When was the last time you were there? _____

e. Is there anyplace else you have gone to see a doctor during the past few years?

_____

31. Have you ever smoked cigarettes regularly?

    No _____ (Skip the rest of the questions)

    Yes _____

a. About how many cigarettes do you usually smoke each day now?

    Less than 1/2 pack _____   go to 30 d
    1/2 - 1-1/2 packs _____
    2 + packs _____   Ask b,c,and d
    None _____

b. About how many cigarettes did you used to smoke each day before you stopped?

    Less than 1/2 pack _____
    1/2 - 1-1/2 packs _____
    2 + packs _____

c. When did you stop smoking cigarettes? _____

d. How old were you when you first started smoking cigarettes regularly? _____

32. Are you right-handed or left-handed?

    Right-handed _____
    Left-handed _____
    Ambidextrous _____

33. In general, would you say that your health today is

    excellent _____
    very good _____
    good _____
    fair _____
    poor _____

DIAGNOSTIC INFORMATION

1. Angina Pectoris:

		No ___
		Probable ___
		Possible ___

- Q. 3 "yes" ___
- Q. 3a. under breastbone or both sides of chest ___
- Q. 3b. 30 seconds - 30 minutes ___
- Q. 3c. "no" ___
- Q. 3d. "yes" ___
- Q. 3e. "no" ___
- Q. 3f. "yes" ___

If all above answers are present angina is probable.

If Q. 3a. one side of chest only
Q. 3b. 1st or 3rd answer (less than 30 seconds, more than 30 minutes) then angina is possible.

2. Myocardial Infarction

If Q.2a "yes" MI is possible.

3. Congestive Heart Failure

		No ___
		Probable ___
		Possible ___

- Q. 7 "yes" (both ankles swollen) ___
- Q. 8 1st answer (propped up) ___
- Q. 9 "yes" ___
- Q. 24 "yes" ___

If all above answers are present congestive heart failure is probable.

If all above answers are present except Q.8 and respondent gave 2nd answer (flat)-congestive heart failure is possible.

4. Hypertensive Heart Disease

Absent ___
Present ___

If blood pressure is 160/100 or greater and congestive heart failure is probable or possible, hypertensive heart disease is present.

5. Peripheral Atherosclerosis

Absent ___
Present ___

- Q. 4 "yes" ___
- Q. 4a. 2nd answer (walking) ___
- Q. 4b. 1st answer (2 minutes or less) ___

If all above answers are present peripheral atherosclerosis is present

---

1. "Look straight at me." Do both eyes look straight at you? ___ Yes ___ R no L no ___ NT*

2. Are nose-to-mouth lines equal and present on both sides? ___ Yes ___ Both absent ___ R/L L/R ___ NT*

3. "Smile as wide as you can." Do lips stretch back the same on both sides? ___ Yes ___ Both absent ___ R/L L/R ___ NT*

4. "Hold arms straight out for 1 minute. Close eyes." Are both arms held straight out in front? ___ Yes ___ Both no ___ R no L no ___ NT*

5. Does one arm drift more than the other? ___ No ___ R more L more ___ NT*

6. "Hold wrist and fingers stiff." Bend R wrist then L. Is one wrist weaker than the other? ___ No ___ R weaker L weaker ___ NT*

7. "Touch thumb to fingers one after the other 3 times, first with R hand, then L. Is one hand much slower than other? ___ No ___ R slower L slower ___ NT*

8. "Rest hands palm down. Close eyes. Where do you feel the touch?" Touch R knuckle, then L, then both at same time. Feels touch? ___ Both Yes ___ Both No ___ R no L no ___ NT*

9. "Stand with feet together for 1 minute. Don't hold on. Does S lose balance or refuse to do because he will lose balance? ___ No ___ Yes ___ NT*

10. "Walk 8 feet, turn & walk back." Less than 6 inches between feet? ___ Yes ___ No ___ NT*

b. Both feet lifted off floor? ___ Yes ___ Both drag ___ R L drag drag ___ NT*

c. Turns with several short steps? ___ No ___ Yes ___ NT*

d. Toes lifted on both feet? ___ Yes ___ Both droop ___ R L droop droop ___ NT*

e. Does one leg swing out? ___ No ___ R L ___ NT*

f. Do arms swing equally? ___ Yes ___ Both don't ___ R/L L/R ___ NT*

11. Ask subject about the day or date & where (he/she) is. Is subject confused? ___ No ___ Yes ___ NT*

12. Speech abnormal? ___ No ___ speech meaningless, ___ same word repeated several times, ___ words out of order, ___ words used inappropriately, ___ inappropriate answers to questions, ___ slurred speech, ___ other.

* Not Tested. Explain: ___

-2-

6. Arthritis

Q. 13a. "yes"   No
Q. 13b. 2nd answer (fingers,   Probable
        hands, or arms)   Possible
Q. 13d. 2nd answer (arthritis)

Interviewer observation of arthritis

If all above answers present arthritis is probable.

If Q. 13d. -- doctor didn't say arthritis but all other answers present arthritis is possible.

If all answers present, except interviewer observation arthritis is possible.

If interviewer observes arthritis, even if none of the above answers are present, arthritis is possible.

7. Traumatic Injury   Absent
                                                   Present

8. Stroke   No
Q. 13a. "yes" other   Possible
Q. 13c. only on one side   Probable
Q. 13d. stroke

If all above answers present stroke is possible.

From neurological check list:
Q. 2 nose-to-mouth lines not equal
Q. 3 lips do not stretch equally both sides
Q. 4&5 both arms not held straight out front and
       one arm drifts more than other
Q. 6 one wrist weaker
Q. 7 one hand slower
Q. 8 does not feel touch one side
Q. 10b. one foot drags
Q. 10d. one side droops
Q. 10c. one leg swings out
Q. 10f. one arm swings more

If all answers present on same side of body stroke probable.

Any neurological items present and no other info stroke possible.

Q. 2c. (Dr. or nurse said patient had stroke) but no other signs stroke possible.

-3-

9. TIA   No
                                                   Possible

If Q. 5 "yes" and/or Q. 6 "yes" TIA possible.

10. Diabetes   Absent
                                                   Present

Q. 2d. (Dr. or nurse said patient had diabetes) diabetes is present.

11. Chronic Bronchitis   No
                                                   Probable
Q. 22 "yes" first section of Q.   Possible
Q. 22 "yes" second section
Q. 23 "yes"
Q. 23a. Yellow or green
Q. 23b. always or usually
Q. 24 "yes"

If all above answers present chronic bronchitis is probable.

If Q. 23a. White, grey, blackish or other and all other answers present chronic bronchitis is possible.

Is respondent taking treatment for diabetes?

         Inappropriate (respondent does not have diabetes)
         No
         Yes

Is respondent taking treatment for high blood pressure?

         Inappropriate (respondent does not have high blood pressure)
         No
         Yes

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